

Table S1. List of maize inbred lines used in the study.

Entry number	Genotype	Source	Type	Entry number	Genotype	Source	Type
1	CLHP00306	CIMMYT-Zimbabwe	ProVA-experimental	26	CLHP0156	CIMMYT-Zimbabwe	ProVA-experimental
2	CLHP0310	CIMMYT-Zimbabwe	ProVA-experimental	27	CLHP0005	CIMMYT-Zimbabwe	ProVA-experimental
3	CLHP0302	CIMMYT-Zimbabwe	ProVA-experimental	28	CLHP0003	CIMMYT-Zimbabwe	ProVA-experimental
4	CLHP0312	CIMMYT-Zimbabwe	ProVA-experimental	29	CLHP0049	CIMMYT-Zimbabwe	ProVA-experimental
5	CLHP0334	CIMMYT-Zimbabwe	ProVA-experimental	30	CLHP0020	CIMMYT-Zimbabwe	ProVA-experimental
6	CLHP00478	CIMMYT-Zimbabwe	ProVA-experimental	31	CML486	CIMMYT-Zimbabwe	ProVA-experimental
7	CLHP00286	CIMMYT-Zimbabwe	ProVA-experimental	32	CML451	CIMMYT-Zimbabwe	ProVA-experimental
8	CLHP0303	CIMMYT-Zimbabwe	ProVA-experimental	33	CML304	CIMMYT-Zimbabwe	ProVA-experimental
9	CLHP00307	CIMMYT-Zimbabwe	ProVA-experimental	34	TZM114	IITA-Nigeria	ProVA-experimental
10	CLHP00322	CIMMYT-Zimbabwe	ProVA-experimental	35	TZM116	IITA-Nigeria	ProVA-experimental
11	CLHP00378	CIMMYT-Zimbabwe	ProVA-experimental	36	TZM25	IITA-Nigeria	ProVA-experimental
12	CLHP00432	CIMMYT-Zimbabwe	ProVA-experimental	37	TZM113	IITA-Nigeria	ProVA-experimental
13	CLHP0331	CIMMYT-Zimbabwe	ProVA-experimental	38	TZM1225	IITA-Nigeria	ProVA-experimental
14	CLHP0343	CIMMYT-Zimbabwe	ProVA-experimental	39	TZM1224	IITA-Nigeria	ProVA-experimental
15	CLHP0350	CIMMYT-Zimbabwe	ProVA-experimental	40	TZM112	IITA-Nigeria	ProVA-experimental
16	CLHP0326	CIMMYT-Zimbabwe	ProVA-experimental	41	TZM117	IITA-Nigeria	ProVA-experimental
17	CLHP0310	CIMMYT-Zimbabwe	ProVA-experimental	42	TZM1223	IITA-Nigeria	ProVA-experimental
18	CLHP0352	CIMMYT-Zimbabwe	ProVA-experimental	43	TZM106	IITA-Nigeria	ProVA-experimental
19	CLHP00294	CIMMYT-Zimbabwe	ProVA-experimental	44	TZM109	IITA-Nigeria	ProVA-experimental
20	CLHP0364	CIMMYT-Zimbabwe	ProVA-experimental	45	TZM1248	IITA-Nigeria	ProVA-experimental
21	CLHP0404	CIMMYT-Zimbabwe	ProVA-experimental	46	TZM1276	IITA-Nigeria	ProVA-experimental
22	CLHP0221	CIMMYT-Zimbabwe	ProVA-experimental	47	CML488	ARC-South Africa	Drought tolerant
23	CLHP0058	CIMMYT-Zimbabwe	ProVA-experimental	48	CML550	ARC-South Africa	Drought tolerant
24	CLHP0022	CIMMYT-Zimbabwe	ProVA-experimental	49	K64R	ARC-South Africa	Drought tolerant
25	CLHP0113	CIMMYT-Zimbabwe	ProVA-experimental	50	CML569	ARC-South Africa	Drought tolerant

Table S2. Monthly weather data during the greenhouse trials (Env & Env2) at UKZN and field trials (Env3 & Env4) at Ukulinga and Makhatini research stations in South Africa.

Environment (Env)	Year	Month	Tmax (°C)	Tmin (°C)	RHm (%)	ETO (mm)	Rainfall (mm)
1	2017	January	32.64	16.71	75.97	106.16	---
		February	30.59	17.18	77.50	105.96	---
		March	28.43	16.34	79.09	98.31	---
		April	30.83	15.55	77.80	102.98	---
		May	28.54	12.12	68.04	95.17	---
2	2017	May	28.54	12.12	68.04	75.17	---
		June	30.59	16.71	78.50	94.98	---
		July	27.83	17.18	76.00	74.86	---
		August	28.31	16.34	74.22	76.89	---
		September	31.81	15.55	70.56	89.46	---
3	2017	April	28.55	16.42	76.18	103.91	53.0
		May	23.36	17.42	76.86	90.12	11.33
		June	18.36	9.76	51.91	71.36	0.00
		July	19.30	13.65	45.03	68.34	0.00
		August	24.15	17.11	34.55	88.31	0.00
4	2018	May	32.33	20.12	72.13	99.13	2.20
		June	26.31	13.98	52.13	78.24	0.00
		July	27.08	17.23	44.13	68.33	0.00
		August	28.30	19.88	32.33	78.12	0.00
		September	32.12	21.22	25.28	84.17	0.00

Tmax - average maximum temperature, Tmin - average minimum temperature, RHm - mean relative humidity, ETO - average total relative evapo-transpiration. Soil type at Ukulinga and Makhatini research station are dominantly black clay loam .

Table S3. Mean performance of all the genotypes evaluated under drought (S) and non-stressed (W) conditions across four environments ranked by the selection index (SI) values.

Gen	SI	BCC	GY		ASI		DA		EPP		RL		Gs		SG		CC		PC	
			S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
1	0.75	4.22	1.00	2.23	12.75	2.38	74.88	71.25	1.63	2.50	27.50	1.63	26.60	330.11	37.50	10.00	22.21	41.93	175.82	24.88
2	0.79	1.16	1.00	2.34	7.50	1.75	60.88	75.25	2.00	2.38	35.00	2.75	21.07	428.81	32.50	10.00	21.90	40.91	157.09	27.87
3	0.36	2.28	0.79	1.34	12.50	3.50	75.63	79.88	1.63	2.13	38.75	4.13	50.73	367.75	38.75	10.00	20.45	42.27	109.66	37.97
4	0.50	2.03	0.87	1.71	6.13	1.25	61.63	77.75	1.75	2.00	20.00	3.88	46.98	312.98	32.50	11.25	22.47	42.09	157.11	24.96
5	0.46	3.44	0.78	1.74	10.88	1.25	71.63	85.50	1.75	2.25	50.00	3.63	76.29	387.19	71.25	10.00	15.56	40.07	150.45	34.41
6	0.51	3.67	1.00	1.51	6.50	2.50	59.50	82.75	2.13	1.88	16.25	2.75	57.78	280.17	28.75	13.75	22.70	40.16	151.33	27.05
7	0.58	2.61	1.00	1.73	4.63	2.25	79.25	80.75	2.00	2.38	18.75	3.88	34.79	376.43	25.00	10.00	19.79	40.66	205.98	35.33
8	0.70	2.26	1.00	2.08	4.75	2.13	73.63	78.38	2.00	2.13	12.50	1.88	35.53	353.66	33.75	13.75	20.99	37.17	193.53	25.57
9	0.51	2.69	1.00	1.53	4.00	2.00	74.38	82.75	2.63	1.88	21.25	2.25	50.20	262.63	20.00	10.00	24.12	40.44	196.74	22.90
10	0.42	1.92	0.79	1.58	8.50	2.38	79.00	72.25	1.75	2.13	40.00	3.63	56.78	432.82	48.75	15.00	16.06	41.67	162.30	39.84
11	0.48	4.22	0.85	1.67	5.00	2.50	75.13	66.25	2.25	2.13	21.25	3.75	22.62	442.36	31.25	13.75	20.64	38.39	178.92	30.15
12	0.27	2.88	0.70	1.16	10.63	1.63	75.63	77.88	1.38	1.63	58.75	2.13	66.85	314.55	66.25	13.75	16.04	38.04	139.47	28.92
13	0.83	0.79	0.98	2.51	6.50	2.50	69.88	76.88	2.13	2.75	30.00	2.25	19.92	435.79	22.50	10.00	28.66	42.15	113.43	30.28
14	0.32	0.64	0.82	1.17	21.25	2.00	56.50	61.88	1.00	1.88	72.50	4.75	70.69	345.79	87.50	12.50	10.86	34.87	112.30	29.40
15	0.38	2.89	0.87	1.30	13.88	2.25	62.00	70.88	1.00	1.25	62.50	2.88	41.00	373.59	86.25	11.25	10.72	39.41	88.42	29.82
16	0.69	0.60	1.00	2.04	4.75	1.00	73.88	77.50	2.50	2.88	16.25	2.50	30.61	496.53	20.00	13.75	24.16	38.02	208.50	38.38
17	0.69	1.59	0.99	2.07	4.00	2.25	80.13	74.50	1.88	2.25	26.25	3.25	40.64	413.58	26.25	10.00	19.23	44.53	178.11	40.96
18	0.47	1.62	0.86	1.63	11.88	1.38	69.13	66.25	1.25	2.38	58.75	2.88	44.23	353.90	85.00	13.75	9.43	38.21	96.44	37.11
19	0.31	1.81	0.75	1.21	12.38	3.50	74.88	78.00	1.13	2.13	58.75	2.50	73.76	349.29	81.25	11.25	15.14	38.61	100.77	27.59
20	0.23	3.39	0.69	0.97	-9.88	0.88	80.88	72.00	1.13	1.75	87.50	3.50	68.86	338.51	88.75	12.50	10.07	34.20	95.98	28.24
21	0.34	1.97	0.75	1.32	11.38	1.13	78.63	81.25	1.25	2.13	78.75	4.00	66.66	384.13	71.25	12.50	16.32	41.94	103.21	31.60
22	0.35	0.72	0.76	1.37	-1.25	1.75	74.75	75.38	1.63	2.13	45.00	2.75	55.28	403.85	35.00	10.00	22.82	35.47	136.97	35.27
23	0.34	2.57	0.75	1.36	9.88	2.63	76.75	78.00	1.00	1.38	68.75	3.50	52.87	360.95	80.00	15.00	16.49	39.85	138.78	33.32
24	0.77	2.73	1.00	2.27	6.88	0.75	77.63	79.00	1.88	2.75	27.50	2.00	26.03	420.63	31.25	11.25	19.18	44.45	148.93	33.20
25	0.58	1.67	0.85	2.01	4.75	2.63	79.50	75.13	1.75	2.13	22.50	2.88	44.85	273.27	27.50	11.25	23.01	38.75	184.89	28.27
26	0.61	0.71	0.93	1.95	8.13	1.38	78.63	77.13	1.25	2.75	26.25	3.88	54.21	465.58	37.50	11.25	16.93	40.37	169.90	38.00
27	0.94	0.95	1.00	2.79	16.38	2.13	63.88	81.13	1.38	3.00	66.25	2.13	75.47	447.45	86.25	10.00	13.60	44.13	91.78	28.23
28	0.33	1.29	0.81	1.19	15.13	2.75	78.25	71.75	1.00	2.13	70.00	2.50	73.64	267.79	75.00	11.25	11.51	39.54	119.32	31.56
29	0.55	1.64	0.91	1.80	11.88	2.50	76.63	73.13	1.13	1.63	65.00	3.00	72.47	268.94	63.75	12.50	14.96	40.76	122.25	30.07
30	0.54	3.05	0.98	1.62	17.38	2.88	70.25	73.00	1.25	2.13	70.00	3.00	63.01	269.70	61.25	10.00	18.45	39.64	113.45	32.68
31	0.69	1.20	0.92	2.22	11.88	2.63	74.88	73.50	1.75	2.50	37.50	2.50	29.51	330.46	41.25	10.00	19.04	40.33	230.63	29.00
32	0.31	2.92	0.81	1.15	12.13	2.88	77.50	74.13	1.00	2.50	66.25	3.88	92.69	376.40	85.00	12.50	12.19	36.62	89.56	35.81

Gen	SI	BCC	GY		ASI		DA		EPP		RL		Gs		SG		CC		PC	
			S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
33	0.44	2.25	0.98	1.32	12.25	2.38	77.75	78.13	1.00	2.00	62.50	2.75	69.14	209.41	67.50	11.25	14.42	40.52	80.29	43.68
34	0.54	0.99	0.99	1.61	5.75	2.25	61.00	69.63	1.63	2.38	25.00	3.63	47.61	383.53	36.25	10.00	28.08	43.86	171.24	32.99
35	0.66	1.41	1.00	1.97	-0.63	2.38	61.25	71.38	2.63	2.50	22.50	3.50	27.13	470.56	40.00	11.25	15.75	40.98	167.08	40.77
36	0.39	1.43	0.80	1.43	11.88	2.13	74.38	84.00	1.38	2.38	40.00	2.25	116.93	393.17	71.25	10.00	16.05	40.78	142.15	41.84
37	0.53	2.65	0.90	1.74	7.88	0.63	60.50	71.25	1.75	2.38	27.50	3.50	22.48	422.92	55.00	12.50	15.14	39.21	127.88	33.67
38	0.64	2.76	0.91	2.08	0.50	1.38	63.50	71.38	2.38	2.75	30.00	2.50	20.14	347.01	47.50	12.50	16.73	43.74	140.98	28.30
39	0.58	1.69	0.91	1.90	6.88	1.75	62.00	64.63	1.75	2.25	21.25	4.00	17.52	292.60	43.75	10.00	21.73	39.95	175.97	23.09
40	0.54	2.81	0.95	1.67	8.25	2.13	63.38	71.38	1.50	2.75	27.50	3.88	44.04	424.38	35.00	10.00	20.29	43.64	192.63	30.32
41	0.58	0.88	1.00	1.73	7.50	1.75	61.50	70.38	2.13	2.38	27.50	3.00	38.58	371.18	41.25	12.50	21.59	36.87	207.51	34.29
42	0.68	2.64	0.95	2.12	5.25	0.25	53.88	71.75	2.50	2.63	13.75	3.50	24.12	406.85	27.50	13.75	24.33	39.06	165.51	34.52
43	0.66	1.40	1.00	1.96	7.75	2.00	59.75	76.25	2.25	2.88	30.00	1.88	28.01	405.87	41.25	10.00	21.13	40.63	190.91	32.54
44	0.60	2.53	0.94	1.88	5.50	1.38	58.00	64.88	2.13	2.00	16.25	3.00	37.85	361.02	30.00	10.00	25.19	35.24	213.15	25.96
45	0.58	1.65	0.98	1.74	14.25	2.75	71.50	79.38	1.50	2.38	50.00	2.88	76.46	381.35	66.25	10.00	16.98	36.51	124.21	27.19
46	0.37	0.87	0.75	1.48	5.75	1.50	59.13	71.75	2.38	2.50	18.75	3.88	29.75	415.15	33.75	11.25	19.75	39.73	187.66	35.32
Drought Tolerant non-provitamin A checks																				
47	0.32		0.73	1.32	6.88	2.50	63.75	69.25	1.63	1.50	50.00	3.38	27.14	278.62	40.00	13.75	25.09	36.88	176.57	25.87
48	0.34		0.71	1.41	14.38	1.13	55.75	81.50	1.13	1.88	70.00	1.88	91.08	379.63	65.00	13.75	20.29	42.17	113.62	35.10
49	0.53		0.83	1.89	15.13	1.50	55.00	82.25	1.00	2.25	66.25	2.25	69.95	313.70	78.75	13.75	14.98	38.53	90.54	22.99
50	0.71		0.94	2.26	9.75	1.38	72.25	81.25	2.13	2.63	32.50	3.50	58.28	524.28	30.00	10.00	26.71	40.27	171.68	34.31
Mean		2.05	0.88	1.72	8.56	1.97	69.40	75.03	1.68	2.24	40.95	3.04	49.78	368.94	50.18	11.60	18.80	39.88	149.23	31.83
CV		3.65	7.87	5.33	17.96	63.75	1.93	5.51	20.69	23.40	10.85	27.36	1.38	16.11	13.26	26.78	4.28	9.09	20.24	13.45
LSD		0.12	0.07	0.09	1.52	1.24	1.32	4.08	0.34	0.52	4.38	0.82	0.68	58.60	6.56	3.06	0.79	3.58	29.79	4.22

Table S4. Pearson's correlation coefficients (r) describing association of four environments grouped according to water regimes.

	Greenhouse non-stressed	Greenhouse stressed	Field non-stressed	Field stressed
Greenhouse non-stressed	1			
Greenhouse stressed	0.553***	1		
Field non-stressed	0.751***	0.456*	1	
Field stressed	0.502*	0.643***	0.585***	1

*p < 0.05, **p < 0.001.

Table S5. Genetic correlation describing association of traits under S (lower diagonal) and W (upper diagonal) conditions.

		Non-stressed (W)								
		GY	ASI	DA	EPP	RL	Gs	SEN	CC	PC
Water stressed (S)	GY	1	-0.190	-0.163	0.912***	-0.334	0.974***	-0.842***	0.996***	-0.018
	ASI	-0.352*	1	0.205	-0.040	-0.592***	-0.333	-0.459	0.568**	-0.617
	DA	-0.146***	-0.139	1	-0.092	-0.013	0.769***	-0.636***	0.786	0.535
	EPP	0.909***	-0.589***	-0.243*	1	0.054	0.986***	-0.696***	0.459***	0.519***
	RL	-0.934***	0.472***	0.180	-0.882***	1	0.096	0.402*	-0.476*	0.121
	Gs	-0.715***	0.493***	0.252	-0.735***	0.732***	1	0.371***	0.125	0.632***
	SEN	-0.918***	0.558***	0.054	-0.901***	0.958***	0.700***	1	-0.015	0.625
	CC	0.738***	-0.375**	-0.247	0.707***	-0.749***	-0.523***	-0.896***	1	0.291
	PC	0.829***	-0.450**	-0.074	0.804***	-0.869***	-0.627***	-0.423***	0.445***	1

GY - grain yield, ASI - anthesis-silking interval, CC - chlorophyll content, DA - days to anthesis, EPP - ears per plant, Gs - stomatal conductance, RL - leaf rolling, PC - proline content, SEN - leaf senescence, *, **, and *** indicate level of significance of the correlation at p < 0.05, p < 0.01 and p < 0.001, respectively.