Table (1): Mean squares of genotypes, general and specific combining abilities for the studied characters.

Source of variance	df	Days to flowering	Spike length (cm)	No. of spikes/plant	No. of grains/plant	100 kernel weight, g.	Grain yield per plant, g.
Rep.	2	30.40	0.86	3.42	624.36	0.03	0.37
Genotypes	35	9.24**	9.24**	12.12**	45495.91**	1.39**	68.97**
Error	70	3.39	0.48	0.85	1344.67	0.13	6.85
G.C.A.	7	5.47**	9.01**	5.96**	13852.74**	0.88**	26.46**
S.C.A.	28	2.48**	1.60**	3.56**	15493.44**	0.36**	22.12**
Error	70	1.13	0.16	0.28	448.22	0.04	2.28
$\Sigma g^2 i/\Sigma s^2 ij$		0.08	0.15	0.04	0.02	0.06	0.03

$\Sigma g^2 i/\Sigma s^2 ij$ = the ratio of gca variance to sca variance according to Becker (1985).
** Significant at 0.01 level of probability.

Table (2): Mean performance of the parents (diagonal), crosses (above diagonal), SCA effects (below diagonal) and GCA ($\hat{g}_i$) effects for days to heading.

Parent	1	2	3	4	5	6	7	8	$\overline{X}$	$\hat{g}_i$
1- Sakha 69	81.00	83.67	82.00	82.33	81.67	82.33	82.00	81.67	82.24	-1.00**
2- Sids 1	1.693	83.33	83.33	84.00	83.00	83.00	81.33	81.67	82.86	-0.10
3- Giza 155	-0.107	0.326	83.33	82.67	85.67	85.33	81.00	81.33	83.05	0.03
4- Giza 164	-0.841	-0.074	-1.1541	85.33	82.67	86.33	86.33	83.67	84.00	1.10**
5- Sakha 8	-1.174	-0.741	1.793	-2.274*	84.33	84.33	84.67	84.67	83.81	0.77*
6- Sids 6	-0.207	-0.441	1.759	1.693	0.026	85.00	80.00	81.00	83.19	0.47
7-Gemmiza 1	0.526	-1.041	-1.507	2.759**	1.426	-2.941**	83.67	79.00	82.05	-0.60
8-Gemmiza 3	0.259	-0.641	-1.107	0.159	1.493	-1.874	-2.807**	83.00	81.86	-0.67*

Parent mean = 83.62 Hybrid mean = 82.99

R.LSD (0.05) for testing differences between genotypes = 3.53

SE ($\hat{g}_i$) = 0.31, SE ($\hat{g}_i - \hat{g}_j$) = 0.47,

SE ($\hat{S}_{ij}$) = 0.96, SE ($\hat{S}_{ij} - \hat{S}_{ik}$) = 1.42, SE ($\hat{S}_{ij} - \hat{S}_{Kl}$) = 1.34

*, ** Significant at 0.05 and 0.01 level of probability, respectively .

Table(3): Mean performance of the parents (diagonal), crosses (above diagonal), SCA effects (below diagonal) and GCA ($\hat{g}_i$) effects for spike length.

Parent	1	2	3	4	5	6	7	8	$\overline{X}$	$\hat{g}_i$
1- Sakha 69	12.73	14.27	15.27	16.73	16.17	16.07	15.60	18.03	16.08	1.826**
2- Sids 1	-1.973**	13.83	15.23	14.13	14.03	14.20	15.83	14.77	14.64	0.412**
3- Giza 155	0.944**	2.324**	10.77	11.17	11.37	11.57	13.03	11.80	12.78	-1.504**
4- Giza 164	0.821	-0.366	-1.416**	13.73	14.63	14.43	14.57	13.73	14.10	0.085
5- Sakha 8	1.024**	0.304	-0.446	1.231	11.90	12.87	13.50	12.80	13.62	-0.684**
6- Sids 6	0.091	-0.363	-1.079**	0.197	-0.599	13.90	16.30	14.27	14.24	0.149
7-Gemmiza 1	-0.043	1.554**	0.671	0.614	0.317	2.284**	11.40	13.63	14.64	-0.134
8-Gemmiza 3	2.357**	0.504	-0.546	-0.203	-0.366	0.267	-0.083	13.73	14.15	-0.151

Parent mean = 12.75 Hybrid mean = 14.27

R.LSD (0.05) for testing differences between genotypes = 1.05

SE ($\hat{g}_i$) = 0.118, SE ($\hat{g}_i - \hat{g}_j$) = 0.179

SE ($\hat{S}_{ij}$) = 0.362, SE ($\hat{S}_{ij} - \hat{S}_{ik}$) = 0.536, SE ($\hat{S}_{ij} - \hat{S}_{Kl}$) = 0.506

*, ** Significant at 0.05 and 0.01 level of probability, respectively.

Table(4): Mean performance of the parents (diagonal), crosses (above diagonal), SCA effects (below diagonal) and GCA ($\hat{g}_i$) effects for number of spikes/plant.

Parent	1	2	3	4	5	6	7	8	$\overline{X}$	$\hat{g}_i$
1- Sakha 69	11.63	12.43	11.00	13.07	12.50	12.90	12.87	12.53	12.47	-0.552**
2- Sids 1	1.006*	10.17	12.30	10.93	12.63	10.90	12.30	15.07	12.36	-0.919**
3- Giza 155	-2.821**	-1.154**	16.37	16.30	14.90	14.67	12.90	16.03	14.01	1.474**
4- Giza 164	0.806	-0.961*	2.013**	11.73	13.07	13.07	12.20	13.13	13.11	-0.085
5- Sakha 8	-0.131	0.369	0.243	-0.031	15.53	13.93	10.27	10.57	12.55	0.284
6- Sids 6	1.316**	-0.317	1.056*	1.016	1.513	11.60	8.33	11.47	12.13	-0.762
7-Gemmiza 1	0.343	0.143	-1.651**	-0.791	-3.094**	-3.981**	18.00	13.00	11.65	0.178
8-Gemmiza 3	-0.197	2.703**	1.276**	-0.064	-3.001**	-1.054*	-0.461	14.07	12.93	0.384*

Parent mean = 13.64 Hybrid mean = 12.69

R.LSD (0.05) for testing differences between genotypes = 1.39

SE ($\hat{g}_i$) = 0.158, SE ($\hat{g}_i - \hat{g}_j$) = 0.238

SE ($\hat{S}_{ij}$) = 0.420, SE ($\hat{S}_{ij} - \hat{S}_{ik}$) = 0.715, SE ($\hat{S}_{ij} - \hat{S}_{Kl}$) = 0.674

*, ** Significant at 0.05 and 0.01 level of probability, respectively.

Table(5): Mean performance of the parents (diagonal), crosses (above diagonal), SCA effects (below diagonal) and GCA ($\hat{g}_i$) effects number of grains/plant.

Parent	1	2	3	4	5	6	7	8	$\overline{X}$	$\hat{g}_i$
1- Sakha 69	725	572	758	1015	753	673	843	731	763	48.92**
2- Sids 1	-164.2**	607	768	654	727	658	796	784	708	-13.48*
3- Giza 155	-23.5	48.9*	729	866	689	733	620	733	738	32.12**
4- Giza 164	238.5**	-60.1**	106.3**	604	725	754	660	689	766	26.46**
5- Sakha 8	-13.2	23.5	-59.8**	-18.4	951	796	440	438	653	16.56**
6- Sids 6	-66.3**	-18.6	11.1	37.5	89.0**	640	799	507	703	-10.68
7-Gemmiza 1	141.4**	156.1**	-65.1**	-19.1	-229.6**	156.7**	556	559	654	-47.74**
8-Gemmiza 3	33.2	148.6**	52.6**	14.0	-227.1**	-130.6**	-41.8*	672	634	-52.18**

Parent mean = 686 Hybrid mean = 700

R.LSD (0.05) for testing differences between genotypes = 52.40

SE ($\hat{g}_i$) = 6.26, SE ($\hat{g}_i - \hat{g}_j$) = 9.47

SE ($\hat{S}_{ij}$) = 19.20, SE ($\hat{S}_{ij} - \hat{S}_{ik}$) = 28.40, SE ($\hat{S}_{ij} - \hat{S}_{Kl}$) = 26.78

*, ** Significant at 0.05 and 0.01 level of probability, respectively.

Table(6): Mean performance of the parents (diagonal), crosses (above diagonal), SCA effects (below diagonal) and GCA ($\hat{g}_i$) effects for 100 kernel weight, g.

Parent	1	2	3	4	5	6	7	8	$\overline{X}$	$\hat{g}_i$
1- Sakha 69	3.97	6.30	4.27	4.47	4.00	4.80	4.77	4.73	4.76	0.118
2- Sids 1	1.536**	5.17	4.17	4.00	4.70	4.17	4.30	4.03	4.52	0.192**
3- Giza 155	-0.070	-0.244	3.7	4.23	4.33	3.37	5.70	4.27	4.33	-0.235**
4- Giza 164	0.196	-0.344	0.316	3.73	4.43	3.90	4.50	4.07	4.23	-0.302**
5- Sakha 8	-0.437*	0.189	0.250	0.416*	3.50	3.60	5.13	5.53	4.53	-0.135*
6- Sids 6	0.596**	-0.110	-0.484**	0.116	-0.350	4.00	3.93	4.63	4.06	-0.368**
7-Gemmiza 1	-0.184	-0.724**	1.103**	-0.030	0.436*	-0.530**	4.83	5.87	4.88	0.378**
8-Gemmiza 3	-0.190	-0.964**	-0.304	-0.437*	0.863**	0.196	0.683**	5.23	4.74	0.352**

Parent mean = 4.27 Hybrid mean = 4.51

R.LSD (0.05) for testing differences between genotypes = 0.54

SE ($\hat{g}_i$) = 0.061, SE ($\hat{g}_i - \hat{g}_j$) = 0.092

SE ($\hat{S}_{ij}$) = 0.186, SE ($\hat{S}_{ij} - \hat{S}_{ik}$) = 0.276, SE ($\hat{S}_{ij} - \hat{S}_{Kl}$) = 0.260

*, ** Significant at 0.05 and 0.01 level of probability, respectively.

Table(7): Mean performance of the parents (diagonal), crosses (above diagonal), SCA effects (below diagonal) and GCA ($\hat{g}_i$) effects for grain yield/plant, g.

Parent	1	2	3	4	5	6	7	8	$\overline{X}$	$\hat{g}_i$
1- Sakha 69	28.97	36.00	32.33	45.40	30.10	32.33	38.83	34.57	35.65	3.183**
2- Sids 1	3.317*	31.27	32.17	26.13	34.07	27.50	34.37	31.60	31.69	0.869
3- Giza 155	-1.033	1.114	27.17	36.60	30.00	24.73	29.73	31.30	30.98	-0.447
4- Giza 164	11.977**	-4.976**	6.807**	22.83	32.17	29.57	28.17	28.07	32.30	-0.390
5- Sakha 8	-2.981*	3.299*	0.549	2.659	33.10	29.28	22.50	24.03	28.88	-0.732
6- Sids 6	1.092	-1.428	-2.878*	1.899	1.957	25.80	31.37	23.57	27.48	-2.572**
7-Gemmiza 1	5.231**	3.077*	-0.239	-1.863	-7.188**	3.519*	26.87	34.87	31.31	-0.210
8-Gemmiza 3	0.454	-0.199	0.817	-2.473	-6.164**	-4.791**	4.147**	35.33	29.71	0.300

Parent mean = 28.92 Hybrid mean = 31.00

R.LSD (0.05) for testing differences between genotypes = 3.95

SE ($\hat{g}_i$) = 0.447, SE ($\hat{g}_i - \hat{g}_j$) = 0.676

SE ($\hat{S}_{ij}$) = 1.370, SE ($\hat{S}_{ij} - \hat{S}_{ik}$) = 2.027, SE ($\hat{S}_{ij} - \hat{S}_{Kl}$) = 1.911

*, ** Significant at 0.05 and 0.01 level of probability, respectively.

Table (8): Percentage of mid- (MP) and better-parent (BP) heterosis for the studied traits.

No.	Crosses	Days to flowering		Spike length (cm)		No. of spikes/plant		No. of grains/plant		100 kernel weight, g		Grain yield plant, g.	
		MP	BP	MP	BP	MP	BP	MP	BP	MP	BP	MP	BP
1	P_1xP_2	1.83	3.30	7.45*	3.18	14.04*	6.88	-14.14*	-21.17*	37.85*	21.86*	19.52*	15.13*
2	P_1xP_3	-0.20	1.23	29.96*	19.95*	-6.64	-32.80	4.21	3.93	16.56*	7.56	15.18*	11.60
3	P_1xP_4	-1.00	1.64	26.45*	21.84*	11.90	11.42	52.58*	39.82*	16.10*	12.59	75.29*	56.71*
4	P_1xP_5	-0.01	0.83	31.30*	27.02*	-7.95	-19.51	-10.21*	-20.87*	7.09	0.75	-3.01	-0.09
5	P_1xP_6	-0.81	1.64	20.69*	15.61*	11.06	10.92	-1.49	-7.30	20.45*	20.00	18.06*	11.60
6	P_1xP_7	-0.41	1.23	29.30*	22.54*	-13.13	-28.50	31.60*	16.21*	8.41	-1.24	39.07*	34.03*
7	P_1xP_8	-1.60	0.83	36.28*	31.32*	-2.49	-10.94	4.55	0.69	2.83	-9.56	7.53	-2.15
8	P_2xP_3	0.00	0.00	23.82*	10.12*	-7.31	-24.86	14.99*	5.30	-5.97	-19.34*	10.10	2.87
9	P_1xP_4	-0.004	0.80	2.54	2.17	-0.18	-6.82	7.95	7.75	-10.11	-22.63*	-3.40	-16.43*
10	P_2xP_5	-0.99	-0.40	9.05*	1.45	-1.71	-18.67	-6.65	-23.57*	8.42	-9.09	5.86	2.93
11	P_2xP_6	-1.38	-0.40	2.42	2.16	0.09	-6.03	5.56	2.81	-9.05	-19.34*	-3.63	-12.06
12	P_2xP_7	-2.60	-2.40	25.48*	14.46*	-12.14	-31.67	36.87*	31.15*	-14.00*	-16.83*	18.23*	9.91
13	P_2xP_8	1.80	-1.60	7.18*	6.80	24.34*	7.11	22.57*	0.17*	-22.5*	-22.94*	-5.10	-10.55
14	P_3xP_4	-1.97	-0.79	-8.82*	-14.78*	16.01*	-2.63	14.89*	18.64*	13.86*	13.40	46.40*	34.71*
15	P_3xP_5	2.19	2.81	0.31	-4.45	-6.58	-8.98	-17.96*	-27.53*	20.28*	17.03*	-0.45	-9.37
16	P_3xP_6	1.38	2.40	-6.20	-16.76*	-4.90	-10.38	7.08	0.50	-12.47	-15.75*	-6.63	-8.98
17	P_3xP_7	-2.99	-2.80	17.55*	14.30*	-24.93	-28.33	-3.55	-0.15*	33.64*	18.01*	10.03	9.42
18	P_3xP_8	-2.21	-2.01	-3.67	-14.66*	5.32	-2.08	4.71	0.50	-4.37	-18.35*	0.16	-11.41
19	P_4xP_5	-2.55	-1.97	14.16*	6.55	-4.11	-15.84	-6.77*	-23.78*	22.54*	18.77*	15.04*	-2.81
20	P_4xP_6	1.37	1.56	4.45	3.81	12.04	11.42	21.19*	17.81*	0.90	-2.50	21.61*	14.61
21	P_4xP_7	2.16	3.18	15.96*	6.12	-17.93	-32.32	13.82*	9.27	5.14	-6.83	13.36*	4.84
22	P_4xP_8	-0.59	0.81	0.00	0.00	1.78	-6.68	7.97	2.53	-9.15	-22.18*	-3.47	-20.55*
23	P_5xP_6	-0.39	0.00	-0.23	-7.41*	2.69	-10.30	-0.02	-16.39*	-4.00	-10.00	-0.58	-11.54
24	P_5xP_7	0.80	1.19	15.88*	13.44*	-38.74	-42.94	-41.63*	-53.76*	23.17*	6.21	-24.96	-32.02*
25	P_5xP_8	1.20	2.01	-0.12	-6.77	-28.58	-31.94	-46.05*	-53.97*	26.67*	0.06	-29.77*	-31.98*
26	P_6xP_7	-5.14*	-4.39*	28.85*	17.27*	-43.72	-53.72	33.61*	24.84*	-10.98	-18.63*	19.12*	16.75*
27	P_6xP_8	-3.57*	-2.41	3.29	2.66	10.63	-18.48	-22.66*	-24.50*	0.32	-11.47*	-22.89*	-33.29*
28	P_7xP_8	-5.20*	-4.82*	8.47*	-0.73	18.93	-27.78	-8.96*	-16.81*	16.70*	12.24*	12.12*	-1.30

*, ** significant at 0.05 and 0.01 level of probability, respectively.