

Supplementary Table 1. Combined analysis of variance for grain yield and biochemical traits of the 58 triticale genotypes grown under normal irrigation and drought stress conditions in three growing seasons.

Source	DF	Mean squares												
		H ₂ O ₂	MDA	Chl_a	Chl_b	Chl T	Car	Protein	SOD	POD	CAT	APX	Proline	Grain Yield
Y	2	519** 4989.39*	5424.11**	3628.83* *	44.22ns	2484.68* *	561.23**	481.16ns	5231.26ns	14957.97**	1802.36**	135742.95*	3155.86*	1026103** 49783298*
I	1	*	26055.84**	3339.14* *	857.58**	6527.01* *	191.57**	110241.65**	255226.8**	232666.62**	4568.33**	543172.04**	26789.01**	*
Y×I	2	632.53**	2353.7*	67.36ns	2.3ns	97.51ns	1480.72* *	29.95ns	596.12ns	3473.1ns	456.97*	5348.38ns	15977.05**	82679.12**
B(Y×I)	12	18.38	556.51	29.56	13.44	42.4	14.98	472.77	3224.59	1703.02	77.38	28460.04	709.82	4436.65
G	57	8.8**	52.36**	21.64**	4.58**	25.01**	2.31**	58.25**	476.14**	282.63**	2.17**	4981.93**	34.79**	55766.89**
Y×G	114	4.23**	17.63**	13.37**	6.32**	20.42**	2.99**	34.34**	21.62**	113.78**	2.18**	3857.38**	48.07**	20269.07**
I×G	57	9.23**	6.04**	7.61**	2.6ns	9.44**	1.19**	24.7**	25.26**	228.92**	2.77**	364.8ns	40.73**	28988.97**
Y×I×G	114	3.18**	5.9**	3.9ns	2.54ns	5.08ns	1.09**	9.94ns	46.99**	113.73**	0.98ns	274.22ns	31.34**	10298.86ns
E	684	2.09	2.83	3.71	2.8	6.01	0.72	12.51	13.64	72.31	1.06	1258.04	6.39	10207.55
CV(%)		26.18	18.5	17.82	24.67	15.67	15.03	14.27	13.3	20.17	24.65	24.4	18.05	19.29

ns: Non-significant; * and **: Significant at 5% and 1% , respectively.

Y: year; E: error; I: Irrigation; B: Block; G: genotype; E: Error; CV: Coefficient of variation; H₂O₂: Hydrogen peroxide; MDA: Malondialdehyde; Ch: Chlorophyll; Car: Carotenoid; SOD: Superoxide dismutase; POD: Peroxidase; CAT: Catalase; APX: Ascorbic peroxidase.

Supplementary Table 2. List of the triticale genotypes originated from CIMMYT.

Number	Triticale Genotype	Pedigree
1	ELTCC-1	LIRON_2.5.DIS B5. 3. SPHD. PVN. YOGUI_ 6.4. KER_3. 6. BULL_10. MANATI_ 1. 7. ARDI_ 1. TOPO 1419. ERIZO_9.3.2 *KETTU_1
2	ELTCC-2	AR.SNP6.TARASCA 87_3. C, S10.3. URON_ 5. TATU_ 1.4. BULL_ 10. MANATI_ 1.3. ELK54. BUF_ 2. NIMIR_3.5. DAHBI_ 6.3. ARDI_ 1. TOPO 1419.ERIZO_9
3	ELTCC-4	BW32-1.CENT.SARDEV.7.LIRON_2.5.DIS B5. 3. SPHD. PVN. YOGUI_ 6.4. KER_ 3.6. BULL_ 10. MANATI_ 1.8. MERINO. JLO. REH. 3. HARE_267. 4. ARDI_ 4.5. PTR. CSTO. GLT.3. RHINO_4-1.4.HARE_7265.YOGUI_3.6.BULL_10.MANATI_1
4	ELTCC-7	DRIRA.2*CMH77A.1165.8.NIMIR_3.ERIZO_12.5.GC.3.733.EB.MPE.3.LAMB_3.4.BUF_2.6.POLLMER_2.7.FAHAD_8-2.9. ARDI_ 1. TOPO 1419. ERIZO_9_3. LIRON_1-1.4. FAHAD_ 4. FARAS_1
5	ELTCC-8	CMH80.1212.CMH81A.1239.3.YOGUI_3.ERIZO_11.ONA_2.POSS_1-2.7.LIRON_2.5.DIS B5. 3. SPHD. PVN. YOGUI_ 6.4. KER_ 3.6. BULL_ 10. MANATI_1
6	ELTCC-9	CMH82. 1082.ZEBRA 31.7.LIRON_2.5.DIS B5. 3. SPHD. PVN. YOGUI_ 6.4.KER_ 3.6.BULL_ 10.MANATI_ 1.8.LIRON_2.5.DIS B5.3.SPHD.PVN.YOGUI_6.4.KER_3.6.BULL_10.MANATI_1
7	ELTCC-10	FD-693. 2* FAHAD_ 4. POLLMER_ 4.3. POLLMER_ 2.1.4. FARAS. CMH84. 4414.6. RHINO_ 3. BULL_ 1-1.5. CMH77. 1135. CMH77A. 1165.2 *YOGUI_1.3.IBEX.4.JLO 97. CIVET
8	ELTCC-12	LIRON_2.5.DIS B5. 3. SPHD. PVN. YOGUI_ 6.4. KER_ 3.6. BULL_ 10. MANATI_ 1.7. DAHBI_ 6.3. ARDI_ 1. TOPO 1419. ERIZO_9
9	ELTCC-15	ARDI_1. TOPO 1419. ERIZO_9.3. LIRON_1 -1.4. FAHAD_4. FARAS_1.5. DAHBI.3. FAHAD-2-8*2. PTR.PND-T
10	ELTCC-18	HX87-244.HX87-255. 3. T1502_ WG. MOLOC_ 4. RHINO_ 3. BULL_1-1
11	ELTCC-19	HX87-244.HX87-255.5.PRESTO.2*TESMO_1.MUSX 603.4.ARD_1.TOPO 1419.ERIZO_9.3.SUSI_2
12	ELTCC-20	POPP1_2.TX93-57-7.7.LIRON_2.5.DIS B5.3.SPHD.PVN.YOGUI_6.4.KER_3.6.BULL_10.MANATI_1
13	ELTCC-21	TAHARA.TREAT.7.LIRON_2.5.DIS B5.3.SPHD.PVN.YOGUI_6.4.KER_3.6.BULL_10.MANATI_1

Number	Triticale Genotype	Pedigree
14	ELTCC-22	POLLMER_2.2.1*2.FARAS.CMH84.4414.4.DAHBI_6.3.ARD1_1.TOPO 1419.ERIZO_9
15	ELTCC-24	LIRON_2.5.DIS B5. 3. SPHD. PVN. YOGUI_6. 4. KER_3. 6. BULL_10. MANATI_1. 7. RHINO_3. BULL_1-1.8. BAT*2. BCN. CAAL. 3. ERIZO_7. BAGAL_2. FARAS_1
16	ELTCC-25	PRESTO. 2* TESMO_1. MUSX 603. 4. ARDI_1. TOPO 1419. ERIZO_9.3. SUSI_2.5. POPP1_1.6. BULL_10. MANATI_1*2. FARAS. CMH84. 4414
17	ELTCC-28	LIRON_2.5.DIS B5. 3. PHD. PVN. YOGUI_6.4. KER_3.6. BULL_10. MANATI_1*2.7. TUKURU
18	ELTCC-29	LIRON_2.5. DIS B5. 3. SPHD. PVN. YOGUI_6. 4. KER_3. 6. BULL_10. MANATI_1*2.7. TUKURU
19	ELTCC-30	LIRON_2.5. DIS B5. 3. SPHD. PVN. YOGUI_6. 4. KER_3.6. BULL_10. MANATI_1*2.7. TUKURU
20	ET-90-3	DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9/4/SONNI_3
21	ET-90-4	BAT*2/BCN//CAAL/3/ERIZO_7/BAGAL_2//FARAS_1
22	ET-90-5	ARDI_1/TOPO 1419//ERIZO_9/3/LIRON_1-1/4/FAHAD_4/FARAS_1/5/CT775.81/ARDI_1//ANOAS_1
23	ET-90-6	DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9/5/804/BAT/3/MUSX/LYNX//STIER_12-3/4/VARSA_3-1
24	ET-90-7	DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9/4/NIMIR_1/HARE_265//ERIZO_9/5/RHINO 1RS.1DL 3384/2*VICUNA_4
25	ET-90-8	POLLMER_2.2.1//FARAS/CMH84.4414/4/LAD 622.81/PORSAS_4-1/3/ARDI_1/TOPO 1419//ERIZO_9
26	ET-90-9	PRESTO//2*TESMO_1/MUSX 603/4/ARDI_1/TOPO 1419//ERIZO_9/3/SUSI_2/5/AR/SNP6//TARASCA 87_2/C,S10/3/PORSAS...
27	ET-90-10	PRESTO//2*TESMO_1/MUSX 603/4/ARDI_1/TOPO 1419//ERIZO_9/3/SUSI_2/5/AR/SNP6//TARASCA 87_2/C,S10/3/PORSAS...

Number	Triticale Genotype	Pedigree
28	ET-90-11	DAHBI/3/FAHAD_8-2*2//PTR/PND-T/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1
29	ET-90-12	PRESTO//2*TESMO_1/MUSX 603/4/ARDI_1/TOPO 1419//ERIZO_9/3/SUSI_2/5/AR/SNP6//TARASCA 87_2/C,S10/3/PORSAS...
30	ET-90-13	AR/SNP6//TARASCA 87_3/C,S10/3/URON_5/TATU_1/4/POLLMER_4//2*ERIZO_10/BULL_1-1/5/POP_WG
31	ET-90-14	CHEN/CENT.ELVON/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/8/PRESTO//2*TESMO...
32	ET-90-15	CMH73A.497/3*MEXI75//CENT.BRAZIL/5/ERIZO_12/2*NIMIR_3/3/Z9/ZEBRA 31//ASAD/4/FOCA_2- 1/6/PRESTO//2*TESMO...
33	ET-90-16	BW32-1/CENT.SARDEV/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/8/MERINO/JLO...
34	ET-90-17	PAVON/CENT.SARDEV/6/CMH77A.1024/2*YOGUI_1//CIVET#2/3/JLO 97/CIVET/4/MANATI_1/5/ERIZO_11/YOGUI_...
35	ET-90-18	TURACO/CENT.SARDEV/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/8/LIRON...
36	ET-90-19	HX87-244/HX87-255/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1
37	ET-90-20	HX87-244/HX87-255/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1
38	ET-85-11	PRESTO//2*TESMO_1/MUSX 603/3/ARDI_1/TOPO 1419//ERIZO_9/4/MUSX/LYNX/
39	ET-92-3	LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/7/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
40	ET-92-4	LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/7/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
41	ET-92-5	HX87-244/HX87-255/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1

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42	ET-92-6	BW32-1/CENT.SARDEV/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/8/MERINO/JLO//REH/3...
43	ET-92-7	BW32-1/CENT.SARDEV/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/8/MERINO/JLO//REH/3...
44	ET-92-8	BW32-1/CENT.SARDEV/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/8/MERINO/JLO//REH/3...
45	ET-92-9	LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/7/83 TR 1- 11/3/150.83//2*TESMO_1/MUSX 603/4/150.83...
46	ET-92-10	LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/7/83 TR 1- 11/3/150.83//2*TESMO_1/MUSX 603/4/150.83...
47	ET-92-12	HX87-244/HX87-255/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1
48	ET-92-13	HX87-244/HX87-255/7/LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1
49	ET-92-14	POPP1_2/TAHARA/4/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
50	ET-92-15	POPP1_2/TAHARA/4/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
51	ET-92-16	POLLMER_2.2.1*2//FARAS/CMH84.4414/4/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
52	ET-92-17	POLLMER_2.2.1//FARAS/CMH84.4414/5/PRESTO//2*TESMO_1/MUSX 603/4/ARDI_1/TOPO 1419//ERIZO_9/3/SUSI_2
53	ET-92-18	POLLMER_2.2.1*2//FARAS/CMH84.4414/4/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
54	ET-92-19	POLLMER_2.2.1*2//FARAS/CMH84.4414/4/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9
55	ET-92-20	LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/7/RHINO_3/BULL_1- 1/8/BAT*2/BCN//CAAL/3/ERIZO_7/BAGAL_2//FARAS_1
56	Juanillo*	Juanillo92
57	Sanabad*	RONDO/BANT_5//ANOAS_2/3/VICUNA_4

Number	Triticale Genotype	Pedigree
58	Paj*	ET-92-2: LIRON_2/5/DIS B5/3/SPHD/PVN//YOGUI_6/4/KER_3/6/BULL_10/MANATI_1/7/DAHBI_6/3/ARDI_1/TOPO 1419//ERIZO_9

*: Juanillo, Sanabad, and Paj are triticale cultivars in Iran.