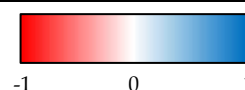


**Table S1.** Correlation coefficient matrix for wheat production and grain yield components among sixty wheat genotypes grown under elevated CO<sub>2</sub> and high temperature.

	Stalk	Chaff	Grain yield	Grain number	Ear number	Grain weight	GYE	GNE	HI	Height
Aboveground	<b>0.90</b>	<b>0.77</b>	<b>0.88</b>	<b>0.76</b>	<b>0.57</b>	-0.11	<b>0.31</b>	<b>0.31</b>	0.00	<b>0.15</b>
Stalk		<b>0.60</b>	<b>0.64</b>	<b>0.57</b>	<b>0.47</b>	-0.10	<b>0.15</b>	<b>0.19</b>	<b>-0.31</b>	<b>0.28</b>
Chaff			<b>0.60</b>	<b>0.51</b>	<b>0.47</b>	0.00	<b>0.16</b>	0.11	<b>-0.15</b>	0.07
Grain yield				<b>0.85</b>	<b>0.54</b>	-0.11	<b>0.45</b>	<b>0.43</b>	<b>0.42</b>	0.03
Grain number					<b>0.54</b>	<b>-0.58</b>	<b>0.32</b>	<b>0.61</b>	<b>0.35</b>	-0.06
Ear number						-0.16	<b>-0.44</b>	<b>-0.29</b>	0.10	0.02
Grain weight							0.05	<b>-0.54</b>	-0.02	<b>0.19</b>
GYE								<b>0.78</b>	<b>0.37</b>	0.00
GNE									<b>0.32</b>	-0.10
HI										<b>-0.27</b>

GNE: grain number ear<sup>-1</sup>; GYE: grain yield ear<sup>-1</sup>; HI: harvest index.

Data was generated from Spearman correlation analysis. Values in bold represent significance ( $p < 0.05$ ).

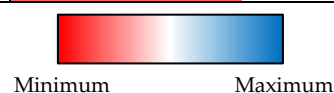


**Table S2.** Average days from sowing to ear emergence, anthesis and maturity developmental stages among sixty wheat genotypes grown under elevated CO<sub>2</sub> and high temperature.

Genotype	Ee	Anthesis	Maturity	Genotype	Ee	Anthesis	Maturity	Genotype	Ee	Anthesis	Maturity
150	58	60	95	16	64	65	99	35	57	60	95
74	65	66	99	22	63	65	98	4	60	62	96
23	68	69	102	13	63	64	95	26	59	61	95
8	65	66	97	92	66	67	102	48	59	62	96
76	64	65	99	117	62	64	93	99	65	65	96
15	60	63	97	79	61	63	96	53	57	59	94
73	61	63	95	33	59	61	96	59	61	63	97
21	64	66	101	69	64	65	98	83	66	67	102
9	65	66	97	31	57	61	95	10	63	64	98
118	57	60	92	19	66	66	100	65	61	63	94
81	63	65	97	114	62	63	93	42	61	63	95
77	65	66	99	97	62	63	94	107	61	63	96
115	57	60	92	113	66	67	97	11	60	62	96
87	65	66	99	25	60	62	96	58	65	66	100
29	60	62	99	18	59	61	93	5	58	60	93
46	63	64	95	70	66	67	102	43	61	62	98
119	63	65	96	63	60	61	94	94	63	65	97
6	60	62	97	105	63	65	98	95	58	60	93
110	64	65	98	88	65	66	99	61	62	64	95
71	62	64	96	93	60	61	94	41	59	61	96

Ee: Ear emergence; GNE: grain number ear<sup>-1</sup>; GYE: grain yield ear<sup>-1</sup>; HI: harvest index.

Data was generated from Spearman correlation analysis. Values in bold represent significance ( $p < 0.05$ ).

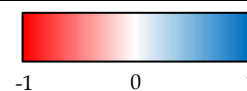


**Table S3.** Correlation coefficient matrix for average wheat production and grain yield components with days from sowing to ear emergence, anthesis and maturity developmental stages among sixty wheat genotypes grown under elevated CO<sub>2</sub> and high temperature.

	Ear emergence	Anthesis	Maturity
<b>Aboveground</b>	-0,25	<b>-0,29</b>	<b>-0,33</b>
<b>Stalk</b>	-0,12	-0,16	<b>-0,31</b>
<b>Chaff</b>	<b>-0,37</b>	<b>-0,42</b>	<b>-0,40</b>
<b>Grain yield</b>	-0,24	-0,28	-0,22
<b>Grain number</b>	-0,09	-0,13	-0,10
<b>Ear number</b>	<b>-0,30</b>	<b>-0,30</b>	<b>-0,35</b>
<b>Grain weight</b>	-0,08	-0,03	-0,03
<b>GYE</b>	0,11	0,07	0,18
<b>GNE</b>	0,14	0,09	0,19
<b>HI</b>	-0,04	-0,01	0,23
<b>Height</b>	0,21	0,21	-0,13

GNE: grain number ear<sup>-1</sup>; GYE: grain yield ear<sup>-1</sup>; HI: harvest index.

Data was generated from Spearman correlation analysis. Values in bold represent significance ( $p < 0.05$ ).



**Table S4.** Catalogue of the 60 wheat genotypes employed in the present study. Pedigree, accession code and top name of genotypes belonging to the Heat Tolerance Wheat Screening Nursery (8TH HTWSN) collection of the International Maize and Wheat Improvement Centre (CIMMYT) are provided.

Cultivar	Genotype	Pedigree	Accession	Reception	Top Name
				year	
SUPER 152 BAJ #1 REEDLING #1	4	PFAU/SERI.1B//AMADINA/3/WAXWING	BW 43354	2009	CGSS-02-Y-00153S-099M-099Y-099M-46Y-0B
	5	WAXWING/4/SONOITA F 81/TRAP #1/3/KAUZ*2/TRAP//KAUZ	BW 42811	2009	CGSS01Y00134S-099Y-099M-099M-13Y-0B
	6	-	-	-	CMSS06Y00605T-099TOPM-099Y-099ZTM-099Y-099M-11WGY-0B
	8	KACHU/KIRITATI	BW 49924	2012	CMSS07Y00127S-0B-099Y-099M-099NJ-099NJ-6WGY-0B
	9	KACHU #1//WEEBILL1*2/KUKUNA	BW 49925	2013	CMSS07Y00129S-0B-099Y-099M-099NJ-099NJ-14WGY-0B
	10	KIRITATI/WEEBILL1//FRANCOLIN #1	BW 49926	2012	CMSS07Y00174S-0B-099Y-099M-099Y-5M-0WGY
	11	SUPER 152/BAJ #1	BW 49927	2012	CMSS07Y00195S-0B-099Y-099M-099Y-16M-0WGY
	13	BAJ #1/3/KIRITATI//ATTILA*2/PASTOR	BW 49930	2012	CMSS07Y00288S-0B-099Y-099M-099Y-17M-0WGY
	15	SUPER 152/AKURI//SUPER 152	BW 49936	2012	CMSS07Y00965T-099TOPM-099Y-099M-099Y-23M-0WGY
	16	BECARD/FRANCOLIN	BW 49948	2012	CMSS07B00235S-099M-099Y-099M-25WGY-0B
	18	BECARD//ND643/2*WEEBILL1	BW 49950	2012	CMSS07B00377S-099M-099NJ-099NJ-23WGY-0B
	19	FRET2*2/BRAMBLING//BECARD/3/WEEBILL1*2/BRAMBLING	BW 49952	2013	CMSS07B00560T-099TOPY-099M-099Y-099M-19WGY-0B
	21	KACHU/BECARD//WEEBILL1*2/BRAMBLING	BW 49954	2012	CMSS07B00580T-099TOPY-099M-099Y-099M-10WGY-0B
	22	KAUZ/PASTOR//PBW343/3/KIRITATI/4/FRANCOLIN	BW 49955	2012	CMSS07B00585T-099TOPY-099M-099Y-099M-11WGY-0B
	23	SUPER 152*2/TECUE #1	BW 49956	2012	CMSS07B00614T-099TOPY-099M-099Y-099M-49WGY-0B
	25	WEEBILL1*2/4/SONOITA F 81/TRAP #1/3/KAUZ*2/TRAP//KAUZ/5/BAJ #1	BW 49388	2012	CMSS06B00162S-0Y-099ZTM-099Y-099M-7WGY-0B
	26	NACAZARI F 76/TH.ACUTUM//3*PAVON F76/3/MIRLO/BUCKBUCK/4/ 2*PASTOR/5/T.DICOCCON PI94624/AE.SQUARROSA (409)//BACANORA T 88/ 6/WEEBILL4//BABAX.1B.1B*2/PARULA/3/PASTOR	BW 50018	2013	CMSS06B01043T-099TOPY-099Y-39M-0Y-2B-0Y
	29	CHIBIA//PARULA II/CM65531/3/SUPER KAUZ/BAVIACORA M 92/4/MUNAL #1	BW 50026	2013	CMSS07Y00066S-0B-099Y-099M-099Y-43M-0WGY
	31	FRET2/TUKURU//FRET2/3/MUNAL #1	BW 50028	2012	CMSS07Y00093S-0B-099Y-099M-099NJ-099NJ-9WGY-0B
	33	KACHU #1//WEEBILL1*2/KUKUNA	BW 50036	2013	CMSS07Y00129S-0B-099Y-099M-099NJ-099NJ-12WGY-0B
	35	KACHU//KIRITATI/WEEBILL1	BW 50038	2013	CMSS07Y00130S-0B-099Y-099M-099NJ-099NJ-8WGY-0B
	41	SUPER 152/BAJ #1	BW 50048	2013	CMSS07Y00195S-0B-099Y-099M-099Y-5M-0WGY
	42	SUPER 152/BAJ #1	BW 50049	2012	CMSS07Y00195S-0B-099Y-099M-099Y-25M-0WGY
	43	SUPER 152//WEEBILL1*2/BRAMBLING	BW 50050	2012	CMSS07Y00196S-0B-099Y-099M-099Y-6M-0WGY
	46	BAJ #1/3/KIRITATI//ATTILA*2/PASTOR	BW 50059	2012	CMSS07Y00288S-0B-099Y-099M-099Y-3M-0WGY
	48	WHEATEAR*2/3/FRET2/WEEBILL1//TACUPETO F2001	BW 50085	2012	CMSS07Y00794T-099TOPM-099Y-099M-099Y-3M-0WGY
	53	SUPER 152*2/MUU	BW 50107	2012	CMSS07Y00964T-099TOPM-099Y-099M-099Y-8M-0WGY
	58	WEEBILL1*2/BRAMBLING//JUCHI F2000/3/WEEBILL1*2/BRAMBLING	BW 50117	2013	CMSS07Y01044T-099TOPM-099Y-099M-099Y-6M-0WGY
	59	WEEBILL1/KUKUNA//TACUPETO F2001*2/6/PAVON F 76//CARIANCA 422/ ANAHUAC F 75/5/BOBWHITE/CROW//BUCKBUCK/PAVON F 76/3/YECORA F 70/4/TRAP #1	BW 50119	2012	CMSS07Y01070T-099TOPM-099Y-099M-099Y-20M-0WGY
	61	TOBARITO M 97/PASTOR*2//AKURI	BW 50122	2013	CMSS07Y01094T-099TOPM-099Y-099M-099NJ-099NJ-17WGY-0B
	63	INQALAB 91*2/KUKUNA*2//HUIRIVIS #1	BW 50126	2012	CMSS07Y01115T-099TOPM-099Y-099M-099Y-9M-0WGY

Table S4. Continuation

	65	SUPER 152/VILLA JUAREZ F2009	BW 50150	2013	CMSS07B00144S-099M-099Y-099M-5WGY-0B
	69	BECARD/FRANCOLIN	BW 50181	2012	CMSS07B00235S-099M-099Y-099M-8WGY-0B
	70	BECARD/CHYAKHURA	BW 50184	2013	CMSS07B00236S-099M-099Y-099M-13WGY-0B
	71	WEEBILL1*2/KUKUNA/4/WHEATEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WEEBILL1	BW 50185	2012	CMSS07B00240S-099M-099Y-099M-12WGY-0B
	73	WEEBILL1/KUKUNA//TACUPETO F2001/4/WHEATEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WEEBILL1	BW 50191	2012	CMSS07B00245S-099M-099Y-099M-10WGY-0B
	74	WEEBILL1/KUKUNA//TACUPETO F2001/3/QUAIU #2	BW 50193	2012	CMSS07B00246S-099M-099Y-099M-5WGY-0B
	76	WHEATEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WEEBILL1/4/QUAIU	BW 50196	2012	CMSS07B00264S-099M-099NJ-099NJ-2WGY-0B
	77	WHEATEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WEEBILL1/4/QUAIU	BW 50197	2012	CMSS07B00264S-099M-099NJ-099NJ-7WGY-0B
	79	SUPER 152/CHYAKHURA #1	BW 50208	2013	CMSS07B00339S-099M-099Y-099M-11WGY-0B
	81	PBW 65/2*PASTOR/3/KIRITATI//PBW 65/2*SERI.1B/4/DANPHE #1	BW 50215	2012	CMSS07B00513T-099TOPY-099M-099Y-099M-12WGY-0B
	83	CIANO T 79//PF70354/MUSALA/3/PASTOR/4/BAVIACORA M 92/5/KIRITATI//ATTILA*2/PASTOR/6/CHYAKHURA	BW 50229	2013	CMSS07B00550T-099TOPY-099M-099Y-099M-6WGY-0B
	87	KACHU/BECARD//WEEBILL1*2/BRAMBLING	BW 50238	2013	CMSS07B00580T-099TOPY-099M-099NJ-099NJ-32WGY-0B
	88	KACHU/BECARD//WEEBILL1*2/BRAMBLING	BW 50239	2013	CMSS07B00580T-099TOPY-099M-099NJ-099NJ-34WGY-0B
	92	SUPER 152*2/TECUE #1	BW 50248	2013	CMSS07B00614T-099TOPY-099M-099Y-099M-16WGY-0B
	93	WEEBILL1*2/KUKUNA//KIRITATI/3/WEEBILL1*2/KUKUNA	BW 50263	2013	CMSS07B00682T-099TOPY-099M-099Y-099M-22WGY-0B
	94	WEEBILL1*2/KURUKU*2//SUPER 152	BW 50264	2013	CMSS07B00685T-099TOPY-099M-099Y-099M-17WGY-0B
	95	FRET2/KUKUNA//FRET2/3/HEILO/4/BLOUK #1	BW 50266	2013	CMSS07B00715T-099TOPY-099M-099Y-099M-7WGY-0B
	97	ND643/2*WEEBILL1//ATTILA*2/PBW 65/3/MUNAL	BW 50270	2012	CMSS07B00807T-099TOPY-099M-099NJ-099NJ-1WGY-0B
	99	ND643//2*ATTILA*2/PASTOR/3/WEEBILL1*2/KURUKU/4/WEEBILL1*2/BRAMBLING	BW 50276	2012	CMSS07B00833T-099TOPY-099M-099NJ-099NJ-3WGY-0B
	105	REH/HARE//2*BACANORA T 88/3/CROC_1/AE.SQUARROSA (213)//PAPAGO M 86/4/HUITES F 95/5/T.DICOCCON PI94624/AE.SQUARROSA (409)//BACANORA T 88/6/REH/HARE//2*BACANORA T 88/3/CROC_1/AE.SQUARROSA (213)//PAPAGO M 86/4/HUITES F 95/7/MUTUS	BW 49979	2013	CMSS07Y01305T-099Y-43M-0Y-2B-0Y
	107	BLOUK #1//TACUPETO F2001*2/KIRITATI	BW 50284	2013	CMSS07Y00036S-0B-099Y-099M-099NJ-099NJ-1RGY-0B
	110	QUAIU #3//TACUPETO F2001*2/KIRITATI	BW 50287	2013	CMSS07Y00040S-0B-099Y-099M-099NJ-099NJ-5RGY-0B
	113	FRANCOLIN #1/2*BLOUK #1	BW 50296	2013	CMSS07Y00670T-099TOPM-099Y-099M-099Y-11M-0RGY
	114	PFAU/WEAVER*2//TUKURU/3/BLOUK #1/4/QUAIU	BW 50298	2013	CMSS07Y00695T-099TOPM-099Y-099M-099Y-11M-0RGY
	115	VOROBAY/FISCAL//KACHU/3/WEEBILL1*2/BRAMBLING	BW 50299	2013	CMSS07Y00706T-099TOPM-099Y-099M-099Y-11M-0RGY
	117	WEEBILL1*2/BRAMBLING/5/WEEBILL1*2/4/SONOITA F 81/TRAP #1/3/KAUZ*2//TRAP//KAUZ/6/WEEBILL1*2/BRAMBLING	BW 50303	2013	CMSS07Y00815T-099TOPM-099Y-099M-099Y-9M-0RGY
	118	BLOUK #1/MUNAL	BW 50308	2013	CMSS07B00024S-099M-099Y-099M-21RGY-0B
	119	BECARD/3/PASTOR//MUNIA/ALTAR 84	BW 50313	2013	CMSS07B00468S-099M-099Y-099M-18RGY-0B
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**Table S5.** Statistical design with tests employed, assessed assumptions for each test, central tendency estimator used and indices for the effect size.

One-group comparison			Multiple group comparison: Independent measures			
Assumptions	Normal distribution	Non-normal distribution	Normal distribution		Non-normal distribution	
	-	-	Homogeneity of variances	Heterogeneity of variances	Homogeneity of variances	Heterogeneity of variances
	-	-	Unbalanced groups	Un/balanced groups	Un/balanced groups	Un/balanced groups
	Absence of extreme outliers	Absence of extreme outliers	Absence of extreme outliers	Absence of extreme outliers	Dealing with extreme outliers	Dealing with extreme outliers
Type of analysis	T test	Wilcoxon test	ANOVA	ANOVA with heteroscedasticity correction	Kruskal-Wallis (K-W) test	Robust ANOVA for medians
R function	<i>t_test</i> [1]	<i>wilcox_test</i> [1]	<i>anova_test</i> [1]	<i>anova_test</i> [1]	<i>Kruskal_test</i> [1]	<i>med1way</i> [2]
Post-hoc test	-	-	Pairwise T test	Pairwise T test	Wilcox	Pairwise permutation tests for percentiles
R function	-	-	<i>pairwise.t.test</i> [3]	<i>pairwise.t.test</i> [3]	<i>pairwise.wilcox.test</i> [1]	<i>pairwisePercentileTest</i> [4]
Central tendency estimator	Mean	Trimmed mean (20%)	Mean	Mean	Median	
Effect size	Indices		$\eta^2$	$\eta^2$	$\omega^2$	
	R function		Included in	<i>eta.F</i>	<i>omega.F</i>	
			<i>anova_test</i> [1]	[5]	[5]	
	Interpretation					
	No effect	$d < 0.20$	$\eta^2 < 0.01$		$\omega^2 < 0.01$	
	Small	$0.20 \leq d < 0.50$	$0.01 \leq \eta^2 < 0.06$		$0.01 \leq \omega^2 < 0.06$	
	Medium	$0.50 \leq d < 0.80$	$0.06 \leq \eta^2 < 0.14$		$0.06 \leq \omega^2 < 0.14$	
	Large	$d \geq 0.80$	$\eta^2 \geq 0.14$		$\omega^2 \geq 0.14$	

Note\*: The Benjamini, Hochberg, and Yekutieli method for the false discovery rate control was applied for pairwise comparisons (*pairwise.t.test* [3]), with corrections for homo/heterogeneity of variances.

Other references employed to perform this table:

- Selection of tests: [6–10]
- Effect size: [7,11–15]

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