

Physiological investigations on heat and drought stress tolerance in wheat

Heat and Drought Tolerance Screening Trial (HDTST) was conducted to identify the temperature and drought stress tolerant lines among AVT final year genotypes and the trial was planted under timely sown (TS), late sown (LS) and drought stress (DR) conditions. The HDTST trial was conducted using 49 entries including checks sown in 7 x 7 lattice square design with two replications during the crop season 2025-26. The trial was planted at 12 locations under TS (November) and LS (December) conditions keeping at least 21 days difference between the sowing dates to expose the crop to optimum and high temperature environments, respectively. In addition, one set was also planted under drought stress condition with pre sown irrigation. Observations on weather, growth and yield parameters were recorded at all the locations in the prescribed format. Physiological parameters namely Normalized Difference Vegetation Index (NDVI), canopy temperature (CT) and chlorophyll content index (CCI) were recorded at 15 days after anthesis (DAA) and 21DAA at Karnal, Ludhiana, Hisar, Sabour, Junagadh, Vijapur, Dharwad, Ranchi, Indore, Pune and Ayodhya locations. The data from the Ayodhya centre was excluded from the analysis because of the high variation between replications. The data from the Niphad centre was not considered for analysis, as it was found to be erroneous. At Ranchi centre due to heavy rainfall and lodging data for late sown condition was not recorded, hence the centre data is only considered for drought stress and rest of the 9 locations data were considered for pooled analysis.

Magnitude of heat and drought stress:

- In NWPZ the mean minimum and maximum temperature across centres was higher by 1.51°C and 1.4°C respectively, under reproductive stage in LS compared to TS conditions. The RH ranged from 43-84% and no significant difference in the rainfall was reported during TS and LS conditions.
- In CZ the mean minimum and maximum temperature across centres was higher by 2.46°C and 2.75°C respectively, under reproductive stage in LS compared to TS conditions. No significant difference in temperature was observed in PZ during TS and LS conditions. The RH ranged from 54-74% and the rainfall received was more under LS reproductive stage compared to TS conditions.

Impact of heat/drought stress was adjudged by taking into account, Heat Sensitivity Index (HSI) and Drought Sensitivity Index (DSI). HSI/DSI was calculated using the formula $HSI/DSI = (1 - YD/Yi) / (1 - XD/Xi)$ Where, YD and Yi are the grain yield for each genotype under stress and control conditions respectively. XD and Xi are the means of all study genotypes grain yield under stress and control conditions respectively. For reference, HSI/DSI < 0.5 is considered as highly tolerant, HSI/DSI < 0.5-1 as moderately tolerant and HSI/DSI > 1.0 as stress susceptible genotypes.

Under heat stress, the genotypes HI1700 (0.57), NIAW4624 (0.67), PDW367(d) (0.69), HD3515 (0.70), MP3598 (0.75), MACS4146 (d) (0.80), UAS3034 (0.84), HI1696 (0.87), NIAW4621 (0.87) showed lowest HSI with minimum yield reduction compared to the best check HI1605 (0.88). Under drought condition, HD3515 (0.70) and HI1700 (0.71) showed lower DSI, however the best check HI1605 was

recorded with a lowest value of 0.77 with minimum yield reduction under drought condition. The name of genotypes showing HSI /DSI lower than one are listed in table.1.

Table 1: List of wheat genotypes identified as heat/drought tolerant (HSI/DSI) compared to best checks in HDTST during 2025-26.

Trial	Genotypes	
	HSI	DSI
HDTST	HI1700 (0.57), NIAW4624 (0.67), PDW367(d) (0.69), HD3515(0.70), MP3598 (0.75), MACS4146 (d) (0.80), UAS3034 (0.84), HI1696 (0.87), NIAW4621 (0.87), HI8855 (0.89), HI1697 (0.91), NIAW4533 (0.93), GW1370(d) (0.94), WHD969(d) (0.97), DBW509 (0.97), HI8858 (0.99)	HD3515 (0.70), HI1700 (0.71), HI1699 (0.83), HP1983 (0.85), NIAW4533 (0.84), MACS4147(d) (0.88), UAS3034 (0.91), NIAW4621 (0.90), VL3040 (0.93), SVPWL22-02 (0.93), DBW509 (0.93), HI1696 (0.90), MACS6854 (0.93), NIAW4624 (0.95), VL2064 (0.97), HI1697 (0.97), DBW458 (0.99), DBW465 (0.99), HI8853 (0.96)

Values in the paranthesis indicates HSI /DSI

Correlation of grain yield with different traits under late sown and drought conditions

The correlation of different growth, yield and physiological traits with yield under late sown condition indicated that, the grain yield is significantly correlated with plant height, canopy temperature and chlorophyll fluorescence (PSII activity, photosynthetic efficiency) both at 15 and 21 days after anthesis. The grain yield under drought condition is significantly correlated with grain number/spike and canopy temperature 15 days after anthesis.

Table 2: Correlation (r^2) of pooled analysis traits with GYLS and GYDR

Traits	GYLS	GYDR
Days to heading	-0.29	-0.34
Days to anthesis	-0.24	-0.39
Days to maturity	-0.07	-0.34
Plant height	0.06**	0.30
Thousand grain weight	0.40	0.22
Tiller number	0.36	0.31
NDVI at 1month after germination	0.09**	0.15
NDVI at 21 DAA	-0.04**	-0.25
Harvest index	0.49	0.30
Grain number per spike	-0.23	0.03**
Grain filling period	0.18	0.42
CT at 15DAA	-0.03**	-0.10**
CT at 21DAA	0.05**	-0.18
CCI at 15DAA	-0.02**	-0.19
CCI at 21DAA	-0.05**	0.03

* Significant@ 5%, ** @ 1% .

Annexure I: The grain yield, HSI, DSI and yield reduction percentage of genotypes pooled across locations during 2025-26

Sl. No.	Genotype	Grain Yield (g/plot)			HSI	DSI	Yield Reduction	
		TS	LS	DR			HS	DS
1	CG1040©	1185.93	749.58	775.85	1.18	0.99	58.21	34.58
2	DBW296©	1235.85	883.19	789.00	0.92	1.04	39.93	36.16
3	DBW359©	1255.65	853.78	841.75	1.03	0.95	47.07	32.96
4	DBW458	1245.85	810.94	815.05	1.12	0.99	53.63	34.58
5	DBW465	1258.80	854.19	822.88	1.03	0.99	47.37	34.63
6	DBW466	1226.28	807.97	794.88	1.10	1.01	51.77	35.18
7	DBW467	1244.18	796.44	736.28	1.16	1.17	56.22	40.82
8	DBW509	1229.15	858.56	830.95	0.97	0.93	43.16	32.40
9	GW1369(d)	1268.83	857.47	763.18	1.04	1.14	47.97	39.85
10	GW1370(d)	1173.38	831.42	734.78	0.94	1.07	41.13	37.38
11	GW322©	1186.53	716.22	706.90	1.28	1.16	65.66	40.42
12	HD3118©	1222.10	793.36	752.95	1.13	1.10	54.04	38.39
13	HD3386©	1310.48	922.47	840.95	0.95	1.03	42.06	35.83
14	HD3515	1062.98	831.75	804.38	0.70	0.70	27.80	24.33
15	HI1605©	1103.10	801.28	809.05	0.88	0.77	37.67	26.66
16	HI1696	1185.55	864.36	812.60	0.87	0.90	37.16	31.46
17	HI1697	1212.30	868.89	804.78	0.91	0.97	39.52	33.62
18	HI1699	1305.98	855.64	928.68	1.11	0.83	52.63	28.89
19	HI1700	1265.83	1041.50	951.05	0.57	0.71	21.54	24.87
20	HI8737©	1102.83	793.19	725.73	0.90	0.98	39.04	34.19
21	HI8849©	1242.38	863.92	730.28	0.98	1.18	43.81	41.22
22	HI8853	1297.45	858.22	862.08	1.09	0.96	51.18	33.56
23	HI8854	1455.43	896.92	805.28	1.23	1.28	62.27	44.67
24	HI8855	1257.45	909.14	778.83	0.89	1.09	38.31	38.06
25	HI8858	1258.75	869.44	790.48	0.99	1.07	44.78	37.20
26	HP1983	1252.73	862.47	884.08	1.00	0.85	45.25	29.43
27	MACS3949(d)©	1146.40	708.28	706.40	1.23	1.10	61.86	38.38
28	MACS4146(d)	1216.83	913.47	784.58	0.80	1.02	33.21	35.52
29	MACS4147(d)	1251.95	840.31	867.95	1.06	0.88	48.99	30.67
30	MACS6854	1265.28	861.58	853.53	1.03	0.93	46.85	32.54
31	MP1401	1195.70	758.42	709.00	1.18	1.17	57.66	40.70
32	MP3598	1224.15	938.50	791.93	0.75	1.01	30.44	35.31
33	NIAW3170©	1231.48	857.06	804.80	0.98	1.00	43.69	34.65
34	NIAW4533	1173.98	835.97	831.43	0.93	0.84	40.43	29.18
35	NIAW4621	1177.08	858.78	806.65	0.87	0.90	37.06	31.47
36	NIAW4624	1065.60	844.39	711.75	0.67	0.95	26.20	33.21
37	NIDW1557(d)	1207.25	781.61	744.55	1.13	1.10	54.46	38.33
38	PBW644©	1107.78	796.81	765.75	0.90	0.89	39.03	30.87
39	PBW826©	1399.35	937.11	931.83	1.06	0.96	49.33	33.41
40	PDW367(d)	982.18	771.53	611.38	0.69	1.08	27.30	37.75
41	SVPWL22-02	1170.75	801.44	792.15	1.01	0.93	46.08	32.34
42	UAS3034	1235.08	912.39	844.53	0.84	0.91	35.37	31.62
43	UAS485(d)	1208.60	729.36	724.13	1.28	1.15	65.71	40.09
44	UP3145	1344.20	887.19	824.03	1.09	1.11	51.51	38.70
45	VL2064	1109.25	742.78	733.35	1.06	0.97	49.34	33.89
46	VL3040	1138.28	755.22	768.40	1.08	0.93	50.72	32.49
47	VL892©	1153.10	763.61	789.83	1.09	0.90	51.01	31.50
48	VL907©	1104.03	717.00	690.10	1.13	1.08	53.98	37.49
49	WHD969(d)	1122.53	785.39	655.65	0.97	1.19	42.93	41.59

HS-Heat stress, DS-Drought stress

Annexure 2a: The grain yield (g/plot), HSI, DSI and yield reduction percentage of genotypes at Hisar and Karnal locations during 2025-26

		Hisar							Karnal						
	Genotypes	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	CG1040©	1433	1120	1365	1.05	0.30	21.84	4.75	1390	300.5	1343	1.20	0.55	78.38	3.38
2	DBW296©	1384	1160	1200	0.78	0.84	16.18	13.29	1516	691	1391	0.83	1.35	54.42	8.25
3	DBW359©	1395	900	1233	1.71	0.74	35.48	11.61	1245	303	1161	1.16	1.11	75.66	6.75
4	DBW458	2028	1435	1290	1.41	2.31	29.24	36.39	1300	299.5	1335	1.18	-0.44	76.96	-2.69
5	DBW465	1458	1145	1155	1.03	1.32	21.47	20.78	1459	516	1498	0.99	-0.44	64.63	-2.67
6	DBW466	1330	1080	1215	0.91	0.55	18.80	8.65	1622	600	1466	0.96	1.58	63.01	9.62
7	DBW467	1430	1385	1395	0.15	0.16	3.15	2.45	1514	553	1385	0.97	1.40	63.47	8.52
8	DBW509	1280	1260	1035	0.08	1.21	1.56	19.14	1543	517	1212	1.02	3.52	66.49	21.45
9	GW1369(d)	1311	1045	985	0.98	1.58	20.29	24.87	1202	400	822	1.02	5.18	66.72	31.61
10	GW1370(d)	1510	1220	1145	0.93	1.53	19.21	24.17	1224	290	955	1.17	3.60	76.31	21.98
11	GW322©	1500	1140	1118	1.16	1.61	24.00	25.47	1206	381	965	1.05	3.28	68.41	19.98
12	HD3118©	1450	1195	1218	0.85	1.01	17.59	16.00	1516	629	1523	0.89	-0.08	58.51	-0.46
13	HD3386©	1450	912.5	1038	1.79	1.80	37.07	28.41	1713	438.5	1712	1.14	0.01	74.40	0.06
14	HD3515	1544	1265	1375	0.87	0.69	18.07	10.95	1441	538	1326.5	0.96	1.30	62.66	7.95
15	HI1605©	1295	990	1205	1.14	0.44	23.55	6.95	1185	622	1221	0.73	-0.50	47.51	-3.04
16	HI1696	1457	1245	1265	0.70	0.84	14.55	13.18	1030	297.5	1371	1.09	-5.43	71.12	-33.11
17	HI1697	1528	1235	1135	0.92	1.63	19.18	25.72	1056	240	1141	1.18	-1.32	77.27	-8.05
18	HI1699	1316	1290	1290	0.10	0.13	1.98	1.98	1498	258	1400.5	1.27	1.07	82.78	6.51
19	HI1700	1510	1343	1185	0.53	1.36	11.06	21.52	1650	773	1462	0.81	1.87	53.15	11.39
20	HI8737©	1335	970	1179	1.32	0.74	27.34	11.69	1445	393	1112	1.11	3.78	72.80	23.04
21	HI8849©	1519	1300	1120	0.70	1.66	14.42	26.27	1394	306	1285	1.19	1.28	78.05	7.82
22	HI8853	1550	1010	1475	1.68	0.31	34.84	4.84	1463	448	1290	1.06	1.94	69.38	11.83
23	HI8854	1548	1235	1150	0.97	1.63	20.22	25.71	1341	395	1187	1.08	1.88	70.54	11.48
24	HI8855	1515	1023	1230	1.57	1.19	32.48	18.81	1332	370	1150	1.10	2.24	72.22	13.66
25	HI8858	1537	1320	1320	0.68	0.89	14.12	14.12	1440	564	1335	0.93	1.20	60.83	7.29
26	HP1983	1523	1200	1135	1.02	1.61	21.21	25.48	1615	723	1473	0.84	1.44	55.23	8.79
27	MACS3949(d)©	1497	822	1165	2.17	1.41	45.09	22.18	1141	481	1177	0.88	-0.52	57.84	-3.16
28	MACS4146(d)	1375	1160	1195	0.75	0.83	15.64	13.09	1290	575	1473	0.85	-2.33	55.43	-14.19
29	MACS4147(d)	1479	1112.5	1360	1.19	0.51	24.78	8.05	1361	542	1344	0.92	0.20	60.18	1.25
30	MACS6854	1327	965	1260	1.32	0.32	27.28	5.05	1187	255.5	1229	1.20	-0.58	78.48	-3.54
31	MP1401	1695	1140	1288	1.58	1.52	32.74	24.01	1590	309	1054	1.23	5.53	80.57	33.71
32	MP3598	1390	1155	1166.5	0.82	1.02	16.91	16.08	1397	791	1535	0.66	-1.62	43.38	-9.88
33	NIAW3170©	1305.5	1120	1257	0.69	0.24	14.21	3.72	1082	467	1215	0.87	-2.02	56.84	-12.29
34	NIAW4533	1320	1045	1234	1.00	0.41	20.83	6.52	1530	636	1501	0.89	0.31	58.43	1.90
35	NIAW4621	1460	1250	1365	0.69	0.41	14.38	6.51	1337	313	1278	1.17	0.72	76.59	4.41
36	NIAW4624	1315	1169	825	0.54	2.36	11.10	37.26	1403	607	1383	0.87	0.23	56.74	1.43
37	NIDW1557(d)	1689	965	1385	2.07	1.14	42.87	18.00	1502	703	1301	0.81	2.19	53.20	13.38

38	PBW644©	1365	980	1276	1.36	0.41	28.21	6.52	1397	720	1301	0.74	1.13	48.46	6.87
39	PBW826©	1429	1265	1325	0.55	0.46	11.48	7.28	1777	438	1689	1.15	0.81	75.35	4.95
40	PDW367(d)	1330	1285	1287	0.16	0.20	3.38	3.23	1238	459	1200	0.96	0.50	62.92	3.07
41	SVPWL22-02	1275	1095	1190	0.68	0.42	14.12	6.67	1471	773	1553	0.73	-0.91	47.45	-5.57
42	UAS3034	1350	1310	1125	0.14	1.06	2.96	16.67	1674	472.5	1596	1.10	0.76	71.77	4.66
43	UAS485(d)	1265	1205	1078	0.23	0.94	4.74	14.78	1148	198.5	1110	1.26	0.54	82.71	3.31
44	UP3145	1563	1345	1350	0.67	0.86	13.95	13.63	1448	586	1448	0.91	0.00	59.53	0.00
45	VL2064	1174	900	915	1.13	1.40	23.34	22.06	1542	309	972	1.22	6.06	79.96	36.96
46	VL3040	1405	1000	1118	1.39	1.29	28.83	20.43	997	268	1079	1.12	-1.35	73.12	-8.22
47	VL892©	1412	1130	1180	0.96	1.04	19.97	16.43	1138.5	395	1177	1.00	-0.55	65.31	-3.38
48	VL907©	1320	1015	1051	1.11	1.29	23.11	20.38	743	308	864	0.89	-2.67	58.55	-16.29
49	WHD969(d)	1355	843.5	1300	1.82	0.26	37.75	4.06	1535	798	1166	0.73	3.94	48.01	24.04

GYTS - Grain yield under timely sown, GYLS - Grain yield under late sown, GYDR -Grain yield under drought, YR%H -Yield reduction percentage under heat stress, YR%D - Yield reduction percentage under drought stress

Annexure 2b: The grain yield(g/plot), HSI, DSI and yield reduction percentage of genotypes at Ludhiana and Vijapur locations during 2025-26

	Genotypes	Ludhiana							Vijapur						
		GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	CG1040©	1134	1105.5	755.5	0.23	1.30	2.51	33.38	1120	530	480	1.27	0.96	52.68	57.14
2	DBW296©	1429	1299.5	972.5	0.82	1.24	9.06	31.95	1170	565	525	1.25	0.93	51.71	55.13
3	DBW359©	1205	1181	1262.5	0.18	-0.19	1.99	-4.77	1200	955	530	0.49	0.94	20.42	55.83
4	DBW458	1039.5	863	890.5	1.53	0.56	16.98	14.33	887.5	612.5	385	0.75	0.95	30.99	56.62
5	DBW465	1387	1215	875	1.12	1.43	12.40	36.91	1270	752.5	560	0.98	0.94	40.75	55.91
6	DBW466	1320.5	1243	766.5	0.53	1.63	5.87	41.95	1000	607.5	515	0.95	0.81	39.25	48.50
7	DBW467	1523	1094	860	2.54	1.69	28.17	43.53	855	545	275	0.87	1.14	36.26	67.84
8	DBW509	1375	940	1036	2.86	0.96	31.64	24.65	1270	817.5	585	0.86	0.91	35.63	53.94
9	GW1369(d)	1664.5	1209	905	2.47	1.77	27.37	45.63	1335	627.5	505	1.28	1.04	53.00	62.17
10	GW1370(d)	1540	1183.5	900	2.09	1.61	23.15	41.56	945	610	415	0.86	0.94	35.45	56.08
11	GW322©	1708.5	1109	1018.5	3.17	1.57	35.09	40.39	815	387.5	250	1.27	1.16	52.45	69.33
12	HD3118©	1380.5	1010.5	954	2.42	1.20	26.80	30.89	1215	407.5	425	1.60	1.09	66.46	65.02
13	HD3386©	1338	1305	591	0.22	2.17	2.47	55.83	1205	725	685	0.96	0.73	39.83	43.15
14	HD3515	1308	1334.5	716	-0.18	1.76	-2.03	45.26	1045	585	520	1.06	0.84	44.02	50.24
15	HI1605©	1129.5	1181	1024.5	-0.41	0.36	-4.56	9.30	976	432.5	405	1.34	0.98	55.69	58.50
16	HI1696	1145.5	1261	861.5	-0.91	0.96	-10.08	24.79	960	617.5	360	0.86	1.05	35.68	62.50

17	HI1697	1022	870	996	1.34	0.10	14.87	2.54	975	627.5	480	0.86	0.85	35.64	50.77
18	HI1699	1066.5	937.5	1218.5	1.09	-0.55	12.10	-14.25	955	542.5	395	1.04	0.99	43.19	58.64
19	HI1700	727	1289	748.5	-6.98	-0.11	-77.30	-2.96	1124	710	575	0.89	0.82	36.83	48.84
20	HI8737©	1302.5	1343	797.5	-0.28	1.51	-3.11	38.77	810	567.5	265	0.72	1.13	29.94	67.28
21	HI8849©	1270.5	1346	1109.5	-0.54	0.49	-5.94	12.67	1020	517.5	300	1.19	1.19	49.26	70.59
22	HI8853	1697	1239	889	2.44	1.85	26.99	47.61	1020	507.5	375	1.21	1.06	50.25	63.24
23	HI8854	1709.5	1312	1130	2.10	1.32	23.25	33.90	1175	672.5	405	1.03	1.10	42.77	65.53
24	HI8855	936	1119.5	884	-1.77	0.22	-19.60	5.56	1375	765	395	1.07	1.20	44.36	71.27
25	HI8858	895.5	941	980	-0.46	-0.37	-5.08	-9.44	1225	732.5	405	0.97	1.12	40.20	66.94
26	HP1983	1125.5	1025.5	959	0.80	0.57	8.88	14.79	995	730	670	0.64	0.55	26.63	32.66
27	MACS3949(d)©	998.5	1129	627	-1.18	1.44	-13.07	37.21	900	370	335	1.42	1.05	58.89	62.78
28	MACS4146(d)	969.5	882	838	0.81	0.53	9.03	13.56	1000	680	345	0.77	1.10	32.00	65.50
29	MACS4147(d)	1227	1010	1234	1.60	-0.02	17.69	-0.57	1185	650	470	1.09	1.01	45.15	60.34
30	MACS6854	1274	1263	824.5	0.08	1.37	0.86	35.28	1200	765	520	0.87	0.95	36.25	56.67
31	MP1401	797	976	650	-2.03	0.72	-22.46	18.44	1155	790	535	0.76	0.90	31.60	53.68
32	MP3598	1192.5	1229	844.5	-0.28	1.13	-3.06	29.18	1195	547.5	390	1.31	1.13	54.18	67.36
33	NIAW3170©	1024.5	916	781	0.96	0.92	10.59	23.77	1145	790	530	0.75	0.90	31.00	53.71
34	NIAW4533	561.5	886.5	616.5	-5.23	-0.38	-57.88	-9.80	1165	642.5	580	1.08	0.84	44.85	50.21
35	NIAW4621	1268.5	1085.5	916.5	1.30	1.08	14.43	27.75	1005	747.5	380	0.62	1.05	25.62	62.19
36	NIAW4624	823.5	907	870	-0.92	-0.22	-10.14	-5.65	1000	730	360	0.65	1.08	27.00	64.00
37	NIDW1557(d)	1176.5	1035.5	1082.5	1.08	0.31	11.98	7.99	1110	685	255	0.92	1.29	38.29	77.03
38	PBW644©	770.5	1009	1030	-2.79	-1.31	-30.95	-33.68	1130	517.5	450	1.31	1.01	54.20	60.18
39	PBW826©	1821	1422.5	1317	1.98	1.07	21.88	27.68	1260	657.5	573.5	1.15	0.92	47.82	54.48
40	PDW367(d)	1249	976	676	1.97	1.78	21.86	45.88	800	470	105	1.00	1.46	41.25	86.88
41	SVPWL22-02	1273	1043	853.5	1.63	1.28	18.07	32.95	1210	800	695	0.82	0.72	33.88	42.56
42	UAS3034	1039	1175	1002.5	-1.18	0.14	-13.09	3.51	1070	802.5	547	0.60	0.82	25.00	48.88
43	UAS485(d)	1865	1010	1044.5	4.14	1.71	45.84	43.99	805	485	245	0.96	1.17	39.75	69.57
44	UP3145	1736	1050	876	3.57	1.92	39.52	49.54	1205	730	505	0.95	0.98	39.42	58.09
45	VL2064	1198.5	709	1180	3.69	0.06	40.84	1.54	840	512.5	325	0.94	1.03	38.99	61.31
46	VL3040	1392.5	1141	1118	1.63	0.77	18.06	19.71	890	425	295	1.26	1.12	52.25	66.85

47	VL892©	1157.5	1019	1004	1.08	0.51	11.97	13.26	890	532.5	330	0.97	1.06	40.17	62.92
48	VL907©	1404.5	907	677	3.20	2.01	35.42	51.80	725	442.5	310	0.94	0.96	38.97	57.24
49	WHD969(d)	1101.5	1240	900.5	-1.14	0.71	-12.57	18.25	915	375	185	1.42	1.34	59.02	79.78

GYTS - Grain yield under timely sown, GYLS - Grain yield under late sown, GYDR -Grain yield under drought, YR%H -Yield reduction percentage under heat stress, YR%D - Yield reduction percentage under drought stress

Annexure 2c: The grain yield(g/plot), HSI, DSI and yield reduction percentage of genotypes at Sabour and Dharwad locations during 2025-26

		Sabour							Dharwad						
	Genotypes	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	CG1040©	945	654	834	1.20	0.31	30.79	11.75	1062.5	634	415.5	2.32	1.07	40.33	60.89
2	DBW296©	1252	963	841	0.90	0.85	23.08	32.83	623.5	583	228	0.37	1.12	6.50	63.43
3	DBW359©	1060	652	708	1.50	0.86	38.49	33.21	980.5	953.5	450.5	0.16	0.95	2.75	54.05
4	DBW458	995	872	390	0.48	1.58	12.36	60.80	740	566	407.5	1.35	0.79	23.51	44.93
5	DBW465	880	850	795	0.13	0.25	3.41	9.66	726	739.5	206.5	-0.11	1.26	-1.86	71.56
6	DBW466	1022	725	648	1.13	0.95	29.06	36.59	626	560.5	358.5	0.60	0.75	10.46	42.73
7	DBW467	1034	683	583	1.33	1.13	33.95	43.62	683	601.5	241.5	0.69	1.14	11.93	64.64
8	DBW509	1092	999	796	0.33	0.70	8.52	27.11	585	388.5	241	1.93	1.04	33.59	58.80
9	GW1369(d)	862	815	786	0.21	0.23	5.45	8.82	1115	753.5	383.5	1.86	1.16	32.42	65.61
10	GW1370(d)	976	804	403	0.69	1.52	17.62	58.71	973	982	409	-0.05	1.02	-0.92	57.97
11	GW322©	892	487	555	1.77	0.98	45.40	37.78	842	550	458	1.99	0.80	34.68	45.61
12	HD3118©	1019	831	405	0.72	1.56	18.45	60.26	754	720.5	398	0.26	0.83	4.44	47.21
13	HD3386©	1263	874	635	1.20	1.29	30.80	49.72	978	807.5	367	1.00	1.10	17.43	62.47
14	HD3515	876	780	596	0.43	0.83	10.96	31.96	492.5	385.5	285	1.25	0.74	21.73	42.13
15	HI1605©	1070	751	739	1.16	0.80	29.81	30.93	984	743	382.5	1.41	1.08	24.49	61.13
16	HI1696	827	789	420	0.18	1.28	4.59	49.21	794.5	553.5	336.5	1.74	1.02	30.33	57.65
17	HI1697	1084	895	623	0.68	1.10	17.44	42.53	1102	852.5	360	1.30	1.19	22.64	67.33
18	HI1699	1410	890	460	1.44	1.75	36.88	67.38	992	781.5	386	1.22	1.08	21.22	61.09
19	HI1700	1133	805	997	1.13	0.31	28.95	12.00	1060.5	999	469	0.33	0.98	5.80	55.78
20	HI8737©	990	740	560	0.99	1.13	25.25	43.43	632.5	395	313.5	2.16	0.89	37.55	50.43
21	HI8849©	1468	795	543	1.79	1.64	45.84	63.01	862.5	762.5	378	0.67	0.99	11.59	56.17
22	HI8853	1215	734	792	1.55	0.90	39.59	34.81	806	784.5	444.5	0.15	0.79	2.67	44.85

23	HI8854	1180	857	655	1.07	1.16	27.37	44.49	1072.5	664.5	355.5	2.19	1.18	38.04	66.85
24	HI8855	1125	810	525	1.09	1.38	28.00	53.33	840.5	822	366.5	0.13	0.99	2.20	56.40
25	HI8858	949	724	615	0.93	0.91	23.71	35.19	868	808	371.5	0.40	1.01	6.91	57.20
26	HP1983	1083	865	896	0.79	0.45	20.13	17.27	708	680.5	321	0.22	0.96	3.88	54.66
27	MACS3949(d)©	1007	482	620	2.04	1.00	52.14	38.43	909.5	505	351.5	2.56	1.08	44.47	61.35
28	MACS4146(d)	1061	883	641	0.65	1.03	16.78	39.59	830	750	408.5	0.55	0.89	9.64	50.78
29	MACS4147(d)	857	806	485	0.23	1.13	5.95	43.41	812.5	591	445.5	1.57	0.80	27.26	45.17
30	MACS6854	1194	1079	773	0.38	0.92	9.63	35.26	729	519.5	278	1.65	1.09	28.74	61.87
31	MP1401	856	530	484	1.49	1.13	38.08	43.46	512	498	262.5	0.16	0.86	2.73	48.73
32	MP3598	848	745	641	0.47	0.63	12.15	24.41	911.5	811.5	387	0.63	1.01	10.97	57.54
33	NIAW3170©	1346	911	964	1.26	0.74	32.32	28.38	858	696	276.5	1.09	1.19	18.88	67.77
34	NIAW4533	1106	800	681	1.08	1.00	27.67	38.43	766.5	614	582.5	1.14	0.42	19.90	24.01
35	NIAW4621	1054	897	651	0.58	0.99	14.90	38.24	750.5	726	296.5	0.19	1.07	3.26	60.49
36	NIAW4624	1188	810	659	1.24	1.16	31.82	44.53	405.5	386	232	0.28	0.75	4.81	42.79
37	NIDW1557(d)	833	760	478	0.34	1.11	8.76	42.62	843.5	636	263.5	1.41	1.21	24.60	68.76
38	PBW644©	1110	1053	652	0.20	1.07	5.14	41.26	720	555.5	358	1.31	0.89	22.85	50.28
39	PBW826©	1156	808	1002	1.18	0.35	30.10	13.32	861.5	747.5	294.5	0.76	1.16	13.23	65.82
40	PDW367(d)	871	680	424	0.86	1.33	21.93	51.32	647	599.5	314	0.42	0.91	7.34	51.47
41	SVPWL22-02	1027	694	408	1.27	1.57	32.42	60.27	740	641	263	0.77	1.14	13.38	64.46
42	UAS3034	1105	708	1016	1.40	0.21	35.93	8.05	914	794.5	343.5	0.75	1.10	13.07	62.42
43	UAS485(d)	962	675	775	1.16	0.50	29.83	19.44	1159.5	735	430	2.10	1.11	36.61	62.92
44	UP3145	1315	832	735	1.43	1.15	36.73	44.11	960.5	780	357	1.08	1.11	18.79	62.83
45	VL2064	605	585	500	0.13	0.45	3.31	17.36	1148.5	1008.5	413	0.70	1.13	12.19	64.04
46	VL3040	1415	741	551	1.86	1.59	47.63	61.06	632.5	517	315	1.05	0.88	18.26	50.20
47	VL892©	1076	712	631	1.32	1.07	33.83	41.36	766	616	419	1.13	0.80	19.58	45.30
48	VL907©	966	690	504	1.12	1.24	28.57	47.83	852	859	460	-0.05	0.81	-0.82	46.01
49	WHD969(d)	918	841	640	0.33	0.79	8.39	30.28	685.5	648	341	0.31	0.89	5.47	50.26

GYTS - Grain yield under timely sown, GYLS - Grain yield under late sown, GYDR -Grain yield under drought, YR%H -Yield reduction percentage under heat stress, YR%D - Yield reduction percentage under drought stress

Annexure 2d: The grain yield (g/plot), HSI, DSI and yield reduction percentage of genotypes at Pune and Ranchi locations during 2025-26

		Pune								Ranchi		
	Genotypes	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYDR	DSI	YR%D
1	CG1040©	1239.5	905.5	414	0.81	0.97	26.95	66.60	1100	495	1.67	55.00
2	DBW296©	1050	808	313	0.69	1.02	23.05	70.19	800	410	1.48	48.75
3	DBW359©	1370.5	877	442.5	1.08	0.98	36.01	67.71	1050	585	1.34	44.29
4	DBW458	1241	999.5	523	0.58	0.84	19.46	57.86	1250	725	1.27	42.00
5	DBW465	1111.5	826.5	421	0.77	0.90	25.64	62.12	1100	525	1.59	52.27
6	DBW466	1482	717	430.5	1.55	1.03	51.62	70.95	750	465	1.15	38.00
7	DBW467	1273	863	371.5	0.97	1.03	32.21	70.82	1100	455	1.78	58.64
8	DBW509	1303	1021	489.5	0.65	0.91	21.64	62.43	700	850	-0.65	-21.43
9	GW1369(d)	1622.5	1118	465	0.93	1.04	31.09	71.34	450	465	-0.10	-3.33
10	GW1370(d)	1424.5	962.5	453	0.97	0.99	32.43	68.20	700	545	0.67	22.14
11	GW322©	1304	762	310	1.25	1.11	41.56	76.23	800	460	1.29	42.50
12	HD3118©	1268	814	405.5	1.08	0.99	35.80	68.02	1000	470	1.61	53.00
13	HD3386©	1451	1099.5	307	0.73	1.15	24.22	78.84	600	835	-1.19	-39.17
14	HD3515	948.5	679	297	0.85	1.00	28.41	68.69	650	860	-0.98	-32.31
15	HI1605©	1116	727	435.5	1.05	0.89	34.86	60.98	750	745	0.02	0.67
16	HI1696	1517	1170	526.5	0.69	0.95	22.87	65.29	950	345	1.93	63.68
17	HI1697	1359.5	902	496.5	1.01	0.92	33.65	63.48	900	750	0.51	16.67
18	HI1699	1489	873.5	541.5	1.24	0.93	41.34	63.63	1200	1380	-0.45	-15.00
19	HI1700	1271.5	1097.5	482	0.41	0.90	13.68	62.09	900	1050	-0.51	-16.67
20	HI8737©	1379.5	793	351.5	1.28	1.08	42.52	74.52	550	685	-0.74	-24.55
21	HI8849©	1343.5	851	321	1.10	1.11	36.66	76.11	600	425	0.88	29.17
22	HI8853	1686.5	945.5	511	1.32	1.01	43.94	69.70	650	720	-0.33	-10.77
23	HI8854	1845.5	761	533	1.76	1.03	58.76	71.12	1350	650	1.57	51.85
24	HI8855	1756.5	1205	342.5	0.94	1.17	31.40	80.50	600	475	0.63	20.83
25	HI8858	1600	966	324	1.19	1.16	39.63	79.75	800	445	1.35	44.38
26	HP1983	1252.5	599.5	503	1.57	0.87	52.14	59.84	900	555	1.16	38.33
27	MACS3949(d)©	1448	802.5	391.5	1.34	1.06	44.58	72.96	650	565	0.40	13.08
28	MACS4146(d)	1522	1139	338.5	0.76	1.13	25.16	77.76	1100	620	1.32	43.64
29	MACS4147(d)	1424	982.5	583.5	0.93	0.86	31.00	59.02	1100	695	1.12	36.82
30	MACS6854	1298	963.5	337	0.77	1.08	25.77	74.04	950	910	0.13	4.21
31	MP1401	1209.5	967	292.5	0.60	1.10	20.05	75.82	1100	495	1.67	55.00
32	MP3598	1307.5	1063.5	463	0.56	0.94	18.66	64.59	900	480	1.42	46.67
33	NIAW3170©	1604	876.5	473	1.36	1.03	45.36	70.51	1050	435	1.78	58.57
34	NIAW4533	1133	1077.5	489.5	0.15	0.83	4.90	56.80	1050	580	1.36	44.76
35	NIAW4621	1300	855	405.5	1.03	1.00	34.23	68.81	800	825	-0.09	-3.13
36	NIAW4624	1252.5	813.5	418	1.05	0.97	35.05	66.63	450	630	-1.21	-40.00
37	NIDW1557(d)	1401	779.5	337.5	1.33	1.10	44.36	75.91	1150	510	1.69	55.65

38	PBW644©	918	735.5	352.5	0.60	0.90	19.88	61.60	900	495	1.36	45.00
39	PBW826©	1352	972	329	0.84	1.10	28.11	75.67	750	565	0.75	24.67
40	PDW367(d)	1182	813.5	302.5	0.94	1.08	31.18	74.41	650	370	1.31	43.08
41	SVPWL22-02	1180.5	690	452	1.25	0.90	41.55	61.71	950	420	1.69	55.79
42	UAS3034	1525	937	438.5	1.16	1.04	38.56	71.25	850	435	1.48	48.82
43	UAS485(d)	1435	840	424.5	1.25	1.02	41.46	70.42	600	420	0.91	30.00
44	UP3145	1269.5	758.5	421.5	1.21	0.97	40.25	66.80	1350	695	1.47	48.52
45	VL2064	967.5	896	534	0.22	0.65	7.39	44.81	950	470	1.53	50.53
46	VL3040	1171.5	806	469.5	0.94	0.87	31.20	59.92	800	540	0.99	32.50
47	VL892©	1183	760.5	461	1.07	0.89	35.71	61.03	1050	515	1.55	50.95
48	VL907©	1248	782.5	368	1.12	1.03	37.30	70.51	1200	800	1.01	33.33
49	WHD969(d)	1247.5	892	293.5	0.86	1.11	28.50	76.47	900	285	2.07	68.33

GYTS - Grain yield under timely sown, GYLS - Grain yield under late sown, GYDR -Grain yield under drought, YR%H -Yield reduction percentage under heat stress, YR%D - Yield reduction percentage under drought stress

Annexure 2e: The grain yield (g/plot), HSI, DSI and yield reduction percentage of genotypes at Junagadh and Indore locations during 2025-26

	Genotypes	Junagadh							Indore						
		GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	CG1040©	1060	640	520	0.90	1.23	39.62	50.94	1375.25	856.75	1136.5	1.15	0.77	37.70	17.36
2	DBW296©	1240	720	660	0.96	1.13	41.94	46.77	1894	1159.25	1349.5	1.18	1.27	38.79	28.75
3	DBW359©	1340	600	740	1.26	1.08	55.22	44.78	1710.5	1262.5	1305	0.80	1.05	26.19	23.71
4	DBW458	1250	470	770	1.42	0.92	62.40	38.40	1727.5	1181	1434.5	0.96	0.75	31.64	16.96
5	DBW465	1190	530	850	1.26	0.69	55.46	28.57	2006.5	1113.25	1343.25	1.35	1.46	44.52	33.06
6	DBW466	1300	530	700	1.35	1.11	59.23	46.15	1810.25	1208.75	1384.25	1.01	1.04	33.23	23.53
7	DBW467	1280	470	690	1.44	1.11	63.28	46.09	1749.75	973.5	1106.75	1.35	1.63	44.36	36.75
8	DBW509	1250	610	790	1.17	0.89	51.20	36.80	1893.5	1174	1275	1.16	1.45	38.00	32.66
9	GW1369(d)	1200	700	720	0.95	0.96	41.67	40.00	1926.25	1049.25	1595.25	1.38	0.76	45.53	17.18
10	GW1370(d)	860	495	630	0.97	0.64	42.44	26.74	1581.25	935.75	1492.75	1.24	0.25	40.82	5.60
11	GW322©	1140	515	700	1.25	0.93	54.82	38.60	1657.75	1114.5	1234.5	1.00	1.13	32.77	25.53
12	HD3118©	1060	545	630	1.11	0.98	48.58	40.57	1558.5	987.75	1101	1.11	1.30	36.62	29.36
13	HD3386©	1320	750	860	0.98	0.84	43.18	34.85	1786.75	1390.25	1379.5	0.67	1.01	22.19	22.79
14	HD3515	840	500	670	0.92	0.49	40.48	20.24	1484.75	1418.75	1398.25	0.14	0.26	4.45	5.83
15	HI1605©	1070	560	660	1.09	0.92	47.66	38.32	1455.5	1205	1273	0.52	0.56	17.21	12.54
16	HI1696	1100	690	900	0.85	0.44	37.27	18.18	2074.5	1155.75	1740.5	1.35	0.71	44.29	16.10
17	HI1697	1070	860	600	0.45	1.06	19.63	43.93	2026.5	1338	1466.25	1.03	1.22	33.97	27.65
18	HI1699	1280	720	750	1.00	1.00	43.75	41.41	1853.25	1407.75	1465.25	0.73	0.93	24.04	20.94
19	HI1700	1310	970	900	0.59	0.75	25.95	31.30	1972.25	1387	1642	0.90	0.74	29.67	16.74
20	HI8737©	940	740	560	0.48	0.97	21.28	40.43	1643.75	1197.25	1433.75	0.83	0.57	27.16	12.78

21	HI8849©	1050	680	470	0.80	1.33	35.24	55.24	1896.25	1217.25	1351.25	1.09	1.27	35.81	28.74
22	HI8853	920	710	460	0.52	1.20	22.83	50.00	1967	1345.5	1664.25	0.96	0.68	31.60	15.39
23	HI8854	1360	700	520	1.11	1.49	48.53	61.76	1972.75	1475.25	1467.25	0.77	1.14	25.22	25.62
24	HI8855	1080	870	690	0.44	0.87	19.44	36.11	2014.5	1197.75	1730.25	1.23	0.63	40.54	14.11
25	HI8858	1250	600	430	1.18	1.58	52.00	65.60	2023	1169.5	1679.25	1.28	0.75	42.19	16.99
26	HP1983	1320	620	790	1.21	0.97	53.03	40.15	2005.25	1318.75	1538.75	1.04	1.03	34.24	23.26
27	MACS3949(d)©	1130	700	450	0.87	1.45	38.05	60.18	1783	1083	1382	1.19	1.00	39.26	22.49
28	MACS4146(d)	1240	940	645	0.55	1.15	24.19	47.98	1780.75	1212.25	1341.75	0.97	1.09	31.92	24.65
29	MACS4147(d)	1210	720	660	0.92	1.09	40.50	45.45	1864	1148.75	1402.5	1.17	1.10	38.37	24.76
30	MACS6854	1340	910	840	0.73	0.90	32.09	37.31	2153.75	1033.75	1563.75	1.58	1.21	52.00	27.39
31	MP1401	1350	470	780	1.48	1.02	65.19	42.22	1692.5	1145.75	1249	0.98	1.16	32.30	26.20
32	MP3598	1370	590	650	1.30	1.26	56.93	52.55	1730	1514	1362.25	0.38	0.94	12.49	21.26
33	NIAW3170©	1190	690	810	0.96	0.77	42.02	31.93	1709.75	1247	1306.5	0.82	1.04	27.07	23.59
34	NIAW4533	1270	690	740	1.04	1.00	45.67	41.73	1837.75	1132.25	1309.75	1.17	1.27	38.39	28.73
35	NIAW4621	1270	530	690	1.33	1.10	58.27	45.67	1525.75	1325	1259	0.40	0.77	13.16	17.48
36	NIAW4624	1240	730	550	0.94	1.34	41.13	55.65	1578.5	1447	1190.5	0.25	1.09	8.33	24.58
37	NIDW1557(d)	970	600	540	0.87	1.07	38.14	44.33	1397.5	870.5	1293	1.15	0.33	37.71	7.48
38	PBW644©	1090	360	440	1.53	1.44	66.97	59.63	1677.25	1240.75	1303	0.79	0.99	26.02	22.31
39	PBW826©	1520	680	890	1.26	1.00	55.26	41.45	2067	1443.5	1333.25	0.92	1.57	30.16	35.50
40	PDW367(d)	500	720	290	-1.00	1.01	-44.00	42.00	1354.75	940.75	1145.25	0.93	0.69	30.56	15.46
41	SVPWL22-02	1020	275	840	1.66	0.42	73.04	17.65	1561	1202	1247	0.70	0.89	23.00	20.12
42	UAS3034	1170	700	610	0.91	1.15	40.17	47.86	1653.75	1312	1331.75	0.63	0.86	20.67	19.47
43	UAS485(d)	960	350	550	1.45	1.03	63.54	42.71	1886.5	1065.75	1164.25	1.32	1.70	43.51	38.29
44	UP3145	1000	700	650	0.68	0.84	30.00	35.00	1595	1203.25	1202.75	0.75	1.09	24.56	24.59
45	VL2064	1120	900	800	0.45	0.69	19.64	28.57	1547	865	1224.5	1.34	0.92	44.09	20.85
46	VL3040	1010	770	880	0.54	0.31	23.76	12.87	1669.25	1129	1318.5	0.98	0.93	32.36	21.01
47	VL892©	1170	745	850	0.83	0.66	36.32	27.35	1688	962.5	1331.25	1.31	0.94	42.98	21.13
48	VL907©	1300	640	830	1.16	0.87	50.77	36.15	1281.75	809	1037	1.12	0.85	36.88	19.09
49	WHD969(d)	970	480	375	1.15	1.48	50.52	61.34	1597.75	951	1070.5	1.23	1.46	40.48	33.00

GYTS - Grain yield under timely sown, GYLS - Grain yield under late sown, GYDR -Grain yield under drought, YR%H -Yield reduction percentage under heat stress, YR%D - Yield reduction percentage under drought stress