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 25 entries including checks sown in 5 x 5 lattice square design with two replications during the crop season 2023-24. 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 and Pune locations. The data from Pusa and the late sown data of Indore centres were not included for analysis, as there was no yield reduction under stress conditions and rest of the 11 locations data were considered for pooled analysis.

Magnitude of heat and drought stress:

- In NWPZ and NEPZ, the mean minimum and maximum temperature across centres was higher by 1.2^{0}C and 1.1^{0}C respectively, under reproductive stage in LS compared to TS conditions. The RH ranged from 38-62% and the rainfall received was more under TS reproductive stage compared to LS.
- In CZ and PZ, the mean minimum and maximum temperature across centres was higher by 2.3^{0}C and 1.5^{0}C respectively, under reproductive stage in LS compared to TS conditions. The RH ranged from 42-76% and the rainfall received was almost same both in TS and LS reproductive stages.

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 HI1674 (0.65), HD3428 (0.67) and DBW386 (0.67) showed lowest HSI with minimum yield reduction compared to the best check HI1633 (0.70). Under drought condition, HD3428 (0.79) and GW543 (0.82) showed lower DSI compared to the best check NIDW1149 (0.88) with minimum yield reduction under drought condition. The list of genotypes showing HSI /DSI <1 in HDTST are listed in Table 1.

Table 1: List of wheat genotypes identified as heat/ drought tolerant (HSI/DSI<1.0) in HDTST during 2023-24.

Trial	Genotypes	
	HSI<1	**DSI<1**
HDTST	HI1674 (0.65), HD3428 (0.67), DBW386 (0.67), AKAW5100 (0.75), HD3471 (0.79), NWS2222 (0.83), DBW443 (0.85), HI1669 (0.85), LOK79 (0.94)	HD3428 (0.79), GW543 (0.82), HD3471 (0.89), DBW443 (0.89), PBW891 (0.93), AKAW5100 (0.93), LOK79 (0.96), HI1669 (0.99), DBW441 (0.99)

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 positively correlated with days to maturity, biomass, plant height, harvest index, grain number and weight/spike, chlorophyll content and NDVI. The grain yield under drought condition is positively correlated with biomass, thousand grain weight, harvest index, grain number and weight/spike, chlorophyll content and NDVI at 21DAA.

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

Traits	GYLS	GYDR
Days to heading	0.23	0.17
Days to maturity	**0.63****	0.16
Tiller number	0.21	0.26
Biomass	**0.90****	**0.82****
Thousand grain weight	0.23	**0.37***
Plant height	**0.48****	0.15
Harvest index	**0.40****	**0.56****
Grain filling Period	0.20	0.21
Grain number per spike	**0.67****	0**.49****
Grain weight per spike	**0.69****	**0.62****
CT at 15DAA	-0.16*	-0.2
CT at 21DAA	-0.10**	0.22
CCI at 15DAA	**0.53****	0.31
CCI at 21DAA	0.24	**0.40****
NDVI at 1month after germination.	**0.49****	0.24
NDVI at 21 DAA	**0.70****	**0.46****

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

Annexure I: The grain yield, HSI, DSI and yield reduction percentage of genotypes pooled across locations during 2023-24

	Grain Yield (Kg/plot)					Yield reduction (%)	
	TS	**LS**	**DR**	**HSI**	**DSI**	**HS**	**DS**
AKAW5100	1.14	0.94	0.76	0.75	0.93	17.5	33.4
CG1044	1.21	0.82	0.75	1.40	1.07	32.7	38.3
DBW386	1.17	0.99	0.74	0.67	1.02	15.7	36.5
DBW441	1.21	0.87	0.78	1.20	0.99	28.0	35.5
DBW443	1.31	1.05	0.89	0.85	0.89	19.8	31.9
DDW55(d)	1.17	0.79	0.68	1.38	1.17	32.2	42.1
GW543	1.36	0.98	0.96	1.19	0.82	27.7	29.5
HD3428	1.27	1.07	0.91	0.67	0.79	15.6	28.4
HD3471	1.23	1.00	0.84	0.79	0.89	18.5	31.8
HI1668	1.32	0.97	0.84	1.13	1.02	26.3	36.5
HI1669	1.18	0.94	0.76	0.85	0.99	19.9	35.4
HI1674	1.12	0.95	0.71	0.65	1.02	15.1	36.4
LOK 79	1.05	0.82	0.69	0.94	0.96	22.0	34.4
NIAW4114	1.05	0.76	0.65	1.17	1.06	27.2	38.0
NIAW4120	1.21	0.88	0.70	1.16	1.17	27.1	41.8
NWS2222	1.17	0.95	0.74	0.83	1.02	19.4	36.5
PBW891	1.20	0.88	0.80	1.15	0.93	26.9	33.3
WH1306	1.19	0.86	0.75	1.17	1.04	27.4	37.2
DBW110©	1.28	0.84	0.83	1.47	0.98	34.4	35.0
DBW187©	1.31	1.01	0.84	0.97	1.01	22.7	36.2
GW322©	1.17	0.91	0.75	0.96	1.01	22.5	36.3
HI1633©	1.18	0.99	0.75	0.70	1.02	16.2	36.4
NIDW1149(d)©	1.12	0.91	0.77	0.82	0.88	19.1	31.4
PBW826©	1.30	1.03	0.86	0.90	0.94	21.1	33.8
WH730©	1.09	0.85	0.63	0.93	1.19	21.7	42.5

HS-Heat stress, DS-Drought stress

Annexure 2a: The grain yield (kg/plot), HSI, DSI and yield reduction percentage of genotypes at Hisar and Karnal locations during 2023-24

		Hisar							Karnal						
		GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	AKAW5100	1.11	0.81	0.70	0.82	0.71	27.5	36.9	1.92	1.34	1.01	1.06	1.06	30.0	47.5
2	CG1044	1.37	1.00	0.70	0.82	0.94	27.3	49.3	1.70	1.52	0.77	0.38	1.22	10.9	54.7
3	DBW386	1.22	0.86	0.64	0.88	0.91	29.5	47.5	1.42	1.74	0.51	-0.79	1.44	-22.4	64.5
4	DBW441	1.10	0.98	0.68	0.32	0.73	10.5	38.4	2.06	1.24	1.16	1.41	0.97	40.0	43.8
5	DBW443	1.53	0.93	0.66	1.18	1.09	39.4	57.2	1.86	1.69	1.16	0.32	0.84	9.2	37.6
6	DDW55(d)	1.41	0.86	0.69	1.17	0.98	38.9	51.4	1.18	1.50	0.55	-0.95	1.19	-26.9	53.4
7	GW543	1.35	0.92	0.61	0.95	1.06	31.6	55.2	1.98	1.31	1.32	1.19	0.73	33.7	33.0
8	HD3428	1.25	0.89	0.63	0.86	0.94	28.6	49.4	1.94	1.76	1.19	0.33	0.86	9.3	38.6
9	HD3471	1.27	0.79	0.69	1.13	0.87	37.7	45.7	2.21	1.25	1.15	1.54	1.07	43.6	47.9
10	HI1668	1.53	0.81	0.53	1.41	1.25	47.2	65.4	2.24	1.23	1.17	1.59	1.06	45.2	47.9
11	HI1669	1.59	0.98	0.69	1.14	1.08	38.1	56.5	1.20	0.81	0.72	1.14	0.90	32.3	40.3
12	HI1674	1.25	0.88	0.69	0.88	0.85	29.3	44.7	1.08	1.12	0.58	-0.11	1.04	-3.1	46.9
13	LOK79	1.28	0.75	0.62	1.24	0.98	41.2	51.1	0.89	0.54	0.54	1.38	0.88	39.3	39.6
14	NIAW4114	1.22	0.74	0.55	1.17	1.05	39.1	55.1	0.96	0.55	0.55	1.50	0.95	42.6	42.8
15	NIAW4120	1.57	1.03	0.61	1.03	1.18	34.3	61.5	1.74	1.24	0.86	1.01	1.12	28.8	50.4
16	NWS2222	1.13	0.65	0.59	1.28	0.91	42.7	47.8	2.11	1.53	1.04	0.97	1.12	27.6	50.5
17	PBW891	1.36	0.85	0.60	1.12	1.07	37.5	56.1	2.14	1.21	1.30	1.53	0.87	43.4	39.2
18	WH1306	1.18	0.87	0.58	0.79	0.98	26.4	51.1	1.63	1.48	1.02	0.32	0.84	9.0	37.7
19	DBW110©	1.55	0.94	0.70	1.17	1.05	39.1	54.7	1.98	1.43	1.17	0.97	0.91	27.5	40.9
20	DBW187©	1.47	0.85	0.70	1.26	1.00	41.9	52.2	2.53	1.45	1.18	1.50	1.19	42.5	53.4
21	GW322©	1.48	0.92	0.58	1.14	1.17	37.9	61.0	1.61	1.05	0.88	1.23	1.01	35.1	45.4
22	HI1633©	1.29	0.87	0.55	0.96	1.10	32.1	57.5	1.64	1.49	0.95	0.33	0.94	9.4	42.4
23	NIDW1149(d)©	1.15	0.79	0.59	0.92	0.94	30.8	48.9	1.33	1.53	0.79	-0.54	0.91	-15.4	40.9
24	PBW826©	1.19	1.01	0.74	0.44	0.73	14.8	38.2	2.05	1.74	1.22	0.54	0.91	15.4	40.7
25	WH730©	1.21	0.91	0.51	0.75	1.11	25.1	58.1	0.99	1.30	0.31	-1.13	1.52	-32.2	68.6

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(kg/plot), HSI, DSI and yield reduction percentage of genotypes at Ludhiana and Ranchi locations during 2023-24

		Ludhiana							Ranchi						
		GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	AKAW5100	0.99	0.78	0.62	1.03	1.14	21.6	38.0	1.30	1.20	1.30	1.87	0.00	7.7	0.0
2	CG1044	0.86	0.66	0.42	1.12	1.56	23.7	51.9	1.40	1.25	1.65	2.61	-2.37	10.7	-17.9
5	DBW386	1.41	0.79	0.99	2.09	0.90	43.9	30.0	1.45	1.50	1.30	-0.84	1.37	-3.4	10.3
6	DBW441	1.13	0.92	0.69	0.87	1.15	18.2	38.4	1.60	1.30	1.50	4.56	0.83	18.8	6.3
7	DBW443	1.51	1.27	1.05	0.75	0.91	15.8	30.5	1.45	1.45	1.50	0.00	-0.46	0.0	-3.4
8	DDW55(d)	1.21	0.58	0.82	2.48	0.97	52.2	32.4	1.60	1.35	1.30	3.80	2.49	15.6	18.8
10	GW543	1.26	0.92	0.88	1.29	0.90	27.2	30.1	1.70	1.55	1.65	2.15	0.39	8.8	2.9
11	HD3428	1.36	1.20	1.32	0.58	0.10	12.3	3.4	1.90	1.65	1.65	3.20	1.75	13.2	13.2
12	HD3471	1.29	1.31	1.21	-0.08	0.19	-1.7	6.5	1.40	1.45	1.30	-0.87	0.95	-3.6	7.1
14	HI1668	1.32	1.08	1.27	0.86	0.12	18.2	3.9	1.30	1.55	1.35	-4.68	-0.51	-19.2	-3.8
15	HI1669	0.87	0.72	0.37	0.78	1.72	16.4	57.2	1.40	1.55	1.35	-2.61	0.47	-10.7	3.6
16	HI1674	0.99	0.76	0.44	1.12	1.66	23.5	55.4	1.30	1.40	1.35	-1.87	-0.51	-7.7	-3.8
17	LOK 79	0.87	0.57	0.35	1.63	1.79	34.3	59.6	1.15	1.40	1.10	-5.29	0.58	-21.7	4.3
18	NIAW4114	0.71	0.49	0.34	1.49	1.57	31.3	52.2	1.45	1.50	1.20	-0.84	2.29	-3.4	17.2
19	NIAW4120	0.71	0.52	0.35	1.29	1.54	27.1	51.3	1.50	1.45	1.30	0.81	1.77	3.3	13.3
21	NWS2222	1.08	1.07	0.72	0.05	1.01	1.0	33.6	1.40	1.50	1.30	-1.74	0.95	-7.1	7.1
23	PBW891	1.02	0.96	0.63	0.25	1.13	5.3	37.6	1.45	1.35	1.50	1.68	-0.46	6.9	-3.4
24	WH1306	1.41	0.99	1.16	1.40	0.53	29.4	17.8	1.35	1.40	1.20	-0.90	1.47	-3.7	11.1
3	DBW110©	1.10	0.90	0.68	0.85	1.14	17.9	37.8	1.75	1.30	1.60	6.26	1.14	25.7	8.6
4	DBW187©	1.43	1.23	0.93	0.66	1.05	13.9	34.9	1.50	1.45	1.45	0.81	0.44	3.3	3.3
9	GW322©	0.95	0.86	0.45	0.42	1.57	8.8	52.2	1.40	1.35	1.10	0.87	2.84	3.6	21.4
13	HI1633©	1.03	1.03	0.40	0.01	1.84	0.2	61.3	1.45	1.45	1.30	0.00	1.37	0.0	10.3
20	NIDW1149(d)©	1.23	0.92	0.96	1.18	0.64	24.9	21.5	1.70	1.30	1.20	5.73	3.90	23.5	29.4
22	PBW826©	1.66	1.31	1.37	1.01	0.54	21.3	17.8	1.35	1.35	1.35	0.00	0.00	0.0	0.0
25	WH730©	1.28	0.75	0.64	1.97	1.49	41.5	49.8	1.25	1.20	1.05	0.97	2.12	4.0	16.0

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(kg/plot), HSI, DSI and yield reduction percentage of genotypes at Sabour and Dharwad locations during 2023-24

		Sabour							Dharwad						
		GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	AKAW5100	0.99	0.62	1.01	0.92	-0.25	36.9	-2.3	0.69	0.70	0.60	-0.06	0.53	-1.5	13.4
2	CG1044	0.90	0.64	0.74	0.72	1.90	28.7	17.3	0.51	0.31	0.40	1.48	0.90	40.0	22.8
5	DBW386	1.21	0.60	1.00	1.26	1.92	50.4	17.4	0.64	0.60	0.39	0.26	1.54	7.0	39.2
6	DBW441	0.97	0.53	0.83	1.14	1.64	45.8	14.9	0.38	0.15	0.23	2.19	1.51	59.4	38.3
7	DBW443	1.11	0.63	1.02	1.08	0.87	43.2	7.9	0.65	0.43	0.48	1.23	1.02	33.5	25.8
8	DDW55(d)	0.85	0.43	0.65	1.24	2.65	49.4	24.1	0.44	0.21	0.18	1.97	2.30	53.4	58.4
10	GW543	1.10	0.53	1.17	1.30	-0.70	51.8	-6.4	0.63	0.53	0.51	0.62	0.74	16.8	18.9
11	HD3428	1.11	0.67	1.10	0.98	0.02	39.4	0.2	0.61	0.32	0.42	1.72	1.18	46.7	29.9
12	HD3471	1.12	0.72	0.94	0.89	1.72	35.6	15.7	0.61	0.46	0.52	0.91	0.60	24.7	15.2
14	HI1668	1.25	0.68	1.07	1.15	1.57	45.9	14.2	0.61	0.48	0.53	0.78	0.48	21.1	12.2
15	HI1669	0.99	0.76	1.16	0.58	-1.95	23.4	-17.8	0.62	0.57	0.52	0.31	0.68	8.5	17.4
16	HI1674	1.06	0.64	0.89	1.00	1.76	39.9	16.0	0.61	0.54	0.52	0.41	0.59	11.2	14.9
17	LOK 79	0.75	0.52	0.79	0.78	-0.55	31.3	-5.0	0.64	0.63	0.53	0.05	0.65	1.2	16.6
18	NIAW4114	0.95	0.57	0.76	1.01	2.23	40.5	20.3	0.69	0.54	0.36	0.81	1.87	21.9	47.4
19	NIAW4120	0.81	0.65	0.63	0.49	2.50	19.7	22.8	0.67	0.64	0.41	0.14	1.52	3.9	38.5
21	NWS2222	1.14	0.71	0.84	0.95	2.90	38.0	26.4	0.44	0.19	0.39	2.07	0.43	56.3	10.9
23	PBW891	0.77	0.49	0.91	0.90	-2.08	35.8	-18.9	0.79	0.48	0.50	1.44	1.48	39.1	37.5
24	WH1306	1.00	0.63	0.60	0.91	4.36	36.6	39.6	0.52	0.20	0.32	2.31	1.56	62.6	39.7
3	DBW110©	0.87	0.42	0.80	1.30	0.91	52.1	8.3	0.63	0.25	0.55	2.22	0.50	60.1	12.8
4	DBW187©	0.98	0.74	1.15	0.62	-1.88	24.8	-17.1	0.53	0.58	0.37	-0.37	1.16	-10.0	29.5
9	GW322©	1.07	0.61	0.85	1.08	2.22	43.2	20.2	0.69	0.39	0.61	1.62	0.46	43.8	11.8
13	HI1633©	1.04	0.61	0.98	1.04	0.71	41.5	6.5	0.64	0.61	0.50	0.19	0.84	5.0	21.4
20	NIDW1149(d)©	0.73	0.44	0.94	1.01	-3.13	40.4	-28.4	0.61	0.50	0.55	0.66	0.36	18.0	9.1
22	PBW826©	1.22	0.71	0.99	1.05	2.06	42.1	18.7	0.39	0.21	0.29	1.74	1.05	47.1	26.8
25	WH730©	0.98	0.54	0.85	1.14	1.46	45.5	13.2	0.54	0.37	0.37	1.15	1.26	31.2	32.0

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(kg/plot), HSI, DSI and yield reduction percentage of genotypes at Pune and Niphad locations during 2023-24

		Pune							Niphad						
		GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%	YR%D
1	AKAW5100	1.05	0.90	0.39	0.44	0.97	14.0	63.0	0.82	0.94	0.86	-0.76	-1.02	-15.3	-5.7
2	CG1044	1.11	0.77	0.44	0.97	0.93	30.7	60.3	1.29	0.58	1.00	2.73	3.90	55.2	21.9
3	DBW386	1.05	0.87	0.47	0.52	0.86	16.6	55.6	0.78	0.80	0.64	-0.12	3.35	-2.4	18.8
4	DBW441	1.14	0.80	0.31	0.95	1.12	30.1	72.6	0.88	0.50	0.89	2.14	-0.07	43.4	-0.4
5	DBW443	1.33	0.63	0.46	1.66	1.00	52.4	65.2	0.96	0.60	1.08	1.87	-2.16	37.8	-12.1
6	DDW55(d)	1.28	0.54	0.34	1.83	1.13	57.8	73.1	0.76	0.29	0.78	3.04	-0.59	61.4	-3.3
7	GW543	1.40	0.90	0.58	1.12	0.90	35.4	58.5	1.19	0.78	1.20	1.70	-0.28	34.4	-1.6
8	HD3428	1.23	0.88	0.52	0.90	0.89	28.5	58.0	0.81	0.88	0.92	-0.44	-2.37	-8.8	-13.3
9	HD3471	1.17	0.69	0.34	1.30	1.09	41.0	70.8	0.85	0.69	0.82	0.90	0.55	18.3	3.1
10	HI1668	1.03	0.84	0.41	0.58	0.92	18.3	59.7	0.83	0.64	0.61	1.16	4.71	23.5	26.4
11	HI1669	1.13	0.88	0.35	0.71	1.07	22.6	69.3	1.07	0.83	0.85	1.12	3.65	22.6	20.5
12	HI1674	1.21	0.92	0.46	0.76	0.96	24.0	62.5	0.85	0.82	0.84	0.17	0.24	3.5	1.3
13	LOK 79	1.09	0.80	0.40	0.85	0.97	26.8	63.2	0.89	1.05	0.89	-0.91	-0.05	-18.4	-0.3
14	NIAW4114	1.26	0.89	0.42	0.92	1.02	29.1	66.4	0.83	1.10	0.75	-1.60	1.77	-32.3	9.9
15	NIAW4120	1.37	0.96	0.44	0.94	1.04	29.7	67.9	0.99	0.84	0.79	0.75	3.68	15.2	20.7
16	NWS2222	1.02	0.81	0.42	0.64	0.91	20.3	59.1	0.76	0.74	0.85	0.15	-2.22	3.0	-12.5
17	PBW891	1.00	0.66	0.34	1.06	1.02	33.5	66.0	1.06	0.71	0.90	1.63	2.70	33.0	15.2
18	WH1306	1.04	0.58	0.32	1.40	1.07	44.2	69.4	0.87	0.46	0.76	2.32	2.20	47.0	12.3
19	DBW110©	1.32	0.65	0.55	1.61	0.90	50.9	58.6	0.79	0.33	0.87	2.87	-1.94	58.1	-10.9
20	DBW187©	1.12	0.61	0.42	1.43	0.97	45.3	62.8	0.86	0.54	0.67	1.84	3.93	37.2	22.1
21	GW322©	1.27	0.97	0.39	0.74	1.07	23.2	69.4	0.96	0.66	0.88	1.55	1.47	31.4	8.3
22	HI1633©	1.08	0.88	0.34	0.58	1.05	18.2	68.4	0.75	0.74	0.68	0.10	1.67	2.0	9.4
23	NIDW1149(d)©	1.17	0.92	0.42	0.69	0.99	21.7	64.3	0.95	0.89	0.82	0.27	2.28	5.6	12.8
24	PBW826©	1.36	0.95	0.49	0.95	0.99	30.1	64.3	0.96	0.73	0.95	1.20	0.14	24.3	0.8
25	WH730©	1.14	0.80	0.39	0.96	1.01	30.2	65.5	0.71	0.82	0.74	-0.73	-0.57	-14.7	-3.2

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(kg/plot), HSI, DSI and yield reduction percentage of genotypes at Indore and Junagadh locations during 2023-24

		Indore				Junagadh						
		GYTS	GYDR	DSI	YR%D	GYTS	GYLS	GYDR	HSI	DSI	YR%H	YR%D
1	AKAW5100	1.382	0.950	1.23	31.3	1.211	0.837	0.439	0.88	1.01	30.9	63.7
2	CG1044	1.346	1.005	0.99	25.3	1.540	0.880	0.468	1.22	1.10	42.9	69.6
3	DBW386	1.419	0.931	1.35	34.4	0.982	0.701	0.465	0.82	0.83	28.7	52.7
4	DBW441	1.323	1.116	0.61	15.6	1.315	0.832	0.475	1.05	1.01	36.7	63.9
5	DBW443	1.362	0.877	1.40	35.6	1.094	0.660	0.481	1.13	0.89	39.7	56.1
6	DDW55(d)	1.438	1.082	0.97	24.8	1.352	0.718	0.381	1.34	1.13	46.9	71.8
7	GW543	1.514	1.147	0.95	24.3	1.391	0.820	0.458	1.17	1.06	41.0	67.1
8	HD3428	1.254	1.081	0.54	13.8	1.149	0.895	0.445	0.63	0.97	22.1	61.3
9	HD3471	1.171	1.005	0.56	14.2	1.111	0.863	0.435	0.64	0.96	22.3	60.9
10	HI1668	1.529	1.070	1.18	30.1	1.284	0.883	0.431	0.89	1.05	31.2	66.5
11	HI1669	1.649	1.185	1.10	28.1	1.120	0.835	0.458	0.73	0.93	25.5	59.1
12	HI1674	1.557	0.964	1.49	38.1	1.150	0.802	0.433	0.86	0.98	30.3	62.4
13	LOK 79	1.474	1.130	0.91	23.3	1.089	0.735	0.425	0.93	0.96	32.5	61.0
14	NIAW4114	1.498	1.113	1.01	25.7	0.976	0.695	0.497	0.82	0.77	28.8	49.1
15	NIAW4120	1.521	1.103	1.08	27.5	1.359	0.823	0.507	1.13	0.99	39.4	62.7
16	NWS2222	1.331	0.965	1.08	27.5	1.175	0.825	0.443	0.85	0.98	29.8	62.3
17	PBW891	1.235	1.007	0.72	18.5	1.237	0.725	0.504	1.18	0.94	41.4	59.3
18	WH1306	1.380	0.911	1.33	34.0	1.283	0.659	0.462	1.39	1.01	48.6	64.0
19	DBW110©	1.272	0.951	0.99	25.2	1.473	0.792	0.440	1.32	1.11	46.2	70.2
20	DBW187©	1.525	1.103	1.09	27.7	1.142	0.750	0.427	0.98	0.99	34.3	62.6
21	GW322©	1.391	1.160	0.65	16.6	1.186	0.879	0.473	0.74	0.95	25.9	60.2
22	HI1633©	1.511	1.161	0.91	23.2	1.138	0.779	0.433	0.90	0.98	31.6	62.0
23	NIDW1149(d)©	1.275	0.827	1.38	35.1	1.036	0.623	0.498	1.14	0.82	39.9	51.9
24	PBW826©	1.280	1.106	0.53	13.6	1.406	0.864	0.381	1.10	1.15	38.6	72.9
25	WH730©	1.398	1.149	0.70	17.8	1.053	0.647	0.374	1.10	1.02	38.5	64.5

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 2f: The grain yield(kg/plot), HSI, DSI and yield reduction percentage of genotypes at Vijapur location during 2023-24

		Vijapur						
		GYTS	**GYLS**	**GYDR**	**HSI**	**DSI**	**YR%H**	**YR%D**
1	**AKAW5100**	1.095	0.603	0.495	1.10	1.30	45.0	54.8
2	**CG1044**	1.293	0.908	0.633	0.73	1.21	29.8	51.1
3	**DBW386**	1.283	0.918	0.850	0.70	0.80	28.5	33.7
4	**DBW441**	1.458	0.673	0.743	1.32	1.16	53.9	49.1
5	**DBW443**	1.583	1.018	1.058	0.88	0.78	35.7	33.2
6	**DDW55(d)**	1.328	0.703	0.670	1.15	1.17	47.1	49.5
7	**GW543**	1.445	0.840	1.008	1.03	0.72	41.9	30.3
8	**HD3428**	1.328	0.810	0.698	0.96	1.12	39.0	47.5
9	**HD3471**	1.325	0.955	0.818	0.68	0.91	27.9	38.3
10	**HI1668**	1.588	0.893	0.773	1.07	1.21	43.8	51.3
11	**HI1669**	1.323	0.718	0.730	1.12	1.06	45.7	44.8
12	**HI1674**	1.228	0.880	0.655	0.69	1.10	28.3	46.6
13	**LOK 79**	1.425	0.900	0.788	0.90	1.06	36.8	44.7
14	**NIAW4114**	0.985	0.550	0.608	1.08	0.91	44.2	38.3
15	**NIAW4120**	1.055	0.870	0.753	0.43	0.68	17.5	28.7
16	**NWS2222**	1.328	0.855	0.633	0.87	1.24	35.6	52.4
17	**PBW891**	1.183	0.753	0.635	0.89	1.09	36.4	46.3
18	**WH1306**	1.398	0.745	0.885	1.15	0.87	46.7	36.7
19	**DBW110©**	1.410	0.663	0.873	1.30	0.90	53.0	38.1
20	**DBW187©**	1.340	0.778	0.808	1.03	0.94	42.0	39.7
21	**GW322©**	0.873	0.720	0.825	0.43	0.13	17.5	5.4
22	**HI1633©**	1.378	0.715	0.945	1.18	0.74	48.1	31.4
23	**NIDW1149(d)©**	1.205	0.585	0.888	1.26	0.62	51.5	26.3
24	**PBW826©**	1.433	0.750	0.605	1.17	1.37	47.6	57.8
25	**WH730©**	1.413	0.525	0.500	1.54	1.53	62.8	64.6

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