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Screening of wheat (*Triticum aestivum* L.) genotypes for field performance and seed quality parameters

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Wheat is an important cereal crop of world including India. The major problems of drought condition in India therefore wheat have a low productivity, so we would like to develop drought tolerant crop varieties through help of various verities. In which present study we have used twenty six wheat genotypes of diverse genetic background with popular cultivar of India. All the genotypes had screened accordingly morphological and physiological characterizations for drought condition. On the basis of morphological and physiological traits it was observed that genotypes C-306, BRW-3806, DBW-110, DBW-116, GW-477, HI-1620, MACS-6695, MP-1331, NI-5439, NIAW-3212 and RW-5 performed better for drought induced conditions.

Introduction

Wheat (*Triticum aestivum* L.) is an annual, self-pollinated crop and belonging to Poaceae family (grasses). All over India, wheat crop is cultivated and considered as an essential staple food grain. It belongs to the sub-tribe *Triticinae*, which is recent origin of tribe *Triticeae*. This tribe contains about 35 genera including *Thinopyrum*, *Triticum*, *Dasypyrum*, *Aegilops*, *Secale* and *Lophopyrum.*

Area, productivity and production of wheat in Karnataka is 0.17 million hectare (0.57 %), 1,012 kg per ha and 0.17 million tonnes (0.19 %) respectively, during 2017-18 and wheat is being cultivated widely in Dharwad, Belgaum, Bijapur, Gulbarga and Bidar districts. In India, second major cereal crop is wheat after rice. The enhancement of productivity is in greater demand in building the country self adequate in food production of food. Under timely sown irrigated condition, semi-dwarf type genotypes are cultivated in a major part of the area (Joshi *et al.*, 2007).

Hexaploid species of bread wheat is extensively cultivated throughout the world and followed by durum wheat of tetraploid species, which is the second most cultivated.

In India mainly three kinds of wheat are grown *viz.,* (i) *Triticum aestivum* (Common wheat) (ii) *Triticum durum* (durum wheat) and (iii) *Triticum dicoccum* (dicoccum wheat).

In general, *T. aestivum* and *T. durum* cultivars of wheat are more sensitive to high temperatures during crop growth and development. As compared to other wheat species, dicoccum has the capacity to withstand at higher temperature stress. The capability of dicoccum wheat for may be attributed to internal genetic makeup and morpho-physiological mechanisms.

Water is the essential input on which yields of field crops depends oftenly. Presently water provided for crop production is leap towards decline by future due to increasing demand of water for industrial and drinking purposes. Consequently, wheat is an essential food crop which is affected by water stress due to high requirement of water it will suffer the most if drought provides during crops period. This would cause a set back to the sustainability of wheat productivity. Additionally, insufficient accessibility of water and its distribution would always remain a limiting factor to attain expected yield in wheat. If the crop is exposed to water stress especially during crown root initiation stage at high temperature maximum impact on field is observed. Therefore, the heat stress and water are most important components that affect the productivity of wheat.

Materials and Methods

An experiment was conducted in rainout shelter, College of Agiculture, Vijayapura, Karnataka. The field experiment was laid out in randomized complete block design (RCBD) with two moisture regimes with three replications. After sowing, well water was provided both the treatments. At critical stages, no irrigation was applied for one set (low moisture stress) and crop was protected from rainfall.

Morphological evaluation of wheat genotypes

Observation of Morphological and physiological traits were recorded on randomly selected five plants from each tagged plants in each replication at deferent growth stage. The data was recorded for pre-harvest characters like plant height **(**cm) from bottom of the plant from soil level to the base of the spike, productive tiller, days to 50 per cent flowering, days of maturity, length of spikelet (cm) from tips of apical spikelet (excluding awns) to the bases or collar of ear, number of grains per spike (g), number of grains per spike, 1000 grain weight and yield per plant were recorded.

Physiological evaluation of wheat genotypes

The SPAD chlorophyll reading was taken at 30 and 60 DAS on which leaf using the SPAD meter on the green leaves in randomly selected five plants and the average relative chlorophyll content was worked out and expressed in number.

Results and Discussion

Yield parameters

The combined effect of two moisture regimes and wheat genotypes on grain yield was found significant. Under well water condition, the maximum grain yield was recorded in C-306 (4.25 g) followed by HI-1620 (1.76 g) whereas minimum yield for genotype DBW-14 (3.44 g). Under water stress condition more reduction in grain yield was observed in HD-2733 (1.39 g) genotype compared to other genotypes. The increased in grain yield per plant may be attributed higher plant height (Table 1 and Fig. 1), number of tillers per plant (Table 1 and Fig. 2), spike length (Table 1 and Fig. 3), number of grains per spike (Table 1 and Fig. 6), grain weight per spike (Table 1 and Fig. 7) and 1000 grain weight (Table 2 and Fig. 8). The decrease in number of grains per spike was main responsible factors for reducing the grain yield under stress condition. More reduction of grain yield per plant due to water stress and yield of the plants is intimately associated with the photosynthetic rate of the leaf area findings by Gifford and Evans, 1981; Baque, 2003). Similarly the decreased 1000 grains weight may be attributed to disturbed nutrient uptake efficiency and photosynthetic translocation within the plant that produced shrivelled grains due to hastened maturity. It is important to note that genotypes C-306, HI-1620, RW-5, MACS-6695, NIAW-3212, DBW-110, GW-477 and NI-5439 which we believe have resistant to water deficit, had a feature of developmental plasticity and this enables them to produce seed on a limited supply of water which otherwise is coupled with the abundant of water (Quarrie *et al.,* 1999). Similarly the other yield attributing parameters were also significantly influenced by differential water regimes and wheat genotypes.

The genotypes C-306, DBW-110, DBW-166, GW-477, HI-1620, MACS-6695, NIAW-3212 and RW-5 were attained early days to 50 per cent flowering and days to maturity (Table 1 and Fig. 4). The genotypes which flowered and matured earlier may have an advantage of allowing drought escape (Lopes *et al.*, 2012) and have a capability to complete their life before dehydrated by high summer temperature, enabling the genotype to efficiently utilize rainfall during critical development stages (Fig. 5).

Maintenance of chlorophyll content is necessary for photosynthesis under moisture stress condition. Lower per cent of reduction and highest chlorophyll content under moisture stress in wheat tolerant genotype has been reported (Almeselmani, 2012; Kraus *et al.*, 1995; Nyachiro *et al.*, 2001). Similar result revealed that chlorophyll content decreased under drought stress (Meena Kumari *et al.*, 2004).

Fig.1 Influence of WW and LMS on plant height in wheat genotypes

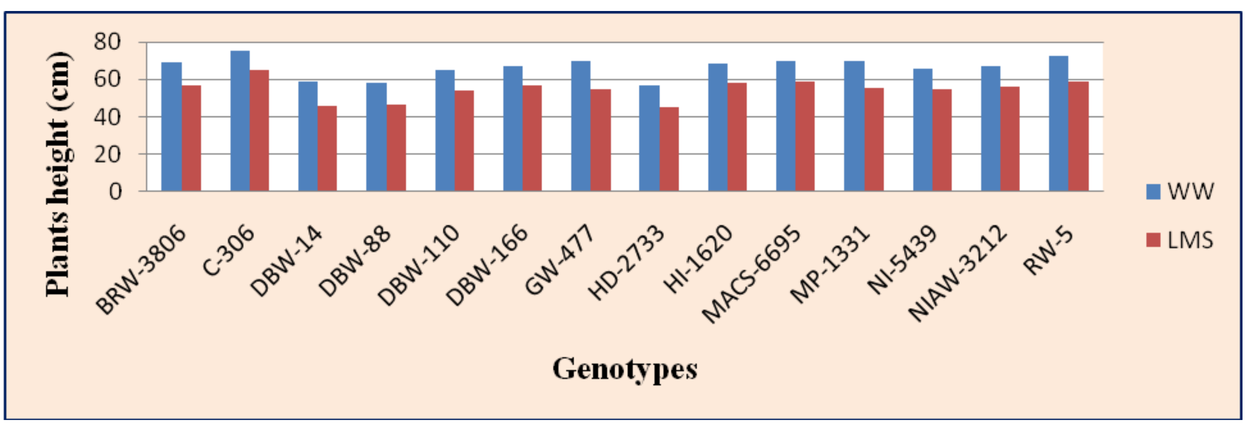

Fig.2 Influence of WW and LMS on No. of tillers per plant in wheat genotypes

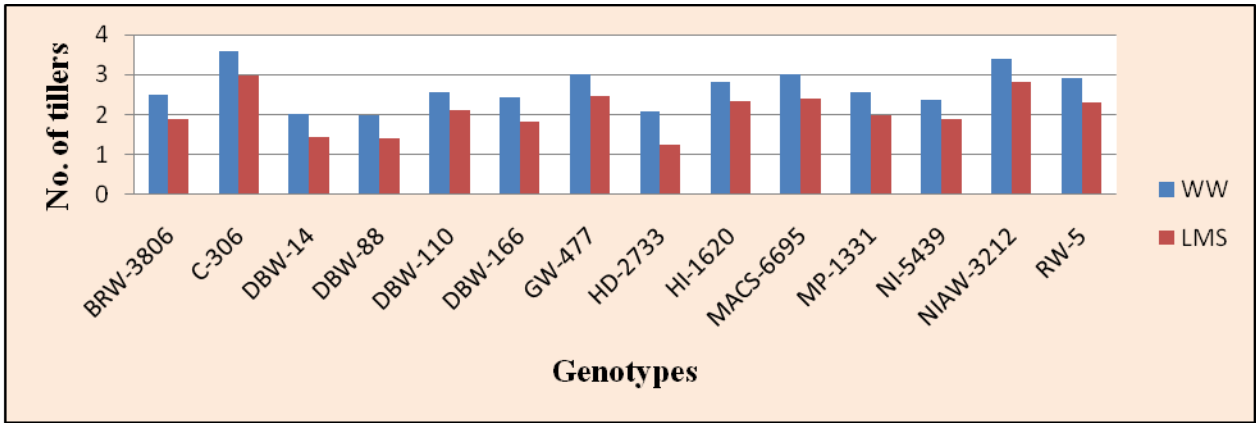

Fig.3 Influence of WW and LMS on spike length in wheat genotypes

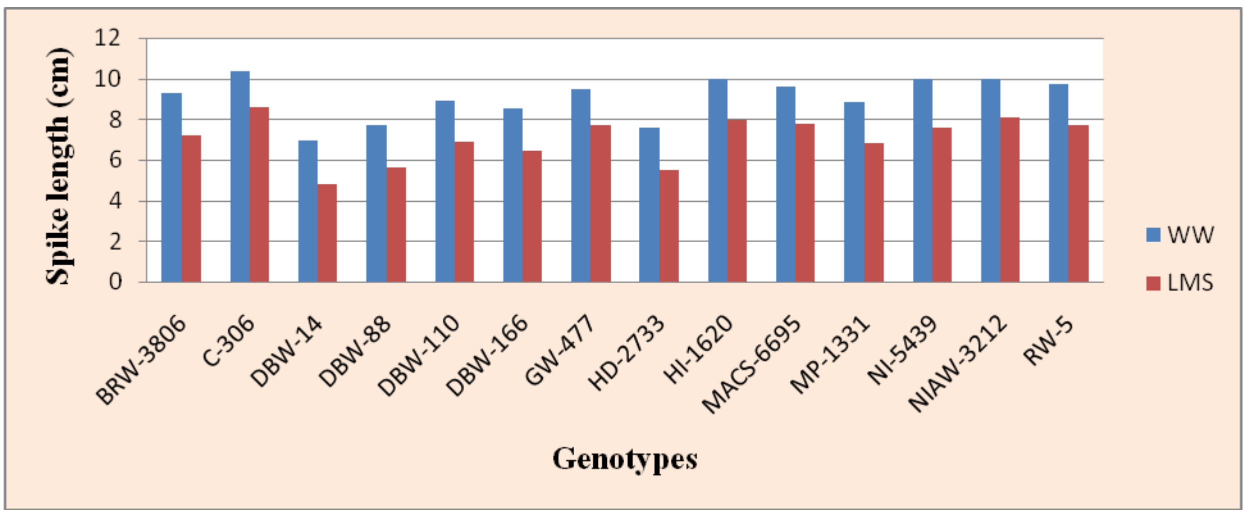

Fig.4 Influence of WW and LMS on days to 50 % flowering in wheat genotypes

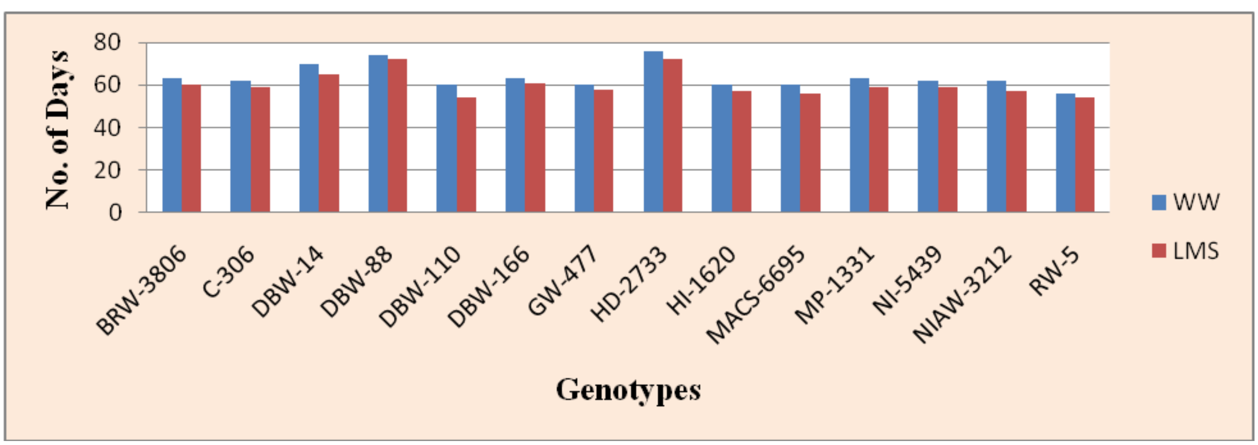

Fig.5 Influence of WW and LMS on days to maturity in wheat genotypes

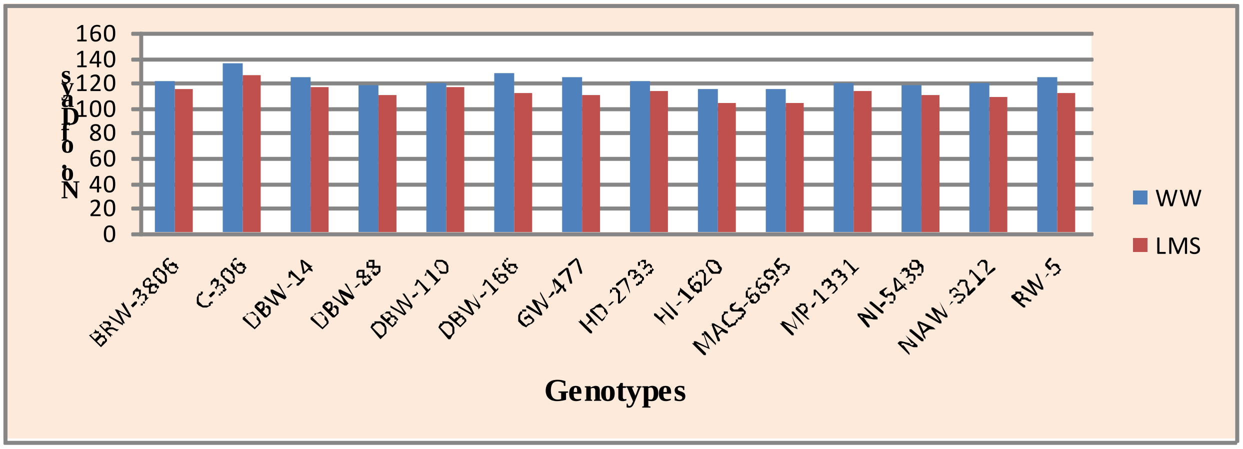

Fig.6 Influence of WW and LMS on No. of grains per spike in wheat genotypes

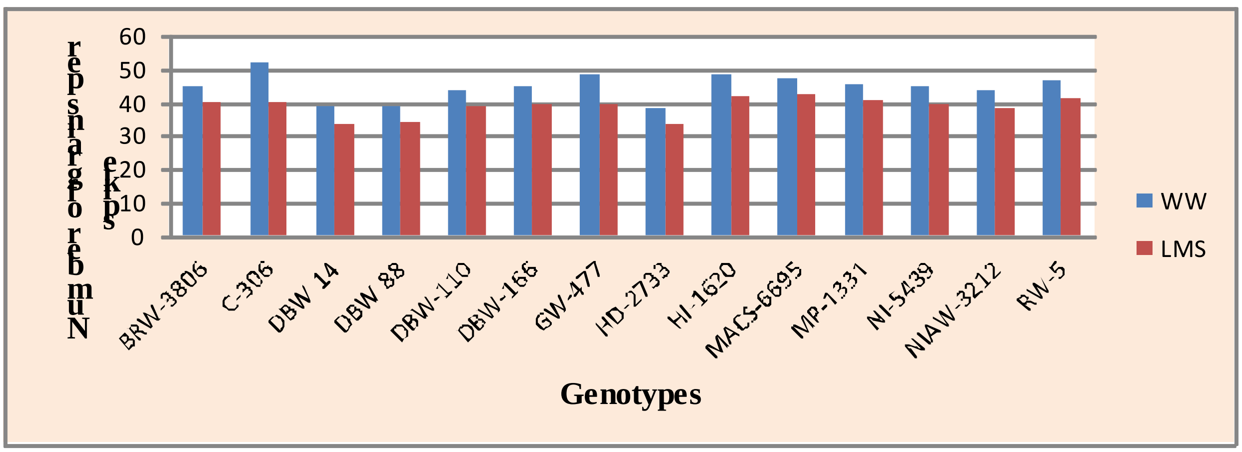

Fig.7 Influence of WW and LMS on grain weight per spike in wheat genotypes

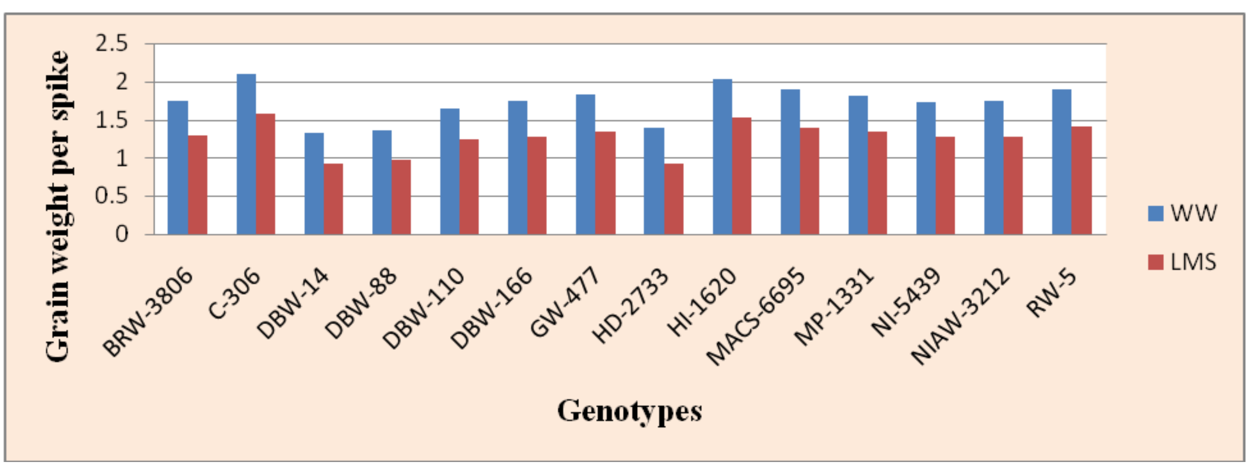

Fig.8 Influence of WW and LMS on 1000 grain in wheat genotypes

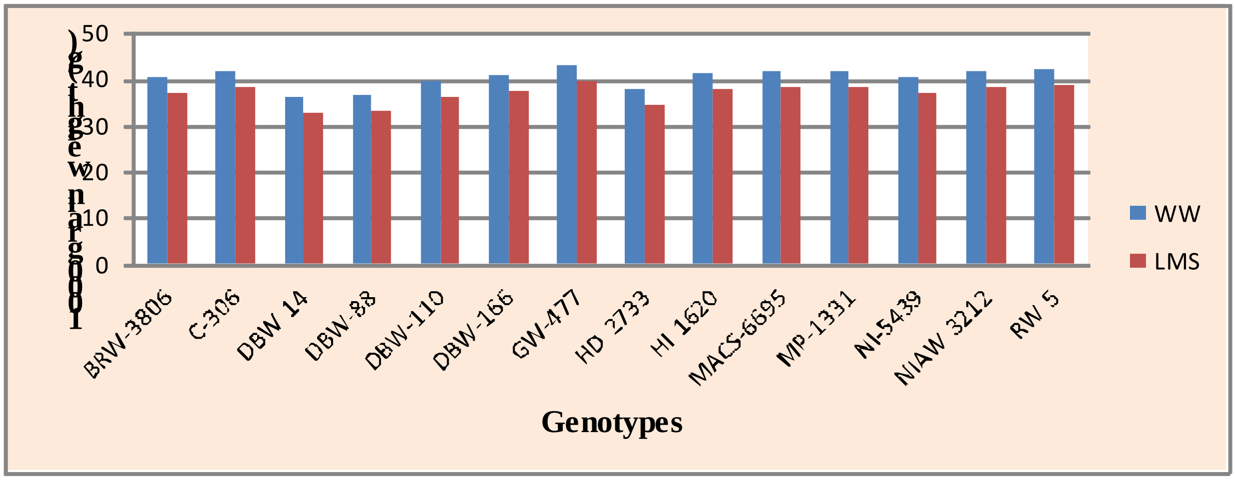

Fig.9 Influence of WW and LMS on dry matter accumulation in wheat genotypes

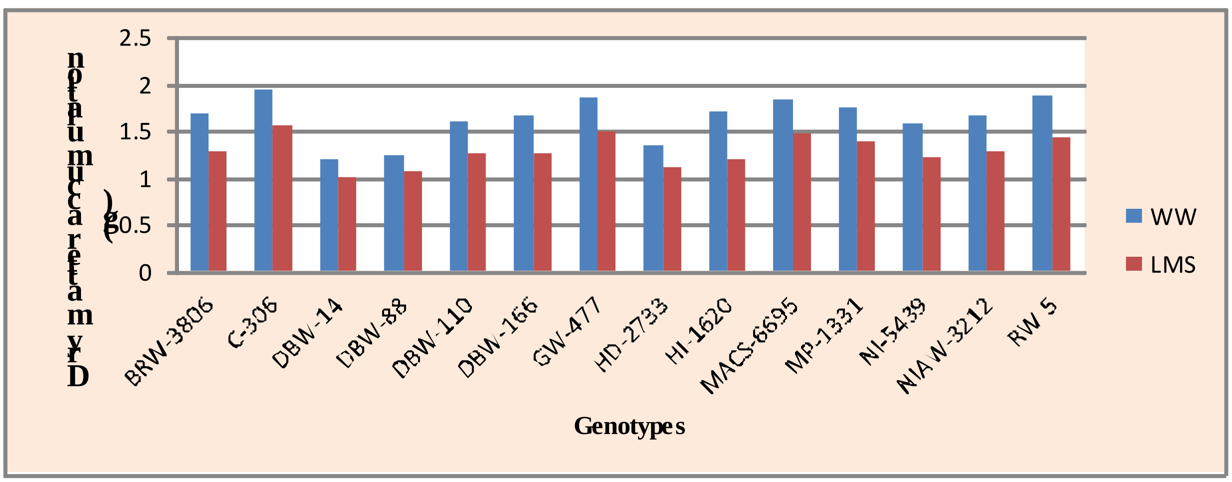

Table.1 Yield quality parameters as influenced by WW and LMS

SI. No.	Genotypes	Plant height (cm)		Number of tillers		Spike length (cm)		Days to 50 % flowering		Days to maturity		SPAD (30 DAS)		SPAD (60 DAS)		Number of grains per spike		Grain weight per spike (g)	
		WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS
1	BRW-3806	68.9	56.7	2.50	1.90	9.27	7.20	63	60	122	115	44.63	41.17	55.93	54.37	45.17	40.00	1.75	1.29
2	C-306	75.2	64.8	3.57	2.97	10.37	8.57	62	59	135	126	47.80	45.21	56.47	55.30	51.89	40.10	2.09	1.58
3	DBW-14	58.9	45.9	2.03	1.43	6.93	4.83	70	65	125	116	41.97	39.54	43.54	40.58	38.67	33.83	1.32	0.92
4	DBW-88	58.1	46.3	2.00	1.40	7.70	5.60	74	72	118	110	38.50	36.90	56.30	54.00	39.00	34.07	1.36	0.97
5	DBW-110	65.2	54.3	2.56	2.10	8.90	6.87	60	54	120	117	44.00	41.23	54.03	53.60	43.60	38.83	1.65	1.24
6	DBW-166	67.1	56.9	2.43	1.83	8.53	6.45	63	61	128	112	46.70	44.80	43.57	42.50	44.70	39.50	1.74	1.28
7	GW-477	69.9	54.4	3.00	2.47	9.50	7.73	60	58	124	110	45.77	44.43	54.33	52.97	48.33	39.37	1.83	1.35
8	HD-2733	57.0	45.4	2.07	1.25	7.57	5.50	76	72	122	113	35.20	35.18	45.03	43.30	38.33	33.43	1.39	0.92
9	HI-1620	68.5	57.8	2.83	2.33	10.00	7.93	60	57	115	104	45.90	44.53	54.40	53.93	48.67	42.20	2.03	1.52
10	HI-1628	63.6	53.4	2.50	1.90	8.60	6.57	64	59	122	113	42.20	42.97	50.77	49.77	43.00	36.07	1.58	1.13
11	HW-1235	60.1	49.8	2.40	1.80	9.00	6.57	62	55	117	112	41.70	41.77	47.77	49.17	41.33	36.20	1.49	1.07
12	JWS-810	63.1	52.4	2.80	1.90	8.40	6.33	64	60	115	106	42.90	41.87	48.67	49.90	43.00	38.10	1.56	1.12
13	K-1317	62.0	52.8	2.60	1.70	8.20	6.17	71	67	124	115	40.07	40.10	50.57	49.97	43.33	38.03	1.59	1.11
14	M-516	60.8	51.3	2.73	2.13	8.49	6.62	65	59	115	112	38.80	39.23	50.07	49.03	43.67	38.70	1.54	1.11
15	MACS-6695	70.0	59.0	3.00	2.40	9.60	7.77	60	56	115	104	47.30	44.63	55.40	52.33	47.38	42.41	1.90	1.41
16	MACS-6696	64.2	52.4	2.13	1.60	8.58	6.61	67	64	117	108	45.03	42.43	49.87	49.23	42.67	37.73	1.59	1.13
17	MP-1331	69.5	55.7	2.57	1.97	8.87	6.83	63	59	120	114	47.03	44.57	54.32	53.10	45.33	40.50	1.82	1.34

18	MP-3288	64.2	51.6	2.00	1.54	8.20	6.60	66	62	121	112	41.43	37.13	50.43	47.57	41.67	36.83	1.53	1.10
19	NI-5439	65.3	54.8	2.37	1.90	10.01	7.61	62	59	119	110	44.97	41.37	56.03	54.90	44.81	39.78	1.73	1.28
20	NIAW-3170	64.2	51.1	2.63	2.03	7.82	5.79	65	60	122	113	42.70	40.27	50.00	48.67	42.67	33.67	1.45	1.02
21	NIAW-3212	67.2	55.9	3.40	2.80	10.01	8.08	62	57	120	108	44.67	41.13	54.10	53.17	43.67	38.50	1.74	1.28
22	RIL-SI-38	64.3	54.9	2.20	1.33	8.47	6.09	64	61	122	113	45.50	40.03	54.00	48.41	44.28	37.51	1.66	1.18
23	RW-5	72.4	59.0	2.90	2.30	9.72	7.70	56	54	124	112	46.80	41.98	53.60	52.33	46.89	41.29	1.89	1.41
24	UAS-347	60.2	50.0	2.23	1.63	8.23	6.36	65	60	125	109	43.44	39.33	47.97	45.30	42.67	38.03	1.49	1.07
25	UAS-375	60.1	49.2	2.07	1.47	8.37	6.33	64	60	110	103	43.17	39.53	49.00	43.97	39.44	37.27	1.40	1.09
26	UAS-446	63.7	50.6	2.20	1.47	8.30	6.47	63	61	110	100	42.03	38.20	50.90	44.23	40.11	37.23	1.38	1.08
Mean		**64.8**	**53.3**	**2.53**	**1.91**	**8.75**	**6.74**	**64**	**60**	**120**	**111**	**43.47**	**41.14**	**51.43**	**49.83**	**43.63**	**38.05**	**1.64**	**1.19**
S.Em±		**3.31**	**2.98**	**0.21**	**0.10**	**0.29**	**0.28**	**1.81**	**1.66**	**3.07**	**2.97**	**2.01**	**1.39**	**1.77**	**1.71**	**1.50**	**1.12**	**0.08**	**0.07**
C.D. (P = 0.05)		**9.39**	**8.47**	**0.59**	**0.40**	**0.81**	**0.80**	**5.13**	**4.72**	**8.73**	**8.44**	**5.71**	**3.94**	**5.03**	**4.85**	**4.25**	**3.18**	**0.23**	**0.20**

Note: WW- Well water, **LMS**- Low Moisture Stress

Table.2 Yield quality parameters as influenced by WW and LMS

SI. No.	Genotypes	1000 grain weight (g)		Dry matter accumulation per plant (g)		Grain yield	
		WW	**LMS**	**WW**	**LMS**	**WW**	**LMS**
1	BRW-3806	40.59	37.09	1.69	1.29	4.56	1.78
2	C-306	41.61	38.11	1.94	1.55	5.45	2.02
3	DBW-14	36.03	32.53	1.20	1.01	3.44	1.39
4	DBW-88	36.64	33.14	1.24	1.07	3.54	1.57
5	DBW-110	39.58	36.08	1.61	1.25	4.29	1.97
6	DBW-166	40.78	37.28	1.67	1.26	4.53	1.91
7	GW-477	43.02	39.52	1.86	1.50	4.76	1.93
8	HD-2733	37.91	34.41	1.35	1.11	3.60	1.34
9	HI-1620	41.50	38.00	1.71	1.20	5.27	2.03
10	HI-1628	38.48	34.98	1.29	1.13	4.11	1.73
11	HW-1235	37.73	34.23	1.34	1.23	3.86	1.67
12	JWS-810	38.04	34.54	1.39	1.03	4.06	1.72
13	K-1317	38.61	35.11	1.42	1.06	4.14	1.64
14	M-516	37.12	33.62	1.46	1.23	4.01	1.71
15	MACS-6695	41.96	38.46	1.83	1.47	4.95	2.00
16	MACS-6696	39.08	35.58	1.29	1.07	4.13	1.73
17	MP-1331	41.84	38.34	1.74	1.38	4.72	1.86
18	MP-3288	38.51	35.01	1.43	1.11	3.98	1.70
19	NI-5439	40.44	36.94	1.57	1.21	4.50	1.94
20	NIAW-3170	37.83	34.33	1.41	1.05	3.78	1.62
21	NIAW-3212	41.70	38.20	1.66	1.28	4.53	1.88
22	RIL-SI-38	39.14	35.64	1.40	1.04	4.30	1.71
23	RW-5	42.09	38.59	1.88	1.43	4.92	1.92
24	UAS-347	37.81	34.31	1.34	1.04	3.88	1.67
25	UAS-375	37.41	33.91	1.44	1.08	3.65	1.69
26	UAS-446	38.21	34.71	1.41	1.11	3.60	1.63
Mean		39.37	35.87	1.52	1.20	4.25	1.76
S.Em±		1.30	2.13	0.09	0.08	0.21	0.08
C.D. (P = 0.05)		3.69	3.55	0.25	0.24	0.59	0.23

Note: WW- Well water, LMS- Low Moisture Stress

Table.3 Seed quality parameters as influenced by WW and LMS

SI. No.	Genotypes	Germination percentage		Root length		Shoot length		Seedling length (cm)		Seedling dry weight (mg0		Seedling vigour index I		Seedling vigour index II		EC (dSm^{-1})	
		WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS	WW	LMS
1	BRW-3806	95.7 (78.0) *	93.3 (75.0)	6.9	5.4	7.4	5.8	14.4	11.4	307.33	293.53	1375	1060	29	27	0.341	0.483
2	C-306	96.8 (79.7)	91.5 (73.0)	7.0	5.2	7.3	5.9	14.2	11.1	309.33	295.53	1375	1024	30	27	0.363	0.473
3	DBW-14	86.6 (68.5)	81.5 (64.5)	5.3	3.8	4.3	4.0	9.7	7.9	228.00	214.20	836	642	20	17	0.434	0.544
4	DBW-88	86.2 (68.2)	85.0 (75.3)	4.8	3.3	4.7	3.5	9.5	6.8	270.33	256.53	817	577	23	22	0.426	0.536
5	DBW-110	96.2 (78.7)	93.6 (72.0)	7.2	5.9	7.1	5.6	14.2	11.5	305.67	291.87	1368	1050	29	27	0.358	0.468
6	DBW-166	95.7 (78.0)	90.4 (67.2)	8.4	6.7	7.2	5.7	15.5	12.5	308.00	294.20	1480	1127	29	27	0.322	0.471
7	GW-477	95.9 (78.3)	93.9 (75.7)	6.2	4.8	7.8	6.3	14.1	11.5	312.00	298.20	1349	1039	30	28	0.337	0.462
8	HD-2733	83.0 (65.6)	80.7 (63.9)	5.1	3.7	4.4	3.0	9.4	6.7	262.33	248.53	779	541	22	20	0.433	0.543
9	HI-1620	96.9 (79.9)	95.8 (78.2)	7.5	6.0	7.0	5.5	14.4	11.2	306.83	279.07	1399	1095	30	27	0.347	0.457
10	HI-1628	85.6 (67.7)	83.8 (66.2)	6.6	5.1	6.0	4.5	12.6	9.6	256.00	242.20	1080	806	22	20	0.404	0.514
11	HW-1235	91.5 (73.1)	85.4 (67.5)	6.4	4.9	6.1	4.4	12.6	9.4	291.67	283.53	1150	800	27	24	0.419	0.529
12	JWS-810	94.5 (76.4)	85.8 (67.8)	6.5	5.0	6.3	4.8	12.9	9.9	307.00	230.87	1215	846	29	20	0.403	0.513
13	K-1317	88.1 (69.8)	86.3 (68.3)	6.6	5.1	6.1	4.3	12.7	9.4	291.00	277.20	1121	809	26	24	0.386	0.496
14	M-516	91.0 (72.6)	86.7 (68.6)	6.3	4.8	6.0	4.4	12.3	9.3	243.67	229.87	1121	805	22	20	0.380	0.490
15	MACS-6695	95.2 (77.3)	89.7 (71.2)	7.0	5.5	7.5	6.3	14.5	11.7	317.00	305.87	1380	1051	31	27	0.360	0.470
16	MACS-6696	91.7 (73.3)	84.2 (66.6)	6.5	5.0	6.0	4.2	12.5	9.2	297.33	276.20	1150	777	27	23	0.389	0.499
17	MP-1331	95.3 (77.5)	91.1 (72.6)	6.6	5.1	6.8	5.5	13.4	10.6	293.60	292.53	1279	959	28	27	0.369	0.479
18	MP-3288	87.2 (69.0)	84.5 (66.8)	6.5	5.0	5.6	3.9	12.2	9.0	306.33	225.53	1060	756	27	19	0.389	0.499
19	NI-5439	95.6 (77.8)	93.0 (74.7)	6.7	5.2	7.6	6.1	14.3	11.3	257.67	243.87	1371	1055	25	23	0.337	0.447
20	NIAW-3170	86.4 (68.4)	85.3 (67.5)	6.0	4.5	5.5	4.5	11.5	9.0	291.00	239.53	989	756	25	21	0.408	0.518
21	NIAW-3212	96.4 (79.1)	93.6 (75.3)	7.4	5.9	7.8	5.8	15.2	11.7	311.20	294.13	1462	1096	30	28	0.364	0.474
22	RIL-SI-38	92.5 (74.1)	89.5 (71.1)	6.1	4.6	6.2	4.7	12.3	9.3	294.33	236.20	1136	831	27	21	0.413	0.523
23	RW-5	95.9 (78.4)	90.6 (72.1)	7.8	6.3	7.0	5.5	14.8	11.8	310.00	276.73	1421	1070	30	25	0.365	0.475
24	UAS-347	91.8 (73.3)	85.0 (67.2)	6.5	5.0	5.7	5.1	12.1	10.1	240.33	215.87	1114	857	22	18	0.387	0.497
25	UAS-375	91.2 (72.7)	84.3 (66.7)	6.2	5.0	5.9	4.7	12.1	9.7	255.67	241.87	1104	821	23	20	0.360	0.470
26	UAS-446	90.5 (72.0)	85.2 (67.4)	6.3	5.0	6.0	4.6	12.3	9.6	234.00	220.47	1116	819	21	19	0.385	0.495
Mean		**92.1 (73.6)**	**88.1 (69.8)**	**6.5**	**5.1**	**6.4**	**5.0**	**12.9**	**10.0**	**284.91**	**261.70**	**1194**	**887**	**26**	**23**	**0.380**	**0.493**
S.Em±		**1.45**	**1.18**	**0.43**	**0.42**	**0.50**	**0.29**	**0.67**	**0.53**	**17.62**	**16.84**	**58.72**	**43.51**	**1.63**	**1.60**	**0.02**	**0.02**
C.D. (P = 0.05)		**6.10**	**5.0**	**1.76**	**1.78**	**2.12**	**1.23**	**2.83**	**2.23**	**74.19**	**70.91**	**247.1**	**183.1**	**6.86**	**6.75**	**0.09**	**0.09**

Seed quality parameters

Seed quality parameters after the harvest of the wheat crop were also significantly influenced by two moisture regimes. The wheat seeds of 26 genotypes from two moisture condition were significantly high in seedling vigour index I. The seeds from well water situation greater seedling vigour index I was noticed in the genotype DBW-166 (1480) followed by NIAW-3212 (1462) while, HD-2733 (779) noticed lowest. The seeds from stress condition, DBW-110 (1127) recorded highest SVI followed by NIAW-3212 (1096) while compared to DBW-88 (541). The seedling vigour index II was found significant in all the genotypes between two moisture regimes. An average seedling vigour index II was 26 and 23 in well water and stress condition respectively. As the seeds from well water situation greatest seedling vigour index II was recorded in the genotype MACS-6695 (31) followed by NIAW-3212 (30). While, the genotype DBW-14 (20) noticed lowest value of seedling vigour index II. As the seeds from stress condition, the genotype GW-477 (28) and NIAW-3212 (28) recorded highest seedling vigour index II followed by while compared to DBW-14 (17) (Table 3).

The increased in seedling vigour index I and II may be attributed higher germination percentage, root length, shoot length, seedling length and seedling dry weight in well water as well as in low moisture condition.

The seedling vigour index was reduced in low moisture condition as compared to well water condition. This may be due to eventual depletion of grain moisture which produces smaller endosperm and premature seed with potentially reduced germination percentage and seedling vigour. Similar findings were stated by Saini and Westagate (2000). The decrease in the shoot length, root length and seedling length might be due to a difficulty of elongation and cell division leading to type of tuberization. This lignification and the tuberization of the root system allow the plant to enter a slow-down state, while waiting for the conditions to become favourable again (Fraser *et al.,* 1990). Moisture stress probably perturbed the physiological mechanisms of the sensitive varieties more severely than the tolerant varieties. The seeds under stress decreased as compared to well water due to shriveled seeds and nutritive value lower and may be due to a difficulty of elongation and cell division. Similar findings supported by Saini and Westagate (2000). The decline in seedling dry weight was attributed due to length of the seedling was lesser with increased osmotic stress level finding was reported by Ming *et al.,* (2012); Moucheshi *et al*., (2012); Almadi *et al.,* (2012).

The electrical conductivity was significant in all the genotypes between two moisture regimes .All the genotypes of wheat from different moisture regimes found highly significant on electrical conductivity. The seeds from well water condition lowest electrical conductivity was recorded in the genotype DBW-166 (0.322 dSm^{-1}) while the highest value of electrical conductivity was recorded for the genotype DBW-14 (0.434 dSm^{-1}). As the seeds from stress condition the lowest value of electrical conductivity was found in the genotype GW-477 (0.462 dSm^{-1}) and premier value of electrical conductivity was noticed in DBW-14 (0.544 dSm^{-1}). The genotypes NI-5439, HI-1620, GW-477, C-306, DBW-110 and NIAW-3212 had maximum membrane stability index. Higher membrane stability reflects the existence of stress resistance mechanism in these genotypes. The results from electrolyte leakage measurements showed that membrane integrity was conserved for tolerant as compared to susceptible genotypes which are in supported Almeselmani *et al.,* (2012) that electrolyte leakage was related with drought tolerance.

In conclusion, the growth and yield attributing parameters such as days to 50 per cent flowering, days to maturity, plant height (cm), number of productive tillers per plant, number of grains per pike, 1000 grain weight (g), spike length (cm), grain weight per spike, SPAD chlorophyll meter reading and grain yield showed that the genotypes were highly significant for all the traits under well water condition as compared to drought indicating that the genotypes performed differentially from each other for all the traits. Finally, the genotypes C-306, BRW-3806, GW-477, HI-1620, MACS-6695, MP-1331, NIAW-3212, NI-5439 and RW-5 were found to have better combination of above mentioned characters and maximum yield was observed when compared to all the genotypes.

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