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All India Coordinated Wheat and Barley Improvement Project

**PROGRESS REPORT
2014-15**

**Vol. IV
WHEAT QUALITY**

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(R.K. Gupta)
PI, Quality

Detail of samples in Advance Varietal Trials

Station	Zone	Condition	No. of Samples	
			<i>T. aestivum</i>	<i>T. durum</i>
Almora	NHZ	ITS, RTS, RES, RILS	68	--
Shimla	NHZ	ITS, RTS, RES, RILS	68	--
Malan	NHZ	ITS, RTS, RES, RILS	68	--
Ludhiana	NWPZ	ITS, ILS, RTS, RITS	74	20
Hisar	NWPZ	ITS, ILS, RTS, RITS	74	20
Delhi	NWPZ	ITS, ILS, RTS, RITS	74	20
Pantnagar	NWPZ	ITS, ILS, RITS	62	20
Durgapura	NWPZ	ITS, ILS	52	20
Kanpur	NEPZ	RTS	10	--
Pusa	NEPZ	RTS	10	--
Sabour	NEPZ	RTS	10	--
Vijapur	CZ	ITS, ILS	16	12
Junagarh	CZ	ITS, ILS	16	12
Powerkheda	CZ	ITS, ILS	16	12
Kota	CZ	ITS, ILS,	16	12
Indore	CZ	ITS, ILS	16	12
Pune	PZ	ITS, RITS	22	12
Dharwad	PZ	ITS, RTS, RITS	34	28
Niphad	PZ	ITS, RITS	22	12
Total			728	212

Detail of samples in National Initial Varietal Trials

Trial	Condition	Samples Size	Zone	Station	Total Samples
NIVT 1A	ITS	98	NWPZ	Ludhiana, Delhi, Hisar, Pantnagar, Durgapura	490
			NEPZ	Pusa, Sabour, Kanpur	294
NIVT 1B	ITS	98	NWPZ	Ludhiana, Delhi, Hisar, Pantnagar, Durgapura	490
			NEPZ	Kanpur, Pusa, Sabour	294
NIVT 2	ITS	72	CZ	Indore, Kota, Vijapur, Junagarh, Powarkheda	360
			PZ	Pune, Dharwad, Niphad, Ugar, Nippansi	360
NIVT 3A	ILS	72	NWPZ	Ludhiana, Hisar, Pantanagar, Delhi, Durgapura	360
			NEPZ	Samastipur, Sabour, Kanpur	216
NIVT 3B		72	CZ	Indore, Vijapur, Junagarh, Powarkheda	288
			PZ	Pune, Dharwad, Niphad	216
NIVT 4	ITS	72	CZ	Indore, Kota, Vijapur, Junagarh, Powarkheda	360
			PZ	Dharwad, Niphad, Pune, Ugar, Nippansi	360
NIVT 5A	RTS	72	NWPZ	Delhi, Kota, Annengiri	216
	RITS	72	NWPZ	Ludhiana, Delhi, Hisar	216
			NEPZ	Kanpur, Sabour, Pusa	216
			CZ	Kota, Indore	144
			PZ	Niphad, Dharwad, Pune, Bailhongal	288
NIVT 5B	RITS	50	CZ	Indore, Kota	100
	RTS	50	CZ	Dhanduka, P'Kheda, Kota	150
			PZ	Dharwad, Niphad, Annegiri	200
IVT	ITS	46	NHZ	Almora, Shimla, Malan	138
	RTS	46	NHZ	Almora, Shimla, Malan	138
	RTS	40	SHZ	Wellington	40
Total					5934

Detail of samples in Special Trials

<i>T.dicoccum</i>	ITS	14	PZ	Arabhavi, Dharwad, Pune, Ugar, Kalloli, Mudhol	84
			SHZ	Wellington	14
<i>Salinity/alkalinity</i>	ITS	22	NWPZ	Hisar, Karnal	44
			NHZ	Dhaulakuan, Bajaura	36
<i>Triticale</i>	ITS	18	NWPZ	Ludhiana, Delhi	36
<i>MABB</i>	ITS	10	NWPZ	Ludhiana, Delhi, Karnal, Dhaulakuan	40
			NEPZ	Kanpur, Pusa	20
		12	CZ	Indore, Powarkheda, Vijapur	36
		12	PZ	Pune, Dharwad, Niphad	36
<i>NIL</i>	ITS	16	NWPZ	Ludhiana, Pantnagar, Dhaulakuan	48
<i>Biofortification</i>	ITS	34	NWPZ	Ludhiana, Durgapura, Delhi, Karnal, Hisar	170
			NEPZ	Kanpur	34
			CZ	Indore, Vijapur	68
			PZ	Niphad, Pune	68
Total					734

Detail of Samples in Nurseries

QCSN	ITS	122	NHZ	Almora,	122
			NWPZ	Ludhiana, Durgapura, Delhi, Pantnagar, Karnal	610
			NEPZ	Kanpur	122
			CZ	Junagarh, Vijapur	244
			PZ	Pune, Dharwad	244
National Wheat Nurseries					
NGSN					138
EIGN-I					212
EIGN-II					152
Total					1844
Grand Total					9452

Detail of FCI Wheat Grain Samples

State (No. of Samples)	Total Samples
Punjab (3325), Haryana (1609) and Madhya Pradesh (2637)	7571

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SECTION A

ADVANCE VARIETAL TRAILS

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ADVANCED VARIETAL TRIALS (*Triticum aestivum*)

GRAIN CHARACTERSTICS

The *Triticum aestivum* entries were tested under Irrigated Timely Sown (ITS), Rainfed Timely Sown (RTS), Rainfed Early sown (RES) and Restricted Irrigation Late Sown (RILS) conditions of Northern Hill Zone (NHZ). In North Western Plains Zone (NWPZ), the entries were tested under ITS, Irrigated Late Sown (ILS), RTS and Restricted Irrigated Timely Sown (RITS) conditions. The trial was conducted only under RTS condition of North Eastern Plains Zone (NEPZ). In central Zone (CZ), the condition included were ITS and RTS. The entries were tested under ITS, RTS and RITS conditions of Peninsular Zone (PZ). There were no entries in Southern Hill Zone (SHZ).

(i) Grain Appearance Score (Table 1-5)

It is a subjective test and an important parameter in grain trade and for this grain size, shape, soundness, colour & lustre are collectively taken into consideration to judge the grain appearance out of total score of 10.0. Same set of entries was planted under ITS & RTS conditions of NHZ. The zonal means were 6.4 and 6.3 respectively. Two entries, HS 597 & HS 598 recorded the same values as that of the best check, HS 542 (6.8) and the zonal mean was 6.5 under RES condition. Five out of nine 1st year entries had an edge over the best check, VL 892 (6.6) under RILS condition and the zonal mean was 6.6. In NWPZ, all the 2nd and 1st year entries were found comparable to their respective best checks under ITS, ILS, RTS & RITS conditions and the zonal means were 6.1, 6.5, 6.2 & 5.9 respectively. The grain appearance score was found better at Durgapura centre. Under RTS condition of NEPZ and ITS & ILS conditions of CZ, all the entries including checks recorded >6.0 score and the zonal means were 6.4, 6.5 and 6.4 respectively. In PZ, the 2nd year entry, NIAW 2030 (8.4) was found distinctly better than the best check, NI 5439 (6.9) under RTS condition. The zonal means were 6.6, 7.1 and 6.6 under ITS, RTS and RITS conditions respectively.

(ii) Test Weight (Table 6-10)

This parameter merits consideration for millers as it is positively correlated with flour recovery. Bread wheat with 76.4 kg/hl and above test weight is classified in grade-I in U.S. system of grain trading. In Canadian system, the threshold value is 78.0 kg/hl. It is a very important parameter of wheat trading in the international market.

Under ITS and RTS conditions of NHZ where same set of entries were tested, none of entries could surpass their respective best checks and the zonal means were 79.2 kg/hl and 80.5 kg/hl respectively. Four entries under RES condition and six entries under RILS condition recorded > 80.0 kg/hl test weight and the zonal means were 80.5 kg/hl and 79.5 kg/hl respectively. In NWPZ, only one 1st year entry, K 1314 had >80 kg/hl test weight under ILS condition. Durgapura Centre (80.6 kg/hl) exhibited highest values followed by Delhi centre (80.4 kg/hl). The zonal means were 77.7 kg/hl, 78.6 kg/hl, 77.9 kg/hl and 76.7 kg/hl under ITS, ILS, RTS and RITS conditions respectively. Both the 1st year entries had an edge over the best check, C 306 (78.2 kg/hl) under RTS condition of NEPZ and the zonal mean was 77.8 kg/hl. In CZ, no entry could beat the respective best checks under ITS and ILS conditions and the zonal means were 79.6 kg/hl and 79.3 kg/hl respectively. The highest values of test weight were recorded at Indore Centre. All the entries under ITS & RTS conditions of PZ had higher values compared to their respective best checks. However, no entry could complete with the best check under RITS condition. The zonal means were 79.4 kg/hl, 82.2 kg/hl and 76.9 kg/hl respectively.

(iii) Grain Protein Content (Table 11-15)

It is an important parameter for making different products of bread wheat. The protein requirements are >12.0 %, 10.0-12.0 and <10.0 % for making good quality bread, chapatti and biscuit respectively. Under ITS & RTS conditions of NHZ, none of the entry could surpass their respective best checks and the zonal means were 9.8 % & 9.4 % respectively. The entries, VL 1007 under RES condition and HS 599 & VL 3008 under RILS condition recorded >11.0 % protein content and the zonal means were 9.9 % and 9.7 % respectively. The lowest values of protein content were exhibited by Shimla centre. In NWPZ, one entry, PBW 709 under ITS condition and three entries, PBW 719, DBW 148 & K 1314 under ILS condition recorded higher content compared to their respective best checks. The zonal means were 12.0 % and 12.4 % respectively. All the entries exhibited higher content compared to the best check under RTS condition but none under RITS condition and the zonal means were 12.4 % and 12.1 % respectively. Both the 1st year entries were found comparable to the best check, K 8027 (12.0 %) under RTS condition of NEPZ and the zonal mean was 12.0 %. Similar was the trend under ITS & ILS conditions of CZ and the zonal means were 11.6 % & 13.6 % respectively. The highest values were obtained in Junagarh centre. In PZ, the zonal means were 12.4 %, 10.6 % and 12.9 % under ITS, RTS and RITS conditions respectively. The highest values were observed at Dharwad centre.

(iv) Grain Hardness Index (Table 16-20)

Grain Hardness is an important parameter for making various wheat products, as hard wheat (>75 index) is required for making good bread & chapatti and soft wheat (<45 index) for good quality biscuit. The percentage of hard textured entries including checks recording >75 index was 50.5 % and only one entry, HS 490 was found soft textured exhibiting <45 index. Remaining entries in between were medium hard textured.

(v) Sedimentation Value (Table 21-25)

This quality parameter gives an idea of gluten strength. For making good quality bread, chapatti and biscuit, the required sedimentation values are >60 ml, 30 ml, 60 ml and <30 ml respectively. Same set of entries were tested under ITS and RTS conditions of NHZ where both the entries (one each of 2nd and 1st year) were found comparable to their respective best check (~50 ml). The zonal means were 44 ml and 42 ml respectively. Four out of eight 1st year entries recorded >50 ml sedimentation value under RES condition and recorded higher values compared to the best check, HS 542 (45 ml). Under RILS condition, five out of nine 1st year entries were found comparable to the best VL 892 (~45 ml) and the zonal mean was 41 ml. Two 1st year entries under ITS condition and five 1st year entries under ILS condition of NWPZ recorded >50 ml values and were found comparable to their respective best checks. The zonal means were 54 and 49 ml respectively. There was not much variation among the mean values of different Centre. The 1st year entry, HI 1605 (53 ml) under RTS condition and 2nd year entry, MP 1277 (54 ml) under RITS condition were found comparable to their respective best checks. The zonal mean were 46 ml and 48 ml respectively. Both the 1st year entries had >55 ml sedimentation values, which more distinctly higher compared to the best check, HD 2888 (45 ml) under RTS condition of NEPZ and the zonal mean was 48 ml. Under ITS and ILS conditions of CZ, no entry could best their respective best checks and the zonal means were 40 ml and 42 ml respectively. One 1st year entry, UAS 360 had an edge over the best check, MACS 6478 (46 ml) under ITS condition of PZ with the zonal mean of 42 ml. However, all the entries under RTS and RITS conditions recorded >50 ml values and were found comparable to their respective best checks. The zonal means was 53 ml under both the conditions.

(vi) Moisture Content (Table 26-30)

It is an important parameter from storage point of view and grain trading. It depends on the weather conditions at the time of harvesting and also at the time when the determination has been made. Higher moisture content adversely affects the keeping quality of wheat. Also, the protein content values mentioned previously are at 'as is' basis. Hence, moisture content merits consideration if protein is to be calculated on dry basis or any other given moisture content. The threshold value is 12.0%. All the entries in all the zones, centres and sowing conditions fulfilled this requirement except Sabour (RTS, NEPZ) and Dharwad (RITS, PZ)

(vii) High Molecular Weight Glutenin Subunits (HMWGS) of *T.aestivum* AVTs (Table 31-35)

One hundred one (101), 2nd and 1st year entries including checks were evaluated for HMWGS composition from various sowing conditions of different zones of the country. The number of units varied from 3 to 5 in each entry. The percent entries having 3, 4 and 5 subunits were 3.96 %, 43.56 % and 52.48 % respectively. Maximum entries had 5 subunits in all the zones except PZ. Subunits 5+10 were present in 62.38 % of the total entries whereas 2+12 in 37.62 % entries. More number of entries had 5+10 subunits in NHZ and NWPZ whereas in NEPZ, SHZ, CZ and PZ, 2+12 subunits were more prevalent. Subunits 1, 2* and N were present in 33.66 %, 55.45 % and 10.89 % of the total entries respectively. Subunit 2* was more prevalent in all the zones. The subunits 7, 7+8, 7+9, 17+18, 20 and 13+16 were present in 38.61 %, 12.87 %, 5.94 %, 38.61 %, 1.98 % and 1.98 % of the total entries respectively. Subunit 7 was more prevalent in NHZ and PZ. The percent entries having Glu-1 score 4, 5, 6, 7, 8, 9 and 10 were 3.96, 0.00, 8.91, 4.95, 54.46, 0.99 and 26.73 respectively. Maximum entries had Glu-1 score of 8 in all of the zones.

Table 1: Grain appearance of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	6.4	5.9	6.8	6.4
2. VL 804 (C)	03	6.2	6.0	6.1	6.1
3. VL 907 (C)	05	6.3	6.3	6.5	6.4
4. HS 507 (C)	06	6.9	6.6	6.7	6.7
5. HPW 349 (C)	04	6.7	6.1	6.5	6.4
6. HS 583	02	6.6	6.4	6.9	6.6
Mean		6.5	6.2	6.6	6.4
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	6.5	6.5	6.0	6.3
2. VL 804 (C)	03	6.2	6.4	6.0	6.2
3. VL 907 (C)	05	6.2	6.6	6.0	6.3
4. HS 507 (C)	06	6.5	6.7	6.4	6.5
5. HPW 349 (C)	04	6.4	6.4	6.2	6.3
6. HS 583	02	6.3	6.6	6.3	6.4
Mean		6.4	6.5	6.2	6.3
Rainfed, Early Sown					
1. VL 829 (C)	04	5.9	6.7	6.7	6.4
2. HPW 251 (C)	06	6.0	6.7	6.4	6.4
3. HS 542 (C)	01	6.8	6.9	6.6	6.8
4. HPW 413	02	6.0	7.0	6.4	6.5
5. HS 596	07	5.8	6.3	6.9	6.3
6. HS 597	05	6.2	7.3	6.8	6.8
7. HS 598	03	6.9	7.2	6.2	6.8
8. VL 1005	11	6.5	6.6	6.6	6.6
9. VL 1006	10	6.1	6.4	6.1	6.2
10. VL 1007	08	6.3	6.8	6.7	6.6
11. UP 2917	09	6.7	6.7	6.5	6.6
Mean		6.3	6.8	6.5	6.5
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	6.2	7.3	6.2	6.6
2. HS 490 (C)	02	6.6	6.4	6.0	6.3
3. HS 599	07	6.7	7.4	6.5	6.9
4. HS 600	05	6.6	7.4	6.4	6.8
5. HS 601	10	5.8	6.9	6.3	6.3
6. HPW 421	04	6.4	7.2	6.0	6.5
7. HPW 422	06	6.1	6.7	6.2	6.3
8. VL 3007	11	6.3	7.2	6.2	6.6
9. VL 3008	09	6.8	7.4	6.6	6.9
10. VL 3009	01	6.8	6.8	6.5	6.7
11. UP 2918	08	6.4	7.3	6.3	6.7
Mean		6.4	7.1	6.3	6.6

Table 2: Grain appearance of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	5.2	6.4	5.4	6.1	6.0	5.8
2. DPW 621-50 (C)	02	5.6	6.4	5.8	6.8	6.2	6.2
3. WH 1105 (C)	03	5.7	6.5	5.6	6.3	6.7	6.2
4. DBW 88 (C)	05	6.0	6.7	5.9	6.2	5.9	6.1
5. HD 3086 (C)	04	6.5	6.6	5.8	6.0	6.4	6.3
6. PBW 707	07	6.2	6.5	5.4	5.9	6.1	6.0
7. PBW 709	06	6.1	6.3	5.7	6.1	5.9	6.0
8. HD 3159	08	6.1	6.4	5.3	6.0	6.2	6.0
Mean		5.9	6.5	5.6	6.2	6.2	6.1
Irrigated, Late Sown							
1. WH 1021 (C)	09	6.2	6.5	6.4	6.3	6.4	6.4
2. HD 3059 (C)	11	6.5	7.2	7.1	6.4	6.1	6.7
3. DBW 90 (C)	15	6.3	6.6	7.4	6.3	6.4	6.6
4. WH 1124 (C)	10	6.8	7.0	6.0	6.4	6.2	6.5
5. WH 1179	13	6.1	6.7	6.7	6.1	6.0	6.3
6. PBW 716	03	6.3	7.0	6.1	5.9	5.9	6.2
7. PBW 718	18	6.7	6.9	7.2	6.5	6.0	6.7
8. PBW 719	06	6.3	7.1	6.7	6.0	5.9	6.4
9. HD 3165	12	6.9	6.9	7.2	6.2	6.2	6.7
10. HI 1604	01	6.5	7.0	6.2	6.0	5.8	6.3
11. DBW 147	17	6.3	7.1	6.7	6.3	6.2	6.5
12. DBW 148	02	6.6	7.4	6.3	6.5	5.3	6.4
13. DBW 150	07	6.4	7.6	6.9	6.2	6.0	6.6
14. HUW 688	04	6.2	7.4	6.0	5.8	5.7	6.2
15. UP 2883	08	6.0	7.1	6.1	6.0	6.3	6.3
16. K 1312	14	5.9	6.0	6.9	5.9	5.9	6.1
17. K 1313	16	6.7	6.9	7.2	6.5	6.0	6.7
18. K 1314	05	6.9	7.5	7.1	6.4	6.3	6.8
Mean		6.4	7.0	6.7	6.2	6.0	6.5
Rainfed, Timely Sown							
1. WH 1164	05	5.8	-	6.6	-	6.4	6.3
2. PBW 644 (C)	06	5.5	-	6.7	-	6.5	6.2
3. WH 1080 (C)	01	6.4	-	6.0	-	6.1	6.2
4. HD 3174	04	5.9	-	6.4	-	6.3	6.2
5. HI 1605	02	5.8	-	6.2	-	6.0	6.0
6. K 1317	03	6.2	-	6.4	-	6.4	6.3
Mean		5.9	-	6.4	-	6.3	6.2
Restricted Irrigation, Timely Sown							
1. MP 1277	05	5.6	-	6.1	5.8	6.5	6.0
2. PBW 644 (C)	01	5.8	-	6.0	6.2	6.6	6.2
3. WH 1080 (C)	04	5.4	-	5.9	5.8	6.0	5.8
4. HD 3043 (C)	02	4.6	-	6.2	6.0	5.9	5.7
5. WH 1142 (I)	03	5.2	-	6.2	5.9	5.8	5.8
Mean		5.3	-	6.1	5.9	6.2	5.9

Table 3: Grain appearance of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	6.2	6.2	6.8	6.4
2. K 8027 (C)	05	6.3	6.7	6.7	6.6
3. HD 2888 (C)	03	6.4	6.3	6.7	6.5
4. HD 3171	01	6.0	6.8	6.5	6.4
5. K 1317	02	6.1	6.4	6.6	6.4
Mean		6.2	6.5	6.7	6.4

Table 4: Grain appearance of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	6.9	6.0	6.1	5.6	8.4	6.6
2. HI 1544 (C)	07	6.2	6.3	6.2	6.0	8.2	6.6
3. GW 463	05	6.0	6.2	6.4	5.8	7.9	6.5
Mean		6.4	6.2	6.2	5.8	8.2	6.5
Irrigated, Late Sown							
1. MP 4010 (C)	04	6.3	6.0	6.6	6.2	7.2	6.5
2. HD 2864 (C)	05	6.4	6.3	6.5	6.0	7.0	6.4
3. HD 2932 (C)	03	6.7	6.2	6.4	6.3	7.3	6.6
4. MP 3336 (C)	02	6.5	6.1	6.5	6.1	7.4	6.5
5. CG 1015	01	6.3	6.0	6.3	5.9	6.4	6.2
Mean		6.4	6.1	6.5	6.1	7.1	6.4

Table 5: Grain appearance of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	7.2	5.8	7.3	6.8
2. MACS 6478 (C)	05	7.0	5.3	7.5	6.6
3. HD 3164	02	6.3	5.4	7.4	6.4
4. UAS 360	08	7.4	5.9	7.4	6.9
5. UAS 361	04	6.7	5.6	7.2	6.5
Mean		6.9	5.6	7.4	6.6
Rainfed, Timely Sown					
1. NIAW 2030	06	-	8.4	-	8.4
2. NI 5439 (C)	13	-	6.9	-	6.9
3. NIAW 1415 (C)	10	-	6.8	-	6.8
4. UAS 347 (I)	05	-	6.7	-	6.7
5. PBW 721	03	-	7.0	-	7.0
6. K 1315	01	-	6.9	-	6.9
Mean		-	7.1	-	7.1
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	7.8	6.4	6.6	6.9
2. NIAW 1415 (C)	02	7.8	5.4	7.4	6.9
3. DBW 93 (I)	08	6.4	5.3	6.1	5.9
4. HD 3171	01	7.7	5.2	7.2	6.7
5. HI 1605	03	7.7	6.2	6.2	6.7
6. JWS 712	06	7.0	5.1	7.1	6.4
Mean		7.4	5.6	6.8	6.6

Table 6: Test Weight (kg/ha) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	80.0	77.0	79.5	78.8
2. VL 804 (C)	03	77.5	77.5	81.5	78.8
3. VL 907 (C)	05	78.0	75.0	79.4	77.5
4. HS 507 (C)	06	81.4	76.8	82.5	80.2
5. HPW 349 (C)	04	80.0	78.0	81.4	79.8
6. HS 583	02	81.0	78.4	80.7	80.0
Mean		79.7	77.1	80.8	79.2
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	81.0	80.0	81.2	80.7
2. VL 804 (C)	03	80.5	82.5	80.5	81.2
3. VL 907 (C)	05	77.5	81.4	79.3	79.4
4. HS 507 (C)	06	80.3	81.5	80.3	80.7
5. HPW 349 (C)	04	79.5	81.3	80.8	80.5
6. HS 583	02	79.5	80.0	81.6	80.4
Mean		79.7	81.1	80.6	80.5
Rainfed, Early Sown					
1. VL 829 (C)	04	78.7	80.5	82.8	80.7
2. HPW 251 (C)	06	81.5	82.0	81.3	81.6
3. HS 542 (C)	01	82.4	81.7	82.8	82.3
4. HPW 413	02	78.0	79.5	80.5	79.3
5. HS 596	07	73.5	80.4	81.5	78.5
6. HS 597	05	78.6	81.5	82.0	80.7
7. HS 598	03	80.0	80.3	79.2	79.8
8. VL 1005	11	80.0	82.0	82.4	81.5
9. VL 1006	10	80.6	80.6	81.3	80.8
10. VL 1007	08	79.0	78.6	80.7	79.4
11. UP 2917	09	80.5	80.0	81.6	80.7
Mean		79.3	80.6	81.5	80.5
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	80.4	82.0	78.0	80.1
2. HS 490 (C)	02	75.0	74.5	75.4	75.0
3. HS 599	07	81.0	82.6	79.4	81.0
4. HS 600	05	79.0	82.5	80.5	80.7
5. HS 601	10	80.2	81.7	78.7	80.2
6. HPW 421	04	76.0	81.0	75.7	77.6
7. HPW 422	06	77.2	78.2	77.0	77.5
8. VL 3007	11	80.6	82.0	81.4	81.3
9. VL 3008	09	80.7	81.6	77.2	79.8
10. VL 3009	01	79.7	80.0	80.6	80.1
11. UP 2918	08	81.6	82.0	80.7	81.4
Mean		79.2	80.7	78.6	79.5

Table 7: Test Weight (kg/ha) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	74.0	81.7	76.2	78.6	76.4	77.4
2. DPW 621-50 (C)	02	75.9	80.6	76.6	80.2	76.3	77.9
3. WH 1105 (C)	03	75.3	81.0	78.0	78.4	78.9	78.3
4. DBW 88 (C)	05	76.9	81.0	77.5	78.5	77.1	78.2
5. HD 3086 (C)	04	78.0	80.1	77.0	78.8	77.6	78.3
6. PBW 707	07	77.0	79.2	74.7	76.0	76.1	76.6
7. PBW 709	06	77.5	80.0	77.2	78.6	75.4	77.7
8. HD 3159	08	75.6	81.2	74.0	77.4	76.5	76.9
Mean		76.3	80.6	76.4	78.3	76.8	77.7
Irrigated, Late Sown							
1. WH 1021 (C)	09	80.1	80.4	81.4	77.5	78.2	79.5
2. HD 3059 (C)	11	79.3	81.4	81.8	77.5	76.8	79.4
3. DBW 90 (C)	15	79.1	82.0	80.3	76.6	77.0	79.0
4. WH 1124 (C)	10	79.5	81.3	80.2	77.5	76.7	79.0
5. WH 1179	13	79.3	81.0	79.2	75.0	75.2	77.9
6. PBW 716	03	78.3	79.5	81.5	75.2	75.6	78.0
7. PBW 718	18	80.5	81.7	82.0	77.5	77.9	79.9
8. PBW 719	06	78.9	78.8	78.6	75.6	75.7	77.5
9. HD 3165	12	80.4	80.5	81.2	77.5	77.8	79.5
10. HI 1604	01	78.2	79.5	78.7	74.5	75.3	77.2
11. DBW 147	17	79.7	80.8	80.0	76.0	74.6	78.2
12. DBW 148	02	79.5	81.3	81.2	76.5	76.8	79.1
13. DBW 150	07	81.0	81.8	80.6	77.0	76.3	79.3
14. HUW 688	04	77.8	76.4	76.5	72.4	73.6	75.3
15. UP 2883	08	78.7	81.5	79.8	73.0	77.9	78.2
16. K 1312	14	78.0	79.5	78.8	74.0	75.4	77.1
17. K 1313	16	80.1	82.4	82.8	78.0	75.9	79.8
18. K 1314	05	80.8	81.5	82.4	77.5	79.8	80.4
Mean		79.4	80.6	80.4	76.0	76.5	78.6
Rainfed, Timely Sown							
1. WH 1164	05	74.9	-	80.5	-	77.8	77.7
2. PBW 644 (C)	06	75.9	-	80.3	-	78.0	78.1
3. WH 1080 (C)	01	70.8	-	78.5	-	78.3	75.9
4. HD 3174	04	76.5	-	79.5	-	78.7	78.2
5. HI 1605	02	78.5	-	78.5	-	77.5	78.2
6. K 1317	03	76.3	-	80.0	-	80.9	79.1
Mean		75.5	-	79.6	-	78.5	77.9
Restricted Irrigation, Timely Sown							
1. MP 1277	05	73.8	-	79.0	77.3	78.4	77.1
2. PBW 644 (C)	01	75.3	-	80.5	77.5	77.6	77.7
3. WH 1080 (C)	04	71.2	-	77.8	72.5	76.7	74.6
4. HD 3043 (C)	02	73.2	-	79.0	78.5	78.4	77.3
5. WH 1142 (I)	03	75.1	-	79.6	75.4	78.0	77.0
Mean		73.7	-	79.2	76.2	77.8	76.7

Table 8: Test Weight (kg/hl) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	79.4	78.6	76.6	78.2
2. K 8027 (C)	05	75.7	78.2	75.4	76.4
3. HD 2888 (C)	03	77.3	77.8	77.5	77.5
4. HD 3171	01	77.6	80.8	77.5	78.6
5. K 1317	02	77.2	80.6	77.5	78.4
Mean		77.4	79.2	76.9	77.8

Table 9: Test Weight (kg/hl) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	80.3	77.6	78.5	75.7	82.7	79.0
2. HI 1544 (C)	07	82.5	80.0	80.3	78.2	79.2	80.0
3. GW 463	05	83.3	78.0	78.5	78.2	80.6	79.7
Mean		82.0	78.5	79.1	77.4	80.8	79.6
Irrigated, Late Sown							
1. MP 4010 (C)	04	82.0	81.0	80.6	73.8	81.0	79.7
2. HD 2864 (C)	05	80.3	81.3	81.5	75.5	81.5	80.0
3. HD 2932 (C)	03	80.0	79.0	79.6	74.4	79.2	78.4
4. MP 3336 (C)	02	82.0	80.5	80.3	74.5	80.5	79.6
5. CG 1015	01	79.8	79.5	81.3	73.8	79.0	78.7
Mean		80.8	80.3	80.7	74.4	80.2	79.3

Table 10: Test Weight (kg/hl) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	81.6	76.9	82.0	80.2
2. MACS 6478 (C)	05	78.6	75.4	80.1	78.0
3. HD 3164	02	78.4	73.8	80.5	77.6
4. UAS 360	08	83.5	77.6	80.7	80.6
5. UAS 361	04	81.5	78.4	82.0	80.6
Mean		80.7	76.4	81.1	79.4
Rainfed, Timely Sown					
1. NIAW 2030	06	-	83.0	-	83.0
2. NI 5439 (C)	13	-	81.2	-	81.2
3. NIAW 1415 (C)	10	-	81.6	-	81.6
4. UAS 347 (I)	05	-	81.0	-	81.0
5. PBW 721	03	-	83.5	-	83.5
6. K 1315	01	-	83.0	-	83.0
Mean		-	82.2	-	82.2
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	80.5	75.1	78.5	78.0
2. NIAW 1415 (C)	02	80.0	76.7	79.1	78.6
3. DBW 93 (I)	08	79.0	73.1	77.0	76.4
4. HD 3171	01	80.0	74.2	79.4	77.9
5. HI 1605	03	77.0	72.8	75.0	74.9
6. JWS 712	06	78.0	72.7	76.3	75.7
Mean		79.1	74.1	77.6	76.9

Table 11: Protein Content (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	9.3	8.1	10.7	9.4
2. VL 804 (C)	03	10.9	8.4	11.0	10.1
3. VL 907 (C)	05	10.1	9.2	10.7	10.0
4. HS 507 (C)	06	9.9	9.4	10.8	10.0
5. HPW 349 (C)	04	10.9	8.8	10.0	9.9
6. HS 583	02	9.4	8.1	11.1	9.5
Mean		10.1	8.7	10.7	9.8
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	9.4	8.0	9.5	9.0
2. VL 804 (C)	03	9.6	8.1	10.0	9.2
3. VL 907 (C)	05	11.1	8.4	10.6	10.0
4. HS 507 (C)	06	10.5	8.4	10.4	9.8
5. HPW 349 (C)	04	10.9	8.8	9.8	9.8
6. HS 583	02	9.0	8.1	9.1	8.7
Mean		10.1	8.3	9.9	9.4
Rainfed, Early Sown					
1. VL 829 (C)	04	10.4	8.4	8.9	9.2
2. HPW 251 (C)	06	11.0	8.1	8.6	9.2
3. HS 542 (C)	01	10.5	9.6	9.0	9.7
4. HPW 413	02	10.7	8.2	9.6	9.5
5. HS 596	07	11.5	9.6	10.1	10.4
6. HS 597	05	10.0	8.8	8.8	9.2
7. HS 598	03	10.1	8.5	9.5	9.4
8. VL 1005	11	10.5	8.2	9.2	9.3
9. VL 1006	10	10.3	9.4	10.3	10.0
10. VL 1007	08	11.8	12.3	11.6	11.9
11. UP 2917	09	10.4	10.8	10.5	10.6
Mean		10.7	9.3	9.6	9.9
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	8.9	8.6	9.0	8.8
2. HS 490 (C)	02	8.8	8.8	9.9	9.1
3. HS 599	07	11.0	9.9	12.4	11.1
4. HS 600	05	10.2	10.7	8.5	9.8
5. HS 601	10	9.0	8.5	8.6	8.7
6. HPW 421	04	9.6	9.8	9.9	9.7
7. HPW 422	06	9.3	8.4	9.7	9.1
8. VL 3007	11	10.3	10.1	9.6	10.0
9. VL 3008	09	11.2	10.7	11.2	11.0
10. VL 3009	01	8.8	8.6	10.0	9.1
11. UP 2918	08	9.7	9.7	10.3	9.9
Mean		9.7	9.4	9.9	9.7

Table 12: Protein Content (%) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	10.5	12.1	12.0	10.2	13.5	11.7
2. DPW 621-50 (C)	02	11.9	13.1	12.7	11.8	13.2	12.6
3. WH 1105 (C)	03	10.9	12.7	12.0	11.1	12.9	11.9
4. DBW 88 (C)	05	12.6	12.4	12.8	11.6	12.5	12.4
5. HD 3086 (C)	04	11.9	13.8	12.2	10.8	11.2	12.0
6. PBW 707	07	10.9	11.7	11.6	10.8	13.0	11.6
7. PBW 709	06	12.2	12.8	13.5	12.4	14.0	13.0
8. HD 3159	08	11.3	11.8	12.0	9.5	11.4	11.2
Mean		11.5	12.6	12.4	11.0	12.7	12.0
Irrigated, Late Sown							
1. WH 1021 (C)	09	12.2	14.7	11.6	12.0	11.7	12.4
2. HD 3059 (C)	11	12.9	14.5	12.7	12.0	11.5	12.7
3. DBW 90 (C)	15	12.5	13.4	11.8	11.4	11.3	12.1
4. WH 1124 (C)	10	12.2	14.4	12.4	11.4	11.1	12.3
5. WH 1179	13	12.3	13.2	11.4	11.7	10.5	11.8
6. PBW 716	03	12.2	14.1	12.1	10.8	11.0	12.0
7. PBW 718	18	12.1	13.5	13.3	11.3	10.2	12.1
8. PBW 719	06	12.8	14.5	12.4	12.6	12.7	13.0
9. HD 3165	12	12.5	13.9	12.6	12.7	11.0	12.5
10. HI 1604	01	11.4	13.5	10.6	10.2	10.5	11.2
11. DBW 147	17	12.7	13.3	12.5	11.0	11.0	12.1
12. DBW 148	02	13.7	14.0	13.4	12.5	12.1	13.1
13. DBW 150	07	12.5	13.6	11.8	11.2	12.2	12.2
14. HUW 688	04	13.0	14.4	12.4	11.9	11.7	12.7
15. UP 2883	08	12.4	13.3	12.1	11.8	12.3	12.4
16. K 1312	14	12.2	14.2	11.9	12.4	11.6	12.4
17. K 1313	16	12.4	13.8	11.5	11.8	10.3	12.0
18. K 1314	05	14.0	15.5	13.4	13.2	12.6	13.7
Mean		12.6	14.0	12.2	11.8	11.4	12.4
Rainfed, Timely Sown							
1. WH 1164	05	12.8	-	13.9	-	11.6	12.8
2. PBW 644 (C)	06	12.7	-	13.8	-	10.4	12.3
3. WH 1080 (C)	01	12.9	-	14.1	-	9.7	12.2
4. HD 3174	04	12.7	-	14.2	-	10.0	12.3
5. HI 1605	02	13.2	-	14.3	-	10.4	12.6
6. K 1317	03	13.0	-	13.7	-	10.4	12.4
Mean		12.9	-	14.0	-	10.4	12.4
Restricted Irrigation, Timely Sown							
1. MP 1277	05	12.6	-	14.1	10.2	11.2	12.0
2. PBW 644 (C)	01	13.3	-	14.1	10.2	11.4	12.2
3. WH 1080 (C)	04	13.3	-	13.8	11.6	11.5	12.5
4. HD 3043 (C)	02	13.7	-	13.0	10.9	10.7	12.1
5. WH 1142 (I)	03	12.6	-	13.2	10.4	10.6	11.7
Mean		13.1	-	13.6	10.7	11.1	12.1

Table 13: Protein Content (%) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	10.8	13.4	10.9	11.7
2. K 8027 (C)	05	11.3	13.7	11.1	12.0
3. HD 2888 (C)	03	11.8	13.7	10.5	12.0
4. HD 3171	01	10.3	13.5	12.2	12.0
5. K 1317	02	11.4	13.4	11.9	12.2
Mean		11.1	13.5	11.3	12.0

Table 14: Protein Content (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	9.7	11.1	11.6	13.6	11.5	11.5
2. HI 1544 (C)	07	9.7	11.7	11.7	13.3	12.1	11.7
3. GW 463	05	8.9	11.2	12.0	14.3	11.3	11.5
Mean		9.4	11.4	11.8	13.8	11.6	11.6
Irrigated, Late Sown							
1. MP 4010 (C)	04	12.7	14.0	14.5	14.1	14.7	14.0
2. HD 2864 (C)	05	11.9	13.0	13.6	13.2	13.0	12.9
3. HD 2932 (C)	03	12.9	14.2	14.4	13.6	13.9	13.8
4. MP 3336 (C)	02	12.4	12.9	13.6	14.1	13.8	13.4
5. CG 1015	01	12.9	14.3	14.4	14.8	13.9	14.0
Mean		12.5	13.7	14.1	14.0	13.9	13.6

Table 15: Protein Content (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	12.1	12.4	12.4	12.3
2. MACS 6478 (C)	05	12.2	12.4	13.1	12.6
3. HD 3164	02	13.1	13.7	12.8	13.2
4. UAS 360	08	12.6	12.3	12.5	12.5
5. UAS 361	04	11.6	11.6	11.3	11.5
Mean		12.3	12.5	12.4	12.4
Rainfed, Timely Sown					
1. NIAW 2030	06	-	10.6	-	10.6
2. NI 5439 (C)	13	-	10.2	-	10.2
3. NIAW 1415 (C)	10	-	10.9	-	10.9
4. UAS 347 (I)	05	-	9.5	-	9.5
5. PBW 721	03	-	10.5	-	10.5
6. K 1315	01	-	11.9	-	11.9
Mean		-	10.6	-	10.6
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	12.8	13.3	11.5	12.5
2. NIAW 1415 (C)	02	13.8	14.5	12.9	13.7
3. DBW 93 (I)	08	13.9	14.8	13.1	13.9
4. HD 3171	01	12.4	12.7	12.1	12.4
5. HI 1605	03	11.8	12.5	11.5	11.9
6. JWS 712	06	12.9	13.3	13.4	12.9
Mean		12.9	13.5	12.4	12.9

Table 16: Grain Hardness Index of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	64	86	89	80
2. VL 804 (C)	03	87	89	91	89
3. VL 907 (C)	05	70	81	78	76
4. HS 507 (C)	06	74	87	85	82
5. HPW 349 (C)	04	77	86	89	84
6. HS 583	02	82	77	88	82
Mean		76	84	87	82
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	85	74	86	82
2. VL 804 (C)	03	87	76	90	84
3. VL 907 (C)	05	73	68	74	72
4. HS 507 (C)	06	86	76	83	82
5. HPW 349 (C)	04	79	86	74	80
6. HS 583	02	72	58	75	68
Mean		80	73	80	78
Rainfed, Early Sown					
1. VL 829 (C)	04	76	79	82	79
2. HPW 251 (C)	06	85	69	79	78
3. HS 542 (C)	01	81	64	70	72
4. HPW 413	02	97	71	83	84
5. HS 596	07	75	77	82	78
6. HS 597	05	73	71	79	74
7. HS 598	03	83	64	77	75
8. VL 1005	11	81	73	78	77
9. VL 1006	10	71	68	68	69
10. VL 1007	08	62	62	68	64
11. UP 2917	09	77	75	72	75
Mean		78	70	76	75
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	71	78	65	71
2. HS 490 (C)	02	15	23	22	20
3. HS 599	07	85	85	83	84
4. HS 600	05	71	82	74	76
5. HS 601	10	60	71	63	65
6. HPW 421	04	70	73	79	74
7. HPW 422	06	60	54	64	59
8. VL 3007	11	63	83	61	69
9. VL 3008	09	76	79	72	76
10. VL 3009	01	51	60	61	57
11. UP 2918	08	75	81	79	78
Mean		63	70	66	66

**Table 17: Grain Hardness Index) of *T.aestivum* genotypes in North Western Plains Zone
AVT 's**

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	69	68	69	65	68	68
2. DPW 621-50 (C)	02	82	73	79	75	78	77
3. WH 1105 (C)	03	72	67	65	64	75	69
4. DBW 88 (C)	05	84	71	81	74	68	76
5. HD 3086 (C)	04	80	71	72	75	75	75
6. PBW 707	07	66	62	66	59	67	64
7. PBW 709	06	68	60	68	65	67	66
8. HD 3159	08	76	66	68	62	71	69
Mean		75	67	71	67	71	70
Irrigated, Late Sown							
1. WH 1021 (C)	09	79	81	85	73	76	79
2. HD 3059 (C)	11	83	79	86	74	81	81
3. DBW 90 (C)	15	78	85	87	74	80	81
4. WH 1124 (C)	10	79	76	84	77	81	79
5. WH 1179	13	79	81	84	79	77	80
6. PBW 716	03	64	79	77	57	59	67
7. PBW 718	18	76	71	78	72	67	73
8. PBW 719	06	79	84	85	80	84	82
9. HD 3165	12	77	80	87	80	76	80
10. HI 1604	01	61	70	68	60	62	64
11. DBW 147	17	80	80	83	80	81	81
12. DBW 148	02	80	78	80	72	71	76
13. DBW 150	07	76	77	91	80	73	79
14. HUW 688	04	83	83	89	75	72	80
15. UP 2883	08	80	72	89	74	78	79
16. K 1312	14	75	85	88	82	76	81
17. K 1313	16	79	80	81	81	74	79
18. K 1314	05	67	69	73	75	62	69
Mean		76	78	83	75	74	77
Rainfed, Timely Sown							
1. WH 1164	05	72	-	67	-	56	65
2. PBW 644 (C)	06	73	-	69	-	62	68
3. WH 1080 (C)	01	76	-	74	-	61	70
4. HD 3174	04	77	-	72	-	63	71
5. HI 1605	02	81	-	85	-	59	75
6. K 1317	03	75	-	73	-	69	72
Mean		76	-	73	-	62	70
Restricted Irrigation, Timely Sown							
1. MP 1277	05	75	-	76	62	67	70
2. PBW 644 (C)	01	77	-	80	62	70	72
3. WH 1080 (C)	04	77	-	70	61	70	70
4. HD 3043 (C)	02	80	-	79	69	79	77
5. WH 1142 (I)	03	75	-	73	64	74	72
Mean		77	-	76	64	72	72

Table 18: Grain Hardness Index of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	86	87	94	89
2. K 8027 (C)	05	77	82	94	84
3. HD 2888 (C)	03	84	79	88	84
4. HD 3171	01	67	71	87	75
5. K 1317	02	70	78	86	78
Mean		77	79	90	82

Table 19: Grain Hardness Index of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	82	78	84	67	88	80
2. HI 1544 (C)	07	83	77	86	73	92	82
3. GW 463	05	63	69	75	71	84	72
Mean		76	75	82	70	88	78
Irrigated, Late Sown							
1. MP 4010 (C)	04	66	74	74	70	74	72
2. HD 2864 (C)	05	64	71	82	63	69	70
3. HD 2932 (C)	03	66	72	76	59	70	69
4. MP 3336 (C)	02	62	75	80	69	80	73
5. CG 1015	01	60	70	77	63	81	70
Mean		64	72	78	65	75	71

Table 20: Grain Hardness Index of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	80	72	74	75
2. MACS 6478 (C)	05	77	69	72	73
3. HD 3164	02	67	66	65	66
4. UAS 360	08	67	70	65	67
5. UAS 361	04	81	66	69	72
Mean		74	69	69	71
Rainfed, Timely Sown					
1. NIAW 2030	06	-	88	-	88
2. NI 5439 (C)	13	-	81	-	81
3. NIAW 1415 (C)	10	-	85	-	85
4. UAS 347 (I)	05	-	66	-	66
5. PBW 721	03	-	84	-	84
6. K 1315	01	-	76	-	76
Mean		-	80	-	80
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	88	85	92	88
2. NIAW 1415 (C)	02	86	84	84	85
3. DBW 93 (I)	08	88	68	73	76
4. HD 3171	01	85	66	66	72
5. HI 1605	03	74	64	65	68
6. JWS 712	06	93	66	71	77
Mean		86	72	75	78

Table 21: Sedimentation Value (ml) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	46	45	53	48
2. VL 804 (C)	03	35	35	37	36
3. VL 907 (C)	05	43	34	39	39
4. HS 507 (C)	06	43	36	44	41
5. HPW 349 (C)	04	53	50	48	50
6. HS 583	02	47	47	51	48
Mean		45	41	45	44
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	48	45	51	48
2. VL 804 (C)	03	33	36	34	34
3. VL 907 (C)	05	38	32	36	35
4. HS 507 (C)	06	40	35	40	38
5. HPW 349 (C)	04	49	45	53	49
6. HS 583	02	47	46	55	49
Mean		43	40	45	42
Rainfed, Early Sown					
1. VL 829 (C)	04	38	37	36	37
2. HPW 251 (C)	06	36	30	31	32
3. HS 542 (C)	01	44	41	50	45
4. HPW 413	02	55	52	56	54
5. HS 596	07	52	45	53	50
6. HS 597	05	39	34	36	36
7. HS 598	03	54	54	62	57
8. VL 1005	11	37	32	38	36
9. VL 1006	10	50	49	54	51
10. VL 1007	08	36	42	39	39
11. UP 2917	09	39	38	33	37
Mean		44	41	44	43
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	40	42	47	43
2. HS 490 (C)	02	30	37	34	34
3. HS 599	07	39	34	44	39
4. HS 600	05	46	41	40	42
5. HS 601	10	41	44	47	44
6. HPW 421	04	45	46	54	48
7. HPW 422	06	35	33	37	35
8. VL 3007	11	34	36	39	36
9. VL 3008	09	35	36	37	36
10. VL 3009	01	51	50	40	47
11. UP 2918	08	46	44	47	46
Mean		40	40	42	41

Table 22: Sedimentation Value (ml) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	55	50	64	57	52	56
2. DPW 621-50 (C)	02	59	47	59	55	57	55
3. WH 1105 (C)	03	50	56	58	58	53	55
4. DBW 88 (C)	05	61	51	61	59	54	57
5. HD 3086 (C)	04	55	47	50	59	54	53
6. PBW 707	07	42	44	43	41	47	43
7. PBW 709	06	61	51	58	59	59	58
8. HD 3159	08	60	50	54	52	57	55
Mean		55	50	56	55	54	54
Irrigated, Late Sown							
1. WH 1021 (C)	09	39	35	39	34	36	37
2. HD 3059 (C)	11	45	54	54	56	49	52
3. DBW 90 (C)	15	46	48	58	57	61	54
4. WH 1124 (C)	10	53	46	55	50	50	51
5. WH 1179	13	51	55	59	60	60	57
6. PBW 716	03	42	52	52	51	49	49
7. PBW 718	18	60	52	64	54	59	58
8. PBW 719	06	34	37	49	44	39	41
9. HD 3165	12	44	42	48	56	47	47
10. HI 1604	01	42	48	48	45	38	44
11. DBW 147	17	61	63	57	67	62	62
12. DBW 148	02	47	48	51	57	46	50
13. DBW 150	07	37	37	44	44	43	41
14. HUW 688	04	44	53	53	56	51	51
15. UP 2883	08	41	42	52	42	45	44
16. K 1312	14	48	48	55	57	52	52
17. K 1313	16	37	40	47	47	43	43
18. K 1314	05	44	40	49	50	49	46
Mean		45	47	52	52	49	49
Rainfed, Timely Sown							
1. WH 1164	05	40	-	50	-	42	44
2. PBW 644 (C)	06	38	-	43	-	44	42
3. WH 1080 (C)	01	56	-	59	-	53	56
4. HD 3174	04	46	-	47	-	51	48
5. HI 1605	02	47	-	59	-	54	53
6. K 1317	03	32	-	36	-	34	34
Mean		43	-	49	-	46	46
Restricted Irrigation, Timely Sown							
1. MP 1277	05	57	-	46	56	57	54
2. PBW 644 (C)	01	45	-	37	47	45	44
3. WH 1080 (C)	04	56	-	54	65	54	57
4. HD 3043 (C)	02	40	-	48	41	46	44
5. WH 1142 (I)	03	43	-	41	44	42	43
Mean		48	-	45	51	49	48

Table 23: Sedimentation Value (ml) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	36	42	41	40
2. K 8027 (C)	05	37	44	40	40
3. HD 2888 (C)	03	45	48	43	45
4. HD 3171	01	51	59	57	56
5. K 1317	02	60	60	52	57
Mean		46	51	47	48

Table 24: Sedimentation Value (ml) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	38	42	39	41	38	40
2. HI 1544 (C)	07	40	38	43	42	36	40
3. GW 463	05	34	40	45	41	38	40
Mean		37	40	42	41	37	40
Irrigated, Late Sown							
1. MP 4010 (C)	04	34	33	48	38	43	39
2. HD 2864 (C)	05	42	39	46	44	43	43
3. HD 2932 (C)	03	42	50	50	41	49	46
4. MP 3336 (C)	02	34	35	41	38	40	38
5. CG 1015	01	39	44	45	37	46	42
Mean		38	40	46	40	44	42

Table 25: Sedimentation Value (ml) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	38	40	33	37
2. MACS 6478 (C)	05	45	45	47	46
3. HD 3164	02	39	39	41	40
4. UAS 360	08	44	50	51	48
5. UAS 361	04	39	40	42	40
Mean		41	43	43	42
Rainfed, Timely Sown					
1. NIAW 2030	06	-	52	-	52
2. NI 5439 (C)	13	-	55	-	55
3. NIAW 1415 (C)	10	-	51	-	51
4. UAS 347 (I)	05	-	51	-	51
5. PBW 721	03	-	52	-	52
6. K 1315	01	-	58	-	58
Mean		-	53	-	53
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	49	46	54	50
2. NIAW 1415 (C)	02	57	50	51	53
3. DBW 93 (I)	08	48	51	41	47
4. HD 3171	01	55	50	58	54
5. HI 1605	03	60	50	56	55
6. JWS 712	06	61	56	58	58
Mean		55	51	53	53

Table 26: Moisture Content (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	11.9	11.2	10.5	11.2
2. VL 804 (C)	03	11.2	11.5	10.7	11.1
3. VL 907 (C)	05	11.8	11.1	10.5	11.1
4. HS 507 (C)	06	11.0	11.1	11.1	11.1
5. HPW 349 (C)	04	12.1	10.8	10.3	11.1
6. HS 583	02	11.6	11.5	11.0	11.4
Mean		11.6	11.2	10.7	11.2
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	11.1	11.3	10.5	11.0
2. VL 804 (C)	03	11.2	11.1	10.1	10.8
3. VL 907 (C)	05	11.2	11.1	10.2	10.8
4. HS 507 (C)	06	11.3	10.9	10.3	10.8
5. HPW 349 (C)	04	10.6	10.1	9.7	10.1
6. HS 583	02	11.3	11.0	10.2	10.8
Mean		11.1	10.9	10.2	10.7
Rainfed, Early Sown					
1. VL 829 (C)	04	11.0	11.1	9.9	10.7
2. HPW 251 (C)	06	11.5	11.3	10.0	10.9
3. HS 542 (C)	01	11.4	11.2	10.5	11.0
4. HPW 413	02	11.7	11.2	10.7	11.2
5. HS 596	07	11.4	10.9	10.6	11.0
6. HS 597	05	11.7	11.2	10.6	11.2
7. HS 598	03	11.2	11.0	10.0	10.7
8. VL 1005	11	11.4	10.8	10.5	10.9
9. VL 1006	10	11.6	10.9	10.4	11.0
10. VL 1007	08	11.6	11.2	9.6	10.8
11. UP 2917	09	11.4	11.2	10.0	10.9
Mean		11.4	11.1	10.3	10.9
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	11.6	10.9	8.1	10.2
2. HS 490 (C)	02	11.1	11.1	8.7	10.3
3. HS 599	07	11.8	11.5	9.1	10.8
4. HS 600	05	11.2	10.7	8.1	10.0
5. HS 601	10	10.8	10.8	8.0	9.9
6. HPW 421	04	11.2	11.3	8.7	10.4
7. HPW 422	06	11.0	10.8	8.4	10.1
8. VL 3007	11	11.1	10.9	8.0	10.0
9. VL 3008	09	11.6	10.9	8.9	10.5
10. VL 3009	01	11.2	10.7	8.3	10.1
11. UP 2918	08	11.1	10.8	8.2	10.0
Mean		11.2	10.9	8.4	10.2

**Table 27: Moisture Content (%) of *T.aestivum* genotypes in North Western Plains Zone
AVT's**

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	10.1	8.0	9.3	11.0	10.2	9.7
2. DPW 621-50 (C)	02	10.5	8.1	9.4	11.1	10.7	10.0
3. WH 1105 (C)	03	10.3	9.4	9.5	11.1	10.7	10.2
4. DBW 88 (C)	05	10.3	7.8	9.7	11.0	11.0	10.0
5. HD 3086 (C)	04	10.0	8.0	9.3	11.1	11.5	10.0
6. PBW 707	07	10.1	8.2	9.0	11.0	10.7	9.8
7. PBW 709	06	10.2	7.8	9.5	10.9	10.6	9.8
8. HD 3159	08	10.1	8.0	9.4	11.2	10.6	9.9
Mean		10.2	8.2	9.4	11.1	10.8	9.9
Irrigated, Late Sown							
1. WH 1021 (C)	09	10.2	7.8	9.4	11.3	7.9	9.3
2. HD 3059 (C)	11	10.1	8.1	9.7	10.8	7.9	9.3
3. DBW 90 (C)	15	9.9	7.9	9.6	10.6	8.0	9.2
4. WH 1124 (C)	10	10.1	8.4	9.6	11.1	7.8	9.4
5. WH 1179	13	9.9	8.0	9.4	10.8	7.9	9.2
6. PBW 716	03	10.0	7.8	9.2	10.8	7.8	9.1
7. PBW 718	18	9.9	7.9	9.7	11.0	7.9	9.3
8. PBW 719	06	10.2	7.9	9.6	10.7	8.2	9.3
9. HD 3165	12	10.1	7.9	9.7	11.0	7.9	9.3
10. HI 1604	01	9.9	8.0	9.9	10.9	7.9	9.3
11. DBW 147	17	10.2	8.0	9.4	10.8	8.0	9.3
12. DBW 148	02	10.1	7.8	9.5	10.6	8.0	9.2
13. DBW 150	07	10.1	7.8	9.5	10.7	7.9	9.2
14. HUW 688	04	10.1	8.0	9.6	11.0	8.4	9.4
15. UP 2883	08	9.9	8.3	9.7	10.9	8.1	9.4
16. K 1312	14	9.8	7.8	9.5	11.0	7.8	9.2
17. K 1313	16	9.8	7.9	9.5	10.7	7.9	9.2
18. K 1314	05	9.7	7.9	9.4	10.9	8.1	9.2
Mean		10.0	8.0	9.6	10.9	8.0	9.3
Rainfed, Timely Sown							
1. WH 1164	05	10.0	-	10.8	-	10.8	10.5
2. PBW 644 (C)	06	9.9	-	10.7	-	10.7	10.4
3. WH 1080 (C)	01	9.8	-	10.6	-	10.8	10.4
4. HD 3174	04	9.8	-	10.4	-	10.7	10.3
5. HI 1605	02	9.1	-	10.3	-	10.8	10.1
6. K 1317	03	9.5	-	10.6	-	10.8	10.3
Mean		9.7	-	10.6	-	10.8	10.3
Restricted Irrigation, Timely Sown							
1. MP 1277	05	9.7	-	10.4	10.9	10.2	10.3
2. PBW 644 (C)	01	9.7	-	10.3	11.3	10.7	10.5
3. WH 1080 (C)	04	9.8	-	10.5	11.0	10.3	10.4
4. HD 3043 (C)	02	9.5	-	10.6	10.7	9.9	10.2
5. WH 1142 (I)	03	10.0	-	10.5	10.7	9.6	10.2
Mean		9.7	-	10.5	10.9	10.1	10.3

Table 28: Moisture Content (%) of *T.aestivum* genotypes in North Eastern Plains Zone AV

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	11.8	11.9	12.8	12.2
2. K 8027 (C)	05	11.9	12.1	13.0	12.3
3. HD 2888 (C)	03	11.8	11.9	12.8	12.2
4. HD 3171	01	11.6	12.1	12.4	12.0
5. K 1317	02	11.7	12.0	12.7	12.1
Mean		11.8	12.0	12.7	12.2

Table 29: Moisture Content (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	8.8	10.1	10.0	8.4	9.9	9.4
2. HI 1544 (C)	07	10.5	9.7	10.1	8.8	10.0	9.8
3. GW 463	05	9.7	9.9	10.1	8.3	10.0	9.6
Mean		9.7	9.9	10.1	8.5	10.0	9.6
Irrigated, Late Sown							
1. MP 4010 (C)	04	7.5	9.8	9.0	8.0	9.6	8.8
2. HD 2864 (C)	05	7.1	9.5	9.0	7.6	9.2	8.5
3. HD 2932 (C)	03	7.3	9.4	9.0	7.6	9.2	8.5
4. MP 3336 (C)	02	7.1	9.5	9.1	7.6	9.5	8.6
5. CG 1015	01	7.3	9.2	9.4	7.8	9.4	8.6
Mean		7.3	9.5	9.1	7.7	9.4	8.6

Table 30: Moisture Content (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	10.5	11.6	9.8	10.6
2. MACS 6478 (C)	05	10.7	12.3	10.5	11.2
3. HD 3164	02	10.0	12.1	10.2	10.8
4. UAS 360	08	10.6	11.9	10.4	11.0
5. UAS 361	04	10.3	11.9	10.3	10.8
Mean		10.4	12.0	10.2	10.9
Rainfed, Timely Sown					
1. NIAW 2030	06	-	10.3	-	10.3
2. NI 5439 (C)	13	-	10.6	-	10.6
3. NIAW 1415 (C)	10	-	10.5	-	10.5
4. UAS 347 (I)	05	-	10.4	-	10.4
5. PBW 721	03	-	10.6	-	10.6
6. K 1315	01	-	10.8	-	10.8
Mean		-	10.5	-	10.5
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	9.8	11.8	11.6	11.1
2. NIAW 1415 (C)	02	9.5	13.2	11.8	11.5
3. DBW 93 (I)	08	9.5	13.2	12.0	11.6
4. HD 3171	01	9.8	13.3	11.5	11.5
5. HI 1605	03	10.2	13.0	11.8	11.7
6. JWS 712	06	9.7	13.0	12.1	11.6
Mean		9.8	12.9	11.8	11.5

Table 31: High Molecular weight Glutenin Subunit of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	5+10	1	17+18	10
2. VL 804 (C)	03	2+12	N	7+8	6
3. VL 907 (C)	05	5+10	1	7	8
4. HS 507 (C)	06	5+10	1	7+8	10
5. HPW 349 (C)	04	5+10	2*	17+18	10
6. HS 583	02	5+10	2*	7	8
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	5+10	1	17+18	10
2. VL 804 (C)	03	2+12	N	7+8	6
3. VL 907 (C)	05	5+10	1	7	8
4. HS 507 (C)	06	5+10	1	7+8	10
5. HPW 349 (C)	04	5+10	2*	17+18	10
6. HS 583	02	5+10	2*	7	8
Rainfed, Early Sown					
1. VL 829 (C)	04	2+12	1	7+9	7
2. HPW 251 (C)	06	5+10	2*	7+9	9
3. HS 542 (C)	01	5+10	2*	7	8
4. HPW 413	02	5+10	2*	17+18	10
5. HS 596	07	5+10	N	13+16	8
6. HS 597	05	2+12	1	17+18	8
7. HS 598	03	5+10	1	17+18	10
8. VL 1005	11	5+10	2*	7	8
9. VL 1006	10	5+10	2*	7	8
10. VL 1007	08	5+10	2*	7	8
11. UP 2917	09	5+10	1	7	8
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	2+12	2*	7+8	8
2. HS 490 (C)	02	2+12	2*	7+8	8
3. HS 599	07	2+12	N	7	4
4. HS 600	05	2+12	2*	7	6
5. HS 601	10	5+10	2*	17+18	10
6. HPW 421	04	2+12	2*	17+18	8
7. HPW 422	06	2+12	N	7	4
8. VL 3007	11	2+12	1	7+9	7
9. VL 3008	09	5+10	2*	7	8
10. VL 3009	01	5+10	1	7	8
11. UP 2918	08	2+12	2*	17+18	8

Table 32: High Molecular weight Glutenin Subunit of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Irrigated, Timely Sown					
1. HD 2967 (C)	01	5+10	2*	17+18	10
2. DPW 621-50 (C)	02	5+10	2*	17+18	10
3. WH 1105 (C)	03	5+10	2*	7	8
4. DBW 88 (C)	05	5+10	2*	17+18	10
5. HD 3086 (C)	04	5+10	1	17+18	10
6. PBW 707	07	2+12	2*	7	6
7. PBW 709	06	5+10	2*	17+18	10
8. HD 3159	08	5+10	2*	7	8
Irrigated, Late Sown					
1. WH 1021 (C)	09	2+12	2*	7+8	8
2. HD 3059 (C)	11	5+10	2*	17+18	10
3. DBW 90 (C)	15	5+10	1	17+18	10
4. WH 1124 (C)	10	5+10	1	17+18	10
5. WH 1179	13	5+10	1	17+18	10
6. PBW 716	03	5+10	2*	17+18	10
7. PBW 718	18	5+10	2*	7	8
8. PBW 719	06	5+10	2*	7	8
9. HD 3165	12	5+10	2*	17+18	10
10. HI 1604	01	5+10	2*	7	8
11. DBW 147	17	5+10	1	17+18	10
12. DBW 148	02	5+10	1	17+18	10
13. DBW 150	07	5+10	2*	7	8
14. HUW 688	04	5+10	1	17+18	10
15. UP 2883	08	2+12	2*	17+18	8
16. K 1312	14	5+10	2*	13+16	10
17. K 1313	16	5+10	2*	7	8
18. K 1314	05	5+10	1	7	8
Rainfed, Timely Sown					
1. WH 1164	05	5+10	2*	7	8
2. PBW 644 (C)	06	2+12	1	7+8	8
3. WH 1080 (C)	01	5+10	1	7	8
4. HD 3174	04	5+10	1	17+18	10
5. HI 1605	02	5+10	2*	7	8
6. K 1317	03	2+12	2*	17+18	8
Restricted Irrigation, Timely Sown					
1. MP 1277	05	5+10	2*	7	8
2. PBW 644 (C)	01	2+12	1	7+8	8
3. WH 1080 (C)	04	5+10	1	7	8
4. HD 3043 (C)	02	5+10	2*	7	8
5. WH 1142 (I)	03	5+10	1	7	8

Table 33: High Molecular Weight Glutenin Subunit of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Rainfed, Timely Sown					
1. C 306 (C)	04	2+12	N	20	4
2. K 8027 (C)	05	2+12	2*	17+18	8
3. HD 2888 (C)	03	2+12	N	20	4
4. HD 3171	01	5+10	2*	7	8
5. K 1317	02	2+12	2*	17+18	8

Table 34: High Molecular Weight Glutenin Subunit of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Rainfed, Timely Sown					
1. GW 322 (C)	09	2+12	2*	7+8	8
2. HI 1544 (C)	07	2+12	N	7+8	6
3. GW 463	05	5+10	2*	17+18	10
Irrigated, Late Sown					
1. MP 4010 (C)	04	2+12	1	17+18	8
2. HD 2864 (C)	05	2+12	1	7+8	8
3. HD 2932 (C)	03	2+12	2*	17+18	8
4. MP 3336 (C)	02	2+12	2*	7+8	8
5. CG 1015	01	2+12	2*	17+18	8

Table 35: High Molecular Weight Glutenin Subunit of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	2+12	2*	7+9	7
2. MACS 6478 (C)	05	2+12	2*	17+18	8
3. HD 3164	02	2+12	2*	7	6
4. UAS 360	08	5+10	2*	7	8
5. UAS 361	04	5+10	1	7	8
Rainfed, Timely Sown					
1. NIAW 2030	06	2+12	N	17+18	6
2. NI 5439 (C)	13	2+12	N	17+18	6
3. NIAW 1415 (C)	10	2+12	1	7+9	7
4. UAS 347 (I)	05	5+10	1	7	8
5. PBW 721	03	5+10	1	7	8
6. K 1315	01	5+10	1	7	8
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	2+12	N	17+18	6
2. NIAW 1415 (C)	02	2+12	1	7+9	7
3. DBW 93 (I)	08	5+10	2*	17+18	10
4. HD 3171	01	5+10	2*	7	8
5. HI 1605	03	5+10	2*	7	8
6. JWS 712	06	2+12	2*	17+18	8

ADVANCED VARIETAL TRIALS (*Triticum durum*)

GRAIN CHARACTERSTICS

The *T. durum* entries were tested under Irrigated Timely Sown (ITS) condition in North Western Plains Zone (NWPZ), Central Zone (CZ) and Peninsular Zone (PZ). The entries were also tested under Rainfed Timely Sown (RTS) condition in Central Zone (CZ) and Peninsular Zone (PZ). One 2nd year entry and four 1st year entries were tested against three durum and two *aestivum* checks in NWPZ. Under ITS condition of CZ, two 2nd year and one 1st year entries was tested against two durum checks. In PZ, three 1st year entries were tested against one durum check (ITS), one 2nd year & five 1st year entries against two durum checks (RTS) and one 1st year entry against one durum check (RITS)

(i) Grain Appearance Score (Table 36-38)

It is a subjective test and the parameters like grain size, shape, soundness, colour & luster are taken into consideration to score the grain appearance out of a total score of 10.0. This parameter merits consideration in grain trade. The highest score of 7.2 was recorded by the check PDW 291 and the zonal mean was 6.7 under ITS condition of NWPZ. All the entries including checks had >7.0 score and the zonal mean was 7.4 under ITS condition CZ. The zonal mans were 7.0, 7.3 and 6.7 under ITS, RTS and RITS conditions respectively in PZ. In general, grain appearance score was higher in CZ.

(ii) Test Weight (Table 39-41)

This parameter is important for millers as it is positively correlated with flour recovery. It is an important quality parameter for durum wheat trading in the international market. In U.S grading system, durum wheat with 78.0 kg/hl and above test weight is classified in grade 1. The 2nd year entry, HD 4730 had an edge over the best check, PDW 291 (80.1 kg/hl) and the zonal mean was 78.8 kg/hl under ITS condition of NWPZ. The highest values were obtained at Durgapura centre and the lowest at Ludhiana centre. In CZ, all the entries recorded >80.0 kg/hl values and were found comparable to the best check, HI 8498 (81.4 kg/hl). The zonal mean was 81.4 kg/hl. The Indore centre recorded the highest mean value and the lowest mean value at Junagarh centre. All the entries under ITS, RTS and RITS conditions exhibited >80.0 kg/hl values and the zonal means were 81.6 kg/hl, 82.0 kg/hl and 77.7 kg/hl respectively

(iii) Protein Content (Table 42-44)

It is an important quality parameter for making different products of wheat. More than 12.0 % protein is required for making good quality pasta products. The highest content was exhibited by the check, PDW 233 (12.3 %) under ITS condition of NWPZ. The highest mean value was recorded at Delhi centre & the lowest at Pantnagar centre and the zonal mean was 11.9 %. Similarly, under ITS condition of CZ, the highest content was recorded by the check, HI 8498 (12.4 %) and the zonal mean was 12.0 %. The highest mean value was observed at Powarkheda centre and the lowest at Indore centre. In PZ also, the respective checks recorded highest content under all the three sowing conditions i.e. ITS, RTS, & RITS and the zonal means were 11.7 %, 10.6 % & 12.7 % respectively.

(iv) Grain Hardness (Table 45-47)

It is an important parameter as hard durum wheat is required for making good quality pasta products. The entries including checks (90.0 %) were found to be hard as the index values were >75. Remaining 10.0% were medium hard with the index value in between 45-75. There was no soft durum.

(v) Sedimentation Value (Table 48-50)

This quality parameter indicates gluten strength and the value of 40 ml and above is required for making good quality pasta products. Under ITS condition of NWPZ, two 1st year entries, DDW 32 (44 ml) and MACS 3949 (43 ml) recorded higher values compared to the best durum check, PDW 314 (38 ml). There was not much variation in the mean values of different centres and the zonal mean was 41 ml. The check, HI 8737 (36 ml) exhibited the highest value under ITS condition of CZ and the zonal mean was 33 ml. Under all the three sowing conditions i.e. ITS, RTS & RITS of PZ, respective checks recorded highest values and the zonal means were 34 ml, 33 ml & 38 ml respectively.

(vi) Yellow Berry Incidence (Table 51-53)

Yellow berry (starchiness, mealiness, non-virtuousness) is a physiological disorder due to protein imbalance and imparts undesirable white spots in dried pasta, thus lowering its cooking quality. Under ITS condition of NWPZ, the lowest incidence was exhibited by the durum check, PDW 233 (4.9 %) and the zonal mean was 9.1 %. The highest mean value (22.6 %) was observed at Pantnagar centre whereas the lowest (0.5%) was at Delhi centre. Similarly, the check, MPO 1215 (4.0 %) exhibited

the lowest incidence under ITS condition of CZ and the zonal mean was 8.8 %. Indore centre recorded the highest mean value (23.7 %) and the lowest (1.0 %) was at Powarkheda centre. Under ITS, RTS, and RITS conditions of PZ, the zonal means were 6.0 %, 24.6 % and 1.7% respectively.

(vii) Yellow Pigment Content (Table 54-56)

It imparts attractive colour to the pasta products and is considered to be an important quality character of durum wheat in many countries. It is a precursor of vitamin-A, hence has immense nutritional importance. Durum wheat with >7.0 ppm β -carotene content is generally preferred in the international market. The highest content was recorded by the check, PDW 233 (7.84 ppm) under ITS condition of NWPZ and the zonal mean was 6.27 ppm. The 1st year entry, HI 8759 (6.16 ppm) recorded higher content compared to the best check, MPO 1215 (5.94 ppm) under ITS condition of CZ and the zonal mean was 5.31 ppm. All the three 1st year entries were found better than the 1st year entries (6.00 ppm) under ITS condition of PZ and the zonal mean was (6.60 ppm). The zonal means under RTS and RITS conditions of PZ were 5.06 ppm and 4.48 ppm respectively.

(viii) Moisture Content (Table 57-59)

It is an important parameter from storage point of view and grain trading. It depends on the weather conditions at the time of harvesting and also at the time when the determination has been made. Higher moisture content adversely affects the keeping quality of wheat. Also, the protein content values mentioned previously are at 'as is' basis. Hence, moisture content merits consideration if protein is to be calculated on dry basis or any other given moisture content. The threshold value is 12.0 %. All the entries in all the zones, centres and sowing conditions fulfilled this requirement except RITS condition of Dharwad, PZ.

(ix) γ -gliadin (Table 60-62)

It is an important quality parameter for assessing the quality of pasta products. Durum wheat genotypes with γ -gliadin '45' make good quality pasta products whereas γ -gliadin '42' is negatively related. From this point of view, Indian durums are well placed as all the entries including checks except MACS 3927 (γ -gliadin 42), MACS 4020 and GW 1315 (γ -gliadin 44) had γ -gliadin 45.

Table 36: Grain appearance of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Panchnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	6.1	6.8	7.6	6.4	6.2	6.6
2. PDW 233 (C)	05	5.9	7.3	7.3	6.5	6.8	6.8
3. PDW 291 (C)	03	6.5	7.4	7.7	7.2	7.0	7.2
4. PDW 314 (C)	08	6.0	7.6	7.1	6.7	6.7	6.8
5. HD 2967 (C)	07	5.0	6.6	6.2	6.2	6.1	6.0
6. WH 1105 (C)	04	6.1	6.5	6.1	6.4	6.3	6.3
7. DDW 31	01	6.3	7.5	7.5	6.9	6.4	6.9
8. DDW 32	10	5.9	6.8	6.4	6.4	6.7	6.4
9. MACS 3949	09	6.4	7.4	7.8	6.6	6.3	6.9
10. MACS 4024	06	6.3	7.4	7.4	6.7	6.3	6.8
Mean		6.1	7.1	7.1	6.6	6.5	6.7

Table 37: Grain appearance of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	8.1	7.4	7.9	6.4	8.2	7.6
2. HD 4730	06	7.7	6.9	7.9	6.5	8.4	7.5
3. HI 8498 (C)	02	8.2	6.6	7.9	6.4	7.9	7.4
4. MPO 1215 (C)	01	7.9	6.4	7.8	6.3	7.5	7.2
5. HI 8737 (I)	03	7.1	6.5	8.2	6.5	7.3	7.1
6. HI 8759	04	7.4	6.3	8.0	6.7	8.3	7.3
Mean		7.7	6.7	8.0	6.5	7.9	7.4

Table 38: Grain appearance of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	6.9	6.3	6.8	6.7
2. MACS 3949	09	8.0	6.7	7.7	7.5
3. HI 8759	07	7.8	6.6	7.3	7.2
4. UAS 453	03	6.7	6.4	6.7	6.6
Mean		7.4	6.5	7.1	7.0
Rainfed, Timely Sown					
1. MACS 3927	04	-	7.2	-	7.2
2. AKDW 2997-16 (C)	09	-	7.4	-	7.4
3. UAS 446 (I)	11	-	7.6	-	7.6
4. MACS 3972	02	-	7.9	-	7.9
5. MACS 4020	12	-	7.5	-	7.5
6. HI 8765	08	-	7.2	-	7.2
7. GW 1315	14	-	6.2	-	6.2
8. UAS 455	07	-	7.3	-	7.3
Mean		-	7.3	-	7.3
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	6.9	5.2	6.5	6.2
2. MACS 3970	04	8.1	5.5	7.8	7.1
Mean		7.5	5.4	7.2	6.7

Table 39: Test Weight (kg/ha) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	83.5	80.5	81.0	78.2	78.2	80.3
2. PDW 233 (C)	05	73.4	82.1	81.2	79.0	76.7	78.5
3. PDW 291 (C)	03	79.8	81.4	81.4	79.5	78.2	80.1
4. PDW 314 (C)	08	78.7	82.0	82.4	79.3	77.2	79.9
5. HD 2967 (C)	07	70.2	80.3	79.2	76.7	75.2	76.3
6. WH 1105 (C)	04	75.1	81.0	79.4	77.0	77.7	78.0
7. DDW 31	01	78.2	80.6	79.5	79.2	78.2	79.1
8. DDW 32	10	73.6	77.5	78.0	75.8	78.3	76.6
9. MACS 3949	09	78.6	82.2	80.2	80.0	75.6	79.3
10. MACS 4024	06	77.6	81.3	81.1	79.5	78.9	79.7
Mean		76.9	80.9	80.3	78.4	77.4	78.8

Table 40: Test Weight (kg/ha) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	83.6	81.6	81.0	80.3	80.3	81.4
2. HD 4730	06	83.2	81.8	80.4	80.1	83.5	81.8
3. HI 8498 (C)	02	82.7	81.4	80.5	78.6	83.6	81.4
4. MPO 1215 (C)	01	82.3	81.0	79.7	76.5	83.3	80.6
5. HI 8737 (I)	03	83.0	82.1	80.6	79.0	82.5	81.4
6. HI 8759	04	82.5	82.0	82.0	80.1	83.0	81.9
Mean		82.9	81.7	80.7	79.1	82.7	81.4

Table 41: Test Weight (kg/ha) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	82.5	77.6	83.9	81.3
2. MACS 3949	09	83.0	79.2	83.5	81.9
3. HI 8759	07	84.0	80.0	83.5	82.5
4. UAS 453	03	82.0	78.4	82.0	80.8
Mean		82.9	78.8	83.2	81.6
Rainfed, Timely Sown					
1. MACS 3927	04	-	83.0	-	83.0
2. AKDW 2997-16 (C)	09	-	81.7	-	81.7
3. UAS 446 (I)	11	-	83.5	-	83.5
4. MACS 3972	02	-	83.2	-	83.2
5. MACS 4020	12	-	81.3	-	81.3
6. HI 8765	08	-	83.6	-	83.6
7. GW 1315	14	-	76.5	-	76.5
8. UAS 455	07	-	83.5	-	83.5
Mean		-	82.0	-	82.0
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	77.5	71.3	77.1	75.3
2. MACS 3970	04	81.3	78.4	80.5	80.1
Mean		79.4	74.9	78.8	77.7

Table 42: Protein Content of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	10.4	12.3	13.4	8.8	10.4	11.1
2. PDW 233 (C)	05	12.5	13.0	14.1	9.7	12.3	12.3
3. PDW 291 (C)	03	11.8	11.8	14.0	9.6	12.6	11.9
4. PDW 314 (C)	08	11.8	12.4	13.7	10.1	12.1	12.0
5. HD 2967 (C)	07	11.2	13.8	14.5	9.4	12.9	12.4
6. WH 1105 (C)	04	11.2	12.8	14.0	9.4	12.2	11.9
7. DDW 31	01	12.0	13.9	13.8	9.7	11.2	12.1
8. DDW 32	10	11.4	12.1	14.2	9.1	11.1	11.6
9. MACS 3949	09	11.6	12.6	13.8	9.3	13.1	12.1
10. MACS 4024	06	11.5	12.9	12.9	9.4	11.2	11.6
Mean		11.5	12.8	13.8	9.5	11.9	11.9

Table 43: Protein Content of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	8.6	11.9	12.9	13.6	11.8	11.8
2. HD 4730	06	9.1	11.5	12.7	14.4	12.3	12.0
3. HI 8498 (C)	02	10.1	12.1	13.0	14.7	12.1	12.4
4. MPO 1215 (C)	01	8.8	13.1	12.9	14.9	10.3	12.0
5. HI 8737 (I)	03	9.9	12.3	12.7	14.1	11.2	12.0
6. HI 8759	04	9.1	11.2	13.1	14.2	11.2	11.7
Mean		9.3	12.0	12.9	14.3	11.5	12.0

Table 44: Protein Content of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	12.0	12.5	12.2	12.2
2. MACS 3949	09	11.8	11.6	12.9	12.1
3. HI 8759	07	11.4	11.1	11.2	11.2
4. UAS 453	03	11.4	10.9	11.4	11.3
Mean		11.7	11.5	12.0	11.7
Rainfed, Timely Sown					
1. MACS 3927	04	-	10.7	-	10.7
2. AKDW 2997-16 (C)	09	-	11.1	-	11.1
3. UAS 446 (I)	11	-	10.5	-	10.5
4. MACS 3972	02	-	10.6	-	10.6
5. MACS 4020	12	-	10.8	-	10.8
6. HI 8765	08	-	10.2	-	10.2
7. GW 1315	14	-	9.9	-	9.9
8. UAS 455	07	-	11.0	-	11.0
Mean		-	10.6	-	10.6
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	12.9	13.4	11.6	12.7
2. MACS 3970	04	13.4	12.9	12.1	12.8
Mean		13.2	13.2	11.9	12.7

Table 45: Grain Hardness Index of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	88	89	95	70	87	86
2. PDW 233 (C)	05	99	89	96	87	90	92
3. PDW 291 (C)	03	94	98	101	85	92	94
4. PDW 314 (C)	08	87	84	99	76	83	86
5. HD 2967 (C)	07	61	72	79	55	54	64
6. WH 1105 (C)	04	67	72	78	54	71	68
7. DDW 31	01	96	88	97	75	79	87
8. DDW 32	10	87	85	89	69	82	82
9. MACS 3949	09	95	90	101	78	84	90
10. MACS 4024	06	91	83	94	72	79	84
Mean		87	85	93	72	80	83

Table 46: Grain Hardness Index of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	77	82	78	80	88	81
2. HD 4730	06	80	85	81	81	92	84
3. HI 8498 (C)	02	76	82	91	85	87	84
4. MPO 1215 (C)	01	85	86	89	85	87	86
5. HI 8737 (I)	03	78	95	89	80	86	86
6. HI 8759	04	90	77	84	86	88	85
Mean		81	85	85	83	88	84

Table 47: Grain Hardness Index of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	83	85	88	85
2. MACS 3949	09	91	83	85	86
3. HI 8759	07	96	83	84	88
4. UAS 453	03	94	81	87	87
Mean		91	83	86	87
Rainfed, Timely Sown					
1. MACS 3927	04	-	84	-	84
2. AKDW 2997-16 (C)	09	-	94	-	94
3. UAS 446 (I)	11	-	91	-	91
4. MACS 3972	02	-	88	-	88
5. MACS 4020	12	-	89	-	89
6. HI 8765	08	-	82	-	82
7. GW 1315	14	-	70	-	70
8. UAS 455	07	-	94	-	94
Mean		-	87	-	87
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	93	78	90	87
2. MACS 3970	04	97	99	106	101
Mean		95	89	98	94

Table 48: Sedimentation Value (ml) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Panthagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	40	35	36	30	35	35
2. PDW 233 (C)	05	33	37	40	36	39	37
3. PDW 291 (C)	03	30	28	30	32	36	31
4. PDW 314 (C)	08	35	35	40	38	42	38
5. HD 2967 (C)	07	59	55	51	55	51	54
6. WH 1105 (C)	04	59	57	57	55	60	58
7. DDW 31	01	48	38	37	34	37	39
8. DDW 32	10	42	40	46	41	49	44
9. MACS 3949	09	46	40	46	36	46	43
10. MACS 4024	06	34	34	38	32	36	35
Mean		43	40	42	39	43	41

Table 49: Sedimentation Value (ml) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	26	33	34	33	28	32
2. HD 4730	06	33	30	36	33	34	33
3. HI 8498 (C)	02	34	32	39	31	30	33
4. MPO 1215 (C)	01	35	31	36	34	33	34
5. HI 8737 (I)	03	35	32	39	31	42	36
6. HI 8759	04	28	30	37	30	28	31
Mean		33	31	37	32	33	33

Table 50: Sedimentation Value (ml) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	34	36	31	34
2. MACS 3949	09	35	39	39	38
3. HI 8759	07	29	35	31	32
4. UAS 453	03	34	35	34	34
Mean		33	36	34	34
Rainfed, Timely Sown					
1. MACS 3927	04	-	26	-	26
2. AKDW 2997-16 (C)	09	-	38	-	38
3. UAS 446 (I)	11	-	40	-	40
4. MACS 3972	02	-	35	-	35
5. MACS 4020	12	-	27	-	27
6. HI 8765	08	-	40	-	40
7. GW 1315	14	-	26	-	26
8. UAS 455	07	-	28	-	28
Mean		-	33	-	33
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	40	36	42	39
2. MACS 3970	04	40	35	37	37
Mean		40	36	40	38

Table 51: Yellow Berry Incidence (%) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Panthagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	4.6	21.1	2.2	49.2	45.3	24.5
2. PDW 233 (C)	05	2.3	2.6	0.2	14.3	5.2	4.9
3. PDW 291 (C)	03	5.1	4.3	0.1	24.4	9.3	8.6
4. PDW 314 (C)	08	11.1	8.3	0.3	23.4	13.2	11.3
5. HD 2967 (C)	07	0.4	0.2	0.1	0.3	0.2	0.2
6. WH 1105 (C)	04	0.1	0.2	0.3	0.1	0.1	0.2
7. DDW 31	01	14.1	0.3	1.1	30.3	10.2	11.2
8. DDW 32	10	5.2	7.1	0.2	15.3	18.2	9.2
9. MACS 3949	09	2.2	4.3	0.1	40.3	8.3	11.0
10. MACS 4024	06	5.2	4.1	0.2	28.2	11.1	9.8
Mean		5.0	5.3	0.5	22.6	12.1	9.1

Table 52: Yellow Berry Incidence (%) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	39.2	6.1	2.2	0.3	2.4	10.0
2. HD 4730	06	23.1	26.2	4.2	0.3	14.1	13.6
3. HI 8498 (C)	02	12.3	10.3	0.1	0.2	11.1	6.8
4. MPO 1215 (C)	01	6.4	4.2	3.2	1.1	5.3	4.0
5. HI 8737 (I)	03	35.6	10.0	3.3	3.1	0.3	10.5
6. HI 8759	04	25.3	7.2	0.4	1.2	4.4	7.7
Mean		23.7	10.7	2.2	1.0	6.3	8.8

Table 53: Yellow Berry Incidence (%) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	0.3	4.4	12.2	5.6
2. MACS 3949	09	3.3	11.1	2.2	5.5
3. HI 8759	07	1.3	10.1	3.4	4.9
4. UAS 453	03	3.4	10.6	9.5	7.8
Mean		2.1	9.1	6.8	6.0
Rainfed, Timely Sown					
1. MACS 3927	04	-	23.3	-	23.3
2. AKDW 2997-16 (C)	09	-	18.2	-	18.2
3. UAS 446 (I)	11	-	1.4	-	1.4
4. MACS 3972	02	-	11.5	-	11.5
5. MACS 4020	12	-	23.5	-	23.5
6. HI 8765	08	-	29.3	-	29.3
7. GW 1315	14	-	66.3	-	66.3
8. UAS 455	07	-	23.5	-	23.5
Mean		-	24.6	-	24.6
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	1.2	2.5	1.6	1.8
2. MACS 3970	04	0.5	1.8	2.3	1.5
Mean		0.9	2.2	2.0	1.7

Table 54: Yellow Pigment Content (ppm) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	6.67	6.80	6.67	7.17	7.13	6.89
2. PDW 233 (C)	05	8.58	7.57	7.33	7.57	8.13	7.84
3. PDW 291 (C)	03	5.31	5.41	5.81	6.06	5.84	5.69
4. PDW 314 (C)	08	5.98	5.86	5.97	5.75	5.37	5.79
5. HD 2967 (C)	07	4.24	4.15	3.53	4.22	3.74	3.98
6. WH 1105 (C)	04	3.81	4.20	4.34	3.45	4.11	3.98
7. DDW 31	01	7.73	7.17	7.73	6.74	7.19	7.31
8. DDW 32	10	6.88	7.68	7.15	7.50	7.75	7.39
9. MACS 3949	09	6.91	6.25	7.31	7.17	6.70	6.87
10. MACS 4024	06	6.65	7.31	6.92	7.17	6.97	7.00
Mean		6.28	6.24	6.28	6.28	6.29	6.27

Table 55: Yellow Pigment Content (ppm) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	4.34	4.53	4.01	4.87	5.22	4.59
2. HD 4730	06	4.13	4.06	4.45	4.44	5.20	4.46
3. HI 8498 (C)	02	4.66	5.29	4.44	4.55	4.78	4.74
4. MPO 1215 (C)	01	5.82	5.92	5.87	6.05	6.04	5.94
5. HI 8737 (I)	03	6.25	5.96	5.71	5.72	6.05	5.94
6. HI 8759	04	5.80	6.20	5.90	6.39	6.52	6.16
Mean		5.17	5.33	5.06	5.34	5.64	5.31

Table 56: Yellow Pigment Content (ppm) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	6.25	6.06	5.69	6.00
2. MACS 3949	09	6.69	6.11	6.37	6.39
3. HI 8759	07	7.14	6.38	7.00	6.84
4. UAS 453	03	7.17	7.42	6.87	7.15
Mean		6.81	6.49	6.48	6.60
Rainfed, Timely Sown					
1. MACS 3927	04	-	5.06	-	5.06
2. AKDW 2997-16 (C)	09	-	4.21	-	4.21
3. UAS 446 (I)	11	-	6.19	-	6.19
4. MACS 3972	02	-	4.59	-	4.59
5. MACS 4020	12	-	6.21	-	6.21
6. HI 8765	08	-	5.07	-	5.07
7. GW 1315	14	-	5.00	-	5.00
8. UAS 455	07	-	5.86	-	5.86
Mean	-		5.06	-	5.06
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	4.84	4.42	4.40	4.55
2. MACS 3970	04	4.48	4.11	4.62	4.40
Mean		4.66	4.27	4.51	4.48

Table 57: Moisture Content (%) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	10.3	8.2	9.5	11.1	10.8	10.0
2. PDW 233 (C)	05	10.0	8.1	9.7	11.1	10.9	10.0
3. PDW 291 (C)	03	10.0	8.4	9.8	10.9	10.3	9.9
4. PDW 314 (C)	08	9.9	8.1	9.6	11.0	10.3	9.8
5. HD 2967 (C)	07	9.9	7.7	9.7	11.2	10.5	9.8
6. WH 1105 (C)	04	10.4	8.1	9.6	11.4	10.8	10.1
7. DDW 31	01	10.1	8.2	10.3	11.3	11.0	10.2
8. DDW 32	10	10.0	8.3	9.1	11.2	10.2	9.8
9. MACS 3949	09	10.2	8.2	9.8	11.1	9.7	9.8
10. MACS 4024	06	10.0	8.2	9.7	11.1	10.4	9.9
Mean		10.1	8.2	9.7	11.1	10.5	9.9

Table 58: Moisture Content (%) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	9.0	9.8	10.1	9.0	9.9	9.6
2. HD 4730	06	8.6	9.8	10.1	8.6	9.7	9.4
3. HI 8498 (C)	02	10.1	10.1	10.7	8.8	9.5	9.8
4. MPO 1215 (C)	01	10.8	9.8	10.6	8.7	9.7	9.9
5. HI 8737 (I)	03	8.5	9.8	10.5	8.3	10.1	9.4
6. HI 8759	04	10.1	10.0	10.3	8.6	9.7	9.7
Mean		9.5	9.9	10.4	8.7	9.8	9.6

Table 59: Moisture Content (%) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	9.9	11.3	10.3	10.5
2. MACS 3949	09	10.0	11.2	10.1	10.4
3. HI 8759	07	10.1	11.2	10.2	10.5
4. UAS 453	03	10.0	11.1	9.9	10.3
Mean		10.0	11.2	10.1	10.4
Rainfed, Timely Sown					
1. MACS 3927	04	-	10.2	-	10.2
2. AKDW 2997-16 (C)	09	-	10.0	-	10.0
3. UAS 446 (I)	11	-	9.9	-	9.9
4. MACS 3972	02	-	10.0	-	10.0
5. MACS 4020	12	-	10.1	-	10.1
6. HI 8765	08	-	9.8	-	9.8
7. GW 1315	14	-	10.3	-	10.3
8. UAS 455	07	-	10.6	-	10.6
Mean		-	10.1	-	10.1
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	9.8	12.7	11.9	11.5
2. MACS 3970	04	9.9	12.3	11.7	11.3
Mean		9.9	12.5	11.8	11.4

Table 60: Y-gliadin of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Y-gliadin
Irrigated, Timely Sown		
1. HD 4730	02	45
2. PDW 233 (C)	05	45
3. PDW 291 (C)	03	45
4. PDW 314 (C)	08	45
5. HD 2967 (C)	07	Bread Wheat
6. WH 1105 (C)	04	Bread Wheat
7. DDW 31	01	45
8. DDW 32	10	45
9. MACS 3949	09	45
10. MACS 4024	06	45

Table 61: Y-gliadin of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Y-gliadin
Irrigated, Timely Sown		
1. HD 4728	08	45
2. HD 4730	06	45
3. HI 8498 (C)	02	45
4. MPO 1215 (C)	01	45
5. HI 8737 (I)	03	45
6. HI 8759	04	45

Table 62: Y-gliadin of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Y-gliadin
Irrigated, Timely Sown		
1. UAS 428 (C)	01	45
2. MACS 3949	09	45
3. HI 8759	07	45
4. UAS 453	03	45
Rainfed, Timely Sown		
1. MACS 3927	04	42
2. AKDW 2997-16 (C)	09	45
3. UAS 446 (I)	11	45
4. MACS 3972	02	45
5. MACS 4020	12	44
6. HI 8765	08	45
7. GW 1315	14	44
8. UAS 455	07	45
Restricted Irrigation, Timely Sown		
1. AKDW 2997-16 (C)	07	45
2. MACS 3970	04	45

SECTION B

NATIONAL INITIAL VARIETAL TRIALS

- i. NIVT 1A
- ii. NIVT 1B
- iii. NIVT 2
- iv. NIVT 3A
- v. NIVT 3B
- vi. NIVT 4
- vii. NIVT 5A
- viii. NIVT 5B
- ix. IVTs from NHZ and SHZ

NATIONAL INITIAL VARIETAL TRIALS

All entries received for initial varietal screening in the coordinated trials were examined for some important quality parameters like grain appearance score, grain protein content, sedimentation value, test weight and phenol reaction score. In addition, the durum entries were also evaluated for yellow berry incidence and yellow pigments content. There were seven such multi-zone trials, the results of which are discussed below:

NIVT 1A (Irrigated, Timely Sown) – Table 1-5

Samples of 49 entries were received from five locations in the NWPZ and three locations in the NEPZ and analyzed for some important quality parameters like grain appearance score, test weight, grain protein content, sedimentation value and phenol reaction score. Grain appearance score within different locations varied from 5.3 to 5.7 with Durgapura and Kanpur recording the highest mean value. The entries PBW 725, HD 3183, Raj 4419 and Raj 4417 were the best with 5.8 grain appearance score. The highest mean test weight value of 77.0kg/hl was recorded at Durgapura followed by Kanpur with a value of 76.3kg/hl. The lowest mean test weight value of 72.2kg/hl was observed for the entries grown at Sabour. The highest test weight value of 76.8kg/hl was observed for the entries DBW 159 and UP 2905. The mean value of protein content in the NWPZ and NEPZ was observed as 12.37 and 12.13 percent respectively. The lowest protein content among different locations was recorded at Kanpur (10.51 percent) and highest at Pusa (13.31 percent). The entry UP 2905 was observed to have highest protein content value of 13.20 percent followed by two more entries UP 2904 and NW 6050 with protein content of 13.02 and 13.01 percent respectively. There were a large number of entries with a protein content value of more than 12.00 percent. On the whole the SDS-sedimentation values of the entries varied from 30-48 with a mean value of 42cc. The highest sedimentation mean value of 47cc was recorded at Pusa whereas the lowest mean value of 38cc was observed at Kanpur. A number of entries were showing sedimentation values in the range of 35-45cc, desirable for chapatties. The mean phenol reaction score varied from 3.1 to 3.6 over the locations in the two zones. Even the value of zonal or overall mean was observed to be below 4.0 which is quite normal for chapatti dough. The best entries having lowest phenol reaction score were NW 6047 (2.6) and Mahyco-Goal (2.6). In addition eight more entries were showing phenol reaction score of less than 3.0, considered desirable for chapatties as such dough can be stored for longer time without the risk of darkening.

Table 1: Grain appearance score (Max-10) of *T.aestivum* genotypes in NIVT-1A

Sr. No	Entry	Trial Code	NWPZ						NEPZ				Overall Mean
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusha	Kanpur	Sabour	Mean	
1	WH 1182	01	5.6	5.4	5.8	5.6	5.5	5.6	5.5	5.7	5.5	5.6	5.6
2	HD 2733(C)	02	4.7	5.1	5.3	5.6	5.5	5.2	5.8	5.6	5.6	5.7	5.4
3	DBW 158	03	5.1	5.3	5.7	5.2	5.5	5.4	5.4	5.6	5.6	5.3	5.4
4	WH1105(C)	04	5.3	5.7	6.0	5.4	5.5	5.6	5.5	5.9	5.4	5.6	5.6
5	BRW 3762	05	4.8	5.1	5.4	5.5	5.3	5.2	5.1	5.6	5.0	5.2	5.2
6	HUW 701	06	5.6	5.3	5.4	5.4	5.6	5.5	5.5	5.6	5.1	5.4	5.4
7	PBW 724	07	5.5	4.9	5.5	5.6	5.5	5.4	5.7	5.6	5.4	5.6	5.5
8	HD 3186	08	5.5	5.5	5.6	5.4	5.5	5.5	5.4	5.8	5.2	5.5	5.5
9	HD 3180	09	5.1	5.2	5.7	5.1	5.6	5.3	5.6	5.5	5.3	5.5	5.4
10	UP 2901	10	5.4	5.1	5.6	5.3	5.7	5.4	5.2	5.7	4.7	5.2	5.3
11	K 0307 (C)	11	5.5	5.3	5.7	5.5	5.7	5.5	5.7	5.9	5.6	5.7	5.6
12	JAUW 635	12	5.5	5.4	5.8	5.5	5.6	5.6	5.3	6.0	5.1	5.5	5.5
13	WH 1186	13	5.5	5.5	5.6	5.4	5.6	5.5	5.7	5.7	5.2	5.5	5.5
14	DBW 159	14	5.5	5.2	5.8	5.5	5.7	5.5	5.7	6.0	5.5	5.7	5.6
15	DBW 156	15	5.0	4.8	5.6	5.4	5.6	5.3	5.2	5.9	5.5	5.5	5.4
16	HS 602	16	5.0	5.1	5.4	5.4	5.6	5.3	5.6	5.6	5.5	5.6	5.4
17	K 1401	17	5.2	5.2	5.4	5.1	5.4	5.3	5.6	5.6	5.4	5.5	5.4
18	PBW 725	18	5.9	5.6	6.1	5.6	5.8	5.8	5.7	6.4	5.3	5.8	5.8
19	WH 1184	19	5.4	5.0	5.8	5.6	5.8	5.5	5.5	5.8	5.4	5.6	5.5
20	Raj 4418	20	5.7	5.6	6.1	5.6	5.8	5.8	5.7	5.7	5.4	5.6	5.7
21	K 1402	21	5.5	5.8	5.9	5.6	5.8	5.7	5.6	5.6	5.4	5.5	5.7
22	HD 3182	22	5.5	5.0	5.8	5.5	5.3	5.4	5.6	5.9	5.2	5.6	5.5
23	HD 2967 (C)	23	4.7	5.2	5.4	5.4	5.4	5.2	5.5	5.5	5.3	5.4	5.3
24	JKW 205	24	5.5	5.4	5.5	5.1	4.9	5.3	5.0	5.7	5.0	5.2	5.3
25	PBW 727	25	5.7	5.6	5.9	5.4	5.2	5.6	5.6	5.9	5.1	5.5	5.6
26	NW 6047	26	5.3	5.3	5.6	5.5	5.6	5.5	5.3	5.9	5.3	5.5	5.5
27	PBW 726	27	5.8	5.5	5.7	5.3	5.9	5.6	5.8	5.8	5.2	5.6	5.6
28	WH 1183	28	5.4	5.1	5.4	5.3	4.7	5.2	5.3	5.6	5.3	5.4	5.3
29	UP 2904	29	4.8	5.2	5.8	5.2	5.7	5.3	5.2	5.6	5.3	5.4	5.4
30	DBW 160	30	5.3	5.3	5.6	5.4	5.5	5.4	5.3	5.3	5.4	5.3	5.4
31	DBW 162	31	5.3	4.9	5.2	5.4	5.5	5.3	4.8	5.5	4.8	5.0	5.2
32	BRW 3763	32	5.6	5.0	5.3	5.5	5.5	5.4	5.6	5.2	5.6	5.5	5.4
33	UP 2903	33	5.4	5.9	6.0	5.4	5.8	5.7	5.4	6.2	5.5	5.7	5.7
34	Mahyco Goal	34	5.4	5.6	5.6	5.5	5.7	5.6	5.5	5.9	5.2	5.5	5.6
35	DBW 161	35	5.4	5.2	5.4	5.5	5.6	5.4	5.5	5.4	5.0	5.3	5.4
36	HD 3181	36	5.5	5.3	5.7	5.5	5.7	5.5	5.4	5.8	5.3	5.5	5.5
37	DBW 157	37	5.5	5.5	5.8	5.5	5.7	5.6	5.6	5.8	5.5	5.6	5.6
38	HD 3184	38	5.4	5.3	5.7	5.4	5.7	5.5	5.6	5.7	5.4	5.6	5.5
39	NW 6050	39	5.8	5.5	5.9	5.8	5.7	5.7	5.6	6.0	5.4	5.7	5.7
40	HD 3183	40	5.6	5.7	6.0	5.7	5.7	5.7	5.5	6.4	5.7	5.9	5.8
41	PBW 728	41	5.7	5.6	5.7	5.6	5.8	5.7	5.3	5.6	5.4	5.4	5.6
42	Raj 4421	42	5.5	5.7	5.9	5.5	5.7	5.7	5.6	5.6	5.1	5.4	5.6
43	Raj 4419	43	5.7	5.8	6.1	5.9	5.9	5.9	5.8	5.9	5.7	5.8	5.9
44	HUW 702	44	5.6	5.5	5.8	5.6	5.4	5.6	5.6	5.8	5.5	5.6	5.6
45	UP 2905	45	5.8	5.6	5.9	5.8	5.9	5.8	5.7	5.6	5.0	5.4	5.7
46	UP 2902	46	5.6	5.7	5.7	5.7	5.9	5.7	5.8	5.6	5.3	5.6	5.7
47	HD 3185	47	5.4	5.2	5.8	5.4	5.7	5.5	5.6	5.5	5.4	5.5	5.5
48	WH 1185	48	5.6	5.6	5.9	5.7	5.6	5.7	5.4	5.8	5.4	5.5	5.6
49	Raj 4417	49	5.6	5.7	6.3	5.6	5.8	5.8	5.9	5.8	5.6	5.8	5.8
Mean			5.4	5.4	5.7	5.5	5.6	5.5	5.5	5.7	5.3	5.5	5.5

Table 2: Test weight (kg/ha) of *T.aestivum* genotypes in NIVT-1A

Sr. No	Entry	Trial Code	NWPZ					NEPZ			Overall Mean	
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusa	Kanpur		
1	WH 1182	01	73.0	74.0	77.3	74.5	73.5	74.5	74.5	76.3	72.8	74.5 74.5
2	HD 2733 (C)	02	68.8	75.0	74.0	74.8	75.5	73.6	77.3	75.8	74.8	76.0 74.5
3	DBW 158	03	71.3	73.8	77.3	71.5	74.0	73.6	73.0	75.0	70.0	72.7 73.2
4	WH 1105 (C)	04	71.8	76.3	77.5	73.3	76.5	75.1	73.3	77.3	71.3	74.0 74.7
5	BRW 3762	05	69.0	73.0	75.5	74.3	75.0	73.4	73.3	75.5	70.8	73.2 73.3
6	HUW 701	06	75.0	73.5	75.0	73.0	76.0	74.5	74.5	75.3	70.3	73.4 74.1
7	PBW 724	07	73.8	71.5	75.0	75.5	74.8	74.1	76.0	75.0	72.0	74.3 74.2
8	HD 3186	08	76.3	76.8	78.3	74.8	78.3	76.9	75.8	78.3	74.3	76.1 76.6
9	HD 3180	09	71.0	72.8	76.8	73.0	75.5	73.8	74.8	74.8	71.0	73.5 73.7
10	UP 2901	10	72.0	72.5	75.3	72.5	75.8	73.6	73.0	75.5	69.0	72.5 73.2
11	K 0307 (C)	11	73.3	75.0	77.8	74.8	77.0	75.6	77.0	77.3	74.0	76.1 75.8
12	JAUW 635	12	74.0	76.0	77.8	74.0	76.5	75.7	73.5	77.0	70.3	73.6 74.9
13	WH 1186	13	73.5	73.5	75.3	74.5	75.5	74.5	74.5	75.0	70.0	73.2 74.0
14	DBW 159	14	76.0	75.3	78.0	74.8	78.5	76.5	77.8	78.0	76.3	77.4 76.8
15	DBW 156	15	73.5	71.3	77.8	74.5	75.3	74.5	73.5	76.5	71.8	73.9 74.3
16	HS 602	16	75.8	75.0	75.3	74.3	76.8	75.4	77.3	77.5	73.8	76.2 75.7
17	K 1401	17	74.0	73.3	73.5	71.8	72.0	72.9	76.5	76.0	72.3	74.9 73.7
18	PBW 725	18	77.8	76.0	78.5	75.8	77.3	77.1	76.5	76.8	72.0	75.1 76.3
19	WH 1184	19	74.8	74.0	78.0	74.8	76.8	75.7	76.3	77.3	72.8	75.5 75.6
20	Raj 4418	20	75.5	75.5	78.0	77.3	76.8	76.6	77.0	76.5	73.0	75.5 76.2
21	K 1402	21	74.8	76.5	78.0	73.5	75.8	75.7	75.3	76.0	73.3	74.9 75.4
22	HD 3182	22	74.8	73.5	77.8	74.3	74.8	75.0	75.3	77.3	72.3	75.0 75.0
23	HD 2967 (C)	23	68.3	74.3	76.0	72.8	74.8	73.2	75.8	76.3	71.0	74.4 73.7
24	JKW 205	24	74.8	75.0	77.3	69.8	70.5	73.5	70.3	77.3	69.0	72.2 73.0
25	PBW 727	25	76.0	75.8	78.5	74.0	74.0	75.7	76.3	77.5	72.3	75.4 75.6
26	NW 6047	26	73.0	74.3	76.5	74.5	74.8	74.6	74.0	77.0	71.0	74.0 74.4
27	PBW 726	27	76.8	75.8	76.8	72.0	77.3	75.7	77.3	76.3	72.8	75.5 75.6
28	WH 1183	28	75.3	72.3	75.0	73.3	68.5	72.9	75.0	76.3	72.8	74.7 73.6
29	UP 2904	29	69.8	74.0	76.8	74.0	76.0	74.1	73.3	75.3	73.0	73.9 74.0
30	DBW 160	30	74.3	74.5	76.5	74.5	74.5	74.9	74.0	74.3	75.5	74.6 74.8
31	DBW 162	31	72.5	73.3	75.8	73.3	75.8	74.1	71.0	76.0	70.0	72.3 73.5
32	BRW 3763	32	75.8	73.0	76.0	76.0	76.0	75.4	76.3	74.8	73.8	75.0 75.2
33	UP 2903	33	72.5	76.3	77.8	73.3	76.0	75.2	73.5	76.3	72.0	73.9 74.7
34	Mahyco Goal	34	72.8	74.3	75.8	73.8	74.8	74.3	75.5	76.3	71.5	74.4 74.4
35	DBW 161	35	74.5	70.8	74.5	72.8	72.8	73.1	73.3	73.5	69.8	72.2 72.8
36	HD 3181	36	74.0	74.8	78.5	74.3	76.3	75.6	73.3	77.0	71.8	74.0 75.0
37	DBW 157	37	75.3	77.3	78.8	77.0	76.8	77.0	76.5	76.0	73.3	75.3 76.4
38	HD 3184	38	72.8	72.3	77.0	73.8	75.8	74.3	76.3	75.3	72.8	74.8 74.5
39	NW 6050	39	76.3	74.5	77.5	75.3	74.8	75.7	74.8	76.3	72.5	74.5 75.3
40	HD 3183	40	75.3	75.8	78.5	75.8	77.0	76.5	75.5	78.5	74.3	76.1 76.3
41	PBW 728	41	75.5	75.8	77.0	75.8	76.0	76.0	74.0	75.8	73.0	74.3 75.4
42	Raj 4421	42	74.8	74.5	76.5	72.5	74.8	74.6	74.5	75.0	70.3	73.3 74.1
43	Raj 4419	43	75.8	75.8	78.0	76.5	76.8	76.6	76.8	77.0	73.0	75.6 76.2
44	HUW 702	44	76.5	75.0	78.5	74.5	76.5	76.2	76.8	78.0	73.5	76.1 76.2
45	UP 2905	45	78.0	76.5	78.3	77.0	78.0	77.6	77.8	76.8	72.5	75.7 76.9
46	UP 2902	46	74.0	75.3	78.0	76.3	76.5	76.0	76.8	76.3	72.5	75.2 75.7
47	HD 3185	47	72.8	74.5	77.5	74.8	75.3	75.0	76.5	75.3	72.3	74.7 74.9
48	WH 1185	48	74.5	75.3	78.0	76.0	74.0	75.6	74.3	76.5	72.5	74.4 75.1
49	Raj 4417	49	76.0	77.0	79.5	75.0	77.8	77.1	76.3	76.8	73.5	75.5 76.5
Mean			74.0	74.5	77.0	74.3	75.5	75.1	75.1	76.3	72.2	74.5 74.9

Table 3: Protein content (%) of *T.aestivum* genotypes in NIVT-1A

Sr. No	Entry	Trial Code	NWPZ						NEPZ				Overall Mean
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusa	Kanpur	Sabour	Mean	
1	WH 1182	01	11.6	12.2	11.9	12.2	12.3	12.1	12.9	10.4	11.5	11.6	11.9
2	HD 2733 (C)	02	11.4	12.1	11.7	12.5	12.0	11.9	13.0	10.7	12.4	12.1	12.0
3	DBW 158	03	12.0	12.0	11.8	13.2	12.8	12.4	13.4	10.2	12.6	12.1	12.2
4	WH 1105 (C)	04	11.6	12.1	12.2	12.1	11.9	12.0	12.8	10.4	12.9	12.0	12.0
5	BRW 3762	05	12.3	12.6	13.2	13.7	12.7	12.9	14.3	10.9	12.8	12.7	12.8
6	HUW 701	06	11.9	13.0	13.2	13.0	12.8	12.8	13.4	11.5	13.6	12.8	12.8
7	PBW 724	07	11.4	11.8	13.8	11.9	11.6	12.1	12.4	9.8	11.9	11.3	11.8
8	HD 3186	08	12.2	12.3	11.9	14.7	13.1	12.8	14.3	11.1	13.8	13.1	12.9
9	HD 3180	09	11.7	11.6	11.6	13.3	11.5	12.0	13.5	10.8	13.2	12.5	12.2
10	UP 2901	10	11.4	12.7	11.9	12.2	11.6	12.0	13.2	10.7	13.8	12.6	12.2
11	K 0307 (C)	11	10.7	13.5	13.0	12.2	12.6	12.4	12.7	10.7	11.1	11.5	12.0
12	JAUW 635	12	11.5	9.9	12.2	12.5	12.1	11.6	13.2	10.6	13.0	12.2	11.9
13	WH 1186	13	12.2	11.7	12.4	12.7	12.5	12.3	11.9	10.1	11.9	11.3	11.9
14	DBW 159	14	11.8	12.6	11.3	12.0	11.8	11.9	12.4	10.8	11.8	11.7	11.8
15	DBW 156	15	12.0	13.7	11.2	12.9	12.4	12.4	13.6	10.0	12.5	12.0	12.3
16	HS 602	16	11.8	11.4	12.6	12.4	11.5	11.9	12.8	10.0	12.6	11.8	11.9
17	K 1401	17	12.3	12.1	12.5	12.6	12.1	12.3	12.7	9.9	12.6	11.7	12.1
18	PBW 725	18	11.9	12.8	11.7	12.9	12.5	12.4	13.3	11.1	12.0	12.1	12.3
19	WH 1184	19	11.8	12.0	13.1	12.7	12.5	12.4	12.6	10.4	12.2	11.7	12.2
20	Raj 4418	20	12.1	10.9	12.9	13.5	13.3	12.5	13.8	11.0	13.8	12.9	12.7
21	K 1402	21	11.7	11.5	13.0	12.8	12.9	12.4	13.9	11.5	13.6	13.0	12.6
22	HD 3182	22	12.7	12.3	11.9	12.9	12.5	12.5	13.9	10.3	11.7	11.9	12.3
23	HD 2967 (C)	23	11.6	12.3	13.5	12.8	12.6	12.6	12.4	9.5	12.4	11.4	12.1
24	JKW 205	24	10.7	10.9	12.5	12.2	11.7	11.6	14.0	9.3	12.7	12.0	11.8
25	PBW 727	25	10.8	11.2	11.4	12.0	11.6	11.4	12.3	9.5	13.4	11.7	11.5
26	NW 6047	26	12.1	12.2	12.3	12.3	11.5	12.1	13.3	10.4	12.0	11.9	12.0
27	PBW 726	27	11.5	12.4	14.4	12.4	12.1	12.6	12.7	9.8	11.7	11.4	12.1
28	WH 1183	28	10.9	12.2	11.6	10.9	11.8	11.5	12.4	8.7	11.5	10.8	11.3
29	UP 2904	29	11.7	14.7	13.9	14.0	12.3	13.3	14.2	10.8	12.6	12.6	13.0
30	DBW 160	30	12.0	11.4	11.9	12.6	12.0	12.0	13.3	12.0	12.7	12.6	12.2
31	DBW 162	31	11.9	11.5	12.2	11.7	11.9	11.9	13.7	9.6	12.7	12.0	11.9
32	BRW 3763	32	11.8	13.9	13.2	12.3	12.7	12.8	12.8	10.8	12.2	11.9	12.5
33	UP 2903	33	11.8	12.2	10.7	12.7	11.2	11.7	12.8	10.1	12.8	11.9	11.8
34	Mahyco Goal	34	11.3	12.6	12.8	13.9	13.6	12.8	13.7	11.1	12.6	12.5	12.7
35	DBW 161	35	12.8	13.3	13.2	13.7	12.6	13.1	14.0	11.4	12.7	12.7	13.0
36	HD 3181	36	12.9	13.5	12.2	13.7	12.1	12.9	13.4	10.4	12.1	11.9	12.5
37	DBW 157	37	11.0	12.6	12.8	12.8	11.4	12.1	12.3	11.0	11.9	11.7	12.0
38	HD 3184	38	11.0	14.7	12.5	13.9	13.0	13.0	13.8	10.6	12.6	12.3	12.8
39	NW 6050	39	12.7	13.7	12.9	13.8	12.2	13.1	14.3	11.2	13.2	12.9	13.0
40	HD 3183	40	12.0	10.6	11.0	11.9	11.5	11.4	12.7	10.1	11.7	11.5	11.4
41	PBW 728	41	11.5	13.1	13.7	12.8	12.5	12.7	13.9	10.3	13.3	12.5	12.6
42	Raj 4421	42	12.6	11.5	11.1	13.3	13.1	12.3	14.3	11.5	14.1	13.3	12.7
43	Raj 4419	43	11.9	12.5	13.6	13.4	12.8	12.8	13.5	10.6	12.1	12.1	12.5
44	HUW 702	44	12.1	14.2	12.4	13.1	13.0	12.9	14.6	10.6	12.8	12.7	12.8
45	UP 2905	45	13.2	12.9	14.2	14.0	13.4	13.5	13.8	11.0	13.2	12.6	13.2
46	UP 2902	46	13.3	12.2	12.3	14.5	13.1	13.1	14.3	11.3	12.3	12.6	12.9
47	HD 3185	47	11.5	13.5	12.0	12.8	11.6	12.3	13.0	10.5	11.7	11.7	12.1
48	WH 1185	48	11.9	12.2	10.4	11.9	12.8	11.8	13.3	10.0	12.0	11.8	11.8
49	Raj 4417	49	12.0	13.8	12.0	14.1	13.2	13.0	13.9	10.5	13.5	12.6	12.9
Mean			11.8	12.4	12.4	12.9	12.3	12.4	13.3	10.5	12.6	12.1	12.3

Table 4: Sedimentation value (ml) of *T.aestivum* genotypes in NIVT-1A

Sr. No	Entry	Trial Code	NWPZ					NEPZ				Overall Mean	
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusha	Kanpur	Sabour		
1	WH 1182	01	45	44	49	51	40	46	49	40	44	44	
2	HD2733(C)	02	32	34	36	39	33	35	37	33	35	35	
3	DBW 158	03	40	40	42	37	43	40	45	37	39	40	
4	WH1105(C)	04	44	46	50	41	50	46	48	40	47	45	
5	BRW3762	05	50	48	47	50	53	50	51	42	46	46	
6	HUW 701	06	38	40	44	38	41	40	44	35	38	39	
7	PBW 724	07	41	43	45	39	45	43	48	38	43	43	
8	HD 3186	08	37	40	42	41	43	41	46	41	39	42	
9	HD 3180	09	46	41	47	45	45	45	56	44	47	49	
10	UP 2901	10	33	34	33	33	35	34	40	30	33	34	
11	K 0307 (C)	11	30	30	32	31	35	32	40	28	29	32	
12	JAUW 635	12	37	37	43	36	38	38	45	39	41	42	
13	WH 1186	13	47	41	46	43	43	44	48	37	44	43	
14	DBW 159	14	40	43	44	45	42	43	50	36	40	42	
15	DBW 156	15	46	48	45	51	48	48	53	45	43	47	
16	HS 602	16	39	36	39	42	41	39	40	33	39	37	
17	K 1401	17	36	37	43	44	38	40	43	35	41	40	
18	PBW 725	18	40	45	45	46	49	45	46	39	44	43	
19	WH 1184	19	40	40	40	45	44	42	44	36	41	40	
20	Raj 4418	20	44	47	45	48	50	47	50	40	43	44	
21	K 1402	21	41	42	42	44	41	42	44	37	41	41	
22	HD 3182	22	42	41	45	45	48	44	45	47	44	45	
23	HD2967(C)	23	45	45	48	50	50	48	46	45	47	46	
24	JKW 205	24	36	38	43	42	45	41	44	40	42	41	
25	PBW 727	25	43	46	47	50	44	46	51	39	45	45	
26	NW 6047	26	41	44	44	46	51	45	54	41	50	48	
27	PBW 726	27	35	38	42	39	41	39	48	34	39	40	
28	WH 1183	28	38	39	39	40	41	39	45	39	41	42	
29	UP 2904	29	41	39	41	44	45	42	46	35	38	40	
30	DBW 160	30	43	42	39	43	48	43	50	41	34	42	
31	DBW 162	31	41	44	45	44	42	43	48	36	44	43	
32	BRW 3763	32	35	37	38	37	40	37	45	38	37	40	
33	UP 2903	33	43	50	39	46	49	45	48	39	45	44	
34	Mahyco Goal	34	32	35	41	34	38	36	41	33	33	36	
35	DBW 161	35	34	43	37	41	49	41	50	42	44	45	
36	HD 3181	36	43	48	44	46	46	45	45	40	40	44	
37	DBW 157	37	25	31	30	32	35	31	32	27	30	30	
38	HD 3184	38	46	46	47	46	51	47	51	42	44	46	
39	NW 6050	39	38	35	40	41	38	38	44	35	36	38	
40	HD 3183	40	37	35	35	40	42	38	45	38	36	40	
41	PBW 728	41	37	37	39	41	41	39	42	34	38	38	
42	Raj 4421	42	38	37	38	40	41	39	43	36	38	39	
43	Raj 4419	43	41	47	43	45	50	45	50	46	50	49	
44	HUW 702	44	45	45	47	45	54	47	51	45	43	46	
45	UP 2905	45	39	42	45	42	43	42	47	41	41	43	
46	UP 2902	46	39	46	46	45	50	45	54	45	40	46	
47	HD 3185	47	43	49	45	50	53	48	50	43	46	47	
48	WH 1185	48	46	42	48	42	45	45	50	37	41	43	
49	Raj 4417	49	46	50	45	46	51	48	53	44	45	47	
Mean			40	41	42	43	44	42	47	38	41	42	42

Table 5: Phenol reaction score (Max-10) of *T.aestivum* genotypes in NIVT-1A

Sr. No	Entry	Trial Code	NWPZ					NEPZ			Overall Mean	
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusa	Kanpur	Sabour	
1	WH 1182	01	3.3	3.0	3.7	3.2	3.4	3.3	3.4	3.8	3.3	3.5 3.4
2	HD 2733 (C)	02	3.6	3.2	3.5	3.1	3.2	3.3	3.3	3.7	3.4	3.5 3.4
3	DBW 158	03	3.5	3.4	3.8	3.4	3.0	3.4	3.6	3.7	3.6	3.6 3.5
4	WH 1105 (C)	04	3.6	3.6	3.7	3.5	3.5	3.6	3.7	3.5	3.7	3.6 3.6
5	BRW 3762	05	3.9	3.4	3.6	3.7	3.2	3.6	3.5	3.6	3.6	3.6 3.6
6	HUW 701	06	3.7	3.5	3.3	3.0	3.0	3.3	3.7	3.3	3.6	3.5 3.4
7	PBW 724	07	3.4	3.7	3.6	3.0	3.1	3.4	3.0	3.3	3.6	3.3 3.3
8	HD 3186	08	2.8	2.6	2.9	3.0	2.8	2.8	2.6	2.9	2.9	2.8 2.8
9	HD 3180	09	3.9	3.8	3.6	3.6	3.1	3.6	3.4	3.8	3.7	3.6 3.6
10	UP 2901	10	3.2	2.9	3.1	3.0	3.2	3.1	3.3	3.0	3.2	3.2 3.1
11	K 0307 (C)	11	3.9	3.5	3.4	3.3	3.2	3.5	3.4	3.4	3.9	3.6 3.5
12	JAUW 635	12	4.1	3.5	3.5	3.5	3.2	3.6	3.7	4.0	3.9	3.9 3.7
13	WH 1186	13	2.7	2.6	2.9	2.5	2.9	2.7	2.7	2.7	2.8	2.7 2.7
14	DBW 159	14	4.0	3.3	3.6	3.8	3.3	3.6	3.3	3.7	3.8	3.6 3.6
15	DBW 156	15	3.5	3.8	3.3	3.5	3.1	3.4	3.7	3.8	3.7	3.7 3.6
16	HS 602	16	4.2	3.5	3.4	3.4	3.0	3.5	3.2	3.0	3.6	3.3 3.4
17	K 1401	17	3.8	3.2	3.6	3.4	3.1	3.4	3.4	3.8	3.6	3.6 3.5
18	PBW 725	18	3.2	3.7	3.6	3.6	3.3	3.5	3.7	3.8	3.6	3.7 3.6
19	WH 1184	19	3.3	3.0	3.5	3.4	3.4	3.3	3.6	3.3	3.8	3.6 3.4
20	Raj 4418	20	2.7	2.7	2.7	2.8	2.7	2.7	2.8	2.8	2.7	2.8 2.7
21	K 1402	21	3.6	3.1	3.0	3.5	3.0	3.2	3.6	3.1	3.9	3.5 3.4
22	HD 3182	22	4.2	3.0	3.2	3.4	3.2	3.4	3.4	3.5	3.9	3.6 3.5
23	HD 2967 (C)	23	3.9	3.6	3.4	3.2	3.2	3.5	3.3	3.6	4.2	3.7 3.6
24	JKW 205	24	4.2	3.7	3.3	3.6	3.5	3.7	3.9	3.6	3.3	3.6 3.6
25	PBW 727	25	3.8	3.6	3.0	3.2	3.0	3.3	3.0	3.3	3.7	3.3 3.3
26	NW 6047	26	2.6	2.6	2.6	2.9	2.3	2.6	2.6	2.6	2.8	2.7 2.6
27	PBW 726	27	3.4	3.4	3.0	3.7	3.6	3.4	3.1	3.5	3.6	3.4 3.4
28	WH 1183	28	3.7	3.6	3.0	3.9	3.4	3.5	3.4	3.9	3.8	3.7 3.6
29	UP 2904	29	4.4	3.9	3.2	3.8	3.1	3.7	3.9	3.5	3.7	3.7 3.7
30	DBW 160	30	3.9	3.6	3.2	3.7	3.6	3.6	4.0	3.7	3.6	3.8 3.7
31	DBW 162	31	4.0	3.5	3.2	3.5	3.0	3.4	3.2	3.8	3.9	3.6 3.5
32	BRW 3763	32	2.8	2.6	2.5	2.7	2.9	2.7	3.1	2.3	2.5	2.6 2.7
33	UP 2903	33	3.6	3.9	3.4	4.0	3.1	3.6	3.5	3.4	3.7	3.5 3.6
34	Mahyco Goal	34	2.6	2.2	2.6	2.5	2.9	2.6	2.8	2.4	2.6	2.6 2.6
35	DBW 161	35	3.6	3.7	3.1	3.6	3.0	3.4	3.6	3.2	3.5	3.4 3.4
36	HD 3181	36	3.9	3.6	3.1	3.7	3.3	3.5	4.0	3.1	3.9	3.7 3.6
37	DBW 157	37	3.8	3.1	3.1	3.4	2.9	3.3	3.1	3.5	4.2	3.6 3.4
38	HD 3184	38	3.9	3.9	3.3	3.5	3.2	3.6	3.9	3.5	4.1	3.8 3.7
39	NW 6050	39	4.0	3.5	3.2	3.5	3.1	3.5	3.6	3.1	3.5	3.4 3.4
40	HD 3183	40	3.8	3.3	3.1	3.0	2.9	3.2	3.7	3.4	3.5	3.5 3.3
41	PBW 728	41	3.8	3.0	3.0	3.6	3.4	3.4	3.8	3.5	3.8	3.7 3.5
42	Raj 4421	42	2.8	2.6	2.4	2.8	2.7	2.7	2.8	2.7	2.8	2.8 2.7
43	Raj 4419	43	2.7	2.5	2.6	2.8	2.7	2.7	2.8	2.8	2.8	2.8 2.7
44	HUW 702	44	4.6	3.8	3.2	3.8	3.0	3.7	4.0	3.8	3.4	3.7 3.7
45	UP 2905	45	2.9	2.7	2.6	2.8	2.9	2.8	2.9	2.9	2.5	2.8 2.8
46	UP 2902	46	3.6	3.1	3.1	3.6	3.4	3.4	3.4	3.6	3.4	3.5 3.4
47	HD 3185	47	3.9	3.3	3.5	3.8	3.5	3.6	4.0	3.5	4.1	3.9 3.7
48	WH 1185	48	4.5	3.7	3.4	3.3	3.4	3.7	4.3	3.3	3.9	3.8 3.7
49	Raj 4417	49	2.8	2.6	2.9	2.9	2.8	2.8	2.8	2.8	3.0	2.9 2.8
Mean			3.6	3.3	3.2	3.3	3.1	3.3	3.4	3.3	3.5	3.4

NIVT 1B (Irrigated Timely Sown) – Table 6-9

Grain samples of 49 genotypes were received from five locations (Ludhiana, Hisar, Durgapura, Delhi and Pantnagar) of NWPZ and three sites (Pusa, Kanpur and Sabour) of NEPZ. Both the regions registered no difference in grain appearance score (6.7), sedimentation value (38 ml) and protein content (11.3 %). The test weight in NWPZ (75.1 kg/hl) was higher than the adjoining NEPZ (74.2 kg/hl). Grain appearance score varied between 6.2 to 7.1 in NWPZ and 6.1 to 7.4 in NEPZ and the best entries NW 6048 (7.1) in NWPZ and HD 2733 (7.4) in NEPZ were much better than the zonal checks. Durgapura location of NWPZ and Kanpur of NEPZ had well developed grains with grain appearance score 6.8. Test weight in NWPZ varied between 72.8 to 78.3 kg/hl among the test entries. Best genotype in this region was HD 3189 and best site mean was recorded at Hisar (80.7 kg/hl). In NEPZ, test weight range amongst genotypes was 60.1 to 78.2 kg/hl and the best entry was NW 6048. Kanpur location registered better test weight (79.6 kg/hl). The overall mean was 74.9 kg/hl. Grain protein content in NWPZ was high (12.0 %) at Durgapura and poor at Pantnagar (10.5 %). Site differences could be observed in NEPZ also. The overall mean was 11.3 %. The entries, NW 6056 and NW 6048 recorded >12.0 %. Site differences were not much in sedimentation value but tremendous variability existed in test entries in NWPZ (25-45 ml) and NEPZ (26-47 ml). The entry, HD 3189 excelled in both the zones with sedimentation value 46 ml. The overall mean was 38 ml.

Table 6: Grain appearance score (Max-10) of *T.aestivum* genotypes in NIVT-1B

Sr. No	Entry	Trial Code	NWPZ					NEPZ				Overall Mean	
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusa	Kanpur	Sabour		
1	Raj 4422	01	7.0	6.6	6.6	6.6	6.4	6.6	6.3	6.6	6.2	6.4	6.5
2	K 1404	02	7.0	6.9	6.0	6.4	7.3	6.7	6.6	7.2	7.2	7.0	6.8
3	NW 6056	03	7.4	6.7	6.9	6.8	6.9	6.9	6.6	6.6	6.4	6.5	6.8
4	NW 6048	04	7.2	7.1	6.9	7.0	7.1	7.1	7.4	6.7	7.3	7.1	7.1
5	K 1406	05	6.5	6.5	6.1	5.9	5.9	6.2	6.7	6.5	6.5	6.6	6.3
6	DBW 166	06	6.7	6.7	6.8	7.2	6.8	6.8	6.9	7.1	6.8	6.9	6.9
7	HUW 705	07	6.3	6.6	6.9	6.2	6.3	6.5	6.4	6.5	6.5	6.5	6.5
8	K 0307 (c)	08	6.6	6.5	6.6	6.4	6.6	6.5	6.6	6.5	6.9	6.7	6.6
9	PBW 729	09	6.3	6.5	6.9	6.4	6.2	6.5	6.5	6.7	6.4	6.5	6.5
10	Raj 4423	10	6.4	6.7	7.0	6.3	6.9	6.7	7.0	6.7	6.5	6.7	6.7
11	DBW 165	11	6.8	6.4	6.5	6.0	6.5	6.4	6.5	6.7	6.4	6.5	6.5
12	HD 3188	12	7.5	7.0	6.8	6.7	7.5	7.1	6.7	7.2	6.6	6.8	7.0
13	BRW 3759	13	6.4	6.7	7.1	6.4	6.5	6.6	6.1	6.6	6.4	6.4	6.5
14	WH 1187	14	7.6	6.9	7.0	6.7	6.7	7.0	7.1	6.9	6.4	6.8	6.9
15	K 1405	15	7.4	6.7	7.2	6.6	7.1	7.0	7.4	7.0	6.4	6.9	7.0
16	HUW 706	16	6.6	6.7	6.5	6.5	6.5	6.6	6.7	6.0	6.4	6.4	6.5
17	NW 6052	17	6.3	6.4	6.3	6.3	6.4	6.3	6.2	5.8	6.2	6.1	6.2
18	WH 1189	18	7.3	7.0	7.2	6.6	7.1	7.0	7.1	6.4	6.4	6.6	6.9
19	K 1408	19	7.2	7.0	7.0	6.6	6.7	6.9	6.9	6.7	6.3	6.6	6.8
20	HD 3191	20	7.1	6.5	6.2	6.3	6.4	6.5	6.6	6.9	6.5	6.7	6.6
21	HD 3193	21	6.7	6.7	6.6	6.9	6.9	6.8	6.2	7.1	6.3	6.5	6.7
22	HD 3192	22	6.4	6.4	6.3	6.5	6.5	6.4	6.4	6.3	6.3	6.3	6.4
23	Raj 4415	23	6.3	6.6	6.0	6.0	6.1	6.2	6.1	6.0	6.3	6.1	6.2
24	HUW 703	24	7.3	6.7	7.2	6.3	6.1	6.7	6.2	5.9	6.6	6.2	6.5
25	JKW 208	25	7.0	6.7	6.9	6.3	6.4	6.7	7.2	6.3	6.2	6.6	6.6
26	HD 3194	26	7.3	7.1	7.2	6.6	6.8	7.0	6.9	6.7	6.7	6.8	6.9
27	WH 1188	27	7.5	7.0	7.4	6.8	7.0	7.1	7.3	6.8	6.9	7.0	7.1
28	HD 3187	28	7.0	6.7	6.8	6.9	7.1	6.9	6.9	6.6	6.7	6.7	6.8
29	K 1407	29	6.5	6.8	6.8	6.5	6.7	6.7	6.6	6.4	6.2	6.4	6.6
30	HUW 704	30	7.1	7.0	7.0	6.3	6.8	6.8	7.1	6.4	6.6	6.7	6.8
31	BRW 3767	31	7.2	6.8	7.2	6.3	6.9	6.9	7.3	7.1	6.4	6.9	6.9
32	BRW 3765	32	6.9	7.0	6.9	6.2	6.4	6.7	7.3	6.1	6.3	6.6	6.6
33	HUW 707	33	7.3	7.2	7.2	7.4	6.5	7.1	7.0	6.6	6.5	6.7	7.0
34	PBW 730	34	6.8	7.2	6.9	6.4	6.4	6.7	7.1	6.9	6.4	6.8	6.8
35	JKW 207	35	6.5	6.8	6.7	6.3	6.3	6.5	6.7	6.4	6.2	6.4	6.5
36	HD 3190	36	6.8	6.6	6.7	6.4	6.6	6.6	6.4	6.6	6.2	6.4	6.5
37	DBW 164	37	7.3	6.6	7.1	6.6	6.8	6.9	6.8	6.9	6.5	6.7	6.8
38	UP 2907	38	6.4	6.5	6.9	7.0	6.4	6.6	7.0	6.6	7.0	6.9	6.7
39	PBW 731	39	7.0	6.5	6.6	6.0	6.4	6.5	6.6	6.3	6.4	6.4	6.5
40	HD 3189	40	7.5	7.4	6.7	6.6	6.6	7.0	7.4	6.1	6.5	6.7	6.9
41	UP 2906	41	7.0	6.9	6.9	7.0	7.2	7.0	6.5	7.1	6.3	6.6	6.9
42	HD 2967 (C)	42	7.0	6.7	6.3	6.3	6.9	6.6	6.4	6.7	6.6	6.6	6.6
43	DBW 167	43	6.8	7.1	6.9	7.1	6.8	6.9	6.9	6.4	6.7	6.7	6.8
44	UP 2908	44	6.3	6.8	6.3	6.5	7.1	6.6	6.8	6.7	6.3	6.6	6.6
45	NW 6054	45	7.2	7.1	7.1	6.4	6.7	6.9	7.1	6.7	6.9	6.9	6.9
46	HD 2733 (C)	46	6.7	7.0	6.3	6.4	6.8	6.6	7.4	7.5	7.3	7.4	6.9
47	NW 6049	47	7.0	6.9	6.4	6.5	6.7	6.7	7.1	6.2	6.3	6.5	6.6
48	DBW 163	48	7.1	6.9	6.8	6.5	6.3	6.7	6.8	7.0	6.3	6.7	6.7
49	WH 1105 (C)	49	7.4	7.1	6.6	6.9	6.9	7.0	7.0	6.3	6.7	6.7	6.9
Mean			6.9	6.8	6.8	6.5	6.7	6.7	6.8	6.6	6.5	6.6	6.7

Table 7: Test Weight (kg/ha) of *T.aestivum* genotypes in NIVT-1B

Sr. No	Entry	Trial Code	NWPZ					NEPZ			Overall Mean	
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusa	Kanpur		
1	Raj 4422	01	76.0	74.7	72.4	68.3	72.6	72.8	73.2	76.2	69.5	73.0 72.9
2	K 1404	02	78.5	74.7	75.9	77.2	79.2	77.1	76.6	28.7	75.1	60.1 70.7
3	NW 6056	03	78.4	75.4	75.4	74.7	74.9	75.8	74.5	76.1	73.8	74.8 75.4
4	NW 6048	04	78.8	78.1	76.6	77.7	76.4	77.5	79.6	78.7	76.2	78.2 77.8
5	K 1406	05	70.5	79.8	75.0	74.7	73.5	74.7	78.3	73.9	72.6	74.9 74.8
6	DBW 166	06	75.5	76.0	73.0	76.5	76.8	75.6	73.9	76.5	73.7	74.7 75.2
7	HUW 705	07	74.5	74.7	75.7	72.0	73.7	74.1	76.3	75.7	71.9	74.6 74.3
8	K 0307 (c)	08	77.2	77.3	76.0	75.5	74.8	76.2	76.4	75.8	75.1	75.8 76.0
9	PBW 729	09	78.4	75.3	76.4	77.0	75.2	76.5	76.0	77.6	75.8	76.5 76.5
10	Raj 4423	10	76.8	76.2	75.6	75.5	76.2	76.1	78.1	76.5	75.0	76.5 76.2
11	DBW 165	11	78.4	78.0	73.4	70.6	74.6	75.0	76.6	71.7	71.0	73.1 74.3
12	HD 3188	12	79.9	80.7	78.1	75.2	77.7	78.3	78.5	78.4	71.7	76.2 77.5
13	BRW 3759	13	75.9	75.2	75.8	72.9	75.8	75.1	75.2	74.9	72.5	74.2 74.8
14	WH 1187	14	78.8	76.8	75.3	73.6	75.8	76.1	75.4	76.7	74.3	75.5 75.8
15	K 1405	15	77.4	75.9	76.0	73.3	77.4	76.0	75.2	78.3	73.0	75.5 75.8
16	HUW 706	16	76.6	76.0	70.5	74.7	77.1	75.0	75.2	73.4	74.3	74.3 74.7
17	NW 6052	17	77.5	75.8	72.9	72.5	72.4	74.2	74.0	69.7	68.2	70.6 72.9
18	WH 1189	18	76.5	77.2	75.8	74.4	75.5	75.9	76.7	74.9	71.0	74.2 75.3
19	K 1408	19	76.6	76.0	74.6	74.3	75.4	75.4	75.0	75.0	71.2	73.7 74.8
20	HD 3191	20	77.3	72.8	69.5	74.7	75.3	73.9	75.2	76.4	73.5	75.0 74.3
21	HD 3193	21	77.1	74.3	75.3	76.0	75.8	75.7	75.4	76.7	75.1	75.7 75.7
22	HD 3192	22	76.5	76.7	73.8	74.0	72.9	74.8	76.0	75.3	70.3	73.9 74.4
23	Raj 4415	23	76.2	75.3	69.3	73.6	71.5	73.2	75.1	74.9	68.8	72.9 73.1
24	HUW 703	24	76.9	76.1	76.2	74.0	70.3	74.7	75.8	75.7	72.6	74.7 74.7
25	JKW 208	25	77.8	76.3	76.5	73.4	76.3	76.1	77.3	76.4	73.0	75.6 75.9
26	HD 3194	26	77.7	73.0	76.8	72.5	75.3	75.1	76.0	76.1	70.6	74.2 74.8
27	WH 1188	27	79.1	77.4	76.5	74.1	79.8	77.4	77.4	77.0	75.3	76.6 77.1
28	HD 3187	28	77.8	76.3	75.8	77.5	75.1	76.5	76.6	74.4	71.8	74.3 75.7
29	K 1407	29	78.2	75.5	75.2	74.3	76.3	75.9	75.7	74.6	71.5	73.9 75.2
30	HUW 704	30	77.5	77.5	76.4	75.5	76.3	76.6	77.7	75.3	72.8	75.3 76.1
31	BRW 3767	31	76.5	74.6	73.9	73.7	75.6	74.9	77.4	77.1	73.3	75.9 75.3
32	BRW 3765	32	75.6	76.0	73.7	69.9	72.1	73.5	75.1	70.3	76.7	74.0 73.7
33	HUW 707	33	77.0	76.8	76.0	76.7	74.6	76.2	73.7	78.2	71.4	74.4 75.6
34	PBW 730	34	74.8	76.1	73.7	71.7	73.2	73.9	76.0	72.1	71.2	73.1 73.6
35	JKW 207	35	74.6	72.4	75.9	71.9	72.8	73.5	71.7	74.1	68.0	71.3 72.7
36	HD 3190	36	75.5	72.8	73.4	73.0	76.6	74.3	73.5	76.7	70.9	73.7 74.1
37	DBW 164	37	75.5	73.7	75.3	71.2	73.8	73.9	74.3	75.8	72.3	74.1 74.0
38	UP 2907	38	79.7	77.7	77.3	75.7	76.8	77.4	76.4	78.4	74.3	76.4 77.0
39	PBW 731	39	78.1	78.7	76.6	72.5	79.2	77.0	76.4	76.5	73.5	75.5 76.4
40	HD 3189	40	76.8	77.3	73.7	71.4	72.5	74.3	73.3	72.9	73.2	73.1 73.9
41	UP 2906	41	77.0	76.1	75.3	75.3	76.3	76.0	73.2	76.2	72.3	73.9 75.2
42	HD 2967 (C)	42	76.7	77.6	75.2	72.7	76.1	75.7	75.0	75.6	74.5	75.0 75.4
43	DBW 167	43	76.4	77.3	77.2	79.4	77.5	77.6	76.6	77.3	75.1	76.3 77.1
44	UP 2908	44	75.1	77.3	69.2	73.2	75.9	74.1	72.0	74.2	69.8	72.0 73.3
45	NW 6054	45	75.8	72.1	72.6	72.1	71.8	72.9	74.5	73.6	72.3	73.5 73.1
46	HD 2733 (C)	46	75.0	76.3	70.0	71.4	76.4	73.8	75.6	79.2	74.3	76.4 74.8
47	NW 6049	47	78.2	75.4	72.3	73.9	74.9	74.9	73.4	74.2	70.8	72.8 74.1
48	DBW 163	48	77.1	76.4	76.9	74.4	75.3	76.0	74.4	76.2	72.0	74.2 75.3
49	WH 1105 (C)	49	77.7	77.3	74.7	74.3	75.1	75.8	77.5	72.4	72.0	74.0 75.1
Mean			76.9	76.1	74.7	74.0	75.2	75.4	75.6	74.5	72.6	74.2 74.9

Table 8: Protein Content (%) of *T.aestivum* genotypes in NIVT-1B

Sr. No	Entry	Trial Code	NWPZ						NEPZ				Overall Mean
			Ludhiana	Hisar	Durgapura	Delhi	Pantnagar	Mean	Pusa	Kanpur	Sabour	Mean	
1	Raj 4422	01	14.8	11.4	12.1	10.8	11.6	12.1	12.0	10.8	10.4	11.1	11.7
2	K 1404	02	11.2	10.2	10.1	13.2	10.8	11.1	11.2	12.9	12.1	12.1	11.5
3	NW 6056	03	11.6	10.5	13.6	13.2	13.2	12.4	12.2	14.4	11.4	12.7	12.5
4	NW 6048	04	12.2	11.7	13.6	13.9	12.3	12.7	8.5	14.1	11.4	11.3	12.2
5	K 1406	05	9.5	10.8	12.9	11.8	11.1	11.2	10.2	13.5	9.5	11.1	11.2
6	DBW 166	06	12.9	9.7	12.6	14.0	10.2	11.9	10.6	10.5	11.6	10.9	11.5
7	HUW 705	07	10.6	8.6	9.9	11.6	11.4	10.4	12.2	9.9	10.0	10.7	10.5
8	K 0307 (c)	08	11.5	10.7	9.2	11.8	9.3	10.5	13.8	13.5	10.8	12.7	11.3
9	PBW 729	09	10.3	9.6	10.1	11.6	8.1	9.9	12.6	10.5	10.9	11.3	10.5
10	RaJ 4423	10	10.2	12.6	11.2	10.8	11.1	11.2	12.5	10.2	10.9	11.2	11.2
11	DBW 165	11	11.9	10.2	11.6	11.8	11.1	11.3	9.6	12.3	12.3	11.4	11.4
12	HD 3188	12	9.5	11.1	9.6	11.0	9.0	10.0	12.8	13.5	9.4	11.9	10.7
13	BRW 3759	13	10.3	9.0	11.2	11.8	12.0	10.9	12.1	9.6	10.5	10.7	10.8
14	WH 1187	14	11.4	9.3	11.9	11.2	9.9	10.7	12.2	15.0	10.3	12.5	11.4
15	K 1405	15	9.8	9.9	10.6	10.8	10.5	10.3	12.7	13.2	11.0	12.3	11.1
16	HUW 706	16	11.5	10.2	10.8	11.7	9.4	10.7	9.6	8.1	11.2	9.6	10.3
17	NW 6052	17	9.5	9.8	11.6	9.8	8.1	9.8	11.0	10.8	10.1	10.6	10.1
18	WH 1189	18	10.5	10.8	11.6	10.3	8.8	10.4	13.6	13.2	12.9	13.2	11.5
19	K 1408	19	13.2	11.4	13.4	11.2	11.4	12.1	11.8	12.3	9.5	11.2	11.8
20	HD 3191	20	11.7	10.6	12.2	9.9	12.9	11.5	11.4	12.1	9.7	11.1	11.3
21	HD 3193	21	13.1	11.0	10.8	12.2	10.8	11.6	10.5	10.1	9.6	10.1	11.0
22	HD 3192	22	11.5	10.9	12.3	11.6	10.5	11.4	12.6	14.7	10.2	12.5	11.8
23	Raj 4415	23	11.1	9.6	11.1	11.2	10.8	10.8	12.3	10.2	12.2	11.6	11.1
24	HUW 703	24	14.3	9.7	12.2	12.0	9.8	11.6	9.6	13.8	10.0	11.1	11.4
25	JKW 208	25	9.1	10.5	9.4	11.4	10.9	10.3	11.6	8.4	12.8	10.9	10.5
26	HD 3194	26	11.8	10.5	12.1	10.9	11.1	11.3	10.1	8.5	12.9	10.5	11.0
27	WH 1188	27	11.6	10.2	13.2	10.2	9.6	11.0	11.2	8.2	11.7	10.4	10.7
28	HD 3187	28	13.1	11.2	15.1	10.4	9.9	11.9	8.1	10.2	12.8	10.4	11.4
29	K 1407	29	14.9	11.4	9.2	12.1	10.1	11.5	10.3	9.0	12.0	10.4	11.1
30	HUW 704	30	12.8	10.4	11.7	10.7	10.2	11.2	9.8	7.8	11.0	9.5	10.6
31	BRW 3767	31	14.9	10.2	12.2	10.5	13.1	12.2	8.8	8.1	13.4	10.1	11.4
32	BRW 3765	32	13.0	11.8	12.9	11.8	10.2	11.9	8.2	10.1	12.2	10.2	11.3
33	HUW 707	33	11.1	12.2	11.1	10.5	9.7	10.9	10.8	12.0	12.3	11.7	11.2
34	PBW 730	34	11.9	12.1	12.2	10.3	11.1	11.5	11.4	13.8	11.2	12.1	11.8
35	JKW 207	35	9.4	10.2	10.2	9.2	9.9	9.8	10.3	8.7	12.6	10.5	10.1
36	HD 3190	36	11.1	10.8	12.7	11.0	11.1	11.3	11.2	11.1	9.9	10.7	11.1
37	DBW 164	37	11.0	10.9	11.8	9.8	9.5	10.6	11.4	10.2	10.5	10.7	10.6
38	UP 2907	38	11.5	13.9	13.2	10.2	11.1	12.0	12.1	9.9	12.5	11.5	11.8
39	PBW 731	39	15.0	11.2	12.4	12.3	9.2	12.0	12.0	9.9	13.7	11.9	12.0
40	HD 3189	40	14.2	13.5	13.2	11.4	9.3	12.3	10.4	9.1	13.2	10.9	11.8
41	UP 2906	41	11.6	11.4	12.6	12.0	11.7	11.9	12.0	7.8	12.2	10.7	11.4
42	HD 2967 (C)	42	11.4	13.3	10.6	10.3	10.3	11.2	12.2	9.3	10.8	10.8	11.0
43	DBW 167	43	11.9	13.2	10.8	10.7	10.2	11.4	12.1	10.5	11.8	11.5	11.4
44	UP 2908	44	14.1	12.8	10.5	12.7	10.2	12.1	10.2	10.8	12.2	11.1	11.7
45	NW 6054	45	14.5	12.0	9.0	10.8	9.6	11.2	12.6	11.4	10.0	11.3	11.2
46	HD 2733 (C)	46	14.6	12.6	12.2	10.4	12.7	12.5	9.2	9.0	9.8	9.3	11.3
47	NW 6049	47	11.5	12.0	9.9	12.1	9.6	11.0	11.2	10.2	10.5	10.6	10.9
48	DBW 163	48	14.3	12.1	14.2	13.2	10.5	12.9	13.2	12.3	10.8	12.1	12.6
49	WH 1105 (C)	49	12.2	11.8	12.8	12.6	11.2	12.1	11.6	10.5	14.1	12.1	12.1
Mean			12.0	11.1	11.7	11.4	10.5	11.3	11.2	10.9	11.3	11.2	11.3

Table 9: Sedimentation value (ml) of *T.aestivum* genotypes in NIVT-1B

Sr No	Entry	Trial Code	NWPZ					NEPZ			Overall Mean
			Ludhiana	Hisar	Durgapura	Delhi	Pan Nagar	Mean	Pusa	Kanpur	
1	Raj 4422	01	31	22	25	32	25	27	23	28	27
2	K 1404	02	32	34	31	32	40	34	27	31	35
3	NW 6056	03	35	36	32	37	44	37	33	35	45
4	NW 6048	04	36	37	33	32	40	36	31	36	46
5	K 1406	05	34	30	31	31	32	32	26	38	40
6	DBW 166	06	37	40	37	43	44	40	32	40	44
7	HUW 705	07	35	45	43	51	50	45	32	43	46
8	K 0307 (c)	08	28	24	23	26	22	25	22	35	26
9	PBW 729	09	36	38	36	46	43	40	34	43	29
10	RaJ 4423	10	29	28	26	47	30	32	23	32	36
11	DBW 165	11	38	42	40	42	31	39	35	34	39
12	HD 3188	12	27	44	32	36	40	36	27	36	33
13	BRW 3759	13	40	45	48	40	44	43	32	39	36
14	WH 1187	14	36	43	36	37	39	38	29	50	34
15	K 1405	15	31	40	33	36	39	36	36	40	37
16	HUW 706	16	33	39	41	41	42	39	41	58	28
17	NW 6052	17	41	44	39	34	43	40	32	52	42
18	WH 1189	18	38	35	38	33	40	37	34	38	46
19	K 1408	19	33	34	32	43	38	36	26	29	33
20	HD 3191	20	41	44	34	42	40	40	32	48	22
21	HD 3193	21	35	28	32	27	27	30	24	33	29
22	HD 3192	22	47	50	41	44	44	45	27	59	44
23	Raj 4415	23	36	35	35	36	30	34	31	47	35
24	HUW 703	24	43	40	40	35	35	39	36	42	37
25	JKW 208	25	51	39	35	34	34	39	30	50	34
26	HD 3194	26	46	40	34	36	38	39	32	39	43
27	WH 1188	27	42	40	32	36	33	37	29	46	35
28	HD 3187	28	49	45	36	46	41	43	29	53	40
29	K 1407	29	50	50	37	50	37	45	39	56	44
30	HUW 704	30	39	40	33	39	35	37	33	40	46
31	BRW 3767	31	45	44	41	35	37	40	36	52	33
32	BRW 3765	32	40	32	40	36	32	36	31	45	36
33	HUW 707	33	39	37	34	40	35	37	35	40	30
34	PBW 730	34	48	43	39	43	36	42	32	46	40
35	JKW 207	35	36	38	35	34	34	35	38	55	46
36	HD 3190	36	42	43	41	42	46	43	41	56	45
37	DBW 164	37	35	39	36	36	38	37	41	37	33
38	UP 2907	38	36	41	40	37	40	39	40	41	40
39	PBW 731	39	41	40	40	44	41	41	34	48	33
40	HD 3189	40	41	51	40	43	49	45	48	52	41
41	UP 2906	41	36	30	36	40	32	35	30	51	32
42	HD 2967 (C)	42	41	40	38	40	42	40	38	39	44
43	DBW 167	43	40	41	35	41	40	39	36	44	33
44	UP 2908	44	37	40	40	39	42	40	34	41	43
45	NW 6054	45	42	50	37	40	40	42	35	55	50
46	HD 2733 (C)	46	33	34	34	35	30	33	27	33	28
47	NW 6049	47	50	51	38	40	42	44	40	54	42
48	DBW 163	48	45	47	40	42	44	44	40	49	32
49	WH 1105 (C)	49	36	40	40	34	38	30	38	44	42
Mean			39	39	36	38	38	38	33	44	37
										38	38

NIVT 2 (Irrigated Timely Sown) - Table 10-13

Thirty six entries were evaluated from ten centers of Central and Peninsular zones under Irrigated Timely Sown conditions for different quality traits. The overall grain appearance score varied from 6.7 (UAS 372, HI 1607, GW 471, MP 1311) to 7.0 (JWS 147, NIAW 2595, NIAW 2539, GW 470) with mean value of 6.8. It indicates that overall grain appearance was good in both the zones and all the centers. The overall test weight varied from 74.2 kg/hl (MP 1311) to 79.0 kg/hl (GW 473, GW 470) with the mean value of 77.0 kg. Zone wise there was no difference in test weight values. Centre wise it was lowest in Powerkheda (73.7kg) and highest in Indore (79.1kg). The overall protein content was in higher range and varied from 12.4% (UAS 372, CG 1016) to the maximum value of 14.6% (MP 1309) with the mean value of 13.4%. The overall mean sedimentation value varied from 40.0 (GW 468, GW 473, CG 1016) to 51.0 (RAJ 4424) with the mean value of 45.0. Central zone showed higher value than peninsular zone. Center wise it was lowest in Ugar (39.0) and highest in Junagarh (59.0).

Table 10: Grain appearance Score (Max-10) of *T.aestivum* genotypes in NIVT 2

Sr. No	Entry	Trial Code	CZ						PZ						Overall Mean
			Indore	Kota	Junagadh	P'kheda	Vijapur	Mean	Puné	Dharwad	Ugar	Nippanni	Niphad	Mean	
1	DBW 170	01	6.7	6.9	6.9	6.6	7.0	6.8	6.8	6.6	7.0	6.8	6.6	6.7	6.8
2	DBW 169	02	7.2	6.9	6.7	6.5	6.9	6.8	6.9	6.6	6.9	6.9	6.9	6.8	6.8
3	UAS 372	03	7.0	6.8	6.7	6.3	6.9	6.7	7.0	6.5	6.7	7.0	6.8	6.8	6.7
4	HI 1610	04	7.1	6.9	7.3	6.7	7.1	7.0	7.1	6.6	6.9	7.0	6.9	6.9	6.9
5	UP 2909	05	7.1	7.0	6.9	7.0	7.0	7.0	7.2	6.6	6.9	7.0	6.9	6.9	6.9
6	HI 1608	06	7.0	6.9	7.1	6.1	7.0	6.8	7.1	6.6	6.6	7.5	6.9	6.9	6.9
7	GW 468	07	7.2	6.7	7.1	6.5	7.0	6.9	6.8	6.6	7.0	7.0	6.7	6.8	6.8
8	JWS 147	08	7.2	7.0	7.2	6.6	7.1	7.0	7.3	6.7	7.1	7.2	6.8	7.0	7.0
9	MACS 6671	09	7.1	7.0	6.7	6.5	7.0	6.8	7.3	6.7	6.9	7.0	6.9	6.9	6.9
10	DBW168	10	6.9	6.9	6.9	6.9	6.6	6.8	7.1	6.9	6.9	7.0	6.6	6.9	6.9
11	MP 1309	11	6.9	6.7	7.0	6.4	6.9	6.8	7.0	6.6	7.1	6.8	6.9	6.9	6.8
12	HI 1607	12	7.0	6.9	6.9	6.3	6.8	6.8	6.8	6.5	6.9	6.9	6.4	6.7	6.7
13	RAJ 4424	13	7.2	6.8	7.1	6.6	7.0	6.9	7.0	6.6	6.9	6.9	7.1	6.9	6.9
14	UAS 370	14	7.0	6.8	6.9	6.2	7.0	6.8	7.0	6.9	6.7	6.9	6.9	6.9	6.8
15	WH 1190	15	6.9	6.8	6.8	6.3	6.5	6.6	6.9	6.6	6.9	7.1	6.8	6.9	6.7
16	HI 1609	16	6.8	6.7	7.0	6.6	7.0	6.8	7.1	6.8	6.8	6.8	6.8	6.8	6.8
17	HP 1960	17	6.9	6.9	7.0	6.4	6.7	6.8	7.1	6.6	7.3	6.9	6.6	6.9	6.8
18	MP 1310	18	6.8	6.8	6.9	6.4	6.9	6.7	7.0	6.7	7.1	7.0	6.8	6.9	6.8
19	RVW 4232	19	7.0	7.0	6.8	6.6	7.0	6.8	7.0	6.7	7.1	6.9	6.8	6.9	6.9
20	UAS 369	20	7.0	7.0	6.8	6.5	6.7	6.8	6.7	6.7	6.9	6.9	6.8	6.8	6.8
21	MP 3440	21	7.1	6.7	6.9	6.8	7.1	6.9	7.1	6.5	6.9	6.9	6.9	6.8	6.9
22	NIAW 2595	22	7.2	7.0	7.1	6.9	7.0	7.0	7.2	6.9	7.0	7.2	7.0	7.0	7.0
23	NIAW 2495	23	7.2	6.7	6.6	6.6	6.8	6.8	7.0	6.8	6.9	7.0	6.7	6.9	6.8
24	MACS 6222(C)	24	7.2	6.8	6.9	6.5	6.9	6.8	7.2	6.8	7.0	7.2	6.7	7.0	6.9
25	GW 473	25	7.0	6.8	7.1	6.8	7.1	6.9	6.8	6.8	6.7	6.9	6.5	6.7	6.8
26	AKAW 478	26	7.2	6.9	7.0	6.7	7.2	7.0	6.8	6.8	7.1	7.0	6.8	6.9	6.9
27	UAS 371	27	7.0	6.9	7.1	6.7	7.1	6.9	7.1	6.8	7.1	6.9	6.8	6.9	6.9
28	MACS 6668	28	6.9	6.7	7.0	6.6	6.7	6.8	7.1	6.6	7.0	6.7	6.8	6.8	6.8
29	GW 471	29	6.9	6.7	6.7	6.2	6.8	6.6	6.9	6.6	6.8	6.7	6.8	6.8	6.7
30	MP 1311	30	6.7	6.8	6.9	6.5	6.6	6.7	6.7	6.5	6.7	6.9	6.8	6.7	6.7
31	NIAW 2539	31	7.2	7.0	7.1	6.8	7.1	7.0	7.2	6.6	6.8	7.1	7.0	6.9	7.0
32	PBW 732	32	7.1	7.0	6.9	6.7	6.8	6.9	7.2	6.9	6.9	7.0	6.7	6.9	6.9
33	HI 1544 (C)	33	7.1	6.8	7.2	6.4	6.9	6.9	6.9	6.7	7.0	6.9	6.8	6.8	6.9
34	GW 469	34	7.1	6.9	7.1	6.8	6.9	6.9	7.2	6.7	6.7	7.0	6.8	6.9	6.9
35	GW 470	35	7.1	6.8	6.9	6.6	7.1	6.9	7.2	6.9	7.0	7.1	6.9	7.0	7.0
36	CG 1016	36	7.0	6.8	6.9	6.2	7.0	6.8	7.0	6.8	6.8	6.8	6.8	6.8	6.8
	Mean		7.0	6.8	6.9	6.5	6.9	6.8	7.0	6.7	6.9	7.0	6.8	6.9	6.8

Table 11: Test weight (kg/ha) of *T.aestivum* genotypes in NIVT 2

Sr. No	Entry	Trial Code	CZ						PZ						Overall Mean
			Indore	Kota	Junagadh	P'kheda	Vijapur	Mean	Pune	Dharwad	Ugar	Nippani	Niphad	Mean	
1	DBW 170	01	78.1	76.9	77.7	74.6	78.2	77.1	77.7	72.4	74.9	75.2	75.8	75.2	76.1
2	DBW 169	02	80.0	77.7	75.5	74.8	78.9	77.4	78.4	75.1	76.4	76.6	77.7	76.8	77.1
3	UAS 372	03	77.0	76.4	75.0	72.3	76.3	75.4	76.8	75.4	75.6	78.1	77.9	76.7	76.1
4	HI 1610	04	81.0	78.3	79.4	77.0	79.6	79.0	80.6	76.0	77.4	79.2	79.2	78.5	78.8
5	UP 2909	05	81.6	78.6	78.5	74.6	79.7	78.6	80.3	76.1	77.0	78.3	79.1	78.2	78.4
6	HI 1608	06	79.4	79.1	77.3	74.5	78.5	77.8	79.7	75.5	76.9	79.3	78.4	78.0	77.9
7	GW 468	07	80.2	79.7	77.7	75.5	79.6	78.5	80.1	77.0	78.7	79.5	79.0	78.9	78.7
8	JWS 147	08	80.5	78.7	78.7	75.5	79.9	78.7	80.9	76.0	77.5	78.8	79.8	78.6	78.6
9	MACS 6671	09	77.4	76.0	74.0	72.2	76.3	75.2	77.6	73.4	73.4	78.5	76.2	75.8	75.5
10	DBW168	10	78.6	75.0	75.2	73.4	75.9	75.6	77.6	73.1	74.7	78.3	76.0	75.9	75.8
11	MP 1309	11	77.7	75.6	76.4	71.6	78.4	75.9	77.8	75.3	74.8	78.0	77.0	76.6	76.2
12	HI 1607	12	78.5	76.9	78.8	70.1	79.4	76.7	74.0	73.8	75.0	75.9	76.6	75.1	75.9
13	RAJ 4424	13	80.0	76.7	77.5	72.5	77.8	76.9	79.2	75.5	75.9	75.9	78.9	77.1	77.0
14	UAS 370	14	77.5	76.5	75.8	72.7	76.9	75.8	76.7	75.0	74.4	78.2	77.1	76.2	76.0
15	WH 1190	15	79.1	77.2	75.9	73.5	76.2	76.4	79.1	76.2	77.0	80.0	79.7	78.4	77.4
16	HI 1609	16	78.4	76.8	75.3	73.0	77.7	76.2	78.0	74.6	75.3	75.1	75.7	75.7	76.0
17	HP 1960	17	79.2	77.7	76.8	74.0	77.6	77.0	79.5	75.1	77.3	78.5	78.6	77.8	77.4
18	MP 1310	18	77.5	76.6	75.0	71.0	77.6	75.5	77.8	73.2	77.9	79.1	77.0	77.0	76.2
19	RVW 4232	19	79.1	78.1	75.5	74.4	78.4	77.1	77.6	75.0	76.0	78.5	78.0	77.0	77.0
20	UAS 369	20	79.4	77.7	75.3	74.2	78.3	77.0	76.2	74.7	75.8	75.0	76.8	75.7	76.3
21	MP 3440	21	79.8	78.0	77.8	73.9	80.0	77.9	79.2	75.6	76.7	77.2	78.4	77.4	77.6
22	NIAW 2595	22	79.1	77.6	77.6	75.4	79.1	77.7	79.8	76.2	77.8	79.3	79.0	78.4	78.1
23	NIAW 2495	23	78.9	77.3	75.6	72.8	73.4	75.6	78.2	75.8	76.2	77.9	77.7	77.2	76.4
24	MACS 6222 (C)	24	80.8	77.7	78.9	76.5	78.6	78.5	80.6	75.4	77.0	79.2	79.1	78.2	78.4
25	GW 473	25	80.8	79.0	80.2	74.0	81.2	79.0	80.1	77.8	77.9	79.2	79.7	78.9	79.0
26	AKAW 478	26	79.3	76.7	77.3	73.1	80.3	77.3	77.5	75.6	74.8	76.9	76.9	76.3	76.8
27	UAS 371	27	79.8	78.0	78.0	76.1	80.1	78.4	79.4	72.7	77.1	77.8	77.0	76.8	77.6
28	MACS 6668	28	78.6	76.4	76.8	74.7	79.4	77.2	78.8	75.3	75.7	75.0	76.5	76.2	76.7
29	GW 471	29	76.8	76.2	73.2	68.3	73.6	73.6	76.5	72.4	74.2	76.7	75.3	75.0	74.3
30	MP 1311	30	75.6	74.5	74.1	70.1	74.4	73.7	74.6	73.1	73.6	76.5	75.7	74.7	74.2
31	NIAW 2539	31	79.4	77.5	77.6	75.4	79.8	77.9	78.2	74.2	75.9	77.5	77.8	76.7	77.3
32	PBW 732	32	79.2	75.9	74.9	73.4	77.1	76.1	79.3	75.1	76.2	78.3	77.0	77.2	76.6
33	HI 1544(c)	33	79.5	78.1	79.0	74.5	79.9	78.2	80.0	75.4	76.8	78.9	79.5	78.1	78.1
34	GW 469	34	80.7	78.6	78.4	75.4	80.5	78.7	79.3	75.5	77.6	78.0	78.3	77.7	78.2
35	GW 470	35	81.6	79.9	77.2	74.9	81.6	79.0	81.3	77.0	77.3	79.8	79.5	79.0	79.0
36	CG 1016	36	77.8	77.2	75.4	73.7	76.7	76.1	77.5	75.0	75.2	78.1	77.5	76.6	76.4
	Mean		79.1	77.3	76.8	73.7	78.2	77.0	78.4	74.9	76.1	77.8	77.7	77.0	77.0

Table 12: Protein content (%) of *T.aestivum* genotypes in NIVT 2

Sr. No	Entry	Trial Code	CZ						PZ						Overall Mean
			Indore	Kotta	Jungarh	P'kheda	Vijapur	Mean	Pune	Dharwad	Ugar	Nippani	Niphad	Mean	
1	DBW 170	01	13.1	13.8	15.2	14.1	14.3	14.1	13.9	14.7	14.0	14.2	14.9	14.3	14.2
2	DBW 169	02	12.4	13.3	15.6	15.6	14.7	14.3	13.9	14.8	13.0	11.8	14.6	13.6	13.9
3	UAS 372	03	11.5	12.2	13.9	14.9	12.3	13.0	12.2	11.8	11.9	10.9	13.0	11.9	12.4
4	HI 1610	04	12.3	12.6	14.0	14.1	12.5	13.1	13.0	13.6	13.2	12.3	13.8	13.2	13.1
5	UP 2909	05	12.8	14.2	15.8	15.0	14.4	14.4	14.0	14.3	13.4	12.4	15.1	13.8	14.1
6	HI 1608	06	12.2	12.9	13.3	14.6	14.4	13.5	13.8	14.0	13.3	12.3	14.1	13.5	13.5
7	GW 468	07	11.6	12.5	13.5	13.5	12.7	12.7	12.3	13.0	11.9	11.4	12.6	12.2	12.5
8	JWS 147	08	12.1	13.1	14.9	14.5	13.8	13.7	13.7	14.0	12.2	15.5	13.7	13.8	13.7
9	MACS 6671	09	12.0	13.1	15.3	14.4	13.9	13.7	12.5	13.5	12.9	11.5	13.8	12.8	13.3
10	DBW168	10	12.7	13.2	15.2	15.7	14.9	14.3	13.4	13.7	12.6	12.0	15.2	13.4	13.8
11	MP 1309	11	13.1	15.2	15.7	17.2	14.7	15.2	14.7	15.4	12.7	12.1	15.7	14.1	14.6
12	HI 1607	12	11.9	12.9	13.8	14.9	13.4	13.4	13.5	14.0	13.0	11.9	13.6	13.2	13.3
13	RAJ 4424	13	13.7	15.8	14.1	16.3	15.2	15.0	13.8	15.0	13.4	12.4	15.2	13.9	14.5
14	UAS 370	14	11.0	12.0	14.4	14.8	13.2	13.1	11.9	12.4	11.8	11.6	13.4	12.2	12.6
15	WH 1190	15	12.4	13.3	14.7	15.8	14.6	14.2	12.7	13.7	11.7	13.2	13.6	13.0	13.6
16	HI 1609	16	11.7	12.8	14.6	14.0	13.4	13.3	12.8	13.4	12.0	13.2	13.6	13.0	13.1
17	HP 1960	17	11.8	13.1	14.3	15.4	13.5	13.6	12.6	13.2	12.4	12.6	13.5	12.8	13.2
18	MP 1310	18	12.3	14.4	15.2	15.2	13.5	14.1	12.9	14.2	13.2	12.3	13.1	13.1	13.6
19	RVW 4232	19	11.8	12.7	14.2	14.2	12.2	13.0	12.7	13.0	12.0	12.3	13.3	12.6	12.8
20	UAS 369	20	11.1	12.9	14.3	14.4	12.0	12.9	13.0	14.0	12.1	12.7	13.3	13.0	12.9
21	MP 3440	21	12.0	13.5	14.6	15.6	13.7	13.9	13.8	14.3	12.7	11.5	14.0	13.2	13.5
22	NIAW 2595	22	12.4	13.8	13.9	14.9	13.7	13.7	13.0	12.6	12.5	11.9	13.3	12.6	13.2
23	NIAW 2495	23	11.9	12.9	15.3	14.7	14.6	13.9	13.2	14.2	12.2	11.6	12.5	12.7	13.3
24	MACS 6222 (C)	24	12.3	13.4	14.6	15.9	14.1	14.0	13.1	14.4	11.9	13.3	13.9	13.3	13.7
25	GW 473	25	11.4	13.1	13.6	13.5	12.4	12.8	13.1	13.1	11.5	12.3	13.2	12.6	12.7
26	AKAW 478	26	13.0	15.2	15.2	14.5	14.3	14.4	14.2	14.9	12.3	12.7	14.4	13.7	14.1
27	UAS 371	27	13.2	13.9	14.8	14.2	14.0	14.0	14.3	15.2	12.4	13.2	14.9	14.0	14.0
28	MACS 6668	28	11.2	13.1	13.3	14.3	12.5	12.9	12.8	12.9	12.1	11.9	12.8	12.5	12.7
29	GW 471	29	12.4	13.0	13.6	14.2	14.1	13.5	12.4	13.2	12.2	11.3	13.7	12.5	13.0
30	MP 1311	30	11.4	12.8	14.6	15.3	13.5	13.5	13.3	13.6	12.0	12.1	13.4	12.8	13.2
31	NIAW 2539	31	12.3	12.8	14.4	15.4	12.8	13.5	12.8	14.4	12.1	11.9	14.6	13.2	13.3
32	PBW 732	32	11.8	12.8	15.7	15.1	13.7	13.8	12.9	13.5	12.7	11.8	13.9	12.9	13.4
33	HI 1544(c)	33	12.0	12.9	12.9	14.5	13.1	13.1	13.5	13.2	12.1	11.5	13.5	12.7	12.9
34	GW 469	34	11.4	12.2	14.6	14.5	14.3	13.4	14.0	14.8	11.9	12.1	13.4	13.2	13.3
35	GW 470	35	12.7	13.4	13.5	14.5	13.6	13.5	13.1	14.0	12.4	13.3	13.6	13.3	13.4
36	CG 1016	36	11.1	12.3	13.9	14.0	12.5	12.7	12.5	12.2	11.9	11.1	12.7	12.0	12.4
	Mean		12.1	13.3	14.5	14.8	13.6	13.7	13.2	13.8	12.4	12.3	13.8	13.1	13.4

Table 13: Sedimentation value (ml) of *T.aestivum* genotypes in NIVT 2

Sr. No	Entry	Trial Code	CZ					PZ					Overall Mean	
			Indore	Kota	Junagarh	P'kheda	Vijapur	Mean	Pune	Dharwad	Ugar	Nippani	Niphad	
1	DBW 170	01	40	54	61	41	45	48	44	44	41	41	46	43 45
2	DBW 169	02	42	55	63	54	50	52	44	48	41	40	46	44 48
3	UAS 372	03	42	46	58	47	39	46	36	35	36	36	39	36 41
4	HI 1610	04	38	49	57	45	39	45	39	41	40	38	42	40 43
5	UP 2909	05	43	59	63	48	50	52	45	45	41	42	49	44 48
6	HI 1608	06	40	53	54	49	47	48	44	45	42	43	44	43 46
7	GW 468	07	35	49	55	42	38	44	36	39	34	33	36	36 40
8	JWS 147	08	38	52	59	45	42	47	42	42	36	47	41	41 44
9	MACS 6671	09	41	54	62	45	45	49	40	40	41	43	44	41 45
10	DBW168	10	42	49	59	49	48	49	42	40	39	43	47	42 46
11	MP 1309	11	43	60	62	57	49	54	49	48	41	42	49	46 50
12	HI 1607	12	36	50	57	47	43	46	41	42	38	37	41	39 43
13	RAJ 4424	13	47	61	63	55	52	56	45	48	46	47	49	47 51
14	UAS 370	14	36	45	59	52	41	46	36	39	35	38	41	38 42
15	WH 1190	15	38	52	60	52	47	50	38	41	35	43	41	39 45
16	HI 1609	16	37	51	60	45	41	47	38	38	36	41	41	39 43
17	HP 1960	17	40	45	59	52	44	48	39	39	39	41	42	40 44
18	MP 1310	18	42	60	51	49	45	49	43	45	42	42	43	43 46
19	RVW 4232	19	40	51	59	46	41	47	39	40	38	41	42	40 44
20	UAS 369	20	39	52	59	45	42	47	44	46	43	42	45	44 46
21	MP 3440	21	42	56	60	54	46	51	49	49	41	42	47	45 48
22	NIAW 2595	22	42	57	57	48	45	50	42	40	40	42	43	41 45
23	NIAW 2495	23	40	51	63	47	49	50	41	44	38	40	40	40 45
24	MACS 6222 (C)	24	38	49	60	48	44	48	39	43	36	41	42	40 44
25	GW 473	25	34	45	56	43	37	43	40	38	34	37	39	37 40
26	AKAW 478	26	44	54	61	45	49	50	46	47	41	43	48	45 48
27	UAS 371	27	45	49	59	44	47	48	45	45	39	43	46	44 46
28	MACS 6668	28	37	47	53	47	41	45	40	39	38	37	40	39 42
29	GW 471	29	40	45	56	45	47	46	39	40	37	37	41	39 42
30	MP 1311	30	37	45	60	50	43	47	40	39	37	38	41	39 43
31	NIAW 2539	31	43	46	60	51	44	48	40	45	41	42	46	43 46
32	PBW 732	32	41	47	62	49	47	49	43	43	41	42	46	43 46
33	HI 1544(c)	33	37	45	54	48	42	45	43	42	36	38	41	40 42
34	GW 469	34	39	44	61	48	47	48	42	49	40	42	43	43 45
35	GW 470	35	40	48	55	49	44	47	43	44	39	42	43	42 44
36	CG 1016	36	34	42	57	42	39	43	40	37	36	35	39	37 40
	Mean		40	51	59	48	44	48	41	42	39	40	43	41 45

NIVT 3A (Irrigated Late Sown) - Table 14-18

Grain samples of 36 entries including four checks, received from eight centres of NWPZ and NEPZ grown under irrigated late sown conditions were evaluated for five quality parameters namely, grain appearance score, test weight (kg/hl), protein content (%), sedimentation value (ml) and phenol test score (Table 14 A to 18 A). Grain appearance score varied between 4.4 (HUW 709) and 6.6 (WH 1192) in NWPZ and between 3.2 (MP 1311) and 5.0 (WH 1192) in NEPZ. WH 1192 was identified as the best entry in both the zones with a grain appearance score of 6.6 and 5.0 in NWPZ and NEPZ, respectively. The highest grain appearance score was recorded at Durgapura (6.1) in NWPZ and Samastipur (4.6) in NEPZ. The mean test weight in NWPZ varied between 72.3 to 79.5 kg/hl. The best genotype in this region was HD 3199 and best site mean was recorded at Delhi (78.0 kg/hl). The lowest test weight was recorded at Pantnagar (74.0 kg/hl). In NEPZ, the range varied between 66.4 to 75.6 kg/hl. None of the entries was found better than the best check HI 1563 (75.6 kg/hl) in NEPZ. Among the centres the highest test weight was recorded at Kanpur (74.1 kg/hl). Grain protein content in NWPZ was highest at Durgapura (13.9%) and lowest at Hisar (11.5%). In comparison to best check HD 3059 (12.8%) the promising entries in NWPZ were JKW 206, HI 1961, DBW 172, DBW 173, DBW 174, PBW 736 and MP 1316 with protein level of 12.9% to 13.4%. In NEPZ the protein content varied from 11.1 to 13.4%. The highest protein content was recorded at Samastipur (13.5%). Overall sedimentation value varied from a minimum of 34 ml (HD 3197 and WH 1193) to a maximum value of 46 ml (HP 1961 and RAJ 4428). Several entries outscored best check HI 1563 (43 ml) in NWPZ and DBW 90 (44 ml) in NEPZ. Phenol test score varied from 1.6 (UP 2910 and RAJ 4428) to 6.0 (UP 2913) in NWPZ and from 1.7 (HI 1563) to 6.3 (DBW 172) in NEPZ. The mean phenol test score was equal in both the zones. The lowest phenol test score was recorded at Delhi (2.9) in NWPZ and at Kanpur (3.2) in NEPZ. On the basis of overall mean only two entries, WH 1192 (2.0) and RAJ 4228 (2.0) were found better than the best check HI 1563 (2.1).

Table 14: Grain appearance score (Max-10) of *T.aestivum* genotypes in NIVT 3A

Sr. No.	Entry	Trial Code	NWPZ					NEPZ			Overall Mean	
			Pantnagar	Ludhiana	Hisar	Delhi	Durgapura	Mean	Kanpur	Samastipur	Sabour	
1	HD 3199	01	4.5	5.0	5.5	6.0	6.5	5.5	3.0	4.5	3.5	3.7 4.8
2	WH 1191	02	3.5	5.0	5.0	5.0	5.5	4.8	3.0	3.5	3.5	3.3 4.3
3	NW 6066	03	3.5	4.5	6.0	5.0	5.5	4.9	3.0	3.5	3.0	3.2 4.3
4	HUW 710	04	4.5	4.0	4.5	4.5	6.5	4.8	3.5	3.5	3.5	3.5 4.3
5	NW 6044	05	5.0	5.0	4.5	6.5	7.5	5.7	3.5	5.0	4.0	4.2 5.1
6	MP 1316	06	4.5	4.0	4.5	5.5	6.0	4.9	3.0	3.5	3.0	3.2 4.3
7	HP 1961	07	4.0	5.5	5.0	6.5	5.5	5.3	3.0	4.5	3.5	3.7 4.7
8	HD 3197	08	5.0	4.5	5.5	3.5	5.5	4.8	3.0	5.5	4.0	4.2 4.6
9	HUW 709	09	4.0	4.5	4.5	3.5	5.5	4.4	3.0	4.0	4.0	3.7 4.1
10	HD 3059 (C)	10	6.5	5.0	5.5	7.0	8.0	6.4	4.0	5.0	4.0	4.3 5.6
11	RAJ 4429	11	6.5	5.0	5.0	4.5	6.5	5.5	4.5	4.0	4.0	4.2 5.0
12	HD 3198	12	5.0	5.0	5.5	6.0	6.0	5.5	3.0	5.0	4.5	4.2 5.0
13	DBW 172	13	4.5	5.0	5.5	6.0	6.5	5.5	3.5	5.5	4.5	4.5 5.1
14	DBW 171	14	5.5	5.0	5.0	6.5	6.5	5.7	3.0	4.0	4.0	3.7 4.9
15	UP 2913	15	5.0	5.5	5.5	6.0	6.0	5.6	4.0	4.5	4.0	4.2 5.1
16	K 1412	16	4.5	4.5	5.0	5.5	5.5	5.0	3.0	5.0	3.0	3.7 4.5
17	WH 1192	17	6.5	5.5	6.5	7.5	7.0	6.6	4.0	6.0	5.0	5.0 6.0
18	UP 2910	18	5.0	5.0	5.0	5.0	6.5	5.3	3.0	5.0	4.5	4.2 4.9
19	PBW 735	19	4.5	5.5	5.5	5.5	5.5	5.3	3.0	5.0	5.0	4.3 4.9
20	HUW 708	20	4.5	4.0	4.5	5.0	5.5	4.7	3.0	3.5	3.5	3.3 4.2
21	HD 3200	21	4.0	4.0	5.5	6.5	5.5	5.1	3.5	4.0	4.0	3.8 4.6
22	WH 1193	22	5.5	4.0	5.0	6.0	6.0	5.3	3.0	4.5	4.5	4.0 4.8
23	K 1413	23	5.5	3.5	4.0	6.5	7.0	5.3	3.5	3.5	5.0	4.0 4.8
24	PBW 736	24	5.5	5.0	5.5	6.5	6.5	5.8	3.5	3.5	3.5	3.5 4.9
25	DBW 14 (C)	25	5.0	5.0	5.5	5.0	7.0	5.5	3.0	5.5	4.0	4.2 5.0
26	DBW 173	26	6.0	5.0	5.5	6.0	6.0	5.7	4.0	5.5	3.5	4.3 5.2
27	DBW 174	27	5.0	5.0	6.0	5.5	6.0	5.5	4.0	5.5	5.0	4.8 5.3
28	UP 2911	28	4.0	4.0	5.0	4.0	5.5	4.5	3.5	4.5	3.5	3.8 4.3
29	PBW 734	29	4.5	4.5	5.0	5.5	7.0	5.3	3.0	4.0	3.5	3.5 4.6
30	DBW 90 (C)	30	4.0	4.5	6.0	6.5	7.5	5.7	3.5	5.0	4.5	4.3 5.2
31	K 1414	31	5.5	4.5	6.5	5.5	6.5	5.7	3.5	5.5	4.0	4.3 5.2
32	PBW 733	32	5.0	5.5	5.0	5.0	5.5	5.2	3.5	5.0	4.5	4.3 4.9
33	JKW 206	33	4.0	4.5	5.5	4.0	5.0	4.6	3.0	4.0	4.0	3.7 4.3
34	HI 1563 (C)	34	4.5	5.0	5.5	5.0	4.0	4.8	3.0	4.5	5.0	4.2 4.6
35	HD 3201	35	6.5	5.0	6.5	6.5	6.0	6.1	4.0	5.0	4.0	4.3 5.4
36	RAJ 4428	36	3.5	3.5	4.5	6.0	6.0	4.7	3.0	5.0	4.0	4.0 4.4
Mean			4.8	4.7	5.3	5.6	6.1	5.3	3.3	4.6	4.0	4.0 4.8

Table 15: Test weight (kg/ha) of *T. aestivum* genotypes in NIVT 3A

Sr. No.	Entry	Trial Code	NWPZ						NEPZ			Overall Mean	
			Pantnagar	Ludhiana	Hisar	Delhi	Durgapura	Mean	Kanpur	Samastipur	Sabour		
1	HD 3199	01	77.3	77.5	81.1	79.8	82.0	79.5	73.3	80.9	71.2	75.1	77.9
2	WH 1191	02	76.4	75.4	74.3	76.6	78.3	76.2	75.3	70.4	67.0	70.9	74.2
3	NW 6066	03	71.9	74.2	76.0	78.0	77.7	75.6	69.7	67.6	61.8	66.4	72.1
4	HUW 710	04	75.3	76.4	73.4	74.6	79.2	75.8	74.3	71.0	64.8	70.0	73.6
5	NW 6044	05	76.0	76.4	77.4	79.6	79.2	77.7	74.3	76.0	70.7	73.7	76.2
6	MP 1316	06	76.4	75.2	72.7	75.4	78.5	75.6	75.1	71.1	67.4	71.2	74.0
7	HP 1961	07	75.5	77.3	78.0	79.5	79.2	77.9	76.2	76.4	69.1	73.9	76.4
8	HD 3197	08	78.8	75.4	79.9	79.6	78.4	78.4	75.6	74.9	70.9	73.8	76.7
9	HUW 709	09	74.1	72.0	75.2	74.8	78.3	74.9	73.0	71.9	69.4	71.4	73.6
10	HD 3059 (C)	10	75.6	78.4	78.3	80.2	78.4	78.2	76.8	70.1	68.3	71.7	75.8
11	RAJ 4429	11	74.9	77.0	75.3	77.4	79.7	76.9	76.2	74.9	67.2	72.8	75.3
12	HD 3198	12	72.6	75.7	77.9	79.7	78.8	76.9	71.9	73.9	68.2	71.3	74.8
13	DBW 172	13	74.2	77.8	80.6	81.1	77.5	78.2	76.3	77.4	67.2	73.6	76.5
14	DBW 171	14	73.0	76.5	77.0	78.7	78.2	76.7	73.4	70.5	68.0	70.6	74.4
15	UP 2913	15	72.4	75.9	74.8	78.5	76.0	75.5	75.9	73.1	68.2	72.4	74.4
16	K 1412	16	72.6	76.1	74.1	74.9	74.6	74.5	73.8	67.1	65.6	68.8	72.4
17	WH 1192	17	73.9	76.9	77.9	79.1	76.9	76.9	74.2	73.5	68.3	72.0	75.1
18	UP 2910	18	72.8	76.0	75.2	79.2	77.5	76.1	73.9	74.2	67.4	71.8	74.5
19	PBW 735	19	72.4	77.2	73.4	78.9	77.3	75.8	73.4	72.0	66.2	70.5	73.9
20	HUW 708	20	72.0	72.7	73.2	71.6	75.5	73.0	71.5	67.9	65.3	68.2	71.2
21	HD 3200	21	74.0	74.0	77.8	77.9	76.1	76.0	76.0	76.4	64.8	72.4	74.6
22	WH 1193	22	73.7	73.2	73.7	77.3	77.1	75.0	73.4	71.8	66.8	70.7	73.4
23	K 1413	23	71.6	70.2	73.3	76.2	78.7	74.0	69.5	63.0	68.6	67.0	71.4
24	PBW 736	24	71.9	75.3	76.4	76.1	76.5	75.2	73.2	72.0	66.2	70.5	73.5
25	DBW 14 (C)	25	71.9	72.8	78.1	76.8	76.7	75.3	75.0	74.8	69.2	73.0	74.4
26	DBW 173	26	74.5	76.8	75.8	79.5	75.8	76.5	75.8	73.4	66.0	71.7	74.7
27	DBW 174	27	72.6	76.4	79.9	81.7	78.4	77.8	75.5	76.0	70.0	73.8	76.3
28	UP 2911	28	74.8	75.9	74.8	78.0	77.3	76.2	71.7	73.2	67.2	70.7	74.1
29	PBW 734	29	72.2	76.6	75.8	77.0	78.1	75.9	73.9	68.8	65.3	69.3	73.5
30	DBW 90 (C)	30	73.8	75.7	77.0	77.2	78.3	76.4	74.2	73.5	67.3	71.7	74.6
31	K 1414	31	74.7	74.6	81.4	80.6	78.4	77.9	75.9	73.5	69.3	72.9	76.1
32	PBW 733	32	76.4	79.1	77.4	79.9	78.7	78.3	76.9	71.5	69.8	72.7	76.2
33	JKW 206	33	73.7	75.1	77.8	78.0	75.9	76.1	73.2	68.6	63.0	68.3	73.2
34	HI 1563 (C)	34	76.5	77.3	81.8	81.1	77.8	78.9	78.8	75.5	72.5	75.6	77.7
35	HD 3201	35	75.8	74.8	78.5	78.5	76.8	76.9	70.4	75.9	69.1	71.8	75.0
36	RAJ 4428	36	68.7	70.0	72.1	76.3	74.2	72.3	70.4	75.9	63.1	69.8	71.3
Mean			74.0	75.5	76.6	78.0	77.7	76.4	74.1	72.7	67.5	71.5	74.5

Table 16: Protein content (%) of *T.aestivum* genotypes in NIVT 3A

Sr. No.	Entry	Trial Code	NWPZ						NEPZ			Overall Mean	
			Pantnagar	Ludhiana	Hissar	Delhi	Durgapura	Mean	Kanpur	Samastipur	Sabour		
1	HD 3199	01	11.3	12.1	11.0	11.9	13.2	11.9	12.8	12.4	10.9	12.0	
2	WH 1191	02	11.6	12.0	10.8	11.5	12.4	11.7	10.7	13.8	11.1	11.9	
3	NW 6066	03	11.2	11.9	11.5	12.2	12.2	11.8	11.6	13.2	11.5	12.1	
4	HUW 710	04	10.6	12.5	11.6	12.5	13.0	12.0	11.4	13.9	12.2	12.5	
5	NW 6044	05	12.1	12.2	10.6	12.9	13.9	12.3	11.0	13.3	11.4	11.9	
6	MP 1316	06	11.5	12.9	12.4	13.6	14.3	12.9	11.3	15.1	12.1	12.8	
7	HP 1961	07	12.9	12.4	12.4	12.5	15.0	13.0	12.6	13.3	12.6	12.8	
8	HD 3197	08	11.4	11.6	11.6	11.6	16.2	12.5	9.8	12.1	11.3	11.1	
9	HUW 709	09	11.4	13.2	9.9	12.4	13.9	12.2	12.6	13.8	11.7	12.7	
10	HD 3059 (C)	10	12.0	12.3	11.2	12.9	15.6	12.8	11.7	13.8	12.3	12.6	
11	RAJ 4429	11	12.6	12.5	11.9	12.2	15.0	12.8	12.4	13.9	13.3	13.2	
12	HD 3198	12	11.4	11.5	11.2	12.5	13.5	12.0	12.5	12.8	10.9	12.1	
13	DBW 172	13	11.5	13.0	11.9	13.6	15.9	13.2	13.4	13.8	13.2	13.5	
14	DBW 171	14	11.0	12.6	11.1	11.9	13.6	12.0	12.6	13.6	12.3	12.8	
15	UP 2913	15	10.8	12.2	10.4	11.4	13.6	11.7	10.6	13.3	12.6	12.2	
16	K 1412	16	11.8	12.6	11.4	12.9	13.5	12.4	12.2	14.0	12.1	12.8	
17	WH 1192	17	12.2	11.9	11.7	13.1	14.0	12.6	12.0	13.3	12.1	12.5	
18	UP 2910	18	11.8	12.4	10.8	12.2	13.7	12.2	13.0	13.0	11.5	12.5	
19	PBW 735	19	11.2	11.5	11.3	11.5	13.9	11.9	11.9	12.4	11.3	11.9	
20	HUW 708	20	11.3	12.1	12.0	12.7	12.9	12.2	12.3	13.8	11.4	12.5	
21	HD 3200	21	12.0	12.4	11.2	13.1	13.1	12.4	13.0	14.5	11.5	13.0	
22	WH 1193	22	11.7	11.5	10.7	11.6	12.9	11.7	11.3	12.4	11.1	11.6	
23	K 1413	23	11.9	12.6	12.5	12.5	12.7	12.4	13.4	14.4	11.7	13.2	
24	PBW 736	24	11.6	13.0	12.3	13.3	14.6	13.0	11.5	14.1	12.0	12.5	
25	DBW 14 (C)	25	11.8	11.8	12.6	12.7	14.5	12.7	10.4	13.2	11.9	11.8	
26	DBW 173	26	11.5	13.0	12.6	12.8	14.4	12.9	11.1	14.0	12.6	12.6	
27	DBW 174	27	12.2	13.2	12.8	12.2	14.9	13.1	12.2	14.3	12.9	13.1	
28	UP 2911	28	11.9	11.6	11.2	12.3	13.6	12.1	10.7	13.6	12.7	12.3	
29	PBW 734	29	11.0	12.0	10.9	12.1	13.4	11.9	10.9	14.0	12.0	12.3	
30	DBW 90 (C)	30	11.5	12.2	11.5	11.7	13.8	12.1	13.0	13.0	12.1	12.7	
31	K 1414	31	12.6	12.4	11.8	12.7	13.9	12.7	13.0	13.9	13.2	13.4	
32	PBW 733	32	11.5	12.4	11.0	11.0	14.2	12.0	11.3	12.8	10.6	11.6	
33	JKW 206	33	12.4	13.1	12.4	14.2	14.8	13.4	13.1	14.5	12.6	13.4	
34	HI 1563 (C)	34	11.4	11.9	11.4	12.8	14.0	12.3	11.5	12.5	10.4	11.5	
35	HD 3201	35	11.4	11.9	10.2	13.4	14.1	12.2	10.3	13.8	11.8	12.0	
36	RAJ 4428	36	12.4	12.8	12.0	12.5	14.0	12.7	13.1	13.7	12.6	13.1	
Mean			11.7	12.3	11.5	12.5	14.0	12.4	11.9	13.5	11.9	12.5	12.4

Table 17: Sedimentation value (ml) of *T.aestivum* genotypes in NIVT 3A

Sr. No.	Entry	Trial Code	NWPZ					NEPZ			Overall Mean		
			Pantnagar	Ludhiana	Hisar	Delhi	Durgapura	Mean	Kapur	Samastipur	Sabour		
1	HD 3199	01	32	41	30	45	48	39	40	43	31	38 39	
2	WH 1191	02	35	43	28	34	41	36	27	55	36	39 37	
3	NW 6066	03	30	31	34	42	41	36	30	50	38	39 37	
4	HUW 710	04	29	45	35	46	50	41	30	54	40	41 41	
5	NW 6044	05	34	40	29	48	49	40	40	42	37	40 40	
6	MP 1316	06	30	49	39	48	47	43	35	55	36	42 42	
7	HP 1961	07	38	52	38	50	50	46	44	50	42	45 46	
8	HD 3197	08	32	33	34	36	50	37	28	33	31	31 35	
9	HUW 709	09	31	43	27	36	47	37	33	52	38	41 38	
10	HD 3059 (C)	10	35	45	31	48	48	41	31	51	42	41 41	
11	RAJ 4429	11	35	40	35	38	47	39	31	52	44	42 40	
12	HD 3198	12	35	34	33	47	42	38	36	41	30	36 37	
13	DBW 172	13	31	47	37	46	48	42	45	52	43	47 44	
14	DBW 171	14	34	49	32	42	50	41	39	51	40	43 42	
15	UP 2913	15	31	42	30	33	47	37	30	46	45	40 38	
16	K 1412	16	32	44	36	45	49	41	32	55	35	41 41	
17	WH 1192	17	39	40	37	51	50	43	34	50	34	39 42	
18	UP 2910	18	34	45	33	44	47	41	48	47	35	43 42	
19	PBW 735	19	32	35	37	35	49	38	31	36	33	33 36	
20	HUW 708	20	35	42	39	48	47	42	35	51	35	40 42	
21	HD 3200	21	35	42	31	49	48	41	43	54	36	44 42	
22	WH 1193	22	33	36	28	35	44	35	30	33	35	33 34	
23	K 1413	23	37	45	39	49	42	42	46	54	39	46 44	
24	PBW 736	24	36	55	39	53	50	47	33	52	40	42 45	
25	DBW 14 (C)	25	37	36	40	45	50	42	26	47	34	36 39	
26	DBW 173	26	32	49	39	49	49	44	30	50	40	40 42	
27	DBW 174	27	37	50	39	37	44	41	34	50	46	43 42	
28	UP 2911	28	42	39	35	44	44	41	30	42	45	39 40	
29	PBW 734	29	31	41	34	42	43	38	30	49	34	38 38	
30	DBW 90 (C)	30	36	47	32	37	45	39	48	44	40	44 41	
31	K 1414	31	44	44	38	45	47	44	42	50	42	45 44	
32	PBW 733	32	33	46	32	33	50	39	30	41	31	34 37	
33	JKW 206	33	32	45	40	48	50	43	37	45	42	41 42	
34	HI 1563 (C)	34	38	45	33	48	49	43	35	42	29	35 40	
35	HD 3201	35	34	40	26	50	50	40	29	55	36	40 40	
36	RAJ 4428	36	42	52	35	46	48	45	48	53	42	48 46	
Mean			35	43	34	44	47	41	35	48	38	40	40

Table 18: Phenol test (Max score 10) of *T.aestivum* genotypes in NIVT 3A

Sr. No.	Entry	Trial Code	NWPZ					NEPZ			Overall Mean	
			Pantnagar	Ludhiana	Hisar	Delhi	Durgapura	Mean	Kanpur	Samastipur		
1	HD 3199	01	3	3	5	3	7	4.2	2	5	4	3.7 4.0
2	WH 1191	02	4	3	6	3	6	4.4	1	5	3	3.0 3.9
3	NW 6066	03	5	5	4	2	6	4.4	2	3	4	3.0 3.9
4	HUW 710	04	5	3	5	3	3	3.8	3	5	5	4.3 4.0
5	NW 6044	05	5	5	5	5	5	5.0	6	5	4	5.0 5.0
6	MP 1316	06	2	3	4	1	1	2.2	2	3	3	2.7 2.4
7	HP 1961	07	5	6	4	2	7	4.8	2	6	4	4.0 4.5
8	HD 3197	08	7	4	4	2	6	4.6	3	5	6	4.7 4.6
9	HUW 709	09	5	6	6	2	5	4.8	4	4	5	4.3 4.6
10	HD 3059 (C)	10	6	5	4	3	5	4.6	4	3	5	4.0 4.4
11	RAJ 4429	11	3	3	3	4	1	2.8	1	3	4	2.7 2.8
12	HD 3198	12	6	3	5	3	3	4.0	2	3	4	3.0 3.6
13	DBW 172	13	5	2	5	2	4	3.6	6	6	7	6.3 4.6
14	DBW 171	14	5	3	4	4	6	4.4	5	3	5	4.3 4.4
15	UP 2913	15	5	3	7	7	8	6.0	3	5	6	4.7 5.5
16	K 1412	16	5	3	3	2	7	4.0	6	6	6	6.0 4.8
17	WH 1192	17	2	2	2	1	3	2.0	1	3	2	2.0 2.0
18	UP 2910	18	2	1	2	1	2	1.6	2	3	3	2.7 2.0
19	PBW 735	19	7	7	5	2	3	4.8	5	3	4	4.0 4.5
20	HUW 708	20	3	3	5	3	6	4.0	5	3	7	5.0 4.4
21	HD 3200	21	5	4	4	4	4	4.2	4	5	5	4.7 4.4
22	WH 1193	22	5	5	4	4	3	4.2	4	6	5	5.0 4.5
23	K 1413	23	4	3	6	2	7	4.4	3	5	4	4.0 4.3
24	PBW 736	24	3	2	3	1	1	2.0	2	3	4	3.0 2.4
25	DBW 14 (C)	25	4	4	6	4	3	4.2	2	3	7	4.0 4.1
26	DBW 173	26	7	3	5	2	3	4.0	4	3	4	3.7 3.9
27	DBW 174	27	5	3	2	5	2	3.4	2	5	5	4.0 3.6
28	UP 2911	28	4	3	4	2	4	3.4	2	6	6	4.7 3.9
29	PBW 734	29	4	3	7	5	6	5.0	6	4	4	4.7 4.9
30	DBW 90 (C)	30	5	4	5	4	6	4.8	5	6	5	5.3 5.0
31	K 1414	31	5	7	8	3	5	5.6	3	4	6	4.3 5.1
32	PBW 733	32	4	3	5	5	2	3.8	3	3	4	3.3 3.6
33	JKW 206	33	5	4	5	3	3	4.0	4	5	4	4.3 4.1
34	HI 1563 (C)	34	2	2	4	2	3	2.6	2	1	2	1.7 2.3
35	HD 3201	35	2	3	3	2	2	2.4	2	2	4	2.7 2.5
36	RAJ 4428	36	2	2	2	1	1	1.6	2	2	3	2.3 1.9
Mean			4.3	3.6	4.5	2.9	4.1	3.9	3.2	4.0	4.5	3.9 3.9

NIVT 3B (Irrigated, Late Sown) - Table 19-23

Grain samples of 36 entries were received from four locations in the CZ and three locations in the PZ (Table 14B to 18B). The grain appearance score in CZ varied from 4.6 (UAS 373) to 6.1 (DBW 175, HW 3906 and MP 4010) with Vijapur (6.4) recording the highest value. In PZ the range varied from 4.3 (UAS 373) to 7.2 (HI 8767). The highest grain appearance score was recorded at Pune (6.5) followed by Dharwad (5.8) and Niphad (5.6). The highest mean test weight value of 77.0 kg/hl was recorded at Junagarh in CZ and Pune (80.5 kg/hl) in PZ. The highest mean test weight of 79.3 kg/hl was recorded for the entry MP 3433. The mean protein content was low in PZ (12.1%) as compared to CZ (13.1%). Highest mean protein content among different locations was recorded at Powarkheda (13.9%) and lowest at Pune (11.2%). Four entries namely, RAJ 4426 (13.8%), DBW 177 (13.6%), RVW 4235 (13.5%) and MP 1313 (13.5%) recorded higher protein content as compared to best check NIAW 34 (13.4%). There were large numbers of entries with a mean protein content value of 12 percent and above. Overall sedimentation value varied from 34 ml (GW 477) to 49 ml (RVW 4235 and RAJ 4426). The highest mean value of 49 ml was recorded at Junagarh, whereas, the lowest mean value of 35 ml was recorded at Pune. The mean phenol test score varied from 0.0 (HI 8767) to 5.3 (PBW 739) in CZ and from 0.0 (HI 8767) to 6.0 (CG 1017) in PZ. None of the entries recorded the phenol reaction score lower than the best check HD 2932 (1.5) and only one entry HW 3906 (1.5) was at par with this check.

Table 19: Grain appearance score (Max-10) of *T.aestivum* genotypes in NIVT 3B

Sr. No.	Entry	Trial Code	CZ					PZ			Overall Mean	
			Indore	Vijapur	Junagarh	Powarkheda	Zonal Mean	Pune	Dharwad	Niphad		
1	CG 1019	01	5.0	7.5	5.5	5.0	5.8	7.5	5.5	5.0	6.0	5.9
2	MP 3436	02	3.5	8.0	5.5	4.0	5.3	7.0	4.0	4.5	5.2	5.2
3	MP 3433	03	4.0	8.0	6.0	5.0	5.8	7.5	6.0	4.5	6.0	5.9
4	RAJ 4083 (C)	04	4.5	6.5	6.0	5.5	5.6	7.0	5.5	5.0	5.8	5.7
5	GW 477	05	4.0	7.0	6.5	5.5	5.8	4.0	5.0	5.0	4.7	5.3
6	MACS 6669	06	4.0	5.5	7.0	4.5	5.3	7.5	6.5	6.5	6.8	5.9
7	UAS 371	07	4.0	6.5	5.5	6.0	5.5	8.0	6.0	5.5	6.5	5.9
8	UAS 373	08	3.5	5.5	5.5	4.0	4.6	5.0	4.0	4.0	4.3	4.5
9	HI 1611	09	3.5	6.5	5.5	4.5	5.0	5.5	6.5	4.5	5.5	5.2
10	MACS 6635	10	3.5	7.0	5.5	6.0	5.5	7.0	6.0	6.0	6.3	5.9
11	HD 2932 (C)	11	3.5	6.5	6.5	5.5	5.5	7.5	6.5	6.5	6.8	6.1
12	GW 475	12	3.5	5.5	6.5	5.5	5.3	4.5	5.0	4.0	4.5	4.9
13	AKAW 4842	13	5.5	5.5	5.5	5.5	5.5	7.0	5.5	5.5	6.0	5.7
14	RVW 4235	14	6.0	6.5	5.5	6.0	6.0	7.5	6.5	7.0	7.0	6.4
15	DBW 175	15	5.5	7.0	6.0	6.0	6.1	5.0	6.5	7.5	6.3	6.2
16	MP 1313	16	6.0	5.5	5.5	4.5	5.4	4.5	5.0	5.0	4.8	5.1
17	MP 1312	17	5.0	6.5	5.0	4.0	5.1	6.0	6.0	6.5	6.2	5.6
18	WH 1195	18	5.5	7.5	6.0	5.0	6.0	5.5	5.5	4.0	5.0	5.6
19	NIAW 34 (C)	19	5.0	6.0	6.0	5.0	5.5	6.0	5.0	5.5	5.5	5.5
20	DBW 176	20	5.5	5.0	5.5	6.0	5.5	7.0	6.5	6.0	6.5	5.9
21	NIAW 2613	21	5.0	5.5	5.0	4.0	4.9	5.5	5.5	7.0	6.0	5.4
22	RAJ 4427	22	5.5	6.5	4.5	6.0	5.6	6.5	6.0	6.5	6.3	5.9
23	PBW 743	23	5.5	6.0	5.0	4.0	5.1	6.5	5.5	7.0	6.3	5.6
24	WH 1194	24	5.0	5.5	5.0	4.0	4.9	6.0	7.0	4.0	5.7	5.2
25	PBW 739	25	5.5	5.5	5.0	5.5	5.4	7.0	7.0	5.5	6.5	5.9
26	HI 8767	26	5.5	7.5	5.5	5.5	6.0	8.0	6.5	7.0	7.2	6.5
27	HW 3906	27	6.0	7.0	5.5	6.0	6.1	7.0	6.0	7.0	6.7	6.4
28	MP 4010 (C)	28	6.0	7.5	5.0	6.0	6.1	7.0	5.5	6.5	6.3	6.2
29	NIAW 2565	29	5.5	7.0	4.0	5.5	5.5	7.5	6.5	5.5	6.5	5.9
30	CG 1017	30	5.0	7.0	5.0	6.0	5.8	5.0	5.5	6.0	5.5	5.6
31	GW 478	31	5.0	7.5	5.0	6.0	5.9	5.5	5.5	4.5	5.2	5.6
32	GW 474	32	5.0	5.0	5.0	5.5	5.1	6.0	5.5	5.5	5.7	5.4
33	UP 2912	33	5.5	5.5	5.5	5.5	5.5	7.5	5.0	6.0	6.2	5.8
34	DBW 177	34	5.5	6.0	4.5	6.0	5.5	7.5	4.5	5.5	5.8	5.6
35	HD 3206	35	6.0	6.5	5.0	6.0	5.9	8.0	7.0	6.0	7.0	6.4
36	RAJ 4426	36	5.5	6.0	5.5	5.5	5.6	7.5	5.5	5.5	6.2	5.9
Mean			4.9	6.4	5.5	5.3	5.5	6.5	5.8	5.6	6.0	5.7

Table 20: Test weight (kg/ha) of *T.aestivum* genotypes in NIVT 3B

Sr. No.	Entry	Trial Code	CZ				PZ				Overall Mean
			Indore	Vijapur	Junagadh	Powarkheda	Mean	Pune	Dharwad	Niphad	
1	CG 1019	01	75.5	76.7	76.8	71.0	75.0	82.3	78.9	76.5	79.2 76.8
2	MP 3436	02	76.5	76.3	77.5	66.4	74.2	81.3	79.2	80.4	80.3 76.8
3	MP 3433	03	80.6	78.5	80.0	70.4	77.4	82.5	80.1	81.1	81.2 79.0
4	RAJ 4083 (C)	04	74.0	76.0	78.6	69.3	74.5	80.3	76.1	80.7	79.0 76.4
5	GW 477	05	80.0	80.0	76.1	70.1	76.6	81.0	79.3	81.2	80.5 78.2
6	MACS 6669	06	77.2	74.9	77.3	71.5	75.2	81.6	79.8	80.8	80.7 77.6
7	UAS 371	07	77.9	76.6	78.0	72.0	76.1	81.6	75.4	78.8	78.6 77.2
8	UAS 373	08	71.9	75.4	78.1	62.3	71.9	75.8	76.1	76.0	76.0 73.7
9	HI 1611	09	71.7	72.0	76.4	62.8	70.7	78.1	78.1	75.8	77.3 73.6
10	MACS 6635	10	74.4	78.7	76.8	71.5	75.4	81.2	75.9	81.8	79.6 77.2
11	HD 2932 (C)	11	74.2	76.6	79.8	70.1	75.2	80.3	78.1	78.1	78.8 76.7
12	GW 475	12	73.7	72.7	72.7	65.8	71.2	76.9	77.3	75.4	76.5 73.5
13	AKAW 4842	13	77.6	76.8	75.5	71.4	75.3	80.5	78.8	76.2	78.5 76.7
14	RVW 4235	14	77.0	75.1	76.7	72.0	75.2	81.9	79.4	79.5	80.3 77.4
15	DBW 175	15	77.6	76.3	76.3	68.0	74.6	79.7	78.3	77.1	78.4 76.2
16	MP 1313	16	73.6	73.3	75.0	61.9	71.0	77.4	76.3	75.9	76.5 73.3
17	MP 1312	17	71.6	71.7	76.3	64.7	71.1	78.1	77.9	76.1	77.4 73.8
18	WH 1195	18	74.2	76.2	75.9	67.7	73.5	80.1	78.4	77.7	78.7 75.7
19	NIAW 34 (C)	19	75.0	75.0	72.0	65.6	71.9	79.2	75.7	77.7	77.5 74.3
20	DBW 176	20	74.9	74.0	77.3	71.0	74.3	80.8	80.5	78.6	80.0 76.7
21	NIAW 2613	21	71.7	76.0	76.1	69.3	73.3	81.3	78.5	77.7	79.2 75.8
22	RAJ 4427	22	76.0	78.5	77.6	72.5	76.2	81.7	78.5	74.5	78.2 77.0
23	PBW 743	23	76.4	77.3	75.1	62.1	72.7	77.0	77.5	78.6	77.7 74.9
24	WH 1194	24	71.0	73.0	76.0	61.9	70.5	78.3	74.8	74.5	75.9 72.8
25	PBW 739	25	76.8	75.9	77.0	72.0	75.4	81.5	79.4	78.2	79.7 77.3
26	HI 8767	26	78.1	78.1	80.2	69.7	76.5	83.8	79.3	81.7	81.6 78.7
27	HW 3906	27	79.8	80.4	79.6	71.6	77.9	82.1	78.5	79.6	80.1 78.8
28	MP 4010 (C)	28	79.8	79.5	78.5	66.3	76.0	81.1	80.0	77.9	79.7 77.6
29	NIAW 2565	29	74.4	77.1	75.6	64.9	73.0	79.1	79.9	77.4	78.8 75.5
30	CG 1017	30	78.4	78.2	77.4	69.1	75.8	81.9	79.4	79.6	80.3 77.7
31	GW 478	31	78.5	78.8	79.2	69.3	76.5	82.1	78.1	80.2	80.1 78.0
32	GW 474	32	74.7	72.7	73.4	69.9	72.7	78.8	78.4	77.6	78.3 75.1
33	UP 2912	33	74.4	74.0	78.5	68.9	74.0	81.5	79.3	78.3	79.7 76.4
34	DBW 177	34	77.7	75.5	77.5	70.7	75.4	81.7	78.1	78.5	79.4 77.1
35	HD 3206	35	77.2	77.3	79.3	72.8	76.7	82.7	79.1	78.4	80.1 78.1
36	RAJ 4426	36	75.9	74.8	78.2	66.8	73.9	82.3	78.8	78.6	79.9 76.5
Mean			75.8	76.1	77.0	68.4	74.3	80.5	78.3	78.2	79.0 76.3

Table 21: Protein content (%) of *T.aestivum* genotypes in NIVT 3B

Sr. No.	Entry	Trial Code	CZ				PZ				Overall Mean	
			Indore	Vijapur	Junagarh	Powarkheda	Mean	Pune	Dharwad	Niphad		
1	CG 1019	01	13.1	11.1	14.1	13.7	13.0	10.8	13.0	12.1	12.0	12.6
2	MP 3436	02	11.5	10.2	13.5	14.4	12.4	11.4	11.9	12.1	11.8	12.1
3	MP 3433	03	12.1	11.3	12.9	14.9	12.8	11.6	11.9	13.8	12.4	12.6
4	RAJ 4083 (C)	04	12.4	11.2	13.6	13.4	12.7	11.1	12.7	11.6	11.8	12.3
5	GW 477	05	10.7	9.3	12.7	12.7	11.4	10.6	11.8	11.1	11.2	11.3
6	MACS 6669	06	11.9	11.3	13.2	13.2	12.4	10.8	12.0	14.0	12.3	12.3
7	UAS 371	07	13.2	11.4	13.6	13.6	13.0	11.6	13.4	12.8	12.6	12.8
8	UAS 373	08	11.9	10.8	15.0	14.0	12.9	11.9	12.4	12.6	12.3	12.7
9	HI 1611	09	12.3	11.1	14.0	14.3	12.9	11.5	13.9	12.5	12.6	12.8
10	MACS 6635	10	12.8	11.2	13.5	13.7	12.8	10.3	13.2	12.1	11.9	12.4
11	HD 2932 (C)	11	12.0	12.2	13.5	12.6	12.6	11.0	13.5	12.1	12.2	12.4
12	GW 475	12	13.2	12.0	13.7	15.3	13.6	10.9	12.2	12.2	11.8	12.8
13	AKAW 4842	13	13.2	13.6	13.8	14.4	13.8	11.1	12.0	14.3	12.5	13.2
14	RVW 4235	14	12.5	13.3	14.5	14.4	13.7	11.8	13.4	15.0	13.4	13.6
15	DBW 175	15	11.7	13.3	14.9	14.1	13.5	11.8	13.1	11.6	12.2	12.9
16	MP 1313	16	13.2	12.8	13.9	15.0	13.7	13.5	12.8	13.8	13.4	13.6
17	MP 1312	17	12.8	13.1	15.3	12.6	13.5	11.4	12.6	11.9	12.0	12.8
18	WH 1195	18	11.9	11.8	13.4	14.4	12.9	11.5	11.0	12.6	11.7	12.4
19	NIAW 34 (C)	19	13.2	13.4	13.4	14.5	13.6	12.4	13.5	13.5	13.1	13.4
20	DBW 176	20	12.2	11.0	13.2	13.2	12.4	11.7	12.0	11.9	11.9	12.2
21	NIAW 2613	21	12.1	11.5	13.1	13.6	12.6	10.5	12.6	11.4	11.5	12.1
22	RAJ 4427	22	12.0	13.8	14.7	13.5	13.5	11.1	12.4	13.7	12.4	13.0
23	PBW 743	23	12.1	11.2	13.7	13.6	12.7	12.5	11.3	10.9	11.6	12.2
24	WH 1194	24	13.6	13.3	13.4	14.3	13.7	10.4	11.4	13.1	11.6	12.8
25	PBW 739	25	13.1	14.5	14.5	14.4	14.1	12.1	12.8	13.1	12.7	13.5
26	HI 8767	26	11.9	10.8	13.8	14.7	12.8	9.9	13.4	12.1	11.8	12.4
27	HW 3906	27	11.5	13.1	12.9	12.8	12.6	10.7	13.1	11.5	11.8	12.2
28	MP 4010 (C)	28	11.8	13.2	13.8	14.0	13.2	10.8	13.2	11.6	11.9	12.6
29	NIAW 2565	29	11.5	11.6	12.2	13.0	12.1	10.1	13.4	12.1	11.9	12.0
30	CG 1017	30	11.2	11.8	12.9	12.9	12.2	9.8	11.6	11.8	11.1	11.7
31	GW 478	31	11.2	12.0	14.3	13.1	12.7	10.3	12.4	12.4	11.7	12.2
32	GW 474	32	11.5	13.7	13.9	13.9	13.3	11.2	11.2	11.7	11.4	12.4
33	UP 2912	33	13.2	14.1	15.1	14.4	14.2	10.8	12.6	11.9	11.8	13.2
34	DBW 177	34	13.1	13.2	14.7	14.6	13.9	11.4	15.0	13.5	13.3	13.6
35	HD 3206	35	12.9	13.8	14.5	13.2	13.6	11.1	14.6	13.1	12.9	13.3
36	RAJ 4426	36	12.9	14.2	15.0	15.1	14.3	13.4	13.2	13.2	13.3	13.9
Mean			12.3	12.3	13.8	13.9	13.1	11.2	12.7	12.5	12.1	12.7

Table 22: Sedimentation value (ml) of *T.aestivum* genotypes in NIVT 3B

Sr. No.	Entry	Trial Code	CZ				PZ				Overall Mean	
			Indore	Vijapur	Junagarh	Powarkheda	Mean	Pune	Dharwad	Niphad		
1	CG 1019	01	40	48	46	49	46	29	52	37	39	43
2	MP 3436	02	29	33	46	50	40	34	34	35	34	37
3	MP 3433	03	37	49	46	50	46	36	39	51	42	44
4	RAJ 4083 (C)	04	44	43	47	44	45	39	52	37	43	44
5	GW 477	05	23	32	49	42	37	28	36	29	31	34
6	MACS 6669	06	36	47	46	44	43	32	39	49	40	42
7	UAS 371	07	44	47	47	45	46	32	51	37	40	43
8	UAS 373	08	44	43	48	46	45	45	49	44	46	46
9	HI 1611	09	39	46	50	46	45	33	54	36	41	43
10	MACS 6635	10	46	48	46	44	46	32	51	35	39	43
11	HD 2932 (C)	11	35	48	47	35	41	30	50	33	38	40
12	GW 475	12	46	50	46	49	48	34	43	39	39	44
13	AKAW 4842	13	46	53	50	44	48	31	38	48	39	44
14	RVW 4235	14	43	51	47	47	47	46	53	55	51	49
15	DBW 175	15	40	48	49	44	45	36	49	33	39	43
16	MP 1313	16	46	45	48	47	47	50	47	46	48	47
17	MP 1312	17	42	47	49	42	45	35	43	30	36	41
18	WH 1195	18	33	40	49	46	42	40	32	36	36	39
19	NIAW 34 (C)	19	43	46	49	47	46	43	49	44	45	46
20	DBW 176	20	39	30	48	40	39	40	38	37	38	39
21	NIAW 2613	21	38	40	48	42	42	33	44	33	37	40
22	RAJ 4427	22	34	53	53	42	46	32	44	54	43	45
23	PBW 743	23	40	30	51	44	41	48	36	29	38	40
24	WH 1194	24	47	46	52	46	48	32	37	45	38	44
25	PBW 739	25	46	52	49	45	48	44	51	41	45	47
26	HI 8767	26	40	31	52	49	43	28	52	34	38	41
27	HW 3906	27	32	45	49	39	41	32	49	33	38	40
28	MP 4010 (C)	28	34	49	48	45	44	30	52	35	39	42
29	NIAW 2565	29	32	41	44	48	41	30	49	34	38	40
30	CG 1017	30	27	40	44	46	39	23	35	33	30	35
31	GW 478	31	27	41	50	45	41	24	40	39	34	38
32	GW 474	32	36	48	49	45	45	37	35	34	35	41
33	UP 2912	33	46	53	54	45	50	30	47	33	37	44
34	DBW 177	34	46	46	48	48	47	34	52	44	43	45
35	HD 3206	35	44	51	49	42	47	34	54	45	44	46
36	RAJ 4426	36	38	53	54	50	49	53	51	42	49	49
Mean			39	45	49	45	45	35	45	39	40	42

Table 23: Phenol test (Max score 10) of *T.aestivum* genotypes in NIVT 3B

Sr. No.	Entry	Trial Code	CZ					PZ			Overall Mean
			Indore	Vijapur	Junagarh	Powarkheda	Mean	Pune	Dharwad	Niphad	
1	CG 1019	01	5	3	4	3	3.8	3	5	5	4.3 4.0
2	MP 3436	02	3	3	2	4	3.0	3	2	6	3.7 3.3
3	MP 3433	03	3	3	4	3	3.3	4	2	4	3.3 3.3
4	RAJ 4083 (C)	04	4	4	5	3	4.0	5	5	7	5.7 4.7
5	GW 477	05	4	6	5	3	4.5	5	3	7	5.0 4.7
6	MACS 6669	06	3	4	2	2	2.8	3	2	6	3.7 3.1
7	UAS 371	07	3	5	5	6	4.8	4	2	5	3.7 4.3
8	UAS 373	08	4	4	3	3	3.5	4	3	6	4.3 3.9
9	HI 1611	09	2	6	4	3	3.8	4	4	6	4.7 4.1
10	MACS 6635	10	2	4	5	3	3.5	3	2	7	4.0 3.7
11	HD 2932 (C)	11	1	3	2	1	1.8	2	1	1	1.3 1.6
12	GW 475	12	6	5	4	5	5.0	4	4	3	3.7 4.4
13	AKAW 4842	13	3	6	4	6	4.8	5	3	5	4.3 4.6
14	RVW 4235	14	3	5	6	3	4.3	5	2	4	3.7 4.0
15	DBW 175	15	7	4	4	2	4.3	5	6	5	5.3 4.7
16	MP 1313	16	4	6	3	3	4.0	6	3	5	4.7 4.3
17	MP 1312	17	1	2	2	3	2.0	3	2	3	2.7 2.3
18	WH 1195	18	1	2	2	4	2.3	2	3	4	3.0 2.6
19	NIAW 34 (C)	19	1	2	2	5	2.5	3	3	5	3.7 3.0
20	DBW 176	20	2	5	7	6	5.0	5	5	7	5.7 5.3
21	NIAW 2613	21	4	4	4	7	4.8	5	5	5	5.0 4.9
22	RAJ 4427	22	2	6	4	3	3.8	5	2	6	4.3 4.0
23	PBW 743	23	3	5	2	4	3.5	6	3	6	5.0 4.1
24	WH 1194	24	3	5	3	4	3.8	4	3	5	4.0 3.9
25	PBW 739	25	5	7	4	5	5.3	7	3	5	5.0 5.1
26	HI 8767	26	0	0	0	0	0.0	0	0	0	0.0 0.0
27	HW 3906	27	1	2	1	1	1.3	2	2	1	1.7 1.4
28	MP 4010 (C)	28	3	2	2	3	2.5	3	7	5	5.0 3.6
29	NIAW 2565	29	3	2	5	3	3.3	4	4	5	4.3 3.7
30	CG 1017	30	4	7	4	5	5.0	6	5	7	6.0 5.4
31	GW 478	31	4	4	3	4	3.8	6	3	8	5.7 4.6
32	GW 474	32	3	6	3	5	4.3	8	3	5	5.3 4.7
33	UP 2912	33	3	3	3	3	3.0	4	4	4	4.0 3.4
34	DBW 177	34	4	5	3	5	4.3	6	6	4	5.3 4.7
35	HD 3206	35	3	5	3	3	3.5	3	5	7	5.0 4.1
36	RAJ 4426	36	3	3	2	3	2.8	3	4	3	3.3 3.0
Mean			3.1	4.1	3.4	3.6	3.6	4.2	3.4	4.9	4.2 3.8

NIVT 4 (Irrigated Timely Sown – *T. durum*) - Table 24-29

This irrigated *durum* trial was conducted in two zones and the samples were received from five sites of each zone namely Indore, Junagarh, Vijapur, Kota and Powarkheda in CZ, and Dharwad, Niphad, Nippani, Pune and Ugar in PZ. Samples were analyzed for grain appearance score, test weight, protein content, sedimentation value, yellow pigment content and yellow berry incidence.

Average grain appearance score was low at Powarkheda location of CZ and Ugar and Dharwad locations of PZ (below 5.0) and very good at Junagarh and Pune locations (6.4 to 6.5). Genotypes with GAS ≥ 6.0 could be noted in CZ only and they were PDW 345, GW W1321, HI 8770, HI 8771 and HI 8498 (C). Trial mean in test weight was poor (<80 kg/ha) at Powarkheda in CZ and Dharwad in PZ. Test weight was best at Kota and Niphad (mean: 81.6 & 81.8 kg/ha). There were few test entries with test weight ≥ 82 kg/ha namely PDW 344, PDW 345, PDW 346 in CZ and HI 8774, PDW 346 in PZ.

Average sedimentation value did not differ much at test sites of CZ (41-42 ml) but in PZ, it varied from 39 (Pune) to 43 (Dharwad). Test entries of high sedimentation value (≥ 45 ml) were HI 8770, HI 8771, HI 8772, GW 1320, PDW 346, DDW 35 in CZ and RKD 291, WHD 957, HI 8770, HI 8771, HI 8772, PDW 346, DDW 35 in PZ.

Trial conducting sites had similar protein levels in both the zones as trial mean did not vary much between the locations (11.9 to 12.1 %). Entries with average protein level in the range 12.4-12.6 % were GW 1321, PBND 5175, MPO 1315 in CZ and RKD 291, GW 1321, PDW 344 in PZ.

Yellow pigment content was high at Vijapur with trial mean 6.0 ppm whereas at rest of the sites in CZ; it varied between 5.1 to 5.3 ppm. In PZ, yellow pigment content was poor at Nippani and Ugar (4.8, 4.9 ppm) and good at Pune (5.5 ppm). Few entries registered yellow pigment content ≥ 6.5 ppm in CZ like WHD 957, GW 1321, HI 8498 (C) and HI 8771. In PZ, elite entries had yellow pigment content between 6.1 to 6.4 ppm and they were HI 8498 (C), PDW 314 (C), HI 8771 and WHD 958.

Yellow berry incidence in CZ was generally low and it was only at Kota, Powarkheda and Vijapur where it occurred in each genotype. In PZ however, the incidence level was generally high except at Pune where mean level was below 10 %. Only two entries had yellow berry incidence in the range 15 to 20% in CZ and they were HI 8773 and HI 8498 (C). In PZ however, a large number of genotypes were found sensitive with incidence level ≥ 25 % namely MPO 1314, DDW 36, HI 8772, GW 1320, PDW 344 and NIDW 989.

Table 24: Grain appearance score of *T. durum* genotypes in NIVT-4

Sr. No	Entries	Trial code	CZ						PZ						Overall Mean
			Indore	Junagadh	Kota	P'kheda	Vijapur	Mean	Dharwad	Niphad	Nippani	Pune	Ugar	Mean	
1	MACS 4035	01	5.4	6.5	4.2	3.9	6.1	5.2	4.1	5.0	5.8	6.5	4.9	5.3	5.2
2	UAS 456	02	5.9	6.3	7.0	4.3	4.5	5.6	4.2	4.8	5.6	6.2	4.7	5.1	5.4
3	UAS 457	03	5.2	6.8	6.9	4.5	5.2	5.7	4.3	5.2	6.5	6.9	4.5	5.5	5.6
4	MPO 1314	04	4.4	6.1	6.2	4.4	4.5	5.1	4.7	5.2	4.8	6.2	3.6	4.9	5.0
5	GW 1318	05	5.6	6.2	5.1	4.2	6.3	5.5	4.6	4.8	5.3	6.1	3.7	4.9	5.2
6	RKD 291	06	5.8	6.7	4.5	4.0	5.1	5.2	5.4	5.3	5.1	5.8	4.7	5.3	5.2
7	DDW 36	07	5.6	5.8	4.7	4.7	5.1	5.2	4.6	5.7	3.4	6.3	3.6	4.7	5.0
8	PDW 343	08	5.8	7.1	7.1	5.0	4.5	5.9	5.2	5.8	6.1	7.1	4.0	5.6	5.8
9	MACS 3973	09	6.0	5.8	5.2	4.5	5.5	5.4	4.8	5.7	6.0	4.8	4.2	5.1	5.3
10	WHD 957	10	5.3	6.7	4.1	4.9	5.2	5.2	4.3	5.7	5.8	6.3	4.9	5.4	5.3
11	NIDW295 (C)	11	4.8	6.5	4.3	5.0	5.5	5.2	4.6	5.2	5.1	6.4	4.6	5.2	5.2
12	PDW 345	12	5.9	7.2	5.7	5.2	7.1	6.2	4.1	6.2	3.6	6.8	3.5	4.8	5.5
13	NIDW 950	13	5.0	6.8	4.3	5.0	6.0	5.4	4.2	5.9	4.6	6.4	3.6	4.9	5.2
14	GW 1321	14	4.9	7.4	7.0	4.8	6.1	6.0	4.7	5.8	4.5	6.6	3.5	5.0	5.5
15	HI 8498 (C)	15	4.3	7.3	6.5	4.7	7.5	6.1	4.8	5.0	4.1	6.6	3.6	4.8	5.4
16	HI 8772	16	4.9	7.2	6.2	4.5	7.1	6.0	5.3	4.8	3.8	6.2	3.7	4.8	5.4
17	GW 1319	17	4.9	5.8	5.5	4.3	6.5	5.4	4.3	4.7	3.8	6.0	3.5	4.5	4.9
18	GW 1320	18	4.8	5.6	4.0	5.1	6.9	5.3	4.6	4.9	3.9	5.9	3.4	4.5	4.9
19	UPD 97	19	4.9	5.8	4.1	5.0	7.5	5.5	4.3	5.3	3.5	6.4	3.7	4.6	5.1
20	PBND 5175	20	5.1	6.3	4.0	4.9	6.8	5.4	5.1	5.2	5.6	6.7	4.2	5.4	5.4
21	PDW 314 (C)	21	5.3	5.4	4.1	4.7	6.2	5.1	5.0	4.6	5.9	6.7	3.7	5.2	5.2
22	HI 8770	22	4.7	6.7	7.0	5.3	7.1	6.2	4.6	4.8	4.1	6.2	5.7	5.1	5.6
23	PDW 346	23	5.9	7.3	6.2	5.0	5.0	5.9	4.8	6.7	5.6	7.2	5.6	6.0	5.9
24	HI 8771	24	5.8	6.4	7.3	5.1	5.5	6.0	4.3	4.7	5.8	7.1	5.3	5.4	5.7
25	DDW 35	25	5.4	6.9	6.2	5.4	4.1	5.6	4.6	4.7	5.0	6.9	5.6	5.4	5.5
26	RKD 282	26	4.2	5.2	6.1	3.5	4.0	4.6	5.0	4.8	4.3	4.8	5.1	4.8	4.7
27	HI 8768	27	6.5	6.8	5.5	4.0	4.0	5.4	4.3	5.4	5.6	6.2	5.5	5.4	5.4
28	HI 8769	28	6.2	6.0	3.7	4.8	4.1	5.0	4.8	5.3	5.0	6.8	6.0	5.6	5.3
29	HI 8773	29	6.1	6.7	3.9	4.7	4.5	5.2	4.2	5.0	4.9	6.7	3.6	4.9	5.0
30	PDW 344	30	6.0	7.3	4.1	5.0	6.1	5.7	4.6	6.5	5.3	7.2	4.5	5.6	5.7
31	WHD 958	31	4.6	6.8	4.2	4.6	4.2	4.9	5.3	4.9	5.8	5.8	3.4	5.0	5.0
32	HI 8774	32	5.1	6.9	4.3	4.9	4.5	5.1	4.3	5.2	6.2	7.0	3.2	5.2	5.2
33	MPO 1315	33	4.9	6.4	5.7	5.0	5.1	5.4	4.6	5.6	3.4	7.1	3.7	4.9	5.2
34	AKDW 4525	34	5.6	6.0	6.1	5.1	5.5	5.7	5.3	5.4	5.9	6.8	3.8	5.4	5.6
35	MACS 4029	35	4.6	6.8	5.2	3.9	6.1	5.3	4.4	5.8	4.8	5.8	4.2	5.0	5.2
36	NIDW 989	36	5.0	6.0	5.0	4.0	5.2	5.0	4.3	6.0	5.3	6.2	4.1	5.2	5.1
	Mean		5.3	6.5	5.3	4.7	5.6	5.5	4.6	5.3	5.0	6.4	4.2	5.1	5.3

Table 25: Test weight (kg/ha) of *T. durum* genotypes in NIVT-4

Sr. No	Entries	Trial code	CZ						PZ						Overall Mean
			Indore	Junagadh	Kota	Pikheda	Vijapur	Mean	Dharwad	Niphad	Nippani	Pune	Ugar	Mean	
1	MACS 4035	01	81.0	82.0	81.3	74.0	79.0	79.5	75.1	80.8	80.5	82.4	81.4	80.0	79.8
2	UAS 456	02	81.3	81.7	82.1	74.3	77.8	79.4	78.4	81.3	80.4	79.7	81.0	80.2	79.8
3	UAS 457	03	78.6	80.6	81.9	75.3	81.6	79.6	78.1	81.8	80.6	81.0	80.5	80.4	80.0
4	MPO 1314	04	78.8	81.3	80.3	73.4	79.6	78.7	78.5	81.0	81.0	80.1	81.5	80.4	79.6
5	GW 1318	05	81.0	81.8	74.3	75.4	82.6	79.0	79.5	82.2	81.2	82.3	82.4	81.5	80.3
6	RKD 291	06	77.0	80.8	81.9	71.6	76.3	77.5	76.8	78.0	78.2	75.2	77.7	77.2	77.4
7	DDW 36	07	80.0	69.7	82.9	74.7	80.4	77.5	76.6	83.0	82.2	81.7	79.7	80.6	79.1
8	PDW 343	08	81.4	82.2	83.5	75.9	82.5	81.1	79.7	82.0	81.8	81.3	81.9	81.3	81.2
9	MACS 3973	09	81.5	82.4	80.9	73.4	80.0	79.6	76.2	80.5	80.7	79.8	80.6	79.6	79.6
10	WHD 957	10	81.8	81.1	81.3	72.3	80.7	79.4	80.1	81.0	80.3	78.6	81.3	80.3	79.9
11	NIDW295 (C)	11	82.0	79.2	82.4	71.6	77.6	78.6	78.6	80.4	80.0	77.8	80.9	79.5	79.1
12	PDW 345	12	83.3	82.7	84.3	78.2	83.9	82.5	80.1	81.8	81.3	83.5	82.5	81.8	82.2
13	NIDW 950	13	79.7	80.7	84.9	74.1	80.6	80.0	78.0	81.7	81.4	79.9	81.7	80.5	80.3
14	GW 1321	14	79.8	77.7	83.7	75.1	83.1	79.9	72.2	82.2	81.4	84.3	81.2	80.3	80.1
15	HI 8498 (C)	15	79.7	82.5	85.9	74.5	83.7	81.3	75.0	80.1	81.2	82.1	80.4	79.8	80.5
16	HI 8772	16	80.2	82.1	85.3	76.5	82.6	81.3	79.8	81.8	81.3	80.6	81.6	81.0	81.2
17	GW 1319	17	80.0	77.7	81.9	71.4	78.6	77.9	75.7	80.2	79.2	74.8	77.4	77.5	77.7
18	GW 1320	18	79.8	80.0	81.6	76.6	81.3	79.9	77.8	79.7	79.6	82.0	79.5	79.7	79.8
19	UPD 97	19	82.9	82.5	81.0	77.0	84.2	81.5	80.2	82.8	81.8	81.6	81.7	81.6	81.6
20	PBND 5175	20	81.8	82.4	82.5	75.3	80.1	80.4	77.7	81.3	81.5	80.2	80.8	80.3	80.4
21	PDW 314 (C)	21	81.7	83.0	83.5	76.8	80.5	81.1	78.5	82.9	81.2	81.1	80.4	80.8	81.0
22	HI 8770	22	81.3	82.9	80.1	77.8	80.9	80.6	81.2	80.0	82.4	82.2	81.5	81.5	81.0
23	PDW 346	23	81.8	82.6	85.6	78.4	83.2	82.3	80.2	81.0	83.5	83.3	81.8	82.0	82.1
24	HI 8771	24	81.2	81.3	82.3	76.7	81.2	80.5	79.5	84.0	81.6	82.4	81.4	81.8	81.2
25	DDW 35	25	82.9	80.0	80.1	74.9	77.0	79.0	80.5	84.2	80.8	81.2	80.8	81.5	80.2
26	RKD 282	26	74.0	77.3	78.7	61.3	70.8	72.4	73.1	81.2	78.2	79.9	75.0	77.5	75.0
27	HI 8768	27	84.8	82.0	80.7	76.0	82.2	81.1	78.8	84.2	80.8	82.2	82.1	81.6	81.4
28	HI 8769	28	84.0	80.9	80.7	77.0	81.9	80.9	77.6	84.4	80.0	81.7	82.0	81.1	81.0
29	HI 8773	29	83.9	81.8	80.6	78.0	82.6	81.4	77.9	82.4	80.6	82.1	81.1	80.8	81.1
30	PDW 344	30	84.0	83.6	80.8	78.7	83.3	82.1	80.6	85.7	82.4	81.7	81.9	82.5	82.3
31	WHD 958	31	81.6	81.3	80.4	74.4	81.8	79.9	78.4	81.5	79.6	80.3	79.6	79.9	79.9
32	HI 8774	32	81.5	83.0	80.4	76.6	84.6	81.2	81.7	84.4	81.5	82.4	80.7	82.1	81.7
33	MPO 1315	33	81.6	80.2	81.7	73.5	80.6	79.5	79.1	82.6	78.6	79.5	79.5	79.9	79.7
34	AKDW 4525	34	82.2	80.7	82.7	77.8	82.3	81.1	77.6	84.7	82.3	82.4	81.9	81.8	81.5
35	MACS 4029	35	79.2	78.6	76.0	72.2	78.2	76.8	79.4	79.9	79.9	77.5	76.8	78.7	77.8
36	NIDW 989	36	78.6	77.8	79.9	73.1	74.7	76.8	78.1	80.6	79.7	80.7	79.0	79.6	78.2
Mean			81.0	80.8	81.6	74.8	80.6	79.8	78.3	81.9	80.8	80.5	80.6	80.4	80.1

Table 26: Protein content (%) of *T. durum* genotypes in NIVT-4

Sr. No	Entries	Trial code	CZ						PZ						Overall Mean
			Indore	Junagadh	Kota	P'kheda	Vijapur	Mean	Dharwad	Niphad	Nippani	Pune	Ugar	Mean	
1	MACS 4035	01	11.6	11.8	11.4	11.6	12.2	11.7	12.4	11.8	11.6	12.0	11.4	11.8	11.8
2	UAS 456	02	11.4	11.0	11.8	12.6	11.8	11.7	12.2	12.2	11.4	12.2	11.8	12.0	11.8
3	UAS 457	03	12.2	11.2	12.4	11.8	11.4	11.8	11.6	11.8	11.8	11.4	11.0	11.5	11.7
4	MPO 1314	04	11.8	11.0	12.0	11.4	12.2	11.7	12.0	11.0	11.4	12.2	11.8	11.7	11.7
5	GW 1318	05	12.6	12.8	12.2	12.2	11.8	12.3	12.4	11.8	12.0	12.6	12.4	12.2	12.3
6	RKD 291	06	13.2	12.2	11.8	11.8	11.4	12.1	12.8	12.0	12.4	11.8	12.8	12.4	12.2
7	DDW 36	07	11.8	12.2	11.0	11.4	11.6	11.6	11.4	12.4	12.8	11.4	12.2	12.0	11.8
8	PDW 343	08	11.6	12.6	11.4	12.2	13.0	12.2	13.0	12.6	11.8	11.8	11.0	12.0	12.1
9	MACS 3973	09	11.4	11.8	12.2	11.8	12.2	11.9	11.8	12.2	11.8	12.2	11.8	12.0	11.9
10	WHD 957	10	11.0	12.6	12.4	12.6	12.2	12.2	12.4	12.6	11.8	11.8	11.4	12.0	12.1
11	NIDW295 (C)	11	11.8	12.2	12.2	12.2	12.6	12.2	12.6	11.8	12.4	12.6	11.8	12.2	12.2
12	PDW 345	12	11.4	11.4	11.8	11.0	11.8	11.5	11.8	11.8	11.4	11.4	11.4	11.6	11.5
13	NIDW 950	13	12.2	12.6	12.4	11.2	12.2	12.1	11.4	12.4	11.4	12.6	12.6	12.1	12.1
14	GW 1321	14	12.6	13.2	13.0	11.4	11.8	12.4	12.0	12.2	12.6	13.0	12.8	12.5	12.5
15	HI 8498 (C)	15	11.8	11.4	11.4	11.8	11.4	11.6	11.2	11.8	11.8	11.4	11.8	11.6	11.6
16	HI 8772	16	12.2	11.8	11.2	12.2	12.0	11.9	11.8	11.4	11.8	12.2	12.0	11.8	11.9
17	GW 1319	17	12.6	11.8	11.2	12.6	11.8	12.0	12.4	11.4	11.0	12.2	11.8	11.8	11.9
18	GW 1320	18	13.0	12.4	11.4	12.2	11.4	12.1	12.0	12.6	11.8	12.4	12.2	12.2	12.1
19	UPD 97	19	12.2	11.8	11.2	11.8	12.6	11.9	11.8	12.2	11.4	11.4	11.8	11.7	11.8
20	PBND 5175	20	11.8	12.4	12.6	13.0	13.0	12.6	11.8	11.8	12.2	11.6	12.2	11.9	12.2
21	PDW 314 (C)	21	12.2	12.6	11.2	11.8	11.8	11.9	12.0	12.2	12.4	12.0	12.0	12.1	12.0
22	HI 8770	22	11.4	13.0	11.8	12.2	11.4	12.0	12.6	11.8	11.8	12.2	12.4	12.2	12.1
23	PDW 346	23	11.8	12.4	11.4	12.4	12.2	12.0	12.2	12.2	12.4	12.6	11.8	12.2	12.1
24	HI 8771	24	12.6	11.8	12.0	11.8	11.8	12.0	12.0	12.6	11.8	12.2	11.6	12.0	12.0
25	DDW 35	25	12.4	11.4	11.8	12.4	11.4	11.9	11.8	12.4	11.6	11.4	12.0	11.8	11.9
26	RKD 282	26	12.6	11.8	12.2	12.2	11.8	12.1	12.6	12.2	11.8	12.4	12.4	12.3	12.2
27	HI 8768	27	12.2	11.8	12.6	11.4	12.2	12.0	12.2	11.8	11.4	11.8	11.8	11.8	11.9
28	HI 8769	28	12.6	12.2	11.8	11.8	12.6	12.2	11.8	11.6	12.2	11.6	11.8	11.8	12.0
29	HI 8773	29	11.8	11.8	12.2	11.8	11.4	11.8	11.6	12.6	11.8	12.4	11.0	11.9	11.8
30	PDW 344	30	11.4	12.4	11.8	12.6	12.6	12.2	12.4	13.0	11.4	12.8	12.6	12.4	12.3
31	WHD 958	31	11.4	12.0	12.2	11.8	11.8	11.8	13.0	12.4	12.0	12.0	11.8	12.2	12.0
32	HI 8774	32	12.6	11.8	11.8	12.2	12.6	12.2	12.4	12.4	12.2	11.8	12.0	12.2	12.2
33	MPO 1315	33	12.8	12.2	12.2	11.8	13.0	12.4	12.8	12.2	11.8	12.0	12.8	12.3	12.4
34	AKDW 4525	34	12.2	12.4	11.8	11.6	12.4	12.1	12.2	12.4	11.8	11.6	11.4	11.9	12.0
35	MACS 4029	35	11.8	11.8	12.2	12.0	12.4	12.0	12.0	12.0	11.6	11.8	12.0	11.9	12.0
36	NIDW 989	36	11.6	11.6	11.6	11.8	12.4	11.8	11.8	12.4	12.2	11.6	11.8	12.0	11.9
	Mean		12.0	12.0	11.9	12.0	12.1	12.0	12.1	12.1	11.9	12.0	11.9	12.0	12.0

Table 27: Sedimentation value (ml) of *T. durum* genotypes in NIVT-4

Sr. No	Entries	Trial code	CZ						PZ						Overall Mean
			Indore	Junagadh	Kota	P'kheda	Vijapur	Mean	Dharwad	Nippani	Niipani	Pune	Ugar	Mean	
1	MACS 4035	01	36	34	31	42	38	36	41	40	41	32	38	38	37
2	UAS 456	02	33	38	35	37	42	37	48	42	40	43	44	43	40
3	UAS 457	03	40	41	29	32	41	37	35	37	41	31	39	37	37
4	MPO 1314	04	42	43	41	41	43	42	38	40	35	38	40	38	40
5	GW 1318	05	47	44	33	43	33	40	41	33	42	32	43	38	39
6	RKD 291	06	48	42	43	44	38	43	47	47	47	42	44	45	44
7	DDW 36	07	37	34	43	45	42	40	50	48	38	48	41	45	43
8	PDW 343	08	33	37	32	40	43	37	47	40	37	35	38	39	38
9	MACS 3973	09	42	45	38	37	40	40	48	46	44	42	41	44	42
10	WHD 957	10	47	42	41	40	51	44	50	51	48	44	47	48	46
11	NIDW295 (C)	11	40	43	46	41	43	43	47	43	43	40	42	43	43
12	PDW 345	12	51	50	32	43	48	45	42	42	43	43	51	44	45
13	NIDW 950	13	38	38	40	45	37	40	33	35	35	40	40	37	38
14	GW 1321	14	40	40	42	53	38	43	37	38	39	41	42	39	41
15	HI 8498 (C)	15	45	47	41	42	42	43	46	40	43	41	47	43	43
16	HI 8772	16	47	42	51	40	48	46	53	51	42	42	40	46	46
17	GW 1319	17	40	48	47	41	43	44	42	42	38	43	42	41	43
18	GW 1320	18	42	50	53	43	46	47	50	33	35	41	48	41	44
19	UPD 97	19	40	48	51	32	43	43	52	40	41	42	43	44	43
20	PBND 5175	20	43	43	48	40	42	43	41	45	32	40	42	40	42
21	PDW 314 (C)	21	42	42	44	44	43	43	43	46	47	43	44	45	44
22	HI 8770	22	43	51	50	43	48	47	54	53	52	41	53	51	49
23	PDW 346	23	45	52	48	50	52	49	55	51	48	43	54	50	50
24	HI 8771	24	44	48	35	51	55	47	41	52	43	47	42	45	46
25	DDW 35	25	47	42	40	53	43	45	43	53	44	42	51	47	46
26	RKD 282	26	42	30	42	44	48	41	44	34	35	33	42	38	39
27	HI 8768	27	35	42	40	42	50	42	48	41	34	35	32	38	40
28	HI 8769	28	40	32	43	41	48	41	33	42	41	31	42	38	39
29	HI 8773	29	37	40	42	42	35	39	37	43	40	47	35	40	40
30	PDW 344	30	38	34	43	47	37	40	41	44	35	41	38	40	40
31	WHD 958	31	40	35	40	43	38	39	42	45	37	42	35	40	40
32	HI 8774	32	41	37	41	40	42	40	42	46	41	43	42	43	42
33	MPO 1315	33	43	38	42	38	41	40	41	40	43	40	43	41	41
34	AKDW 4525	34	38	40	46	41	43	42	43	33	44	31	45	39	40
35	MACS 4029	35	42	42	35	42	33	39	40	34	47	30	42	39	39
36	NIDW 989	36	37	37	40	43	45	40	38	37	38	31	32	35	38
	Mean		41	41	41	42	43	42	44	42	41	39	42	42	42

Table 28: Yellow berry incidence of *T. durum* genotypes in NIVT-4

Sr. No	Entries	Trial code	CZ					PZ					Overall Mean	
			Indore	Junagadh	Kota	P'kheda	Vijapur	Mean	Dharwad	Niphad	Nippani	Pune	Ugar	
1	MACS 4035	01	0	0	23.2	10.2	5.8	8	35.1	0	7.2	1.2	26.6	14 11
2	UAS 456	02	0.2	1.1	12.7	15.1	6.8	7	22.4	6.2	12.4	3.2	20.4	13 10
3	UAS 457	03	5.6	5.6	2.3	9.6	3.4	5	26.3	0.3	2.4	17.4	12.3	12 9
4	MPO 1314	04	22.5	22.5	4.1	9.8	4.5	13	32.2	15.4	27.4	2.6	55.4	27 20
5	GW 1318	05	2.1	2.1	5.2	8.1	3.2	4	17.3	10	17.2	0	55.3	20 12
6	RKD 291	06	11.3	11.3	2.3	7.8	3.8	7	21.4	0	12.3	8.2	43.3	17 12
7	DDW 36	07	0	0	11.3	7.5	5.4	5	30.6	4	42.7	3.2	58.4	28 16
8	PDW 343	08	4.3	4.3	2.1	8.5	15.5	7	22	16.1	3.3	1.7	33.2	15 11
9	MACS 3973	09	0	0	4.3	7.2	8.9	4	25.2	5.3	3.1	20.2	20.4	15 9
10	WHD 957	10	0	0	6	7.9	7.8	4	16.3	15	6.1	16.4	17.3	14 9
11	NIDW295 (C)	11	0	0	11.4	8.2	4.8	5	0	0	11.3	16.3	22.2	10 7
12	PDW 345	12	0	3.2	12.3	9.6	8	7	40.2	8	5.3	12.4	33.5	20 13
13	NIDW 950	13	0	11.3	5.3	6.9	3.2	5	15.3	8.2	8.1	7.2	41.7	16 11
14	GW 1321	14	0	44.3	7.3	6.8	3.4	12	4.4	15.3	22.2	18.6	5	13 13
15	HI 8498 (C)	15	0	61	18.3	6.5	6.4	18	0	20.2	42.2	7.2	5	15 17
16	HI 8772	16	0	26.9	17.4	7.5	7.2	12	23	0	62.7	4.7	72.2	33 22
17	GW 1319	17	0	0	13.7	6.5	6.8	5	4	18.3	41.5	25	3.5	18 12
18	GW 1320	18	0	35.3	9.4	6.8	4.6	11	2	4	51.3	4.7	68.3	26 19
19	UPD 97	19	0	35.6	11.2	7.3	5.3	12	24	23.2	51.5	0	16.7	23 17
20	PBND 5175	20	0	0	41.3	8.5	3.8	11	15.3	21.4	3.2	0	48.2	18 14
21	PDW 314 (C)	21	0	0	17.3	8.9	4.6	6	33.2	24.3	7.3	2.3	22.3	18 12
22	HI 8770	22	0	29.3	9.3	9.1	15.1	13	30.4	17.3	33.2	6.4	16.2	21 17
23	PDW 346	23	0	14.3	2.1	9.5	12.3	8	34	0	12.3	0	17.3	13 10
24	HI 8771	24	0	6.2	3.1	7.5	8.3	5	18.5	4.3	9.2	3.4	11.4	9 7
25	DDW 35	25	0	0	4.3	8.2	6.1	4	30.1	26	12.2	2.4	19.2	18 11
26	RKD 282	26	0	41.5	4.3	7.3	9.3	12	12	7.3	22.3	8.7	11.3	12 12
27	HI 8768	27	0	2.1	13.7	9.3	6.9	6	0	4.4	12.2	0	5.3	4 5
28	HI 8769	28	0	0	41.2	6.7	9.8	12	17	10.5	14.5	1.5	61.2	21 16
29	HI 8773	29	0	32.2	43.2	6.1	8.2	18	0	12.4	16.3	0.0	33.9	16 17
30	PDW 344	30	0	5.2	10.4	6.3	4.3	5	40.2	10	11.7	1.3	65	26 15
31	WHD 958	31	0	32.4	16.3	7.3	4.7	12	15.3	14.3	12.4	24.3	49.4	23 18
32	HI 8774	32	0	16.6	11.4	8.4	5.7	8	38.4	11.3	4.3	0	47.3	20 14
33	MPO 1315	33	0	22.3	12.3	9.8	7.9	10	24.2	16.4	40.4	0	20.4	20 15
34	AKDW 4525	34	0	7.9	8.3	7.4	7.1	6	33.4	8.1	7.5	15.3	25	18 12
35	MACS 4029	35	0	19.4	12.3	9.3	8.3	10	0	6.2	8	1.7	13.2	6 8
36	NIDW 989	36	0	15.6	15.1	15.1	9.1	11	38.1	15.2	11.2	16.6	42.4	25 18
Mean			1.2	14.1	11.7	8.1	6.6	8	20.6	10.5	18.5	7.2	31.1	18 13

Table 29: Yellow pigment (ppm) of *T. durum* genotypes in NIVT-4

Sr. No.	Entries	Trial code	CZ						PZ						Overall Mean
			Indore	Junagadh	Kota	P'kheda	Vijapur	Mean	Dharwad	Niphad	Nippani	Pune	Ugar	Mean	
1	MACS 4035	01	4.3	5.4	4.3	4.8	5.4	4.8	4.1	4.2	4.1	5.1	4.0	4.3	4.6
2	UAS 456	02	4.9	4.3	4.7	4.4	6.3	4.9	4.6	5.1	5.1	5.4	4.1	4.9	4.9
3	UAS 457	03	5.1	5.3	5.8	4.8	6.0	5.4	5.7	5.3	4.6	5.7	4.1	5.1	5.2
4	MPO 1314	04	5.2	4.9	5.2	4.6	5.9	5.2	4.1	4.1	5.7	4.7	4.0	4.5	4.8
5	GW 1318	05	5.1	5.2	4.9	4.5	5.9	5.1	5.1	4.0	5.1	5.4	4.8	4.9	5.0
6	RKD 291	06	4.5	3.9	4.3	4.3	4.8	4.4	4.3	4.5	5.0	4.7	4.0	4.5	4.4
7	DDW 36	07	4.3	4.8	4.4	4.4	4.3	4.4	4.5	4.3	4.4	4.5	4.3	4.4	4.4
8	PDW 343	08	4.7	4.5	5.2	4.1	5.4	4.8	4.7	4.5	5.7	5.1	4.4	4.9	4.8
9	MACS 3973	09	3.7	4.7	5.4	4.7	4.3	4.6	4.7	4.2	5.6	5.7	3.8	4.8	4.7
10	WHD 957	10	6.8	6.7	6.2	6.1	6.7	6.5	6.2	5.0	4.7	6.0	5.1	5.4	6.0
11	NIDW295 (C)	11	5.9	6.1	5.6	5.8	6.8	6.0	5.8	5.7	5.8	5.9	6.0	5.8	5.9
12	PDW 345	12	5.5	4.8	5.9	4.1	5.7	5.2	5.1	4.1	4.7	5.0	4.2	4.6	4.9
13	NIDW 950	13	5.5	4.4	4.4	4.6	5.8	4.9	4.7	4.0	5.3	5.7	3.9	4.7	4.8
14	GW 1321	14	6.3	4.9	7.3	7.1	7.3	6.6	4.3	6.3	4.8	6.1	5.3	5.4	6.0
15	HI 8498 (C)	15	6.5	6.9	6.0	6.3	6.9	6.5	5.9	6.4	6.0	6.0	6.1	6.1	6.3
16	HI 8772	16	5.7	5.0	4.5	5.4	6.2	5.4	5.3	5.5	5.1	5.3	4.0	5.0	5.2
17	GW 1319	17	6.0	5.9	5.8	6.2	6.0	6.0	6.2	5.5	4.2	5.2	5.1	5.2	5.6
18	GW 1320	18	5.2	4.9	4.5	4.9	5.3	5.0	5.3	5.7	5.1	4.5	4.2	5.0	5.0
19	UPD 97	19	4.8	5.3	4.8	4.8	5.7	5.1	5.7	4.2	4.1	5.7	5.0	4.9	5.0
20	PBND 5175	20	5.3	4.6	5.2	4.5	6.9	5.3	4.5	4.3	4.2	6.0	5.1	4.8	5.1
21	PDW 314 (C)	21	5.8	5.9	5.0	5.1	7.0	5.8	6.2	6.5	5.8	6.3	6.7	6.3	6.0
22	HI 8770	22	5.0	5.6	6.7	6.6	7.2	6.2	5.7	5.1	4.3	6.0	5.1	5.2	5.7
23	PDW 346	23	5.1	5.3	5.9	5.2	6.3	5.6	5.2	6.2	4.7	6.1	4.2	5.3	5.4
24	HI 8771	24	7.2	6.9	6.8	7.1	7.4	7.1	7.6	6.0	5.1	7.1	6.4	6.4	6.8
25	DDW 35	25	4.5	5.1	5.3	4.6	5.3	5.0	4.3	4.7	4.2	5.1	5.1	4.7	4.8
26	RKD 282	26	4.6	4.7	4.4	5.5	7.0	5.2	5.4	4.5	4.4	5.3	5.3	5.0	5.1
27	HI 8768	27	4.8	4.4	4.7	4.1	6.3	4.9	4.1	4.6	4.5	4.7	4.1	4.4	4.6
28	HI 8769	28	5.9	6.2	6.3	4.8	6.4	5.9	4.7	5.1	5.1	5.1	4.3	4.9	5.4
29	HI 8773	29	4.1	5.3	6.4	5.2	5.5	5.3	5.1	5.6	4.7	5.3	5.1	5.2	5.2
30	PDW 344	30	4.7	4.3	4.4	4.7	5.4	4.7	4.2	4.3	4.1	5.0	5.3	4.6	4.6
31	WHD 958	31	6.7	6.5	5.8	6.1	7.0	6.4	6.3	5.9	6.0	6.2	6.7	6.2	6.3
32	HI 8774	32	4.8	5.1	4.3	4.1	5.8	4.8	5.4	4.3	4.2	5.1	5.2	4.8	4.8
33	MPO 1315	33	5.2	5.3	5.2	4.7	5.3	5.1	5.7	4.5	4.7	5.3	4.3	4.9	5.0
34	AKDW 4525	34	4.7	5.2	5.8	5.6	6.5	5.6	5.4	4.1	4.5	5.2	4.2	4.7	5.1
35	MACS 4029	35	4.6	4.3	5.9	4.3	6.1	5.0	5.1	4.3	4.1	6.0	4.5	4.8	4.9
36	NIDW 989	36	5.3	5.1	4.3	4.4	5.3	4.9	5.0	5.1	4.3	5.2	5.1	4.9	4.9
Mean			5.2	5.2	5.3	5.1	6.0	5.4	5.2	4.9	4.8	5.5	4.8	5.0	5.2

NIVT-5A (Rainfed Timely Sown) - Table 30-33

The same set of entries as mentioned in Restricted Irrigation were sown under Rainfed Timely sown conditions. The genotypes received from three locations namely Delhi, Kota and Annengiri (Dharwad) were analyzed. Comparative performance of entries sown under Rainfed & Restricted Irrigation revealed that the entries of Rainfed Timely sown recorded higher test weight and grain appearance score while entries grown under Restricted Irrigation had higher protein content.

NIVT- 5A (Restricted Irrigation Timely Sown) - Table 34-37

NIVT-5A is a multilocational trial comprising of 36 entries (replicated twice) including 4 checks. Samples were received from eleven locations namely Hisar, Ludhiana, Delhi, Kanpur, Pusa, Sabour, Indore, Pune, Dharwad Niphad and Bailhongal and were tested for grain appearance score (GAS), test weight (TW), protein content, sedimentation value (SV) and phenol test. Grain appearance score varied from 4.9 (NI 5439) to 6.7 (MACS 6659). Entries namely BRW 3761, WH 1181, UP 2914 and NIAW 2547 and JWS 146 were found to demonstrate mean grain appearance score of 6.2-6.3. Among zones, entries from PZ and NEPZ recorded highest mean grain appearance score (6.1) followed by CZ (6.0) and NWPZ (5.9). Hectoliter weight (kg/hl) varied from 69.3 (UP 2915)) to 85.5(JWS 146). Performance of entry JWS 146 was excellent as it recorded highest mean hectoliter weight (80.9 kg/hl). Other promising entries having more than 80 kg/hl hectoliter were UP 2914, WH 1181 and HD 3204. Among zones, entries from CZ recorded highest mean hectoliter weight (80.4 kg/hl) followed by PZ (79.3) NEPZ (78.3) and NWPZ (76.6). Sedimentation value varied from 30 ml (MP 3424) to 58 ml (DBW 179). Entries namely HI 1612, MP 1306, DBW 178, MP 1304 and WH 1080 were having mean sedimentation value of 47-49 ml. Protein content ranged 9.7 to 15.4 % (K 1416). Among the centres, the performance of all the entries and checks was much better at Pune and Niphad where the protein content recorded an average value of 13.1. Among zones, entries from PZ recorded highest mean protein content (13.0) followed by NWPZ (12.8), CZ (12.6) and NEPZ (12.2). In phenol test, the grains of *T. aestivum* turned light brown, medium brown, brownish black and dark brownish black. Depending upon the degree of darkness, score was given out of 10.0. The entries which made excellent chapatti invariably developed very light brown color. Performance of HD 2888 was best as it developed very light brown color. Other entries namely HD 3202, CG 1018, UAS 374 and DBW180 also developed light brown color

Table 30: Grain appearance score (Max. 10) of *T.aestivum* genotypes in NIVT-5A

(Rainfed Timely Sown)

Sr. No.	Entry	Trial Code	Delhi	Kota	Anningeri	Mean
1	MACS 6660	01	6.3	6.1	6.7	6.3
2	HD 3204	02	6.3	6.4	6.8	6.5
3	UP 2914	03	6.4	6.3	6.2	6.3
4	WH 1181	04	6.3	6.4	6.5	6.4
5	MP 3429	05	5.9	6.3	6.0	6.1
6	AKAW 3891	06	6.2	6.0	6.7	6.3
7	NW 6046	07	6.2	6.2	6.6	6.3
8	JWS 146	08	6.4	6.1	6.5	6.3
9	BRW 3761	09	6.2	6.1	6.8	6.4
10	K 1415	10	6.5	6.2	6.7	6.5
11	MP 1304	11	6.0	6.1	6.5	6.2
12	MP 3288 (C)	12	5.7	6.1	6.5	6.1
13	UP 2915	13	6.4	6.3	6.0	6.2
14	UAS 375	14	6.2	6.0	6.3	6.2
15	HD 2888 (C)	15	6.4	6.4	6.2	6.3
16	MP 1303	16	6.4	5.8	6.0	6.1
17	HD 3205	17	6.2	6.1	6.5	6.2
18	DBW 178	18	6.1	6.0	6.5	6.2
19	HI 1612	19	6.2	6.3	6.0	6.2
20	NIAW 2547	20	6.1	6.3	6.6	6.3
21	MP 1305	21	5.9	6.2	6.5	6.2
22	HD 3203	22	6.1	6.2	6.4	6.2
23	WH 1080 (C)	23	6.2	6.3	6.6	6.4
24	HD 3202	24	5.6	6.2	6.6	6.1
25	MP 1306	25	5.9	6.0	6.6	6.2
26	WH 1180	26	6.2	6.0	6.5	6.2
27	MACS 6659	27	6.0	6.3	6.7	6.3
28	K 1417	28	6.1	6.1	6.7	6.3
29	CG 1018	29	6.3	6.2	6.8	6.4
30	DBW 179	30	6.0	6.0	6.4	6.1
31	DBW 180	31	6.4	6.4	6.5	6.4
32	UAS 374	32	6.3	6.4	6.6	6.4
33	NI 5439 (C)	33	5.3	5.9	6.8	6.0
34	PBW 737	34	6.2	5.9	6.5	6.2
35	K 1416	35	6.0	6.0	6.6	6.2
36	PBW 738	36	5.9	5.9	6.0	5.9
	Mean		6.1	6.1	6.5	6.2

Table 31: Test weight (kg/ha) of *T.aestivum* genotypes in NIVT-5A

(Rainfed Timely Sown)

Sr. No.	Entry	Trial Code	Delhi	Kota	Anningeri	Mean
1	MACS 6660	01	80.4	83.3	80.9	81.5
2	HD 3204	02	82.1	83.1	83.2	82.8
3	UP 2914	03	83.5	84.5	81.8	83.3
4	WH 1181	04	83.0	81.9	83.0	82.6
5	MP 3429	05	82.2	82.1	82.8	82.4
6	AKAW 3891	06	82.5	83.7	82.8	83.0
7	NW 6046	07	82.7	82.1	82.0	82.3
8	JWS 146	08	83.6	81.2	80.7	81.8
9	BRW 3761	09	81.4	82.7	85.7	83.2
10	K 1415	10	82.9	82.4	82.5	82.6
11	MP 1304	11	80.8	82.3	82.8	82.0
12	MP 3288 (C)	12	80.0	83.5	81.6	81.7
13	UP 2915	13	80.9	83.2	81.8	81.9
14	UAS 375	14	80.2	82.0	82.2	81.5
15	HD 2888 (C)	15	83.6	84.2	81.2	83.0
16	MP 1303	16	81.8	82.4	82.9	82.4
17	HD 3205	17	81.7	83.3	80.6	81.9
18	DBW 178	18	83.3	83.8	81.8	83.0
19	HI 1612	19	81.0	84.4	80.0	81.8
20	NIAW 2547	20	81.2	81.5	71.8	78.2
21	MP 1305	21	79.7	78.0	82.0	79.9
22	HD 3203	22	82.4	83.0	81.7	82.4
23	WH 1080 (C)	23	81.8	83.1	82.0	82.3
24	HD 3202	24	79.5	83.1	82.6	81.7
25	MP 1306	25	78.0	78.9	81.3	79.4
26	WH 1180	26	81.0	81.1	82.4	81.5
27	MACS 6659	27	79.3	80.2	83.2	80.9
28	K 1417	28	80.7	80.9	82.6	81.4
29	CG 1018	29	83.4	82.4	83.4	83.1
30	DBW 179	30	81.6	80.8	81.8	81.4
31	DBW 180	31	82.3	81.5	81.5	81.8
32	UAS 374	32	81.9	83.3	81.8	82.3
33	NI 5439 (C)	33	79.2	79.6	81.2	80.0
34	PBW 737	34	81.7	80.6	83.4	81.9
35	K 1416	35	82.9	83.5	82.3	82.9
36	PBW 738	36	81.3	82.4	82.3	82.0
	Mean		81.5	82.2	81.9	81.9

Table 32: Protein content (%) of *T. aestivum* genotypes in NIVT-5A

(Rainfed Timely Sown)

Sr. No.	Entry	Trial Code	Delhi	Kota	Anningeri	Mean
1	MACS 6660	01	11.7	12.3	14.0	12.7
2	HD 3204	02	12.2	11.5	12.1	11.9
3	UP 2914	03	12.2	12.2	14.1	12.8
4	WH 1181	04	12.3	11.6	13.9	12.6
5	MP 3429	05	12.9	12.1	14.3	13.1
6	AKAW 3891	06	12.2	11.9	12.9	12.3
7	NW 6046	07	10.8	11.0	12.7	11.5
8	JWS 146	08	11.6	11.4	14.5	12.5
9	BRW 3761	09	12.6	12.3	12.9	12.6
10	K 1415	10	11.5	11.0	12.7	11.7
11	MP 1304	11	11.8	12.2	14.6	12.9
12	MP 3288 (C)	12	11.4	11.0	14.1	12.2
13	UP 2915	13	13.2	11.2	14.1	12.8
14	UAS 375	14	11.2	12.6	13.2	12.3
15	HD 2888 (C)	15	12.6	11.3	14.1	12.7
16	MP 1303	16	11.1	11.8	11.7	11.5
17	HD 3205	17	11.1	11.6	12.7	11.8
18	DBW 178	18	12.5	12.6	12.7	12.6
19	HI 1612	19	11.9	12.5	14.2	12.9
20	NIAW 2547	20	13.0	12.2	13.4	12.9
21	MP 1305	21	12.8	12.5	14.1	13.1
22	HD 3203	22	11.5	11.2	13.7	12.1
23	WH 1080 (C)	23	11.6	12.9	13.9	12.8
24	HD 3202	24	12.2	11.5	12.9	12.2
25	MP 1306	25	12.1	11.4	12.9	12.1
26	WH 1180	26	12.4	12.2	14.0	12.9
27	MACS 6659	27	11.8	11.1	12.9	11.9
28	K 1417	28	11.5	11.6	13.0	12.0
29	CG 1018	29	11.5	12.3	13.1	12.3
30	DBW 179	30	11.1	12.7	13.0	12.3
31	DBW 180	31	11.9	12.2	14.1	12.7
32	UAS 374	32	13.8	12.3	13.5	13.2
33	NI 5439 (C)	33	11.5	12.2	14.5	12.7
34	PBW 737	34	12.2	12.0	14.0	12.7
35	K 1416	35	11.9	11.9	11.7	11.8
36	PBW 738	36	11.6	11.2	13.7	12.2
	Mean		12.0	11.9	13.4	12.4

Table 33: Sedimentation value (ml) of *T.aestivum* genotypes in NIVT-5A

Sr. No.	Entry	Trial Code	Delhi	Kota	Anningeri	(Rainfed Timely Sown) Mean
1	MACS 6660	01	38	32	39	36
2	HD 3204	02	48	36	39	41
3	UP 2914	03	42	35	45	41
4	WH 1181	04	49	44	50	48
5	MP 3429	05	38	38	48	41
6	AKAW 3891	06	50	46	48	48
7	NW 6046	07	53	38	40	44
8	JWS 146	08	42	48	40	43
9	BRW 3761	09	34	35	41	37
10	K 1415	10	40	42	46	43
11	MP 1304	11	52	55	43	50
12	MP 3288 (C)	12	38	38	47	41
13	UP 2915	13	48	38	35	40
14	UAS 375	14	39	32	37	36
15	HD 2888 (C)	15	42	33	41	39
16	MP 1303	16	54	36	46	45
17	HD 3205	17	41	44	45	43
18	DBW 178	18	45	48	48	47
19	HI 1612	19	44	46	44	45
20	NIAW 2547	20	39	42	47	43
21	MP 1305	21	36	40	50	42
22	HD 3203	22	40	46	45	44
23	WH 1080 (C)	23	48	51	50	50
24	HD 3202	24	36	40	48	41
25	MP 1306	25	40	42	38	40
26	WH 1180	26	45	35	40	40
27	MACS 6659	27	33	31	39	34
28	K 1417	28	34	32	45	37
29	CG 1018	29	32	36	47	38
30	DBW 179	30	40	40	48	43
31	DBW 180	31	45	43	46	45
32	UAS 374	32	45	35	45	42
33	NI 5439 (C)	33	34	39	45	39
34	PBW 737	34	30	42	43	38
35	K 1416	35	42	46	48	45
36	PBW 738	36	36	34	46	39
	Mean		41	40	44	42

Table 34: Grain appearance score (Max. score 10) of *T.aestivum* genotypes in NIVT-5A

(Restricted Irrigation Timely Sown)

Sr. No.	Entries	Trial Code	NWPZ				NEPZ				CZ			PZ			Overall Mean			
			Hisar	Ludhiana	Delhi	Mean	Kanpur	Pusa	Sabour	Mean	Indore	Kota	Mean	Pune	Dharwad	Niphad	Bailhongal	Mean		
1	MACS 6660	01	6.0	5.8	6.1	6.0	6.4	6.2	5.5	6.0	6.1	5.9	6.0	6.2	5.9	6.0	6.6	6.2	6.1	
2	HD 3204	02	6.3	5.9	6.1	6.1	6.2	6.1	5.7	6.0	6.1	5.8	6.0	6.1	5.9	6.1	6.0	6.0	6.0	
3	UP 2914	03	6.2	6.0	6.1	6.1	6.3	6.0	6.0	6.1	6.2	6.2	6.2	6.2	5.9	6.2	6.3	6.1	6.1	
4	WH 1181	04	6.3	6.0	5.8	6.0	6.4	6.3	6.0	6.2	6.2	6.2	6.2	6.4	6.0	6.2	6.3	6.2	6.2	
5	MP 3429	05	6.0	5.6	5.8	5.8	6.2	5.9	5.6	5.9	6.1	5.5	5.8	6.3	5.9	6.1	6.2	6.1	5.9	
6	AKAW 3891	06	5.8	5.8	5.6	5.7	6.3	5.8	5.9	6.0	6.2	6.0	6.1	6.2	5.9	6.2	6.2	6.1	6.0	
7	NW 6046	07	5.6	5.6	6.1	5.8	6.0	5.4	5.8	5.7	6.1	5.6	5.9	6.3	5.8	6.2	6.0	6.1	5.9	
8	JWS 146	08	6.0	5.6	5.4	5.7	6.3	6.2	5.4	6.0	6.5	6.0	6.3	6.5	6.0	6.5	6.6	6.4	6.1	
9	BRW 3761	09	6.2	6.1	5.9	6.1	6.4	6.4	6.4	6.4	6.3	6.1	6.2	6.5	6.0	6.4	6.2	6.3	6.2	
10	K 1415	10	6.2	5.6	5.9	5.9	6.5	5.9	6.3	6.2	6.3	5.9	6.1	6.0	5.8	6.3	6.2	6.1	6.1	
11	MP 1304	11	6.2	5.9	5.8	6.0	6.2	5.8	5.8	5.9	6.1	5.7	5.9	5.9	5.8	6.1	6.6	6.1	6.0	
12	MP 3288 (C)	12	6.4	6.1	5.8	6.1	6.0	6.2	5.7	6.0	6.0	5.9	6.0	6.1	5.4	6.0	6.5	6.0	6.0	
13	UP 2915	13	6.0	5.9	5.8	5.9	6.1	5.7	5.7	5.8	6.1	6.0	6.1	6.0	6.0	6.0	6.3	6.1	6.0	
14	UAS 375	14	6.1	5.8	5.8	5.9	6.2	5.9	5.3	5.8	6.0	5.8	5.9	6.4	5.9	6.0	6.3	6.2	6.0	
15	HD 2888 (C)	15	6.0	5.7	5.9	5.9	6.1	6.0	6.3	6.1	6.6	6.0	6.3	5.7	6.2	6.5	6.5	6.2	6.1	
16	MP 1303	16	6.0	5.8	5.8	5.9	6.1	5.4	5.7	5.7	5.8	6.0	5.9	5.9	5.9	6.1	6.6	6.1	5.9	
17	HD 3205	17	6.0	5.7	5.9	5.9	6.3	5.9	6.2	6.1	6.0	5.5	5.8	5.8	6.0	6.0	6.5	6.1	6.0	
18	DBW 178	18	5.8	6.0	5.6	5.8	6.2	5.7	5.7	5.9	6.0	5.9	6.0	5.8	5.9	6.0	6.6	6.1	5.9	
19	HI 1612	19	6.3	5.9	5.8	6.0	6.3	5.9	5.9	6.0	6.0	5.9	6.0	5.9	5.9	6.0	6.5	6.1	6.0	
20	NIAW 2547	20	6.2	5.9	5.9	6.0	6.4	6.0	6.3	6.2	6.2	6.0	6.1	5.9	6.0	6.2	6.5	6.2	6.1	
21	MP 1305	21	6.2	5.9	6.2	6.1	6.4	5.9	5.6	6.0	6.0	5.8	5.9	5.9	5.9	6.0	6.4	6.1	6.0	
22	HD 3203	22	6.0	5.5	6.0	5.8	6.2	6.0	5.6	5.9	5.8	6.1	6.0	5.9	5.8	5.9	6.4	6.0	5.9	
23	WH 1080	23	5.9	5.8	5.7	5.8	6.1	5.0	5.4	5.5	5.8	5.9	5.9	6.0	5.9	6.0	6.6	6.1	5.8	
24	HD 3202	24	5.9	5.7	6.0	5.9	6.2	6.2	6.2	6.2	6.1	5.9	6.0	6.1	6.2	6.2	6.0	6.1	6.1	
25	MP 1306	25	5.8	5.8	6.2	5.9	6.4	5.7	5.5	5.9	5.8	6.0	5.9	6.0	6.1	6.0	6.2	6.1	6.0	
26	WH 1180 (C)	26	5.7	5.8	6.1	5.9	6.1	5.9	5.6	5.9	5.9	5.9	5.9	5.9	5.9	6.0	6.0	6.3	6.1	5.9
27	MACS 6659	27	5.5	5.7	5.9	5.7	6.1	6.2	6.0	6.1	6.0	5.8	5.9	5.8	6.0	6.2	6.7	6.2	6.0	
28	K 1417	28	6.2	5.6	6.1	6.0	6.3	5.9	6.2	6.1	6.0	5.8	5.9	6.0	5.8	6.1	6.0	6.0	6.0	
29	CG 1018	29	5.7	5.5	6.0	5.7	6.3	6.1	5.9	6.1	5.7	5.6	5.7	5.9	5.9	5.9	6.5	6.1	5.9	
30	DBW 179	30	5.8	5.6	5.5	5.6	6.4	6.3	5.8	6.2	6.1	5.6	5.9	6.1	5.8	6.1	6.2	6.1	5.9	
31	DBW 180	31	6.4	6.1	6.1	6.2	6.4	6.2	5.5	6.0	6.0	6.0	6.0	6.2	6.0	6.1	6.6	6.2	6.1	
32	UAS 374	32	6.2	6.0	5.8	6.0	6.4	6.0	5.9	6.1	5.7	5.6	5.7	6.1	5.9	5.9	6.4	6.1	6.0	
33	NI 5439 (C)	33	5.0	5.5	5.3	5.3	5.9	5.0	4.9	5.3	5.6	5.8	5.7	5.9	5.5	5.8	6.0	5.8	5.5	
34	PBW 737	34	6.3	5.9	5.7	6.0	5.9	6.4	6.3	6.2	5.9	6.1	6.0	5.5	5.6	5.9	6.2	5.8	6.0	
35	K 1416	35	6.0	6.0	5.6	5.9	6.1	5.2	5.4	5.6	5.8	6.0	5.9	5.9	5.7	5.9	6.7	6.1	5.9	
36	PBW 738	36	6.3	5.6	6.0	6.0	6.2	6.2	5.9	6.1	5.8	6.2	6.0	6.0	5.9	5.9	6.6	6.1	6.1	
	Mean		6.0	5.8	5.9	5.9	6.2	5.9	5.8	6.0	6.0	5.9	6.0	6.0	5.9	6.1	6.4	6.1	6.0	

Table 35: Test weight (kg/ha) of *T.aestivum* genotypes in NIVT-5A

(Restricted Irrigation Timely Sown)

Sr. No.	Entries	Trial Code	NWPZ				NEPZ				CZ			PZ				Overall Mean	
			Hisar	Ludhiana	Delhi	Mean	Kanpur	Pusa	Sabour	Mean	Indore	Kota	Mean	Pune	Dharwad	Niphad	Bailhongal	Mean	
1	MACS 6660	01	78.3	78.4	79.5	78.7	80.2	80.2	73.5	78.0	81.2	81.2	81.2	80.3	78.9	78.9	80.6	79.7	79.3
2	HD 3204	02	78.6	80.1	79.1	79.3	78.5	78.8	M	78.6	82.0	82.3	82.1	78.8	78.5	80.2	81.9	79.8	79.9
3	UP 2914	03	81.3	77.9	82.3	80.5	81.2	80.0	76.5	79.2	83.1	82.6	82.9	79.3	79.5	79.4	79.1	79.3	80.2
4	WH 1181	04	81.1	78.7	81.1	80.3	80.7	82.7	76.9	80.1	82.1	80.0	81.0	81.5	81.9	80.2	79.6	80.8	80.5
5	MP 3429	05	82.5	77.5	79.3	79.8	79.6	76.7	71.7	76.0	82.1	78.0	80.1	83.4	80.7	82.3	81.5	82.0	79.6
6	AKAW 3891	06	78.8	74.4	79.4	77.5	78.6	76.0	74.0	76.2	82.0	80.9	81.4	81.5	81.2	80.0	81.0	80.9	79.0
7	NW 6046	07	77.3	73.8	81.1	77.4	79.0	72.9	71.4	74.4	82.7	81.3	82.0	79.6	78.3	77.5	80.4	78.9	77.9
8	JWS 146	08	81.2	76.7	79.4	79.1	80.2	81.3	75.4	79.0	85.5	79.0	82.2	84.0	84.3	81.8	82.5	83.1	80.9
9	BRW 3761	09	80.1	78.7	79.5	79.4	79.9	79.6	76.0	78.5	81.3	80.2	80.7	79.9	78.6	79.8	82.1	80.1	79.6
10	K 1415	10	77.7	72.9	78.4	76.3	79.7	77.3	74.3	77.1	79.2	79.9	79.6	77.9	77.8	80.9	80.7	79.3	78.0
11	MP 1304	11	78.3	75.2	76.3	76.6	78.4	76.7	73.0	76.0	78.1	81.7	79.9	80.3	77.9	77.4	79.7	78.8	77.7
12	MP 3288 (C)	12	78.5	77.5	77.7	77.9	75.9	80.2	71.6	75.9	77.7	81.6	79.6	77.0	75.7	76.9	79.7	77.3	77.5
13	UP 2915	13	78.2	73.2	76.0	75.8	43.7	76.3	69.3	63.1	77.5	79.0	78.2	77.2	75.2	77.0	78.1	76.9	73.4
14	UAS 375	14	78.8	78.6	76.9	78.1	78.0	77.7	69.4	75.0	80.3	79.0	79.6	78.9	77.5	76.0	80.8	78.3	77.6
15	HD 2888 (C)	15	77.4	76.6	79.3	77.8	79.9	78.2	79.8	79.3	82.4	79.0	80.7	83.3	83.8	79.8	76.7	80.9	79.7
16	MP 1303	16	76.9	76.2	77.3	76.8	79.7	75.1	72.1	75.6	78.6	81.6	80.1	77.0	76.7	77.6	80.7	78.0	77.4
17	HD 3205	17	77.6	73.9	78.4	76.6	80.0	79.6	73.8	77.8	78.1	81.9	80.0	77.6	77.8	80.4	78.4	78.5	78.1
18	DBW 178	18	81.7	79.2	82.6	81.1	81.2	79.2	76.6	79.0	81.0	79.0	80.0	79.5	78.1	77.8	80.7	79.0	79.7
19	HI 1612	19	80.3	76.9	82.9	80.0	80.8	78.7	75.3	78.3	80.4	82.1	81.3	77.1	77.1	76.3	77.9	77.1	78.8
20	NIAW 2547	20	78.9	76.7	77.0	77.5	79.3	79.1	72.6	77.0	79.9	81.9	80.9	77.6	79.2	77.1	79.4	78.3	78.2
21	MP 1305	21	74.5	73.2	77.2	74.9	78.0	75.5	71.4	75.0	78.7	81.2	79.9	78.6	77.4	76.4	81.0	78.3	76.9
22	HD 3203	22	74.4	76.8	81.7	77.6	81.5	81.1	73.0	78.5	79.1	83.0	81.0	78.8	75.9	79.7	79.8	78.5	78.7
23	WH 1080	23	77.8	73.0	79.3	76.7	78.6	72.8	71.9	74.4	78.7	78.2	78.5	78.3	78.3	79.1	80.6	79.1	77.2
24	HD 3202	24	77.8	73.8	79.4	77.0	77.5	78.0	71.9	75.8	79.6	81.9	80.8	78.2	76.9	79.4	79.2	78.4	77.8
25	MP 1306	25	77.5	74.0	77.7	76.4	77.1	77.0	70.1	74.7	77.4	82.0	79.7	76.1	75.8	76.7	80.4	77.2	76.8
26	WH 1180 (C)	26	78.3	76.2	79.2	77.9	77.7	76.8	73.1	75.9	79.8	84.0	81.9	77.8	78.1	79.2	81.0	79.0	78.4
27	MACS 6659	27	78.7	77.3	79.5	78.5	79.1	78.5	71.2	76.3	80.3	80.2	80.2	77.5	79.2	79.1	81.1	79.2	78.5
28	K 1417	28	80.0	76.6	78.7	78.4	78.4	76.7	73.1	76.1	79.4	80.3	79.8	76.7	76.2	76.6	78.6	77.0	77.6
29	CG 1018	29	78.4	74.6	80.9	78.0	79.5	80.8	74.9	78.4	80.1	79.5	79.8	81.0	79.5	82.8	78.1	80.3	79.2
30	DBW 179	30	81.0	76.0	79.6	78.9	79.3	80.5	73.8	77.9	81.2	79.5	80.3	79.6	78.8	78.9	80.3	79.4	79.0
31	DBW 180	31	79.0	75.1	78.8	77.6	79.6	78.0	72.0	76.5	81.0	79.0	80.0	79.7	78.5	80.1	78.1	79.1	78.2
32	UAS 374	32	79.9	77.6	78.1	78.5	80.1	79.7	74.3	78.0	80.4	81.0	80.7	79.8	77.2	80.4	78.7	79.0	78.9
33	NI 5439 (C)	33	75.1	72.2	77.8	75.0	73.8	74.0	69.2	72.3	79.9	81.6	80.8	79.0	77.9	79.2	77.2	78.3	76.4
34	PBW 737	34	76.5	73.9	78.3	76.2	77.8	77.4	72.3	75.8	78.1	83.1	80.6	76.7	75.8	77.8	76.7	76.7	77.0
35	K 1416	35	80.0	79.9	79.8	79.9	80.7	79.1	72.8	77.5	80.6	71.8	76.2	77.7	76.9	78.4	78.8	77.9	78.0
36	PBW 738	36	78.5	75.3	80.6	78.1	78.6	80.0	76.2	78.3	79.5	83.0	81.3	78.1	77.9	78.6	82.1	79.2	79.0
	Mean		79.3	76.0	76.0	77.1	78.1	78.3	79.0	78.5	80.2	80.6	80.4	79.0	78.3	80.2	80.6	79.5	78.9

Table 36: Protein content (%) of *T.aestivum* genotypes in NIVT-5A

(Restricted Irrigation Timely Sown)

Sr. No.	Entries	Trial Code	NWPZ				NEPZ				CZ			PZ			Overall Mean		
			Hisar	Ludhiana	Delhi	Mean	Kanpur	Pusa	Sabour	Mean	Indore	Kota	Mean	Pune	Dharwad	Niphad	Bailhongal	Mean	
1	MACS 6660	01	13.4	12.8	12.5	12.9	10.9	12.5	13.2	12.2	13.2	12.1	12.7	12.5	13.1	11.9	13.4	12.7	12.6
2	HD 3204	02	12.0	12.1	12.9	12.3	11.3	12.5	12.1	12.0	12.2	12.1	12.2	12.1	12.1	12.2	12.7	12.3	12.2
3	UP 2914	03	12.9	13.6	12.7	13.1	11.8	12.9	11.5	12.1	12.8	12.6	12.7	13.8	12.3	11.7	13.2	12.8	12.6
4	WH 1181	04	13.1	13.2	12.9	13.1	12.4	12.5	12.1	12.3	12.8	12.7	12.8	14.1	13.4	15.4	11.9	13.7	13.0
5	MP 3429	05	11.4	12.0	13.7	12.4	12.0	12.9	12.0	12.3	13.8	11.9	12.9	13.1	13.5	14.2	13.1	13.5	12.7
6	AKAW 3891	06	14.6	13.0	13.2	13.6	12.7	12.2	12.4	12.4	12.2	12.5	12.4	12.3	11.8	13.8	13.9	13.0	12.8
7	NW 6046	07	12.5	12.3	12.9	12.6	10.1	12.3	12.0	11.5	11.4	11.9	11.7	13.4	12.4	13.2	13.8	13.2	12.2
8	JWS 146	08	11.9	13.7	11.7	12.4	11.8	11.4	12.4	11.9	10.6	11.9	11.3	12.8	12.6	11.7	13.0	12.5	12.0
9	BRW 3761	09	15.5	13.4	14.0	14.3	11.0	12.2	12.5	11.9	13.1	12.8	13.0	12.4	13.5	12.7	13.8	13.1	13.1
10	K 1415	10	14.2	13.6	14.2	14.0	11.4	12.1	13.9	12.5	12.6	12.5	12.6	12.0	13.6	13.5	13.3	13.1	13.0
11	MP 1304	11	12.3	12.7	13.0	12.7	12.6	13.4	11.5	12.5	11.8	11.9	11.9	13.3	12.3	14.2	13.8	13.4	12.6
12	MP 3288 (C)	12	13.0	11.1	13.4	12.5	11.3	12.9	13.0	12.4	12.0	12.4	12.2	13.6	11.8	11.8	12.3	12.4	12.4
13	UP 2915	13	11.0	14.0	13.2	12.7	11.4	12.4	11.4	11.7	13.6	12.9	13.3	13.8	12.4	15.1	12.1	13.4	12.8
14	UAS 375	14	11.9	11.6	13.5	12.3	12.1	12.8	11.5	12.1	12.4	12.3	12.4	12.9	13.1	13.2	13.5	13.2	12.5
15	HD 2888 (C)	15	12.5	12.3	12.3	12.4	12.6	12.9	11.6	12.4	14.3	12.3	13.3	12.2	13.7	13.8	14.2	13.5	12.9
16	MP 1303	16	13.6	11.9	13.4	13.0	11.1	12.2	11.2	11.5	13.7	11.9	12.8	12.5	12.7	12.7	12.9	12.7	12.5
17	HD 3205	17	12.2	12.4	13.2	12.6	12.6	11.5	11.9	12.0	12.9	13.0	13.0	13.6	12.5	13.0	12.5	12.9	12.6
18	DBW 178	18	13.1	13.5	14.1	13.6	10.3	13.0	13.5	12.3	12.2	12.5	12.4	12.1	13.2	14.2	13.1	13.2	12.8
19	HI 1612	19	12.3	13.0	13.1	12.8	12.7	12.7	12.1	12.5	12.3	12.9	12.6	14.5	13.4	13.0	12.0	13.2	12.8
20	NIAW 2547	20	13.9	12.7	13.5	13.4	11.6	12.3	12.2	12.0	13.1	13.0	13.1	13.8	12.5	13.5	13.3	13.3	12.9
21	MP 1305	21	11.9	12.4	14.3	12.9	10.0	12.2	12.1	11.4	11.7	12.5	12.1	13.9	13.2	12.0	13.9	13.3	12.4
22	HD 3203	22	9.7	12.0	12.7	11.5	12.4	11.0	12.5	12.0	12.7	12.4	12.6	12.7	11.8	12.1	13.0	12.4	12.1
23	WH 1080	23	10.1	13.2	12.7	12.0	11.7	13.2	12.1	12.3	11.4	12.1	11.8	13.8	12.4	12.3	13.0	12.9	12.2
24	HD 3202	24	12.4	12.7	12.9	12.7	11.7	13.2	12.0	12.3	12.6	11.9	12.3	13.7	11.7	12.4	13.0	12.7	12.5
25	MP 1306	25	10.5	13.0	13.6	12.4	10.7	13.8	12.3	12.3	12.6	12.6	12.6	13.4	12.6	12.6	12.6	12.8	12.5
26	WH 1180 (C)	26	14.1	12.3	13.5	13.3	14.6	12.9	12.2	13.2	13.2	12.8	13.0	12.7	12.5	13.0	13.3	12.9	13.1
27	MACS 6659	27	13.8	13.2	12.8	13.3	12.5	12.1	12.8	12.5	12.1	12.0	12.1	12.9	12.7	13.7	13.1	13.1	12.7
28	K 1417	28	13.3	12.8	13.9	13.3	12.5	13.3	12.1	12.6	12.2	13.2	12.7	13.9	12.0	12.5	10.9	12.3	12.7
29	CG 1018	29	11.6	13.0	12.4	12.3	12.9	12.7	13.0	12.9	12.3	12.3	12.3	12.3	11.0	12.9	13.7	12.5	12.5
30	DBW 179	30	13.9	12.5	13.4	13.3	11.4	12.3	13.4	12.4	12.8	12.7	12.8	13.2	13.8	15.0	13.4	13.9	13.1
31	DBW 180	31	12.4	13.2	13.2	12.9	11.1	12.0	12.6	11.9	13.9	12.8	13.4	12.6	13.3	13.2	12.4	12.9	12.8
32	UAS 374	32	13.3	13.4	13.0	13.2	12.3	12.3	13.0	12.3	12.5	12.7	12.2	12.5	12.2	13.5	11.0	13.8	12.6
33	NI 5439 (C)	33	14.0	13.6	13.4	13.7	11.7	12.0	12.4	12.0	12.3	12.9	12.6	12.1	11.8	13.5	12.7	12.5	12.7
34	PBW 737	34	11.9	12.6	12.9	12.5	12.1	11.6	11.7	11.8	12.4	13.1	12.8	13.4	12.6	12.2	12.2	12.6	12.4
35	K 1416	35	11.9	13.4	13.0	12.8	12.2	13.4	11.9	12.5	13.0	13.0	13.0	13.5	12.6	16.0	13.8	14.0	13.1
36	PBW 738	36	11.4	12.0	12.6	12.0	11.2	13.3	12.2	12.2	13.1	12.9	13.0	12.7	14.0	13.2	12.2	13.0	12.6
	Mean		12.6	12.8	13.2	12.8	11.8	12.5	12.3	12.2	12.6	12.5	12.5	13.1	12.7	13.1	13.0	13.0	12.6

Table 37: Sedimentation value (ml) of *T. aestivum* genotypes in NIVT-5A

(Restricted Irrigation Timely Sown)

Sr. No.	Entries	Trial Code	NWPZ				NEPZ				CZ			PZ			Overall Mean	
			Hisar	Ludhiana	Delhi	Mean	Kanpur	Pusa	Sabour	Mean	Indore	Kota	Mean	Pune	Dharvad	Niphad	Bailhongal	
1	MACS 6660	01	43	31	30	35	37	40	35	37	28	47	38	48	35	38	53	44 39
2	HD 3204	02	55	41	39	45	48	55	M	52	32	45	39	55	42	39	50	47 46
3	UP 2914	03	42	38	30	37	35	35	38	36	30	45	38	40	36	36	48	40 38
4	WH 1181	04	53	42	30	42	50	48	42	47	38	39	39	54	45	45	44	47 44
5	MP 3429	05	40	36	34	37	34	35	30	33	32	39	36	50	41	39	50	45 38
6	AKAW 3891	06	52	50	32	45	50	48	41	46	45	48	47	55	35	48	54	48 47
7	NW 6046	07	48	33	33	38	36	46	48	43	43	45	44	54	43	42	40	45 43
8	JWS 146	08	35	35	30	33	30	35	33	33	28	46	37	48	34	35	52	42 37
9	BRW 3761	09	35	30	32	32	30	32	27	30	38	41	40	45	31	34	36	37 34
10	K 1415	10	48	44	33	42	38	35	43	39	51	39	45	51	38	48	42	45 43
11	MP 1304	11	55	38	30	41	46	50	44	47	60	45	53	50	45	55	35	46 46
12	MP 3288 (C)	12	36	30	33	33	34	30	34	33	45	40	43	50	31	39	45	41 37
13	UP 2915	13	48	42	33	41	43	48	47	46	38	48	43	58	42	39	44	46 44
14	UAS 375	14	47	36	32	38	34	37	32	34	36	38	37	45	36	36	53	43 39
15	HD 2888 (C)	15	46	55	34	45	36	38	34	36	36	35	36	49	31	35	46	40 40
16	MP 1303	16	34	45	37	39	37	48	38	41	43	44	44	55	36	38	54	46 42
17	HD 3205	17	54	52	32	46	45	44	40	43	55	48	52	51	42	36	50	45 46
18	DBW 178	18	55	55	34	48	50	54	45	50	50	45	48	52	45	45	55	49 49
19	HI 1612	19	54	45	32	44	45	52	48	48	60	49	55	55	43	51	40	47 48
20	NIAW 2547	20	46	38	36	40	41	43	41	42	43	46	45	50	45	41	50	47 43
21	MP 1305	21	48	42	34	41	44	48	42	45	52	48	50	53	41	41	49	46 45
22	HD 3203	22	52	45	36	44	43	44	35	41	56	43	50	54	39	46	47	47 45
23	WH 1080	23	53	48	31	44	36	53	47	45	53	49	51	54	46	46	53	50 47
24	HD 3202	24	40	44	40	41	42	44	48	45	48	39	44	50	33	32	44	40 42
25	MP 1306	25	55	45	35	45	45	44	42	44	57	41	49	54	45	47	56	51 47
26	WH 1180 (C)	26	52	42	30	41	40	43	45	43	42	41	42	58	38	44	51	48 44
27	MACS 6659	27	42	38	30	37	32	40	37	36	32	44	38	54	33	40	52	45 40
28	K 1417	28	39	38	34	37	38	40	40	39	41	41	41	55	36	45	54	48 42
29	CG 1018	29	43	40	M	42	40	45	38	41	42	45	44	48	36	43	43	43 42
30	DBW 179	30	52	50	34	45	35	46	44	42	55	50	53	51	43	50	48	48 47
31	DBW 180	31	50	42	40	44	46	54	48	49	42	43	43	50	47	59	40	49 47
32	UAS 374	32	39	45	38	41	43	49	49	47	45	39	42	58	44	48	48	50 45
33	NI 5439 (C)	33	44	46	37	42	38	47	48	44	46	42	44	53	42	52	48	49 45
34	PBW 737	34	45	46	32	41	44	48	50	47	45	42	44	50	42	41	48	45 44
35	K 1416	35	48	37	37	41	46	57	51	51	45	40	43	50	47	53	52	51 47
36	PBW 738	36	36	40	30	35	42	52	43	46	44	43	44	51	38	44	42	44 42
	Mean		46	42	34	41	40	45	41	42	44	43	44	44	52	40	43	48 45 43

**NIVT 5B (Rainfed and Restricted Irrigation Timely Sown – *T. durum*) -
Table 38-43**

This rainfed trial had five locations in CZ and four in PZ. In CZ, it was conducted under rainfed situation in Dhanduka, Kota and Powarkheda whereas at Indore and Kota; moisture stress was limited to restricted irrigation. Under PZ conditions, samples belonged to rainfed condition only and the sites were Dharwad, Annegiri, Niphad and Pune. Quality analysis included six parameters i.e. grain appearance score, test weight, protein content, sedimentation value, yellow pigment content and yellow berry incidence.

Grain appearance score was generally good as except Indore and Niphad, mean score was 6.1 to 7.1 at majority of the locations. There was only one test entry in each zone with GAS below 6.0 and they were GW 1325 in CZ and MACS 4027 in PZ. GAS was high (≥ 7.5) in MPO 1307 (CZ) and UAS 459 (PZ). Like GAS, test weight was also generally good at trial conducting sites (except Powarkheda) as trial mean was ≥ 81 kg/hl at all locations. Entries with test weight 84.0 kg/hl were MPO 1308, UAS 459, DDW 37 in CZ and HI 8775, HI 8779, HI 8779, AKDW 2997-16 © in PZ.

Except Dhanduka and Dharwad, trial mean in grain protein content was high (13-15 %). Many genotypes registered protein content > 14 %. This elite material involved GW 1323, GW 1324, MACS 4027, MACS 4028, MACS 4030, RKD 292 in CZ and GW 1323, GW 1324, MPO 1307, MACS 4028, MAS 4030 in PZ.

Average trial mean in sedimentation value was 33 to 35ml at all test sites. It was < 30 ml in some entries like MACS 4027, MACS 4028, RKD 292 in CZ as well as PZ. Genotypes with Sedimentation value 38-40 ml were MPO 1307, DDW 38, NIDW 937, DDW 37 in CZ and KD 1418, GW 1323, NIDW 937, DDW 37, DDW 38 in PZ.

Amongst all sites, yellow pigment content was low at Dhanduka (4.94ppm) and high at Kota (6.66 ppm). Few genotypes had yellow pigment content in good range (≥ 7.0 ppm) as noted in DDW 38, NIDW 937, UAS 458 in CZ and HI 8775 in PZ. Yellow pigment content was below 5ppm in six entries under CZ conditions. In PZ, entries with yellow pigment content below 4ppm could also be noted and it involved RKD 283 and GW 1323.

Yellow berry incidence was low (mean 9 %) under restricted irrigation condition of Kota. At some site the mean incidence level was as high as 50 % and the locations were Indore and Niphad. Entry with incidence level below ≥ 10 % in both the zones was MPO 1307. Entries with incidence level ≥ 50 % were GW 1325, HI 8779 in CZ and MACS 4027, HI 8775, HI 8779.

Table 38: Grain appearance score (Max-10) of *T. durum* genotypes in NIVT-5B

Sr. No.	Entry	Trial Code	CZ						PZ				Overall Mean	
			Dhandhuka	Indore (Rst. Irr.)	Kota (RF)	Kota (Rst. Irr.)	Powarkheda	Mean	Dharwad	Annigeri	Niphad	Pune		
1	GW 1324	01	7.0	4.3	6.5	6.5	6.0	6.1	5.5	7.0	4.8	6.5	6.0	6.0
2	MPO 1307	02	7.5	7.0	8.0	8.0	8.0	7.7	7.3	8.0	6.5	7.5	7.6	7.5
3	RKD 283	03	5.8	6.5	7.0	6.5	6.0	6.4	6.5	7.5	6.5	7.5	6.6	6.6
4	GW 1325	04	4.8	5.3	4.3	6.5	7.0	5.6	4.8	7.0	6.0	7.3	5.9	5.9
5	KD 1418	05	7.0	4.3	8.0	7.5	7.0	6.8	7.0	7.0	5.3	7.5	6.7	6.7
6	MACS 4027	06	6.5	4.3	8.0	6.5	6.5	6.4	6.3	7.0	4.3	5.3	6.1	6.1
7	HI 8778	07	7.0	7.0	7.3	7.0	7.5	7.2	6.0	8.0	5.5	8.0	7.0	7.0
8	HI 8776	08	7.0	6.5	7.0	8.0	7.8	7.3	7.0	6.3	4.3	7.5	6.9	6.8
9	HI 8775	09	7.5	5.5	7.0	7.0	7.5	6.9	5.5	7.0	5.0	7.0	6.6	6.6
10	HI 8777	10	7.5	4.8	8.0	7.0	6.3	6.7	7.5	7.0	6.8	7.0	6.9	6.9
11	GW 1323	11	7.0	5.0	7.0	7.0	7.0	6.6	7.0	6.5	4.3	7.0	6.4	6.4
12	AKDW 2997-16 (C)	12	5.8	6.8	6.0	6.0	7.0	6.3	5.5	6.5	6.0	6.8	6.3	6.3
13	GW 1327	13	8.3	5.3	7.0	6.5	5.5	6.5	6.0	7.5	4.3	6.0	6.3	6.3
14	MPO 1308	14	7.0	7.0	7.0	8.0	7.0	7.2	5.3	8.0	7.0	7.5	7.1	7.1
15	MACS 4028	15	4.8	8.0	6.5	7.0	6.0	6.5	7.0	6.3	7.0	8.5	6.8	6.8
16	DDW 38	16	6.3	6.0	7.3	7.0	7.0	6.7	7.0	7.0	7.5	6.5	6.8	6.8
17	NIDW 937	17	6.5	6.3	8.0	7.0	7.0	7.0	8.5	7.5	6.3	6.5	7.1	7.1
18	HI 8779	18	4.0	7.0	6.0	6.3	7.5	6.2	4.3	7.0	5.0	7.0	6.0	6.0
19	MACS 4030	19	6.5	6.5	7.0	7.0	6.8	6.8	8.0	8.0	4.0	6.0	6.7	6.6
20	RKD 292	20	6.5	6.0	7.5	6.5	7.0	6.7	5.5	7.0	7.5	6.5	6.7	6.7
21	HI 8627 (C)	21	6.3	7.0	7.0	7.5	6.5	6.9	6.3	7.5	5.3	7.0	6.7	6.7
22	UAS 458	22	6.3	6.3	8.0	7.8	6.0	6.9	7.0	7.0	7.0	7.5	7.0	7.0
23	UAS 459	23	7.0	7.5	5.5	7.8	7.0	7.0	8.0	7.0	8.0	7.5	7.2	7.3
24	GW 1326	24	8.3	6.5	6.5	6.5	4.3	6.4	7.5	7.0	4.3	7.0	6.4	6.4
25	DDW 37	25	6.3	6.0	8.0	7.0	7.0	6.9	7.0	5.3	7.5	7.5	6.8	6.8
Mean			6.6	6.1	7.0	7.0	6.7	6.7	6.5	7.1	5.8	7.0	6.7	6.7

Table 39: Test Weight (Kg/ha) of *T. durum* genotypes in NIVT-5B

Sr. No.	Entry	Trial Code	CZ						PZ						Overall Mean
			Dhandhuka	Indore (Rst. Irr.)	Kota (RF)	Kota (Rst. Irr.)	Powarkheda	Mean	Dharwad	Annigeri	Niphad	Pune	Mean		
1	GW 1324	01	81.5	78.5	80.7	78.4	76.9	79.2	79.4	83.2	78.3	78.9	79.9	79.5	
2	MPO 1307	02	85.5	83.7	84.0	82.6	82.4	83.6	81.3	85.6	81.4	79.4	81.9	82.9	
3	RKD 283	03	84.6	79.2	79.7	78.9	76.8	79.8	81.9	85.1	80.6	81.7	82.3	80.9	
4	GW 1325	04	80.0	74.4	75.0	76.8	67.4	74.7	76.6	81.9	76.2	76.8	77.9	76.1	
5	KD 1418	05	81.8	81.8	81.9	83.3	80.5	81.9	82.8	82.6	81.3	82.0	82.2	82.0	
6	MACS 4027	06	82.8	83.5	83.3	82.6	79.9	82.4	84.9	84.7	82.3	83.7	83.9	83.1	
7	HI 8778	07	82.9	84.0	83.7	84.3	83.0	83.6	83.7	86.6	82.6	82.5	83.9	83.7	
8	HI 8776	08	83.0	84.0	83.4	85.0	82.4	83.6	85.0	85.2	82.3	82.1	83.6	83.6	
9	HI 8775	09	83.1	84.6	84.0	82.2	82.9	83.3	85.4	84.4	82.9	84.1	84.2	83.7	
10	HI 8777	10	84.1	82.2	82.9	83.1	80.2	82.5	82.7	85.7	82.0	81.3	82.9	82.7	
11	GW 1323	11	80.0	78.9	79.1	78.9	74.3	78.2	81.3	78.0	77.8	77.1	78.5	78.4	
12	AKDW 2997-16 (C)	12	77.2	82.1	82.7	84.4	77.8	80.8	85.8	86.1	81.6	82.3	84.0	82.2	
13	GW 1327	13	84.6	79.1	79.9	77.1	74.2	79.0	79.4	85.2	77.1	75.6	79.3	79.1	
14	MPO 1308	14	85.5	83.8	84.7	85.3	82.3	84.3	86.3	84.8	81.7	81.6	83.6	84.0	
15	MACS 4028	15	76.1	82.4	82.0	82.5	80.1	80.6	86.2	80.0	84.0	83.5	83.4	81.9	
16	DDW 38	16	85.2	83.5	86.0	84.6	77.5	83.3	82.4	85.8	83.2	80.1	82.9	83.1	
17	NIDW 937	17	83.7	83.7	83.9	82.2	80.1	82.7	86.5	83.2	82.9	82.3	83.7	83.2	
18	HI 8779	18	81.0	83.6	84.4	85.8	82.9	83.5	84.1	86.8	82.9	83.2	84.3	83.8	
19	MACS 4030	19	83.8	82.9	81.9	84.3	81.2	82.8	84.5	80.5	83.7	81.3	82.5	82.7	
20	RKD 292	20	82.2	83.4	83.7	81.5	77.3	81.6	84.0	83.1	80.9	82.4	82.6	82.0	
21	HI 8627 (C)	21	82.2	84.3	85.1	82.7	81.7	83.2	83.8	84.4	81.2	81.5	82.7	83.0	
22	UAS 458	22	85.4	82.1	82.7	83.4	79.5	82.6	81.6	77.7	80.1	80.1	79.9	81.4	
23	UAS 459	23	80.4	84.9	85.4	85.8	83.7	84.0	85.3	83.1	82.7	81.1	83.0	83.6	
24	GW 1326	24	84.1	78.0	77.8	77.4	70.6	77.6	78.4	79.8	75.8	75.6	77.4	77.5	
25	DDW 37	25	83.7	83.4	84.8	86.2	82.3	84.1	82.7	84.6	82.5	83.6	83.3	83.8	
	Mean		82.6	82.1	82.5	82.4	79.1	81.7	83.0	83.5	81.1	81.0	82.2	81.9	

Table 40: Protein content (%) of *T. durum* genotypes in NIVT-5B

Sr. No.	Entry	Trial Code	CZ						PZ						Overall Mean
			Dhandhuka	Indore (Rst. Irr.)	Kota (RF)	Kota (Rst. Irr.)	Powarkhed	Mean	Dharwad	Annigeri	Niphad	Pune	Mean		
1	GW 1324	01	12.2	15.3	13.7	15.0	16.2	14.5	13.1	14.6	15.0	14.6	14.3	14.4	
2	MPO 1307	02	11.1	15.3	13.3	14.0	14.7	13.7	12.4	14.4	14.9	15.3	14.3	13.9	
3	RKD 283	03	11.9	14.0	12.0	13.8	15.5	13.4	10.5	13.4	12.8	13.5	12.6	13.0	
4	GW 1325	04	11.5	15.0	11.7	14.9	15.7	13.8	12.1	14.0	13.9	13.7	13.4	13.6	
5	KD 1418	05	12.9	13.7	14.2	14.6	14.9	14.1	12.9	13.6	14.4	14.0	13.7	13.9	
6	MACS 4027	06	11.9	14.1	14.5	14.9	15.5	14.2	11.8	14.4	14.2	15.4	14.0	14.1	
7	HI 8778	07	11.7	14.2	14.3	14.5	14.8	13.9	12.6	13.4	13.6	14.5	13.5	13.7	
8	HI 8776	08	11.7	13.4	12.7	13.0	14.6	13.1	11.4	15.0	14.3	14.7	13.9	13.4	
9	HI 8775	09	12.5	12.0	12.6	12.7	15.6	13.1	9.4	14.5	13.3	13.8	12.8	12.9	
10	HI 8777	10	13.8	13.5	13.4	14.7	13.9	13.9	11.8	12.8	13.5	14.5	13.2	13.5	
11	GW 1323	11	13.5	13.8	12.3	15.0	16.1	14.1	12.5	14.1	14.8	16.0	14.4	14.2	
12	AKDW 2997-16 (C)	12	11.6	12.7	11.2	12.7	13.9	12.4	9.8	13.2	13.0	14.3	12.6	12.5	
13	GW 1327	13	13.7	13.6	12.5	14.7	15.6	14.0	12.2	13.8	14.5	14.8	13.8	13.9	
14	MPO 1308	14	11.1	13.8	13.9	13.7	14.7	13.4	10.9	13.9	14.1	15.0	13.5	13.5	
15	MACS 4028	15	12.2	14.6	15.3	15.1	15.9	14.6	14.8	14.2	14.7	14.8	14.6	14.6	
16	DDW 38	16	11.1	14.9	12.0	12.7	15.5	13.2	12.2	13.7	14.3	15.9	14.0	13.6	
17	NIDW 937	17	12.1	12.5	13.7	15.0	15.5	13.8	11.9	14.1	13.3	13.5	13.2	13.5	
18	HI 8779	18	10.1	14.1	12.5	12.4	15.3	12.9	10.5	12.9	13.0	14.7	12.8	12.8	
19	MACS 4030	19	12.2	14.7	15.4	15.2	15.6	14.6	13.4	14.5	15.1	15.7	14.7	14.6	
20	RKD 292	20	13.4	14.5	13.1	14.1	15.8	14.2	11.9	14.2	11.9	13.7	12.9	13.6	
21	HI 8627 (C)	21	12.5	13.3	12.2	14.1	14.5	13.3	10.8	14.0	13.7	14.0	13.1	13.2	
22	UAS 458	22	10.8	14.5	13.6	13.8	15.2	13.6	10.9	12.9	14.5	15.6	13.5	13.5	
23	UAS 459	23	12.6	12.2	11.0	12.4	13.5	12.3	11.7	12.1	11.6	13.1	12.1	12.2	
24	GW 1326	24	11.5	13.7	13.1	14.7	15.2	13.6	10.8	14.0	13.4	13.8	13.0	13.4	
25	DDW 37	25	13.1	13.0	12.7	12.1	14.4	13.1	12.3	12.8	13.0	14.2	13.1	13.1	
	Mean		12.1	13.9	13.1	14.0	15.1	13.6	11.8	13.8	13.8	14.5	13.5	13.6	

Table 41: Sedimentation value (ml) of *T. durum* genotypes in NIVT-5B

Sr. No.	Entry	Trial Code	CZ					PZ					Overall Mean	
			Dhandhuka	Indore (Rst. Irr.)	Kota (RF)	Kota (Rst. Irr.)	Powarkheda	Mean	Dharwad	Annigeri	Niphad	Pune		
1	GW 1324	01	36	38	37	37	39	37	35	37	39	39	38	37
2	MPO 1307	02	38	39	39	39	39	39	34	35	39	39	37	38
3	RKD 283	03	33	32	27	31	33	31	29	31	32	33	31	31
4	GW 1325	04	35	39	35	36	39	37	34	36	37	39	37	37
5	KD 1418	05	33	36	37	35	37	36	37	38	37	39	38	37
6	MACS 4027	06	23	20	18	19	21	20	18	22	21	23	21	21
7	HI 8778	07	35	37	37	37	36	36	35	37	38	37	37	37
8	HI 8776	08	35	35	33	33	35	34	36	32	36	32	34	34
9	HI 8775	09	38	35	36	36	35	36	33	40	38	35	37	36
10	HI 8777	10	31	30	31	32	31	31	30	31	31	31	31	31
11	GW 1323	11	31	39	34	39	39	36	39	39	39	39	39	38
12	AKDW 2997-16 (C)	12	33	36	35	34	36	35	30	32	33	34	32	34
13	GW 1327	13	32	37	34	37	40	36	34	39	37	39	37	37
14	MPO 1308	14	36	38	38	37	36	37	35	34	39	38	37	37
15	MACS 4028	15	33	21	31	25	25	27	24	30	22	25	25	26
16	DDW 38	16	38	39	39	39	38	39	39	39	39	36	38	38
17	NIDW 937	17	39	39	39	40	39	39	37	40	39	37	38	39
18	HI 8779	18	36	34	31	33	34	34	32	37	33	31	33	33
19	MACS 4030	19	40	30	37	34	35	35	33	39	32	34	35	35
20	RKD 292	20	34	25	26	26	28	28	26	29	25	24	26	27
21	HI 8627 (C)	21	34	31	28	32	32	31	29	32	33	31	31	31
22	UAS 458	22	36	38	35	33	36	36	34	38	38	33	36	36
23	UAS 459	23	39	35	37	32	34	35	36	39	35	32	36	35
24	GW 1326	24	39	34	34	33	37	35	35	39	33	33	35	35
25	DDW 37	25	39	40	39	38	37	39	39	37	40	37	38	38
	Mean		35	34	34	34	35	34	33	35	35	34	34	34

Table 42: Yellow berry incidence (%) of *T. durum* genotypes in NIVT-5B

Sr. No.	Entry	Trial Code	CZ						PZ						Overall Mean
			Dhandhuka	Indore (Rst. Irr.)	Kota (RF)	Kota (Rst. Irr.)	Powarkheda	Mean	Dharwad	Annigeri	Niphad	Pune	Mean		
1	GW 1324	01	11	92	8	2	25	28	88	13	89	20	53	39	
2	MPO 1307	02	21	8	9	8	6	10	3	4	9	11	7	9	
3	RKD 283	03	52	18	9	12	2	19	46	6	50	6	27	22	
4	GW 1325	04	90	49	96	25	21	56	97	9	13	24	36	47	
5	KD 1418	05	34	72	6	6	23	28	36	20	60	19	34	31	
6	MACS 4027	06	36	90	17	11	48	40	57	1	97	72	57	48	
7	HI 8778	07	44	26	28	2	23	25	34	15	59	15	31	27	
8	HI 8776	08	34	52	16	10	11	25	23	1	66	27	29	27	
9	HI 8775	09	36	85	20	10	10	32	83	7	77	32	50	40	
10	HI 8777	10	12	61	6	8	50	27	12	10	43	12	19	24	
11	GW 1323	11	15	85	5	5	28	28	14	3	94	28	35	31	
12	AKDW 2997-16 (C)	12	80	36	47	8	12	37	70	5	23	6	26	32	
13	GW 1327	13	11	88	21	6	46	34	59	21	91	15	47	40	
14	MPO 1308	14	27	40	5	6	13	18	60	19	49	19	37	26	
15	MACS 4028	15	91	26	14	9	43	37	9	38	26	14	22	30	
16	DDW 38	16	36	20	9	10	13	18	2	26	25	15	17	17	
17	NIDW 937	17	8	55	3	4	20	18	8	11	48	24	23	20	
18	HI 8779	18	95	62	44	33	22	51	93	17	77	17	51	51	
19	MACS 4030	19	30	68	20	14	42	35	2	13	97	42	39	36	
20	RKD 292	20	20	19	11	5	12	13	48	8	24	14	24	18	
21	HI 8627 (C)	21	78	22	20	4	13	27	31	19	74	30	39	32	
22	UAS 458	22	38	70	22	4	15	30	18	75	28	23	36	33	
23	UAS 459	23	19	50	49	12	17	29	38	14	22	11	21	26	
24	GW 1326	24	12	56	48	15	41	34	24	13	96	32	41	37	
25	DDW 37	25	69	12	7	8	10	21	21	44	10	17	23	22	
	Mean		40	50	22	9	23	29	39	16	54	22	33	31	

Table 43: Yellow Pigment (ppm) of *T. durum* genotypes in NIVT-5B

Sr. No.	Entry	Trial Code	CZ						PZ						Overall Mean
			Dhandhuka	Indore (Rst. Irr.)	Kota (RF)	Kota (Rst. Irr.)	Powarkheda	Mean	Dharwad	Annigeri	Niphad	Pune	Mean		
1	GW 1324	01	7.1	4.7	4.2	5.1	5.0	5.2	4.4	4.5	4.3	4.4	4.4	4.9	
2	MPO 1307	02	4.9	6.8	6.4	8.1	7.1	6.7	7.0	4.1	6.7	6.2	6.0	6.4	
3	RKD 283	03	7.3	3.4	3.4	5.6	4.7	4.9	3.4	4.9	3.1	2.8	3.5	4.3	
4	GW 1325	04	5.0	5.0	4.0	5.4	5.3	5.0	4.9	5.3	4.1	4.6	4.7	4.8	
5	KD 1418	05	4.1	4.2	3.9	5.4	4.6	4.5	4.5	6.2	4.1	4.1	4.7	4.6	
6	MACS 4027	06	6.4	4.5	3.9	6.7	4.9	5.3	4.5	6.3	3.9	3.3	4.5	4.9	
7	HI 8778	07	4.8	6.5	5.2	7.3	5.3	5.8	6.5	4.6	5.7	4.9	5.4	5.6	
8	HI 8776	08	4.8	7.8	6.6	8.1	6.5	6.8	7.5	4.1	7.4	6.5	6.4	6.6	
9	HI 8775	09	3.4	7.6	5.8	5.5	7.0	5.9	7.1	7.9	7.0	7.4	7.3	6.5	
10	HI 8777	10	4.0	4.2	3.6	5.0	4.1	4.1	4.3	4.7	3.5	5.5	4.5	4.3	
11	GW 1323	11	2.8	3.9	3.5	7.0	4.6	4.4	4.5	4.0	3.7	3.4	3.9	4.2	
12	AKDW 2997-16 (C)	12	3.7	4.6	3.9	5.2	4.9	4.4	5.3	5.4	3.9	3.9	4.6	4.5	
13	GW 1327	13	3.6	4.9	4.5	6.7	5.3	5.0	4.7	5.9	4.7	5.2	5.1	5.0	
14	MPO 1308	14	6.4	5.8	4.4	5.4	5.0	5.4	5.2	3.9	4.7	4.9	4.7	5.1	
15	MACS 4028	15	4.0	4.5	4.0	6.1	4.7	4.6	4.7	3.8	4.1	4.2	4.2	4.4	
16	DDW 38	16	6.0	8.0	7.2	8.1	7.9	7.4	7.3	3.7	7.3	7.0	6.3	6.9	
17	NIDW 937	17	6.2	7.3	6.5	8.7	7.0	7.1	6.5	4.5	6.6	7.1	6.2	6.7	
18	HI 8779	18	3.5	6.8	4.9	6.3	6.6	5.6	5.2	4.7	5.9	6.1	5.5	5.6	
19	MACS 4030	19	7.3	4.2	3.4	6.1	4.4	5.1	6.2	4.5	3.7	4.0	4.6	4.9	
20	RKD 292	20	4.4	5.3	4.5	6.6	5.6	5.3	4.9	5.5	4.5	4.5	4.9	5.1	
21	HI 8627 (C)	21	4.5	7.2	7.1	8.4	7.2	6.9	4.5	6.6	6.3	7.0	6.1	6.5	
22	UAS 458	22	5.2	7.9	6.8	8.0	7.7	7.1	7.2	5.2	7.7	7.1	6.8	7.0	
23	UAS 459	23	4.5	7.4	5.3	8.8	7.8	6.7	5.8	4.8	6.4	6.7	5.9	6.4	
24	GW 1326	24	6.3	4.8	5.0	6.1	5.8	5.6	4.9	7.0	4.3	4.4	5.2	5.4	
25	DDW 37	25	3.5	7.2	6.2	6.9	6.3	6.0	6.7	5.0	6.5	6.4	6.1	6.1	
Mean			4.9	5.8	5.0	6.7	5.8	5.6	5.5	5.1	5.2	5.3	5.3	5.5	

Evaluation of *T. durum* NIVT entries for HMWGS and γ -gliadin (Table 44)

The entries in NIVT 4 and NIVT 5B including checks were analyzed for γ -gliadin. The percent samples carrying γ -gliadin '45' were 83 and 92 in NIVT 4 and NIVT 5B respectively. The remaining samples had γ -gliadin 42 viz. GW 1318, MACS 3973, GW 1319 in NIVT 4 and γ -gliadin 44 (MACS 4027) & γ -gliadin 43.5 (GW 1325) in NIVT 5B.

Table 44: Distribution of γ -gliadin in *T. durum* NIVT-4 & NIVT-5B

Sr. No.	Variety	Code	γ -gliadin	Sr. No.	Variety	Code	γ -gliadin
NIVT-4				NIVT-5B			
1	MACS 4035	01	45	1	GW 1324	01	45
2	UAS 456	02	45	2	MPO 1307	02	45
3	UAS 457	03	45	3	RKD 283	03	45
4	MPO 1314	04	45	4	GW 1325	04	43.5
5	GW 1318	05	42	5	KD 1418	05	45
6	RKD 291	06	45	6	MACS 4027	06	44
7	DDW 36	07	45	7	HI 8778	07	45
8	PDW 343	08	45	8	HI 8776	08	45
9	MACS 3973	09	42	9	HI 8775	09	<i>T. aestivum</i>
10	WHD 957	10	45	10	HI 8777	10	45
11	NIDW295 (C)	11	45	11	GW 1323	11	45
12	PDW 345	12	45	12	AKDW 2997-16 (C)	12	45
13	NIDW 950	13	45	13	GW 1327	13	45
14	GW 1321	14	45	14	MPO 1308	14	45
15	HI 8498 (C)	15	45	15	MACS 4028	15	45
16	HI 8772	16	45	16	DDW 38	16	45
17	GW 1319	17	42	17	NIDW 937	17	45
18	GW 1320	18	45	18	HI 8779	18	45
19	UPD 97	19	45	19	MACS 4030	19	45
20	PBND 5175	20	45	20	RKD 292	20	45
21	PDW 314 (C)	21	45	21	HI 8627 (C)	21	45
22	HI 8770	22	45	22	UAS 458	22	45
23	PDW 346	23	45	23	UAS 459	23	45
24	HI 8771	24	45	24	GW 1326	24	45
25	DDW 35	25	45	25	DDW 37	25	45
26	RKD 282	26	45				
27	HI 8768	27	45				
28	HI 8769	28	45				
29	HI 8773	29	45				
30	PDW 344	30	45				
31	WHD 958	31	45				
32	HI 8774	32	45				
33	MPO 1315	33	45				
34	AKDW 4525	34	45				
35	MACS 4029	35	45				
36	NIDW 989	36	45				

Evaluation of *T. aestivum* entries from IVT entries

Northern Hill Zone (Table 45-49)

These trials were conducted under ITS and RTS conditions of NHZ (Almora, Shimla & Malan). There were twenty one entries tested against two checks. The entries including checks were analyzed for grain appearance score, test weight, protein content, sedimentation value and moisture content. Under ITS condition of NHZ, thirteen out of twenty one entries recorded higher grain appearance score compared to both the checks, VL 907 (6.1) and HS 507 (6.1) and the zonal mean was 6.2. However, only one entry, HS 603 (6.4) had an edge over the best check, HS 507 (6.3) under RTS condition and the zonal mean was 6.1. For test weight, two entries namely HS 606 and VL 2017 exhibited higher values than the best check, HS 507 (81.6 kg/hl). Under both ITS & RTS conditions and the zonal means were 79.2 kg/hl and 80.3 kg/hl respectively. The protein contents were low under both ITS & RTS conditions and the zonal means were 10.0 % & 10.4 % respectively. The entry, UP 2916 recorded ~60 ml sedimentation value in ITS & RTS conditions and zonal mean were 47 ml & 46 ml respectively. Considering the threshold value of moisture content as 12.0 %, all the entries had lower values and the zonal means were 10.9 % and 10.8 % respectively.

Southern Hill Zone (Table 50)

In SHZ, There were seventeen entries tested against three checks. These entries were received from Restricted Irrigated Timely Sown (RITS) condition of SHZ. Six entries were found comparative to the best check, HW 2044 (6.3) and the zonal mean was 6.3. Four entries recorded >80.0 kg/hl test weight and were found superior to the last check, HW 2004 (79.6 kg/hl) and the zonal mean was 78.5 kg/hl. Two entries namely, HW 4206 & HW 5247 had >13.0 % protein content and were found comparable to the best check, HW 2044 (13.3 %). The zonal mean was 12.2 %. In sedimentation Value, two entries namely, HS 609 & UAS 377 recorded > 50 ml values and had an edge over the best check, HW 2044 (47 ml). The zonal mean was 43 ml considering the threshold value of moisture content as 12.0 %, all the entries including checks exhibited > 12.0 % moisture content and the zonal mean was 13.8%.

Table 45: Grain appearance of *T.aestivum* genotypes in Northern Hills Zone IVT

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown					
1. VL 907 (C)	07	6.0	6.2	6.0	6.1
2. HS 507 (C)	16	5.9	6.1	6.3	6.1
3. HS 597	19	5.7	5.8	6.1	5.9
4. HS 603	13	6.4	6.5	6.3	6.4
5. HS 604	20	6.1	5.6	6.2	6.0
6. HS 605	02	6.5	6.3	6.3	6.4
7. HS 606	11	6.2	6.3	6.2	6.2
8. HS 607	22	5.8	6.0	6.0	5.9
9. HS 608	03	6.4	6.1	6.2	6.2
10. HPW 414	12	6.4	6.4	6.1	6.3
11. HPW 415	14	6.3	6.0	6.4	6.2
12. HPW 416	21	5.6	5.8	5.9	5.8
13. HPW 417	17	6.2	6.6	6.2	6.3
14. HPW 418	09	6.0	6.1	6.0	6.0
15. HPW 419	23	5.9	5.7	6.0	5.9
16. HPW 420	05	6.3	6.0	6.3	6.2
17. VL 2013	04	6.6	6.2	6.2	6.3
18. VL 2014	18	6.0	6.4	6.3	6.2
19. VL 2015	01	6.4	6.5	6.5	6.5
20. VL 2016	08	5.9	6.1	6.2	6.1
21. VL 2017	06	6.2	6.2	6.0	6.1
22. VL 2018	10	6.0	6.3	6.3	6.2
23. UP 2916	15	6.4	6.4	6.3	6.4
Mean		6.1	6.2	6.2	6.2
Rainfed, Timely Sown					
1. VL 907 (C)	07	6.1	6.2	6.1	6.1
2. HS 507 (C)	16	6.3	6.2	6.5	6.3
3. HS 597	19	5.9	6.1	6.1	6.0
4. HS 603	13	6.3	6.2	6.6	6.4
5. HS 604	20	5.7	6.0	5.9	5.9
6. HS 605	02	6.1	6.4	5.7	6.1
7. HS 606	11	6.0	5.9	6.2	6.0
8. HS 607	22	6.3	6.2	6.3	6.3
9. HS 608	03	6.3	6.5	5.5	6.1
10. HPW 414	12	6.2	6.3	6.1	6.2
11. HPW 415	14	6.2	6.0	6.0	6.1
12. HPW 416	21	5.9	5.6	6.1	5.9
13. HPW 417	17	6.4	6.3	6.3	6.3
14. HPW 418	09	5.8	5.8	5.9	5.8
15. HPW 419	23	6.0	6.0	6.1	6.0
16. HPW 420	05	6.0	6.0	6.2	6.1
17. VL 2013	04	6.2	6.3	5.8	6.1
18. VL 2014	18	6.3	6.2	6.0	6.2
19. VL 2015	01	6.0	6.2	6.0	6.1
20. VL 2016	08	5.7	5.6	5.8	5.7
21. VL 2017	06	6.0	6.4	6.1	6.2
22. VL 2018	10	5.7	6.1	6.3	6.0
23. UP 2916	15	6.1	6.2	6.4	6.2
Mean		6.1	6.1	6.1	6.1

Table 46: Test Weight (kg/ha) of *T.aestivum* genotypes in Northern Hills Zone IVT

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown					
1. VL 907 (C)	07	79.2	79.4	78.2	78.9
2. HS 507 (C)	16	82.0	81.8	81.0	81.6
3. HS 597	19	79.0	78.6	79.4	79.0
4. HS 603	13	80.0	81.4	81.0	80.8
5. HS 604	20	78.7	78.0	78.0	78.2
6. HS 605	02	78.2	80.3	80.0	79.5
7. HS 606	11	82.5	80.5	83.0	82.0
8. HS 607	22	79.5	77.8	82.2	79.8
9. HS 608	03	78.2	76.3	79.0	77.8
10. HPW 414	12	79.7	81.3	81.3	80.8
11. HPW 415	14	80.0	78.7	79.0	79.2
12. HPW 416	21	77.0	78.0	78.5	77.8
13. HPW 417	17	79.0	81.4	82.3	80.9
14. HPW 418	09	77.2	78.7	78.6	78.2
15. HPW 419	23	78.0	78.7	78.5	78.4
16. HPW 420	05	78.7	78.6	81.4	79.6
17. VL 2013	04	79.5	80.7	80.6	80.3
18. VL 2014	18	80.0	80.3	80.5	80.3
19. VL 2015	01	76.8	78.6	80.0	78.5
20. VL 2016	08	79.5	79.2	81.5	80.1
21. VL 2017	06	81.0	82.0	82.0	81.7
22. VL 2018	10	79.2	82.0	81.0	80.7
23. UP 2916	15	79.7	83.0	80.7	81.1
Mean		79.2	79.8	80.3	79.8
Rainfed, Timely Sown					
1. VL 907 (C)	07	78.0	82.5	79.0	79.8
2. HS 507 (C)	16	81.0	81.4	80.5	81.0
3. HS 597	19	78.2	80.2	80.0	79.5
4. HS 603	13	81.0	81.2	81.6	81.3
5. HS 604	20	78.7	79.5	75.0	77.7
6. HS 605	02	81.0	83.2	72.0	78.7
7. HS 606	11	83.0	82.0	81.0	82.0
8. HS 607	22	80.7	81.4	80.3	80.8
9. HS 608	03	77.2	81.0	73.5	77.2
10. HPW 414	12	82.0	81.5	80.0	81.2
11. HPW 415	14	78.0	79.5	72.5	76.7
12. HPW 416	21	79.0	78.6	78.7	78.8
13. HPW 417	17	81.7	81.4	78.0	80.4
14. HPW 418	09	83.0	79.5	78.6	80.4
15. HPW 419	23	79.0	80.0	78.6	79.2
16. HPW 420	05	79.0	80.3	80.0	79.8
17. VL 2013	04	80.3	82.0	79.5	80.6
18. VL 2014	18	81.7	81.0	76.3	79.7
19. VL 2015	01	79.0	81.0	75.0	78.3
20. VL 2016	08	81.0	80.3	78.0	79.8
21. VL 2017	06	80.0	83.0	83.0	82.0
22. VL 2018	10	82.0	80.5	82.0	81.5
23. UP 2916	15	83.1	83.0	81.7	82.6
Mean		80.3	81.0	78.5	79.9

Table 47: Protein Content (%) of *T.aestivum* genotypes in Northern Hills Zone IVT

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown					
1. VL 907 (C)	07	11.0	9.7	12.3	11.0
2. HS 507 (C)	16	10.6	11.0	11.9	11.2
3. HS 597	19	9.8	9.7	11.7	10.4
4. HS 603	13	10.1	10.7	12.6	11.1
5. HS 604	20	10.1	10.5	12.1	10.9
6. HS 605	02	10.1	9.7	11.4	10.4
7. HS 606	11	12.3	12.0	13.7	12.7
8. HS 607	22	11.3	11.8	13.0	12.0
9. HS 608	03	10.5	10.4	11.2	10.7
10. HPW 414	12	11.6	12.5	11.7	11.9
11. HPW 415	14	9.7	9.8	11.7	10.4
12. HPW 416	21	11.2	9.8	11.6	10.9
13. HPW 417	17	11.5	12.2	14.4	12.7
14. HPW 418	09	11.3	10.0	12.5	11.3
15. HPW 419	23	10.8	10.4	10.8	10.7
16. HPW 420	05	10.5	10.2	12.2	11.0
17. VL 2013	04	10.3	10.0	12.0	10.8
18. VL 2014	18	10.3	9.7	12.3	10.8
19. VL 2015	01	9.6	10.2	12.2	10.7
20. VL 2016	08	11.3	11.4	12.4	11.7
21. VL 2017	06	11.4	10.7	12.9	11.7
22. VL 2018	10	11.9	10.6	13.3	11.9
23. UP 2916	15	11.6	12.3	12.3	12.1
Mean		10.8	10.7	12.3	11.3
Rainfed, Timely Sown					
1. VL 907 (C)	07	11.3	8.8	10.7	10.3
2. HS 507 (C)	16	12.4	9.5	11.6	11.2
3. HS 597	19	12.4	9.2	10.6	10.7
4. HS 603	13	11.3	11.2	11.6	11.4
5. HS 604	20	12.3	9.4	12.5	11.4
6. HS 605	02	13.0	9.4	16.1	12.8
7. HS 606	11	12.5	11.7	13.2	12.5
8. HS 607	22	12.8	11.5	11.3	11.9
9. HS 608	03	11.3	9.6	14.5	11.8
10. HPW 414	12	14.2	12.8	12.0	13.0
11. HPW 415	14	11.3	8.1	13.8	11.1
12. HPW 416	21	12.4	10.1	13.5	12.0
13. HPW 417	17	13.8	13.1	15.0	14.0
14. HPW 418	09	13.4	10.2	12.0	11.9
15. HPW 419	23	11.3	9.8	12.5	11.2
16. HPW 420	05	11.7	10.0	11.5	11.1
17. VL 2013	04	10.9	10.7	13.6	11.7
18. VL 2014	18	12.4	9.1	11.9	11.1
19. VL 2015	01	12.1	9.1	12.4	11.2
20. VL 2016	08	10.8	9.6	12.7	11.0
21. VL 2017	06	13.2	10.2	10.7	11.4
22. VL 2018	10	12.4	10.2	12.5	11.7
23. UP 2916	15	13.0	12.8	11.1	12.3
Mean		12.3	10.3	12.5	11.7

Table 48: Sedimentation Value (ml) of *T.aestivum* genotypes in Northern Hills Zone IVT

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown					
1. VL 907 (C)	07	35	35	39	36
2. HS 507 (C)	16	38	39	43	40
3. HS 597	19	42	40	45	42
4. HS 603	13	49	47	51	49
5. HS 604	20	53	50	60	54
6. HS 605	02	37	37	41	38
7. HS 606	11	46	44	52	47
8. HS 607	22	61	51	60	57
9. HS 608	03	39	40	44	41
10. HPW 414	12	42	40	49	44
11. HPW 415	14	46	45	51	47
12. HPW 416	21	49	46	54	50
13. HPW 417	17	42	38	45	42
14. HPW 418	09	42	45	51	46
15. HPW 419	23	46	37	45	43
16. HPW 420	05	48	51	56	52
17. VL 2013	04	46	42	43	44
18. VL 2014	18	49	48	58	52
19. VL 2015	01	56	56	59	57
20. VL 2016	08	49	54	60	54
21. VL 2017	06	45	40	47	44
22. VL 2018	10	44	43	51	46
23. UP 2916	15	57	64	61	61
Mean		46	45	51	47
Rainfed, Timely Sown					
1. VL 907 (C)	07	36	37	41	38
2. HS 507 (C)	16	39	37	47	41
3. HS 597	19	43	44	40	42
4. HS 603	13	49	45	51	48
5. HS 604	20	51	53	60	55
6. HS 605	02	38	38	41	39
7. HS 606	11	47	46	53	49
8. HS 607	22	55	52	60	56
9. HS 608	03	40	36	42	39
10. HPW 414	12	40	39	50	43
11. HPW 415	14	40	45	54	46
12. HPW 416	21	40	45	48	44
13. HPW 417	17	37	38	42	39
14. HPW 418	09	41	44	51	45
15. HPW 419	23	39	43	42	41
16. HPW 420	05	48	46	52	49
17. VL 2013	04	37	40	45	41
18. VL 2014	18	48	46	55	50
19. VL 2015	01	64	56	60	60
20. VL 2016	08	49	48	58	52
21. VL 2017	06	42	42	45	43
22. VL 2018	10	44	45	46	45
23. UP 2916	15	54	65	60	60
Mean		44	45	50	46

Table 49: Moisture Content (%) of *T.aestivum* genotypes in Northern Hills Zone IVT

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown					
1. VL 907 (C)	07	11.2	11.5	10.3	11.0
2. HS 507 (C)	16	11.8	12.0	9.8	11.2
3. HS 597	19	11.8	11.6	10.0	11.1
4. HS 603	13	11.2	11.5	10.1	10.9
5. HS 604	20	10.7	12.6	9.9	11.1
6. HS 605	02	11.7	11.6	9.8	11.0
7. HS 606	11	10.9	12.9	9.9	11.2
8. HS 607	22	11.2	11.5	9.8	10.8
9. HS 608	03	10.7	10.9	9.5	10.4
10. HPW 414	12	11.7	11.5	9.8	11.0
11. HPW 415	14	11.4	11.5	10.1	11.0
12. HPW 416	21	10.8	11.1	10.3	10.7
13. HPW 417	17	11.3	11.7	9.8	10.9
14. HPW 418	09	11.1	11.4	10.0	10.8
15. HPW 419	23	10.7	11.6	9.9	10.7
16. HPW 420	05	10.7	11.5	10.1	10.8
17. VL 2013	04	10.7	11.2	9.7	10.5
18. VL 2014	18	10.7	11.5	9.7	10.6
19. VL 2015	01	11.1	12.5	10.0	11.2
20. VL 2016	08	10.8	11.2	10.2	10.7
21. VL 2017	06	11.1	11.6	9.7	10.8
22. VL 2018	10	11.6	11.6	9.9	11.0
23. UP 2916	15	11.7	11.2	9.6	10.8
Mean		11.2	11.6	9.9	10.9
Rainfed, Timely Sown					
1. VL 907 (C)	07	11.1	10.9	10.0	10.7
2. HS 507 (C)	16	11.2	10.8	10.5	10.8
3. HS 597	19	11.5	10.9	10.5	11.0
4. HS 603	13	11.7	11.4	10.4	11.2
5. HS 604	20	11.2	11.1	10.0	10.8
6. HS 605	02	11.6	10.6	10.0	10.7
7. HS 606	11	11.8	10.6	10.3	10.9
8. HS 607	22	11.4	10.9	10.2	10.8
9. HS 608	03	11.1	11.0	9.6	10.6
10. HPW 414	12	11.2	10.5	10.2	10.6
11. HPW 415	14	11.5	11.3	10.1	11.0
12. HPW 416	21	11.6	10.9	10.4	11.0
13. HPW 417	17	11.3	10.6	9.9	10.6
14. HPW 418	09	11.4	10.8	10.3	10.8
15. HPW 419	23	12.0	10.7	10.3	11.0
16. HPW 420	05	11.9	10.9	10.4	11.1
17. VL 2013	04	11.9	10.6	9.9	10.8
18. VL 2014	18	11.9	10.6	10.1	10.9
19. VL 2015	01	11.4	11.0	10.5	11.0
20. VL 2016	08	11.0	10.8	10.3	10.7
21. VL 2017	06	11.7	11.0	10.2	11.0
22. VL 2018	10	11.3	10.8	10.4	10.8
23. UP 2916	15	11.8	10.4	9.9	10.7
Mean		11.5	10.8	10.2	10.8

Table 50: Quality characters of *T.aestivum* entries in Southern Hills Zone IVT, Wellington

Sr. No.	ENTRY	Code	Grain Appearance (Max. Score 10)	Test Weight (Kg/hl)	Protein Content (%)	Sedimentation Value (ml)	Moisture Content (%)
Restricted Irrigation, Timely Sown							
1.	HW 2044 (C)	4	6.3	79.6	13.3	47	13.5
2.	CoW (W) 1 (C)	13	6.1	77.5	11.8	44	13.6
3.	HW 5216 (C)	6	6.2	76.7	12.1	47	14.0
4.	HW 3624-1	7	6.1	78.5	11.9	47	13.6
5.	HW 3658	9	6.3	78.2	11.4	38	13.7
6.	HW 4205-2	10	5.9	75.3	12.3	35	13.9
7.	HW 4206	2	6.2	79.3	13.6	42	13.7
8.	HW 4207	3	6.0	78.0	12.3	44	13.6
9.	HW 5245	14	6.3	78.5	12.1	37	13.7
10.	HW 5246	12	6.4	78.7	12.5	38	13.4
11.	HW 5247	20	6.0	80.2	13.5	45	13.8
12.	HW 5248	1	6.4	79.6	12.6	36	14.2
13.	HW 4305-2	8	6.3	76.8	12.0	39	13.8
14.	HW 4501	5	6.5	81.3	12.0	40	13.9
15.	HS 609	17	6.0	80.3	12.4	52	13.9
16.	HS 610	18	6.2	79.4	11.8	47	14.0
17.	UAS 376	15	6.0	80.3	12.7	40	13.6
18.	UAS 377	19	6.2	76.3	11.1	55	13.7
19.	NIAW 2613	16	5.8	77.0	11.0	49	13.8
20.	MACS 6670	11	6.1	78.2	11.0	38	14.3
Mean			6.3	78.5	12.2	43	13.8

SECTION C

SPECIAL TRIALS

- i. ***T. dicoccum***
- ii. **Salinity/Alkalinity**
- iii. **Triticale**
- iv. **MABB/NIL**
- v. **Wheat Biofortification**

SPECIAL TRIALS

(I) Dicoccum Trials (Table 1-4)

Four entries and three checks (two *dicoccum* and one *aestivum*) received from six locations (Dharwad, Arabhavi, Kalloli, Ugar, Mudhol & Pune) of PZ and one location (Wellington) of SHZ, were analysed for thousand grain weight, protein content, sedimentation value & yellow pigment content. None of the entry could surpass the best *dicoccum* check, DDK 1029 (42.74 g) in thousand grain weight and the overall mean was 41.5 g. On the other hand, all the entries recorded higher protein contents compared to the best check, HW 1098 (14.7 %) and the overall mean was 14.8 %. The highest sedimentation value was exhibited by *aestivum* check MACS 6222 (41 ml) and the overall mean was 30 ml. The entry, MACS 5043 recorded >4.00 ppm yellow pigment content and was found superior to best check, HW 1098 (3.64 ppm). The overall mean was 3.68 ppm

(II) Salinity/ Alkalinity Trial (Table 5-8)

The material of these entries was received from two locations namely Karnal, and Hisar. This trial comprised of 11 entries including 3 checks namely KRL -19, KRL 210 and Kharchia-65. Grain appearance score varied from 4.9 (Kharchia 65) to 6.3 (WH 1309). Two entries performed better than three checks. The highest mean grain appearance score of 6.3 was demonstrated by WH 1309 followed by KRL 350 having GAS of 6.1. Test weight varied from 75.2 (KRL 351) to 82.2 kg/hl (DBW 181). Among the entries, WH 1309 recorded the highest mean hectoliter weight (81.6 kg/hl), while other two entries namely DBW 181 and DBW 182 had hectoliter weight more than 80 kg/hl. Among centers, entries from Hisar recorded higher hectoliter weight (80.6 kg/hl) followed by Karnal (78.6). Sedimentation value varied from 40 (KRL -19) to 50 ml (DBW 181). Four entries namely DBW 181, WH 1309 and KRL 350 had higher SV (48-50 ml) than KRL 210 (C) with mean sedimentation value of 47ml. Regarding protein content, performance of KRL 351 was excellent as it demonstrated highest mean protein content (12.8%) and was at par with best check KRL-19 (12.8%).

(III) Triticale Trial (Table 9-13)

Five entries and three checks (two durum and one *aestivum* each) received from NHZ (Dhaulakuan & Malan) and NWPZ (Ludhiana & Delhi) were analysed for grain appearance score, test weight, protein content, sedimentation value and moisture content. All the entries in both the zones had an edge over respective best checks and overall mean was 6.2. However, none of the entry could surpass the respective best checks in test weight and the overall mean was 73.2 kg/hl. In protein content, all the entries were either at par or recorded higher values compared to the respective best checks and the overall mean was 11.6 %. As the sedimentation value of *aestivum* is always higher compared to that of triticale, the entries were found to be comparable to the triticale checks. The overall mean was 33 ml. Considering the threshold value of moisture content as 12.0 %, except Ludhiana centre, all other centres in both the zones fulfilled this requirement and the overall mean was 11.3 %

Table 1: Thousand grain weight (g) of Dicoccum genotypes

Sr. No.	Variety	Code	PZ						SHZ	Overall Mean	
			Dharwad	Arabhavi	Kalloli	Ugar	Mudhol	Pune			
1	MACS 6222 (A.) (C)	01	44.5	41.1	44.1	41.2	47.2	48.3	44.4	46.6	44.7
2	DDK 1049	02	42.5	41.3	46.7	42.8	44.7	42.9	43.5	40.3	43.0
3	DDK 1029 (C)	03	45.6	44.8	44.5	40.0	44.2	41.8	43.5	42.0	43.3
4	MACS 5043	04	39.6	41.7	45.8	39.4	43.6	41.8	42.0	38.5	41.5
5	DDK 1048	05	45.6	41.0	44.7	41.6	45.0	40.7	43.1	35.1	42.0
6	MACS 5041	06	41.5	40.3	44.6	40.6	45.9	42.6	42.6	37.9	41.9
7	HW 1098 (C)	07	38.4	41.7	44.0	44.1	45.1	39.8	42.2	39.3	41.8
Mean			42.5	41.7	44.9	41.4	45.1	42.6	43.0	40.0	42.5

Table 2: Protein Content (%) of Dicoccum genotypes

Sr. No.	Variety	Code	PZ						SHZ	Overall Mean	
			Dharwad	Arabhavi	Kalloli	Ugar	Mudhol	Pune			
1	MACS 6222 (A.) (C)	01	13.7	12.7	13.9	14.7	16.3	13.1	14.1	13.3	14.0
2	DDK 1049	02	15.6	13.7	15.9	16.6	15.8	14.2	15.3	15.9	15.4
3	DDK 1029 (C)	03	15.5	14.5	14.8	15.0	15.1	14.3	14.9	13.9	14.7
4	MACS 5043	04	16.1	16.5	15.6	15.9	15.1	16.0	15.9	14.6	15.7
5	DDK 1048	05	14.8	14.1	15.5	15.9	16.0	14.9	15.2	15.2	15.2
6	MACS 5041	06	15.7	14.2	16.3	15.0	15.7	15.5	15.4	14.4	15.3
7	HW 1098 (C)	07	15.8	13.3	15.1	15.3	15.5	14.2	14.9	14.6	14.8
Mean			15.3	14.1	15.3	15.5	15.6	14.6	15.1	14.6	15.0

Table 3: Sedimentation Value (ml) of Dicoccum genotypes

Sr. No.	Variety	Code	PZ						SHZ	Overall Mean
			Dharwad	Arabavi	Kalloi	Ugar	Mudhol	Pune		
1	MACS 6222 (A.) (C)	01	40	41	41	45	39	40	41	41
2	DDK 1049	02	28	28	30	32	29	25	29	33
3	DDK 1029 (C)	03	26	25	29	28	29	25	27	27
4	MACS 5043	04	26	25	28	26	26	24	26	24
5	DDK 1048	05	31	27	28	31	29	25	29	28
6	MACS 5041	06	26	24	27	24	25	22	25	26
7	HW 1098 (C)	07	28	25	29	29	28	26	28	30
	Mean		29	28	30	30	29	26	29	30
										29

Table 4: Yellow Pigment (ppm) of Dicoccum genotypes

Sr. No.	Variety	Code	PZ						SHZ	Overall Mean
			Dharwad	Arabavi	Kalloi	Ugar	Mudhol	Pune		
1	MACS 6222 (A.) (C)	01	3.72	3.25	3.24	3.44	3.37	3.33	3.39	3.34
2	DDK 1049	02	3.94	3.77	3.45	3.67	4.05	4.02	3.82	3.61
3	DDK 1029 (C)	03	3.85	3.80	3.55	3.94	4.12	4.10	3.89	3.28
4	MACS 5043	04	4.12	4.12	3.97	4.17	4.33	3.79	4.08	4.02
5	DDK 1048	05	3.97	3.94	3.92	4.18	4.25	3.67	3.99	3.92
6	MACS 5041	06	3.55	3.87	3.39	3.10	3.88	2.97	3.46	3.48
7	HW 1098 (C)	07	3.62	3.92	3.27	3.88	3.97	3.49	3.69	3.58
	Mean		3.82	3.81	3.54	3.77	4.00	3.62	3.76	3.60
										3.74

Table 5: Grain Appearance (Max.10) of *T.aestivum* entries of Salinity/alkalinity Trial

Sr. No.	Entry	Code	Hisar	Karnal	Mean
1.	DBW 185	1	5.9	5.9	5.9
2.	KRL- 19 (C)	2	6.0	6.0	6.0
3.	DBW 182	3	5.8	5.9	5.9
4.	DBW 183	4	6.0	5.8	5.9
5.	DBW 181	5	5.8	5.9	5.9
6.	KRL 210 (C)	6	6.0	5.9	6.0
7.	KRL 350	7	6.2	6.0	6.1
8.	WH 1309	8	6.4	6.2	6.3
9.	DBW 184	9	5.9	5.4	5.7
10.	KRL 351	10	5.9	5.0	5.5
11.	Kharchia 65 (C)	11	5.0	4.9	5.0
Mean			5.9	5.7	5.8

Table 6: Test Weight (kg/ha) of *T.aestivum* entries of Salinity/alkalinity trial

Sr. No.	Entry	Code	Hisar	Karnal	Mean
1.	DBW 185	1	79.9	78.1	79.0
2.	KRL- 19 (C)	2	79.0	75.2	77.1
3.	DBW 182	3	82.6	78.5	80.6
4.	DBW 183	4	82.0	78.4	80.2
5.	DBW 181	5	79.8	79.5	79.7
6.	KRL 210 (C)	6	80.3	75.8	78.1
7.	KRL 350	7	79.1	79.8	79.5
8.	WH 1309	8	81.5	81.6	81.6
9.	DBW 184	9	81.8	78.9	80.4
10.	KRL 351	10	82.2	80.3	81.3
11.	Kharchia 65 (C)	11	78.8	78.6	78.7
Mean			80.6	78.6	79.6

Table 7: Protein Content (%) of *T.aestivum* entries of Salinity/alkalinity trial

Sr. No.	Entry	Code	Hisar	Karnal	Mean
1.	DBW 185	1	11.7	11.7	11.7
2.	KRL- 19 (C)	2	13.1	12.5	12.8
3.	DBW 182	3	12.9	11.8	12.4
4.	DBW 183	4	12.1	11.4	11.8
5.	DBW 181	5	12.6	11.5	12.1
6.	KRL 210 (C)	6	12.1	10.3	11.2
7.	KRL 350	7	12.6	11.0	11.8
8.	WH 1309	8	13.1	11.2	12.2
9.	DBW 184	9	12.6	12.9	12.8
10.	KRL 351	10	12.6	12.3	12.5
11.	Kharchia 65 (C)	11	12.1	11.6	11.9
	Mean		12.5	11.7	12.1

Table 8: Sedimentation value (ml) of *T.aestivum* entries of Salinity/alkalinity trial

Sr. No.	Entry	Code	Hisar	Karnal	Mean
1.	DBW 185	1	50	48	49
2.	KRL- 19 (C)	2	45	51	48
3.	DBW 182	3	49	50	50
4.	DBW 183	4	45	41	43
5.	DBW 181	5	42	43	43
6.	KRL 210(C)	6	44	44	44
7.	KRL 350	7	47	46	47
8.	WH 1309	8	50	47	49
9.	DBW 184	9	48	45	47
10.	KRL 351	10	44	42	43
11.	Kharchia 65 (C)	11	40	40	40
	Mean		46	45	46

Table 9: Grain Appearance Score (Max-10) of *Triticale* genotypes

Sr. No.	Variety	NHZ				NWPZ				Overall Mean
		Trial Code	Dhaulakuan	Malan	Mean	Trial Code	Ludhiana	Delhi	Mean	
1.	TL 3001	07	6.4	6.2	6.3	08	6.3	6.2	6.3	6.3
2.	TL 3002	02	6.3	6.3	6.3	07	6.2	6.4	6.3	6.3
3.	TL 3003	08	6.2	6.3	6.3	03	6.4	6.5	6.5	6.4
4.	TL 3004	01	6.5	6.5	6.5	05	5.8	6.0	5.9	6.2
5.	TL 3005	03	6.3	6.4	6.4	02	6.4	6.0	6.2	6.3
6.	TL 2942 (C)	06	6.0	6.0	6.0	01	6.4	5.8	6.1	6.1
7.	TL 2969 (C)	04	6.1	6.3	6.2	04	5.8	6.3	6.1	6.1
8.	HS 507 (C)	05	6.0	6.2	6.1	-	-	-	-	6.1
9.	WH 1105 (C)	-	-	-	-	06	6.2	5.9	6.1	6.1
Mean			6.2	6.3	6.3		6.2	6.1	6.2	6.2

Table 10: Test Weight (kg/hl) of *Triticale* genotypes

Sr. No.	Variety	NHZ				NWPZ				Overall Mean
		Trial Code	Dhaulakuan	Malan	Mean	Trial Code	Ludhiana	Delhi	Mean	
1.	TL 3001	07	75.0	75.2	75.1	08	71.4	72.3	71.9	73.5
2.	TL 3002	02	74.5	73.0	73.8	07	70.4	71.3	70.9	72.3
3.	TL 3003	08	70.5	73.5	72.0	03	74.3	76.7	75.5	73.8
4.	TL 3004	01	73.0	74.3	73.7	05	70.1	71.0	70.6	72.1
5.	TL 3005	03	72.0	73.2	72.6	02	71.6	72.4	72.0	72.3
6.	TL 2942 (C)	06	70.3	74.4	72.4	01	78.4	74.5	76.5	74.4
7.	TL 2969 (C)	04	69.0	76.0	72.5	04	71.3	74.0	72.7	72.6
8.	HS 507 (C)	05	71.3	81.0	76.2	-	-	-	-	76.2
9.	WH 1105 (C)	-	-	-	-	06	72.2	73.3	72.8	74.5
Mean			72.0	75.1	73.5		72.5	73.2	72.8	73.2

Table 11: Protein Content (%) of *Triticale* genotypes

Sr. No.	Variety	Trial Code	NHZ			Trial Code	NWPZ			Overall Mean
			Dhaulkuan	Malan	Mean		Ludhiana	Delhi	Mean	
1. TL 3001	07	11.1	12.0	11.6	08	13.3	13.1	13.2	12.4	
2. TL 3002	02	11.1	10.4	10.8	07	11.4	13.1	12.2	11.5	
3. TL 3003	08	11.5	11.1	11.3	03	13.7	14.1	13.9	12.6	
4. TL 3004	01	10.8	10.5	10.6	05	11.8	12.7	12.3	11.4	
5. TL 3005	03	10.9	10.5	10.7	02	13.3	12.6	13.0	11.8	
6. TL 2942 (C)	06	9.5	9.5	9.5	01	11.0	12.1	11.6	10.5	
7. TL 2969 (C)	04	9.5	9.9	9.7	04	11.9	13.3	12.6	11.2	
8. HS 507 (C)	05	10.3	10.6	10.4	-	-	-	-	10.4	
9. WH 1105 (C)	-	-	-	-	06	13.1	12.2	12.6	11.5	
Mean			10.6	10.5	10.6		12.4	12.9	12.7	11.6

Table 12: Sedimentation Value (ml) of *Triticale* genotypes

Sr. No.	Variety	Trial Code	NHZ			Trial Code	NWPZ			Overall Mean
			Dhaulkuan	Malan	Mean		Ludhiana	Delhi	Mean	
1. TL 3001	07	33	28	31	08	32	31	32	31	31
2. TL 3002	02	32	33	33	07	32	32	32	32	32
3. TL 3003	08	33	31	32	03	29	28	29	29	30
4. TL 3004	01	31	29	30	05	31	31	31	31	31
5. TL 3005	03	34	26	30	02	31	30	31	31	30
6. TL 2942 (C)	06	29	25	27	01	31	30	31	31	29
7. TL 2969 (C)	04	30	29	30	04	31	29	30	30	30
8. HS 507 (C)	05	42	39	41	-	-	-	-	-	41
9. WH 1105 (C)	-	-	-	-	06	55	57	56	56	48
Mean			33	30	32		34	34	34	33

Table 13: Moisture Content (%) of Triticale genotypes

Sr. No.	Variety	NHZ				NWPZ				Overall Mean
		Trial Code	Dhaulakuan	Malan	Mean	Trial Code	Ludhiana	Delhi	Mean	
1.	TL 3001	07	12.5	11.1	11.8	08	10.3	10.9	10.6	11.2
2.	TL 3002	02	12.4	11.3	11.9	07	10.5	11.2	10.9	11.4
3.	TL 3003	08	12.6	11.3	12.0	03	10.0	10.8	10.4	11.2
4.	TL 3004	01	12.5	11.4	12.0	05	10.3	11.0	10.7	11.3
5.	TL 3005	03	12.5	11.4	12.0	02	10.3	11.0	10.7	11.3
6.	TL 2942 (C)	06	12.6	10.8	11.7	01	10.4	11.0	10.7	11.2
7.	TL 2969 (C)	04	12.6	11.1	11.9	04	10.3	11.1	10.7	11.3
8.	HS 507 (C)	05	12.7	11.0	11.9	-	-	-	-	11.9
9.	WH 1105 (C)	-	-	-	-	06	10.5	10.9	10.7	11.3
Mean			12.6	11.2	11.9		10.3	11.0	10.7	11.3

(IV) MABB Trial (Table 14-31)

One entry and four checks were received from Ludhiana, Delhi, Karnal & Dhaulakuan) of NWPZ, Likewise, one entry and four checks were received from Kanpur & Pusa of NEPZ. In CZ (Indore, Powarkheda & Vijapur) and PZ (Pune, Dharwad & Niphad), one entry and five checks were received. These were analysed for grain appearance score, test weight, protein content, grain hardness index, sedimentation value and moisture content.

(V) North Western Plain Zone (NWPZ) – Table 14-19

The entries, PBW 723 was found comparable to the best check, DPW 621-50 (6.9) in grain appearance score and the zonal mean was 5.7. Similar were the trends for test weight & protein content and the zonal means were 74.7 kg/hl & 12.2 % respectively. However, the candidate entry recorded lower values of sedimentation value and grain hardness index compared to the respective best checks and the zonal means were 49 ml and 69 respectively. All the entries including checks in all the centres except Dhaulakuan centre fulfilled the criteria of <12.0 % moisture content and the zonal mean was 10.9 %.

(VI) North Eastern Plains Zone (NEPZ) – Table 20-25

The lone candidate entry, MMBL 283 could not surpass the respective best checks in any of the quality parameters and the zonal means for grain appearance score, test weight, protein content, sedimentation value, grain hardness index and moisture content were 6.2, 78.2 kg/hl, 12.0 %, 46 ml, 76 and 11.3 % respectively.

(VII) Central Zone (CZ) and Peninsular Zone (PZ) – Table 26-31

The test entry, HD 2932 + (Lr19/Sr25), could not beat the respective best checks in all the quality parameters. The overall means (CZ and PZ combined) were 6.3, 78.1 kg/hl, 13.0 %, 45 ml, 72 and 9.8 % for grain appearance score, test weight, protein content, sedimentation value, grain hardness index and moisture content respectively.

(VIII) NIL (Karnal Bunt) Trial (Table 32-36)

Three test entries namely, KB 2012-03, DWR-NIL-01 & DWR-NIL-02 and five checks were received from Ludhiana, Panthagar and Dhaulakuan of NWPZ. They were analysed for grain appearance score, test weight, protein content, sedimentation value, grain hardness index and moisture content.

All the three test entries could not surpass the respective best checks in all the quality parameters. The zonal means for grain appearance score, test weight, protein content, sedimentation value and moisture content were 5.6, 74.1 kg/hl, 10.9 %, 46 ml and 11.4% respectively.

Table 14: Grain Appearance (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	6.3	5.9	5.8	5.1	5.8
2.	PBW 343 (C)	02	5.3	6.0	5.3	5.0	5.4
3.	HD 2967 (C)	03	5.6	5.8	5.6	5.1	5.5
4.	DPW 621-50 (C)	05	6.0	6.3	6.1	5.2	5.9
5.	WH 1105 (C)	04	5.9	6.1	6.0	5.0	5.8
Mean			5.8	6.0	5.8	5.1	5.7

Table 15: Test Weight (kg/hl) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	78.0	78.4	73.6	72.0	75.5
2.	PBW 343 (C)	02	68.2	78.4	71.5	69.0	71.8
3.	HD 2967 (C)	03	74.0	78.7	75.1	72.0	75.0
4.	DPW 621-50 (C)	05	77.1	79.0	74.2	72.0	75.6
5.	WH 1105 (C)	04	77.3	78.4	75.2	71.5	75.6
Mean			74.9	78.6	73.9	71.3	74.7

Table 16: Protein Content (%) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	11.7	14.3	11.2	11.0	12.0
2.	PBW 343 (C)	02	11.9	14.2	12.1	11.1	12.3
3.	HD 2967 (C)	03	12.5	14.3	10.8	11.0	12.1
4.	DPW 621-50 (C)	05	12.5	14.5	12.2	10.8	12.5
5.	WH 1105 (C)	04	11.9	14.0	11.7	10.9	12.1
Mean			12.1	14.3	11.6	11.0	12.2

Table 17: Sedimentation Value (ml) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	39	42	39	42	41
2.	PBW 343 (C)	02	35	38	37	38	37
3.	HD 2967 (C)	03	50	54	59	59	56
4.	DPW 621-50 (C)	05	54	50	60	58	56
5.	WH 1105 (C)	04	58	57	58	62	59
Mean			47	48	51	52	49

Table 18: Grain Hardness Index of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	78	75	64	71	72
2.	PBW 343 (C)	02	77	75	60	60	68
3.	HD 2967 (C)	03	67	71	57	65	65
4.	DPW 621-50 (C)	05	82	75	69	75	75
5.	WH 1105 (C)	04	71	68	62	65	67
Mean			75	73	62	67	69

Table 19: Moisture Content (%) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	10.1	9.8	11.5	12.2	10.9
2.	PBW 343 (C)	02	10.6	9.5	11.5	12.6	11.1
3.	HD 2967 (C)	03	10.0	9.4	11.1	12.3	10.7
4.	DPW 621-50 (C)	05	10.5	9.9	11.1	12.6	11.0
5.	WH 1105 (C)	04	10.2	9.5	11.3	12.6	10.9
Mean			10.3	9.6	11.3	12.5	10.9

Table 20: Grain Appearance (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	6.7	6.0	6.4
2.	HUW 234 (C)	02	6.6	6.2	6.4
3.	HI 1563 (C)	01	6.5	6.1	6.3
4.	HD 2985 (C)	04	6.0	5.8	5.9
5.	DBW 14 (C)	05	5.9	6.3	6.1
Mean			6.3	6.1	6.2

Table 21: Test Weight (kg/hl) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	79.8	77.8	78.8
2.	HUW 234 (C)	02	77.5	76.7	77.1
3.	HI 1563 (C)	01	81.5	79.7	80.6
4.	HD 2985 (C)	04	78.1	76.8	77.5
5.	DBW 14 (C)	05	76.0	78.2	77.1
Mean			78.6	77.8	78.2

Table 22: Protein Content (%) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	10.4	14.4	12.4
2.	HUW 234 (C)	02	9.9	13.6	11.8
3.	HI 1563 (C)	01	10.4	13.5	12.0
4.	HD 2985 (C)	04	10.4	12.9	11.7
5.	DBW 14 (C)	05	10.8	13.9	12.4
Mean			10.4	13.7	12.0

Table 23: Sedimentation Value (ml) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	41	48	45
2.	HUW 234 (C)	02	43	45	44
3.	HI 1563 (C)	01	47	51	49
4.	HD 2985 (C)	04	50	53	52
5.	DBW 14 (C)	05	43	41	42
Mean			45	48	46

Table 24: Grain Hardness Index of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	69	87	78
2.	HUW 234 (C)	02	69	84	77
3.	HI 1563 (C)	01	73	90	82
4.	HD 2985 (C)	04	70	82	76
5.	DBW 14 (C)	05	57	81	69
Mean			68	85	76

Table 25: Moisture Content (%) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	11.0	11.4	11.2
2.	HUW 234 (C)	02	11.2	11.4	11.3
3.	HI 1563 (C)	01	10.9	11.6	11.3
4.	HD 2985 (C)	04	10.9	11.5	11.2
5.	DBW 14 (C)	05	11.2	11.4	11.3
Mean			11.0	11.5	11.3

Table 26: Grain Appearance (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean	
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	6.2	5.2	7.5	6.3	6.8	5.4	5.9	6.0	6.2
2.	HD 3209 (C)	04	6.3	5.4	7.6	6.4	7.2	5.6	6.2	6.3	6.4
3.	HD 2932 (C)	01	5.8	5.0	7.3	6.0	7.4	5.5	6.0	6.3	6.2
4.	Raj 4083 (C)	02	5.9	5.4	7.6	6.3	7.2	5.7	6.3	6.4	6.4
5.	HD 2864 (C)	03	6.1	5.1	7.7	6.3	7.3	5.9	6.2	6.5	6.4
6.	MP 3336 (C)	06	6.5	5.5	7.4	6.5	7.4	5.7	6.3	6.5	6.5
Mean			6.1	5.3	7.5	6.3	7.2	5.6	6.2	6.3	6.3

Table 27: Test Weight (kg/hl) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean	
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	76.7	72.4	79.7	76.3	80.6	76.3	78.0	78.3	77.3
2.	HD 3209 (C)	04	77.0	71.4	80.7	76.4	80.6	76.3	77.0	78.0	77.2
3.	HD 2932 (C)	01	77.2	70.4	78.6	75.4	80.6	77.5	79.2	79.1	77.3
4.	Raj 4083 (C)	02	78.4	73.0	80.0	77.1	81.0	78.1	83.1	80.7	78.9
5.	HD 2864 (C)	03	79.0	75.6	81.7	78.8	83.0	79.5	78.5	80.3	79.6
6.	MP 3336 (C)	06	79.0	74.3	81.0	78.1	81.3	76.7	79.4	79.1	78.6
Mean			77.9	72.9	80.3	77.0	81.2	77.4	79.2	79.3	78.1

Table 28: Protein Content (%) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean	
Irrigated Timely Sown											
1.	HD2932 + Lr19/Sr25	05	13.1	13.7	11.9	12.9	13.5	14.8	12.4	13.6	13.2
2.	HD 3209 (C)	04	12.3	14.2	10.9	12.4	12.8	15.3	12.9	13.7	13.1
3.	HD 2932 (C)	01	12.4	14.4	11.5	12.8	13.2	15.6	12.9	13.9	13.3
4.	Raj 4083 (C)	02	12.7	13.9	10.9	12.5	12.2	13.0	12.6	12.6	12.5
5.	HD 2864 (C)	03	12.1	13.5	11.3	12.3	12.4	13.1	12.4	12.6	12.4
6.	MP 3336 (C)	06	12.5	14.0	11.8	12.8	12.8	14.7	12.9	13.5	13.1
Mean			12.5	13.9	11.4	12.6	12.8	14.4	12.7	13.3	13.0

Table 29: Sedimentation Value (ml) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean	
Irrigated Timely Sown											
1.	HD2932 + Lr19/Sr25	05	43	42	46	44	43	50	46	46	45
2.	HD 3209 (C)	04	47	46	42	45	46	47	46	46	46
3.	HD 2932 (C)	01	46	45	43	45	48	53	48	50	47
4.	Raj 4083 (C)	02	45	49	44	46	47	48	46	47	47
5.	HD 2864 (C)	03	41	45	40	42	45	45	43	44	43
6.	MP 3336 (C)	06	38	40	37	38	47	40	37	41	40
Mean			43	45	42	43	46	47	44	46	45

Table 30: Grain Hardness Index of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean	
Irrigated Timely Sown											
1. HD2932 + Lr19/Sr25	05	65	67	71	68	68	77	69	58	68	68
2. HD 3209 (C)	04	63	66	69	66	66	77	76	64	72	69
3. HD 2932 (C)	01	74	68	72	71	71	80	77	64	74	73
4. Raj 4083 (C)	02	82	68	75	75	75	82	76	69	76	75
5. HD 2864 (C)	03	81	66	77	75	75	84	82	66	77	76
6. MP 3336 (C)	06	65	65	71	67	67	79	75	70	75	71
Mean			72	67	73	70	80	76	65	74	72

Table 31: Moisture Content (%) of *T.aestivum* in Special Trial (MABB/NIL Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean	
Irrigated Timely Sown											
1. HD2932 + Lr19/Sr25	05	8.8	8.0	9.5	8.8	8.8	9.3	11.1	11.3	10.6	9.7
2. HD 3209 (C)	04	10.3	8.1	9.8	9.4	9.4	9.3	11.3	10.4	10.3	9.9
3. HD 2932 (C)	01	8.6	7.4	10.0	8.7	8.7	9.2	11.5	10.5	10.4	9.5
4. Raj 4083 (C)	02	10.3	8.8	9.8	9.6	9.6	9.7	11.0	10.9	10.5	10.1
5. HD 2864 (C)	03	9.3	8.5	9.6	9.1	9.1	9.5	11.1	10.7	10.4	9.8
6. MP 3336 (C)	06	9.8	8.5	10.3	9.5	9.5	9.6	11.0	10.7	10.4	10.0
Mean			9.5	8.2	9.8	9.2	9.4	11.2	10.8	10.5	9.8

Table 32: Grain Appearance (Max-10) of *T.aestivum* in Special Trial-NIL (KB) in NWPZ

Sr. No.	Variety	Code	Ludhiana	Pantnagar	Dhaulakuan	Mean
Irrigated Timely Sown						
1.	KB 2012-03	03	5.4	5.9	5.5	5.6
2.	DWR-NIL-01	01	4.9	6.0	5.4	5.4
3.	DWR-NIL-02	04	5.0	6.0	5.1	5.4
4.	PBW 343 (C)	08	5.3	5.9	5.2	5.5
5.	WH 542 (C)	05	5.4	6.1	5.1	5.5
6.	HD 2967 (C)	06	6.0	6.2	5.2	5.8
7.	DPW 621-50 (C)	02	6.0	6.3	5.2	5.8
8.	WH 1105 (C)	07	6.1	6.3	5.3	5.9
Mean			5.5	6.1	5.3	5.6

Table 33: Test Weight (kg/ha) of *T.aestivum* in Special Trial-NIL (KB) in NWPZ

Sr. No.	Variety	Code	Ludhiana	Pantnagar	Dhaulakuan	Mean
Irrigated Timely Sown						
1.	KB 2012-03	03	73.2	75.2	75.0	74.5
2.	DWR-NIL-01	01	65.0	74.0	75.0	71.3
3.	DWR-NIL-02	04	74.8	70.0	72.0	72.3
4.	PBW 343 (C)	08	69.5	73.6	72.0	71.7
5.	WH 542 (C)	05	75.4	76.5	72.5	74.8
6.	HD 2967 (C)	06	75.2	78.2	72.5	75.3
7.	DPW 621-50 (C)	02	76.5	79.5	74.0	76.7
8.	WH 1105 (C)	07	77.2	78.0	74.5	76.6
Mean			73.4	75.6	73.4	74.1

Table 34: Protein Content (%) of *T.aestivum* in Special Trial-NIL (KB) in NWPZ

Sr. No.	Variety	Code	Ludhiana	Pantnagar	Dhaulakuan	Mean
Irrigated Timely Sown						
1.	KB 2012-03	03	12.3	10.0	11.1	11.1
2.	DWR-NIL-01	01	12.5	9.5	10.4	10.8
3.	DWR-NIL-02	04	12.3	9.3	10.6	10.7
4.	PBW 343 (C)	08	12.3	9.1	10.8	10.7
5.	WH 542 (C)	05	12.2	10.1	10.8	11.0
6.	HD 2967 (C)	06	12.3	9.0	11.6	10.9
7.	DPW 621-50 (C)	02	12.5	9.9	11.4	11.3
8.	WH 1105 (C)	07	12.2	9.8	10.7	10.9
Mean			12.3	9.6	10.9	10.9

Table 35: Sedimentation Value (ml) of *T.aestivum* in Special Trial-NIL (KB) in NWPZ

Sr. No.	Variety	Code	Ludhiana	Pantnagar	Dhaulakuan	Mean
Irrigated Timely Sown						
1.	KB 2012-03	03	42	46	38	42
2.	DWR-NIL-01	01	34	36	41	37
3.	DWR-NIL-02	04	41	40	36	39
4.	PBW 343 (C)	08	37	40	38	38
5.	WH 542 (C)	05	39	40	35	38
6.	HD 2967 (C)	06	56	64	60	60
7.	DPW 621-50 (C)	02	54	56	50	53
8.	WH 1105 (C)	07	60	63	54	59
Mean			45	48	44	46

Table 36: Moisture Content (%) of *T.aestivum* in Special Trial-NIL (KB) in NWPZ

Sr. No.	Variety	Code	Ludhiana	Pantnagar	Dhaulakuan	Mean
Irrigated Timely Sown						
1.	KB 2012-03	03	10.4	11.1	12.5	11.3
2.	DWR-NIL-01	01	10.5	11.4	12.4	11.4
3.	DWR-NIL-02	04	11.1	11.2	12.3	11.5
4.	PBW 343 (C)	08	10.5	11.2	12.4	11.4
5.	WH 542 (C)	05	10.2	11.0	12.6	11.3
6.	HD 2967 (C)	06	10.4	11.1	12.5	11.3
7.	DPW 621-50 (C)	02	10.6	11.4	12.6	11.5
8.	WH 1105 (C)	07	10.3	11.2	12.6	11.4
Mean			10.5	11.2	12.5	11.4

(IX) Wheat Bio-fortification Trial (Table 37-44)

Thirteen entries and four checks were received from five centres (Ludhiana, Durgapura, Delhi, Hisar &, Karnal,) of NWPZ, one centre (Kanpur) of NEPZ, two centres (Indore & Vijapur) of CZ and two centres (Pune & Niphad) of PZ. These were analysed for processing quality parameters like grain appearance score, test weight, protein content, sedimentation value, grain hardness index and moisture content. These were also analysed for nutritional quality parameters like iron content and zinc content.

All the entries recorded >6.0 grain appearance score but the entry, WB-1 had an edge over the best check, K 0307 (6.7) and the overall mean was 6.5. The highest mean score (7.0) was exhibited at Pune centre. Two entries, WB-1 & MCAS 6507 had higher test weight compared to the best check, MACS 6222 (78.9 kg/hl) and the overall mean was 78.6 kg/hl. The Vijapur centre exhibited the highest mean value 80.8 kg/hl test weight. In protein content, four entries recorded >12.0 % and were found better than the best check, DPW 621-50 (11.8 %) and the overall mean was 11.9 %. The highest mean content of 13.5 % was observed at Durgapura centre. All the entries except two recorded >50 ml sedimentation value and the overall mean was 52 ml. There was not much variation in the mean various at different centers. None of the entry could beat the best check, MACS 6222 (77) in grain hardness index. The highest mean index of 83 was recorded at Vijapur centre and the overall mean was 72. All the entries in all the zones had <12.0 % moisture content. Two entries, HPBW 07 and WB-1 had >40 ppm iron content and were found comparable to the best check, K 0307 (40.1 ppm). The highest mean value of 44.7 ppm iron content was recorded at Indore centre and the overall mean was 38.9 ppm. Six out of a total of thirteen entries recorded >40.0 ppm zinc content and were found comparable to the best check, K 0307 (41.6 ppm). Hisar centre exhibited the highest mean content of 45.9 ppm and the overall mean was 40.6 ppm.

Table 37: Grain Appearance (Max-10) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ		Overall Mean		
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Kanpur	Indore	Vijapur	Mean	Pune	Niphad		
1. HPBW01	01	6.2	6.6	5.9	6.4	6.1	6.2	6.4	6.8	6.9	6.7	6.9	6.9	6.9	6.5	
2. HPBW02	06	6.4	7.2	5.6	6.3	6.1	6.3	6.7	6.4	7.2	6.8	6.8	6.3	6.6	6.5	
3. HPBW05	04	6.1	6.6	6.1	6.3	6.0	6.2	6.4	6.4	6.8	6.6	6.6	6.8	7.0	6.9	6.5
4. HPBW 07	02	6.3	6.4	6.0	6.2	6.2	6.2	6.5	6.3	6.7	6.5	6.6	6.7	6.7	6.4	
5. HPBW 08	11	5.8	6.7	6.1	6.2	6.0	6.2	7.0	6.7	6.9	6.9	7.4	6.4	6.9	6.5	
6. HPBW 09	13	6.3	6.9	6.6	6.4	5.8	6.4	7.0	6.4	6.9	6.8	7.0	7.3	7.2	6.7	
7. HUW695	09	6.5	6.8	5.8	6.3	6.1	6.3	6.6	6.7	6.6	6.6	7.4	6.6	7.0	6.5	
8. HUW 711	17	6.1	6.3	6.4	6.4	5.7	6.2	7.1	6.6	6.8	6.8	7.3	6.7	7.0	6.5	
9. HUW 712	12	6.4	6.8	6.2	6.2	6.1	6.3	6.9	6.8	7.3	7.0	7.2	6.1	6.7	6.6	
10. WB 1	10	6.3	7.2	6.5	6.4	6.3	6.5	7.2	7.2	7.2	7.2	7.3	6.7	7.0	6.8	
11. WB 2	08	6.5	6.7	6.0	6.3	6.0	6.3	6.7	6.7	6.5	6.6	6.5	6.5	6.5	6.4	
12. WB 5	16	5.8	6.0	6.2	6.3	5.6	6.0	6.8	6.4	7.4	6.9	6.8	6.3	6.6	6.4	
13. MACS 6507	05	6.5	7.3	6.4	6.4	6.2	6.6	6.6	6.5	7.3	6.8	7.2	6.5	6.9	6.7	
14. DPW 621-50 (C)	07	6.3	6.5	6.2	6.2	6.2	6.3	6.8	6.5	6.6	6.6	6.6	6.6	6.6	6.5	
15. K 0307 (C)	03	6.2	6.8	6.3	6.5	6.2	6.4	6.8	6.6	6.8	6.7	7.4	6.6	7.0	6.6	
16. GW 322 (C)	14	6.5	6.2	6.2	6.1	5.9	6.2	6.7	6.2	6.4	6.4	7.3	6.5	6.9	6.4	
17. MACS 6222 (C)	15	6.4	6.4	6.6	6.5	5.9	6.4	7.2	6.7	6.6	6.8	7.2	6.8	7.0	6.6	
Mean		6.3	6.7	6.2	6.3	6.0	6.3	6.8	6.6	6.9	6.8	7.0	6.6	6.8	6.5	

Table 38: Test Weight (kg/ha) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ		Overall Mean	
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Kanpur	Indore	Vijapur	Mean	Pune	Niphad	
1. HPBW01	01	74.4	80.6	80.0	77.6	77.0	77.9	77.0	78.0	80.2	78.4	80.0	80.0	80.0	78.5
2. HPBW02	06	77.7	80.6	80.0	78.0	77.6	78.8	78.7	78.0	80.0	78.9	80.0	78.2	79.1	78.9
3. HPBW05	04	74.3	79.2	80.0	78.3	77.0	77.8	76.3	80.0	79.9	78.7	79.7	81.0	80.4	78.6
4. HPBW 07	02	77.7	79.5	79.5	77.0	77.0	78.1	74.2	75.0	79.8	76.3	77.0	78.6	77.8	77.5
5. HPBW 08	11	76.3	79.0	78.5	78.5	78.0	78.1	78.0	77.3	81.6	79.0	80.6	80.0	80.3	78.8
6. HPBW 09	13	77.2	78.0	78.0	78.7	79.0	78.2	77.5	77.0	80.5	78.3	80.0	81.3	80.7	78.7
7. HUW695	09	77.5	80.5	77.0	78.0	76.5	77.9	75.0	78.4	81.8	78.4	80.3	81.0	80.7	78.6
8. HUW 711	17	74.4	79.3	77.5	79.5	77.0	77.5	77.0	78.0	81.6	78.9	81.0	81.0	81.0	78.6
9. HUW 712	12	77.2	80.7	79.0	77.5	76.3	78.1	75.1	77.5	80.6	77.7	80.4	79.0	79.7	78.3
10. WB 1	10	78.1	81.6	79.5	79.4	79.0	79.5	78.4	79.5	80.8	79.6	81.0	79.6	80.3	79.7
11. WB 2	08	78.5	79.5	78.5	78.4	78.4	78.7	75.6	78.5	79.6	77.9	80.0	80.3	80.2	78.7
12. WB 5	16	73.0	78.5	78.5	75.6	73.0	75.7	75.4	76.0	79.9	77.1	78.3	80.0	79.2	76.8
13. MACS 6507	05	77.8	80.1	78.0	77.5	79.6	78.6	77.7	79.0	80.7	79.1	80.0	80.0	80.0	79.0
14. DPW 621-50 (C)	07	74.7	80.0	77.5	76.5	77.4	77.2	78.1	76.5	80.0	78.2	80.6	82.0	81.3	78.3
15. K 0307 (C)	03	76.1	80.3	77.0	78.0	78.6	78.0	77.7	76.5	81.3	78.5	80.0	80.3	80.2	78.6
16. GW 322 (C)	14	76.7	77.0	78.5	74.5	76.0	76.5	72.5	77.0	80.8	76.8	80.5	79.0	79.8	77.3
17. MACS 6222 (C)	15	76.1	81.0	78.0	79.5	76.7	78.3	77.8	78.4	80.4	78.9	81.0	79.5	80.3	78.8
Mean		76.3	79.7	78.5	77.8	77.3	77.9	76.6	77.7	80.6	78.3	80.0	80.0	80.0	78.5

Table 39: Protein Content (%) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ			Overall Mean
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Indore	Vijapur	Mean	Pune	Niphad	Mean	
1. HPBW01	01	11.5	14.4	13.5	13.7	11.0	12.8	12.1	10.8	12.3	11.7	12.5	12.1	12.3	12.4
2. HPBW02	06	10.5	11.5	13.3	10.5	9.8	11.1	10.3	10.8	11.8	11.0	11.3	12.6	11.9	11.2
3. HPBW05	04	11.8	12.7	14.2	13.1	9.9	12.3	10.5	10.4	12.0	11.0	11.1	11.5	11.3	11.7
4. HPBW 07	02	12.7	14.3	14.2	14.0	9.3	12.9	10.9	11.6	13.2	11.9	13.4	12.5	12.9	12.6
5. HPBW 08	11	11.4	12.9	14.5	13.2	9.6	12.3	11.5	10.1	11.3	11.0	11.9	10.4	11.2	11.7
6. HPBW 09	13	12.6	14.2	12.9	13.8	10.6	12.8	11.2	11.4	13.1	11.9	11.2	12.1	11.7	12.3
7. HUW695	09	10.1	13.8	14.2	13.3	10.0	12.3	11.4	10.5	12.5	11.5	12.1	11.9	12.0	12.0
8. HUW 711	17	12.3	14.5	13.2	13.2	10.0	12.6	11.2	10.2	12.6	11.4	11.5	11.8	11.6	12.0
9. HUW 712	12	10.9	13.2	14.5	13.4	10.6	12.5	10.1	10.6	12.2	11.0	11.5	10.8	11.1	11.8
10. WB 1	10	11.8	13.1	14.2	12.6	10.4	12.4	12.1	10.2	13.6	12.0	11.4	11.4	11.4	12.1
11. WB 2	08	10.8	13.9	12.3	12.3	9.8	11.8	10.7	10.7	12.9	11.4	10.0	10.8	10.4	11.4
12. WB 5	16	13.5	13.9	13.3	12.9	11.4	13.0	11.4	10.3	12.5	11.4	10.8	10.3	10.5	12.0
13. MACS 6507	05	12.3	13.5	12.1	14.1	9.8	12.3	12.1	11.1	13.3	12.2	12.7	11.8	12.2	12.3
14. DPW 621-50 (C)	07	12.9	13.2	14.0	12.8	10.9	12.7	11.4	10.7	13.0	11.7	11.4	10.5	10.9	12.1
15. K 0307 (C)	03	11.3	13.9	14.1	12.0	9.7	12.2	11.3	9.9	11.2	10.8	10.6	11.9	11.3	11.6
16. GW 322 (C)	14	10.9	12.4	12.4	11.3	9.3	11.3	10.1	10.6	10.6	10.4	12.0	11.9	11.9	11.1
17. MACS 6222 (C)	15	11.9	14.3	13.4	11.8	10.2	12.3	11.1	10.2	11.9	11.1	11.1	11.0	11.0	11.7
Mean		11.7	13.5	0.0	12.8	10.2	12.3	11.1	10.6	12.4	11.4	11.6	11.5	11.5	11.9

Table 40: Grain Hardness Index of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ			Overall Mean
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Kanpur	Indore	Vijapur	Mean	Pune	Niphad	
1. HPBW01	01	71	67	66	62	46	62	61	63	70	65	72	78	75	66
2. HPBW02	06	62	63	75	54	53	61	62	63	78	68	76	87	82	67
3. HPBW05	04	66	73	62	68	58	65	76	65	86	76	76	76	76	71
4. HPBW 07	02	74	64	60	63	67	66	79	69	82	77	72	77	75	71
5. HPBW 08	11	74	88	67	77	68	75	81	71	85	79	88	70	79	77
6. HPBW 09	13	76	76	55	73	82	72	86	68	87	80	85	81	83	77
7. HUW695	09	60	66	64	62	52	61	72	67	80	73	71	81	76	68
8. HUW 711	17	74	69	59	64	58	65	74	63	84	74	83	73	78	70
9. HUW 712	12	62	65	64	58	46	59	69	66	74	70	73	81	77	66
10. WB 1	10	69	71	62	66	59	65	75	70	83	76	76	69	73	70
11. WB 2	08	67	72	68	64	59	66	76	74	84	78	80	80	80	72
12. WB 5	16	76	74	61	74	67	70	80	67	92	80	85	77	81	75
13. MACS 6507	05	72	76	59	65	59	66	70	64	82	72	74	74	74	70
14. DPW 621-50 (C)	07	84	72	66	71	69	72	83	68	87	79	78	86	82	76
15. K 0307 (C)	03	76	74	66	71	73	72	74	68	88	77	82	90	86	76
16. GW 322 (C)	14	70	82	55	70	56	67	73	64	85	74	76	70	73	70
17. MACS 6222 (C)	15	81	76	72	75	66	74	85	72	89	82	86	67	77	77
Mean		71	72	64	67	61	67	75	67	83	75	78	77	78	72

Table 41: Sedimentation Value (ml) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ		Overall Mean	
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Indore	Vijapur	Mean	Pune	Niphad		
1. HPBW01	01	56	64	50	53	60	57	56	53	56	55	56	47	52	55
2. HPBW02	06	56	64	62	60	61	61	59	56	55	57	59	49	54	58
3. HPBW05	04	56	62	50	62	60	58	49	52	60	54	57	54	56	56
4. HPBW 07	02	51	60	58	60	59	58	50	53	55	53	54	52	53	55
5. HPBW 08	11	62	65	60	64	60	62	62	55	54	57	64	58	61	60
6. HPBW 09	13	45	43	54	42	42	45	50	39	41	43	50	46	48	45
7. HUW695	09	55	60	58	64	56	59	55	52	55	54	57	54	56	57
8. HUW 711	17	55	60	54	58	61	58	60	59	64	61	58	49	54	58
9. HUW 712	12	54	60	56	62	59	58	53	57	51	54	61	49	55	56
10. WB 1	10	56	54	49	62	57	56	57	56	53	55	60	57	59	56
11. WB 2	08	54	63	57	63	54	58	57	49	53	53	58	49	54	56
12. WB 5	16	45	47	54	45	58	50	46	41	45	44	41	51	46	47
13. MACS 6507	05	48	52	59	50	56	53	56	49	59	55	54	55	55	54
14. DPW 621-50 (C)	07	55	55	49	60	58	55	60	51	51	54	53	49	51	54
15. K 0307 (C)	03	36	38	37	36	38	37	44	36	39	40	34	43	39	38
16. GW 322 (C)	14	34	42	40	37	37	38	42	41	37	40	38	44	41	39
17. MACS 6222 (C)	15	36	39	42	36	39	38	41	33	36	37	38	42	40	38
Mean		50	55	52	54	54	53	53	49	51	51	52	50	51	52

Table 42: Moisture Content (%) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ		Overall Mean	
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Kanpur	Indore	Vijapur	Mean	Pune	Niphad	
1. HPBW01	01	9.8	8.1	8.5	9.6	10.4	9.3	10.9	10.1	10.0	10.3	10.4	10.9	10.7	9.9
2. HPBW02	06	9.3	8.0	8.9	9.1	10.0	9.1	11.0	9.5	10.0	10.2	10.3	10.8	10.6	9.7
3. HPBW05	04	9.9	8.7	8.1	9.7	11.0	9.5	11.0	9.3	10.4	10.2	10.3	10.7	10.5	9.9
4. HPBW 07	02	10.1	8.7	8.5	9.4	11.0	9.5	11.3	10.3	10.1	10.6	10.4	10.4	10.4	10.0
5. HPBW 08	11	9.9	8.6	8.6	9.5	10.1	9.3	11.1	9.5	10.1	10.2	10.5	11.0	10.8	9.9
6. HPBW 09	13	10.0	8.9	8.2	9.8	10.9	9.6	11.2	9.3	10.0	10.2	10.1	10.8	10.5	9.9
7. HUW695	09	9.6	8.5	8.4	9.6	10.7	9.4	11.0	9.1	9.8	10.0	10.7	10.9	10.8	9.8
8. HUW 711	17	9.9	8.7	8.5	9.3	10.4	9.4	11.1	9.5	9.8	10.1	10.5	10.8	10.7	9.9
9. HUW 712	12	9.6	8.2	8.7	9.8	10.1	9.3	11.0	9.1	10.0	10.0	10.8	10.3	10.6	9.8
10. WB 1	10	9.8	8.7	8.7	9.2	10.1	9.3	11.0	8.9	10.0	10.0	10.8	10.6	10.7	9.8
11. WB 2	08	9.6	8.7	9.4	9.2	10.1	9.4	11.0	8.9	10.5	10.1	10.3	10.1	10.2	9.8
12. WB 5	16	9.8	8.5	8.3	9.0	10.3	9.2	11.1	10.7	10.1	10.6	10.0	10.8	10.4	9.9
13. MACS 6507	05	9.9	8.2	8.4	9.1	10.6	9.2	10.9	9.2	9.8	10.0	10.8	10.7	10.8	9.8
14. DPW 621-50 (C)	07	10.1	8.6	8.8	9.3	10.4	9.4	11.2	9.4	10.1	10.2	11.3	10.4	10.9	10.0
15. K 0307 (C)	03	9.7	8.9	8.1	9.3	10.6	9.3	10.9	10.0	10.1	10.3	10.7	10.4	10.6	9.9
16. GW 322 (C)	14	9.8	8.2	8.3	9.3	10.7	9.3	11.1	9.7	11.5	10.8	9.9	10.6	10.3	9.9
17. MACS 6222 (C)	15	9.8	8.3	8.6	9.0	10.3	9.2	11.1	9.2	11.9	10.7	9.8	10.7	10.3	9.9
Mean		9.8	8.5	8.5	9.4	10.5	9.3	11.1	9.5	10.2	10.3	10.4	10.6	10.5	9.9

Table 43: Iron Content (ppm) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ			Overall Mean
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Kanpur	Indore	Vijapur	Mean	Pune	Niphad	
1. HPBW01	01	37.4	38.2	47.0	36.4	34.7	38.7	38.1	46.2	32.6	39.0	42.2	42.3	42.3	39.5
2. HPBW02	06	31.1	40.3	41.6	35.7	38.1	37.4	34.9	46.2	36.1	39.1	39.3	43.9	41.6	38.7
3. HPBW05	04	32.4	32.2	42.8	40.5	37.4	37.1	35.1	46.7	33.5	38.4	37.8	40.2	39.0	37.9
4. HPBW 07	02	39.5	38.8	41.3	35.5	41.2	39.3	40.8	47.6	32.3	40.2	40.9	45.5	43.2	40.3
5. HPBW 08	11	31.5	32.3	42.4	37.4	39.3	36.6	39.5	41.0	31.5	37.3	36.9	42.4	39.7	37.4
6. HPBW 09	13	31.2	38.0	44.2	35.8	39.9	37.8	42.3	42.0	32.3	38.9	35.8	47.3	41.6	38.9
7. HUW695	09	32.4	37.0	41.4	33.2	39.6	36.7	37.2	46.9	34.0	39.4	38.4	45.9	42.2	38.6
8. HUW 711	17	35.2	40.8	44.4	40.0	41.4	40.4	36.9	45.0	36.9	39.6	37.5	43.9	40.7	40.2
9. HUW 712	12	32.2	35.5	48.9	36.2	40.6	38.7	38.5	44.7	33.1	38.8	41.1	45.8	43.5	39.7
10. WB 1	10	33.9	38.9	42.5	34.5	38.5	37.7	47.4	43.9	37.8	43.0	39.7	45.2	42.5	40.2
11. WB 2	08	33.9	40.9	42.1	38.2	40.3	39.1	37.7	45.3	36.1	39.7	35.2	42.3	38.8	39.2
12. WB 5	16	42.1	37.0	45.4	32.8	40.7	39.6	36.8	43.4	34.3	38.2	34.8	47.3	41.1	39.5
13. MACS 6507	05	34.7	30.0	42.4	34.5	39.1	36.1	36.8	42.1	31.6	36.8	36.8	46.5	41.7	37.5
14. DPW 621-50 (C)	07	34.6	39.7	43.6	34.5	41.6	38.8	38.7	41.1	33.1	37.6	33.9	43.8	38.9	38.5
15. K 0307 (C)	03	39.4	42.6	44.5	36.1	37.5	40.0	45.7	43.1	35.1	41.3	39.3	42.2	40.8	40.6
16. GW 322 (C)	14	33.7	32.6	40.5	32.8	39.2	35.8	36.1	48.0	31.2	38.4	33.1	39.3	36.2	36.7
17. MACS 6222 (C)	15	36.9	35.9	42.8	36.8	40.9	38.7	39.4	46.4	33.4	39.7	35.7	39.4	37.6	38.8
Mean		34.8	37.1	43.4	35.9	39.4	38.1	38.9	44.7	33.8	39.1	37.6	43.7	40.6	38.9

Table 44: Zinc Content (ppm) of *T.aestivum* in Special Trial (Wheat Bio-fortification Trial)

Sr. No.	Variety	Code	NWPZ					NEPZ	C Z			PZ			Overall Mean
			Ludhiana	Durgapura	Delhi	Hisar	Karnal		Kanpur	Indore	Vijapur	Mean	Pune	Niphad	
1. HPBW01	01	46.9	44.0	54.2	46.5	28.7	44.1	36.8	46.2	34.8	39.3	37.8	32.8	35.3	40.9
2. HPBW02	06	44.9	47.4	53.2	47.9	32.7	45.2	39.2	46.2	43.0	42.8	37.3	32.6	35.0	42.4
3. HPBW05	04	39.1	37.1	44.1	41.7	31.2	38.6	32.5	46.7	40.7	40.0	35.4	31.1	33.3	38.0
4. HPBW 07	02	35.4	45.0	46.6	44.7	29.5	40.2	38.3	47.6	37.4	41.1	35.5	32.1	33.8	39.2
5. HPBW 08	11	39.2	43.9	52.9	47.6	33.5	43.4	42.0	41.0	34.5	39.2	32.4	32.1	32.3	39.9
6. HPBW 09	13	47.5	56.4	48.4	44.6	33.2	46.0	36.7	42.0	45.4	41.4	39.2	33.4	36.3	42.7
7. HUW695	09	44.4	45.8	46.5	41.9	32.7	42.3	39.0	46.9	39.5	41.8	34.3	35.3	34.8	40.6
8. HUW 711	17	47.4	46.4	50.4	44.1	30.0	43.7	38.9	45.0	42.1	42.0	35.7	29.2	32.5	40.9
9. HUW 712	12	44.8	42.4	53.5	52.9	30.6	44.8	42.0	44.7	38.7	41.8	37.1	30.6	33.9	41.7
10. WB 1	10	49.2	48.9	52.8	55.7	35.2	48.4	46.8	43.9	43.3	44.7	37.5	28.6	33.1	44.2
11. WB 2	08	43.8	42.1	50.0	41.7	35.5	42.6	38.7	45.3	43.4	42.5	32.6	30.0	31.3	40.3
12. WB 5	16	51.9	43.8	51.6	41.0	33.2	44.3	41.5	43.4	42.6	42.5	36.2	31.5	33.9	41.7
13. MACS 6507	05	30.8	29.7	50.6	43.7	32.1	37.4	35.7	42.1	35.1	37.6	31.9	29.8	30.9	36.2
14. DPW 621-50 (C)	07	35.4	42.1	47.6	48.8	33.6	41.5	31.7	41.1	34.0	35.6	29.3	30.6	30.0	37.4
15. K 0307 (C)	03	49.1	54.6	48.6	48.4	33.2	46.8	42.9	43.1	37.9	41.3	35.8	29.2	32.5	42.3
16. GW 322 (C)	14	50.5	39.4	51.8	38.8	33.4	42.8	37.0	48.0	39.9	41.6	32.1	29.5	30.8	40.0
17. MACS 6222 (C)	15	41.0	48.5	56.6	50.0	32.9	45.8	39.2	46.4	36.8	40.8	35.0	28.5	31.8	41.5
Mean		43.6	44.6	50.6	45.9	32.4	43.4	38.8	44.7	39.4	40.9	35.0	31.0	33.0	40.6

SECTION D

NURSERIES

- i. **Quality Component Screening Nursery (QCSN)**
- ii. **National Wheat Nurseries**
 - **NGSN**
 - **EIGN - I**
 - **NDSN**

Quality Component Screening Nursery

The nursery constituted to select useful donors for quality improvement through multi-location testing was planted at 12 locations namely Almora, New Delhi, Ludhiana, Karnal, Pantnagar, Durgapura, Kanpur, Pusa, Vijapur, Junagarh, Pune and Dharwad. In total, there were 52 genotypes under testing and Karnal contributed 48% of it (25 entries). Comparison was made against the checks HI 977, UP 2672, and PDW 233 (durum). Field conduct was satisfactory at all test sites. Yield levels were high at Gujarat locations of Vijapur & Junagarh, and poorest at Kanpur (Table 1). Samples were not received from Pusa centre; therefore this location was excluded in pooled analysis.

Table 1: Overall field performance at test sites

Location	Plot size (m ²)	Sowing date	Grain yield (g/m ²)	Height (cm)	Heading (days)	1000 grain weight (g)
Almora	3.75	Nov 15	345	107	121	44.4
New Delhi	3.75	Nov 23	319	92	93	43.0
Ludhiana	3.75	Nov 23	276	97	102	39.1
Karnal	3.60	Nov 16	399	99	97	43.7
Pantnagar	2.50	Nov 25	347	91	83	40.8
Durgapura	3.75	Nov 15	262	93	83	47.7
Kanpur	3.75	-	119	85	62	40.7
Vijapur	2.50	Nov 13	439	97	68	40.9
Junagarh	2.00	Nov 30	476	81	59	39.4
Pune	4.50	Nov 23	372	93	64	42.9
Dharwad	2.00	Nov 10	314	73	60	43.7

Six parameters were examined in the quality analysis i.e. protein content derived at 14% grain moisture, protein yield, test weight, sedimentation value, grain hardness index and grain appearance score (Table 2). Test weight was high at Vijapur and Pune, and low at Ludhiana, Pantnagar and Kanpur. Grain protein content was highest at Junagarh, New Delhi and Durgapura, and lowest at Almora. Protein yield was highest at Junagarh and lowest at Kanpur. Pune topped in sedimentation value and Durgapura trailed in gluten strength. Vijapur and Durgapura had an edge in grain hardness index whereas Dharwad trailed in this attribute. There were not wide differences in grain appearance score and it was generally high in the central-peninsular India.

Table 2: Overall quality characteristics at test sites

Locations	Test wt. (kg/ha)	Protein (%)	Protein yield (g/m ²)	Sedimentation value (ml)	Hardness Index	Grain look (score)
Almora	79.0	11.0	37.8	43	66	6.1
New Delhi	79.6	13.2	42.1	42	69	6.1
Ludhiana	76.6	12.7	35.1	45	64	6.0
Karnal	77.4	12.8	50.9	43	61	5.9
Pantnagar	77.0	12.1	42.1	44	64	6.0
Durgapura	79.2	13.0	34.4	40	73	6.3
Kanpur	77.1	12.1	15.6	44	65	6.0
Vijapur	80.3	12.7	55.7	43	76	6.3
Junagarh	78.1	13.2	62.7	45	69	6.3
Pune	80.2	12.8	57.7	47	71	6.3
Dharwad	77.6	12.5	49.1	45	58	6.0

Genetic superiority: Statistical analysis was done for each trait taking into account locations as replications. Classified information on promising genotypes (Table 3) and the overall performance all test entries is given in Table 4.

Sedimentation value: Range of sedimentation volume was quite large (16-60ml) and it was generally low in *durum* entries. In comparison to the best checks HI 977 (C) and BW 5872(I); two new entries i.e. QLD 76 and QLD 78 also registered matching values of sedimentation value i.e. 59-60ml.

Grain protein content: Test entries registered wide range in protein content (11.1 to 13.4%). There were 13 genotypes had GPC ≥13.5%. The top seven among them were BWL numbers 1660, 1661, 1662, 1663, 1664 and QLD 46 & 54. GPC in the best check QLD 11 was 13.0%.

Test weight: Range in test weight was 75.3 to 80.5 kg/ha. Entries with test weight ≥80kg/ha included three durum (GW 2013-513, QBPQ 02, GW 2012-454) and two bread wheat (QLD 70, QLD 51) entries. Test weight in the best check PDW 233 (d) was 79.2kg/ha.

Table 3: Promising genotypes for individual quality trait

Component	Range	Genotypes
Protein content (%)	13.2-13.4	BWL 1660, BWL 1661, BWL 1663, BWL 1664, QLD 46
Protein yield (g/m ²)	50-54	BWL 1661, BWL 1662, QLD 46, QLD 65, QLD 73
Sedimentation (ml)	58-60	QLD 78, QLD 76, HI 9777 (C), BW 5872 (I)
Grain hardness index	85-89	GW 2013-503, GW 2012-454, GW 2010-305, DBPQ 02, PDW 233 (C,D)
	17-25	QLD 73, QBP 12-8, QBP 12-11, QBP 13-11, QLD 49
Test weight (kg/ml)	80-81	GW 2013-513, QBPQ 02, QLD 70, QLD 51, QLD 46, GW 2012-454, QLD 76, QLD 78
1000 grain weight (g)	50-54	DBPQ 03, GW 2012-442, GW 2013-498, GW 2013-499, GW 2013-500, GW 2013-502, GW 2013-503
Grain appearance score	6.4-6.6	GW 2013-503, GW 2013-502, GW 2013-500, DBPQ 02

Grain hardness index: Material had good mix of hard and soft grain texture. Genotypes with highest grain hardness index were GW 2013-503, GW 2012-454, GW 2010-305, DBPQ 02, PDW 233 (C). Three genotypes of IARI (QBP 12-8, 12-11, 13-11) and two from Karnal (QLD 49 and QLD 73) registered soft grain texture (17-25).

Grain appearance score: Three entries of durum wheats i.e. GW 2013-503, GW 2013-502, GW 2013-500; had grain appearance score (6.6-6.7) in comparison to 6.3 score of PDW 233 (C). In bread wheat; best entries (QLD 46, QLD 78) also had matching score i.e. 6.3.

Protein yield: Range in protein yield was large (21 to 55g per m²) and it was highest (50-54 g/m²) in BLD 1662, BLD 1661, QLD 46, QLD 65, QLD 73. Protein yield in the best and QLD 11(I) was 49g/m².

1000 Grain weight: Kernel weight was generally high in durum entries and the best genotypes were DBPQ 03, GW 2012-442, GW 2013-498, GW 2013-502 (51-54mg). In bread wheat category bold grain entries were QLD 46, QLD 67, QLD 73 and QBP 12-8 (45-47mg).

Table 4: Overall performance of the test entries

S. No.	Entries	GPC (%)	Prot (g/m ²)	Yld (g)	TGW (kg/ha)	Test Wt. V. (ml)	Sedim	Hard. index	GAS (score)	Yield (g/m ²)	Height (cm)	Head. (days)
1	BW-5872	12.1	47.7	37.7	77.7	58	77	6.2	385	87	82	
2	DBPQ-02 [D]	12.6	38.5	42.2	80.5	37	93	6.4	303	80	86	
3	GW-2010-305 [D]	12.8	47.9	46.9	75.3	39	93	6.3	375	77	83	
4	GW-2010-389	12.6	31.5	39.2	76.6	55	69	6.1	249	91	80	
5	GW-2012-442 [D]	12.9	36.5	51.8	79.4	25	87	6.3	284	79	81	
6	GW-2012-454 [D]	12.6	47.6	43.9	80.1	31	93	6.2	381	81	85	
7	QBP-12-10	12.8	43.3	38.5	77.6	38	27	5.8	341	91	81	
8	QBP-12-11	12.7	42.7	42.4	76.2	46	25	5.6	336	89	78	
9	QBP-12-8	12.1	37.2	45.8	77.3	45	25	6.0	305	98	82	
10	QBP-13-11	12.7	43.7	41.4	77.1	39	24	5.7	344	92	82	
11	QLD-11[I]	13.0	48.5	38.7	78.9	39	69	5.7	374	90	86	
12	QLD-28 [I]	12.5	36.6	42.7	77.9	37	36	5.8	292	90	85	
13	QLD-31 [I]	13.0	47.0	37.4	77.2	53	71	6.0	361	95	78	
14	QLD-46	13.2	54.0	46.5	79.6	44	58	6.3	412	106	82	
15	QLD-49	12.9	42.4	35.4	77.2	47	17	5.8	329	90	77	
16	QLD-51	12.5	46.1	40.8	80.1	44	70	6.1	370	89	80	
17	QLD-54	13.1	46.1	40.0	76.5	36	30	5.9	352	84	75	
18	QLD-58	12.9	44.8	37.6	79.3	47	76	6.1	349	82	78	
19	QLD-61	12.5	43.9	42.8	79.2	49	69	6.2	350	90	84	
20	QLD-63	12.5	46.2	40.5	78.8	41	70	6.1	368	88	84	
21	QLD-65	12.5	51.5	37.5	78.7	46	82	6.0	412	87	83	
22	QLD-67	12.5	45.5	45.1	78.3	42	29	6.0	365	90	78	
23	QBP-12-9	11.8	45.7	40.1	77.8	35	28	5.6	386	89	84	
24	QBP-13-8	11.5	29.2	44.0	77.2	54	57	6.0	253	93	78	
25	PHS-708	12.6	28.6	38.1	78.1	56	67	5.9	227	95	86	
26	QBP-13-12	12.9	28.4	41.6	78.6	44	37	5.9	220	97	77	
27	QBP-13-13	11.3	20.9	43.5	76.7	56	55	6.1	180	94	80	
28	GW-2013-498 [D]	12.7	37.6	51.5	79.0	29	87	6.3	293	88	81	
29	GW-2013-499 [D]	12.6	42.2	49.2	77.0	16	89	6.2	332	81	84	
30	GW-2013-500 [D]	12.8	44.7	47.7	78.3	22	90	6.6	349	85	81	
31	DBPQ-03 [D]	12.8	40.7	54.3	77.9	31	89	6.3	314	120	87	
32	DBPQ-04 [D]	13.1	36.6	45.8	76.9	37	86	6.4	279	123	85	
33	GW-2013-501 [D]	13.1	37.1	41.7	76.4	37	90	6.0	281	86	81	
34	GW-2013-502 [D]	12.9	32.8	50.9	79.4	34	90	6.6	257	78	77	
35	GW-2013-503 [D]	12.7	40.8	48.7	79.2	26	94	6.7	318	88	81	
36	GW-2013-513	12.2	35.7	43.8	80.5	40	75	6.2	295	84	76	
37	BWL-991	13.0	46.6	40.3	78.6	48	71	6.3	357	111	76	
38	BWL-1660	13.3	45.6	40.4	79.0	50	68	6.3	343	108	72	
39	BWL-1661	13.3	50.8	39.6	78.2	47	68	6.2	381	113	77	
40	BWL-1662	13.1	54.7	40.9	78.2	47	67	6.2	414	120	78	

Cont...

S. No.	Entries	GPC (%)	Prot (g/m ²)	Yld (g)	TGW (kg/ha)	Test Wt. (ml)	Sedim V. (ml)	Hard. index	GAS (score)	Yield (g/m ²)	Height (cm)	Head. (days)
41	BWL-1663	13.4	41.9	39.5	78.4	45	70	6.2	314	119	77	
42	BWL-1664	13.2	46.8	39.1	78.7	47	67	6.2	355	108	71	
43	BWL-1797	12.2	46.5	40.6	79.3	44	77	6.1	379	85	73	
44	QLD-70	12.3	48.7	43.4	80.1	50	71	6.1	393	93	85	
45	QLD-71	13.0	41.8	43.3	79.6	51	70	6.1	321	89	82	
46	QLD-72	11.6	37.1	43.9	78.7	57	70	6.1	316	86	84	
47	QLD-73	12.0	49.7	44.6	77.8	48	25	5.8	414	94	86	
48	QLD-74	12.3	38.4	40.3	77.2	48	60	5.9	314	59	84	
49	QLD-75	11.7	41.7	38.7	78.7	47	74	5.9	362	89	87	
50	QLD-76	11.1	39.5	39.5	79.9	59	76	6.1	355	97	85	
51	QLD-77	12.2	47.0	38.2	79.3	54	79	6.1	379	91	84	
52	QLD-78	12.3	48.5	40.3	79.6	60	59	6.3	393	90	84	
53	HI-977 [C]	12.1	40.5	39.3	78.2	58	73	6.1	333	93	80	
54	UP-2672 [C]	12.7	37.2	43.4	79.1	48	73	6.1	296	89	79	
55	PDW-233 [C, D]	11.9	43.0	40.2	79.2	39	92	6.2	362	86	87	
	Nursery Mean	12.6	42.1	42.4	78.4	44	66	6.1	334	92	81	
	CD 5%	0.8	13.2	3.4	1.7	4	5	0.2	100	10	NS	
	CV (%)	7.2	37.5	9.5	2.6	11.6	9.4	4.7	36.0	13.0	25.7	

Disease incidence: Incidence of yellow rust was reported from Almora and Pantnagar. Reactions upto 40S were reported only from Almora and the entries included test entries UP 2672 (C), QLD 28 (I), QLD 49 (I), BWL 1797 and QLD 74. Brown rust was reported from Almora, Pantnagar, Vijapur and Dharwad and it was not severe in any quarter. Black rust was noticed at Vijapur and 40S reactions were reported in BW 5872 and QLD 75.

Utilization: 38 entries were either used in the crossing programme or retained as genetic resource. Genotypes with highest utilization were BWL 1797, BW 5872, QBP 12-10, QLD 73, GW 2013-523 and QLD 75.

Preliminary evaluation: 66 genotypes were evaluated at Karnal for preliminary screening to find new test entries for multi-location testing in the QCSN and couple of them excelled in various quality components. Entries found suitable for different quality traits are listed in Table 4.

Table 5: Elite material in preliminary screening

Parameter	Criteria	Genotypes
Protein content (%)	>14	UAS 462 (d), GW 2014-568, GW 2014-607 (d), UAS 463 (d), GW 2014-596, GW 2014-603 (d),
Grain Hardness index	>95	GW 2014-591 (d), GW 2014-602 (d), GW 2014-593 (d), AKAW 4225, GW 2014-603 (d),
Sedimentation Value (ml)	>55	HD 3215, HD 3216, HD 3210, GW 2014-615
Test weight (kg/hl)	>80	GW 2014-593 (d), UP 2926, GW 2014-602 (d), AKAW 4224, GW 2014-568 (d), GW 2014-601 (d)
Grain weight (mg)	>55	GW 2014-607 (d), GW 2014-617 (d), PHS 2014-2, PHS 2014-3, PHS 2014-4, PHS 2014-10
Grain appearance	>6.2	UAS 461 (d), GW 2014-602 (d), GW 2014-568 (d), AKAW 4225, GW 2014-586 (d), GW 2014-601 (d)

New genetic stocks: Ten genotypes including one *durum* completed three years of testing in QCSN and their overall performance was judged to identify the new genetic resources. Three genotypes were identified in bread wheat category whereas none qualified in *durum*. QBW 12-9 and QLD 54 were identified for soft grain texture. QBP 12-9, developed by IARI New Delhi, has soft grains (hardness index: 24) with sedimentation value (35ml) and protein content (11.8%) suited for cookie quality. QLD 54 (37th IBWSN 05/ PBW 550) was developed at IIWBR, Karnal and it registered matching grain softness (index: 22) and sedimentation value (38ml) but protein concentration was high (13.3%). Heading in QLD 54 came a week earlier in comparison to other checks and identified genotypes. QLD 58 (25th ESTWYT 24/ PBW 550) expressed good combination of protein (13.1%), hardness (index: 74), test weight (79.8 kg/hl) and grain appearance score (6.0). QLD 58 was also 10cm shorter in height in comparison to other genotypes.

The detailed results are given in Table 6 (grain appearance score), Table 7 (test weight), Table 8 (protein content), Table 9 (sedimentation value), Table 10 (grain hardness index) and Table 11 (moisture content).

Table 6: Grain appearance score (Max-10) of Quality Component Screening Nursery Entries

Sr. No.	QCSN Entries	NHZ		NWPZ			NEPZ		CZ		PZ		Overall Mean	
		Almora	Ludhiana	Durgapura	Delhi	Pantnagar	Karmal	Mean	Kanpur	Junagarh	Vijapur	Pune	Dharwad	
1. BW-5872	6.2	6.0	6.5	6.1	6.2	5.9	6.1	5.8	6.2	6.3	6.3	6.4	6.2	6.3 6.2
2. DBPQ-02	6.4	6.1	6.4	6.6	6.4	6.1	6.3	6.4	7.1	6.5	6.8	6.8	6.1	6.5 6.4
B. UP-2672 (C)	6.3	6.2	6.3	6.1	6.3	6.0	6.2	6.2	6.4	6.2	6.3	6.5	6.0	6.3 6.2
3. GW-2010-305 (C)	6.7	5.8	6.4	6.2	5.9	5.9	6.0	6.2	7.2	6.5	6.9	6.9	5.7	6.3 6.3
4. GW-2010-389	6.4	5.8	6.3	6.0	6.0	5.6	5.9	5.8	6.0	6.4	6.2	6.4	6.0	6.2 6.1
5. GW-2012-442	6.4	6.2	6.3	6.2	6.3	6.0	6.2	6.2	6.6	6.9	6.8	6.5	6.1	6.3 6.3
6. GW-2012-454	5.7	6.0	6.4	6.0	6.1	5.7	6.0	5.7	7.0	6.7	6.9	6.4	6.1	6.3 6.2
7. QBP-12-10	5.6	5.6	5.7	5.8	6.0	5.6	5.7	5.6	5.9	5.8	5.9	6.0	5.7	5.9 5.8
8. QBP-12-11	5.7	5.4	5.9	5.5	5.8	5.3	5.6	5.4	5.8	5.6	5.7	5.9	5.5	5.7 5.6
A. HI-977 (C)	6.4	5.8	6.3	6.3	6.3	5.9	6.1	6.2	6.2	6.4	6.3	6.4	6.0	6.2 6.2
9. QBP-12-8	6.0	5.7	6.0	5.8	6.4	6.0	6.0	5.9	5.9	5.8	5.9	6.2	6.1	6.2 6.0
10. QBP-13-11	5.9	5.4	6.0	5.3	5.7	5.7	5.6	5.5	5.9	5.8	5.9	5.8	5.9	5.9 5.7
11. QLD-11(I)	5.6	5.6	5.8	5.9	5.9	5.7	5.8	5.4	5.6	5.6	5.6	5.7	5.7	5.7 5.7
12. QLD-28 (I)	5.4	5.9	6.2	5.4	5.6	5.8	5.8	5.4	6.0	5.8	5.9	5.8	6.1	6.0 5.8
13. QLD-31 (I)	6.1	5.8	6.4	5.8	6.1	6.0	6.0	6.0	6.1	5.9	6.0	6.3	5.9	6.1 6.0
14. QLD-46	6.4	6.3	6.6	6.2	6.2	6.4	6.3	6.3	6.2	6.1	6.2	6.4	6.1	6.3 6.3
15. QLD-49	5.6	5.9	5.7	5.8	5.9	5.7	5.8	6.0	6.0	5.6	5.8	5.6	5.9	5.8 5.8
C. PDW-233 (C)	5.8	5.7	6.8	6.3	6.0	6.2	6.2	6.3	7.3	5.8	6.6	6.5	5.8	6.2 6.2
16. QLD-51	5.8	6.2	6.4	6.2	5.8	5.8	6.1	6.3	6.2	6.3	6.3	6.5	5.6	6.1 6.1
17. QLD-54	6.1	6.0	6.2	6.0	5.7	5.6	5.9	5.9	5.7	6.1	5.9	6.0	6.1	6.1 5.9
18. QLD-58	6.4	6.1	6.3	6.1	6.1	6.1	6.1	5.7	6.4	6.2	6.3	6.3	5.6	6.0 6.1
19. QLD-61	6.5	6.2	6.5	6.4	6.3	6.2	6.3	6.0	6.3	6.1	6.2	6.1	5.8	6.0 6.2
C. PDW-233 (C)	6.1	5.9	6.4	6.3	6.0	5.7	6.1	5.4	6.0	6.2	6.1	6.3	6.0	6.2 6.0
20. QLD-63	6.3	5.8	6.5	5.9	6.2	6.3	6.1	6.0	6.2	6.3	6.3	6.3	5.6	6.0 6.1
21. QLD-65	6.1	5.6	6.3	5.6	5.7	5.9	5.8	5.8	6.1	6.3	6.2	6.2	6.0	6.1 6.0
22. QLD-67	6.2	5.8	6.1	5.8	5.8	6.2	5.9	5.5	6.0	6.2	6.1	6.1	6.1	6.1 6.0
23. QBP-12-9	5.4	5.5	5.8	5.4	5.5	5.5	5.5	5.4	6.1	5.7	5.9	6.0	5.7	5.9 5.6
24. QBP-13-8	6.2	5.8	6.1	5.9	5.7	5.3	5.8	6.3	6.2	6.2	6.2	6.3	5.9	6.1 6.0
25. PHS-708	5.9	6.0	6.0	6.0	5.8	5.5	5.9	6.1	6.2	6.1	6.2	6.0	5.7	5.9 5.9
B. UP-2672 (C)	6.3	6.2	6.3	6.1	6.0	5.9	6.1	6.2	6.3	6.4	6.4	6.4	6.0	6.2 6.2
A. HI-977 (C)	6.2	5.9	6.1	6.0	6.1	6.0	6.0	6.2	6.1	6.2	6.2	6.4	5.9	6.2 6.1
26. QBP-13-12	6.2	5.5	5.9	5.7	5.9	6.1	5.8	6.0	6.0	5.9	6.0	6.2	5.8	6.0 5.9
27. QBP-13-13	6.4	5.7	6.3	6.2	6.1	6.2	6.1	6.2	6.2	5.9	6.1	6.3	5.7	6.0 6.1
28. GW-2013-498	6.5	6.1	6.6	6.3	6.3	5.7	6.2	6.3	6.9	6.8	6.9	6.2	6.0	6.1 6.3
29. GW-2013-499	5.7	6.3	6.2	6.2	5.8	5.6	6.0	6.1	7.0	6.7	6.9	6.0	6.2	6.1 6.2
30. GW-2013-500	7.2	6.2	6.8	6.3	6.1	6.0	6.3	6.5	7.4	6.9	7.2	6.7	6.2	6.5 6.6
31. DBPQ-03	5.4	6.5	6.3	6.2	5.8	5.5	6.1	6.2	7.1	6.9	7.0	6.8	6.3	6.6 6.3
32. DBPQ-04	6.4	6.4	6.5	6.3	6.0	5.9	6.2	6.0	7.0	6.7	6.9	6.6	6.1	6.4 6.4
33. GW-2013-501	6.1	4.9	6.5	6.4	4.6	5.4	5.6	6.5	6.7	6.4	6.6	6.5	5.6	6.1 6.0
34. GW-2013-502	6.3	6.3	6.7	6.3	6.4	6.2	6.4	6.6	7.3	7.1	7.2	7.4	6.4	6.9 6.6
35. GW-2013-503	6.6	6.3	7.1	6.6	6.3	6.2	6.5	6.2	7.2	7.3	7.3	7.2	6.3	6.8 6.7
36. GW-2013-513	6.4	6.0	6.3	6.4	6.2	6.0	6.2	6.1	6.5	6.6	6.6	6.3	5.9	6.1 6.2
37. BWL-991	6.2	6.2	6.3	6.3	6.2	5.8	6.2	6.3	6.3	6.8	6.6	6.5	6.0	6.3 6.3
A. HI-977 (C)	6.4	5.8	5.7	6.2	6.3	5.7	5.9	6.1	6.1	6.4	6.3	6.4	6.1	6.3 6.1
38. BWL-1660	6.3	6.3	6.2	6.3	6.4	6.1	6.3	6.3	6.5	6.7	6.6	6.3	6.2	6.3 6.3
39. BWL-1661	6.0	6.1	6.2	6.3	6.2	6.0	6.2	6.2	6.2	6.8	6.5	6.2	6.1	6.2 6.2
40. BWL-1662	6.1	6.2	6.3	6.2	6.1	6.0	6.2	5.9	6.3	6.5	6.4	6.7	6.2	6.5 6.2
41. BWL-1663	6.0	6.0	6.2	6.4	6.3	6.1	6.2	6.0	6.1	6.6	6.4	6.4	6.2	6.3 6.2
C. PDW-233 (C)	6.1	6.0	6.2	6.4	6.1	6.2	6.2	6.2	6.4	6.4	6.4	6.4	6.0	6.2 6.2
42. BWL-1664	6.1	6.2	6.3	6.4	5.9	6.1	6.2	6.3	6.2	6.5	6.4	6.4	6.3	6.4 6.2
43. BWL-1797	6.2	5.8	6.0	6.2	6.0	6.1	6.0	5.9	6.0	6.2	6.1	6.2	6.0	6.1 6.1
44. QLD-70	6.3	5.8	6.1	6.4	6.1	6.3	6.1	6.1	6.3	6.0	6.2	6.3	5.9	6.1 6.1
45. QLD-71	6.2	6.0	6.0	6.4	5.7	5.9	6.0	6.0	6.2	6.2	6.2	6.6	6.1	6.4 6.1
B. UP-2672 (C)	6.3	5.7	6.2	6.3	5.9	5.7	6.0	6.2	6.1	6.1	6.1	6.5	6.2	6.4 6.1
46. QLD-72	6.2	5.6	6.1	6.2	5.9	6.3	6.0	6.3	6.0	6.3	6.2	6.4	6.0	6.2 6.1
47. QLD-73	5.8	6.0	5.9	5.5	5.6	5.8	5.8	5.7	5.7	5.9	5.8	5.9	5.7	5.8 5.8
48. QLD-74	6.3	6.2	6.1	6.3	5.7	5.9	6.0	5.7	5.9	5.8	5.9	5.6	5.8	5.7 5.9
49. QLD-75	6.2	6.1	6.3	6.0	5.5	5.6	5.9	5.6	6.0	6.1	6.1	6.0	5.9	6.0 5.9
50. QLD-76	6.3	6.0	6.3	6.1	5.9	5.7	6.0	5.9	6.2	6.2	6.2	6.1	6.0	6.1 6.1
51. QLD-77	6.4	6.3	6.4	6.0	6.2	5.6	6.1	5.8	6.0	6.3	6.2	6.2	5.9	6.1 6.1
52. QLD-78	6.3	6.5	6.5	6.2	6.1	5.9	6.2	6.1	6.2	6.7	6.5	6.4	6.1	6.3 6.3
Mean	6.1	6.0	6.3	6.1	6.0	5.9	6.0	6.0	6.3	6.3	6.3	6.3	6.0	6.1 6.1

Table 7: Protein Content (%) of Quality Component Screening Nursery Entries

Sr. No.	QCSN Entries	NHZ		NWPZ			NEPZ		CZ		PZ		Overall Mean		
		Almora	Ludhiana	Durgapura	Delhi	Pantnagar	Karnal	Mean	Kanpur	Junagarh	Vijapur	Mean	Pune	Dharwad	Mean
1. BW-5872	10.1	12.8	13.3	13.3	11.9	13.2	12.9	11.2	12.7	9.9	11.3	12.6	12.2	12.4	12.1
2. DBPQ-02	10.8	13.3	13.2	13.2	11.4	13.2	12.9	13.2	13.7	11.6	12.6	13.4	12.0	12.7	12.6
B. UP-2672 (C)	11.4	13.1	13.3	12.9	13.0	12.9	13.0	12.5	13.5	13.6	13.5	13.1	13.2	13.1	12.9
3. GW-2010-305 (C)	12.2	13.1	13.5	13.2	11.4	12.9	12.8	13.4	12.9	12.9	12.9	13.5	12.2	12.9	12.8
4. GW-2010-389	10.7	12.1	13.4	13.3	11.9	12.9	12.7	12.2	13.3	12.6	12.9	13.4	13.0	13.2	12.6
5. GW-2012-442	11.7	13.2	13.7	12.9	13.0	13.1	13.2	13.5	12.9	12.2	12.6	13.2	12.4	12.8	12.9
6. GW-2012-454	11.1	13.3	13.2	13.1	11.9	13.3	13.0	12.3	12.6	13.5	13.1	13.0	11.0	12.0	12.6
7. QBP-12-10	10.8	12.9	13.2	13.1	12.0	13.6	13.0	12.9	13.3	13.1	13.2	12.6	13.0	12.8	12.8
8. QBP-12-11	10.8	13.0	12.9	13.6	12.6	13.1	13.0	12.4	13.3	12.5	12.9	13.1	12.3	12.7	12.7
A. HI-977 (C)	10.2	13.7	12.2	13.1	11.3	12.8	12.6	12.1	13.3	12.0	12.6	12.9	11.7	12.3	12.3
9. QBP-12-8	10.8	12.6	12.3	12.5	11.8	12.5	12.3	11.7	12.6	12.2	12.4	12.9	11.8	12.3	12.1
10. QBP-13-11	10.2	13.6	13.2	13.2	12.7	13.2	13.2	12.6	13.2	12.5	12.9	13.1	12.1	12.6	12.7
11. QLD-11(I)	12.0	13.2	13.1	13.4	12.9	13.1	13.1	12.8	13.2	13.5	13.3	12.6	13.2	12.9	13.0
12. QLD-28 (I)	10.1	12.0	13.1	13.2	13.1	13.2	12.9	12.6	13.1	13.0	13.0	12.1	11.9	12.0	12.5
13. QLD-31 (I)	13.7	12.5	12.8	13.7	12.1	12.9	12.8	12.7	13.3	13.4	13.4	12.9	12.7	12.8	13.0
14. QLD-46	11.6	13.6	13.5	13.2	13.7	13.2	13.4	13.7	13.2	13.1	13.1	13.0	13.2	13.1	13.2
15. QLD-49	11.6	13.1	12.8	13.1	12.1	13.2	12.9	13.2	13.5	13.6	13.5	12.6	13.2	12.9	12.9
C. PDW-233 (C)	10.5	12.0	12.0	12.3	12.1	12.3	12.2	10.4	12.7	12.2	12.5	12.0	12.1	12.1	11.9
16. QLD-51	10.9	12.1	12.6	13.3	12.9	13.2	12.8	13.2	12.5	11.9	12.2	12.6	12.0	12.3	12.5
17. QLD-54	11.9	12.3	12.9	13.4	13.5	13.5	13.1	12.9	13.2	13.2	13.2	13.6	13.6	13.6	13.1
18. QLD-58	11.4	12.7	13.3	13.2	12.4	13.0	12.9	13.6	13.5	13.3	13.4	13.4	11.6	12.5	12.9
19. QLD-61	12.2	11.7	13.0	12.9	11.1	13.3	12.4	12.4	13.2	12.3	12.7	13.1	11.9	12.5	12.5
C. PDW-233 (C)	9.7	12.3	12.4	12.5	10.3	11.3	11.7	11.4	12.7	12.4	12.6	12.3	13.1	12.7	11.9
20. QLD-63	11.0	12.0	13.0	13.7	12.0	13.5	12.8	11.7	13.5	12.4	12.9	12.9	11.9	12.4	12.5
21. QLD-65	9.7	13.5	13.1	13.2	12.0	12.9	12.9	12.6	13.2	13.0	13.1	13.6	11.2	12.4	12.5
22. QLD-67	10.1	12.2	12.9	13.2	11.8	13.0	12.6	12.7	13.1	13.1	13.1	13.1	12.2	12.6	12.5
23. QBP-12-9	8.8	11.6	12.3	13.6	11.9	12.9	12.5	10.9	12.6	12.2	12.4	12.5	10.9	11.7	11.8
24. QBP-13-8	9.5	12.0	11.4	12.6	11.8	12.1	12.0	10.8	12.6	12.0	12.3	10.1	11.6	10.9	11.5
25. PHS-708	10.9	12.8	13.2	13.6	11.3	12.6	12.7	11.4	13.6	13.3	13.5	12.4	12.9	12.6	12.6
B. UP-2672 (C)	10.5	13.3	13.7	13.7	13.3	13.3	13.5	13.5	12.6	11.7	12.1	13.5	12.2	12.9	12.8
A. HI-977 (C)	9.1	13.1	11.9	13.3	10.9	12.4	12.3	11.2	12.6	12.1	12.4	11.8	11.3	11.5	11.8
26. QBP-13-12	10.9	13.6	13.2	13.7	12.9	13.0	13.3	13.0	13.2	13.1	13.1	13.4	12.6	13.0	12.9
27. QBP-13-13	8.3	12.2	12.0	13.3	11.8	11.3	12.1	10.7	12.3	12.1	12.2	10.6	10.1	10.4	11.3
28. GW-2013-498	11.1	13.6	12.9	13.4	11.4	13.2	12.9	13.0	13.7	13.2	13.4	11.9	13.0	12.4	12.7
29. GW-2013-499	10.8	13.6	13.7	12.9	11.1	13.0	12.8	12.4	13.6	13.2	13.4	11.9	13.2	12.5	12.6
30. GW-2013-500	10.9	11.8	13.5	13.1	12.0	13.3	12.7	12.6	13.4	13.7	13.5	13.0	13.1	13.0	12.8
31. DBPQ-03	13.7	12.7	13.6	12.9	11.9	13.3	12.9	11.5	13.2	13.2	13.2	12.7	12.4	12.6	12.8
32. DBPQ-04	12.6	12.9	13.2	13.7	12.8	13.5	13.2	12.4	13.2	13.6	13.4	13.1	12.8	12.9	13.1
33. GW-2013-501	11.8	13.7	13.3	13.2	13.4	13.5	13.4	11.4	13.4	13.5	13.5	13.6	13.0	13.3	13.1
34. GW-2013-502	12.0	13.5	13.5	12.8	13.1	12.3	13.0	13.2	13.2	13.1	13.1	13.5	11.4	12.5	12.9
35. GW-2013-503	10.8	13.1	13.6	13.5	13.2	12.9	13.2	11.1	13.7	13.0	13.3	13.1	11.9	12.5	12.7
36. GW-2013-513	10.3	12.2	13.0	12.8	12.4	12.5	12.6	11.3	13.2	11.9	12.0	11.9	11.5	12.0	12.2
37. BWL-991	13.2	13.3	13.2	13.6	13.1	12.9	13.2	11.8	13.0	13.1	13.0	13.2	13.0	13.1	13.0
A. HI-977 (C)	10.3	13.7	13.4	12.7	11.1	12.6	12.7	11.9	12.6	11.7	12.1	12.9	12.2	12.6	12.3
38. BWL-1660	12.7	13.5	13.5	13.7	13.0	13.7	13.5	13.0	13.7	13.1	13.4	13.4	13.1	13.2	13.3
39. BWL-1661	13.5	12.9	13.6	13.5	13.2	13.5	13.3	13.0	13.4	13.3	13.4	13.3	13.1	13.2	13.3
40. BWL-1662	13.5	13.7	13.0	13.0	13.3	13.3	13.3	10.7	13.4	13.6	13.5	13.3	13.1	13.2	13.1
41. BWL-1663	13.0	13.4	13.4	13.3	13.5	13.3	13.4	13.6	13.4	13.2	13.3	13.5	13.5	13.4	13.4
C. PDW-233 (C)	8.5	12.7	13.4	13.2	11.2	12.0	12.5	9.8	13.6	12.2	12.9	11.7	11.7	11.7	11.8
42. BWL-1664	12.5	13.3	13.7	13.2	13.2	13.0	13.3	13.0	13.3	13.7	13.5	13.1	13.2	13.2	13.2
43. BWL-1797	9.3	12.6	13.2	13.5	11.4	11.7	12.5	11.3	13.2	11.8	12.5	13.4	12.9	13.2	12.2
44. QLD-70	11.3	11.7	13.0	12.9	12.1	11.6	12.3	11.6	13.2	12.9	13.1	12.1	12.6	12.3	12.3
45. QLD-71	11.9	12.6	12.9	13.4	13.6	13.2	13.1	12.6	13.0	12.6	12.8	13.5	13.4	13.5	13.0
B. UP-2672 (C)	10.4	12.9	13.0	13.0	13.4	13.0	13.1	10.1	12.1	11.6	11.9	13.2	11.7	12.4	12.2
46. QLD-72	8.9	12.3	12.7	12.7	10.8	11.3	12.0	10.8	13.0	11.7	12.3	11.4	12.6	12.0	11.6
47. QLD-73	8.8	12.6	13.2	13.5	11.1	11.1	12.3	10.8	13.5	12.6	13.1	11.8	12.8	12.3	12.0
48. QLD-74	10.1	12.0	12.9	13.5	11.5	12.0	12.4	10.8	13.2	12.6	12.9	13.0	13.3	13.2	12.3
49. QLD-75	9.2	11.3	12.8	12.7	10.1	11.6	11.7	10.3	13.3	11.1	12.2	12.5	13.5	13.0	11.7
50. QLD-76	8.1	10.8	11.3	12.3	9.3	10.8	10.9	9.9	13.2	10.7	11.9	12.9	13.3	13.1	11.1
51. QLD-77	9.8	12.4	13.2	13.6	9.9	11.9	12.2	11.8	13.3	11.7	12.5	13.5	13.6	13.5	12.2
52. QLD-78	10.7	11.8	13.0	13.6	10.9	11.8	12.2	12.0	13.2	12.6	12.9	13.1	12.6	12.9	12.3
Mean	10.9	12.7	13.0	13.2	12.1	12.7	12.8	12.1	13.1	12.6	12.9	12.8	12.5	12.6	12.5

Table 8: Test weight (kg/hl) of Quality Component Screening Nursery Entries

Sr. No.	QCSN Entries	NHZ		NWPZ			NEPZ		CZ		PZ		Overall Mean		
		Almora	Ludhiana	Durgapura	Delhi	Pantnagar	Karmal	Mean	Kanpur	Junagadh	Vijapur	Mean	Pune	Dharwad	Mean
1. BW-5872	80.3	74.3	81.0	80.3	74.5	78.2	77.7	74.2	75.4	79.6	77.5	78.3	78.3	78.3	77.7
2. DBPQ-02	82.0	77.3	81.0	81.8	80.2	78.5	79.8	77.6	81.4	83.5	82.5	82.5	79.5	81.0	80.5
B. UP-2672 (C)	78.8	76.3	79.0	79.7	76.5	76.5	77.6	79.0	78.8	82.0	80.4	80.5	76.8	78.7	78.5
3. GW-2010-305 (C)	75.6	69.6	76.0	75.2	70.6	74.1	73.1	78.0	78.7	79.0	78.9	76.0	76.0	76.0	75.3
4. GW-2010-389	79.4	74.4	77.5	79.2	77.2	72.5	76.2	73.8	79.5	77.0	78.3	78.0	74.5	76.3	76.6
5. GW-2012-442	78.7	80.0	79.5	79.4	75.5	76.5	78.2	78.6	81.4	82.0	81.7	82.0	79.5	80.8	79.4
6. GW-2012-454	80.2	78.7	82.0	82.5	77.7	77.0	79.6	78.0	78.7	82.7	80.7	83.7	79.4	81.6	80.1
7. QBP-12-10	78.4	76.5	78.7	76.8	78.4	75.6	77.2	75.2	75.4	79.0	77.2	80.6	78.7	79.7	77.6
8. QBP-12-11	81.5	72.5	77.0	76.7	73.3	75.4	75.0	74.8	75.6	76.7	76.2	79.0	76.2	77.6	76.2
A. HI-977 (C)	80.0	73.2	78.5	79.7	77.0	76.8	77.0	74.2	75.6	76.5	76.1	80.3	77.5	78.9	77.2
9. QBP-12-8	76.5	74.8	79.0	78.0	77.5	77.0	77.3	74.7	78.3	78.8	78.6	78.5	77.0	77.8	77.3
10. QBP-13-11	79.3	72.6	78.6	78.6	76.2	75.1	76.2	75.2	77.3	78.6	78.0	79.5	76.8	78.2	77.1
11. QLD-11(I)	80.5	74.8	81.0	80.8	78.7	79.5	79.0	76.2	75.7	81.4	78.6	81.0	78.3	79.7	78.9
12. QLD-28 (I)	78.3	74.8	78.2	81.3	76.5	79.5	78.1	77.3	78.4	74.5	76.5	79.0	79.0	77.9	77.9
13. QLD-31 (I)	79.0	76.5	78.5	78.3	75.0	75.0	76.7	78.0	76.5	76.2	76.4	79.0	77.0	78.0	77.2
14. QLD-46	77.2	79.3	80.0	82.0	78.6	80.0	80.0	78.8	79.5	82.0	80.8	81.0	77.6	79.3	79.6
15. QLD-49	78.4	76.5	77.0	79.2	75.0	76.2	76.8	78.5	75.3	78.2	76.8	78.0	77.0	77.5	77.2
C. PDW-233 (C)	77.3	79.7	81.0	80.4	76.5	78.7	79.3	77.3	80.3	80.1	80.2	82.0	76.8	79.4	79.1
16. QLD-51	80.5	76.7	82.0	81.6	78.5	78.5	79.5	81.0	78.3	82.3	80.3	83.0	78.8	80.9	80.1
17. QLD-54	76.7	78.5	77.0	78.0	72.8	76.2	76.5	76.7	76.5	79.4	78.0	77.0	73.0	75.0	76.5
18. QLD-58	80.3	79.3	80.0	80.8	79.5	79.7	79.9	78.0	78.2	81.8	80.0	80.0	74.5	77.3	79.3
19. QLD-61	80.7	73.7	80.0	81.4	79.2	78.4	78.5	78.6	78.3	80.5	79.4	82.0	78.6	80.3	79.2
C. PDW-233 (C)	80.4	78.5	81.0	80.6	80.4	78.7	79.8	78.0	79.1	81.2	80.2	81.4	74.8	78.1	79.5
20. QLD-63	80.2	78.5	79.6	80.6	79.4	79.4	79.5	78.6	75.5	79.7	77.6	78.6	76.5	77.6	78.8
21. QLD-65	81.0	74.5	81.0	79.5	76.4	78.0	77.9	78.0	78.4	79.3	78.9	81.0	78.4	79.7	78.7
22. QLD-67	78.0	77.0	78.6	78.5	78.7	77.0	78.0	75.7	81.0	80.6	80.8	81.0	75.3	78.2	78.3
23. QBP-12-9	79.5	75.4	80.5	80.5	75.6	77.8	78.0	77.3	75.4	76.7	76.1	80.3	76.8	78.6	77.8
24. QBP-13-8	78.5	74.5	78.7	78.6	72.6	75.4	76.0	78.0	78.6	78.3	78.5	79.3	76.7	78.0	77.2
25. PHS-708	78.0	78.4	79.5	80.6	75.0	78.0	78.3	77.4	79.3	75.3	77.3	80.0	77.2	78.6	78.1
B. UP-2672 (C)	78.7	76.3	79.5	80.3	78.7	77.0	78.4	78.3	78.1	76.5	77.3	81.0	76.5	78.8	78.3
A. HI-977 (C)	82.5	74.0	79.5	79.5	82.5	77.6	78.6	76.0	77.8	79.2	78.5	81.0	78.0	79.5	78.9
26. QBP-13-12	79.0	75.4	80.0	78.3	75.6	77.0	77.3	78.0	78.5	83.5	81.0	80.5	78.7	79.6	78.6
27. QBP-13-13	78.6	73.5	78.0	78.2	73.5	75.6	75.8	76.0	76.8	78.0	77.4	79.0	76.7	77.9	76.7
28. GW-2013-498	79.4	75.8	77.0	80.0	82.0	77.6	78.5	76.0	78.7	81.6	80.2	81.0	80.3	80.7	79.0
29. GW-2013-499	76.5	78.0	76.0	76.2	75.0	77.1	76.5	74.0	79.5	78.7	79.1	79.0	77.3	78.2	77.0
30. GW-2013-500	78.0	77.8	78.0	78.6	76.3	75.2	77.2	75.5	81.3	81.6	81.5	80.7	78.5	79.6	78.3
31. DBPQ-03	75.0	78.6	79.0	75.6	77.0	74.0	76.8	78.0	75.4	82.7	79.1	82.0	79.5	80.8	77.9
32. DBPQ-04	78.0	74.8	78.5	76.3	73.5	75.5	75.7	72.0	78.4	79.5	79.0	80.0	79.5	79.8	76.9
33. GW-2013-501	76.5	67.5	78.2	77.3	76.1	70.6	73.9	79.5	76.4	79.6	78.0	80.3	78.8	76.4	76.4
34. GW-2013-502	80.6	78.0	81.0	81.4	77.0	79.4	79.4	76.3	76.5	82.7	79.6	81.0	79.0	80.0	79.4
35. GW-2013-503	79.7	76.8	80.0	80.3	76.5	77.5	78.2	78.2	78.7	82.0	80.4	80.5	81.5	81.0	79.2
36. GW-2013-513	81.0	80.8	82.0	82.7	78.8	79.5	80.8	78.3	79.0	83.8	81.4	82.0	78.0	80.0	80.5
37. BWL-991	78.5	78.5	80.0	80.0	77.8	78.3	78.9	76.6	77.8	80.2	79.0	79.0	77.5	78.3	78.6
A. HI-977 (C)	80.5	74.5	76.0	79.5	80.5	78.5	77.8	76.0	78.6	79.6	79.1	80.4	79.1	79.8	78.5
38. BWL-1660	78.0	80.5	78.4	79.8	78.4	78.3	79.1	76.0	79.3	81.5	80.4	80.0	78.5	79.3	79.0
39. BWL-1661	77.6	77.3	80.0	78.6	77.5	77.8	78.2	78.4	76.3	80.2	78.3	79.5	77.5	78.5	78.2
40. BWL-1662	79.5	79.0	79.6	77.8	78.0	78.2	78.5	74.3	76.5	79.2	77.9	80.0	77.8	78.9	78.2
41. BWL-1663	79.0	78.6	77.5	79.2	78.3	79.5	78.6	78.2	75.2	79.5	77.4	80.0	77.2	78.6	78.4
C. PDW-233 (C)	81.0	75.3	76.5	80.6	81.0	78.0	78.3	79.7	79.3	80.2	79.8	81.5	76.5	79.0	79.1
42. BWL-1664	78.2	78.5	80.0	78.6	76.7	78.7	78.5	79.2	78.4	80.7	79.6	78.0	78.5	78.3	78.7
43. BWL-1797	79.0	77.8	78.2	80.0	78.6	80.0	78.9	79.6	78.5	83.2	80.9	80.0	77.0	78.5	79.3
44. QLD-70	78.7	79.5	80.5	81.6	78.0	79.2	79.8	80.3	81.6	81.8	81.7	83.0	77.0	80.0	80.1
45. QLD-71	79.5	79.0	79.6	83.2	78.6	77.6	79.6	79.7	78.8	82.7	80.8	80.0	76.8	78.4	79.6
B. UP-2672 (C)	79.0	77.5	78.6	80.6	79.5	77.3	78.7	77.3	79.2	81.6	80.4	81.0	78.1	79.6	79.1
46. QLD-72	78.7	73.5	79.1	80.3	78.6	77.3	77.8	76.6	80.7	82.7	81.7	80.5	77.3	78.9	78.7
47. QLD-73	79.5	75.8	78.0	79.3	76.7	78.6	77.7	76.3	76.5	79.7	78.1	79.6	75.5	77.6	77.8
48. QLD-74	78.0	78.2	76.0	80.2	76.8	76.6	77.6	76.7	75.2	79.3	77.3	78.0	74.0	76.0	77.2
49. QLD-75	78.7	78.5	80.0	80.0	75.7	78.6	78.6	77.0	79.3	80.7	80.0	80.0	77.5	78.8	78.7
50. QLD-76	80.5	78.6	81.0	81.0	79.0	80.3	80.0	78.3	78.4	81.6	80.0	81.3	78.7	80.0	79.9
51. QLD-77	80.0	78.2	80.0	82.0	77.6	78.6	79.3	77.0	78.5	81.5	80.0	80.5	78.0	79.3	79.3
52. QLD-78	79.3	79.0	80.5	80.0	77.2	78.4	79.0	76.0	81.6	82.5	82.1	82.5	78.2	80.4	79.6
Mean	79.0	76.6	79.1	79.6	77.2	77.4	78.0	77.1	78.1	80.2	79.1	80.3	77.5	78.9	78.4

Table 9: Sedimentation values of Quality Component Screening Nursery Entries

Sr. No.	QCSN Entries	NHZ		NWPZ			NEPZ		CZ		PZ		Overall Mean	
		Almora	Ludhiana	Durgapura	Delhi	Pantnagar	Karmal	Mean	Kanpur	Junagadh	Vijapur	Pune	Dharwad	
1. BW-5872	65	67	54	49	55	53	56	55	60	63	62	60	55	58
2. DBPQ-02	31	44	35	40	37	36	38	37	36	34	35	35	38	37
B. UP-2672 (C)	55	52	44	45	48	44	47	46	57	53	55	50	55	53
3. GW-2010-305 (C)	38	47	37	40	35	40	40	42	36	34	35	42	41	42
4. GW-2010-389	61	55	48	49	56	53	52	55	52	58	55	56	63	60
5. GW-2012-442	28	26	22	21	26	24	24	23	30	22	26	25	27	26
6. GW-2012-454	29	35	28	31	32	29	31	33	29	24	27	37	30	34
7. QBP-12-10	39	34	33	37	42	33	36	36	37	36	37	48	43	46
8. QBP-12-11	43	49	40	41	49	43	44	46	48	50	49	47	47	46
A. HI-977 (C)	55	61	58	60	58	53	58	58	46	61	54	62	66	64
9. QBP-12-8	41	50	40	47	49	47	47	50	45	41	43	41	44	43
10. QBP-13-11	38	36	34	37	43	37	37	39	42	39	41	46	38	42
11. QLD-11(I)	36	63	35	37	38	36	42	38	35	33	34	39	36	38
12. QLD-28 (I)	38	40	35	33	42	36	37	37	35	35	35	34	38	36
13. QLD-31 (I)	65	33	54	58	58	42	49	58	60	58	59	65	37	51
14. QLD-46	47	39	43	38	50	50	44	44	43	40	42	45	46	44
15. QLD-49	46	50	47	47	46	50	48	45	53	48	51	50	38	44
C. PDW-233 (C)	36	40	39	41	37	39	39	36	38	42	40	40	49	45
16. QLD-51	42	45	37	43	42	44	42	43	47	50	49	46	45	46
17. QLD-54	33	36	33	33	38	38	36	39	37	39	38	35	38	37
18. QLD-58	52	44	44	42	44	50	45	45	48	50	49	55	42	49
19. QLD-61	51	53	48	48	50	49	50	46	44	45	45	53	53	49
C. PDW-233 (C)	36	40	40	44	33	37	39	40	36	42	39	41	38	40
20. QLD-63	41	44	41	42	40	36	41	38	40	40	40	42	44	41
21. QLD-65	44	39	45	39	53	47	45	42	51	45	48	48	50	49
22. QLD-67	40	48	48	41	42	40	44	39	42	39	41	41	44	43
23. QBP-12-9	30	31	29	34	39	35	34	33	35	35	35	42	39	41
24. QBP-13-8	62	55	50	51	63	60	56	24	60	54	57	58	58	54
25. PHS-708	52	50	50	56	61	58	55	57	53	58	56	63	60	62
B. UP-2672 (C)	54	48	46	45	45	54	48	52	49	51	50	54	52	53
A. HI-977 (C)	55	65	49	64	54	59	58	56	58	54	56	62	56	57
26. QBP-13-12	45	46	38	41	38	41	41	50	45	43	44	50	45	48
27. QBP-13-13	56	52	64	54	62	54	57	51	55	54	55	60	59	60
28. GW-2013-498	27	23	21	23	26	24	23	33	35	21	28	58	23	41
29. GW-2013-499	13	14	16	16	13	20	16	17	17	15	16	16	14	15
30. GW-2013-500	18	19	22	22	21	23	21	23	25	21	23	25	21	22
31. DBPQ-03	35	39	29	31	26	31	31	28	28	31	30	33	32	33
32. DBPQ-04	34	35	32	39	38	42	37	35	38	36	37	40	37	37
33. GW-2013-501	35	30	34	42	42	42	38	30	40	35	38	40	40	37
34. GW-2013-502	32	36	31	34	35	37	35	29	38	30	34	38	32	34
35. GW-2013-503	22	25	24	26	24	42	28	27	24	23	24	29	25	27
36. GW-2013-513	38	36	35	39	39	57	41	44	38	33	36	42	40	40
37. BWL-991	46	52	40	43	42	42	44	55	54	49	52	54	50	52
A. HI-977 (C)	54	61	53	60	58	57	58	67	60	58	59	63	59	61
38. BWL-1660	44	54	46	53	46	42	48	50	54	53	54	55	53	50
39. BWL-1661	41	44	40	46	40	50	44	50	52	49	51	53	52	47
40. BWL-1662	46	48	41	46	42	46	45	51	54	47	51	51	50	51
41. BWL-1663	48	47	39	42	43	42	43	45	50	45	48	48	50	49
C. PDW-233 (C)	30	37	38	45	38	41	40	38	40	42	41	43	41	39
42. BWL-1664	49	49	42	50	48	42	46	42	50	48	49	52	46	47
43. BWL-1797	46	45	42	46	46	35	43	44	41	40	41	49	50	44
44. QLD-70	51	43	44	47	55	49	48	54	49	47	48	57	52	55
45. QLD-71	52	51	47	44	46	47	47	62	55	47	51	48	58	53
B. UP-2672 (C)	49	50	45	48	45	50	48	42	48	46	47	52	50	51
46. QLD-72	55	68	51	60	67	51	59	61	60	46	53	63	45	57
47. QLD-73	33	48	54	40	41	55	48	62	44	48	46	46	58	52
48. QLD-74	52	42	38	42	49	55	45	60	52	40	46	48	45	48
49. QLD-75	48	53	40	44	45	42	45	52	47	43	45	40	59	50
50. QLD-76	60	63	54	50	58	50	55	64	65	67	66	63	60	62
51. QLD-77	47	60	53	49	50	50	52	57	58	57	58	57	54	56
52. QLD-78	57	65	53	58	65	64	61	67	63	55	59	63	55	60
Mean	43	45	41	43	44	44	43	45	45	43	44	47	45	46

Table 10: Grain Hardness Index of Quality Component Screening Nursery Entries

Sr. No.	QCSN Entries	NHZ		NWPZ			NEPZ		CZ		PZ		Overall Mean		
		Almora	Ludhiana	Durgapura	Delhi	Pantnagar	Karnal	Mean	Kanpur	Junagadh	Vijapur	Mean	Pune	Dharwad	Mean
1. BW-5872	83	76	73	79	73	74	76	69	90	82	80	87	66	77	77
2. DBPQ-02	97	94	95	93	81	95	93	95	94	96	95	96	82	89	93
B. UP-2672 (C)	75	74	71	74	76	71	74	70	71	90	77	74	63	69	74
3. GW-2010-305 (C)	93	96	87	100	86	89	92	96	97	99	97	98	85	92	93
4. GW-2010-389	66	68	71	78	59	70	69	68	66	82	72	72	57	65	69
5. GW-2012-442	83	89	87	86	87	89	87	89	88	94	90	87	79	83	87
6. GW-2012-454	96	93	94	96	95	91	94	85	102	101	96	93	78	86	93
7. QBP-12-10	29	18	20	31	22	22	24	25	31	34	30	38	21	30	26
8. QBP-12-11	32	11	18	25	67	18	29	19	15	26	20	28	14	21	25
A. HI-977 (C)	80	79	68	72	71	58	71	74	80	86	80	71	54	63	72
9. QBP-12-8	25	12	21	33	28	25	24	25	22	32	26	37	16	27	25
10. QBP-13-11	28	20	25	17	16	18	21	19	32	31	27	36	19	28	24
11. QLD-11(I)	75	60	66	78	64	69	69	51	72	81	68	75	65	70	69
12. QLD-28 (I)	39	26	27	34	32	30	31	59	34	42	45	41	88	65	41
13. QLD-31 (I)	67	70	61	75	62	61	66	72	84	92	83	79	57	68	71
14. QLD-46	56	61	56	61	61	52	58	52	53	70	58	63	49	56	58
15. QLD-49	23	14	13	17	10	9	14	18	18	23	20	17	30	24	17
C. PDW-233 (C)	101	98	97	99	74	55	87	92	96	86	91	89	89	89	89
16. QLD-51	67	66	63	77	65	68	68	69	74	89	77	80	48	64	70
17. QLD-54	33	27	25	24	31	20	27	23	31	60	38	27	27	27	30
18. QLD-58	81	77	57	79	67	72	72	84	78	94	85	79	66	73	76
19. QLD-61	67	62	66	72	66	62	66	66	76	85	76	81	58	70	69
C. PDW-233 (C)	103	92	84	97	91	92	93	99	96	94	96	100	11	56	87
20. QLD-63	69	68	63	74	70	69	69	72	79	80	77	78	54	66	71
21. QLD-65	77	86	76	86	85	71	80	81	88	97	89	88	69	79	82
22. QLD-67	33	23	35	26	31	29	30	26	18	31	25	52	19	36	29
23. QBP-12-9	38	21	25	26	22	23	26	26	28	38	31	45	17	31	28
24. QBP-13-8	54	53	47	62	46	43	51	72	60	77	70	68	47	58	57
25. PHS-708	78	64	58	71	60	58	65	59	65	88	71	75	60	68	67
B. UP-2672 (C)	79	75	62	74	66	73	72	74	72	68	71	73	72	73	72
A. HI-977 (C)	58	77	70	81	68	36	65	57	66	64	62	83	68	76	66
26. QBP-13-12	40	34	28	40	39	71	42	34	36	49	40	46	29	38	41
27. QBP-13-13	51	54	58	62	43	38	51	54	63	73	63	62	42	52	55
28. GW-2013-498	84	91	87	84	95	82	87	86	91	92	90	80	83	82	87
29. GW-2013-499	98	86	82	89	88	93	89	84	95	95	91	86	81	84	89
30. GW-2013-500	89	90	87	95	86	88	89	90	92	100	94	92	79	86	90
31. DBPQ-03	90	93	81	91	79	93	88	80	91	97	89	92	90	91	89
32. DBPQ-04	93	85	83	80	93	96	88	73	90	96	86	86	73	80	86
33. GW-2013-501	97	89	90	95	86	79	89	92	94	99	95	93	87	87	94
34. GW-2013-502	88	87	89	90	94	88	89	94	94	96	95	92	83	88	90
35. GW-2013-503	101	98	87	97	104	93	97	86	93	100	93	87	87	87	94
36. GW-2013-513	70	79	75	80	70	73	75	76	81	91	83	79	54	67	75
37. BWL-991	65	68	69	73	72	70	70	77	75	76	76	75	65	70	71
A. HI-977 (C)	84	74	75	81	72	63	75	77	76	74	76	81	77	79	76
38. BWL-1660	63	69	68	66	62	65	66	71	65	79	72	74	63	69	68
39. BWL-1661	65	64	70	66	70	69	67	71	71	77	73	63	64	64	68
40. BWL-1662	67	70	62	66	62	67	66	68	72	75	72	68	64	66	67
41. BWL-1663	65	65	66	68	94	64	70	69	72	71	71	69	66	68	70
C. PDW-233 (C)	98	103	89	97	99	98	97	80	82	84	82	96	94	95	93
42. BWL-1664	62	64	63	68	64	65	64	74	68	73	72	78	61	70	67
43. BWL-1797	74	77	78	85	71	73	76	72	78	89	80	78	71	75	77
44. QLD-70	64	78	71	74	67	54	68	77	70	84	77	77	62	70	71
45. QLD-71	70	65	66	73	71	57	67	69	80	82	77	76	61	69	70
B. UP-2672 (C)	76	74	75	79	67	74	74	76	74	69	73	73	69	71	73
46. QLD-72	54	74	72	76	70	55	67	65	79	85	76	80	64	72	70
47. QLD-73	23	20	21	19	21	12	19	53	24	33	37	41	14	28	26
48. QLD-74	54	55	59	76	54	51	58	58	66	78	67	62	47	55	60
49. QLD-75	59	69	78	80	67	69	70	62	82	90	78	81	78	80	74
50. QLD-76	67	73	75	80	69	62	71	73	90	87	83	87	69	78	76
51. QLD-77	76	76	79	84	70	68	76	76	85	93	85	87	72	80	79
52. QLD-78	52	52	54	67	49	51	54	63	63	72	66	71	54	63	59
Mean	83	76	73	79	73	74	76	69	90	82	80	87	66	77	77

Table 11: Moisture Content (%) of Quality Component Screening Nursery Entries

Sr. No.	QCSN Entries	NHZ		NWPZ		NEPZ		CZ		PZ		Overall Mean			
		Almora	Ludhiana	Durgapura	Delhi	Pantnagar	Karnal	Mean	Kanpur	Junagadh	Vijapur	Mean	Pune	Dharwad	Mean
1. BW-5872	11.5	9.9	11.2	10.5	10.9	10.7	10.6	9.7	10.8	10.0	10.4	8.9	11.9	10.4	10.5
2. DBPQ-02	11.2	9.4	10.5	10.1	11.5	9.9	10.3	9.6	10.6	10.1	10.4	9.4	11.4	10.4	10.3
B. UP-2672 (C)	11.4	9.6	9.5	10.8	11.6	10.3	10.4	12.2	10.2	9.8	10.0	9.2	11.7	10.5	10.6
3. GW-2010-305 (C)	11.3	10.1	10.4	10.4	11.5	10.5	10.6	10.0	10.5	10.2	10.4	9.8	11.5	10.7	10.6
4. GW-2010-389	11.4	9.7	10.9	10.3	11.2	10.3	10.5	9.1	9.9	9.7	9.8	8.7	12.5	10.6	10.3
5. GW-2012-442	11.4	10.1	10.8	10.2	11.4	9.8	10.5	9.6	10.3	10.0	10.2	9.0	11.7	10.4	10.4
6. GW-2012-454	11.4	9.9	10.4	10.2	11.4	10.3	10.4	9.2	11.0	10.0	10.5	9.3	12.0	10.7	10.5
7. QBP-12-10	11.0	9.9	10.4	10.1	11.3	9.9	10.3	8.8	10.1	8.9	9.5	8.0	12.0	10.0	10.0
8. QBP-12-11	11.5	9.7	10.9	9.9	10.7	10.7	10.4	9.1	10.3	9.3	9.8	9.0	12.0	10.5	10.3
A. HI-977 (C)	11.3	9.6	9.2	10.1	11.1	9.9	10.0	9.1	10.3	9.9	10.1	8.5	11.8	10.2	10.1
9. QBP-12-8	11.4	10.2	10.6	10.4	11.3	10.3	10.6	9.0	10.6	9.4	10.0	8.7	12.3	10.5	10.4
10. QBP-13-11	11.2	9.5	10.8	10.1	11.1	9.9	10.3	9.0	10.2	9.4	9.8	9.0	12.0	10.5	10.2
11. QLD-11(I)	12.0	9.7	10.4	10.4	11.0	9.9	10.3	8.9	10.3	9.5	9.9	8.8	11.8	10.3	10.2
12. QLD-28 (I)	11.4	9.4	10.8	10.2	11.0	10.2	10.3	8.8	10.3	8.9	9.6	8.1	11.3	9.7	10.0
13. QLD-31 (I)	10.9	10.1	10.9	10.4	11.2	10.0	10.5	9.0	10.4	9.6	10.0	9.3	11.6	10.5	10.3
14. QLD-46	11.9	9.7	10.5	10.3	10.7	9.8	10.2	9.3	10.2	9.3	9.8	8.8	11.5	10.2	10.2
15. QLD-49	11.4	9.6	10.0	9.5	11.0	9.6	9.9	8.6	10.0	8.9	9.5	8.2	12.2	10.2	9.9
C. PDW-233 (C)	11.9	10.0	9.4	10.1	11.3	10.2	10.2	9.2	10.3	9.2	9.8	9.5	11.8	10.7	10.3
16. QLD-51	11.1	9.7	11.4	10.3	11.2	10.2	10.6	9.6	10.2	9.6	9.9	8.4	12.2	10.3	10.4
17. QLD-54	11.1	9.9	10.2	10.1	11.3	10.2	10.3	9.7	10.2	9.3	9.8	8.7	12.0	10.4	10.2
18. QLD-58	11.5	9.8	10.8	10.7	11.3	10.1	10.5	9.6	10.6	9.5	10.1	8.9	11.6	10.3	10.4
19. QLD-61	11.1	10.0	11.2	10.0	10.9	9.6	10.3	9.1	10.0	9.6	9.8	8.8	11.5	10.2	10.2
C. PDW-233 (C)	11.5	9.8	9.4	10.3	11.0	10.5	10.2	9.0	9.9	10.1	10.0	9.3	11.9	10.6	10.2
20. QLD-63	11.4	9.9	10.5	10.5	10.8	10.3	10.4	8.9	10.4	9.8	10.1	9.1	11.1	10.1	10.2
21. QLD-65	11.3	9.7	10.9	10.8	11.1	10.2	10.5	8.6	10.3	9.8	10.1	9.4	11.0	10.2	10.3
22. QLD-67	12.3	9.8	10.7	10.6	11.5	10.1	10.5	8.9	10.2	9.5	9.9	9.5	12.1	10.8	10.5
23. QBP-12-9	11.4	9.6	10.9	10.8	10.8	10.3	10.5	8.6	10.1	8.9	9.5	10.0	12.1	11.1	10.3
24. QBP-13-8	11.6	10.0	11.6	10.3	11.0	10.2	10.6	12.6	10.6	9.5	10.1	8.3	12.8	10.6	10.8
25. PHS-708	11.6	9.9	10.8	10.2	11.1	9.5	10.3	9.0	10.5	9.5	10.0	8.5	11.8	10.2	10.2
B. UP-2672 (C)	11.4	9.8	9.5	10.7	10.6	10.7	10.3	9.6	9.9	10.0	10.0	8.6	12.2	10.4	10.3
A. HI-977 (C)	12.2	9.8	9.1	10.5	11.6	10.2	10.2	9.0	9.8	9.6	9.7	9.1	11.8	10.5	10.2
26. QBP-13-12	11.1	10.4	10.7	10.2	11.2	10.2	10.5	8.6	10.2	9.3	9.8	8.6	12.2	10.4	10.2
27. QBP-13-13	11.9	9.8	10.5	10.2	11.1	10.2	10.4	9.2	9.9	9.7	9.8	8.6	12.4	10.9	10.4
28. GW-2013-498	11.9	9.7	10.3	10.6	11.5	10.3	10.5	9.0	10.3	9.9	10.1	9.1	11.2	10.2	10.3
29. GW-2013-499	11.7	10.0	10.8	10.7	11.2	10.5	10.6	9.0	10.3	10.0	10.2	9.3	11.2	10.3	10.4
30. GW-2013-500	11.9	9.7	10.6	10.3	10.7	9.6	10.2	8.8	10.1	10.1	10.1	9.2	11.5	10.4	10.2
31. DBPQ-03	12.1	10.1	11.2	10.3	10.9	10.7	10.6	9.0	10.3	10.3	10.3	9.7	11.5	10.6	10.6
32. DBPQ-04	11.8	10.0	10.5	10.1	11.0	10.4	10.4	11.7	10.3	10.1	10.2	9.3	11.3	10.3	10.6
33. GW-2013-501	11.7	9.9	11.1	10.4	10.9	10.2	10.5	11.2	10.5	9.8	10.2	9.1	11.4	10.3	10.6
34. GW-2013-502	11.4	9.7	10.3	10.1	10.8	11.0	10.4	11.4	10.3	10.0	10.2	9.1	11.6	10.4	10.5
35. GW-2013-503	12.2	10.1	10.8	10.8	11.7	10.5	10.8	11.1	10.6	9.8	10.2	9.9	11.5	10.7	10.8
36. GW-2013-513	11.8	9.8	10.5	10.0	11.1	10.3	10.3	11.7	10.4	9.6	10.0	9.5	11.7	10.6	10.6
37. BWL-991	11.6	10.0	10.4	10.2	11.2	9.8	10.3	11.7	10.2	9.9	10.1	9.1	11.8	10.5	10.5
A. HI-977 (C)	12.2	9.9	9.4	10.0	11.2	10.0	10.1	9.0	9.8	10.1	10.0	8.9	11.6	10.3	10.2
38. BWL-1660	11.3	9.8	10.5	10.2	10.8	10.5	10.4	12.1	10.4	9.9	10.2	9.2	12.0	10.6	10.6
39. BWL-1661	11.0	10.0	11.1	10.0	11.4	9.8	10.5	11.6	10.2	9.9	10.1	8.9	12.0	10.5	10.5
40. BWL-1662	11.5	10.0	11.1	10.1	11.3	10.4	10.6	8.8	10.4	10.0	10.2	9.3	12.0	10.7	10.4
41. BWL-1663	11.1	10.0	11.0	10.1	10.8	10.0	10.4	11.1	10.6	9.8	10.2	9.7	12.1	10.9	10.6
C. PDW-233 (C)	12.3	9.8	9.4	10.1	10.7	10.1	10.0	11.3	9.9	10.1	10.0	9.0	11.6	10.3	10.4
42. BWL-1664	11.2	10.2	11.2	10.2	11.1	10.0	10.5	11.9	10.5	9.9	10.2	8.5	11.5	10.0	10.6
43. BWL-1797	12.1	10.2	11.1	10.4	11.2	10.1	10.6	11.7	10.2	9.8	10.0	8.9	11.5	10.2	10.7
44. QLD-70	11.6	9.7	10.8	10.3	11.4	9.9	10.4	11.3	10.3	9.8	10.1	8.7	12.0	10.4	10.5
45. QLD-71	11.6	9.8	11.0	10.3	11.3	9.6	10.4	11.7	10.4	9.6	10.0	8.6	12.1	10.4	10.5
B. UP-2672 (C)	12.3	9.5	9.4	10.3	10.9	10.7	10.2	13.1	10.3	10.0	10.2	9.3	11.7	10.5	10.7
46. QLD-72	12.3	9.9	10.5	10.3	11.5	9.8	10.4	12.0	10.0	9.9	10.0	9.0	11.8	10.4	10.6
47. QLD-73	11.3	10.0	11.1	10.7	11.0	10.4	10.6	11.7	9.9	9.2	9.6	8.5	12.2	10.4	10.5
48. QLD-74	11.2	9.8	11.3	10.0	11.0	9.9	10.4	12.8	10.0	9.1	9.6	8.4	11.2	9.8	10.4
49. QLD-75	11.8	9.6	10.5	10.2	10.8	10.2	10.3	11.5	10.3	9.6	10.0	8.5	11.2	9.9	10.4
50. QLD-76	12.0	9.6	10.3	10.7	11.2	10.2	10.4	11.8	10.3	9.4	9.9	8.8	11.9	10.4	10.6
51. QLD-77	12.2	9.8	10.5	10.1	11.0	9.7	10.2	12.1	10.3	9.5	9.9	8.7	12.0	10.4	10.5
52. QLD-78	11.6	9.7	10.8	10.3	11.1	9.9	10.4	12.6	10.1	9.4	9.8	8.5	11.9	10.2	10.5
Mean	11.6	9.8	10.5	10.3	11.1	10.2	10.4	10.2	10.3	9.7	9.9	9.0	11.8	10.4	10.4

Evaluation of Processing and Nutritional Quality of National Wheat Nurseries

During the year (2014-15), 69, 106 and 76 lines including checks belonging to NGSN, EIGN-I and NDSN were grown at IIWBR Research Farm, Karnal. All the lines of these three nurseries were analysed for processing quality parameters viz. test weight, protein content, grain hardness index, moisture content & sedimentation value and also for nutritional quality parameters like iron & zinc. Different processing and nutritional quality parameters showed wide variability (Table 12).

Table 12: Variability in Processing and Nutritional Quality Parameters

Parameter	NGSN	EIGN-I	NDSN
Test Weight (Kg/hl)	77.9 (73.2-80.7)	78.2 (73.8-80.8)	77.1 (68.0-82.0)
Protein Content (%)	12.5 (9.2-14.3)	11.3 (9.3-13.5)	12.4 (9.8-15.2)
Sedimentation Value(ml)	48 (31-64)	53 (31-69)	39 (23-50)
Grain Hardness Index	66 (34-88)	59 (29-80)	89 (67-103)
Iron (ppm)	40.6 (35.5-52.7)	36.8 (29.5-46.4)	41.3 (31.5-50.7)
Zinc (ppm)	34.0 (27.3-44.2)	31.2 (25.9-39.8)	35.3 (29.2-47.0)

Attempts were made to identify promising genotypes for various processing and nutritional quality parameters from all the 3 nurseries viz. NGSN (Table 13), EIGN-I (Table 14) and NDSN (Table 15).

Table 13: Promising Genotypes for Processing and Nutritional Quality Parameters (NGSN)

Parameters	Value	Genotypes
Test Weight (kg/hl)	>80.0	HS 557, NIAW 34, NW 5013, PBW 640 and Sonalika
Protein Content (%)	>13.5	MP 3288, Sonalika, UAS 320, AKAW 4731, VW 20167, VW 20168 and EIGN 2013-36
Sedimentation Value (ml)	>60	HD 3098, PBW 670, HD 3077, HS 526, WH 1105, PHS 11, HD 2967 and EIGN 2013-6
Grain Hardness Index	>75	HD 3098, HD 3075, DBW 58, HPW 360, VL 941 and K 1006
	<45.0	MP 1259, PHS 1107 and EIGN 2013-67
Iron (ppm)	>45.0	PBW 658, HD 3065, HI 1579, Raj 4388 and K 1006
Zinc (ppm)	>40.0	HS 526, HI 1579, PW 360, PBW 640 and NW 5013

Table 14: Promising Genotypes for Processing and Nutritional Quality Parameters (EIGN-I)

Parameters	Value	Genotypes
Test Weight (kg/hl)	>80.0	34 th ESWYT 108, 128, 145, K 1006 (C), 46 th IBWSN 1128, 8 th HTWSN 4426, 4471, 4506, 21 st SAWYT 336, 350, 31 st SAWSN 3090
Protein Content (%)	~13.0	34 th ESWYT 147, 46 th IBWSN 1113, 1117, 1128 and 8 th SREMRRSN 6198
Sedimentation value (ml)	>65	34 th ESWYT 146, 8 th EBWYT 520, 21 st HRWYT 233, 46 th IBWSN 1145, 24 th HRWSN 2014, 8 th HTWSN 4426 and 21 st SAWYT 334
	>75	34 th ESWYT 146, K 1006 (C), HI 1544 (C), DBW 88 (C) and 8 th SREMRRSN 6198
Grain Hardness Index	<45	UAS 304 (C), 24 th HRWSN 2105, 21 st SAWYT 307, 337 and 31 st SAWSN 3117
Iron (ppm)	~45.0	8 th EBWYT 510, 46 th IBWSN 1128, HI 1544 (C), DBW 88 (C) and 31 st SAWSN 3117
Zinc (ppm)	>35.0	34 th ESWYT 128, 142, 46 th IBWSN 1113, 1128, 8 th SREMRRSN 6198, 8 th HTWSN 4426, 31 st SAWSN 3064, 3090, K 1006 (C) and HI 1544 (C)

Table 15: Promising Genotypes for Processing and Nutritional Quality Parameters (NDSN)

Parameters	Value	Genotypes
Test Weight (kg/hl)	>80.0	45 th IDYN 730, 734, 45 th IDSN 7008, HI 8498, DBPY-11-2, GW 2010-284, PDW 233, PDW 329, AKDW 4749 and MACS 3828
Protein Content (%)	~14.0	45 th IDYN 710, 711, 724, GW 2010-275, 2010-277 & 2010-286 and NIDW 760
Sedimentation value (ml)	>45	45 th IDYN 707, 716, 730, 734, 745, 45 th IDSN 7018 and 7151
Grain Hardness Index	>95	45 th IDYN 727, 734, 745, 45 th IDSN 7018, 7019, 7029, 7059, 7064, 7109, HI 8498 and PDW 291
Iron (ppm)	>45.0	45 th IDYN 706, 711, 727, 45 th IDSN 7003, 7108, 7110, 7144, GW 2010-278, 2010-286, VW 20169 and PDW 329
Zinc (ppm)	>40.0	45 th IDYN 711, 727, 746, 45 th IDSN 7003, 7110, 7144, GW 2010-277, 2010-278, 2010-279, 2010-286,

Detailed results have been present in Table 16 (NGSN), Table 17 (EIGN-I) and Table 18 (NDSN).

Table 16: Evaluation of Processing & Nutritional Quality Parameters of National Wheat Nurseries NGSN for the year 2014-15

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kg/hl)	Protein Content (%)	Moisture Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)
A. Resistant to all three rusts								
1	HD 3098	79.5	11.7	10.2	64	81	41.4	31.1
2	PBW 670	78.7	9.2	10.0	61	59	43.1	29.5
3	RAJ 4270	75.3	12.1	9.5	55	64	41.8	30.2
4	TL 2978 (T)	-	-	-	-	-	-	-
B. Resistant to Stem & Leaf rust								
5	HI 1584	79.2	11.8	9.8	48	63	47.6	35.1
6	MP 1259	78.7	12.8	9.5	45	35	44.5	34.0
7	PBW 658	78.4	12.6	9.1	58	65	45.8	36.4
8	HW 1098 (dic.)	-	-	-	-	-	-	-
C. Resistant to Leaf & Stripe rusts								
9	HD 3065	78.2	13.2	9.6	56	73	46.4	31.7
10	HD 3075	79.2	12.6	9.1	59	75	41.6	29.2
11	HD 3077	78.7	11.4	9.7	62	64	38.3	32.2
12	HS 526	79.8	11.7	9.6	63	57	38.4	40.1
13	HS 557	80.5	12.1	9.8	50	66	43.1	39.3
14	WH 1105	79.5	12.0	9.7	64	64	37.8	30.2
15	HI 1579	79.6	13.3	9.5	54	68	46.5	40.6
II. Promising entries from NGSN 2013-14 (Contributor: SK Singh)								
16	DBW 58	78.0	13.3	9.9	57	75	36.5	33.6
17	HD 3040	77.2	12.6	9.1	53	72	40.7	37.6
18	HPW 360	76.5	13.4	9.8	46	88	40.8	40.4
19	MP 3288	78.3	14.3	9.0	35	66	44.5	36.4
20	NIAW 34	80.0	13.3	9.5	50	69	40.7	36.8
20A	Sonalika	78.5	13.7	9.1	53	72	39.7	38.7
20B	HD 2967	77.3	13.5	9.0	53	67	40.0	37.2
20C	Infector	78.4	12.7	9.8	49	61	40.5	39.9
21	NW 5013	80.7	12.6	9.2	31	68	41.5	44.2
22	PBW 640	80.5	12.9	9.9	37	69	37.7	40.5
23	PHS 1101	-	-	-	-	-	-	-
24	PHS 1103	76.8	12.1	9.3	38	70	37.8	35.0
25	PHS 1104	75.7	11.1	9.4	43	56	41.3	35.8
26	PHS 1106	76.5	12.0	9.4	35	55	39.6	33.0
27	PHS 1107	78.7	11.7	10.0	37	45	37.5	31.9
28	Raj 4388	78.6	11.6	9.5	40	74	45.0	32.8
29	UAS 320	78.7	13.6	9.7	41	66	41.8	36.8
30	VL 941	79.4	12.8	9.2	41	75	43.9	32.5

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kg/hl)	Protein Content (%)	Moisture Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)

III. New Agronomic base (Contributor: SK Singh)

31	DBW 71	78.6	12.4	9.4	33	70	44.3	38.5
32	DBW 88	78.4	13.2	9.8	52	71	43.3	33.5
33	DBW 90	79.4	11.8	10.3	46	70	43.6	32.3
34	DBW 107	78.6	12.1	9.0	38	63	40.5	33.0
35	DBW 110	78.2	11.2	9.4	53	60	36.4	34.7
36	K 1006	79.2	13.3	9.4	53	77	45.5	37.8
37	NW 5054	77.3	12.4	9.4	50	60	36.2	30.6

IV. Genetic Stocks (Contributor: SK Singh)

38	PHSL 5	74.8	12.5	10.1	40	54	38.7	32.4
39	PHSL 10	73.5	11.3	10.1	39	66	37.4	30.4
40	PHSL 11	76.7	11.9	9.6	63	56	38.5	29.2
40A	Sonalika	78.7	13.7	10.0	44	61	38.9	32.2
40B	HD 2967	79.2	12.9	9.2	60	67	37.5	28.5
40C	Infector	77.5	13.5	9.8	33	69	52.7	33.9
41	AKAW 4731	78.2	13.8	9.8	44	70	39.8	27.3
42	AKAW 4739	76.5	12.1	10.2	43	73	37.5	28.5
43	GW 2010-272	77.5	12.3	9.9	32	73	41.7	32.0
44	GW 2010-281	74.1	11.6	9.4	49	63	36.8	28.7
45	GW 2010-287	74.5	12.6	9.2	58	61	40.2	32.6
46	GW 2010-288	75.2	12.4	9.5	42	67	41.8	30.7
47	GW 2010-291	74.5	12.6	9.8	44	70	37.5	31.6
48	KLY 1035	79.5	11.9	9.5	56	73	39.2	32.5
49	KLY 1082	74.5	13.0	10.1	45	62	38.1	30.4
50	KLY 1090	78.8	13.5	9.5	56	73	41.6	33.9
51	RAJ 4265	73.2	12.6	9.7	52	71	40.8	31.4
52	VW 20145	78.3	12.7	9.9	41	69	40.5	38.1
53	VW 20167	77.5	13.9	9.8	46	61	43.4	37.1
54	VW 20168	79.5	13.6	9.2	40	65	40.0	30.8

VI. Elite lines from International nurseries (Contributor: Arun Gupta)

55	EIGN 2013-6	75.5	11.6	9.7	60	54	36.1	32.6
56	EIGN 2013-8	78.3	12.6	9.7	52	70	39.0	37.9
57	EIGN 2013-13	78.4	11.6	9.7	44	71	35.5	31.9
58	EIGN 2013-36	75.4	14.1	10.0	43	70	40.7	37.1
59	EIGN 2013-55	79.3	12.1	10.2	44	56	38.9	33.6
60	EIGN 2013-67	78.5	12.4	10.0	45	34	37.5	32.8
60A	Sonalika	80.4	10.8	10.1	59	64	36.7	34.4
60B	HD 2967	78.4	10.6	9.9	63	55	36.3	31.9
60C	Infector	79.4	11.5	9.6	42	69	39.4	38.9
Overall Mean		77.9	12.5	9.6	48	66	40.6	34.0
Minimum		73.2	9.2	9.0	31	34	35.5	27.3
Maximum		80.7	14.3	10.3	64	88	52.7	44.2

Table 17: Evaluation of Processing & Nutritional Quality Parameters of National Wheat Nurseries EIGN-I for the year 2014-15

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kg/hl)	Protein Content (%)	Moisture Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)
1	34th ESWYT 108	79.7	11.2	10.6	55	65	34.9	32.3
2	34th ESWYT 109	80.5	10.5	9.6	49	59	37.4	30.2
3	34th ESWYT 111	78.3	10.2	10.0	50	48	30.9	27.3
4	34th ESWYT 119	76.8	10.2	10.1	46	61	34.4	30.8
5	34th ESWYT 121	78.3	10.6	10.0	60	51	33.0	31.0
6	34th ESWYT 122	79.5	10.9	9.8	54	55	37.6	30.1
7	34th ESWYT 124	78.2	11.3	10.0	60	68	35.6	28.0
7A	DBW 88 (Check)	79.0	10.8	9.6	52	54	35.7	32.5
8	34th ESWYT 128	80.4	11.1	10.5	53	55	39.8	38.9
9	34th ESWYT 131	78.8	10.2	9.8	61	49	31.1	26.9
10	34th ESWYT 134	77.8	10.3	9.7	58	63	38.9	33.8
11	34th ESWYT 142	78.3	11.7	9.8	49	61	40.8	36.1
12	34th ESWYT 145	80.5	10.5	9.5	62	54	33.7	29.4
13	34th ESWYT 146	79.7	11.5	9.9	65	78	33.5	26.8
14	34th ESWYT 147	78.4	13.0	9.4	51	63	36.4	29.9
14B	K1006 (Check)	78.5	11.9	9.9	33	74	42.0	34.2
15	34th ESWYT 148	78.3	11.7	10.0	53	63	39.4	31.0
16	8th EBWYT 503	76.5	10.6	10.4	51	54	33.8	31.2
17	8th EBWYT 506	77.6	9.3	9.7	49	53	33.9	30.6
18	8th EBWYT 507	77.3	9.9	9.7	55	48	34.1	32.0
18B	-	-	-	-	-	-	-	-
18C	HI 1544 (Check)	76.6	11.0	9.8	44	70	38.7	27.3
19	8th EBWYT 509	78.2	10.7	9.7	61	69	37.6	33.1
19D	UAS 304 (Check)	76.7	12.4	9.7	42	60	39.7	33.6
20	8th EBWYT 510	78.2	11.5	9.6	55	52	42.9	33.8
21	8th EBWYT 512	78.8	10.8	9.8	49	54	35.9	28.5
22	8th EBWYT 514	76.4	10.4	9.8	60	58	34.3	27.1
22B	K1006 (Check)	80.5	12.1	9.8	32	65	41.6	34.7
23	8th EBWYT 518	79.5	11.2	9.6	58	66	36.0	31.0
24	8th EBWYT 520	75.4	10.5	10.0	65	55	32.0	26.8
25	8th EBWYT 522	77.0	9.9	9.7	51	48	29.5	28.6
25C	HI 1544 (Check)	77.5	11.4	9.9	43	80	40.7	29.1
26	8th EBWYT 528	77.8	11.6	9.9	59	58	35.4	34.7
27	8th EBWYT 529	76.3	11.6	9.8	57	58	37.2	29.0
28	8th EBWYT 530	74.8	11.7	9.6	49	64	31.9	30.1
28D	UAS 304 (Check)	78.5	12.1	9.8	43	62	40.8	32.8
29	21st HRWYT 211	79.3	11.1	9.5	59	57	35.8	30.1
30	21st HRWYT 222	77.3	11.1	9.9	55	55	38.0	27.3
31	21st HRWYT 224	79.1	11.6	10.0	50	71	34.0	34.0
32	21st HRWYT 230	76.4	11.9	10.1	54	70	33.2	32.6
33	21st HRWYT 231	78.5	11.8	9.5	47	58	32.6	27.1
33A	DBW 88 (Check)	78.3	11.9	9.5	60	73	37.0	31.1
34	21st HRWYT 233	76.7	11.7	9.7	66	59	36.9	28.5
35	46th IBWSN 1009	78.4	11.4	9.9	60	59	36.8	33.9

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kg/hl)	Protein Content (%)	Moisture Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)
36	46th IBWSN 1013	78.5	11.4	9.9	60	62	37.9	31.8
37	46th IBWSN 1095	79.4	11.5	10.3	56	56	39.1	33.2
38	46th IBWSN 1107	79.8	11.4	9.8	60	69	35.4	29.8
39	46th IBWSN 1113	74.5	13.5	10.6	51	60	40.9	36.1
40	46th IBWSN 1117	75.3	13.5	9.5	54	60	39.6	28.5
41	46th IBWSN 1128	80.5	12.5	9.7	47	66	44.3	38.9
42	46th IBWSN 1132	79.6	11.1	9.6	54	58	37.6	31.8
43	46th IBWSN 1138	76.5	12.4	9.8	53	62	35.8	33.6
43C	HI 1544 (Check)	76.5	12.3	9.8	44	69	46.4	30.4
44	46th IBWSN 1143	76.2	11.9	9.9	62	59	37.8	34.3
45	46th IBWSN 1145	78.4	11.9	10.2	67	55	36.5	31.7
45D	UAS 304 (Check)	78.5	9.7	10.0	45	42	32.4	26.2
46	46th IBWSN 1181	78.4	11.4	9.2	42	59	39.9	33.1
47	46th IBWSN 1203	78.5	11.3	9.7	55	55	31.0	26.4
48	46th IBWSN 1208	78.8	10.5	9.9	51	58	36.0	31.2
49	46th IBWSN 1252	77.3	12.0	10.0	46	49	32.9	28.6
49B	K 1006 (Check)	80.5	10.6	9.9	31	70	38.4	32.6
50	46th IBWSN 1329	79.5	10.9	9.7	60	65	34.1	27.8
51	24TH HRWSN 2001	78.3	11.8	10.0	45	48	39.4	34.5
52	24TH HRWSN 2009	79.6	11.6	10.3	51	57	36.0	30.0
53	24TH HRWSN 2014	79.8	10.7	9.7	65	55	36.2	31.6
53A	DBW 88 (Check)	78.8	11.8	10.4	60	64	37.0	29.9
54	24TH HRWSN 2079	79.8	11.5	9.7	61	64	35.4	29.7
55	24TH HRWSN 2105	77.8	11.5	9.9	50	33	33.3	28.3
56	24TH HRWSN 2112	77.3	11.1	10.3	59	50	34.9	30.6
57	8 TH SREMRRSN 6010	76.3	10.8	9.9	60	68	33.1	27.6
58	8 TH SREMRRSN 6037	77.6	10.1	9.9	58	62	34.8	30.9
59	8 TH SREMRRSN 6043	73.8	11.6	10.5	48	54	38.7	30.8
60	8 TH SREMRRSN 6198	77.8	12.8	9.5	53	73	38.5	35.1
61	8 TH HTWSN 4426	80.4	12.0	10.1	68	72	40.6	37.2
62	8 TH HTWSN 4471	80.5	12.2	10.0	54	66	39.2	32.2
63	8 TH HTWSN 4481	78.3	12.1	9.5	57	59	36.2	29.4
63B	K 1006 (Check)	80.3	11.1	9.6	32	70	38.5	33.0
64	8 TH HTWSN 4506	80.8	9.9	10.0	57	50	36.5	30.6
65	21stSAWYT 307	77.8	9.6	9.6	49	46	35.7	31.6
66	21stSAWYT 310	78.7	10.6	9.4	59	56	32.3	29.5
67	21stSAWYT 312	78.8	11.4	9.6	59	64	33.2	30.1
67D	UAS 304 (Check)	79.0	11.3	9.8	45	56	36.5	32.7
68	21stSAWYT 316	77.7	11.4	10.2	53	63	38.2	26.1
69	21stSAWYT 319	76.4	10.4	9.4	50	55	39.1	29.1
70	21stSAWYT 330	78.7	12.4	9.7	50	69	38.7	32.1
71	21stSAWYT 331	77.6	10.7	10.0	50	55	36.1	30.1
71A	DBW 88 (Check)	79.3	10.9	9.5	62	63	34.8	25.9
72	21stSAWYT 332	77.6	9.4	10.0	44	59	32.7	28.3
73	21stSAWYT 333	78.0	9.7	9.8	46	52	36.1	31.2
74	21stSAWYT 334	77.5	10.9	9.8	69	61	38.5	34.7
75	21stSAWYT 335	78.4	10.7	9.8	63	54	35.7	31.9

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kg/hl)	Protein Content (%)	Moisture Content (%)	Sedimen- tation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)
75C	HI 1544 (Check)	78.3	10.5	10.1	45	69	38.6	29.4
76	21stSAWYT 336	80.5	9.9	9.7	39	62	33.9	30
77	21stSAWYT 337	78.7	10.7	9.7	46	29	33.3	29.5
78	21stSAWYT 342	77.5	10.9	10.3	47	38	34.4	28
79	21stSAWYT 349	79.3	10.8	10.1	61	59	39.5	29.9
80	21stSAWYT 350	80.5	10.8	9.5	62	58	35.3	29.2
80D	UAS 304 (Check)	78.6	11.6	9.3	46	49	36.2	30.9
81	31st SAWSN 3064	78.7	11.6	10.1	56	65	35.3	35.7
82	31st SAWSN 3083	76.5	11.0	9.9	58	64	41.9	33.9
82A	DBW 88 (Check)	78.3	12.3	9.9	63	70	42.3	34.6
83	31st SAWSN 3086	76.4	12.4	9.7	47	60	34.7	32.6
84	31st SAWSN 3090	80.3	12.2	9.6	49	61	36.5	37.3
84B	K 1006 (Check)	80.5	12.3	9.8	34	70	40.8	39.8
85	31st SAWSN 3111	74.8	12.4	9.6	59	60	40.9	31.6
86	31st SAWSN 3117	77.8	12.6	9.3	45	32	42.4	32.8
86C	HI 1544 (Check)	78.7	11.6	9.7	44	74	42.7	35.0
Overall Mean		78.2	11.3	9.8	53	59	36.8	31.2
	Minimum	73.8	9.3	9.2	31	29	29.5	25.9
	Maximum	80.8	13.5	10.6	69	80	46.4	39.8

Table 18: Evaluation of Processing & Nutritional Quality Parameters of National Wheat Nurseries NDSN for the year 2014-15

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kg/hl)	Protein Content (%)	Moisture Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)
1	45 th IDYN-706	75.3	12.0	9.4	39	82	45.1	34.6
2	45 th IDYN- 707	73.2	12.8	10.0	46	90	42.2	29.7
3	45 th IDYN-708	78.5	13.3	9.6	43	93	41.1	29.4
4	45 th IDYN-710	71.2	14.0	9.5	43	89	41.6	35.3
5	45 th IDYN-711	68.0	14.9	10.3	29	89	50.7	47.0
6	45 th IDYN-713	75.2	13.1	9.9	38	91	43.7	34.8
7	45 th IDYN-716	73.6	13.8	9.5	46	87	44.6	34.8
8	45 th IDYN-721	75.2	13.5	9.5	41	91	44.3	36.8
9	45 th IDYN-724	78.0	13.9	9.4	40	91	44.6	35.0
10	45 th IDYN-727	79.3	13.8	9.5	39	97	47.4	40.2
11	45 th IDYN-730	80.2	12.9	9.6	50	94	44.1	31.1
12	45 th IDYN-734	80.8	11.8	9.7	48	96	41.2	29.4
13	45 th IDYN-736	76.8	11.4	10.0	35	93	44.5	30.6
14	45 th IDYN-742	78.6	11.9	9.7	41	90	39.4	39.2
15	45 th IDYN-745	79.2	11.4	10.1	46	101	43.2	30.0
16	45 th IDYN-746	78.2	11.5	9.8	40	90	36.6	41.1
17	45 th IDYN-747	79.4	11.7	9.4	39	88	42.3	35.5
18	45 th IDSN-7003	77.5	13.2	9.8	45	92	48.8	42.0
19	45 th IDSN-7008	80.1	11.1	9.7	43	85	40.8	32.5
20	45 th IDSN-7009	72.3	12.1	9.5	35	90	36.3	30.7
20A	HI 8498	82.0	11.8	9.8	35	94	37.9	35.4
20B	PDW 291	78.2	11.5	9.6	30	94	38.7	39.5
20C	PDW 233	78.4	11.8	9.4	41	89	35.4	30.1
21	45 th IDSN-7011	72.5	12.9	10.0	34	87	37.6	35.9
22	45 th IDSN-7016	76.7	13.3	9.9	42	88	38.9	31.9
23	45 th IDSN-7017	70.0	13.1	9.4	40	85	41.8	30.9
24	45 th IDSN-7018	78.5	12.9	9.5	49	99	43.2	37.4
25	45 th IDSN-7019	79.2	13.0	10.2	39	100	43.3	29.8
26	45 th IDSN-7029	76.7	12.9	9.6	36	99	38.8	35.7
27	45 th IDSN-7038	74.2	12.8	9.3	39	88	37.1	30.7
28	45 th IDSN-7048	76.3	11.4	9.5	42	87	38.1	30.1
29	45 th IDSN-7059	77.2	11.9	9.6	44	103	38.9	37.5
30	45 th IDSN-7060	77.6	12.1	9.0	43	89	44.9	39.9
31	45 th IDSN-7064	78.7	12.7	9.8	40	97	41.8	33.2
32	45 th IDSN-7084	77.7	12.1	9.8	42	95	43.4	34.2
33	45 th IDSN-7090	75.0	11.8	9.3	35	86	42.3	29.3
34	45 th IDSN-7104	76.2	12.2	9.5	37	90	41.1	31.3
35	45 th IDSN-7108	76.8	13.4	9.6	40	93	45.6	35.4
36	45 th IDSN-7109	78.6	13.8	9.7	39	99	43.3	35.7
37	45 th IDSN-7110	75.7	12.9	10.0	40	86	48.0	43.8
38	45 th IDSN-7135	77.6	11.4	9.4	44	85	35.7	35.5
39	45 th IDSN-7144	78.2	13.0	9.6	43	90	49.9	41.2
40	45 th IDSN-7147	76.2	11.3	9.6	30	79	34.9	33.3

Sr. No	Entry	Processing Quality					Nutritional Quality	
		Test Weight (kghl)	Protein Content (%)	Moisture Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Iron (ppm)	Zinc (ppm)
40A	HI 8498	79.8	12.2	9.6	38	97	38.5	36.5
40B	PDW 291	79.3	11.9	9.7	35	98	43.1	39.4
40C	PDW 233	78.7	12.0	9.5	45	92	41.5	31.6
41	45 th IDSN-7151	76.7	10.8	9.7	46	90	36.2	38.1
42	DBPY-1 1-1	77.8	12.8	10.1	31	87	40.9	33.5
43	DBPY-1 1-2	80.7	13.3	9.5	43	86	39.4	35.8
44	GW-2010-275	75.5	14.9	10.1	40	93	43.0	38.5
45	GW-2010-277	79.4	13.9	9.9	39	77	42.4	42.0
46	GW-2010-278	69.2	13.7	9.9	41	80	45.7	45.3
47	GW-2010-279	77.8	13.7	9.6	30	88	43.0	43.3
48	GW-2010-282	72.3	12.4	10.1	44	85	37.8	36.5
49	GW-2010-284	80.5	11.0	9.6	37	69	42.2	36.1
50	GW-2010-285	77.3	11.0	9.7	28	74	31.5	29.6
51	GW-2010-286	76.2	15.2	9.8	35	92	48.6	43.4
52	GW-2010-298	72.4	13.8	10.0	32	87	40.7	35.0
53	NIDW-760	77.5	13.9	9.6	38	67	43.0	38.7
54	VW-20169	78.7	12.6	9.7	37	89	45.2	35.6
55	44 th IDYN-13	76.8	11.2	9.1	27	91	35.5	30.7
56	44 th IDYN-30	76.8	12.3	9.4	29	88	41.0	36.0
57	44 th IDYN-33	79.4	10.7	9.0	40	91	38.9	35.5
58	44th IDYN-36	78.7	11.2	9.7	42	87	41.5	39.9
59	44 th IDYN-43	78.5	10.9	9.6	40	91	40.6	39.0
60	44 th IDYN-49	79.2	10.9	9.1	43	75	39.1	31.8
60A	HI 8498	80.2	11.3	9.8	40	98	37.9	37.2
60B	PDW 291	79.3	10.9	9.8	35	78	40.2	35.3
60C	PDW 233	80.4	11.3	10.0	34	95	36.2	33.7
61	44 th IDSN-57	77.3	13.5	9.3	41	91	40.8	33.4
62	44 th IDSN-117	77.0	13.1	9.5	42	94	39.3	34.9
63	GW 1276	75.8	13.3	10.1	36	76	42.4	33.7
64	PDW 329	80.3	13.0	9.7	37	90	45.3	31.3
65	GW 1280	72.4	12.7	9.5	24	91	40.9	36.5
66	AKDW 4749	80.5	10.0	9.6	23	85	37.9	31.6
67	MACS 3828	80.4	9.8	9.7	37	77	37.5	29.2
	Overall Mean	77.1	12.4	9.7	39	89	41.3	35.3
	Minimum	68.0	9.8	9.0	23	67	31.5	29.2
	Maximum	82.0	15.2	10.3	50	103	50.7	47.0

SECTION E

WHEAT PRODUCTS EVALUATION

- i. Chapati
- ii. Bread
- iii. Biscuit
- iv. Pasta

WHEAT PRODUCTS EVALUATION

The 2nd year AVT entries including checks were evaluated for chapati, bread & biscuit from *T. aestivum* and pasta products from *T. durum* in all the centres, sowing conditions and zones. Various aspects covered in this chapter are chapatti quality (maximum score 10.0), phenol test (maximum score 10.0), bread loaf volume (ml), bread loaf volume (ml)/dough weight (g), bread quality (maximum score 10.0), extraction rate (%), wet gluten (%), dry gluten (%), gluten index, biscuit diameter (cm), biscuit spread factor of *T. aestivum*, pasta cooking quality and pasta sensory evaluation of *T. durum*.

Chapati Quality (Table 1-5)

For the evaluation of chapatti quality, various parameters like water absorption, nature & colour of dough (before and after maturation), chapati appearance, colour, aroma, taste, puffing height, pliability and loss of water (just after and after 4 hrs of baking) were considered and the score was given out of 10.0. Among the checks, C 306, K 8027, HD 2888, (RTS, NEPZ), HD 2864, HD 2932, MP 3336 (ILS, CZ), MACS 6478 (ITS, PZ) and NIAW 1415 (RTS, RITS, PZ) recorded >8.0/10.0 score. No 2nd year entry scored >8.0

The phenol test (table 5-10) was carried out on all the samples. In this test, about 100 wheat grains were taken in a tube and 1.0% phenol solution was added so as to submerge the grains. After two hours, the solution was drained and grains were dried on a filter paper. The grains of *T.aestivum* turned light brown, medium brownish black and dark brownish black. Depending upon the degree of darkness, score was given out of 10.0. The phenol test score was found to correlate negatively with chapatti quality score. The entries which made excellent chapatti with >8.0 score invariably developed very light brown colour. This technique is simple and can be easily used in screening the genotypes for chapatti. Since different varieties develop different degree of darkness, this technique may be used in identifying mixtures of wheat varieties.

Table 1: Chapati Quality (Max-10) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	7.60	7.50	7.70	7.60
2. VL 804 (C)	03	7.57	7.43	7.71	7.57
3. VL 907 (C)	05	7.43	7.23	6.67	7.11
4. HS 507 (C)	06	7.30	7.25	6.72	7.09
5. HPW 349 (C)	04	7.40	7.35	6.80	7.18
Mean		7.46	7.35	7.12	7.31
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	7.45	7.67	7.50	7.54
2. VL 804 (C)	03	7.40	7.55	7.65	7.53
3. VL 907 (C)	05	7.30	7.45	6.70	7.15
4. HS 507 (C)	06	7.40	7.15	6.80	7.12
5. HPW 349 (C)	04	7.30	7.45	7.15	7.30
Mean		7.37	7.45	7.16	7.33
Rainfed, Early Sown					
1. VL 829 (C)	04	7.10	6.80	6.90	6.93
2. HPW 251 (C)	06	7.50	7.45	7.30	7.42
3. HS 542 (C)	01	7.60	7.50	7.25	7.45
Mean		7.40	7.25	7.15	7.27
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	6.80	6.95	7.15	6.97
2. HS 490 (C)	02	6.70	6.85	7.05	6.87
Mean		6.75	6.90	7.10	6.92

Table 2: Chapati Quality (Max-10) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	7.80	7.50	7.75	7.55	7.80	7.68
2. DPW 621-50 (C)	02	7.70	7.45	7.65	7.55	7.45	7.56
3. WH 1105 (C)	03	7.65	7.55	7.70	7.67	7.40	7.59
4. DBW 88 (C)	05	7.75	7.40	7.80	7.55	7.60	7.62
5. HD 3086 (C)	04	7.50	7.45	7.58	7.60	7.75	7.58
Mean		7.68	7.47	7.70	7.58	7.60	7.61
Irrigated, Late Sown							
1. WH 1021 (C)	09	7.62	7.55	7.50	7.83	7.50	7.60
2. HD 3059 (C)	11	7.77	7.50	7.70	7.80	7.55	7.66
3. DBW 90 (C)	15	7.60	7.70	7.60	7.75	7.40	7.61
4. WH 1124 (C)	10	7.75	7.60	7.75	7.62	7.45	7.63
Mean		7.69	7.59	7.64	7.75	7.48	7.63
Rainfed, Timely Sown							
1. WH 1164	05	7.55	-	7.75	-	7.40	7.57
2. PBW 644 (C)	06	7.60	-	7.80	-	7.50	7.63
3. WH 1080 (C)	01	7.70	-	7.80	-	7.60	7.70
Mean		7.62	-	7.78	-	7.50	7.63
Restricted Irrigation, Timely Sown							
1. MP 1277	05	7.80	-	7.75	7.70	7.65	7.73
2. PBW 644 (C)	01	7.55	-	7.70	7.60	7.50	7.59
3. WH 1080 (C)	04	7.75	-	7.70	7.65	7.60	7.68
4. HD 3043 (C)	02	7.60	-	7.75	7.50	7.40	7.56
5. WH 1142 (I)	03	7.50	-	7.60	7.45	7.40	7.49
Mean		7.64	-	7.70	7.58	7.51	7.61

Table 3: Chapati Quality (Max-10) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	8.32	8.05	7.97	8.11
2. K 8027 (C)	05	8.12	7.95	8.05	8.04
3. HD 2888 (C)	03	8.05	8.00	7.98	8.01
Mean		8.16	8.00	8.00	8.05

Table 4: Chapati Quality (Max-10) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	7.65	7.50	7.75	7.67	7.55	7.62
2. HI 1544 (C)	07	7.70	7.60	7.80	7.55	7.45	7.62
Mean		7.68	7.55	7.78	7.61	7.50	7.62
Irrigated, Late Sown							
1. MP 4010 (C)	04	7.80	7.70	7.90	7.75	7.70	7.77
2. HD 2864 (C)	05	8.15	7.96	8.12	8.05	7.90	8.04
3. HD 2932 (C)	03	8.20	7.90	8.15	8.00	7.95	8.04
4. MP 3336 (C)	02	8.11	8.00	8.20	7.96	7.92	8.04
Mean		8.07	7.89	8.09	7.94	7.87	7.97

Table 5: Chapati Quality (Max-10) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	7.75	7.70	7.60	7.68
2. MACS 6478 (C)	05	8.15	8.05	7.95	8.05
Mean		7.95	7.88	7.78	7.87
Rainfed, Timely Sown					
1. NIAW 2030	06	-	7.85	-	7.85
2. NI 5439 (C)	13	-	7.70	-	7.70
3. NIAW 1415 (C)	10	-	8.05	-	8.05
4. UAS 347 (I)	05	-	7.65	-	7.65
Mean		-	7.81	-	7.81
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	7.75	7.60	7.80	7.72
2. NIAW 1415 (C)	02	8.15	7.95	8.05	8.05
3. DBW 93 (I)	08	8.05	7.90	7.95	7.97
Mean		7.98	7.82	7.93	7.91

Table 6: Phenol Test (Max-10) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	5.5	6.5	5.0	5.7
2. VL 804 (C)	03	4.0	4.5	5.5	4.7
3. VL 907 (C)	05	6.5	6.0	6.0	6.2
4. HS 507 (C)	06	5.0	5.5	5.0	5.2
5. HPW 349 (C)	04	4.5	6.0	6.0	5.5
Mean		5.1	5.7	5.5	5.4
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	6.5	6.5	5.5	6.2
2. VL 804 (C)	03	4.0	4.5	5.0	4.5
3. VL 907 (C)	05	5.5	6.0	4.5	5.3
4. HS 507 (C)	06	6.0	5.5	4.5	5.3
5. HPW 349 (C)	04	4.5	6.5	5.0	5.3
Mean		5.3	5.8	4.9	5.3
Rainfed, Early Sown					
1. VL 829 (C)	04	6.0	5.5	5.5	5.7
2. HPW 251 (C)	06	4.0	4.0	4.5	4.2
3. HS 542 (C)	01	4.0	4.5	4.0	4.2
Mean		4.7	4.7	4.7	4.7
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	6.0	6.5	6.0	6.2
2. HS 490 (C)	02	6.5	6.0	5.0	5.8
Mean		6.3	6.3	5.5	6.0

Table 7: Phenol Test (Max-10) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	6.0	4.5	5.0	4.5	5.5	5.1
2. DPW 621-50 (C)	02	7.0	4.5	5.5	5.0	6.0	5.6
3. WH 1105 (C)	03	7.0	5.5	6.5	6.0	5.5	6.1
4. DBW 88 (C)	05	6.5	6.0	6.0	5.5	6.0	6.0
5. HD 3086 (C)	04	6.5	5.5	6.0	5.5	5.5	5.8
Mean		6.6	5.2	5.8	5.3	5.7	5.7
Irrigated, Late Sown							
1. WH 1021 (C)	09	7.0	5.0	6.0	6.5	6.5	6.2
2. HD 3059 (C)	11	6.5	6.0	7.0	6.5	6.5	6.5
3. DBW 90 (C)	15	6.5	6.5	6.0	6.0	6.5	6.3
4. WH 1124 (C)	10	6.5	5.0	7.5	7.0	6.0	6.4
Mean		6.6	5.6	6.6	6.5	6.4	6.4
Rainfed, Timely Sown							
1. WH 1164	05	4.5	-	4.5	-	4.5	4.5
2. PBW 644 (C)	06	5.0	-	5.5	-	5.0	5.2
3. WH 1080 (C)	01	6.0	-	6.0	-	6.0	6.0
Mean		5.2	-	5.3	-	5.2	5.2
Restricted Irrigation, Timely Sown							
1. MP 1277	05	5.0	-	4.5	5.0	5.0	4.9
2. PBW 644 (C)	01	5.0	-	4.5	5.5	5.0	5.0
3. WH 1080 (C)	04	5.0	-	5.5	6.0	5.0	5.4
4. HD 3043 (C)	02	6.0	-	5.0	4.5	6.0	5.4
5. WH 1142 (I)	03	5.0	-	6.0	4.5	5.0	5.1
Mean		5.2	-	5.1	5.1	5.2	5.2

Table 8: Phenol Test (Max-10) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	1.5	1.5	1.0	1.3
2. K 8027 (C)	05	2.5	3.0	2.0	2.5
3. HD 2888 (C)	03	3.0	3.5	4.0	3.5
Mean		2.3	2.7	2.3	2.4

Table 9: Phenol Test (Max-10) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	5.0	6.0	6.0	5.0	5.5	5.5
2. HI 1544 (C)	07	4.0	5.0	5.5	5.5	5.0	5.0
Mean		4.5	5.5	5.8	5.3	5.3	5.3
Irrigated, Late Sown							
1. MP 4010 (C)	04	5.0	4.5	4.0	5.5	4.5	4.7
2. HD 2864 (C)	05	3.5	4.0	3.5	4.0	3.5	3.7
3. HD 2932 (C)	03	3.5	4.5	3.5	4.5	4.5	4.1
4. MP 3336 (C)	02	4.5	3.0	3.5	4.5	4.0	3.9
Mean		4.1	4.0	3.6	4.6	4.1	4.1

Table 10: Phenol Test (Max-10) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	6.5	6.0	5.0	5.8
2. MACS 6478 (C)	05	3.5	4.0	3.5	3.7
Mean		2.0	2.0	2.0	2.0
Rainfed, Timely Sown					
1. NIAW 2030	06	-	6.0	-	6.0
2. NI 5439 (C)	13	-	6.0	-	6.0
3. NIAW 1415 (C)	10	-	3.5	-	3.5
4. UAS 347 (I)	05	-	6.5	-	6.5
Mean		-	5.5	-	5.5
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	6.0	5.5	6.5	6.0
2. NIAW 1415 (C)	02	4.0	3.0	4.5	3.8
3. DBW 93 (I)	08	4.5	4.5	4.5	4.5
Mean		4.8	4.3	5.2	4.8

Bread Qualiy (Table 11-45)

Among various parameters, loaf volume (Table 11-15) is considered most important is given maximum weight age while evaluating bread quality. The 2nd year entry, NIAW 2030 made comparatively better bread recording 575 ml bread loaf volume. Among the checks, MACS 6222, MACS 6474 (ITS, PZ) NI 5439 NIAW 1415 (RTS, RITS, PZ) gave loaf volume of >575 ml. In general, bread loaf volume was comparatively better in PZ. For the evaluation of bread quality (Table 16-20), various parameters like loaf volume, stickness, appearance, crust colour, texture, taste and aroma were considered and the score was given out of 10.0. All the prementioned genotypes, which were found well in loaf volume, gave high bread quality score. The ratio of bread loaf volume (ml) / dough weight (g) is considered important, while evaluating bread quality, value of >3.5 is considered appropriate for good quality bread. All the prementioned genotypes which were found good in loaf volume gave a value of ~ 3.5 (Table 21-25).

Extraction rate (Table 26-30) is important parameters for milers, who are interested in a wheat variety with higher flour recovery. Among the checks, C 306, K 8027, HD 2888, (RTS, NEPZ), HI 1544 (ITS, CZ), NI 5439, NIAW 1415 (RTS, RITS, PZ) recorded > 71.0 % extraction rate. The 2nd year entry, NIAW 2030 (RTS, PZ) recorded the highest extraction rate of 72.5 %. The extraction rate was comparatively lower in NHZ.

Gluten (Table 31-45) is associated with the quality of the end products of wheat. The data on wet gluten are presented in Table 31-35. The 2nd year entry, WH 1164 (RTS, NWPZ) recorded > 32.0 % wet gluten .Among the checks, MP 4010, HD 2932, MP 3336 (ILS,CZ), MACS 6222, MACS 6478 (ITS, PZ), DBW 93 (RITS, PZ) also had > 32.0 % wet gluten. All these entries also recorded > 10.0 % dry gluten (Table 36-40). The data on gluten index are presented in Table 41-45 and is calculated from the portion retained when the wet gluten is passed through the glutamate centrifuge. It is positively correlated with the gluten strength of wheat flour. The checks, WH 1105, DBW 88, HD 3086 (ITS, NWPZ) and HD 3059 (ILS, NWPZ) exhibited > 80 gluten index. In general, Indian wheat need improvement in this parameter.

Table 11: Bread Loaf Volume (ml) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	550	540	530	540
2. VL 804 (C)	03	555	545	535	545
3. VL 907 (C)	05	550	555	535	547
4. HS 507 (C)	06	555	535	530	540
5. HPW 349 (C)	04	560	550	540	550
Mean		554	545	534	544
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	545	530	535	537
2. VL 804 (C)	03	550	525	530	535
3. VL 907 (C)	05	545	520	525	530
4. HS 507 (C)	06	550	535	530	538
5. HPW 349 (C)	04	555	530	535	540
Mean		549	528	531	536
Rainfed, Early Sown					
1. VL 829 (C)	04	520	495	510	508
2. HPW 251 (C)	06	530	490	520	513
3. HS 542 (C)	01	515	495	515	508
Mean		522	493	515	510
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	490	480	505	492
2. HS 490 (C)	02	485	480	510	492
Mean		488	480	508	492

Table 12: Bread Loaf Volume (ml) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	550	565	560	545	575	559
2. DPW 621-50 (C)	02	555	565	550	540	545	551
3. WH 1105 (C)	03	560	560	565	545	555	557
4. DBW 88 (C)	05	555	570	560	555	550	558
5. HD 3086 (C)	04	560	575	565	550	555	561
Mean		556	567	560	547	556	557
Irrigated, Late Sown							
1. WH 1021 (C)	09	560	575	550	565	545	559
2. HD 3059 (C)	11	565	580	560	560	550	563
3. DBW 90 (C)	15	560	575	550	555	550	558
4. WH 1124 (C)	10	555	575	560	555	555	560
Mean		560	576	555	559	550	560
Rainfed, Timely Sown							
1. WH 1164	05	560	-	570	-	550	560
2. PBW 644 (C)	06	555	-	580	-	540	558
3. WH 1080 (C)	01	565	-	575	-	540	560
Mean		560	-	575	-	543	559
Restricted Irrigation, Timely Sown							
1. MP 1277	05	565	-	580	550	555	563
2. PBW 644 (C)	01	560	-	570	545	550	556
3. WH 1080 (C)	04	565	-	575	555	560	564
4. HD 3043 (C)	02	570	-	565	550	555	560
5. WH 1142 (I)	03	560	-	565	550	545	555
Mean		564	-	571	550	553	560

Table 13: Bread Loaf Volume (ml) of *T.aestivum* genotypes in North Eastern Plains Zone /

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	480	510	485	492
2. K 8027 (C)	05	490	515	490	498
3. HD 2888 (C)	03	495	515	480	497
Mean		488	513	485	496

Table 14: Bread Loaf Volume (ml) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	480	495	490	515	500	496
2. HI 1544 (C)	07	485	500	495	520	510	502
Mean		483	498	493	518	505	499
Irrigated, Late Sown							
1. MP 4010 (C)	04	555	565	570	560	570	564
2. HD 2864 (C)	05	550	560	565	555	560	558
3. HD 2932 (C)	03	560	570	575	570	565	568
4. MP 3336 (C)	02	555	560	565	570	565	563
Mean		555	564	569	564	565	563

Table 15: Bread Loaf Volume (ml) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	580	585	580	582
2. MACS 6478 (C)	05	575	580	585	580
Mean		578	583	583	581
Rainfed, Timely Sown					
1. NIAW 2030	06	-	575	-	575
2. NI 5439 (C)	13	-	570	-	570
3. NIAW 1415 (C)	10	-	575	-	575
4. UAS 347 (I)	05	-	565	-	565
Mean		-	571	-	571
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	580	600	575	585
2. NIAW 1415 (C)	02	585	595	580	587
3. DBW 93 (I)	08	575	580	565	573
Mean		580	592	573	582

Table 16: Bread Quality (Max-10) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	6.37	6.25	6.11	6.24
2. VL 804 (C)	03	6.45	6.32	6.20	6.32
3. VL 907 (C)	05	6.40	6.50	6.25	6.38
4. HS 507 (C)	06	6.45	6.20	6.05	6.23
5. HPW 349 (C)	04	6.60	6.40	6.30	6.43
Mean		6.45	6.33	6.18	6.32
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	6.40	6.05	6.20	6.22
2. VL 804 (C)	03	6.40	5.95	6.10	6.15
3. VL 907 (C)	05	6.30	5.85	5.90	6.02
4. HS 507 (C)	06	6.35	6.25	6.10	6.23
5. HPW 349 (C)	04	6.50	6.05	6.20	6.25
Mean		6.39	6.03	6.10	6.17
Rainfed, Early Sown					
1. VL 829 (C)	04	5.80	4.90	5.50	5.40
2. HPW 251 (C)	06	6.00	4.80	5.70	5.50
3. HS 542 (C)	01	5.70	4.95	5.80	5.48
Mean		5.83	4.88	5.67	5.46
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	4.80	4.70	5.15	4.88
2. HS 490 (C)	02	4.80	4.90	5.25	4.98
Mean		4.80	4.80	5.20	4.93

Table 17: Bread Quality (Max-10) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	6.50	6.75	6.65	6.40	6.95	6.65
2. DPW 621-50 (C)	02	6.60	6.80	6.50	6.42	6.50	6.56
3. WH 1105 (C)	03	6.70	6.66	6.82	6.40	6.60	6.64
4. DBW 88 (C)	05	6.58	6.90	6.72	6.58	6.50	6.66
5. HD 3086 (C)	04	6.70	7.00	6.78	6.48	6.65	6.72
Mean		6.62	6.82	6.69	6.46	6.64	6.65
Irrigated, Late Sown							
1. WH 1021 (C)	09	6.70	7.00	6.50	6.82	6.40	6.68
2. HD 3059 (C)	11	6.80	7.10	6.80	6.75	6.50	6.79
3. DBW 90 (C)	15	6.85	7.05	6.48	6.60	6.45	6.69
4. WH 1124 (C)	10	6.62	7.05	6.67	6.58	6.62	6.71
Mean		6.74	7.05	6.61	6.69	6.49	6.72
Rainfed, Timely Sown							
1. WH 1164	05	6.70	-	6.90	-	6.50	6.70
2. PBW 644 (C)	06	6.62	-	7.12	-	6.30	6.68
3. WH 1080 (C)	01	6.70	-	7.00	-	6.30	6.67
Mean		6.67	-	7.01	-	6.37	6.68
Restricted Irrigation, Timely Sown							
1. MP 1277	05	6.75	-	7.12	6.52	6.60	6.75
2. PBW 644 (C)	01	6.67	-	6.92	6.40	6.52	6.63
3. WH 1080 (C)	04	6.80	-	7.00	6.58	6.70	6.77
4. HD 3043 (C)	02	6.90	-	6.82	6.48	6.60	6.70
5. WH 1142 (I)	03	6.57	-	6.78	6.48	6.40	6.56
Mean		6.74	-	6.93	6.49	6.56	6.68

Table 18: Bread Quality (Max-10) of *T.aestivum* genotypes in North Eastern Plains Zone A

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	4.85	5.40	4.90	5.05
2. K 8027 (C)	05	4.95	5.60	4.92	5.16
3. HD 2888 (C)	03	4.88	5.55	4.80	5.08
Mean		4.89	5.52	4.87	5.09

Table 19: Bread Quality (Max-10) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	4.85	5.00	4.95	5.50	5.00	5.06
2. HI 1544 (C)	07	4.90	5.05	5.00	5.70	5.40	5.21
Mean		4.88	5.03	4.98	5.60	5.20	5.14
Irrigated, Late Sown							
1. MP 4010 (C)	04	6.65	6.85	6.94	6.72	6.96	6.82
2. HD 2864 (C)	05	6.54	6.70	6.80	6.62	6.72	6.68
3. HD 2932 (C)	03	6.68	7.00	7.10	6.95	6.75	6.90
4. MP 3336 (C)	02	6.60	6.70	6.80	6.95	6.75	6.76
Mean		6.62	6.81	6.91	6.81	6.80	6.79

Table 20: Bread Quality (Max-10) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	7.15	7.25	7.12	7.17
2. MACS 6478 (C)	05	7.05	7.10	7.25	7.13
Mean		7.10	7.18	7.19	7.15
Rainfed, Timely Sown					
1. NIAW 2030	06	-	7.10	-	7.10
2. NI 5439 (C)	13	-	6.98	-	6.98
3. NIAW 1415 (C)	10	-	7.05	-	7.05
4. UAS 347 (I)	05	-	6.90	-	6.90
Mean		-	7.01	-	7.01
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	7.18	7.60	7.10	7.29
2. NIAW 1415 (C)	02	7.30	7.50	7.22	7.34
3. DBW 93 (I)	08	7.10	7.20	6.90	7.07
Mean		7.19	7.43	7.07	7.23

Table 21: Bread Quality (ml) / Dough Weight (g) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	3.28	3.22	3.16	3.22
2. VL 804 (C)	03	3.31	3.25	3.19	3.25
3. VL 907 (C)	05	3.28	3.31	3.19	3.26
4. HS 507 (C)	06	3.31	3.19	3.16	3.22
5. HPW 349 (C)	04	3.34	3.28	3.22	3.28
Mean		3.30	3.25	3.18	3.25
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	3.25	3.16	3.19	3.20
2. VL 804 (C)	03	3.28	3.13	3.16	3.19
3. VL 907 (C)	05	3.25	3.10	3.13	3.16
4. HS 507 (C)	06	3.28	3.19	3.16	3.21
5. HPW 349 (C)	04	3.31	3.16	3.19	3.22
Mean		3.27	3.15	3.17	3.20
Rainfed, Early Sown					
1. VL 829 (C)	04	3.10	2.96	3.04	3.03
2. HPW 251 (C)	06	3.16	2.93	3.10	3.06
3. HS 542 (C)	01	3.07	2.96	3.07	3.03
Mean		3.11	2.95	3.07	3.04
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	2.93	2.87	3.01	2.94
2. HS 490 (C)	02	2.90	2.87	3.04	2.94
Mean		2.92	2.87	3.03	2.94

Table 22: Bread Quality (ml) / Dough Weight (g) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	3.28	3.37	3.34	3.25	3.43	3.33
2. DPW 621-50 (C)	02	3.31	3.37	3.28	3.22	3.25	3.29
3. WH 1105 (C)	03	3.34	3.34	3.37	3.25	3.31	3.32
4. DBW 88 (C)	05	3.31	3.40	3.34	3.31	3.28	3.33
5. HD 3086 (C)	04	3.34	3.43	3.37	3.28	3.31	3.35
Mean		3.32	3.38	3.34	3.26	3.32	3.32
Irrigated, Late Sown							
1. WH 1021 (C)	09	3.34	3.43	3.28	3.37	3.25	3.33
2. HD 3059 (C)	11	3.37	3.46	3.34	3.34	3.28	3.36
3. DBW 90 (C)	15	3.34	3.43	3.28	3.31	3.28	3.33
4. WH 1124 (C)	10	3.31	3.43	3.34	3.31	3.31	3.34
Mean		3.34	3.44	3.31	3.33	3.28	3.34
Rainfed, Timely Sown							
1. WH 1164	05	3.34	-	3.40	-	3.28	3.34
2. PBW 644 (C)	06	3.31	-	3.46	-	3.22	3.33
3. WH 1080 (C)	01	3.37	-	3.43	-	3.22	3.34
Mean		3.34	-	3.43	-	3.24	3.34
Restricted Irrigation, Timely Sown							
1. MP 1277	05	3.37	-	3.46	3.28	3.31	3.36
2. PBW 644 (C)	01	3.34	-	3.40	3.25	3.28	3.32
3. WH 1080 (C)	04	3.37	-	3.43	3.31	3.34	3.36
4. HD 3043 (C)	02	3.40	-	3.37	3.28	3.31	3.34
5. WH 1142 (I)	03	3.34	-	3.37	3.28	3.25	3.31
Mean		3.36	-	3.41	3.28	3.30	3.34

Table 23: Bread Quality (ml) / Dough Weight (g) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	2.87	3.04	2.90	2.94
2. K 8027 (C)	05	2.93	3.07	2.93	2.98
3. HD 2888 (C)	03	2.96	3.07	2.87	2.97
Mean		2.92	3.06	2.90	2.96

Table 24: Bread Quality (ml) / Dough Weight (g) of *T.aestivum* genotypes in Central Zone

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	2.87	2.96	2.93	3.07	2.99	2.96
2. HI 1544 (C)	07	2.90	2.99	2.96	3.10	3.04	3.00
Mean		2.89	2.98	2.95	3.09	3.02	2.98
Irrigated, Late Sown							
1. MP 4010 (C)	04	3.31	3.37	3.40	3.34	3.40	3.36
2. HD 2864 (C)	05	3.28	3.34	3.37	3.31	3.34	3.33
3. HD 2932 (C)	03	3.34	3.40	3.43	3.40	3.37	3.39
4. MP 3336 (C)	02	3.31	3.34	3.37	3.40	3.37	3.36
Mean		3.31	3.36	3.39	3.36	3.37	3.36

Table 25: Bread Quality (ml) / Dough Weight (g) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	3.46	3.49	3.46	3.47
2. MACS 6478 (C)	05	3.43	3.46	3.49	3.46
Mean		3.45	3.48	3.48	3.47
Rainfed, Timely Sown					
1. NIAW 2030	06	-	3.43	-	3.43
2. NI 5439 (C)	13	-	3.40	-	3.40
3. NIAW 1415 (C)	10	-	3.43	-	3.43
4. UAS 347 (I)	05	-	3.37	-	3.37
Mean		-	3.41	-	3.41
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	3.46	3.58	3.43	3.49
2. NIAW 1415 (C)	02	3.49	3.55	3.46	3.50
3. DBW 93 (I)	08	3.43	3.46	3.37	3.42
Mean		3.46	3.53	3.42	3.47

Table 26: Extraction Rate (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	63.5	66.1	66.9	65.5
2. VL 804 (C)	03	65.6	66.1	67.2	66.3
3. VL 907 (C)	05	62.1	64.6	63.5	63.4
4. HS 507 (C)	06	63.2	65.5	65.1	64.6
5. HPW 349 (C)	04	62.8	65.9	66.7	65.1
Mean		63.4	65.6	65.9	65.0
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	65.3	62.8	66.4	64.8
2. VL 804 (C)	03	65.6	63.1	67.3	65.3
3. VL 907 (C)	05	62.8	61.6	63.5	62.6
4. HS 507 (C)	06	66.1	62.2	64.6	64.3
5. HPW 349 (C)	04	64.2	66.2	62.8	64.4
Mean		64.8	63.2	64.9	64.3
Rainfed, Early Sown					
1. VL 829 (C)	04	61.8	63.2	64.8	63.3
2. HPW 251 (C)	06	65.6	61.2	63.6	63.5
3. HS 542 (C)	01	64.5	62.5	63.6	63.5
Mean		64.0	62.3	64.0	63.4
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	62.5	63.8	61.2	62.5
2. HS 490 (C)	02	61.2	59.6	60.6	60.5
Mean		61.9	61.7	60.9	61.5

Table 27: Extraction Rate (%) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	67.2	68.1	66.7	66.8	68.6	67.5
2. DPW 621-50 (C)	02	68.6	67.2	68.5	69.1	68.1	68.3
3. WH 1105 (C)	03	66.7	66.1	66.5	67.5	68.2	67.0
4. DBW 88 (C)	05	69.6	66.7	68.5	67.6	66.2	67.7
5. HD 3086 (C)	04	69.6	66.1	67.2	68.1	67.9	67.8
Mean		68.3	66.8	67.5	67.8	67.8	67.7
Irrigated, Late Sown							
1. WH 1021 (C)	09	69.2	70.2	71.6	68.3	68.8	69.6
2. HD 3059 (C)	11	69.8	69.6	72.1	69.6	71.8	70.6
3. DBW 90 (C)	15	69.1	71.8	72.3	69.2	69.6	70.4
4. WH 1124 (C)	10	70.1	68.9	72.5	69.6	70.5	70.3
Mean		69.6	70.1	72.1	69.2	70.2	70.2
Rainfed, Timely Sown							
1. WH 1164	05	69.2	-	68.1	-	66.3	67.9
2. PBW 644 (C)	06	70.1	-	69.1	-	68.8	69.3
3. WH 1080 (C)	01	69.6	-	69.1	-	68.7	69.1
Mean		69.6	-	68.8	-	67.9	68.8
Restricted Irrigation, Timely Sown							
1. MP 1277	05	69.2	-	70.1	68.5	68.8	69.2
2. PBW 644 (C)	01	69.6	-	70.5	67.9	68.5	69.1
3. WH 1080 (C)	04	69.5	-	68.6	67.6	68.4	68.5
4. HD 3043 (C)	02	70.5	-	70.1	69.1	70.6	70.1
5. WH 1142 (I)	03	71.5	-	70.8	69.6	70.5	70.6
Mean		70.1	-	70.0	68.5	69.4	69.5

Table 28: Extraction Rate (%) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	72.1	72.5	73.6	72.7
2. K 8027 (C)	05	70.1	71.3	73.6	71.7
3. HD 2888 (C)	03	71.8	70.3	72.1	71.4
Mean		71.3	71.4	73.1	71.9

Table 29: Extraction Rate (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	70.8	68.8	72.2	69.1	71.8	70.5
2. HI 1544 (C)	07	71.3	69.1	72.5	70.1	73.3	71.3
Mean		71.1	69.0	72.4	69.6	72.6	70.9
Irrigated, Late Sown							
1. MP 4010 (C)	04	68.1	69.8	69.6	68.8	70.1	69.3
2. HD 2864 (C)	05	68.6	69.2	70.6	68.8	69.6	69.4
3. HD 2932 (C)	03	68.4	70.1	70.5	66.8	68.5	68.9
4. MP 3336 (C)	02	67.8	70.2	71.3	68.2	70.6	69.6
Mean		68.2	69.8	70.5	68.2	69.7	69.3

Table 30: Extraction Rate (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	72.5	69.6	70.8	71.0
2. MACS 6478 (C)	05	71.6	69.1	70.1	70.3
Mean		72.1	69.4	70.5	70.6
Rainfed, Timely Sown					
1. NIAW 2030	06	72.5	-	-	72.5
2. NI 5439 (C)	13	71.2	-	-	71.2
3. NIAW 1415 (C)	10	71.6	-	-	71.6
4. UAS 347 (I)	05	69.5	-	-	69.5
Mean		71.2	-	-	71.2
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	72.5	70.3	73.5	72.1
2. NIAW 1415 (C)	02	71.8	70.6	71.2	71.2
3. DBW 93 (I)	08	72.6	69.3	70.5	70.8
Mean		72.3	70.1	71.7	71.4

Table 31: Wet Gluten (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	21.5	19.1	24.8	21.8
2. VL 804 (C)	03	27.3	21.2	29.3	25.9
3. VL 907 (C)	05	28.1	21.0	26.5	25.2
4. HS 507 (C)	06	24.0	20.8	25.5	23.4
5. HPW 349 (C)	04	25.7	19.5	21.8	22.3
Mean		25.3	20.3	25.6	23.7
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	21.3	18.3	19.9	19.8
2. VL 804 (C)	03	22.8	18.6	27.1	22.8
3. VL 907 (C)	05	24.3	19.0	23.4	22.2
4. HS 507 (C)	06	23.9	18.4	24.0	22.1
5. HPW 349 (C)	04	25.7	18.8	22.8	22.4
Mean		23.6	18.6	23.4	21.9
Rainfed, Early Sown					
1. VL 829 (C)	04	24.2	19.1	22.1	21.8
2. HPW 251 (C)	06	24.9	18.4	20.3	21.2
3. HS 542 (C)	01	23.9	21.6	22.8	22.8
Mean		24.3	19.7	21.7	21.9
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	21.4	20.7	19.6	20.6
2. HS 490 (C)	02	20.4	19.8	22.6	20.9
Mean		20.9	20.3	21.1	20.8

Table 32: Wet Gluten (%) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	24.3	28.7	27.4	22.0	28.0	26.1
2. DPW 621-50 (C)	02	26.0	29.8	28.7	26.3	29.0	28.0
3. WH 1105 (C)	03	24.8	28.8	27.3	24.4	28.0	26.7
4. DBW 88 (C)	05	27.1	30.7	28.1	24.9	26.7	27.5
5. HD 3086 (C)	04	25.5	32.7	29.5	24.6	24.4	27.3
Mean		25.5	30.1	28.2	24.4	27.2	27.1
Irrigated, Late Sown							
1. WH 1021 (C)	09	31.7	36.1	29.9	29.1	29.1	31.2
2. HD 3059 (C)	11	29.1	34.8	29.7	27.1	25.6	29.3
3. DBW 90 (C)	15	29.9	32.6	28.6	26.1	26.6	28.8
4. WH 1124 (C)	10	28.3	37.1	28.4	26.0	25.0	29.0
Mean		29.8	35.2	29.2	27.1	26.6	29.5
Rainfed, Timely Sown							
1. WH 1164	05	34.7	-	35.0	-	27.4	32.4
2. PBW 644 (C)	06	33.7	-	36.5	-	23.7	31.3
3. WH 1080 (C)	01	30.9	-	35.7	-	22.4	29.7
Mean		33.1	-	35.7	-	24.5	31.1
Restricted Irrigation, Timely Sown							
1. MP 1277	05	29.1	-	35.0	21.8	23.7	27.4
2. PBW 644 (C)	01	33.2	-	31.3	22.6	26.8	28.5
3. WH 1080 (C)	04	32.4	-	35.1	24.2	25.7	29.4
4. HD 3043 (C)	02	32.2	-	30.2	25.6	24.3	28.1
5. WH 1142 (I)	03	29.5	-	36.4	22.5	23.9	28.1
Mean		31.3	-	33.6	23.3	24.9	28.3

Table 33: Wet Gluten (%) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	26.2	33.0	33.0	30.7
2. K 8027 (C)	05	27.5	36.3	30.0	31.3
3. HD 2888 (C)	03	27.8	35.0	25.6	29.5
Mean		27.2	34.8	29.5	30.5

Table 34: Wet Gluten (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	24.4	25.4	28.8	34.4	28.6	28.3
2. HI 1544 (C)	07	24.5	28.1	30.7	34.9	29.9	29.6
Mean		24.5	26.8	29.8	34.7	29.3	29.0
Irrigated, Late Sown							
1. MP 4010 (C)	04	30.9	37.0	33.5	34.6	36.7	34.5
2. HD 2864 (C)	05	29.8	33.0	30.3	31.9	32.1	31.4
3. HD 2932 (C)	03	32.7	36.5	33.5	34.1	33.1	34.0
4. MP 3336 (C)	02	32.7	36.3	33.7	35.6	35.4	34.7
Mean		31.5	35.7	32.8	34.1	34.3	33.7

Table 35: Wet Gluten (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	33.8	33.0	33.3	33.4
2. MACS 6478 (C)	05	32.1	31.7	32.4	32.1
Mean		33.0	32.4	32.9	32.7
Rainfed, Timely Sown					
1. NIAW 2030	06	-	28.0	-	28.0
2. NI 5439 (C)	13	-	24.3	-	24.3
3. NIAW 1415 (C)	10	-	27.3	-	27.3
4. UAS 347 (I)	05	-	24.4	-	24.4
Mean		-	26.0	-	26.0
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	28.9	32.8	28.1	29.9
2. NIAW 1415 (C)	02	31.4	33.0	27.3	30.6
3. DBW 93 (I)	08	32.2	34.4	31.6	32.7
Mean		30.8	33.4	29.0	31.1

Table 36: Dry Gluten (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	7.3	6.1	8.0	7.1
2. VL 804 (C)	03	8.6	6.8	9.1	8.2
3. VL 907 (C)	05	8.8	7.3	8.6	8.2
4. HS 507 (C)	06	7.7	6.2	8.2	7.4
5. HPW 349 (C)	04	8.3	6.5	7.4	7.4
Mean		8.1	6.6	8.3	7.7
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	6.9	5.6	6.6	6.4
2. VL 804 (C)	03	7.4	5.8	8.3	7.2
3. VL 907 (C)	05	7.6	5.9	7.7	7.1
4. HS 507 (C)	06	7.5	6.0	7.6	7.0
5. HPW 349 (C)	04	8.3	6.2	7.4	7.3
Mean		7.5	5.9	7.5	7.0
Rainfed, Early Sown					
1. VL 829 (C)	04	7.9	6.6	7.4	7.3
2. HPW 251 (C)	06	8.2	6.4	6.8	7.1
3. HS 542 (C)	01	7.6	7.1	7.4	7.4
Mean		7.9	6.7	7.2	7.3
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	6.9	6.9	6.6	6.8
2. HS 490 (C)	02	6.7	6.5	7.4	6.9
Mean		6.8	6.7	7.0	6.8

Table 37: Dry Gluten (%) of *T.aestivum* genotypes in North Western Plains Zone AVT 's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	7.3	9.3	9.1	7.4	9.8	8.6
2. DPW 621-50 (C)	02	8.7	9.9	9.7	8.9	9.8	9.4
3. WH 1105 (C)	03	8.4	9.6	9.1	8.5	9.5	9.0
4. DBW 88 (C)	05	9.2	10.2	9.5	8.5	8.9	9.3
5. HD 3086 (C)	04	8.4	10.6	9.5	8.3	7.9	8.9
Mean		8.4	9.9	9.4	8.3	9.2	9.0
Irrigated, Late Sown							
1. WH 1021 (C)	09	10.0	11.4	9.6	9.2	9.2	9.9
2. HD 3059 (C)	11	10.0	11.7	10.2	9.1	8.9	10.0
3. DBW 90 (C)	15	10.0	10.2	9.4	8.8	9.0	9.5
4. WH 1124 (C)	10	9.5	11.6	9.5	8.8	8.4	9.6
Mean		9.9	11.2	9.7	9.0	8.9	9.7
Rainfed, Timely Sown							
1. WH 1164	05	10.3	-	11.5	-	9.0	10.3
2. PBW 644 (C)	06	10.4	-	11.7	-	7.4	9.8
3. WH 1080 (C)	01	9.9	-	11.6	-	7.3	9.6
Mean		10.2	-	11.6	-	7.9	9.9
Restricted Irrigation, Timely Sown							
1. MP 1277	05	9.6	-	10.9	7.1	7.8	8.9
2. PBW 644 (C)	01	10.3	-	10.3	7.7	8.5	9.2
3. WH 1080 (C)	04	10.5	-	11.5	8.2	8.5	9.7
4. HD 3043 (C)	02	10.1	-	9.8	8.4	7.8	9.0
5. WH 1142 (I)	03	9.4	-	11.6	7.4	7.7	9.0
Mean		10.0	-	10.8	7.8	8.1	9.2

Table 38: Dry Gluten (%) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	8.4	10.9	9.6	9.6
2. K 8027 (C)	05	9.5	12.0	9.8	10.4
3. HD 2888 (C)	03	9.5	12.4	8.6	10.2
Mean		9.1	11.8	9.3	10.1

Table 39: Dry Gluten (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	7.9	8.1	9.1	10.7	9.1	9.0
2. HI 1544 (C)	07	7.9	9.4	9.8	11.2	9.6	9.6
Mean		7.9	8.8	9.5	11.0	9.4	9.3
Irrigated, Late Sown							
1. MP 4010 (C)	04	10.1	11.7	10.8	10.7	11.5	11.0
2. HD 2864 (C)	05	9.4	10.5	9.8	10.2	9.8	9.9
3. HD 2932 (C)	03	10.3	11.8	10.9	10.6	10.8	10.9
4. MP 3336 (C)	02	10.5	11.3	10.9	11.3	11.1	11.0
Mean		10.1	11.3	10.6	10.7	10.8	10.7

Table 40: Dry Gluten (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	10.9	10.4	10.2	10.5
2. MACS 6478 (C)	05	9.9	10.0	10.2	10.0
Mean		10.4	10.2	10.2	10.3
Rainfed, Timely Sown					
1. NIAW 2030	06	-	8.9	-	8.9
2. NI 5439 (C)	13	-	8.2	-	8.2
3. NIAW 1415 (C)	10	-	8.6	-	8.6
4. UAS 347 (I)	05	-	7.9	-	7.9
Mean		-	8.4	-	8.4
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	9.6	10.7	9.2	9.8
2. NIAW 1415 (C)	02	10.6	11.5	10.2	10.8
3. DBW 93 (I)	08	10.3	11.6	11.0	11.0
Mean		10.2	11.3	10.1	10.5

Table 41: Gluten Index (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	73	69	80	74
2. VL 804 (C)	03	66	62	52	60
3. VL 907 (C)	05	60	65	49	58
4. HS 507 (C)	06	68	62	72	67
5. HPW 349 (C)	04	81	86	89	85
Mean		70	69	68	69
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	79	69	81	76
2. VL 804 (C)	03	63	53	68	61
3. VL 907 (C)	05	45	59	66	57
4. HS 507 (C)	06	57	68	74	66
5. HPW 349 (C)	04	86	83	72	80
Mean		66	66	72	68
Rainfed, Early Sown					
1. VL 829 (C)	04	47	61	69	59
2. HPW 251 (C)	06	64	80	67	70
3. HS 542 (C)	01	69	68	81	73
Mean		60	70	72	67
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	54	69	65	63
2. HS 490 (C)	02	53	60	53	55
Mean		54	65	59	59

Table 42: Gluten Index (%) of *T.aestivum* genotypes in North Western Plains Zone AVT 's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	80	82	73	70	79	77
2. DPW 621-50 (C)	02	77	81	75	78	69	76
3. WH 1105 (C)	03	80	78	86	80	79	81
4. DBW 88 (C)	05	80	80	87	80	84	82
5. HD 3086 (C)	04	88	74	74	83	83	80
Mean		81	79	79	78	79	79
Irrigated, Late Sown							
1. WH 1021 (C)	09	48	48	58	65	51	54
2. HD 3059 (C)	11	79	80	78	83	80	80
3. DBW 90 (C)	15	77	68	77	86	80	78
4. WH 1124 (C)	10	76	80	80	82	74	78
Mean		70	69	73	79	71	73
Rainfed, Timely Sown							
1. WH 1164	05	44	-	63	-	58	55
2. PBW 644 (C)	06	55	-	45	-	64	55
3. WH 1080 (C)	01	76	-	76	-	86	79
Mean		58	-	61	-	69	63
Restricted Irrigation, Timely Sown							
1. MP 1277	05	76	-	88	67	75	77
2. PBW 644 (C)	01	58	-	49	57	63	57
3. WH 1080 (C)	04	82	-	66	79	69	74
4. HD 3043 (C)	02	64	-	85	68	75	73
5. WH 1142 (I)	03	68	-	54	66	77	66
Mean		70	-	68	67	72	69

Table 43: Gluten Index (%) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	45	64	54	54
2. K 8027 (C)	05	55	43	53	50
3. HD 2888 (C)	03	60	50	59	56
Mean		53	52	55	54

Table 44: Gluten Index (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	58	56	46	46	43	58
2. HI 1544 (C)	07	49	47	44	41	55	49
Mean		54	52	45	44	49	54
Irrigated, Late Sown							
1. MP 4010 (C)	04	48	56	57	47	54	52
2. HD 2864 (C)	05	54	61	74	83	65	67
3. HD 2932 (C)	03	52	63	73	55	78	64
4. MP 3336 (C)	02	47	40	54	49	44	47
Mean		50	55	65	59	60	58

Table 45: Gluten Index (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	46	54	38	46
2. MACS 6478 (C)	05	57	54	51	54
Mean		52	54	45	50
Rainfed, Timely Sown					
1. NIAW 2030	06	-	62	-	62
2. NI 5439 (C)	13	-	59	-	59
3. NIAW 1415 (C)	10	-	73	-	73
4. UAS 347 (I)	05	-	70	-	70
Mean		-	66	-	66
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	55	56	58	56
2. NIAW 1415 (C)	02	85	76	73	78
3. DBW 93 (I)	08	45	44	48	46
Mean		62	59	60	60

Biscuit Quality (Table 46 – 55)

More than two hundred samples of AVT (2nd year) and checks representing different locations were evaluated for biscuit making quality. The data is presented in table 55-66 for biscuit diameter and spread factor. The samples of AVT (IInd year and checks) were evaluated from all centres from each zone representing all the conditions as ITS, ILS, RILS and RTS. Baking test was conducted from pooled samples of all the replications of a condition and two parameters as biscuit diameter and spread factor were recorded. The flour was extracted from all the entries using Quadrumet Senior Mill with the average extraction rate of ~70%.

Varieties from RILS conditions from NHZ exhibited higher spread factor (average 10.04) as compared to other conditions in the zone as exhibited earlier years also. The highest average spread factor was exhibited by HS490 (RILS, NHZ) (>11.41). This also exhibited lower SKCS Hardness Index indicating its higher potential towards biscuit making. Besides HS490, there was no variety in the trial with soft grain texture and high spread factor (>9.0). In NWPZ, higher spread factor was observed in ILS conditions with the average value of 7.80 and the highest average value was recorded in Delhi (8.63). Overall, like previous year, only one variety (HS490) showed soft grain characteristics and higher spread factor, hence there is need to incorporate soft grain characteristics in entries belonging to other zones to improve biscuit making quality.

Table 46: Biscuit Diameter (cm) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	8.00	7.95	7.25	7.73
2. VL 804 (C)	03	7.70	7.75	-	7.73
3. VL 907 (C)	05	7.85	7.83	7.48	7.72
4. HS 507 (C)	06	7.93	7.83	7.40	7.72
5. HPW 349 (C)	04	7.80	7.90	7.65	7.78
Mean		7.86	7.85	7.44	7.72
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	7.90	7.65	7.50	7.68
2. VL 804 (C)	03	7.78	7.78	-	7.78
3. VL 907 (C)	05	7.65	7.98	7.45	7.69
4. HS 507 (C)	06	7.70	7.90	7.60	7.73
5. HPW 349 (C)	04	7.25	8.13	7.45	7.61
Mean		7.66	7.89	7.50	7.68
Rainfed, Early Sown					
1. VL 829 (C)	04	7.87	7.60	7.29	7.59
2. HPW 251 (C)	06	7.69	7.76	7.69	7.71
3. HS 542 (C)	01	7.65	7.89	7.57	7.70
Mean		7.73	7.75	7.52	7.67
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	8.06	7.60	7.57	7.74
2. HS 490 (C)	02	8.33	8.28	8.17	8.26
Mean		8.19	7.94	7.87	8.00

Table 47: Biscuit Diameter (cm) of *T.aestivum* genotypes in North Western Plains Zone AV

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	7.50	7.75	7.49	7.00	7.46	7.44
2. DPW 621-50 (C)	02	7.67	7.39	7.30	7.42	7.68	7.49
3. WH 1105 (C)	03	7.89	7.64	7.67	7.77	7.75	7.74
4. DBW 88 (C)	05	7.60	7.46	7.78	7.59	4.21	6.93
5. HD 3086 (C)	04	7.71	7.56	7.54	7.61	3.87	6.86
Mean		7.67	7.56	7.56	7.48	6.19	7.29
Irrigated, Late Sown							
1. WH 1021 (C)	09	7.61	7.59	7.71	7.56	8.01	7.70
2. HD 3059 (C)	11	7.36	7.33	7.64	7.52	7.59	7.49
3. DBW 90 (C)	15	7.57	7.07	7.85	7.75	7.32	7.51
4. WH 1124 (C)	10	7.66	7.75	7.79	7.66	7.54	7.68
Mean		7.55	7.43	7.75	7.62	7.61	7.59
Rainfed, Timely Sown							
1. WH 1164	05	7.36	-	7.31	-	7.52	7.39
2. PBW 644 (C)	06	7.57	-	7.32	-	7.34	7.41
3. WH 1080 (C)	01	7.49	-	-	-	7.50	7.49
Mean		7.47	-	7.31	-	7.45	7.41
Restricted Irrigation, Timely Sown							
1. MP 1277	04	7.65	-	7.71	7.58	7.43	7.59
2. PBW 644 (C)	05	7.43	-	7.49	7.51	7.57	7.50
3. WH 1080 (C)	03	7.42	-	7.74	7.67	7.51	7.58
4. HD 3043 (C)	04	7.64	-	7.63	7.22	7.58	7.52
5. WH 1142 (I)	05	7.58	-	7.61	7.51	7.25	7.49
Mean		7.54	-	7.63	7.50	7.47	7.53

Table 48: Biscuit Diameter (cm) of *T.aestivum* genotypes in North Eastern Plains Zone AVT

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	6.81	7.08	7.23	7.04
2. K 8027 (C)	05	7.24	6.82	7.21	7.09
3. HD 2888 (C)	03	7.30	6.95	7.07	7.11
Mean		7.12	6.95	7.17	7.08

Table 49: Biscuit Diameter (cm) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	7.25	7.19	7.03	7.11	7.01	7.11
2. HI 1544 (C)	07	6.88	6.80	6.89	6.84	7.08	6.90
Mean		7.06	6.99	6.96	6.97	7.04	7.01
Irrigated, Late Sown							
1. MP 4010 (C)	04	7.09	6.99	7.18	7.08	7.07	7.08
2. HD 2864 (C)	05	7.09	7.28	7.15	7.21	7.38	7.22
3. HD 2932 (C)	03	7.24	7.12	7.30	7.21	7.09	7.19
4. MP 3336 (C)	02	7.25	6.93	7.10	7.01	7.07	7.07
Mean		7.17	7.08	7.18	7.13	7.15	7.14

Table 50: Biscuit Diameter (cm) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	7.15	7.39	7.14	7.23
2. MACS 6478 (C)	05	7.05	7.51	7.13	7.23
Mean		7.10	7.45	7.13	7.23
Rainfed, Timely Sown					
1. NIAW 2030	06	-	7.01	-	7.01
2. NI 5439 (C)	13	7.28	7.48	7.11	7.29
3. NIAW 1415 (C)	10	7.26	7.53	7.20	7.33
4. UAS 347 (I)	05	7.12	7.40	7.60	7.37
Mean		7.22	7.35	7.30	7.29
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05		7.18		7.18
2. NIAW 1415 (C)	02		7.44		7.44
3. DBW 93 (I)	08		7.19		7.19
Mean			7.27		7.27

Table 51: Biscuit Speard Factor of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	9.22	9.22	6.79	8.41
2. VL 804 (C)	03	7.74	8.38	-	8.06
3. VL 907 (C)	05	9.10	8.58	7.67	8.45
4. HS 507 (C)	06	8.68	8.17	7.22	8.03
5. HPW 349 (C)	04	8.43	9.24	7.46	8.38
Mean		8.64	8.72	7.29	8.21
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	8.90	8.38	7.41	8.23
2. VL 804 (C)	03	8.29	8.89	-	8.59
3. VL 907 (C)	05	7.75	9.11	7.27	8.04
4. HS 507 (C)	06	8.00	9.72	7.41	8.38
5. HPW 349 (C)	04	7.20	10.32	7.01	8.18
Mean		8.03	9.28	7.28	8.20
Rainfed, Early Sown					
1. VL 829 (C)	04	8.13	7.96	8.26	8.12
2. HPW 251 (C)	06	8.31	9.27	9.15	8.91
3. HS 542 (C)	01	7.46	8.89	8.18	8.18
Mean		7.97	8.70	8.53	8.40
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	9.54	8.06	8.41	8.67
2. HS 490 (C)	02	11.29	11.74	11.19	11.41
Mean		10.41	9.90	9.80	10.04

Table 52: Biscuit Speard Factor of *T.aestivum* genotypes in North Western Plains Zone AV

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	7.95	8.01	7.78	5.62	7.07	7.29
2. DPW 621-50 (C)	02	8.41	7.55	7.21	7.15	7.77	7.62
3. WH 1105 (C)	03	9.12	7.11	8.03	7.06	8.17	7.90
4. DBW 88 (C)	05	8.17	7.65	7.94	7.25	4.15	7.03
5. HD 3086 (C)	04	8.76	7.29	7.00	8.32	3.56	6.98
Mean		8.48	7.52	7.59	7.08	6.15	7.36
Irrigated, Late Sown							
1. WH 1021 (C)	09	7.83	7.78	8.69	7.30	8.07	7.93
2. HD 3059 (C)	11	7.53	7.37	8.06	7.61	7.60	7.63
3. DBW 90 (C)	15	7.27	6.50	9.18	8.36	6.68	7.60
4. WH 1124 (C)	10	8.96	7.47	8.61	7.79	7.44	8.05
Mean		7.90	7.28	8.63	7.76	7.45	7.80
Rainfed, Timely Sown							
1. WH 1164	05	6.94	-	6.75	-	7.48	7.05
2. PBW 644 (C)	06	7.91	-	7.21	-	7.02	7.38
3. WH 1080 (C)	01	6.90	-	-	-	7.40	7.15
Mean		7.25	-	6.98	-	7.30	7.18
Restricted Irrigation, Timely Sown							
1. MP 1277	05	8.05	-	8.58	8.02	7.23	7.97
2. PBW 644 (C)	01	6.89	-	7.80	7.60	7.47	7.44
3. WH 1080 (C)	04	7.27	-	8.62	8.05	7.27	7.80
4. HD 3043 (C)	02	7.86	-	7.72	6.46	7.44	7.37
5. WH 1142 (I)	03	7.49	-	8.34	7.24	6.71	7.44
Mean		7.51	-	8.21	7.47	7.23	7.61

Table 53: Biscuit Speard Factor of *T.aestivum* genotypes in North Eastern Plains Zone AVT

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	5.46	5.86	6.49	5.94
2. K 8027 (C)	05	6.07	5.35	6.43	5.95
3. HD 2888 (C)	03	6.87	6.54	5.98	6.46
Mean		6.13	5.92	6.30	6.12

Table 54: Biscuit Speard Factor of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	6.30	6.61	6.80	6.61	6.30	6.52
2. HI 1544 (C)	07	5.85	5.09	5.82	7.46	6.47	6.14
Mean		6.08	5.85	6.31	7.03	6.38	6.33
Irrigated, Late Sown							
1. MP 4010 (C)	04	6.18	5.78	6.63	7.14	6.60	6.47
2. HD 2864 (C)	05	6.00	6.51	6.75	8.48	7.00	6.95
3. HD 2932 (C)	03	6.01	6.56	6.90	6.88	6.42	6.55
4. MP 3336 (C)	02	6.57	5.46	6.68	6.56	6.28	6.31
Mean		6.19	6.08	6.74	7.27	6.57	6.57

Table 55: Biscuit Speard Factor of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	6.43	6.64	6.08	6.38
2. MACS 6478 (C)	05	6.34	7.04	6.82	6.73
Mean		6.38	6.84	6.45	6.56
Rainfed, Timely Sown					
1. NIAW 2030	06	-	6.05	-	6.05
2. NI 5439 (C)	13	7.05	7.44	6.58	7.02
3. NIAW 1415 (C)	10	6.41	7.78	6.71	6.97
4. UAS 347 (I)	05	5.87	7.16	6.83	6.62
Mean		6.44	7.11	6.71	6.75
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	-	6.22	-	6.22
2. NIAW 1415 (C)	02	-	6.92	-	6.92
3. DBW 93 (I)	08	-	6.49	-	6.49
Mean		-	6.54	-	6.54

Pasta Quality (Table 56-61)

Pasta product (macaroni) was prepared from all the 2nd year AVT entries including checks. Samolina was extracted and purified from all the centres in ITS conditions of NWPZ & CZ and also RTS condition of PZ. The semolina samples of all the respective centres of each zone and sowing condition were mixed and macaroni were prepared from the composite samples. For the evaluation of macaroni cooking quality (Table 56-58), various parameters like cooking time, water absorption, water uptake ratio, gruel solid loss and stickiness were considered. Apart from these, sensory evaluation (Table 59-61) was carried out where parameters like colour, texture, flavor, taste and based on these, overall acceptability using '9' point hedonic scale was considered. The cooking time (minute : second) varied from 10 : 20 (HD 2967, ITS, NWPZ) to 12 : 30 (PDW 291, ITS, NWPZ). The water absorption was maximum in PDW 291 (129 %) and minimum in HD 2967 (112 %). The water uptake ratio ranged from 1.12 to 1.29. The lowest gruel solid loss was observed in PDW 233 (1.52 %) and the highest was in WH 1105 (3.17 %). Out of fourteen samples, six samples were found non-sticky (NS), six partially sticky (PS) and remaining two were sticky (S). The 2nd year entry, HD 4730 (ITS, NWPZ) scored 7.0 on hedonic scale of 9.0. Among the checks, PDW 233 & PDW 314 (ITS, NWPZ), MPO 1215 & HI 8737 (ITS, CZ) and UAS 446 (RTS, PZ) scored >7.0/9.0.

Table 56: Pasta Cooking Quality of *T. durum* genotypes in North Western Plain Zone AVT's

Variety	Code	Cooking Time (Min.:Sec.)	Water Absorption (%)	Water Uptake Ratio	Gruel Solid Loss (%)	Stickiness Mean
Irrigated, Timely Sown						
1. HD 4730	2	11:50	124	1.24	1.97	PS
2. PDW 233 (C)	5	12:05	127	1.27	1.52	NS
3. PDW 291 (C)	3	12:30	129	1.29	2.05	PS
4. PDW 314 (C)	8	11:45	123	1.23	1.84	NS
5. HD 2967 (C)	7	10:20	112	1.12	3.10	S
6. WH 1105 (C)	4	10:25	113	1.13	3.17	S

Table 57: Pasta Cooking Quality of *T. durum* genotypes in Central Zone AVT's

Irrigated, Timely Sown						
1. HD 4728	8	10:25	117	1.17	2.22	PS
2. HD 4730	6	11:10	121	1.21	2.35	PS
3. HI 8498 (C)	2	10:50	120	1.20	2.81	NS
4. MPO 1215 (C)	1	11:40	122	1.22	1.67	NS
5. HI 8737 (I)	3	11:30	122	1.22	1.91	NS

Table 58: Pasta Cooking Quality of *T. durum* genotypes in Peninsular Zone AVT's

Rainfed, Timely Sown						
1. MACS 3927	4	11:00	119	1.19	2.57	PS
2. AKDW 2997-16 (C)	9	12:20	128	1.28	2.12	PS
3. UAS 446 (I)	11	12:00	126	1.26	1.72	NS

Table 59: Pasta Sensory Evaluation of *T. durum* genotypes in North Western Plain Zone AVT's

Variety	Code	COLOUR	TEXTURE	FLAVOUR	Taste	OVERALL ACCEPTABILITY	RANK
Irrigated, Timely Sown							
1. HD 4730	2	8	6	7	7	7.00	4
2. PDW 233 (C)	5	9	7	7	8	7.75	1
3. PDW 291 (C)	3	6	7	7	7	6.75	5
4. PDW 314 (C)	8	7	7	7	8	7.25	3
5. HD 2967 (C)	7	5	6	6	5	5.50	10
6. WH 1105 (C)	4	5	5	6	6	5.50	10

Table 60: Pasta Sensory Evaluation of *T. durum* genotypes in Central Zone AVT's

Irrigated, Timely Sown							
1. HD 4728	8	6	7	7	6	6.50	6
2. HD 4730	6	6	6	7	6	6.25	7
3. HI 8498 (C)	2	6	6	6	5	5.75	9
4. MPO 1215 (C)	1	7	7	8	8	7.50	2
5. HI 8737 (I)	3	7	7	7	8	7.25	3

Table 61: Pasta Sensory Evaluation of *T. durum* genotypes in Peninsular Zone AVT's

Rainfed, Timely Sown							
1. MACS 3927	4	6	6	7	5	6.00	8
2. AKDW 2997-16 (C)	9	6	7	7	7	6.75	5
3. UAS 446 (I)	11	8	7	7	8	7.50	2

Product Evaluation of *T.aestivum* entries in Special MABB Trial (62-100)

One entry and four checks were received from Ludhiana, Delhi, Karnal & Dhaulakuan) of NWPZ, Likewise, one entry and four checks were received from Kanpur & Pusa of NEPZ. In CZ (Indore, Powarkheda & Vijapur) and PZ (Pune, Dharwad & Niphad), one entry and five checks were received. These were evaluated for chapatti and bread in all the centres and zones. Various aspects covered in this chapter are chapatti quality (maximum score 10.0), phenol test (maximum score 10.0), bread loaf volume (ml), bread loaf volume (ml)/dough weight (g), bread quality (maximum score 10.0), extraction rate (%), wet gluten (%), dry gluten (%) and gluten index.

The data are presented in Tables 63-73 for NWPZ, Tables 74-85 for NEPZ and Tables 86-97 for CZ+PZ. Data on High Molecular Weight Glutenin Subunits (HMWGS) for all three situations are presented in Tables 98-100.

Table 62: Chapati Quality (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	7.60	7.65	7.55	7.45	7.56
2.	PBW 343 (C)	02	7.55	7.71	7.45	7.50	7.55
3.	HD 2967 (C)	03	7.65	7.75	7.50	7.60	7.63
4.	DPW 621-50 (C)	05	7.50	7.65	7.40	7.45	7.50
5.	WH 1105 (C)	04	7.55	7.60	7.45	7.50	7.53
Mean			7.57	7.67	7.47	7.50	7.55

Table 63: Phenol Test (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	5.0	6.5	6.0	5.5	5.8
2.	PBW 343 (C)	02	5.5	5.0	6.5	6.0	5.8
3.	HD 2967 (C)	03	5.0	5.0	6.0	5.5	5.4
4.	DPW 621-50 (C)	05	6.5	6.0	7.0	6.5	6.5
5.	WH 1105 (C)	04	6.0	5.5	7.5	6.5	6.4
Mean			5.6	5.6	6.6	6.0	6.0

Table 64: Bread Loaf Volume (ml) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	570	560	550	545	556
2.	PBW 343 (C)	02	565	555	545	540	551
3.	HD 2967 (C)	03	565	560	555	550	558
4.	DPW 621-50 (C)	05	560	555	550	540	551
5.	WH 1105 (C)	04	565	560	545	540	553
Mean			565	558	549	543	554

Table 65: Bread Quality (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	6.95	6.67	6.50	6.42	6.64
2.	PBW 343 (C)	02	6.80	6.60	6.45	6.35	6.55
3.	HD 2967 (C)	03	6.85	6.72	6.58	6.50	6.66
4.	DPW 621-50 (C)	05	6.67	6.62	6.52	6.32	6.53
5.	WH 1105 (C)	04	6.77	6.68	6.40	6.30	6.54
Mean			6.81	6.66	6.49	6.38	6.58

Table 66: Bread Quality (ml) / Dough Weight (g) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	3.40	3.34	3.28	3.25	3.32
2.	PBW 343 (C)	02	3.37	3.31	3.25	3.22	3.29
3.	HD 2967 (C)	03	3.37	3.34	3.31	3.31	3.33
4.	DPW 621-50 (C)	05	3.34	3.31	3.28	3.22	3.29
5.	WH 1105 (C)	04	3.37	3.34	3.25	3.22	3.30
Mean			3.37	3.33	3.27	3.24	3.30

Table 67: Extraction Rate (%) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	68.2	69.6	67.1	67.1	68.0
2.	PBW 343 (C)	02	68.6	70.2	67.5	67.1	68.4
3.	HD 2967 (C)	03	69.5	71.3	68.6	68.2	69.4
4.	DPW 621-50 (C)	05	68.1	69.6	67.2	67.1	68.0
5.	WH 1105 (C)	04	68.4	70.0	67.3	67.2	68.2
Mean			68.6	70.1	67.5	67.3	68.4

Table 68: Wet Gluten (%) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	29.4	30.1	25.1	25.8	27.6
2.	PBW 343 (C)	02	28.6	33.3	29.6	26.5	29.5
3.	HD 2967 (C)	03	29.7	34.1	26.3	26.4	29.1
4.	DPW 621-50 (C)	05	29.1	34.5	29.7	26.1	29.9
5.	WH 1105 (C)	04	28.4	32.5	27.4	26.4	28.7
Mean			29.0	32.9	27.6	26.2	29.0

Table 69: Dry Gluten (%) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	9.4	9.8	8.2	8.3	8.9
2.	PBW 343 (C)	02	9.2	11.8	8.9	8.7	9.7
3.	HD 2967 (C)	03	9.4	11.6	9.9	8.8	9.9
4.	DPW 621-50 (C)	05	10.1	11.9	8.4	8.5	9.7
5.	WH 1105 (C)	04	10.2	12.1	9.9	8.2	10.1
Mean			9.7	11.4	9.1	8.5	9.7

Table 70: Gluten Index (%) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	52	55	67	61	59
2.	PBW 343 (C)	02	52	58	48	46	51
3.	HD 2967 (C)	03	77	81	67	61	72
4.	DPW 621-50 (C)	05	75	80	65	60	70
5.	WH 1105 (C)	04	77	82	60	60	70
Mean			67	71	61	58	64

Table 71: Yellow Pigment Content (ppm) in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	3.91	4.05	3.73	3.81	3.88
2.	PBW 343 (C)	02	4.01	4.15	3.81	3.92	3.97
3.	HD 2967 (C)	03	3.41	3.57	3.68	3.71	3.59
4.	DPW 621-50 (C)	05	3.11	3.31	3.43	3.52	3.34
5.	WH 1105 (C)	04	3.23	3.43	3.51	3.63	3.45
Mean			3.53	3.70	3.63	3.72	3.65

Table 72: Iron Content (ppm) in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	30.3	42.8	43.6	44.3	40.3
2.	PBW 343 (C)	02	34.1	40.5	40.1	42.5	39.3
3.	HD 2967 (C)	03	33.2	41.6	39.2	43.2	39.3
4.	DPW 621-50 (C)	05	35.3	43.2	40.1	42.5	40.3
5.	WH 1105 (C)	04	38.1	45.3	39.6	44.4	41.9
Mean			34.2	42.7	40.5	43.4	40.2

Table 73: Zinc Content (ppm) of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Ludhiana	Delhi	Karnal	Dhaulakuan	Mean
Irrigated Timely Sown							
1.	PBW 723	01	28.8	48.8	28.6	30.0	34.1
2.	PBW 343 (C)	02	29.5	35.6	36.1	37.5	34.7
3.	HD 2967 (C)	03	28.1	36.5	35.2	37.7	34.4
4.	DPW 621-50 (C)	05	31.3	39.2	36.5	36.3	35.8
5.	WH 1105 (C)	04	34.5	41.3	37.2	40.5	38.4
Mean			30.4	40.3	34.7	36.4	35.5

Table 74: Chapati Quality (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	7.66	7.50	7.58
2.	HUW 234 (C)	02	7.69	7.84	7.77
3.	HI 1563 (C)	01	7.95	8.10	8.03
4.	HD 2985 (C)	04	7.60	7.50	7.55
5.	DBW 14 (C)	05	7.70	7.65	7.68
Mean			7.72	7.72	7.72

Table 75: Phenol Test (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	6.0	5.5	5.8
2.	HUW 234 (C)	02	5.5	5.0	5.3
3.	HI 1563 (C)	01	2.0	1.5	1.8
4.	HD 2985 (C)	04	6.0	7.0	6.5
5.	DBW 14 (C)	05	5.5	6.0	5.8
Mean			5.0	5.0	5.0

Table 76: Bread Loaf Volume (ml) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	555	545	550
2.	HUW 234 (C)	02	570	560	565
3.	HI 1563 (C)	01	570	565	568
4.	HD 2985 (C)	04	565	560	563
5.	DBW 14 (C)	05	570	560	565
Mean			566	558	562

Table 77: Bread Quality Score (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	6.61	6.45	6.53
2.	HUW 234 (C)	02	6.92	6.72	6.82
3.	HI 1563 (C)	01	6.95	6.82	6.89
4.	HD 2985 (C)	04	6.85	6.67	6.76
5.	DBW 14 (C)	05	6.88	6.75	6.82
Mean			6.84	6.68	6.76

Table 78: Bread Loaf Volume (ml) /Dough Weight (g) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	3.31	3.25	3.28
2.	HUW 234 (C)	02	3.40	3.34	3.37
3.	HI 1563 (C)	01	3.40	3.37	3.39
4.	HD 2985 (C)	04	3.37	3.34	3.36
5.	DBW 14 (C)	05	3.40	3.34	3.37
Mean			3.38	3.33	3.35

Table 79: Extraction Rate (%) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	69.7	68.8	69.3
2.	HUW 234 (C)	02	70.5	69.9	70.2
3.	HI 1563 (C)	01	69.2	68.9	69.1
4.	HD 2985 (C)	04	70.1	69.6	69.9
5.	DBW 14 (C)	05	69.9	69.2	69.6
Mean			69.9	69.3	69.6

Table 80: Wet Gluten (%) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	25.4	34.1	29.8
2.	HUW 234 (C)	02	24.9	34.5	29.7
3.	HI 1563 (C)	01	25.8	33.2	29.5
4.	HD 2985 (C)	04	26.1	32.8	29.5
5.	DBW 14 (C)	05	26.9	31.6	29.3
Mean			25.8	33.2	29.5

Table 81: Dry Gluten (%) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	8.1	11.0	9.6
2.	HUW 234 (C)	02	8.4	11.1	9.8
3.	HI 1563 (C)	01	8.9	11.2	10.1
4.	HD 2985 (C)	04	9.1	10.4	9.8
5.	DBW 14 (C)	05	9.3	11.4	10.4
Mean			8.8	11.0	9.9

Table 82: Gluten Index (%) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	71	63	67
2.	HUW 234 (C)	02	69	61	65
3.	HI 1563 (C)	01	59	55	57
4.	HD 2985 (C)	04	65	59	62
5.	DBW 14 (C)	05	62	57	60
Mean			65	59	62

Table 83: Yellow Pigment Content (ppm) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	2.73	3.23	2.98
2.	HUW 234 (C)	02	2.69	3.19	2.94
3.	HI 1563 (C)	01	2.37	3.12	2.75
4.	HD 2985 (C)	04	2.71	3.22	2.97
5.	DBW 14 (C)	05	3.13	3.47	3.30
Mean			2.73	3.25	2.99

Table 84: Iron Content (ppm) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	38.5	41.0	39.8
2.	HUW 234 (C)	02	45.6	49.2	47.4
3.	HI 1563 (C)	01	41.2	42.5	41.9
4.	HD 2985 (C)	04	40.2	43.5	41.9
5.	DBW 14 (C)	05	43.5	47.6	45.6
Mean			41.8	44.8	43.3

Table 86: Zinc Content (ppm) of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Kanpur	Pusa	Mean
Irrigated Late Sown					
1.	MMBL 283	03	40.3	49.4	44.9
2.	HUW 234 (C)	02	43.2	47.1	45.2
3.	HI 1563 (C)	01	37.5	40.2	38.9
4.	HD 2985 (C)	04	35.6	40.2	37.9
5.	DBW 14 (C)	05	41.7	46.5	44.1
Mean			39.7	44.7	42.2

Table 86: Chapati Quality (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	7.75	7.80	7.85	7.80	7.77	7.70	7.63	7.70	7.75
2.	HD 3209	04	7.80	7.85	7.90	7.85	7.85	7.75	7.70	7.77	7.81
3.	HD 2932 (C)	01	7.95	8.10	8.20	8.08	8.15	8.05	7.95	8.05	8.07
4.	Raj 4083 (C)	02	7.67	7.75	7.60	7.67	7.70	7.65	7.55	7.63	7.65
5.	HD 2864 (C)	03	7.90	8.15	8.05	8.03	8.10	8.10	8.00	8.07	8.05
6.	MP 3336 (C)	06	7.98	8.12	8.00	8.03	8.20	8.05	7.90	8.05	8.04
Mean			7.84	7.96	7.93	7.91	7.96	7.88	7.79	7.88	7.90

Table 87: Phenol Test (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	6.0	5.5	5.0	5.5	5.5	6.0	5.0	5.5	5.5
2.	HD 3209	04	5.0	5.0	4.5	4.8	5.0	5.5	5.5	5.3	5.1
3.	HD 2932 (C)	01	2.0	1.5	1.5	1.7	1.0	1.5	2.0	1.5	1.6
4.	Raj 4083 (C)	02	6.0	5.5	6.0	5.8	5.5	5.0	6.0	5.5	5.7
5.	HD 2864 (C)	03	2.5	1.0	1.5	1.7	1.5	1.0	1.5	1.3	1.5
6.	MP 3336 (C)	06	2.0	1.0	1.5	1.5	1.0	1.5	2.0	1.5	1.5
Mean			3.9	3.3	3.3	3.5	3.3	3.4	3.7	3.4	3.5

Table 88: Bread Loaf Volume (ml) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	555	570	565	563	560	565	575	567	565
2.	HD 3209	04	560	555	565	560	565	560	570	565	563
3.	HD 2932 (C)	01	565	575	570	570	570	575	575	573	572
4.	Raj 4083 (C)	02	595	605	590	597	600	610	595	602	599
5.	HD 2864 (C)	03	560	570	565	565	565	575	570	570	568
6.	MP 3336 (C)	06	555	565	560	560	560	570	565	565	563
Mean			565	573	569	569	570	576	575	574	571

Table 89: Bread Quality Score (Max-10) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	6.62	6.98	6.82	6.81	6.75	6.85	7.10	6.90	6.85
2.	HD 3209	04	6.80	6.67	6.82	6.76	6.95	6.77	7.05	6.92	6.84
3.	HD 2932 (C)	01	6.90	7.10	7.05	7.02	7.05	7.12	7.15	7.11	7.06
4.	Raj 4083 (C)	02	7.50	7.67	7.40	7.52	7.70	7.85	7.60	7.72	7.62
5.	HD 2864 (C)	03	6.77	7.00	6.85	6.87	6.88	7.10	7.08	7.02	6.95
6.	MP 3336 (C)	06	6.70	6.70	6.77	6.72	6.80	7.00	6.90	6.90	6.81
Mean			6.88	7.02	6.95	6.95	7.02	7.12	7.15	7.09	7.02

Table 90: Bread Loaf Volume (ml) /Dough Weigh (g) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	3.31	3.40	3.37	3.36	3.34	3.37	3.43	3.38	3.37
2.	HD 3209	04	3.34	3.31	3.37	3.34	3.37	3.34	3.40	3.37	3.36
3.	HD 2932 (C)	01	3.37	3.43	3.40	3.40	3.40	3.43	3.43	3.42	3.41
4.	Raj 4083 (C)	02	3.55	3.61	3.52	3.56	3.58	3.64	3.55	3.59	3.58
5.	HD 2864 (C)	03	3.34	3.40	3.37	3.37	3.37	3.43	3.40	3.40	3.39
6.	MP 3336 (C)	06	3.31	3.37	3.34	3.34	3.34	3.40	3.37	3.37	3.36
Mean			3.37	3.42	3.40	3.40	3.40	3.44	3.43	3.42	3.41

Table 91: Extraction Rate (%) of *T.aestivum* in Special Trial (MABB/NIL Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone				Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	69.4	70.1	69.2	69.6	69.8	70.2	69.6	69.9	69.7
2.	HD 3209	04	70.1	70.8	71.3	70.7	70.5	71.3	72.5	71.4	71.1
3.	HD 2932 (C)	01	69.7	70.2	69.6	69.8	70.1	71.5	69.9	70.5	70.2
4.	Raj 4083 (C)	02	70.5	71.2	72.5	71.4	71.6	71.8	73.2	72.2	71.8
5.	HD 2864 (C)	03	69.1	69.8	68.2	69.0	69.6	70.2	69.1	69.6	69.3
6.	MP 3336 (C)	06	68.8	69.1	67.9	68.6	69.1	69.8	68.3	69.1	68.8
Mean			69.6	70.2	69.8	69.9	70.1	70.8	70.4	70.5	70.2

Table 92: Wet Gluten (%) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	
Irrigated Timely Sown										
1.	HD2932 + Lr19/Sr25	05	31.6	32.2	26.3	30.0	32.1	32.2	29.2	31.2
2.	HD 3209	04	30.1	32.2	26.6	29.6	30.6	34.6	30.7	32.0
3.	HD 2932 (C)	01	29.6	33.3	27.4	30.1	31.5	34.1	30.3	32.0
4.	Raj 4083 (C)	02	30.8	33.0	26.1	30.0	28.9	30.6	29.6	29.7
5.	HD 2864 (C)	03	28.9	30.8	26.9	28.9	29.3	30.5	30.1	30.0
6.	MP 3336 (C)	06	29.8	31.6	27.9	29.8	30.8	33.7	29.8	31.4
Mean			30.1	32.2	26.9	29.7	30.5	32.6	30.0	31.0
										30.4

Table 93: Dry Gluten (%) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	
Irrigated Timely Sown										
1.	HD2932 + Lr19/Sr25	05	11.0	10.7	9.2	10.3	10.9	11.6	9.4	10.6
2.	HD 3209	04	10.1	11.8	9.5	10.5	10.2	11.8	10.3	10.8
3.	HD 2932 (C)	01	9.9	11.9	8.9	10.2	11.1	12.2	10.6	11.3
4.	Raj 4083 (C)	02	10.4	11.6	9.3	10.4	9.9	12.1	10.1	10.7
5.	HD 2864 (C)	03	9.8	11.1	8.8	9.9	10.1	10.8	9.9	10.3
6.	MP 3336 (C)	06	10.2	11.7	9.1	10.3	10.4	10.6	10.4	10.5
Mean			10.2	11.5	9.1	10.3	10.4	11.5	10.1	10.7
										10.5

Table 94: Gluten Index (%) of *T.aestivum* in Special Trial (MABB/NIL Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Power Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	54	56	63	58	58	71	68	66	62
2.	HD 3209	04	53	61	71	62	56	65	74	65	63
3.	HD 2932 (C)	01	64	71	59	65	67	75	63	68	67
4.	Raj 4083 (C)	02	71	75	81	76	75	81	86	81	78
5.	HD 2864 (C)	03	59	67	73	66	63	71	74	69	68
6.	MP 3336 (C)	06	41	53	57	50	44	59	62	55	53
Mean			57	64	67	63	61	70	71	67	65

Table 95: Yellow Pigment Content (ppm) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone				Peninsular Zone				Overall Mean	
		Code	Indore	Power Kheda	Vijapur	Mean	Pune	Dharwad	Niphad		
Irrigated Timely Sown											
1.	HD2932 + <i>Lr19/Sr25</i>	05	2.85	3.10	2.72	2.89	2.77	2.93	2.61	2.77	2.83
2.	HD 3209	04	2.81	3.01	2.69	2.84	2.71	2.87	2.53	2.70	2.77
3.	HD 2932 (C)	01	2.69	2.81	2.43	2.64	2.59	2.77	2.31	2.56	2.60
4.	Raj 4083 (C)	02	2.19	2.37	2.27	2.28	2.05	2.21	2.21	2.16	2.22
5.	HD 2864 (C)	03	2.71	2.93	2.59	2.74	2.59	2.81	2.51	2.64	2.69
6.	MP 3336 (C)	06	2.43	2.69	2.51	2.54	2.33	2.51	2.37	2.40	2.47
Mean			2.61	2.82	2.54	2.66	2.51	2.68	2.42	2.54	2.60

Table 96: Iron Content (ppm) of *T.aestivum* in Special Trial (MABB Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Central Zone					Peninsular Zone					Overall Mean
		Code	Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean		
Irrigated Timely Sown												
1.	HD2932 + <i>Lr19/Sr25</i>	05	36.0	31.4	33.0	33.5	34.7	40.6	38.5	37.9	35.7	
2.	HD 3209	04	39.6	41.2	40.2	40.3	40.3	44.4	41.3	42.0	41.2	
3.	HD 2932 (C)	01	37.2	42.2	39.3	39.6	39.5	43.6	41.2	41.4	40.5	
4.	Raj 4083 (C)	02	41.2	45.3	40.1	42.2	38.6	41.3	40.5	40.1	41.2	
5.	HD 2864 (C)	03	40.6	45.3	42.2	42.7	41.1	46.3	41.2	42.9	42.8	
6.	MP 3336 (C)	06	38.2	43.1	37.5	39.6	42.5	46.1	43.6	44.1	41.8	
Mean			38.8	41.4	38.7	39.6	39.5	43.7	41.1	41.4	40.5	

Table 97: Zinc Content (ppm) of *T.aestivum* in Special Trial (MABB/NIL Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone					Peninsular Zone					Overall Mean
			Indore	Powar Kheda	Vijapur	Mean	Pune	Dharwad	Niphad	Mean			
Irrigated Timely Sown													
1.	HD2932 + <i>Lr19/Sr25</i>	05	34.9	30.1	36.6	33.9	40.1	42.8	27.8	36.9	35.4		
2.	HD 3209	04	40.2	43.1	41.2	41.5	42.5	46.1	43.5	44.0	42.8		
3.	HD 2932 (C)	01	35.3	40.1	37.6	37.7	38.2	41.6	39.2	39.7	38.7		
4.	Raj 4083 (C)	02	39.2	43.6	38.6	40.5	41.6	44.4	42.5	42.8	41.7		
5.	HD 2864 (C)	03	38.1	43.1	38.2	39.8	40.6	45.3	42.1	42.7	41.2		
6.	MP 3336 (C)	06	36.7	41.2	39.1	39.0	39.2	43.5	41.3	41.3	40.2		
Mean			37.4	40.2	38.6	38.7	40.4	44.0	39.4	41.2	40.0		

Table 98: High Molecular weight Glutenin Subunit of *T.aestivum* in Special Trial (MABB Trial) in North Western Plain Zone

Sr. No.	Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Irrigated Timely Sown						
1.	PBW 723	01	5+10	1	7+9	9
2.	PBW 343 (C)	02	5+10	1	7+9	9
3.	HD 2967 (C)	03	5+10	2*	17+18	10
4.	DPW 621-50 (C)	05	5+10	2*	17+18	10
5.	WH 1105 (C)	04	5+10	2*	7	8

Table 99: High Molecular weight Glutenin Subunit of *T.aestivum* in Special Trial (MABB Trial) in North Eastern Plain Zone

Sr. No.	Variety	Code	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Irrigated Late Sown						
1.	MMBL 283	03	2+12	2*	7+8	8
2.	HUW 234 (C)	02	2+12	2*	7+8	8
3.	HI 1563 (C)	01	2+12	2*	7+8	8
4.	HD 2985 (C)	04	2+12	2*	17+18	8
5.	DBW 14 (C)	05	2+12	2*	7+8	8

Table 100: High Molecular weight Glutenin Subunit of *T.aestivum* in Special Trial (MABB/NIL Trial) in Central Zone and Peninsular Zone

Sr. No.	Variety	Code	Central Zone				Peninsular Zone			
			Glu-D1	Glu-A1	Glu-B1	Glu-1 Score	Glu-D1	Glu-A1	Glu-B1	Glu-1 Score
Irrigated Timely Sown										
1.	HD2932 + Lr19/Sr25	05	2+12	2*	17+18	8	2+12	2*	17+18	8
2.	HD 3209	04	2+12	2*	7+8	8	2+12	2*	7+8	8
3.	HD 2932 (C)	01	2+12	2*	17+18	8	2+12	2*	17+18	8
4.	Raj 4083 (C)	02	5+10	1	7+8	10	5+10	1	7+8	10
5.	HD 2864 (C)	03	2+12	1	7+8	8	2+12	1	7+8	8
6.	MP 3336 (C)	06	2+12	2*	7+8	8	2+12	2*	7+8	8

SECTION F

GRAIN NUTRITION

- i. Protein
- ii. Yellow Pigment
- iii. Iron
- iv. Zinc

NUTRITIONAL QUALITY

Quality parameters analysed in relation to grain nutrition were protein, iron, zinc and yellow pigment contents for all the AVT entries including checks.

Grain protein content (Tables 1-5 and 21-23)

Mean protein content was $\geq 12\%$ in irrigated bread wheat trials of each zone except NHZ where it was below 10%. Highest zonal mean was in late-sown trial of CZ (13.6%). Under rainfed condition, average protein content was 9.8% in NHZ, 12.4% in NWPZ and 10.6 % in PZ. Average protein content in normal irrigated durum trials was nearly 12% in all three zones i.e. NWPZ, CZ and PZ. Bread wheat entries with protein $\geq 11\%$ were VL 1007, HS 599 and VL 3008 and they were all rainfed entries. In NWPZ, couple of test entries had protein $\geq 13\%$ and they were K 1314, DBW 148, PBW 709 and PBW 719. There were few good genotypes in late-sown trial of CZ like CG 1015, MP 4010 © and HD 2932 © where protein range was 13.8 to 14.0%. Good entries in *durum* trials with protein content 12.2 to 12.4% were the checks HI 8498, PDW 233 and UAS 428.

Yellow pigments content (Tables 6-10 and 24-26)

Trial mean was high in bread wheats of NHZ & NEPZ (4ppm) and moderate in NWPZ (3.5 to 4.0ppm). Yellow pigment content was high in irrigated durum trails of NWPZ and PZ with mean 6.27 and 6.60ppm, respectively. Genotypes with yellow pigment content $\geq 4.5\text{ppm}$ were VL 804 ©, VL 907 ©, UP 2917 in NHZ. Bread wheat entries with yellow pigment content $\geq 4.25\text{ppm}$ in rest of the zones were DBW147, HUW 688, K 1312, K 1317 in NWPZ and NI 5439 ©, PBW 721 in PZ. Durum entries with yellow pigment content $\geq 6.5\text{ppm}$ were PDW 233 ©, DDW 31, DDW 32, MACS 4024 in NWPZ and HI 8759, UAS 453 in PZ.

Iron content (Tables 11-15 and 27-29)

Range in iron content was almost similar in bread wheat trials of all zones, especially the upper limit (NHZ: 30-41ppm; NWPZ: 37-43; NEPZ: 42-47; CZ: 36-42; PZ: 35-44). Entries with iron content $\geq 42\text{ppm}$ were WH 1105 ©, HD 3165, WH 1164, K 1317 in NWPZ; C 306 ©, K 8027 ©, HD 2888 ©, HD 3171, K 1317 in NEPZ; HI 1544, MP 4010 ©, CG 1015 in CZ; K 1315, HD 3171, HI 1605, JWS 712 in PZ. Durum entries with iron content $\geq 42\text{ppm}$ were MACS 3927, UAS 446 and AKDW 2997-16 © and they all belonged to PZ.

Zinc content (Tables 16-20 and 30-32)

In bread wheat trials, average zinc concentration in the grains was lowest in timely-sown trial of NHZ and restricted irrigation trial of PZ (29-30ppm). In all other trial series, trial mean ranged between 35 to 41ppm. Zinc content was \geq 40ppm in 35 entries and couple of them had zinc in the range 44-50ppm like HS 596, HS 597, VL 1007, UP 2917, VL 3008 in NHZ. WH 1021 ©, PBW 719, DBW 150, K 1313, K 1314, K 1317 in NWPZ; C 306 ©, K 8027 ©, HD 2888 © in NEPZ; CG 1015 in CZ; K 1315, NIAW 1415 © in PZ. In durum, entries with zinc content 44-45ppm were PDW 233 ©, PDW 291 ©, DDW 31, MACS 3949, MACS 4024 in NWPZ; MACS 3927 in PZ.

Table 1: Protein Content (%) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	9.3	8.1	10.7	9.4
2. VL 804 (C)	03	10.9	8.4	11.0	10.1
3. VL 907 (C)	05	10.1	9.2	10.7	10.0
4. HS 507 (C)	06	9.9	9.4	10.8	10.0
5. HPW 349 (C)	04	10.9	8.8	10.0	9.9
6. HS 583	02	9.4	8.1	11.1	9.5
Mean		10.1	8.7	10.7	9.8
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	9.4	8.0	9.5	9.0
2. VL 804 (C)	03	9.6	8.1	10.0	9.2
3. VL 907 (C)	05	11.1	8.4	10.6	10.0
4. HS 507 (C)	06	10.5	8.4	10.4	9.8
5. HPW 349 (C)	04	10.9	8.8	9.8	9.8
6. HS 583	02	9.0	8.1	9.1	8.7
Mean		10.1	8.3	9.9	9.4
Rainfed, Early Sown					
1. VL 829 (C)	04	10.4	8.4	8.9	9.2
2. HPW 251 (C)	06	11.0	8.1	8.6	9.2
3. HS 542 (C)	01	10.5	9.6	9.0	9.7
4. HPW 413	02	10.7	8.2	9.6	9.5
5. HS 596	07	11.5	9.6	10.1	10.4
6. HS 597	05	10.0	8.8	8.8	9.2
7. HS 598	03	10.1	8.5	9.5	9.4
8. VL 1005	11	10.5	8.2	9.2	9.3
9. VL 1006	10	10.3	9.4	10.3	10.0
10. VL 1007	08	11.8	12.3	11.6	11.9
11. UP 2917	09	10.4	10.8	10.5	10.6
Mean		10.7	9.3	9.6	9.9
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	8.9	8.6	9.0	8.8
2. HS 490 (C)	02	8.8	8.8	9.9	9.1
3. HS 599	07	11.0	9.9	12.4	11.1
4. HS 600	05	10.2	10.7	8.5	9.8
5. HS 601	10	9.0	8.5	8.6	8.7
6. HPW 421	04	9.6	9.8	9.9	9.7
7. HPW 422	06	9.3	8.4	9.7	9.1
8. VL 3007	11	10.3	10.1	9.6	10.0
9. VL 3008	09	11.2	10.7	11.2	11.0
10. VL 3009	01	8.8	8.6	10.0	9.1
11. UP 2918	08	9.7	9.7	10.3	9.9
Mean		9.7	9.4	9.9	9.7

Table 2: Protein Content (%) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	10.5	12.1	12.0	10.2	13.5	11.7
2. DPW 621-50 (C)	02	11.9	13.1	12.7	11.8	13.2	12.6
3. WH 1105 (C)	03	10.9	12.7	12.0	11.1	12.9	11.9
4. DBW 88 (C)	05	12.6	12.4	12.8	11.6	12.5	12.4
5. HD 3086 (C)	04	11.9	13.8	12.2	10.8	11.2	12.0
6. PBW 707	07	10.9	11.7	11.6	10.8	13.0	11.6
7. PBW 709	06	12.2	12.8	13.5	12.4	14.0	13.0
8. HD 3159	08	11.3	11.8	12.0	9.5	11.4	11.2
Mean		11.5	12.6	12.4	11.0	12.7	12.0
Irrigated, Late Sown							
1. WH 1021 (C)	09	12.2	14.7	11.6	12.0	11.7	12.4
2. HD 3059 (C)	11	12.9	14.5	12.7	12.0	11.5	12.7
3. DBW 90 (C)	15	12.5	13.4	11.8	11.4	11.3	12.1
4. WH 1124 (C)	10	12.2	14.4	12.4	11.4	11.1	12.3
5. WH 1179	13	12.3	13.2	11.4	11.7	10.5	11.8
6. PBW 716	03	12.2	14.1	12.1	10.8	11.0	12.0
7. PBW 718	18	12.1	13.5	13.3	11.3	10.2	12.1
8. PBW 719	06	12.8	14.5	12.4	12.6	12.7	13.0
9. HD 3165	12	12.5	13.9	12.6	12.7	11.0	12.5
10. HI 1604	01	11.4	13.5	10.6	10.2	10.5	11.2
11. DBW 147	17	12.7	13.3	12.5	11.0	11.0	12.1
12. DBW 148	02	13.7	14.0	13.4	12.5	12.1	13.1
13. DBW 150	07	12.5	13.6	11.8	11.2	12.2	12.2
14. HUW 688	04	13.0	14.4	12.4	11.9	11.7	12.7
15. UP 2883	08	12.4	13.3	12.1	11.8	12.3	12.4
16. K 1312	14	12.2	14.2	11.9	12.4	11.6	12.4
17. K 1313	16	12.4	13.8	11.5	11.8	10.3	12.0
18. K 1314	05	14.0	15.5	13.4	13.2	12.6	13.7
Mean		12.6	14.0	12.2	11.8	11.4	12.4
Rainfed, Timely Sown							
1. WH 1164	05	12.8	-	13.9	-	11.6	12.8
2. PBW 644 (C)	06	12.7	-	13.8	-	10.4	12.3
3. WH 1080 (C)	01	12.9	-	14.1	-	9.7	12.2
4. HD 3174	04	12.7	-	14.2	-	10.0	12.3
5. HI 1605	02	13.2	-	14.3	-	10.4	12.6
6. K 1317	03	13.0	-	13.7	-	10.4	12.4
Mean		12.9	-	14.0	-	10.4	12.4
Restricted Irrigation, Timely Sown							
1. MP 1277	05	12.6	-	14.1	10.2	11.2	12.0
2. PBW 644 (C)	01	13.3	-	14.1	10.2	11.4	12.2
3. WH 1080 (C)	04	13.3	-	13.8	11.6	11.5	12.5
4. HD 3043 (C)	02	13.7	-	13.0	10.9	10.7	12.1
5. WH 1142 (I)	03	12.6	-	13.2	10.4	10.6	11.7
Mean		13.1	-	13.6	10.7	11.1	12.1

Table 3: Protein Content (%) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	10.8	13.4	10.9	11.7
2. K 8027 (C)	05	11.3	13.7	11.1	12.0
3. HD 2888 (C)	03	11.8	13.7	10.5	12.0
4. HD 3171	01	10.3	13.5	12.2	12.0
5. K 1317	02	11.4	13.4	11.9	12.2
Mean		11.1	13.5	11.3	12.0

Table 4: Protein Content (%) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	9.7	11.1	11.6	13.6	11.5	11.5
2. HI 1544 (C)	07	9.7	11.7	11.7	13.3	12.1	11.7
3. GW 463	05	8.9	11.2	12.0	14.3	11.3	11.5
Mean		9.4	11.4	11.8	13.8	11.6	11.6
Irrigated, Late Sown							
1. MP 4010 (C)	04	12.7	14.0	14.5	14.1	14.7	14.0
2. HD 2864 (C)	05	11.9	13.0	13.6	13.2	13.0	12.9
3. HD 2932 (C)	03	12.9	14.2	14.4	13.6	13.9	13.8
4. MP 3336 (C)	02	12.4	12.9	13.6	14.1	13.8	13.4
5. CG 1015	01	12.9	14.3	14.4	14.8	13.9	14.0
Mean		12.5	13.7	14.1	14.0	13.9	13.6

Table 5: Protein Content (%) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	12.1	12.4	12.4	12.3
2. MACS 6478 (C)	05	12.2	12.4	13.1	12.6
3. HD 3164	02	13.1	13.7	12.8	13.2
4. UAS 360	08	12.6	12.3	12.5	12.5
5. UAS 361	04	11.6	11.6	11.3	11.5
Mean		12.3	12.5	12.4	12.4
Rainfed, Timely Sown					
1. NIAW 2030	06	-	10.6	-	10.6
2. NI 5439 (C)	13	-	10.2	-	10.2
3. NIAW 1415 (C)	10	-	10.9	-	10.9
4. UAS 347 (I)	05	-	9.5	-	9.5
5. PBW 721	03	-	10.5	-	10.5
6. K 1315	01	-	11.9	-	11.9
Mean		-	10.6	-	10.6
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	12.8	13.3	11.5	12.5
2. NIAW 1415 (C)	02	13.8	14.5	12.9	13.7
3. DBW 93 (I)	08	13.9	14.8	13.1	13.9
4. HD 3171	01	12.4	12.7	12.1	12.4
5. HI 1605	03	11.8	12.5	11.5	11.9
6. JWS 712	06	12.9	13.3	13.4	12.9
Mean		12.9	13.5	12.4	12.9

Table 6: Yellow Pigment Content (ppm) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	4.14	4.35	4.67	4.39
2. VL 804 (C)	03	4.80	4.81	4.75	4.79
3. VL 907 (C)	05	5.00	5.00	4.45	4.82
4. HS 507 (C)	06	3.84	3.68	3.53	3.68
5. HPW 349 (C)	04	3.06	3.40	3.22	3.23
6. HS 583	02	2.88	3.00	3.18	3.02
Mean		3.95	4.04	3.97	3.99
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	4.93	4.33	4.28	4.51
2. VL 804 (C)	03	4.85	4.80	4.41	4.69
3. VL 907 (C)	05	5.08	4.80	4.99	4.96
4. HS 507 (C)	06	3.84	4.02	3.69	3.85
5. HPW 349 (C)	04	2.88	2.83	3.06	2.92
6. HS 583	02	3.11	2.67	3.68	3.15
Mean		4.12	3.91	4.02	4.01
Rainfed, Early Sown					
1. VL 829 (C)	04	4.31	4.40	4.20	4.30
2. HPW 251 (C)	06	4.12	4.04	3.33	3.83
3. HS 542 (C)	01	4.18	4.16	3.74	4.03
4. HPW 413	02	3.48	3.60	3.40	3.49
5. HS 596	07	4.28	4.37	4.22	4.29
6. HS 597	05	3.71	4.02	4.18	3.97
7. HS 598	03	4.11	3.55	3.78	3.81
8. VL 1005	11	4.29	3.75	3.86	3.97
9. VL 1006	10	4.33	3.69	3.66	3.89
10. VL 1007	08	4.05	3.49	4.44	3.99
11. UP 2917	09	4.61	4.41	5.21	4.74
Mean		4.13	3.95	4.00	4.03
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	3.64	3.09	3.61	3.45
2. HS 490 (C)	02	4.24	4.05	4.17	4.15
3. HS 599	07	3.56	4.11	4.51	4.06
4. HS 600	05	4.07	4.08	3.61	3.92
5. HS 601	10	4.04	3.88	4.01	3.98
6. HPW 421	04	3.79	4.44	4.22	4.15
7. HPW 422	06	3.46	3.66	4.16	3.76
8. VL 3007	11	3.89	3.47	3.87	3.74
9. VL 3008	09	4.25	3.12	4.41	3.93
10. VL 3009	01	3.99	3.42	3.96	3.79
11. UP 2918	08	3.20	4.02	3.99	3.74
Mean		3.83	3.76	4.05	3.88

Table 7: Yellow Pigment Content (ppm) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	3.33	4.08	3.46	3.82	3.67	3.67
2. DPW 621-50 (C)	02	3.11	2.82	3.08	3.68	3.67	3.27
3. WH 1105 (C)	03	3.20	3.78	3.80	3.26	2.94	3.40
4. DBW 88 (C)	05	3.18	3.66	2.94	3.47	3.18	3.29
5. HD 3086 (C)	04	3.66	3.24	3.47	3.07	3.31	3.35
6. PBW 707	07	3.62	2.87	3.53	2.94	3.41	3.27
7. PBW 709	06	4.06	3.82	3.99	3.54	4.20	3.92
8. HD 3159	08	3.78	3.42	3.45	2.93	3.73	3.46
Mean		3.49	3.46	3.47	3.34	3.51	3.45
Irrigated, Late Sown							
1. WH 1021 (C)	09	3.42	2.60	3.42	2.54	3.00	3.00
2. HD 3059 (C)	11	3.15	2.92	3.15	2.78	3.06	3.01
3. DBW 90 (C)	15	3.49	3.42	3.49	3.59	3.59	3.52
4. WH 1124 (C)	10	3.18	3.71	3.18	3.78	3.45	3.46
5. WH 1179	13	3.31	2.95	3.31	3.21	3.28	3.21
6. PBW 716	03	2.88	3.36	2.88	2.91	2.95	3.00
7. PBW 718	18	3.15	3.09	2.75	2.94	3.19	3.02
8. PBW 719	06	3.24	3.05	3.24	3.02	2.99	3.11
9. HD 3165	12	3.56	3.56	3.56	3.80	3.26	3.55
10. HI 1604	01	3.92	3.73	3.92	3.78	4.25	3.92
11. DBW 147	17	3.94	4.69	3.94	4.68	4.64	4.38
12. DBW 148	02	3.59	3.40	3.59	4.11	3.74	3.69
13. DBW 150	07	4.25	3.73	4.25	3.76	4.17	4.03
14. HUW 688	04	4.51	3.89	4.51	4.51	3.82	4.25
15. UP 2883	08	4.09	3.87	4.09	3.60	3.55	3.84
16. K 1312	14	4.12	4.13	4.12	4.69	4.25	4.26
17. K 1313	16	4.55	4.08	4.55	4.53	4.29	4.40
18. K 1314	05	3.78	3.52	3.78	4.22	3.14	3.69
Mean		3.67	3.54	3.65	3.69	3.59	3.63
Rainfed, Timely Sown							
1. WH 1164	05	4.01	-	4.01	-	3.61	3.88
2. PBW 644 (C)	06	3.52	-	3.52	-	3.40	3.48
3. WH 1080 (C)	01	3.92	-	3.92	-	3.42	3.75
4. HD 3174	04	3.71	-	3.71	-	3.33	3.58
5. HI 1605	02	3.59	-	3.59	-	3.37	3.52
6. K 1317	03	4.21	-	4.21	-	4.74	4.39
Mean		3.83	-	3.83	-	3.65	3.77
Restricted Irrigation, Timely Sown							
1. MP 1277	05	3.42	-	3.42	3.02	3.47	3.33
2. PBW 644 (C)	01	3.75	-	3.75	3.42	3.49	3.60
3. WH 1080 (C)	04	3.85	-	3.85	3.42	3.87	3.75
4. HD 3043 (C)	02	3.97	-	3.97	4.00	4.54	4.12
5. WH 1142 (I)	03	3.94	-	3.94	3.45	3.92	3.81
Mean		3.79	-	3.79	3.46	3.86	3.72

Table 8: Yellow Pigment Content (ppm) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	4.05	4.02	4.14	4.07
2. K 8027 (C)	05	3.54	4.12	4.35	4.00
3. HD 2888 (C)	03	3.88	4.33	3.88	4.03
4. HD 3171	01	4.18	4.34	4.65	4.39
5. K 1317	02	3.95	4.05	4.02	4.01
Mean		3.92	4.17	4.21	4.10

Table 9: Yellow Pigment Content (ppm) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	3.38	3.50	2.74	2.67	3.02	3.06
2. HI 1544 (C)	07	3.22	2.48	3.01	3.29	3.13	3.03
3. GW 463	05	3.59	2.94	2.92	2.84	3.22	3.10
Mean		3.40	2.97	2.89	2.93	3.12	3.06
Irrigated, Late Sown							
1. MP 4010 (C)	04	2.94	3.24	3.15	2.84	2.66	2.97
2. HD 2864 (C)	05	3.53	3.34	2.66	3.46	2.73	3.14
3. HD 2932 (C)	03	3.56	3.32	2.87	2.65	2.82	3.04
4. MP 3336 (C)	02	2.52	3.29	2.75	3.22	2.78	2.91
5. CG 1015	01	3.65	3.35	3.06	3.42	2.53	3.20
Mean		3.24	3.31	2.90	3.12	2.70	3.05

Table 10 Yellow Pigment Content (ppm) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	3.35	2.73	2.99	3.02
2. MACS 6478 (C)	05	3.68	2.80	3.13	3.20
3. HD 3164	02	2.80	3.61	3.35	3.25
4. UAS 360	08	3.47	3.21	3.16	3.28
5. UAS 361	04	3.84	3.76	3.95	3.85
Mean		3.43	3.22	3.32	3.32
Rainfed, Timely Sown					
1. NIAW 2030	06	-	3.80	-	3.80
2. NI 5439 (C)	13	-	4.27	-	4.27
3. NIAW 1415 (C)	10	-	4.14	-	4.14
4. UAS 347 (I)	05	-	3.21	-	3.21
5. PBW 721	03	-	4.32	-	4.32
6. K 1315	01	-	3.92	-	3.92
Mean		-	3.94	-	3.94
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	3.71	4.14	3.91	3.92
2. NIAW 1415 (C)	02	2.96	3.21	3.11	3.09
3. DBW 93 (I)	08	4.14	3.95	3.77	3.95
4. HD 3171	01	4.04	3.96	3.71	3.90
5. HI 1605	03	4.04	3.87	3.67	3.86
6. JWS 712	06	4.11	3.91	3.81	3.94
Mean		3.83	3.84	3.66	3.78

Table 11: Iron Content (ppm) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	37.8	32.0	37.4	35.7
2. VL 804 (C)	03	33.9	25.5	31.9	30.4
3. VL 907 (C)	05	35.0	24.7	32.8	30.8
4. HS 507 (C)	06	36.2	27.8	35.5	33.2
5. HPW 349 (C)	04	34.4	32.2	30.6	32.4
6. HS 583	02	38.8	36.7	36.4	37.3
Mean		36.0	29.8	34.1	33.3
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	40.3	34.1	40.7	38.4
2. VL 804 (C)	03	34.3	32.4	37.0	34.6
3. VL 907 (C)	05	38.2	40.6	36.0	38.3
4. HS 507 (C)	06	37.0	33.7	37.8	36.2
5. HPW 349 (C)	04	38.0	33.3	37.2	36.2
6. HS 583	02	42.1	34.2	41.0	39.1
Mean		38.3	34.7	38.3	37.1
Rainfed, Early Sown					
1. VL 829 (C)	04	37.3	33.7	25.6	32.2
2. HPW 251 (C)	06	41.7	40.6	31.4	37.9
3. HS 542 (C)	01	35.4	40.3	27.6	34.4
4. HPW 413	02	36.8	36.4	26.5	33.2
5. HS 596	07	43.4	39.3	33.5	38.7
6. HS 597	05	39.5	38.4	32.3	36.7
7. HS 598	03	40.1	41.4	29.6	37.0
8. VL 1005	11	42.1	37.4	36.6	38.7
9. VL 1006	10	37.8	37.1	33.4	36.1
10. VL 1007	08	37.8	42.6	35.6	38.7
11. UP 2917	09	40.0	42.7	35.5	39.4
Mean		39.3	39.1	31.6	36.6
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	34.7	31.9	33.6	33.4
2. HS 490 (C)	02	34.5	37.1	37.8	36.5
3. HS 599	07	35.8	36.8	41.9	38.2
4. HS 600	05	37.4	33.2	41.8	37.5
5. HS 601	10	37.6	36.3	38.5	37.5
6. HPW 421	04	37.6	32.6	34.4	34.9
7. HPW 422	06	35.7	33.8	37.0	35.5
8. VL 3007	11	40.6	37.0	45.1	40.9
9. VL 3008	09	39.1	38.0	40.3	39.1
10. VL 3009	01	33.7	26.9	37.5	32.7
11. UP 2918	08	36.9	33.1	39.2	36.4
Mean		36.7	34.2	38.8	36.6

Table 12: Iron Content (ppm) of *T.aestivum* genotypes in North Western Plains Zone AVT 's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	31.1	33.6	45.5	40.8	42.5	38.7
2. DPW 621-50 (C)	02	35.5	36.4	35.9	50.9	41.3	40.0
3. WH 1105 (C)	03	34.8	42.5	41.5	45.2	48.4	42.5
4. DBW 88 (C)	05	32.3	35.3	35.8	47.7	37.8	37.8
5. HD 3086 (C)	04	34.9	43.9	40.6	46.7	39.0	41.0
6. PBW 707	07	34.1	37.3	36.8	41.3	46.0	39.1
7. PBW 709	06	31.5	39.7	40.2	52.0	38.8	40.4
8. HD 3159	08	37.1	36.3	36.7	42.3	37.4	38.0
Mean		33.9	38.1	39.1	45.9	41.4	39.7
Irrigated, Late Sown							
1. WH 1021 (C)	09	34.7	40.8	40.6	58.0	33.2	41.5
2. HD 3059 (C)	11	36.4	41.8	41.4	39.4	34.1	38.6
3. DBW 90 (C)	15	39.4	39.3	44.7	48.6	35.7	41.5
4. WH 1124 (C)	10	35.4	43.6	43.9	47.9	36.8	41.5
5. WH 1179	13	42.0	36.6	38.4	48.7	36.7	40.5
6. PBW 716	03	38.5	36.9	38.2	50.0	34.3	39.6
7. PBW 718	18	37.9	38.7	42.4	44.8	35.2	39.8
8. PBW 719	06	36.6	36.3	40.4	58.0	35.4	41.3
9. HD 3165	12	42.1	41.5	43.8	48.4	38.4	42.8
10. HI 1604	01	35.9	35.0	39.5	48.8	28.2	37.5
11. DBW 147	17	39.1	37.3	39.5	54.6	33.4	40.8
12. DBW 148	02	36.8	35.2	43.6	46.4	36.4	39.7
13. DBW 150	07	35.7	37.2	38.7	50.0	36.7	39.7
14. HUW 688	04	35.8	36.9	37.5	52.9	28.9	38.4
15. UP 2883	08	33.0	40.8	40.0	45.6	37.9	39.5
16. K 1312	14	36.7	33.6	36.3	49.6	32.9	37.8
17. K 1313	16	37.0	36.5	42.9	38.2	34.1	37.7
18. K 1314	05	36.9	42.1	41.9	47.5	36.0	40.9
Mean		37.2	38.3	40.8	48.7	34.7	39.9
Rainfed, Timely Sown							
1. WH 1164	05	37.3	-	46.9	-	43.8	42.7
2. PBW 644 (C)	06	37.3	-	43.9	-	42.4	41.2
3. WH 1080 (C)	01	34.9	-	40.9	-	35.6	37.1
4. HD 3174	04	33.3	-	43.5	-	38.4	38.4
5. HI 1605	02	32.9	-	45.3	-	38.4	38.9
6. K 1317	03	39.1	-	46.3	-	42.3	42.6
Mean		35.8	-	44.5	-	40.2	40.1
Restricted Irrigation, Timely Sown							
1. MP 1277	05	34.8	-	41.1	40.0	36.3	38.1
2. PBW 644 (C)	01	42.4	-	39.4	40.6	37.1	39.9
3. WH 1080 (C)	04	31.7	-	40.8	40.5	37.1	37.5
4. HD 3043 (C)	02	34.9	-	45.7	37.1	33.9	37.9
5. WH 1142 (I)	03	40.9	-	44.7	42.5	32.4	40.1
Mean		36.9	-	42.3	40.1	35.4	38.7

Table 13: Iron Content (ppm) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	53.9	40.8	47.9	47.5
2. K 8027 (C)	05	53.8	42.8	40.4	45.7
3. HD 2888 (C)	03	51.9	42.2	46.5	46.9
4. HD 3171	01	41.5	44.5	44.1	43.4
5. K 1317	02	46.7	41.2	38.6	42.2
Mean		49.6	42.3	43.5	45.1

Table 14: Iron Content (ppm) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	35.0	40.0	44.0	35.8	35.9	38.1
2. HI 1544 (C)	07	39.6	45.4	51.7	40.4	30.4	41.5
3. GW 463	05	36.1	41.0	45.6	40.3	32.5	39.1
Mean		36.9	42.1	47.1	38.8	32.9	39.6
Irrigated, Late Sown							
1. MP 4010 (C)	04	41.4	48.4	41.1	39.1	35.9	41.2
2. HD 2864 (C)	05	40.7	46.3	42.2	37.5	30.1	39.4
3. HD 2932 (C)	03	38.4	38.1	33.7	36.1	33.1	35.9
4. MP 3336 (C)	02	39.1	42.4	39.5	40.6	31.1	38.5
5. CG 1015	01	42.3	47.4	42.3	38.9	38.7	41.9
Mean		40.4	44.5	39.8	38.4	33.8	39.4

Table 15: Iron Content (ppm) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	40.2	38.1	37.1	38.5
2. MACS 6478 (C)	05	33.8	36.6	34.1	34.8
3. HD 3164	02	37.9	38.9	42.0	39.6
4. UAS 360	08	40.8	38.1	41.3	40.1
5. UAS 361	04	34.7	35.2	38.6	36.2
Mean		37.5	37.4	38.6	37.8
Rainfed, Timely Sown					
1. NIAW 2030	06	-	41.4	-	41.4
2. NI 5439 (C)	13	-	39.6	-	39.6
3. NIAW 1415 (C)	10	-	41.8	-	41.8
4. UAS 347 (I)	05	-	37.1	-	37.1
5. PBW 721	03	-	39.2	-	39.2
6. K 1315	01	-	42.9	-	42.9
Mean		-	40.3	-	40.3
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	35.7	38.5	46.4	40.2
2. NIAW 1415 (C)	02	42.6	39.8	41.4	41.3
3. DBW 93 (I)	08	38.8	40.3	43.0	40.7
4. HD 3171	01	40.6	42.3	49.1	44.0
5. HI 1605	03	39.9	40.6	51.0	43.8
6. JWS 712	06	40.5	41.9	46.2	42.9
Mean		39.7	40.6	46.2	42.1

Table 16: Zinc Content (ppm) of *T.aestivum* genotypes in Northern Hill Zone AVT's

Variety	Code	Almora	Shimla	Malan	Mean
Irrigated, Timely Sown, High Fertility					
1. HS 562	01	39.2	29.8	21.3	30.1
2. VL 804 (C)	03	38.9	25.1	26.6	30.2
3. VL 907 (C)	05	41.5	24.7	22.1	29.4
4. HS 507 (C)	06	38.4	27.8	22.9	29.7
5. HPW 349 (C)	04	38.1	32.2	18.9	29.7
6. HS 583	02	42.9	28.1	27.9	33.0
Mean		39.8	28.0	23.3	30.4
Rainfed, Timely Sown, Low Fertility					
1. HS 562	01	40.9	30.4	32.1	34.5
2. VL 804 (C)	03	39.1	28.6	30.1	32.6
3. VL 907 (C)	05	42.9	40.5	29.0	37.5
4. HS 507 (C)	06	43.8	30.8	33.2	35.9
5. HPW 349 (C)	04	44.6	35.4	29.7	36.6
6. HS 583	02	51.5	37.8	32.6	40.6
Mean		43.8	33.9	31.1	36.3
Rainfed, Early Sown					
1. VL 829 (C)	04	44.0	29.4	25.6	33.0
2. HPW 251 (C)	06	48.6	43.4	31.4	41.1
3. HS 542 (C)	01	50.1	50.1	27.6	42.6
4. HPW 413	02	42.4	28.1	28.5	33.0
5. HS 596	07	57.3	45.0	33.5	45.3
6. HS 597	05	51.7	43.6	32.0	42.4
7. HS 598	03	42.0	33.9	29.6	35.2
8. VL 1005	11	53.9	36.8	36.6	42.4
9. VL 1006	10	56.1	35.6	33.4	41.7
10. VL 1007	08	57.6	56.4	35.6	49.9
11. UP 2917	09	57.6	48.3	35.5	47.1
Mean		51.0	41.0	31.8	41.2
Restricted Irrigation, Late Sown					
1. VL 892 (C)	03	36.3	42.6	17.7	32.2
2. HS 490 (C)	02	38.5	43.7	23.4	35.2
3. HS 599	07	44.7	47.8	28.3	40.3
4. HS 600	05	39.5	49.4	22.4	37.1
5. HS 601	10	37.1	45.4	21.4	34.6
6. HPW 421	04	42.9	46.0	24.7	37.9
7. HPW 422	06	35.7	37.1	25.0	32.6
8. VL 3007	11	39.5	46.8	26.6	37.6
9. VL 3008	09	49.7	50.6	31.0	43.8
10. VL 3009	01	27.3	31.0	22.6	27.0
11. UP 2918	08	36.2	50.6	24.0	36.9
Mean		38.9	44.6	24.3	35.9

Table 17: Zinc Content (ppm) of *T.aestivum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 2967 (C)	01	30.8	35.8	39.3	24.1	46.8	35.4
2. DPW 621-50 (C)	02	29.4	33.8	36.5	27.2	44.5	34.3
3. WH 1105 (C)	03	32.3	41.4	43.8	26.0	49.5	38.6
4. DBW 88 (C)	05	27.4	32.7	37.0	25.2	37.1	31.9
5. HD 3086 (C)	04	31.2	38.7	39.9	23.7	38.6	34.4
6. PBW 707	07	29.1	34.8	40.2	26.3	45.4	35.2
7. PBW 709	06	29.1	37.0	37.5	24.0	40.2	33.6
8. HD 3159	08	26.9	37.4	43.1	23.3	41.5	34.4
Mean		29.5	36.5	39.7	25.0	43.0	34.7
Irrigated, Late Sown							
1. WH 1021 (C)	09	49.7	44.2	47.2	33.8	44.1	43.8
2. HD 3059 (C)	11	33.1	37.9	52.4	29.5	40.4	38.7
3. DBW 90 (C)	15	26.6	33.9	46.2	32.2	42.4	36.3
4. WH 1124 (C)	10	39.8	39.7	52.2	29.7	45.8	41.4
5. WH 1179	13	44.2	31.9	52.3	34.5	40.2	40.6
6. PBW 716	03	38.4	39.5	48.0	36.3	41.8	40.8
7. PBW 718	18	37.7	43.7	50.0	28.1	41.5	40.2
8. PBW 719	06	37.9	43.2	45.9	36.0	49.9	42.6
9. HD 3165	12	37.2	37.7	50.8	31.1	43.7	40.1
10. HI 1604	01	36.3	41.7	44.9	38.0	37.4	39.7
11. DBW 147	17	29.5	33.8	60.3	29.1	42.6	39.1
12. DBW 148	02	34.7	36.4	54.8	35.1	48.0	41.8
13. DBW 150	07	34.5	42.4	53.7	35.4	44.6	42.1
14. HUW 688	04	26.0	38.3	47.1	33.2	38.7	36.7
15. UP 2883	08	29.4	38.7	47.2	33.9	46.3	39.1
16. K 1312	14	34.2	38.5	47.0	33.4	43.7	39.4
17. K 1313	16	40.6	35.5	55.1	36.6	44.0	42.4
18. K 1314	05	41.0	48.7	43.1	36.0	45.6	42.9
Mean		36.2	39.2	49.9	33.4	43.4	40.4
Rainfed, Timely Sown							
1. WH 1164	05	28.2	-	45.2	-	47.1	40.2
2. PBW 644 (C)	06	30.2	-	45.3	-	41.5	39.0
3. WH 1080 (C)	01	26.3	-	47.0	-	31.7	35.0
4. HD 3174	04	28.5	-	52.3	-	36.6	39.1
5. HI 1605	02	27.2	-	43.0	-	33.2	34.5
6. K 1317	03	35.9	-	41.6	-	48.3	41.9
Mean		29.4	-	45.7	-	39.7	38.3
Restricted Irrigation, Timely Sown							
1. MP 1277	05	30.9	-	48.0	38.9	34.1	38.0
2. PBW 644 (C)	01	28.7	-	45.2	34.5	40.0	37.1
3. WH 1080 (C)	04	25.3	-	53.3	34.9	37.7	37.8
4. HD 3043 (C)	02	30.1	-	53.3	39.2	39.1	40.4
5. WH 1142 (I)	03	29.5	-	50.3	34.1	36.2	37.5
Mean		28.9	-	50.0	36.3	37.4	38.2

Table 18: Zinc Content (ppm) of *T.aestivum* genotypes in North Eastern Plains Zone AVT's

Variety	Code	Kanpur	Pusa	Sabour	Mean
Rainfed, Timely Sown					
1. C 306 (C)	04	46.9	41.8	39.9	42.9
2. K 8027 (C)	05	48.9	38.7	44.3	44.0
3. HD 2888 (C)	03	47.3	41.4	41.6	43.4
4. HD 3171	01	33.3	33.0	40.9	35.7
5. K 1317	02	38.3	37.6	39.5	38.5
Mean		42.9	38.5	41.2	40.9

Table 19: Zinc Content (ppm) of *T.aestivum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P' Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. GW 322 (C)	09	35.0	40.0	44.0	35.8	35.9	38.1
2. HI 1544 (C)	07	39.6	45.4	51.7	40.4	30.4	41.5
3. GW 463	05	36.1	41.0	45.6	40.3	32.5	39.1
Mean		36.9	42.1	47.1	38.8	32.9	39.6
Irrigated, Late Sown							
1. MP 4010 (C)	04	41.4	48.4	41.1	39.1	35.9	41.2
2. HD 2864 (C)	05	40.7	46.3	42.2	37.5	30.1	39.4
3. HD 2932 (C)	03	38.4	38.1	33.7	36.1	33.1	35.9
4. MP 3336 (C)	02	39.1	42.4	39.5	40.6	31.1	38.5
5. CG 1015	01	42.3	47.4	42.3	38.9	38.7	41.9
Mean		40.4	44.5	39.8	38.4	33.8	39.4

Table 20: Zinc Content (ppm) of *T.aestivum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. MACS 6222 (C)	06	40.2	38.1	37.1	38.5
2. MACS 6478 (C)	05	33.8	36.6	34.1	34.8
3. HD 3164	02	37.9	38.9	42.0	39.6
4. UAS 360	08	40.8	38.1	41.3	40.1
5. UAS 361	04	34.7	35.2	38.6	36.2
Mean		37.5	37.4	38.6	37.8
Rainfed, Timely Sown					
1. NIAW 2030	06	-	38.7	-	38.7
2. NI 5439 (C)	13	-	39.6	-	39.6
3. NIAW 1415 (C)	10	-	41.8	-	41.8
4. UAS 347 (I)	05	-	37.1	-	37.1
5. PBW 721	03	-	39.2	-	39.2
6. K 1315	01	-	42.9	-	42.9
Mean		-	39.9	-	39.9
Restricted Irrigation, Timely Sown					
1. NI 5439 (C)	05	30.6	31.9	24.3	28.9
2. NIAW 1415 (C)	02	30.4	32.0	23.6	28.7
3. DBW 93 (I)	08	29.8	33.5	25.0	29.4
4. HD 3171	01	29.9	30.8	27.4	29.4
5. HI 1605	03	24.9	31.8	24.3	27.0
6. JWS 712	06	30.4	37.7	25.9	31.3
Mean		29.3	33.0	25.1	29.1

Table 21: Protein Content of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	10.4	12.3	13.4	8.8	10.4	11.1
2. PDW 233 (C)	05	12.5	13.0	14.1	9.7	12.3	12.3
3. PDW 291 (C)	03	11.8	11.8	14.0	9.6	12.6	11.9
4. PDW 314 (C)	08	11.8	12.4	13.7	10.1	12.1	12.0
5. HD 2967 (C)	07	11.2	13.8	14.5	9.4	12.9	12.4
6. WH 1105 (C)	04	11.2	12.8	14.0	9.4	12.2	11.9
7. DDW 31	01	12.0	13.9	13.8	9.7	11.2	12.1
8. DDW 32	10	11.4	12.1	14.2	9.1	11.1	11.6
9. MACS 3949	09	11.6	12.6	13.8	9.3	13.1	12.1
10. MACS 4024	06	11.5	12.9	12.9	9.4	11.2	11.6
Mean		11.5	12.8	13.8	9.5	11.9	11.9

Table 22: Protein Content of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	8.6	11.9	12.9	13.6	11.8	11.8
2. HD 4730	06	9.1	11.5	12.7	14.4	12.3	12.0
3. HI 8498 (C)	02	10.1	12.1	13.0	14.7	12.1	12.4
4. MPO 1215 (C)	01	8.8	13.1	12.9	14.9	10.3	12.0
5. HI 8737 (I)	03	9.9	12.3	12.7	14.1	11.2	12.0
6. HI 8759	04	9.1	11.2	13.1	14.2	11.2	11.7
Mean		9.3	12.0	12.9	14.3	11.5	12.0

Table 23: Protein Content of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	12.0	12.5	12.2	12.2
2. MACS 3949	09	11.8	11.6	12.9	12.1
3. HI 8759	07	11.4	11.1	11.2	11.2
4. UAS 453	03	11.4	10.9	11.4	11.3
Mean		11.7	11.5	12.0	11.7
Rainfed, Timely Sown					
1. MACS 3927	04	-	10.7	-	10.7
2. AKDW 2997-16 (C)	09	-	11.1	-	11.1
3. UAS 446 (I)	11	-	10.5	-	10.5
4. MACS 3972	02	-	10.6	-	10.6
5. MACS 4020	12	-	10.8	-	10.8
6. HI 8765	08	-	10.2	-	10.2
7. GW 1315	14	-	9.9	-	9.9
8. UAS 455	07	-	11.0	-	11.0
Mean		-	10.6	-	10.6
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	12.9	13.4	11.6	12.7
2. MACS 3970	04	13.4	12.9	12.1	12.8
Mean		13.2	13.2	11.9	12.7

Table 24: Yellow Pigment Content (ppm) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	6.67	6.80	6.67	7.17	7.13	6.89
2. PDW 233 (C)	05	8.58	7.57	7.33	7.57	8.13	7.84
3. PDW 291 (C)	03	5.31	5.41	5.81	6.06	5.84	5.69
4. PDW 314 (C)	08	5.98	5.86	5.97	5.75	5.37	5.79
5. HD 2967 (C)	07	4.24	4.15	3.53	4.22	3.74	3.98
6. WH 1105 (C)	04	3.81	4.20	4.34	3.45	4.11	3.98
7. DDW 31	01	7.73	7.17	7.73	6.74	7.19	7.31
8. DDW 32	10	6.88	7.68	7.15	7.50	7.75	7.39
9. MACS 3949	09	6.91	6.25	7.31	7.17	6.70	6.87
10. MACS 4024	06	6.65	7.31	6.92	7.17	6.97	7.00
Mean		6.28	6.24	6.28	6.28	6.29	6.27

Table 25: Yellow Pigment Content (ppm) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	4.34	4.53	4.01	4.87	5.22	4.59
2. HD 4730	06	4.13	4.06	4.45	4.44	5.20	4.46
3. HI 8498 (C)	02	4.66	5.29	4.44	4.55	4.78	4.74
4. MPO 1215 (C)	01	5.82	5.92	5.87	6.05	6.04	5.94
5. HI 8737 (I)	03	6.25	5.96	5.71	5.72	6.05	5.94
6. HI 8759	04	5.80	6.20	5.90	6.39	6.52	6.16
Mean		5.17	5.33	5.06	5.34	5.64	5.31

Table 26: Yellow Pigment Content (ppm) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	6.25	6.06	5.69	6.00
2. MACS 3949	09	6.69	6.11	6.37	6.39
3. HI 8759	07	7.14	6.38	7.00	6.84
4. UAS 453	03	7.17	7.42	6.87	7.15
Mean		6.81	6.49	6.48	6.60
Rainfed, Timely Sown					
1. MACS 3927	04	-	5.06	-	5.06
2. AKDW 2997-16 (C)	09	-	4.21	-	4.21
3. UAS 446 (I)	11	-	6.19	-	6.19
4. MACS 3972	02	-	4.59	-	4.59
5. MACS 4020	12	-	6.21	-	6.21
6. HI 8765	08	-	5.07	-	5.07
7. GW 1315	14	-	5.00	-	5.00
8. UAS 455	07	-	5.86	-	5.86
Mean		-	5.06	-	5.06
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	4.84	4.42	4.40	4.55
2. MACS 3970	04	4.48	4.11	4.62	4.40
Mean		4.66	4.27	4.51	4.48

Table 27: Iron Content (ppm) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	34.4	37.4	49.5	36.1	36.8	38.8
2. PDW 233 (C)	05	31.0	38.6	47.9	43.0	34.3	39.0
3. PDW 291 (C)	03	32.8	38.7	44.3	43.2	38.0	39.4
4. PDW 314 (C)	08	31.7	35.8	40.9	36.8	36.5	36.3
5. HD 2967 (C)	07	30.2	41.5	44.5	36.5	42.0	38.9
6. WH 1105 (C)	04	30.1	40.5	50.0	49.1	38.7	41.7
7. DDW 31	01	32.5	39.3	48.1	37.1	49.9	41.4
8. DDW 32	10	30.2	35.8	48.0	32.2	37.5	36.7
9. MACS 3949	09	30.9	38.8	42.9	34.9	37.9	37.1
10. MACS 4024	06	34.0	40.2	45.7	44.0	42.8	41.3
Mean		31.8	38.7	46.2	39.3	39.4	39.1

Table 28: Iron Content (ppm) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	34.3	42.5	49.9	39.7	35.9	40.5
2. HD 4730	06	34.4	41.0	54.3	38.4	35.8	40.8
3. HI 8498 (C)	02	38.6	42.5	49.4	37.5	36.8	41.0
4. MPO 1215 (C)	01	37.4	40.4	51.2	40.2	32.5	40.3
5. HI 8737 (I)	03	34.9	44.6	52.4	41.7	30.4	40.8
6. HI 8759	04	37.0	40.1	53.2	37.6	38.1	41.2
Mean		36.1	41.9	51.7	39.2	34.9	40.8

Table 29: Iron Content (ppm) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	38.0	38.0	36.3	37.4
2. MACS 3949	09	37.3	40.1	36.9	38.1
3. HI 8759	07	39.6	41.6	40.2	40.5
4. UAS 453	03	35.4	36.9	33.4	35.2
Mean		37.6	39.2	36.7	37.8
Rainfed, Timely Sown					
1. MACS 3927	04	-	42.2	-	42.2
2. AKDW 2997-16 (C)	09	-	36.8	-	36.8
3. UAS 446 (I)	11	-	43.1	-	43.1
4. MACS 3972	02	-	40.3	-	40.3
5. MACS 4020	12	-	39.2	-	39.2
6. HI 8765	08	-	41.3	-	41.3
7. GW 1315	14	-	38.8	-	38.8
8. UAS 455	07	-	38.1	-	38.1
Mean		-	40.0	-	40.0
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	41.1	41.5	51.6	44.7
2. MACS 3970	04	39.2	37.6	44.2	40.3
Mean		40.2	39.6	47.9	42.5

Table 30: Zinc Content (ppm) of *T.durum* genotypes in North Western Plains Zone AVT's

Variety	Code	Ludhiana	Durgapura	Delhi	Pantnagar	Hisar	Mean
Irrigated, Timely Sown							
1. HD 4730	02	31.3	46.0	49.0	34.0	44.5	41.0
2. PDW 233 (C)	05	33.3	47.8	55.3	31.0	51.7	43.8
3. PDW 291 (C)	03	35.4	44.3	55.5	34.9	55.1	45.0
4. PDW 314 (C)	08	32.4	40.2	52.9	35.2	49.7	42.1
5. HD 2967 (C)	07	25.9	44.6	46.4	29.0	50.9	39.4
6. WH 1105 (C)	04	31.4	45.9	45.0	39.4	52.1	42.8
7. DDW 31	01	34.5	46.4	55.3	32.8	53.1	44.4
8. DDW 32	10	31.6	41.2	53.6	31.4	48.6	41.3
9. MACS 3949	09	31.5	47.0	53.6	34.5	54.2	44.2
10. MACS 4024	06	30.1	49.4	54.3	32.9	54.9	44.3
Mean		31.7	45.3	52.1	33.5	51.5	42.8

Table 31: Zinc Content (ppm) of *T.durum* genotypes in Central Zone AVT's

Variety	Code	Indore	Kota	Junagarh	P'Kheda	Vijapur	Mean
Irrigated, Timely Sown							
1. HD 4728	08	35.0	25.2	36.8	51.5	44.8	38.7
2. HD 4730	06	36.6	24.9	33.2	57.6	45.9	39.6
3. HI 8498 (C)	02	39.1	28.4	40.4	54.2	49.0	42.2
4. MPO 1215 (C)	01	40.5	28.4	39.6	49.6	38.6	39.3
5. HI 8737 (I)	03	37.3	27.1	35.1	47.4	37.1	36.8
6. HI 8759	04	35.2	25.4	35.5	49.4	46.8	38.5
Mean		37.3	26.6	36.8	51.6	43.7	39.2

Table 32: Zinc Content (ppm) of *T.durum* genotypes in Peninsular Zone AVT's

Variety	Code	Pune	Dharwad	Niphad	Mean
Irrigated, Timely Sown					
1. UAS 428 (C)	01	41.3	38.7	33.0	37.7
2. MACS 3949	09	41.0	34.2	33.7	36.3
3. HI 8759	07	38.2	36.6	36.3	37.0
4. UAS 453	03	39.8	34.3	24.7	32.9
Mean		40.1	36.0	31.9	36.0
Rainfed, Timely Sown					
1. MACS 3927	04	-	44.1	-	44.1
2. AKDW 2997-16 (C)	09	-	36.3	-	36.3
3. UAS 446 (I)	11	-	41.0	-	41.0
4. MACS 3972	02	-	38.2	-	38.2
5. MACS 4020	12	-	37.6	-	37.6
6. HI 8765	08	-	42.8	-	42.8
7. GW 1315	14	-	35.6	-	35.6
8. UAS 455	07	-	39.4	-	39.4
Mean		-	39.4	-	39.4
Restricted Irrigation, Timely Sown					
1. AKDW 2997-16 (C)	07	29.2	34.1	28.4	30.6
2. MACS 3970	04	31.0	31.3	27.9	30.1
Mean		30.1	32.7	28.2	30.3

SECTION G

INITIATIVE FOR WHEAT EXPORT (Analysis of FCI Wheat Samples)

Combined Quality Analysis Report (2012-13 & 2013-14)

- i. Punjab
- ii. Haryana
- iii. Madhya Pradesh

Combined Quality Analysis Report of Wheat Samples from Food Corporation of India for the years 2012-13 and 2013-14.

About one hundred and fifty million tons of wheat is traded every year throughout the world. The share of export from India is very small and inconsistent. India achieved wheat production of 92.46 million tons in the year 2012-13, 95.82 million tons 2013-14 & 90.78 million tons in 2014-15 and is the second largest producer of wheat in the world for last more than a decade. Inspite of repeated draught and several other unforeseen reasons the production is more than 90.0 million tones. This shows the inherent strength and resilient nature of wheat programme in the country. This could be made possible by developing high yielding, disease resistant wheat varieties and adopting matching production technologies. Considering the production levels, Government of India decided to export wheat in the years 2012-13 and 2013-14. Wheat quality needs uppermost attention in the time to come to meet the trade requirements of domestic and international market.

Three species of wheat namely, *T.aestivum*, *T.durum* and *T.dicoccum* are cultivated in the country. Bread wheat is contributing approximately 95 % while around 4% comes from durum wheat and just about 1% is the share of *dicoccum* wheat to the total wheat production. The quality requirements of wheat for various products like chapati, bread, biscuit and pasta are different. Hard wheat (*T.aestivum*) with strong & extensible gluten and high protein is required for making good bread. For biscuit, the quality requirements are soft wheat, low protein and weak & extensible gluten. For chapati, we need hard wheat, medium to high protein and medium & extensible gluten. For pasta products, hard wheat (*T.durum*) with strong gluten, high protein, low yellow berry and high yellow pigment content are required.

The wheat is traded based on classes and grades. Hence, all the major wheat exporting nations like U.S.A, Canada, Australia and Argentina have graded and classified their wheat. Grades are based on the physical quality of the wheat and include parameters like test weight, foreign matter, broken & shrunken kernel, total defect and other classes. Classes are based on the functional quality of the wheat and signifies the product specificity of a given wheat lot. For example, wheat in U.S.A has been divided into 6 classes and 6 grades. To classify and grade the Indian wheat in a systematic manner, it is necessary to have an in depth knowledge of quality of wheat grain samples from the stocks of Food Corporation of India (FCI) throughout the country. An exercise had been undertaken during 2012-13 and 2013-14 to analyse wheat grain samples from FCI stocks. Seven thousand five hundred seventy one (7571) wheat grain samples drawn from stocks of Food Corporation of India (FCI) covering three states viz. Punjab (3325 samples), Haryana (1609 samples) & Madhya Pradesh (2637 samples) were analysed for various wheat grading parameters like test weight, damaged kernel, foreign matter, shrunken & broken kernel, total defects & other classes and wheat functional parameters like protein, moisture, wet gluten & falling number. Based on these quality data, Food Corporation of India could export about 6.5 million tons of wheat through its exporting agencies during years 2012-13 and 2013-14.

Collection of wheat grain samples and their quality analysis

During 2012-13 and 2013-14, Seven thousand five hundred seventy one (7571) wheat grain samples (500 g each) were collected by FCI officials from their stocks covering 3 major wheat growing states viz. Punjab (3325 samples), Haryana (1609 samples) and Madhya Pradesh (2637 samples). These samples were sent to Quality Laboratory, Indian Institute of Wheat and Barley Research, Karnal and analyzed for various wheat grading or physical parameters like test weight, damaged kernel, foreign matter, shrivelled& broken kernel, total defects & other classes and wheat non- grading or functional or chemical parameters like protein, moisture, wet gluten and falling number.

Grading Parameters: These parameters explain the physical purity of wheat lot. Higher value of test weight and lower values of all other parameters i.e. damaged kernel, foreign matter, shrunken 8, broken kernel, total defects & other classes are desirable and fetch higher price in the international market.

Test Weight: It is an important parameter for millers as it is positively correlated with flour recovery. In U.S. system of grain trading, bread wheat with 76.4 kg/hl and above test weight is classified in grade 1. In Canadian system, the threshold value is 78.0 kg/hl.

Protein Content: It is an important parameter for making different products of bread wheat. For making good quality bread, chapatti and biscuit, the protein requirements are >12.0%, 10.0-13.0% and <10.0% respectively. The genetic heritability is about 0.50, hence it is highly influenced by agroclimatic conditions.

Moisture Content: It is an important parameter from storage point of view and grain trading. It depends on the weather conditions at the time of harvesting and also at the time when the determination has been made. Higher moisture content adversely affects the keeping quality of wheat. Also, the protein content values mentioned previously are at 'as is' basis. Hence, moisture content merits consideration if protein is to be calculated on dry basis or any other given moisture content. The threshold value is 12.0%.

Wet Gluten: It is associated with the quality of end products of wheat. Higher values are desirable for making bread.

Falling Number: This quality parameter gives a measure of alpha-amylase activity. More is the value of falling no. means less alpha amylase activity. The falling number values more than 300 – 400 seconds is considered desirable in the international market.

PHYSICAL QUALITY PARAMETERS OF WHEAT IN PUNJAB

Sr. No.	Name of District	No. of Samples	Test Weight (kg/hl)		Damaged Kernel (%)		Shrivelled & Broken Kernel (%)		Foreign Mater (%)		Total Defect (%)		Other Classes	
			Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
1.	Amritsar	94	76.8	74.2-80.3	0.929	0.000-10.521	3.399	1.903-6.322	0.096	0.000-0.720	4.414	2.540-14.301	0.252	0.000-1.230
2.	Barnala	99	78.1	75.6-80.2	0.725	0.000-3.614	3.515	0.214-7.934	0.069	0.000-0.397	4.309	0.690-8.747	0.321	0.000-1.855
3.	Bathinda	250	77.5	73.2-80.5	0.496	0.000-3.002	3.345	0.152-9.458	0.067	0.000-0.712	3.911	0.184-10.727	0.271	0.000-1.850
4.	Chandigarh	22	77.1	76.0-79.0	0.646	0.000-2.071	3.972	2.420-6.311	0.104	0.008-0.394	4.721	2.930-8.043	0.181	0.000-0.557
5.	Faridkot	314	78.1	73.2-84.4	0.530	0.000-13.580	3.286	0.560-11.054	0.088	0.000-3.015	3.912	0.560-17.257	0.193	0.000-2.209
6.	Fatehgarh Sahib	90	77.8	75.0-79.6	1.251	0.000-10.338	3.984	0.001-8.154	0.106	0.000-3.448	5.340	2.455-15.189	0.182	0.000-1.099
7.	Fazilka	51	78.2	74.9-80.6	0.343	0.000-2.100	3.594	0.463-7.539	0.101	0.000-0.393	4.044	1.445-7.666	0.310	0.000-2.788
8.	Ferozepur	426	77.7	72.5-81.0	0.499	0.000-4.932	3.413	0.128-7.671	0.135	0.000-4.045	4.051	1.134-10.934	0.343	0.000-2.284
9.	Gurdaspur	67	76.4	72.6-80.8	0.560	0.059-1.699	4.207	1.053-6.908	0.068	0.000-0.253	4.857	1.347-7.534	0.443	0.000-1.580
10.	Hoshiarpur	47	77.7	75.0-80.8	0.626	0.000-1.528	3.285	0.727-5.867	0.053	0.000-0.277	3.893	0.767-7.459	0.148	0.000-0.859
11.	Jalandhar	34	77.9	74.6-81.3	0.902	0.000-4.084	3.425	1.030-6.605	0.057	0.000-0.198	4.384	2.167-8.174	0.255	0.000-0.745
12.	Kapurthala	50	77.2	74.6-78.7	0.704	0.000-4.367	3.439	1.895-6.500	0.069	0.000-0.481	4.211	1.979-10.673	0.225	0.009-0.861
13.	Ludhiana	348	78.3	74.0-82.3	0.530	0.000-5.542	3.721	0.051-8.674	0.103	0.000-6.012	4.371	0.868-10.163	0.135	0.000-1.322
14.	Mansa	194	77.8	74.7-81.6	0.399	0.000-2.199	3.776	0.066-7.149	0.154	0.000-6.340	4.334	1.432-7.896	0.503	0.000-2.497
15.	Moga	127	78.0	75.7-80.4	1.541	0.000-9.520	3.325	0.110-5.895	0.159	0.000-3.995	5.025	1.350-13.022	0.151	0.000-1.022
16.	Muktsar	218	78.1	70.7-81.8	0.353	0.000-6.804	3.352	0.812-8.570	0.086	0.000-4.024	3.796	0.927-11.032	0.195	0.000-6.216
17.	Nabha	4	78.5	78.2-78.7	1.056	0.000-3.376	3.978	2.967-4.776	0.039	0.025-0.067	5.073	3.606-8.219	0.224	0.000-0.331
18.	Nawashahar	5	78.7	78.2-79.2	0.784	0.180-1.857	3.871	3.156-4.561	0.059	0.000-0.195	4.714	3.669-6.439	0.171	0.073-0.220
19.	Patiala	375	78.1	74.3-80.8	0.665	0.000-7.455	4.175	0.040-11.753	0.108	0.000-5.512	4.950	1.123-12.918	0.411	0.000-5.554
20.	Ropar	43	78.5	76.2-81.9	1.179	0.000-4.715	3.934	1.294-7.300	0.095	0.000-0.580	5.208	1.475-12.031	0.150	0.000-0.858
21.	Sangrur	420	78.2	75.7-81.7	0.634	0.000-6.706	4.280	0.275-7.760	0.078	0.000-1.986	4.996	0.870-10.915	0.394	0.000-4.623
22.	Mohali	5	78.2	76.7-79.0	1.590	1.109-2.336	3.719	2.963-4.534	0.024	0.012-0.057	5.333	4.204-6.509	0.237	0.023-0.600
23.	Taran Taran	42	76.8	73.8-78.8	0.694	0.000-2.945	3.444	1.519-5.849	0.079	0.000-0.353	4.217	1.910-7.013	0.464	0.058-1.607
Overall Punjab		3325	77.8	70.7-84.4	0.767	0.000-13.580	3.671	0.001-11.753	0.087	0.000-6.340	4.525	0.184-17.257	0.268	0.000-6.216

CHEMICAL QUALITY PARAMETERS OF WHEAT IN PUNJAB

Sr. No.	Name of District	No. of Samples	Protein Content (as is basis) Mean	Moisture Content (%) Range	Mean	Wet Gluten (%) Range	Mean	Falling No. (Seconds) Range	Mean
1.	Amritsar	94	11.9	10.8-13.1	12.9	11.2-14.1	26.1	23.1-30.3	442
2.	Barnala	99	12.4	11.6-13.1	12.8	11.2-13.7	28.4	26.0-31.2	448
3.	Bathinda	250	12.3	10.7-13.6	12.4	10.4-14.0	28.1	22.7-33.5	470
4.	Chandigarh	22	12.2	11.5-12.9	13.1	12.7-13.8	26.9	25.3-28.6	434
5.	Faridkot	314	12.1	10.7-14.6	12.1	10.3-14.0	27.1	22.3-34.9	482
6.	Fatehgarh Sahib	90	12.1	11.3-13.6	12.8	9.8-14.3	27.0	24.4-31.2	385
7.	Fazilka	51	12.2	11.3-13.1	12.2	10.4-13.5	26.6	24.9-28.8	510
8.	Ferozepur	426	12.1	10.5-13.9	12.0	9.4-14.1	27.0	22.8-33.4	466
9.	Gurdaspur	67	11.9	11.3-12.5	12.7	11.4-14.0	25.8	23.2-27.2	441
10.	Hoshiarpur	47	11.7	10.4-12.5	12.9	11.3-13.7	26.2	23.7-29.1	473
11.	Jalandhar	34	12.3	11.6-13.1	13.1	12.4-13.5	26.7	25.1-29.2	482
12.	Kapurthala	50	12.2	11.4-13.0	13.4	12.3-14.2	26.4	24.1-28.1	493
13.	Ludhiana	348	12.4	10.6-14.5	12.3	8.8-14.4	27.9	22.2-34.2	423
14.	Mansa	194	12.6	11.2-13.6	11.7	8.9-14.0	27.9	24.5-32.3	499
15.	Moga	127	12.2	11.1-13.3	12.9	9.5-14.4	27.9	25.2-33.1	418
16.	Muktsar	218	12.1	10.3-13.8	11.9	10.2-13.8	27.1	22.9-31.6	510
17.	Patiala	375	12.3	10.9-13.8	12.6	9.4-15.0	27.3	23.7-32.2	464
18.	Ropar	43	12.3	11.3-13.2	12.7	10.7-13.8	27.0	25.2-29.1	394
19.	Sangrur	420	12.2	10.8-13.5	12.4	9.6-14.3	27.5	24.1-32.3	479
20.	Taran Taran	42	11.7	11.0-12.6	12.9	11.7-13.7	25.7	23.5-27.6	417
21.	Nabha	4	12.1	11.7-12.6	13.5	13.1-13.8	26.2	25.0-27.3	466
22.	Nawashahar	5	12.5	11.8-12.9	13.2	12.9-13.5	26.6	25.8-27.4	485
23.	Mohali	5	12.3	11.8-12.7	13.5	13.1-13.9	26.4	25.7-27.0	446
Overall Punjab		3325	12.2	10.3-14.6	12.7	8.8-15.0	26.9	22.2-34.9	446

PHYSICAL QUALITY PARAMETERS OF WHEAT IN HARYANA

Sr. No.	Name of District	No. of Samples	Test Weight (kg/hl)			Damaged Kernel (%)			Shriveled & Broken Kernel (%)			Foreign Mater (%)			Total Defect (%)		Other Classes	
			Mean	Range	Mean	Mean	Range	Mean	Mean	Range	Mean	Mean	Range	Mean	Range	Mean	Range	
1.	Ambala	45	76.4	74.2-78.6	0.338	0.000-2.239	4.390	2.360-9.179	0.313	0.025-1.149	5.042	2.553-9.792	0.922	0.153-3.307				
2.	Bhiwani	53	77.4	75.4-79.6	0.674	0.000-2.195	4.788	6.629-6.427	0.159	0.024-0.503	5.621	2.733-8.460	0.758	0.099-3.053				
3.	Faridabad	79	77.9	76.0-80.9	0.383	0.000-2.001	5.060	2.166-8.440	0.175	0.000-0.679	5.618	2.428-10.029	0.581	0.000-2.223				
4.	Fatehabad	234	77.7	75.0-82.3	0.573	0.000-3.828	4.519	1.604-10.934	0.099	0.000-0.622	5.191	1.974-11.153	0.349	0.000-1.130				
5.	Hisar	133	77.1	73.0-81.2	0.655	0.000-3.543	4.740	1.654-8.240	0.144	0.000-0.883	5.538	2.665-8.886	0.575	0.041-2.940				
6.	Jind	102	76.9	72.1-80.8	0.301	0.000-1.406	4.363	1.204-8.665	0.107	0.000-0.437	4.771	1.513-9.290	0.550	0.000-3.075				
7.	Kaithal	144	77.6	72.5-80.8	0.352	0.000-1.624	4.513	3.599-8.200	0.093	0.000-0.520	4.959	4.248-8.430	0.396	0.000-1.445				
8.	Karnal	219	77.5	71.7-80.0	0.536	0.000-4.606	4.524	1.168-8.568	0.171	0.000-2.383	5.199	1.441-13.133	0.358	0.000-2.412				
9.	Kurukshetra	171	78.1	72.5-81.0	0.376	0.000-1.857	4.268	0.096-12.706	0.184	0.000-3.993	4.828	2.146-13.433	0.343	0.000-5.176				
10.	Palwal	37	77.6	75.1-81.2	0.294	0.000-0.977	4.832	0.174-8.781	0.423	0.000-0.5396	5.549	3.282-9.226	0.396	0.110-1.469				
11.	Panipat	48	77.2	73.5-80.0	0.565	0.000-4.113	3.507	0.001-7.943	1.438	0.000-9.202	5.440	2.743-9.371	0.489	0.000-2.551				
12.	Rewari	5	80.4	79.5-81.0	0.483	0.328-0.599	4.724	3.498-6.210	0.281	0.190-0.351	5.488	4.268-6.817	0.381	0.234-0.570				
13.	Rohtak	14	77.4	76.2-79.4	0.338	0.000-0.826	4.664	0.015-9.823	1.301	0.000-6.560	6.304	4.462-10.824	0.702	0.252-1.458				
14.	Sirsa	281	77.2	68.9-83.4	0.456	0.000-3.433	4.073	0.015-11.121	0.228	0.000-5.322	4.757	1.306-11.194	0.539	0.000-5.023				
15.	Sonipat	24	77.5	74.8-79.4	0.279	0.000-0.708	4.679	0.078-9.076	0.267	0.002-3.490	5.225	3.333-9.499	0.646	0.371-1.247				
16.	Yamunanagar	20	77.5	75.4-79.8	0.281	0.000-0.885	4.254	3.217-6.077	0.128	0.000-0.321	4.663	3.518-6.997	0.407	0.147-1.012				
Overall Haryana		1609	77.6	68.9-83.4	0.430	0.000-4.606	4.494	0.001-12.706	0.344	0.000-9.020	5.231	0.745-13.433	0.525	0.000-5.176				

CHEMICAL QUALITY PARAMETERS OF WHEAT IN HARYANA

Sr. No.	Name of District	No. of Samples	Protein Content (as is basis) Mean	Moisture Content (%) Range	Wet Gluten (%) Range	Falling No. (Seconds) Mean				
1.	Ambala	45	11.8	10.8-13.7	13.0	11.7-14.5	27.4	24.9-31.7	412	301-556
2.	Bhiwani	53	12.2	10.5-13.2	11.2	9.8-12.3	26.5	22.3-29.4	491	363-553
3.	Faridabad	79	12.0	11.2-13.3	12.1	8.9-13.6	27.3	25.3-31.2	509	434-617
4.	Fatehabad	234	11.8	11.2-12.8	12.2	10.6-13.6	27.1	23.6-30.1	501	427-583
5.	Hisar	133	12.4	10.5-13.5	12.0	8.7-14.1	27.4	22.3-34.1	504	415-597
6.	Jind	102	12.2	11.5-13.6	12.5	10.2-14.6	28.4	25.7-32.1	529	457-649
7.	Kaithal	144	12.0	10.8-13.6	13.1	11.2-14.6	26.6	24.3-30.4	488	407-617
8.	Karnal	219	12.0	11.1-13.2	12.7	11.2-15.2	26.8	24.6-32.6	476	305-600
9.	Kurukshetra	171	11.8	11.0-13.0	12.6	9.0-14.6	26.8	23.1-29.5	491	397-590
10.	Panipat	48	12.3	11.7-13.7	12.5	9.2-14.7	28.4	26.0-32.8	453	391-505
11.	Palwal	37	12.0	11.4-12.8	14.0	9.7-14.4	28.4	26.8-30.2	518	437-554
12.	Rewari	5	12.1	11.9-12.4	11.1	10.5-11.8	31.2	30.1-32.1	472	462-482
13.	Rohtak	14	11.9	11.5-12.3	12.3	9.9-13.5	27.7	26.3-28.8	473	431-513
14.	Sirsa	281	12.7	10.4-14.3	11.7	9.1-14.2	28.5	22.3-33.8	485	332-576
15.	Sonipat	24	12.3	11.5-13.1	12.2	9.5-14.3	29.4	26.6-32.8	487	417-532
16.	Yamunanagar	20	11.6	11.1-12.2	12.7	11.7-13.7	26.7	25.1-28.8	446	348-529
Overall Haryana		1609	12.1	10.4-14.3	12.7	8.6-15.2	27.8	22.3-34.1	483	301-649

PHYSICAL QUALITY PARAMETERS OF WHEAT IN MADHYA PRADESH

Sr. No.	Name of District	No. of Samples	Test Weight (kg/hl)		Damaged Kernel (%)		Shriveled & Broken Kernel (%)		Foreign Matter (%)		Total Defect (%)		Other Classes
			Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
1. Ashoknagar	8	79.7	78.6-80.5	0.208	0.122-0.303	3.027	2.469-3.857	0.248	0.050-0.528	3.483	2.708-4.375	0.298	0.068-0.438
2. Betul	4	78.6	78.4-79.0	0.222	0.000-0.528	4.566	4.068-5.608	0.334	0.152-0.517	5.121	4.539-6.316	0.063	0.000-0.135
3. Bhind	11	80.1	78.8-81.2	0.908	0.000-0.307	5.816	2.365-8.568	0.401	0.077-0.830	7.125	3.430-12.133	0.349	0.000-0.783
4. Bhopal	561	78.7	74.0-82.4	1.373	0.000-7.172	4.990	0.035-8.348	0.401	0.000-5.016	6.716	1.270-12.295	0.245	0.000-2.071
5. Chhatarpur	9	78.8	78.0-79.6	0.406	0.131-0.823	3.770	2.392-5.500	0.349	0.149-0.671	4.525	2.973-5.894	0.979	0.376-1.647
6. Chhindwara	22	79.4	77.0-81.0	0.456	0.000-1.609	2.704	1.120-5.154	0.391	0.087-0.858	3.550	1.928-7.309	0.194	0.062-0.540
7. Damoh	3	79.5	78.7-80.0	0.178	0.048-0.326	1.861	1.215-2.286	0.363	0.161-0.524	2.402	1.424-3.016	0.703	0.250-0.953
8. Dewas	63	80.1	77.5-82.5	0.333	0.000-1.385	4.356	1.320-7.934	0.314	0.078-0.790	5.003	1.774-8.940	0.197	0.000-0.862
9. Dhar	7	80.6	79.4-81.3	2.341	0.408-4.318	5.994	5.089-8.677	0.483	0.228-0.660	8.817	7.166-12.471	0.226	0.129-0.338
10. Dindori	19	79.7	76.5-81.1	0.543	0.000-1.233	4.169	2.621-5.200	0.462	0.044-1.019	5.173	3.230-6.454	0.587	0.2442-321
11. Guna	12	79.5	78.6-80.5	0.279	0.091-0.747	3.312	1.590-4.775	0.350	0.198-0.601	3.941	1.930-5.537	0.454	0.212-0.683
12. Gwalior	196	78.9	75.4-82.6	0.360	0.000-2.227	4.462	0.238-7.164	0.326	0.000-5.171	5.148	0.983-8.367	0.557	0.000-1.706
13. Harda	83	78.9	77.0-80.5	0.332	0.000-3.317	4.674	0.134-8.718	0.194	0.015-3.550	5.201	2.368-11.368	0.136	0.000-0.711
14. Hoshangabad	215	78.7	76.5-82.4	0.674	0.000-4.981	4.612	0.050-8.107	0.337	0.000-9.644	5.623	1.919-10.532	0.144	0.000-0.741
15. Indore	219	79.7	75.8-82.2	0.434	0.000-4.920	4.048	0.985-7.363	0.389	0.000-1.703	4.871	1.330-11.587	0.175	0.000-0.857
16. Jabalpur	84	78.7	74.5-82.4	1.230	0.000-6.437	3.342	0.052-6.680	0.488	0.000-4.531	5.060	1.247-9.722	0.293	0.000-1.492
17. Khandwa	72	79.2	75.8-81.2	0.569	0.000-4.173	4.841	1.076-10.416	0.681	0.134-4.870	6.091	1.397-14.054	0.143	0.000-0.718
18. Khargone	10	80.3	78.0-81.2	0.362	0.000-0.960	2.935	1.838-5.000	0.339	0.154-0.581	3.636	2.113-5.371	0.108	0.000-0.271
19. Mandla	2	80.0	79.5-80.5	0.564	0.285-0.843	4.880	4.479-5.281	0.377	0.253-0.501	5.821	5.265-6.377	0.138	0.110-0.165
20. Mandsaur	44	79.8	78.0-82.6	0.824	0.000-3.535	3.764	0.314-8.664	0.438	0.000-1.144	5.026	0.502-10.247	0.253	0.000-0.875
21. Morena	15	77.9	76.0-79.5	0.362	0.017-1.345	4.406	3.023-9.359	0.548	0.196-1.215	5.317	3.421-10.459	0.600	0.301-1.778
22. Narsinghpur	42	79.5	77.6-82.8	0.287	0.000-1.146	3.068	0.450-6.171	0.370	0.083-1.005	3.725	0.702-6.932	0.303	0.000-0.815
23. Neemuch	30	80.2	77.6-82.0	0.498	0.000-3.797	2.592	1.009-6.922	0.262	0.017-0.912	3.353	1.359-7.787	0.326	0.000-0.859
24. Raisen	104	79.6	77.0-83.0	0.403	0.000-4.663	4.670	0.225-7.795	0.363	0.000-5.380	5.436	2.235-11.720	0.235	0.000-2.225
25. Rajgarh	64	80.4	78.4-82.6	0.531	0.000-3.863	2.518	0.413-6.075	0.375	0.051-3.369	3.377	0.743-9.638	0.363	0.000-1.410
26. Ratlam	15	80.7	78.0-82.6	0.661	0.000-3.358	3.345	0.975-4.705	0.349	0.086-0.680	4.354	1.404-7.271	0.347	0.055-0.747
27. Sagar	114	78.7	75.0-81.0	0.953	0.000-4.835	3.303	0.399-7.515	0.381	0.000-3.778	4.629	0.944-9.578	0.674	0.026-2.474
28. Sehore	100	79.7	76.5-82.6	0.407	0.000-3.181	4.673	0.270-8.860	0.371	0.002-3.728	5.451	0.772-11.145	0.233	0.000-0.793
29. Satna	7	80.0	79.4-80.6	0.114	0.000-0.305	1.212	0.227-1.960	0.090	0.000-0.137	1.416	0.386-2.094	0.232	0.108-0.349
30. Seoni	29	78.2	73.0-81.2	0.308	0.000-0.711	4.404	2.332-6.011	0.362	0.000-0.986	5.075	3.031-6.406	0.285	0.000-0.868
31. Shahjapur	53	80.0	77.5-82.6	0.722	0.084-2.896	2.984	0.315-9.880	0.412	0.109-1.655	4.118	1.403-12.158	0.237	0.000-0.607
32. Sheopur	8	79.6	78.7-80.0	0.189	0.037-0.301	5.557	3.357-7.469	0.374	0.198-0.674	6.120	3.931-8.285	0.509	0.212-0.509
33. Shivpuri	8	78.7	77.2-80.0	0.261	0.074-0.641	3.128	1.096-5.458	0.292	0.092-0.651	3.681	1.332-5.876	0.408	0.013-0.815
34. Shujapur	13	79.8	77.4-82.4	0.127	0.000-0.290	1.925	0.965-2.665	0.330	0.055-0.586	2.382	1.523-2.994	0.488	0.040-1.118
35. Ujjain	320	79.1	76.3-81.6	1.088	0.000-6.008	3.597	0.136-9.990	0.427	0.039-5.474	5.109	0.576-10.663	0.334	0.000-1.140
36. Vidisha	69	80.3	78.3-82.2	0.161	0.000-0.948	4.348	0.265-8.579	0.244	0.000-4.138	4.753	0.436-8.584	0.139	0.000-0.658
Overall M.P.	2637	79.5	73.0-83.0	0.546	0.000-7.172	3.829	0.035-10.416	0.367	0.000-9.644	4.740	0.386-14.054	0.332	0.000-2.474

CHEMICAL QUALITY PARAMETERS OF WHEAT IN MADHYA PRADESH

Sr. No.	Name of District	No. of Samples	Protein Content (as is basis)	Moisture Content (%)	Wet Gluten (%)	Falling No. (Seconds)
		Mean	Range	Mean	Range	Mean
1.	Ashoknagar	8	10.9	10.4-11.6	14.4	13.4-14.8
2.	Betul	4	11.9	11.6-12.2	11.7	11.2-11.9
3.	Bhind	11	11.8	10.8-12.8	11.2	9.0-14.2
4.	Bhopal	561	12.3	10.4-13.6	12.2	7.9-14.1
5.	Chharatpur	9	11.1	10.5-12.4	11.8	11.0-14.3
6.	Chhindwara	22	13.0	11.5-13.6	12.2	9.0-13.5
7.	Damoh	3	10.8	10.6-11.0	14.3	14.2-14.3
8.	Dewas	63	12.5	11.3-13.2	11.7	9.4-14.6
9.	Dhar	7	12.8	12.3-13.1	9.7	9.4-10.2
10.	Dindori	19	12.3	11.4-13.6	11.6	9.7-12.8
11.	Guna	12	10.9	10.3-11.4	13.2	11.5-14.2
12.	Gwalior	196	11.8	10.1-12.9	12.4	8.5-14.3
13.	Harda	83	11.8	10.3-12.8	12.4	8.0-13.7
14.	Hoshangabad	215	11.8	10.6-12.7	11.9	8.0-13.5
15.	Indore	219	12.9	11.3-13.9	12.0	9.8-14.4
16.	Jabalpur	84	12.3	10.8-13.9	12.3	8.9-14.2
17.	Khandwa	72	12.5	11.2-13.3	12.1	9.0-14.8
18.	Khargone	10	12.9	12.5-13.2	11.7	11.2-13.0
19.	Mandsaur	2	12.0	11.6-12.4	12.6	12.0-13.1
20.	Mandsour	44	12.3	11.4-13.1	10.5	8.6-12.0
21.	Morena	15	11.5	10.7-12.1	13.7	12.5-14.5
22.	Narsinghpur	42	11.8	10.1-12.9	12.6	8.0-14.5
23.	Neemuch	30	12.5	11.7-12.9	11.5	8.9-12.9
24.	Raisen	104	11.4	10.2-12.9	11.7	8.1-14.8
25.	Rajgrah	64	11.7	10.8-12.5	11.3	8.7-14.9
26.	Ratlam	15	12.2	11.8-12.9	9.8	8.9-11.7
27.	Sagar	114	11.2	9.8-12.8	12.5	8.2-14.8
28.	Sehore	100	11.7	10.9-12.7	11.6	8.6-14.3
29.	Satna	7	10.4	10.1-11.0	12.1	12.0-12.3
30.	Seoni	29	11.9	11.4-12.7	12.5	11.1-13.2
31.	Shajapur	53	11.8	9.7-13.3	12.1	8.8-14.6
32.	Sheopur	8	11.0	10.7-11.2	13.6	12.6-14.9
33.	Shivpuri	8	11.8	11.0-12.7	14.3	13.8-14.8
34.	Shujalpur	13	12.2	11.3-12.6	11.5	11.0-12.2
35.	Ujjain	320	12.6	11.3-13.7	12.6	9.0-14.7
36.	Vidisha	69	11.0	10.3-12.5	12.1	8.7-14.6
Overall M.P.		2637	11.9	9.7-13.9	12.2	7.9-14.9
					27.1	21.1-33.6
						515

Frequency Distribution of Physical Quality Parameters in Wheat Grain Samples from Food Corporation of India (2014-15)

Sr. No.	Frequency Distribution	Punjab (3325)*	Haryana (1609)*	Madhya Pradesh (2637)*	Overall (7571)*
Test Weight (Kg/hl)					
1.	<74.0	0.36	1.31	39.70	14.26
2.	74.0-76.0	6.83	12.37	0.11	5.67
3.	76.1-78.0	47.25	54.88	6.64	34.72
4.	78.1-80.0	42.17	29.52	33.07	36.31
5.	>80.0	3.40	1.93	20.36	8.99
Damaged Kernel (%)					
1.	<1.000	83.13	90.37	54.08	74.55
2.	1.000-3.000	14.20	8.95	13.12	12.71
3.	3.001-5.000	1.98	0.68	18.32	7.40
4.	5.001-7.000	0.42	0.00	13.39	4.85
5.	>7.000	0.24	0.00	1.10	0.49
Shrivelled & Broken Kernel (%)					
1.	<1.000	1.17	1.68	40.73	15.06
2.	1.000-3.000	27.85	7.02	14.37	18.73
3.	3.001-5.000	57.44	62.83	27.27	48.08
4.	5.001-7.000	11.67	25.48	15.17	15.82
5.	>7.000	1.83	2.98	2.46	2.30
Foreign Matter (%)					
1.	<0.500	98.77	96.15	49.94	81.20
2.	0.500-1.000	0.33	1.80	8.49	3.49
3.	1.001-2.000	0.24	0.19	1.52	0.67
4.	2.001-4.000	0.42	0.56	7.09	2.77
5.	>4.000	0.24	1.24	32.95	11.85
Total Defect (%)					
1.	<1.000	0.39	0.06	38.95	13.75
2.	1.000-3.000	14.17	3.05	10.24	10.43
3.	3.001-5.000	48.99	48.35	22.07	39.48
4.	5.001-7.000	17.65	40.34	21.05	23.66
5.	>7.000	18.80	8.20	7.70	12.68
Other Classes (%)					
1.	<0.500	84.75	67.50	84.30	80.93
2.	0.500-1.000	11.91	24.30	13.31	15.03
3.	1.001-2.000	2.65	6.71	2.16	3.34
4.	2.001-4.000	0.57	1.37	0.23	0.62
5.	>4.000	0.09	0.12	0.00	0.07

* In brackets are given number of samples

Frequency Distribution of Chemical or Functional Quality Parameters in Wheat Grain Samples from Food Corporation of India (2014-15)

Sr. No.	Frequency Distribution	Punjab (3325)*	Haryana (1609)*	Madhya Pradesh (2637)*	Overall (7571)*
Protein Content (%)					
1.	<10.0	0.00	0.00	0.11	0.04
2.	10.0-11.0	1.32	1.68	7.77	3.65
3.	11.1-12.0	37.68	43.88	35.34	38.19
4.	12.1-13.0	55.49	44.87	49.30	51.08
5.	>13.0	5.50	9.57	7.47	7.05
Moisture Content (%)					
1.	<10.0	1.02	5.28	6.03	3.67
2.	10.0-11.0	8.66	8.70	9.10	8.82
3.	11.1-12.0	27.01	30.08	26.47	27.47
4.	12.1-13.0	36.90	24.74	39.17	35.11
5.	>13.0	26.41	31.20	19.23	24.92
Wet Gluten (%)					
1.	<24.0	1.59	2.73	4.06	2.69
2.	24.0-26.0	18.17	19.64	18.73	18.68
3.	26.1-28.0	52.24	44.50	49.22	49.54
4.	28.1-30.0	19.97	20.01	22.68	20.92
5.	>30.0	8.03	13.11	5.42	8.20
Falling No. (Seconds)					
1.	<300	0.78	0.00	0.34	0.46
2.	300-400	15.79	5.03	4.32	9.51
3.	401-500	53.83	52.45	26.58	44.05
4.	501-600	27.55	40.65	64.51	43.20
5.	>600	2.05	1.86	4.25	2.77

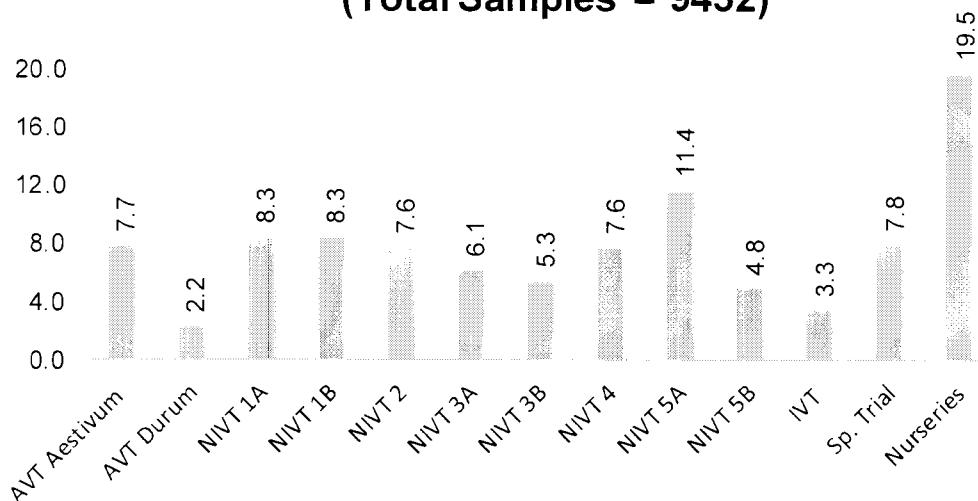
* In brackets are given number of samples

RESEARCH HIGHLIGHTS

RESEARCH HIGHLIGHTS

The wheat production in India is estimated to be 90.78 million tons from 30.37 million hectares area at productivity level of 2.989 Tons/ha during 2014-15. This could be made possible by developing high yielding, disease resistant wheat varieties and also matching production technologies. The increase in domestic demand of baked & pasta products and economic liberalization & global trade have offered opportunities for better utilization of wheat. Wheat quality needs uppermost attention to meet the trade requirements of the domestic and international markets. The report includes aspects like identification of product specific genotypes. Promising genotypes showing superiority in various quality traits including grain nutrition parameters have been identified. Zone wise variability in wheat quality and grain nutrition parameters has been recorded. During 2014-15, nine thousand four hundred fifty two (9452) AICW & BIP wheat grain samples belonging to AVTs, NIVTS, IVTs, Special Trials and Nurseries were analysed.

Samples Analysed for Quality Parameters (Total Samples = 9452)



AVT's :

All the 2nd and AVT entries including checks were subjected to baking evaluation for chapati, bread, biscuit and pasta products apart from analyzing them and also all the 1st year AVT entries for physico- chemical properties (grain appearance, test weight, protein, sedimentation value, moisture, phenol test, extraction rate, grain hardness index, wet / dry gluten and gluten index), HMWGS and grain nutrition (protein, yellow pigment, iron and zinc).

Product specific genotypes were identified from AVT trials. For the evaluation of chapati, several parameters like water absorption, dough nature & colour (before and after maturation), chapati appearance & its colour, aroma, pliability, taste, puffing height and loss of water (just after baking and after 4 hours of baking) were considered. Only those genotypes were selected for chapati, which scored > 8.0 score out 10.0.

Promising *T.aestivum* Genotypes for Chapati

Category	Genotypes
Check	C 306, K 8027, HD 2888 (RTS, NEPZ), HD 2864, HD 2932, MP 3336, (ILS, CZ), MACS 6478 (ITS, PZ), NIAW 1415 (RTS, RITS, PZ).
2 nd year AVT	None

For bread quality evaluation, parameters like loaf volume, stickiness, appearance, crust colour, crumb colour, texture, taste and aroma were considered. Genotypes with > 575 ml loaf volumes were selected for bread.

Promising *T.aestivum* Genotypes for Bread

Category	Genotypes
Check	MACS 6222, MACS 6478 (ITS, PZ), NI 5439, NIAW 1415 (RTS, RITS, PZ).
2 nd year AVT	NIAW 2030 (RTS, PZ).

The spread factor was calculated by dividing the diameter of the biscuit with its thickness. The highest spread factor of 11.41 was exhibited by HS 490 (RILS, NHZ). This variety also showed lower SKCS grain hardness index of 20 indicating its higher potential towards biscuit making.

Promising *T.aestivum* Genotypes for Biscuit

Category	Genotypes
Check	HS 490 (RILS, NHZ)
2 nd year AVT	None

For the evaluation of pasta products (macaroni), various cooking quality parameters like cooking time, water absorption, water uptake ratio, gruel solid loss and stickiness were considered. Apart from these, sensory evaluation was carried out where parameters like colour, texture, flavour and overall acceptability using a '9' point hedonic scales were considered. Only those genotypes were selected which scored > 7.0 point on the hedonic scale and after considering cooking and other quality parameters. Genotypes recording >71.0% extraction rate were also identified.

Promising *T.durum* Genotypes for Pasta Products (Macroni)

Category	Genotypes
Check	PDW 233, PDW 314 (ITS, NWPZ), MPO 1215, HI 8737 (ITS, CZ), UAS 446 (RTS, PZ).
2 nd year AVT	HD 4730 (ITS, NWPZ)

Promising *T.aestivum* Genotypes for Extraction Rate

Category	Genotypes
Check	C 306, K 8027, HD 2888 (RTS, NEPZ), HI 1544 (ITS, CZ), NI 5439, NIAW 1415 (RTS, RITS, PZ)
2 nd year AVT	NIAW 2030 (RTS, PZ)

Three species of wheat namely, *T.aestivum*, *T.durum* and *T.dicoccum* are cultivated in the country. Bread wheat is contributing approximately 95 % while around 4% comes from durum wheat and just about 1% is the share of *dicoccum* wheat to the total wheat production. The quality requirements of wheat for various products like chapati, bread, biscuit and pasta are different. Hard wheat (*T.aestivum*) with strong & extensible gluten and high protein is required for making good bread. For biscuit, the quality requirements are soft wheat, low protein and weak & extensible gluten. For chapati, we need hard wheat, medium to high protein and medium & extensible gluten. For pasta products, hard wheat (*T.durum*) with strong gluten, high protein, low yellow berry incidence and high yellow pigment content are required.

Promising genotypes for various quality parameters were also identified. For *T. aestivum*, parameters included were protein, wet gluten, dry gluten, gluten

index, hardness index, sedimentation value, extraction rate, yellow pigment, iron and zinc. Likewise, *T.durum* genotypes were selected for various quality parameters and micronutrients.

Promising Genotypes for Various Quality Parameters

PARAMETER	VALUE	GENOTYPES
(<i>T.aestivum</i>)		
Protein	> 13.0 %	PBW 709, PBW 719, DBW 148, K 1314, HD 2932, MP 3336, CG 1015, HD 3164, NIAW 1415, DBW 93.
Wet Gluten	> 32.0 %	WH 1164, MP 4010, HD 2932, MP 3336, MACS 6222, MACS 6478, DBW 93.
Dry Gluten	> 10.0 %	WH 1164, MP 4010, HD 2932, MP 3336, MACS 6222, MACS 6478, NIAW 1415, DBW 93.
Gluten Index	> 80.0 %	WH 1105, DBW 88, HD 3086, HD 3059.
Sedimentation value	> 55 ml	HS 598, HD 2967, DBW 88, PBW 709, WH 1179, PBW 718, WH 1080, HD 3171, K 1317, K 1315, JWS 712.
Extraction Rate	> 71.0 %	NIAW 2030, C 306, K 8027, HD 2888, HI 1544, NIAW 1415, NI 5439.
Grain Hardness Index	~ 85	NIAW 2030, VL 804, HPW 349, HPW 413, HS 599, C 306, K 8027, HD 2888, NI 5439, NIAW 1415, PBW 421.
	< 25	HS 490.
Yellow Pigment	> 4.5 ppm	HS 562, VL 804, VL 907, UP 2917.
Iron	~ 45.0 ppm	C 306, K 8027, HD 2888, HD 3171, HI 1605.
Zinc	~ 45.0 ppm	HS 596, VL 1007, UP 2917, VL 3008, WH 1021, C 306, K 8027, HD 2888.
(<i>T.durum</i>)		
Protein	~12.5%	PDW 233, HI 8498, AKDW 2997-16, MACS 3970.
Sedimentation value	> 40 ml	DDW 32, MACS 3949, UAS 446, HI 8765.
Grain Hardness Index	> 90	PDW 233, PDW 291, AKDW 2997-16, UAS 446, UAS 455, MACS 3970.
Yellow Pigment	~ 7.00 ppm	PDW 233, DDW 31, DDW32, UAS 453.
Iron	> 42.0 ppm	MACS 3927, UAS 446, AKDW 2997-16.
Zinc	~ 45.0 ppm	PDW 233, PDW 291, DDW 31, MACS 3949, MACS 4024, MACS 3927.

All the *T.aestivum* 1st and 2nd year AVT entries including checks (728 nos.) were analysed for various quality traits which included grain appearance score, test weight, protein content, grain hardness index & sedimentation value and nutritional traits like yellow pigment iron & zinc. The 2nd year AVT entries including checks (354 nos.) were also analysed for wet gluten,

dry gluten & gluten index and extraction rate. The yellow pigment (ppm) for *T.aestivum* in NHZ, NWPZ, NEPZ, CZ, PZ, and overall were 3.97, 3.61, 4.10, 3.05, 3.63 and 3.67 ranging from 2.57 to 5.08, 2.60 to 4.69, 3.54 to 4.65, 2.48 to 3.65, 2.73 to 4.32 and 2.48 to 5.08 respectively.

Variability in the Quality Parameter of *T.aestivum* in AVT's

Parameter	NHZ	NWPZ	NEPZ	CZ	PZ	Overall
Grain Appearance (out of 10.0)	6.5 (5.9-7.4)	6.3 (4.6-7.6)	6.4 (6.0-6.8)	6.4 (5.6-8.4)	6.7 (5.1-8.4)	6.4 (4.6-8.4)
Test Weight (kg/hl)	79.9 (74.5-82.5)	78.1 (71.2-82.4)	77.8 (75.4-80.6)	79.4 (73.8-83.3)	78.7 (72.7-83.5)	78.8 (71.2-83.5)
Protein content (%)	9.7 (8.0-12.4)	12.3 (9.7-15.5)	12.0 (10.3-13.7)	12.9 (11.1-14.8)	12.4 (9.5-14.8)	11.6 (8.0-15.5)
Grain hardness Index	74 (15-91)	74 (56-91)	82 (67-94)	74 (59-92)	76 (64-92)	75 (15-94)
Sedimentation value (ml)	42 (30-62)	50 (32-65)	48 (36-60)	41 (33-50)	49 (33-61)	47 (30-65)
Wet Gluten (%)	22.4 (18.3-29.3)	28.6 (21.8-37.1)	30.5 (25.6-36.3)	32.1 (24.4-37.0)	30.5 (24.3-34.4)	27.9 (18.3-37.1)
Dry Gluten (%)	7.3 (5.6-8.8)	9.4 (7.1-11.7)	10.1 (8.4-12.4)	10.2 (8.1-11.8)	10.0 (7.9-11.6)	9.1 (5.6-12.4)
Gluten Index (%)	67 (45-89)	66 (44-88)	54 (43-64)	57 (41-83)	58 (38-85)	63 (38-89)
Extraction Rate (%)	64.0 (59.6-67.3)	69.0 (66.1-72.5)	71.9 (70.1-73.6)	69.8 (66.8-73.3)	71.1 (69.1-73.5)	68.2 (59.6-73.3)
Yellow Pigment (ppm)	3.97 (2.67-5.08)	3.61 (2.60-4.69)	4.10 (3.54-4.65)	3.05 (2.48-3.65)	3.63 (2.73-4.32)	3.67 (2.48-5.08)
Iron (ppm)	36.1 (24.7-45.1)	39.7 (28.2-58.0)	45.1 (38.6-53.9)	39.5 (30.1-51.7)	40.2 (33.8-51.0)	38.9 (24.7-58.0)
Zinc (ppm)	36.7 (18.9-57.6)	38.6 (23.3-60.3)	40.9 (33.0-48.9)	39.5 (30.1-51.7)	34.1 (23.6-42.9)	37.8 (18.9-60.3)

In brackets are given the range values.

All the *T.durum* 1st and 2nd year AVT entries including checks (212 nos.) were analysed for various quality traits like grain appearance, test weight, protein content, grain hardness index, sedimentation value, yellow berry incidence and nutritional trials like yellow pigment, iron & zinc. For example, the mean values of yellow pigment (ppm) were distinctly higher in *T.durum*. The mean values (ppm) for NWPZ, CZ, PZ and overall were 6.27, 5.31, 5.64 and 5.91 ranging from 3.59 to 8.58, 4.06 to 6.52, 4.11 to 7.42 and 3.53 to 8.58 respectively.

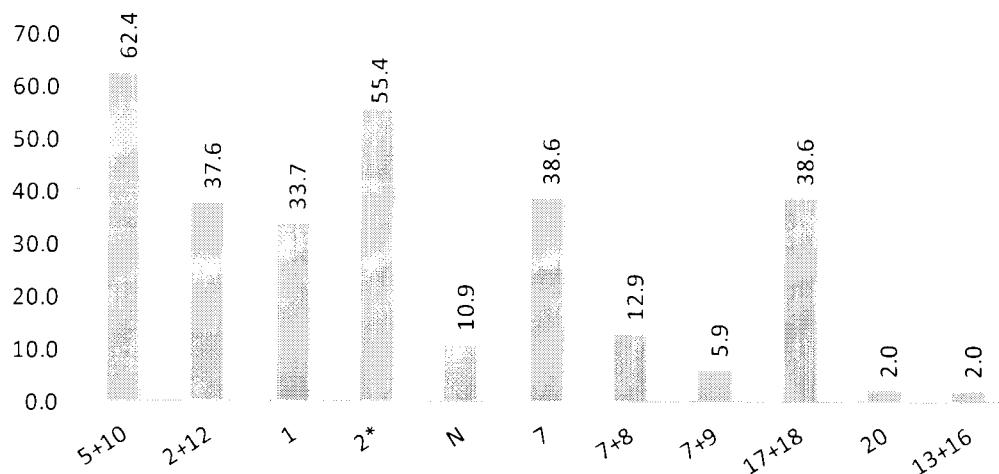
Variability in Quality Parameters of *T. durum* in AVTs

Parameters	NWPZ	CZ	PZ	Overall
Grain Appearance (Out of 10.0)	6.7 (5.0-7.8)	7.4 (6.3-8.4)	7.0 (5.2-8.1)	6.9 (5.0-8.4)
Test Weight (kg/hl)	78.8 (70.2-83.5)	81.4 (76.5-83.6)	80.8 (71.3-83.6)	79.9 (70.2-83.6)
Protein Content (%)	11.9 (8.8-14.5)	12.0 (8.6-14.9)	11.6 (9.9-13.4)	11.8 (8.6-14.9)
Grain hard- ness Index	83 (54-101)	84 (77-92)	87 (70-106)	84 (54-106)
Sedimentation Value (ml)	41 (28-60)	33 (26-42)	34 (26-42)	37 (26-42)
Yellow Berry Incidence (%)	9.1 (0.1-49.2)	8.8 (0.1-39.2)	10.7 (0.3-66.3)	9.5 (0.1-66.3)
Yellow Pigment(ppm)	6.27 (3.53-8.58)	5.31 (4.06-6.52)	5.64 (4.11-7.42)	5.91 (3.53-8.58)
Iron (ppm)	39.1 (30.1-50.0)	40.8 (30.4-54.3)	39.6 (33.4-51.6)	39.6 (30.1-54.3)
Zinc (ppm)	42.8 (25.9-55.5)	39.2 (24.9-57.6)	35.7 (24.7-44.1)	40.1 (24.7-57.6)

In brackets are given the range values.

One hundred and one (101), 2nd and 1st year AVT entries including checks were evaluated for High Molecular Weight Glutenin Subunits (HMWGS). Subunits 5+10 and 2+12 were present in 62.4 % and 37.6 % of the total entries, whereas entries having 1, 2* and N subunits were 33.7 %, 55.4 % and 10.9 % respectively. Likewise, percent entries having subunits 7, 7+8, 7+9, 17+18, 20 and 13+16 were 38.6, 12.9, 5.9, 38.6, 2.0 and 2.0 respectively.

Distribution of HMWGS



NIVTs :

The *T.aestivum* NIVTs were analysed for grain appearance, test weight, protein content and sedimentation value.

Quality Parameters of *T.aestivum* in NIVTs

Trial	Condition	Zone	Grain Appearance (Max Score 10.0)	Test Weight (kg/hl)	Protein Content (%)	Sediment. Value (ml)
NIVT 1A	ITS	NWPZ	5.5	75.1	12.4	42
NIVT 1A	ITS	NEPZ	5.5	74.5	12.1	42
NIVT 1A	ITS	Overall	5.5	74.9	12.3	42
NIVT 1B	ITS	NWPZ	6.7	74.0	11.3	38
NIVT 1B	ITS	NEPZ	6.6	74.5	11.2	38
NIVT 1B	ITS	Overall	6.7	74.2	11.3	38
NIVT 2	ITS	CZ	6.8	77.0	13.7	48
NIVT 2	ITS	PZ	6.9	77.0	13.1	41
NIVT 2	ITS	Overall	6.8	77.0	13.4	45
NIVT 3A	ILS	NWPZ	5.3	76.4	12.4	41
NIVT 3A	ILS	NEPZ	4.0	71.5	12.5	40
NIVT 3A	ILS	Overall	4.8	74.5	12.4	40
NIVT 3B	ILS	CZ	5.5	74.3	13.1	45
NIVT 3B	ILS	PZ	6.0	79.0	12.1	40
NIVT 3B	ILS	Overall	5.7	76.3	12.7	42
NIVT 5A	RTS	NWPZ	6.1	81.5	12.0	41
NIVT 5A	RTS	CZ	6.1	82.2	119.	40
NIVT 5A	RTS	PZ	6.5	81.9	13.4	44
NIVT 5A	RTS	Overall	6.2	81.9	12.4	42
NIVT 5A	RITS	NWPZ	5.9	77.1	12.8	41
NIVT 5A	RITS	NEPZ	6.0	78.5	12.2	42
NIVT 5A	RITS	CZ	6.0	80.4	12.5	44
NIVT 5A	RITS	PZ	6.1	79.5	13.0	45
NIVT 5A	RITS	Overall	6.0	78.9	12.6	43
IVT	ITS	NHZ	6.2	79.8	11.3	47
IVT	RTS	NHZ	6.1	79.9	11.7	46
IVT	RITS	SHZ	6.3	78.5	12.2	43

The *T. durum* NIVTs were also analysed for yellow berry incidence and yellow pigment.

Quality Parameters of *T.durum* in NIVTs

Trial	Sowing Condition	Zone	Grain App. (max. Score 10.0)	Test Weight (kg/hl)	Protein Content (%)	Sed. Value (ml)	Yellow Berry (%)	Yellow Pigment (ppm)
NIVT4A	ITS	CZ	5.5	79.8	12.0	42	8.0	5.4
NIVT 4A	ITS	PZ	5.1	80.4	12.0	42	18.0	5.0
NIVT 4A	ITS	Over All	5.3	80.1	12.0	42	13.0	5.2
NIVT 5B	RTS	CZ	6.7	81.7	13.6	34	29.0	5.6
NIVT 5B	RTS	PZ	6.7	82.2	13.5	34	33.0	5.3
NIVT 5B	RTS	Over All	6.7	81.9	13.6	34	31.0	5.5

Promising entries were selected from NIVTs for promotion to AVT under irrigated timely sown (ITS) condition based on quality traits. From NIVT 1A, the selected entry was PBW 725 for NWPZ and HD 3184 for NEPZ. From NIVT 2, the selected entry was MP 3440 for CZ and DBW 168 for PZ.

Quality Component Screening Nursery:

New genetic stocks: Ten genotypes including one *durum* completed three years of testing in QCSN and their overall performance was judged to identify the new genetic resources. Three genotypes were identified in bread wheat category whereas none qualified in *durum*. QBW 12-9 and QLD 54 were identified for soft grain texture. QBP 12-9, developed by IARI New Delhi, has soft grains (hardness index: 24) with sedimentation value (35ml) and protein content (11.8%) suited for cookie quality. QLD 54 (37th IBWSN 05/ PBW 550) was developed at IIWBR, Karnal and it registered matching grain softness (index: 22) and sedimentation value (38ml) but protein concentration was high (13.3%). Heading in QLD 54 came a week earlier in comparison to other checks and identified genotypes. QLD 58 (25th ESTWYT 24/ PBW 550) expressed good combination of protein (13.1%), hardness (index: 74), test weight (79.8 kg/hl) and grain appearance score (6.0). QLD 58 was also 10cm shorter in height in comparison to other genotypes.

Special Trials:

The entries including checks of special trials on *T.dicoccum* were analysed for thousand grain weight, protein content, sedimentation value and yellow pigment. Similarly those of salinity/alkalinity trial and triticale trial were analysed for grain appearance, test weight, protein content and sedimentation value.

Quality Parameters of Genotypes in *T.dicoccum* Trial

Centres Zone	Thousand Grain Weight (g)	Protein Content (%)	Sedimentation Value (ml)	Yellow Pigment (ppm)
PZ	43.0	15.1	29	3.76
SHZ	40.0	14.6	30	3.60
Overall	42.5	15.0	29	3.74

Quality Parameters of *T.aestivum* Genotypes in Salinity/ Alkalinity Trial

Centres (NWPZ)	Grain Appearance (Out of 10.0)	Test Weight (kg/hl)	Protein Content (%)	Sedimentation Value (ml)
Hisar	5.9	80.6	12.5	46
Karnal	5.7	78.6	11.7	45
OVEALL	5.8	79.6	12.1	46

Quality Parameters of *T.aestivum* Genotypes in Wheat MABB Trial

Zone	Grain Appearance (out of 10.0)	Test Weight (kg/hl)	Protein Content (%)	Sedimentation Value (ml)	Grain Hardness Index	Yellow Pigment (ppm)	Iron Content (ppm)	Zinc Content (ppm)
NWPZ	5.7	74.7	12.2	49	69	3.65	40.2	35.5
NEPZ	6.2	78.2	12.0	46	76	2.99	43.3	42.2
CZ	6.3	77.0	12.6	43	70	2.66	39.6	38.7
PZ	6.3	79.3	13.3	46	74	2.54	41.4	41.2
CZ+PZ	6.3	78.1	13.0	45	72	2.60	40.5	40.0

Product Evaluation of *T.aestivum* Genotypes in wheat MABB Trial

Zone	Chapati Quality (Max.10)	Bread Loaf Volume (ml)	Bread Quality (max.10)	Extraction Rate (%)	Wet Gluten (%)	Dry Gluten (%)	Gluten Index (%)
NWPZ	7.55	554	6.58	68.4	29.0	9.7	64
NEPZ	7.72	562	6.76	69.6	29.5	9.9	62
CZ	7.91	569	6.95	69.9	29.7	10.3	63
PZ	7.88	574	7.09	70.5	31.0	10.7	67
CZ+PZ	7.90	571	7.02	70.2	30.4	10.5	65

Quality Parameters of *T.aestivum* Genotypes in Wheat NIL Trial

Centres (NWPZ)	Grain Appearance (out of 10.0)	Test Weight (kg/hl)	Protein Content (%)	Sedimentation Value (ml)
Ludhiana	5.5	73.5	12.3	45
Pantnagar	6.1	75.6	9.6	48
Dhaulakuan	5.3	73.4	10.9	44
Overall	5.6	74.1	10.9	46

Quality Parameters of Genotypes in Triticale Trial

Zone	Grain Appearance (Out of 10.0)	Test Weight (kg/hl)	Protein Content (%)	Sedimentation Value (ml)
NHZ	6.3	73.5	10.6	32
NWPZ	6.2	72.8	12.7	34
OVERALL	6.2	73.2	11.6	33

Quality Parameters of *T.aestivum* Genotypes in Wheat Bio-fortification Trial

Zone	Grain Appearance (out of 10.0)	Test Weight (kg/hl)	Protein Content (%)	Grain Hardness Index	Sedimen- tation Value (ml)	Iron Content (ppm)	Zinc Content (ppm)
NWPZ	6.3	77.9	12.3	67	53	38.1	43.4
NEPZ	6.8	76.6	11.1	75	53	38.9	38.8
CZ	6.8	78.3	11.4	75	51	39.1	40.9
PZ	6.8	80.0	11.5	78	51	40.6	33.0
OVERALL	6.5	78.5	11.9	72	52	38.9	40.6

New Initiative for Wheat Export (Analysis of FCI Wheat grain samples):

Considering the production level of 92.46 million tons during the year 2012-13 and 95.82 million tons in 2013-14, Government of India decided to undertake export of wheat during 2012-13 and 2013-14. Seven thousand five hundred seventy one (7571) wheat grain samples drawn from stocks of Food Corporation of India (FCI) covering three states viz. Punjab (3325 samples), Haryana (1609 samples) & Madhya Pradesh (2637 samples) were analysed for various wheat grading parameters like test weight, damaged kernel, foreign matter, shrunken & broken kernel, total defects & other classes and wheat functional parameters like protein, moisture, wet gluten & falling number. Based on these quality data, Food Corporation of India could export about 6.5 million tons of wheat through its exporting agencies during years 2012-13 and 2013-14.