ESTIMATION OF COMBINING ABILITY OF NEWLY-DEVELOPED INBRED LINES OF MAIZE BY (*LINE X TESTER*) ANALYSIS

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ABSTRACT

Eight maize inbred lines were top-crossed to four testers, i.e. Sd-34, S.C. SK-1, S.C.122 and T.W.C. 322 at Sakha in 2000 season. The parents and top-crosses were evaluated in 2001 season at Sakha and Sids locations.

Mean squares due to locations and entries (E) ; parents (P), crosses (C),(P vs C) and their interactions were significant for most studied traits.

Ten top crosses, i.e., (Sk-8003/1-2 × S.C. Sk-1), (Sk-8003/1-2 × S.C. 122), (Sk-8003/1-2 × T.W.C. 322), (Sk-8171/1-1 × Sd-34), (Sk-8171/3-2 × S.C.Sk-1), (Sk-8171/3-2 x T.W.C 322), (Sk-8174/7-2 × T.W.C 322), (Sk-8174/7-1 × T.W.C 322), (Sk-8174/1-1 × S.C. Sk-1) and (Sk-8174/1-1 × T.W.C.322) were not significant than the commercial crosses S.C. 122 and T.W.C. 322 for grain yield and most of the studied traits.

The inbred line SK-8003/1-2 exhibited the highest positive and significant G.C.A. effects for grain yield and ear length,while line SK-8174/7-1 exhibited the best G.C A effects for plant height, ear height and late wilt resistance .Whereas the tester S.C.Sk-1 had desirable significant GCA effects for grain yield and number of rows/ear.

The σ^2 G.C.A. played a greater portion in the inheritance of ear length , number of rows/ear, silking date, plant and ear height and late wilt resistance. While σ^2 S.C.A. played the major role in the inheritance of grain yield and number of kernels/row. The interaction between σ^2 G.C.A × locations was greater than σ^2 SCA × locations interaction for all studied traits except number of rows/ear.

INTRODUCTION

Top-crosses testing was used to evaluate new inbred lines for combining ability in the maize breeding programs.

Davis (1927) was the first who suggested this method. Matzinger (1953) defined the desirable tester as one that combines the greatest simplicity in use with the maximum information on performance to be expected from total lines, when used in other combinations or grown in other environments. Allison and Curnow (1966) defined the best tester as one that is capable of giving higher maximum grain yield of its top-cross

hybrids. EL-Itriby *et al* (1981), Shehata (1992) and Mahmoud (1996) suggested that G.C.A effects were relatively more important than S.C.A effects in the inheritance of grain yield, while Lonnquist and Gardner (1961), Shehata and Dhawan (1975), EL-Shenawy (1995), EL-Zier *et al* (2000) and Mosa (2001) found that the S.C.A were more important than G.C.A effects in the inheritance of grain yield.

The objectives of this investigation were:

1- To estimate combining ability and their interaction with locations.
2- To identify the most superior lines and top crosses for their use in hybrid maize breeding programs.

MATERIAL AND METHODS

The materials used were new eight inbred lines developed at Sakha Research Station i.e., Sk-8003/1-2 (isolated from variety F_2 B.A.90-2613 D.M.R), Sk-8171/1-1 and Sk-8171/3-2 (isolated from variety Giza-2. Ev-6) and Sk-8174/7-2, Sk-8174/3, Sk-8174/3-2, Sk-8174/7-1 and Sk-8174/1-1 (isolated from variety tepalcingo# 5).

These eight inbred lines were crossed to four different testers, i.e., the inbred line Sd-34, promising single cross Sakha-1 (S.C.SK-1) and two commercial crosses; single cross 122 (S.C.122)and three way crosses 322 (T.W.C.322). The top-crosses were constituted during the 2000 growing season at Sakha Station. The parental lines ,testers and 32 top-crosses were evaluated at Sakha and Sids Stations in 2001 growing season. A Randomized Complete Blocks Design (R.C.B.D) with four replications was used in both locations . In each replication the entries were arrangement in two sets as follow : 9 lines (8 parental lines + 1 tester line) and 35 crosses (3 testers +32 topcrosses), respectivily, and randamly distributed in each set. The experimental unit was one row 6 m. long, 80 cm apart and 25 cm between hills , one plant was left per hill .The data were recorded on, grain yield (ard/fed) adjusted based on 15.5%grain moisture content, shelling percent (estimated kg/ plot which estimate the yield ard/fad), ear length (cm), ear diameter (cm), number of rows/ear and number of kernels/rows, days to 50% silking, plant and ear height (cm) and percentage of resistance to late wilt disease (number of resistance plants per plot at 35 days after 50% silking emergence, then expressed as percent of total number of plants per plot).

The analysis of variance for every location and over the two locations was carried out as describer by Steel and Torrie (1980).However Combining ability analysis was computed according to Kempthorne (1957).

RESULTS AND DISCUSSION

Data shown in Table (1) appear that the mean squares of grain yield (ard/fed), number of rows/ear, number of kernels/row, number of days to 50% silking, plant and ear height and late wilt disease resistance % were significantly affected by locations while, ear length was not affected. The mean squares of combined analysis among entries (E), i.e., parents (P), crosses (C) and (P vs C). and their interactions with locations were significant for all traits except (P × Loc) for ear length, (C × Loc) for ear length, number of rows/ear, number of kernels/row and late wilt resistance and (P vs C × Loc) for number of rows/ear. The mean squares of crosses and their partitions.i.e, lines (L), testers (T) and (L × T) were significant for all the studied traits except (T) for number of kernels/row and silking date and (L × T) for number of rows/ear, silking date, plant height ,ear height and late wilt resistance. These results indicate that performance of both inbred lines and testers were significantly different from each other in top crosses, also interaction of inbred x testers was significant suggesting that inbred lines may perform differently in crosses depenting on the type of tester used.The interactions between (L × Loc) was significant for all traits except number of rows/ear, plant height and late wilt resistance,while the interactions between (T × Loc) and (L × T × Loc) were not significant, except (T × Loc) for grain yield, silking date ear height, plant height and (L × T × Loc) for grain yield were significant,indicating different ranks of interaction of inbred lines in their top crosses from one location to another in most traits as well as testers for grain yield, silking date and plant and ear heights.

Mean performance of entries are presented in Table (2). The two inbred lines; SK-8174/1-1 and SK8174/3-2 gave highest grain yield over two locations compared to inbred tester Sd-34 which used for produceding commercial crosses.

The mean performance of testers over two locations showed that the promising tester S.C.SK-1 (29.98 ard/fad) was the best for grain yield and most traits than the two testers; S.C.122 (28.21 ard/fad) and T.W.C. 322 (27.26 ard/fad). In addition ten top crosses, i.e., Sk-8003/1-2 x S.C. Sk-1 (29.73 ard/fad), Sk-8003/1-2 x S.C. 122 (27.8 ard/fad), Sk-8003/1-2 × T.W.C. 322 (29.1 ard/fad), Sk-8171/1-1 x Sd-34 (28.19 ard/fad), Sk-8171/3-2 × S.C.Sk-1 (27.29 ard/fad) , Sk-8171/3-2 × T.W.C 322 (27.53 ard/fad), Sk-8174/7-2 × T.W.C 322 (27.25 ard/fad), Sk-8174/7-1 × T.W.C 322 (28.25 ard/fad), Sk-8174/1-1 × S.C. Sk-1 (28.86 ard/fad) and Sk-8174/1-1 × T.W.C.322 (27.35 ard/fad) were not significantly different from the checks S.C. 122 (28.21 ard/fad) and T.W.C. 322 (27.26 ard/fad) (commercial crosses) for grain yield and most other studied traits. The above ten top crosses and the promising S.C.Sk-1 can be used to improve the yielding ability in maize breeding programs.

Table (1): Mean suquers of analysis of variance for eight traits of maize at Sakha (SK) and Sids (SD) locations and their combined.

Source of variance	Grain yield (ard/fed)			Ear length (cm)			No.of rows/ car			No. of kernels/ row		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
Location	—	—	6540.18**	—	—	18.42	—	—	4.26*	—	—	1.40*
Rep/loc.	—	—	31.40	—	—	5.90	—	—	1.01	—	—	51.23
Entries (E)	354.93**	212.07**	532.25**	30.22**	39.16**	67.66**	4.06**	1.81**	4.56**	153.39**	182.71**	318.84**
Parents (P)	517.02**	317.15**	815.49**	39.72**	49.94**	88.44**	7.03**	0.87	5.20**	258.57**	248.89**	481.13**
Crosses (C)	51.72**	22.38**	28.24**	8.46**	5.22**	12.45**	3.07**	1.84**	4.13**	21.37**	13.07*	22.52**
P vs c	7971.24**	493.72**	12730.64**	600.52**	972.8**	1550.48**	1.96	11.08**	10.8**	3089**	4713.4**	7719.6**
E x Loc	—	—	34.75**	—	—	1.72*	—	—	1.31**	—	—	17.26**
P xLoc	—	—	18.68**	—	—	1.22	—	—	2.7**	—	—	26.33**
C x Loc	—	—	35.86**	—	—	1.23	—	—	0.78	—	—	11.92
P vs c x Loc	—	—	177.32**	—	—	22.84**	—	—	2.24	—	—	82.8**
Lines (L)	19.71	44.17**	36.28**	18.71**	9.22**	24.77**	9.19**	5.03**	13.54**	39.18**	18.17*	36.65**
Testers (T)	297.6**	36.28**	137.28**	29.12**	25.72**	53.09**	5.46**	1.30	6.10**	7.66	11.52	4.88
L x T	27.27**	13.13**	24.75**	2.09**	0.95	2.54**	0.69	0.86	0.71	17.39**	11.59	20.33**
L x Loc	—	—	27.6**	—	—	3.15**	—	—	0.68	—	—	20.7**
T x Loc	—	—	196.6**	—	—	1.75	—	—	0.66	—	—	14.3
L xT xLoc	—	—	15.65**	—	—	0.5	—	—	0.84	—	—	8.65
Error	11.03	4.66	7.85	1.18	1.03	1.10	0.69	0.75	0.72	9.16	8.34	8.75
X-	26.19	17.57	21.88	19.97	19.51	19.74	13.95	13.73	13.84	38.32	38.44	38.38
CV%	12.69	12.29	12.80	5.44	5.21	5.33	5.98	6.35	6.16	7.9	7.52	7.71
	Silking date (days)			Plant height (cm)			Earlheight (cm)			Late wilt res.%		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.
Location	—	—	2150.28**	—	—	250915.92**	—	—	62089.84**	—	—	1572.48**
Rep/loc.	—	—	2.40	—	—	357.80	—	—	544.75	—	—	102.89
Entries (E)	37.41**	23.78**	55.63**	11962.98**	6269.38**	17609.55**	4819.05**	2424.50**	6956.94**	40.96**	117.806**	91.441**
Parents (P)	36.17*	37.27**	64.32**	16660.17**	9901.28**	26020.85**	7783.86**	4009.52**	11415.02**	116.552**	155.213**	119.145**
Crosses (C)	10.87**	6.04**	13.70**	382.68**	389.97**	620.66**	650.15**	293.86**	817.54**	5.643	68.925*	40.289*
P vs c	873.64**	425.72**	1259.36**	319283.16**	148580.16**	451742.8**	101442.04**	51039.2**	148239.52**	304.26**	1221.630**	1372.431**
E x Loc	—	—	5.56**	—	—	622.82**	—	—	288.23**	—	—	67.325**
P xLoc	—	—	9.12**	—	—	540.6**	—	—	378.36**	—	—	152.62**
C x Loc	—	—	3.21**	—	—	151.99*	—	—	126.47**	—	—	34.279
P vs c x Loc	—	—	39.25**	—	—	16120.52**	—	—	4241.64**	—	—	153.459**
Lines (L)	41.28**	20.48**	54.66**	955.53**	910.17**	1847.08**	2224.90**	1085.29**	3130.43**	5.724	153.616**	91.749**
Testers (T)	2.03ns	7.22**	3.37	823.70**	1094**	1123.89**	912.66**	93.25	552.59**	10.16	138.949*	77.776*
L x T	1.99ns	1.05n.s	1.53	128.73	116.00	139.96	87.73	58.70	84.42	4.970	30.691	17.780
L x Loc	—	—	7.1**	—	—	18.62	—	—	179.76**	—	—	67.591
T x Loc	—	—	5.88**	—	—	793.81**	—	—	453.32**	—	—	71.33
L xT xLoc	—	—	1.51	—	—	104.77	—	—	62.01	—	—	17.88
Error	1.55	1.41	1.48	109.15	86.15	97.65	77.09	56.02	66.56	8.15	48.05	28.10
X-	65.65	60.71	63.18	260.26	206.86	233.56	141.14	114.58	127.86	98.5	94.27	96.38
CV%	1.90	1.96	1.93	4.01	4.49	4.23	6.22	6.53	6.38	2.9	7.35	5.50

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

Table: (2): Mean performance of maize entries at Sakha (SK) and Sids (SD) locations and their combined for eight traits.

Entries	Grain yield (ard/fad)			Ear length (cm)			No of rows/ear			No of kernels/ row		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
SK-8003/1-2	4.42	1.82	3.12	17.50	16.76	17.13	11.61	13.60	12.60	20.85	29.35	25.10
SK_8171/1-1	6.65	0.81	3.73	13.60	11.52	12.56	12.10	12.62	12.36	24.20	22.75	23.47
SK-8171/3-2	9.03	2.31	5.67	14.72	12.80	13.76	15.80	13.40	14.60	30.50	23.85	27.17
SK-8174/7-2	9.67	5.02	7.35	14.50	12.90	13.70	16.10	14.20	15.15	28.30	25.10	26.70
SK-8174/3-1	9.49	4.74	7.11	14.90	12.55	13.72	14.10	13.10	13.60	25.05	25.20	25.12
SK-8174/3-2	11.68	6.16	8.92	14.50	13.75	14.12	14.40	13.20	13.80	27.35	25.70	26.52
SK-8174/7-1	9.52	6.16	7.84	15.12	14.25	14.68	14.10	13.90	14.00	28.00	25.05	26.52
SK-8174/1-1	13.71	5.41	9.56	16.02	14.05	15.04	13.20	12.90	13.05	29.30	25.15	27.22
Sd-34	7.54	4.32	5.93	17.22	16.70	16.96	13.50	12.80	13.15	32.80	30.05	31.42
S.C. SK-1	36.38	23.59	29.98	22.80	20.76	21.78	14.15	13.50	13.82	43.25	42.30	42.77
S.C.122	33.34	23.09	28.21	21.25	21.00	21.12	13.60	13.70	13.65	44.85	44.30	44.57
T.W.C. 322	30.95	23.58	27.26	21.37	21.11	21.24	12.70	13.10	12.90	43.30	41.15	42.22
SK-8003/1-2 x Sd-34	21.74	26.28	24.01	23.70	23.50	23.60	13.60	13.30	13.45	33.00	42.25	37.62
SK-8003/1-2 x SK-1	36.27	23.18	29.73	23.25	21.80	22.52	14.40	13.65	14.02	42.40	42.30	42.35
SK-8003/1-2 x S.C.122	30.89	24.71	27.80	23.45	22.25	22.85	13.70	14.10	13.90	42.15	42.25	42.20
SK-8003/1-2xT.W.C322	33.86	24.33	29.10	23.15	22.45	22.80	12.90	13.60	13.25	41.25	43.80	42.52
SK-8171/1-1 x Sd- 34	31.89	24.40	28.19	21.90	20.90	21.40	12.60	13.10	12.85	45.10	42.15	43.62
SK-8171/1-1 x SK-1	30.95	17.96	24.46	20.75	20.20	20.47	13.10	12.80	12.95	41.00	41.70	41.35
SK-8171/1-1 x S.C.122	23.65	17.35	20.50	19.17	18.75	18.96	12.60	13.10	12.85	41.70	40.45	41.07
SK-8171/1-1xT.W.C322	29.00	17.48	23.24	19.72	19.16	19.44	12.50	12.30	12.40	41.80	37.55	39.67
SK-8171/3-2 x Sd-34	27.60	18.94	23.27	21.67	21.55	21.61	13.80	14.60	14.20	41.35	41.15	41.25
SK-8171/3-2 x SK-1	36.15	18.43	27.29	22.00	20.65	21.32	14.90	14.60	14.75	44.85	43.50	44.17
SK-8171/3-2 x S.C122	27.95	17.23	22.59	20.95	20.55	20.75	14.80	15.00	14.90	42.10	43.80	42.95
SK-8171/3-2xT.W.C322	32.08	22.98	27.53	21.02	20.50	21.06	13.90	13.90	13.90	44.40	43.80	44.10
SK-8174/7-2 x Sd-34	26.32	21.00	23.66	21.50	21.90	21.70	14.10	14.60	14.35	38.60	39.05	38.82
SK-8174/7-2 x SK-1	32.12	19.52	25.82	20.60	19.90	20.25	15.10	14.60	14.85	38.90	39.90	39.40
SK-8174/7-2 x S.C122	26.35	21.14	23.75	18.65	19.90	19.27	16.00	14.70	15.35	38.95	38.30	38.62
SK-8174/7-2xT.W.C322	32.33	22.18	27.25	20.90	21.10	21.00	15.30	14.20	14.75	41.00	43.20	42.10
SK-8174/3-1 x sd-34	27.98	20.17	24.08	22.20	22.45	22.32	13.50	13.70	13.60	42.55	42.65	42.60
SK-8174/3-1 xSK-1	33.15	19.02	26.08	20.77	20.90	20.83	14.20	14.70	14.45	40.40	39.60	40.00
SK-8174/3-1 x S.C.122	28.97	20.48	24.73	19.45	20.70	20.07	15.10	13.30	14.20	40.30	40.75	40.52
SK-8174/3-1xT.W.C322	29.67	22.51	26.09	20.10	20.65	20.37	14.00	14.30	14.15	40.70	41.20	40.95
SK-8174/3-2 xSD-34	30.15	18.82	24.48	22.40	23.00	22.70	14.10	13.90	14.00	39.65	46.05	42.85
SK-8174/3-2 x SK-1	31.94	20.23	26.09	19.55	20.25	19.90	14.50	14.60	14.55	38.40	39.25	38.82
SK-8174/3-2 x S.C122	26.83	21.55	24.19	18.90	19.40	19.15	14.30	14.00	14.15	40.55	40.75	40.65
SK-8174/3-2xT.W.C322	30.43	20.93	25.68	19.17	20.20	19.68	14.40	14.10	14.25	38.60	42.00	40.30
SK-8174/7-1 xSD-34	25.42	19.55	22.49	21.32	21.95	21.63	14.90	13.00	14.45	37.75	40.80	39.27
SK-8174/7-1 x SK_1	33.98	18.88	26.43	21.80	20.85	21.32	15.10	14.40	14.75	40.05	39.90	39.97
SK-8174/7-1 x S.C122	29.46	21.50	25.48	19.45	20.55	20.00	15.20	14.70	14.95	40.75	41.90	41.32
SK-8174/7-1xT.W.C322	32.82	23.69	28.25	20.80	20.45	20.62	13.70	13.50	13.60	40.65	42.25	41.45
SK-8174/1-1 x Sd-34	28.46	19.73	23.91	24.05	23.00	23.52	13.40	13.30	13.35	43.30	43.45	43.37
SK-8174/1-1 x SK-1	37.94	19.78	28.86	21.20	20.80	21.00	13.40	13.90	13.65	42.20	41.40	41.80
SK-8174/1-1xS.C122	31.79	19.29	25.54	20.55	20.25	20.40	13.60	12.80	13.20	42.50	42.50	42.27
SK-8174/1-1xT.W.C322	31.67	23.02	27.35	20.70	20.20	20.45	12.90	13.90	13.40	41.45	42.55	42.00
L.S.D 0.05	4.60	2.99	2.74	1.50	1.40	1.02	1.15	1.2	0.83	4.19	4.00	2.89
0.01	6.05	3.93	3.61	1.98	1.85	1.35	1.51	1.57	1.09	5.52	5.26	3.81

Table(2): Continue

Entries	Silking date (days)			Plant height (cm)			Ear height (cm)			Late wilt resistance%.		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
SK-8003/1-2	76.25	68.50	72.37	189.50	159.25	174.37	102.75	91.00	96.87	92.24	98.91	95.57
SK_8171/1-1	71.50	68.00	69.75	159.50	131.50	145.50	66.50	66.00	66.25	96.41	86.15	91.28
SK-8171/3-2	71.25	62.00	66.62	131.25	117.00	124.12	64.75	60.00	62.37	96.50	86.25	91.37
SK-8174/7-2	68.50	61.25	64.87	146.00	129.25	137.62	74.25	65.75	70.00	97.86	88.95	93.41
SK-8174/3-1	69.00	61.50	65.25	158.75	128.00	143.37	80.25	67.25	73.75	95.75	81.20	88.47
SK-8174/3-2	68.25	60.50	64.37	140.50	121.50	131.00	70.25	63.50	66.87	97.86	81.51	89.69
SK-8174/7-1	69.00	61.25	65.12	133.75	111.00	122.37	65.00	53.75	59.37	98.75	87.22	92.98
SK-8174/1-1	69.00	62.75	65.87	147.50	126.50	137.00	77.50	68.00	72.75	100.00	91.06	95.53
Sd-34	71.00	68.00	69.50	208.50	185.25	196.87	108.25	103.25	106.00	80.87	93.33	87.10
S.C. SK-1	66.25	62.75	64.50	295.50	230.25	262.87	164.50	130.50	147.50	100.0	88.33	94.15
S.C.122	64.50	60.50	62.50	282.50	225.75	254.12	170.00	132.00	151.00	100.00	100.00	100.00
T.W.C. 322	67.00	62.00	64.50	295.25	247.75	271.50	179.25	139.75	159.50	100.00	96.72	98.36
SK-8003/1-2 x Sd-34	69.00	61.75	65.37	295.00	252.25	273.62	178.25	147.75	163.00	100.00	97.86	98.93
SK-8003/1-2 x SK-1	67.35	61.00	64.12	311.25	242.50	276.87	185.75	146.25	166.00	100.00	96.87	98.43
SK-8003/1-2 x S.C.122	67.25	61.50	64.37	302.75	240.00	271.37	186.25	144.25	165.25	100.00	100.00	100.00
SK-8003/1-2xT.W.C322	67.00	61.00	64.00	310.50	236.00	273.25	187.25	139.00	163.12	100.00	100.00	100.00
SK-8171/1-1 x Sd- 34	64.75	61.00	62.87	284.75	235.00	259.87	154.75	129.00	141.87	100.00	100.00	100.00
SK-8171/1-1 x SK-1	65.00	61.50	63.25	292.50	223.75	258.12	154.75	126.00	140.37	100.00	85.87	92.93
SK-8171/1-1 x S.C.122	65.50	60.00	62.75	277.75	209.75	243.75	147.50	120.50	134.00	100.00	98.95	99.47
SK-8171/1-1xT.W.C322	65.75	61.25	63.50	285.00	216.75	250.87	151.50	119.75	135.62	100.00	98.86	99.43
SK-8171/3-2 x Sd-34	64.25	61.25	62.75	285.50	227.50	256.50	145.50	118.50	132.00	99.00	89.91	94.45
SK-8171/3-2 x SK-1	65.50	60.75	63.12	286.00	213.00	249.50	156.50	117.0	136.75	98.00	82.12	90.06
SK-8171/3-2 x S.C122	65.50	60.50	63.00	274.50	219.00	246.75	152.50	122.25	137.37	99.00	93.10	96.05
SK-8171/3-2xT.W.C322	64.75	59.00	61.87	289.75	224.50	257.12	156.25	121.25	138.75	100.00	92.39	96.19
SK-8174/7-2 x Sd-34	61.75	58.50	60.12	277.50	228.25	252.87	143.00	123.75	133.32	99.00	100.00	99.50
SK-8174/7-2 x SK-1	63.25	59.00	61.12	280.75	221.50	251.12	146.75	123.50	135.12	100.00	93.12	96.56
SK-8174/7-2 x S.C122	62.75	58.25	60.50	249.50	210.25	244.87	152.50	118.75	135.62	95.00	93.12	96.41
SK-8174/7-2xT.W.C322	63.00	58.25	60.62	298.75	230.75	264.75	155.75	128.25	142.00	100.00	97.82	98.81
SK-8174/3-1 x sd-34	62.75	59.75	61.25	284.75	229.25	257.00	145.25	121.50	133.37	100.00	97.61	99.40
SK-8174/3-1 xSK-1	63.75	59.75	61.75	276.75	224.25	250.50	149.75	124.50	137.12	98.00	98.81	97.20
SK-8174/3-1 x S.C.122	63.50	59.50	61.50	286.00	218.50	252.25	153.00	126.75	139.87	98.00	96.41	96.89
SK-8174/3-1xT.W.C322	64.00	58.75	61.37	297.50	227.75	262.62	162.75	129.75	146.25	100.00	95.78	98.86
SK-8174/3-2 xSD-34	62.00	59.00	60.50	271.75	224.25	248.00	139.75	121.50	130.62	100.00	97.72	97.32
SK-8174/3-2 x SK-1	64.75	58.50	61.62	293.25	213.50	253.37	166.50	116.75	141.62	97.00	94.65	95.83
SK-8174/3-2 x S.C122	64.00	57.50	60.75	279.25	215.25	247.25	156.25	118.00	137.12	98.00	93.75	95.64
SK-8174/3-2xT.W.C322	63.50	58.00	60.75	291.50	233.25	262.37	159.25	127.00	143.12	100.00	93.28	96.60
SK-8174/7-1 xSD-34	63.50	59.00	61.25	275.25	219.00	247.12	136.25	115.75	126.00	100.00	93.21	99.43
SK-8174/7-1 x SK_1	63.50	60.25	61.87	281.75	217.00	249.37	153.50	117.25	135.37	100.00	98.86	98.91
SK-8174/7-1 x S.C122	63.00	59.00	61.00	227.25	214.75	246.25	147.50	115.75	131.62	100.00	97.82	100.00
SK-8174/7-1xT.W.C322	63.25	57.75	60.50	283.75	224.25	254.00	151.25	122.25	136.75	100.00	100.00	99.45
SK-8174/1-1 x Sd-34	63.50	60.75	62.12	281.00	230.75	255.87	143.00	125.50	134.25	96.00	98.91	97.89
SK-8174/1-1 x SK-1	63.00	60.75	61.87	285.75	224.75	255.25	152.25	126.75	139.50	100.00	96.41	98.20
SK-8174/1-1xS.C122	62.25	59.75	61.25	282.00	212.75	247.37	156.25	116.75	136.50	99.00	94.53	96.76
SK-8174/1-1xT.W.C322	64.25	59.75	62.00	283.25	229.00	256.12	159.75	128.75	144.25	100.00	94.73	97.37
L.S.D 0.05	1.72	1.64	1.19	14.47	12.86	9.68	12.16	10.37	7.99	3.95	9.60	5.19
0.01	2.27	2.16	1.56	19.05	16.93	12.74	16.01	13.65	10.52	5.20	12.64	6.83

General combining ability (GCA) effects for the studied traits of the eight inbred lines are given in Table (3). The best inbred lines had desirable GCA effects were; Sk-8003/1-2 for grain yield and ear length, SK-8171/3-2 and SK-8174/7-2 for number of rows/ear, SK-8171/3-2 and Sk-8174/1-1 for number of kernels/row, Sk-8174/7-2, SK-8174/3-1,SK-8174/3-2, SK-8174/7-1 for silking date (earlinss) and SK-8174/7-1 for plant height, ear height and late wilt resistance These lines can be used as good combiners in maize breeding program.

values of GCA effects for the testers of the studied traits are presented in Table (4). Desirable significant GCA effects were obtained by tester Sd-34 (narrow genetic base) for ear length and ear height. These results are in agreement with Russell *et al* (1973), Liakat and Teparo (1986) and Soliman and Sadek (1999) where they found the superiority of inbred line as tester to evaluate and select the best lines with highest GCA. While tester S.C.Sk-1 had the highest and desirable significant GCA effects for grain yield and number of rows/ear. Also testers S.C.122 and T.W.C. 322 had desirable significant GCA effects for number of rows/ear and grain yield, respectively.The superiority of crosses as good testers (broad genetic base) was obtained by several workers as Soklov and Kostyuchanco (1978)and Mosa (2001).

Data in Table (5) show specific combining ability(SCA) effects for top crosses for the studied traits.The top-cross (SK-8171/1-1 x Sd-34) was exhibited positive and significant SCA effects for grain yield. Also the top crosses(SK-8171/1-1 x SC122), (SK-8174/7-2 x T.W.C322), (SK-8174/3-2 x Sd-34) and (SK-8174/1-1 x Sd-34) showed positive and significant S.C.A effects for ear length. Whil top-cross (SK-8171/1-1 x T.W.C322) had negative and significant effectes for ear height.

Estimates of GCA and SCA variances and their interaction with locations are shown in Table (6).For grain yield and number of kernels/row, the variance of SCA had the major role in the inheritance of the two traits. These results agreed with Sprague and Tatum (1942), Nawar and EL-Hosary (1984), Ali and Tepora (1986), EL-Shenawy (1995) and Mosa(2001). On the other hand variance of GCA was important in the inheritance of ear length , number of rows/ear, silking date, plant and ear height and late wilt resistance. These results are in agreement with Sokolov and Kostyuchenko (1978), Shehata (1992), Salama *et al* (1995), Soliman and Sadek (1999) and El-Zeir *et al* (2000).

The magnitude of interaction of σ^2 GCA x location was greater than σ^2 SCA x location for all the studied traits except number of rows/ear, indicateing that GCA was more affected by locations than SCA .This result is in agreement with Mohmoud (1996), Soliman and Sadek (1999) and El-Zeir *et al*.(2000).

Table(3): Estimates of general combining ability effects for maize inbred lines at Sakha(SK) and Sids (SD) locations and their combined for eight traits.

Lines	Grain yield			Ear length			No of rows/ear			No of kernels/row		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
SK-8003/1-2	0.380	3.815**	2.100**	2.281**	1.541**	1.912**	-0.368	-0.110	-0.295*	-1.185	1.034	-0.075
SK-8171/1-1	-1.414	-1.511**	-1.462**	-0.720**	-1.205**	-0.962	-1.318**	-1.073**	-1.188**	1.514*	-1.153	0.179
SK-8171/3-2	0.635	-1.414**	-0.390	0.454	-0.145	0.155	0.331	0.626**	0.486**	2.289**	1.446*	1.869**
SK-8174/7-2	-1.029.	0.150	-0.440	-0.693*	-0.258	-0.475**	1.106**	0.626**	0.874**	-1.523*	-1.503*	-1.513**
SK-8174/3-1	-0.366	-0.264	-0.315	-0.475	0.216	-0.132	0.181	0.101	0.149	0.101	-0.565	-0.230
SK-8174/3-2	-0.471	-0.426	-0.450	-1.100**	-0.245	-0.672**	0.306	0.251	0.286	-1.585*	0.396	-0.593
SK-8174/7-1	0.110	0.095	0.1025	-0.263	-0.008	-0.137	0.456*	0.001	0.236	-1.085	-0.403	-0.745
SK-8174/1-1	2.14*	-0.444	0.855	0.519	0.104	0.312	-0.693**	-0.423*	-0.550**	1.476	0.746	1.111*
L.S.D 0.05	1.62	1.05	0.97	0.53	0.49	0.36	0.40	0.42	0.29	1.48	1.41	1.02
0.01	2.15	1.39	1.27	0.70	0.65	0.47	0.53	0.55	0.38	1.98	1.86	1.34
	Silking date			Plant height			Ear height			Late wilt resistance%.		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
SK-8003/1-2	3.335**	1.554**	2.443**	18.531**	18.031**	18.28**	28.531**	19.304**	23.911**	0.694	2.799	1.747
SK-8171/1-1	0.960**	1.179**	1.071**	-1.343	-3.343	-2.344	-3.718	-1.195	-2.465	0.694	0.036	0.364
SK-8171/3-2	0.710*	0.617*	0.663**	-2.406	-3.656	-3.029	-3.156	-5.257**	-4.213**	-0.305	-6.503**	-3.405**
SK-8174/7-2	-1.601**	-1.257**	-1.431**	-2.218	-1.968	-2.094	-6.343**	-1.445	-3.903**	-0.805	1.254	0.227
SK-8174/3-1	-0.789*	-0.320	-0.553**	-0.093	0.281	0.094	-3.156	0.617	-1.278	-0.305	1.296	0.494
SK-8174/3-2	-0.726*	-1.507**	-1.116**	-2.406	-3.093	-2.749	-0.406	-4.195*	-2.310	-0.328	-2.160	-1.245
SK-8174/7-1	-0.976**	-0.757*	-0.866**	-6.718*	-5.906*	-6.312*	-8.718**	-7.257**	-7.995**	0.694	3.014	1.854*
SK-8174/1-1	-0.914**	0.492	-0.211	-3.343	-0.343	-1.844	-3.031	-0.570	-1.743	-0.339	0.261	-0.037
L.S.D 0.05	0.61	0.58	0.42	5.11	4.54	5.98	4.30	3.66	2.82	1.39	3.39	1.83
0.01	0.80	0.76	0.55	6.73	5.98	7.87	5.66	4.82	3.72	1.84	4.47	2.41

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

Table (4): Estimates of general combining ability effects for testers at Sakha (SK) and Sids(SD) locations and their combined for eight traits of maize.

Testers	Grain yield			Ear length			No of rows / ear			No of kernels / row		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
Sd-34	-2.853**	0.256	-1.298**	1.236**	1.323**	1.280**	-0.393**	-0.148	-0.294**	-0.723	0.578	-0.073
S.C. SK-1	3.753**	-1.184**	1.285**	0.134	-0.289	-0.078	0.318*	0.257	0.295**	0.139	-0.671	-0.265
S.C.122	-2.073**	-0.403	-1.237**	-1.034**	-0.664**	-0.848**	0.393**	0.064	0.236*	0.239	-0.334	-0.048
T.W.C 322	1.173**	1.330**	1.251**	-0.335	-0.369*	-0.352**	-0.318*	-0.173	-0.238*	0.345	0.428	0.387
L.S.D 0.05	1.15	0.74	0.68	0.37	0.35	0.25	0.28	0.30	0.20	1.04	1.00	0.72
0.01	1.51	0.98	090	0.49	0.46	0.33	0.37	0.39	0.27	1.38	1.31	0.95
	Silking date			Plant height			Ear height			Late wilt resistance%.		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
Sd-34	-0.351	0.367	0.007	-4.406*	6.125**	0.859	-7.625**	0.398	-3.620**	0.053	1.491	0.772
S.C. SK-1	0.211	0.429*	0.318*	2.156	-2.125	0.015	2.375	-0.257	1.050	-0.066	-3.086*	-1.577*
S.C.122	-0.007	-0.257	-0.131	-3.906*	-7.125**	5.514**	0.625	-2.132	-0.762	-0.680	0.799	0.059
T.W.C 322	0.148	-0.539	-0.195	6.156**	3.125	4.640**	4.625*	1.992	3.332**	0.694	0.795	0.745
L.S.D 0.05	0.43	0.41	0.29	3.61	3.21	2.42	3.04	2.59	1.99	0.98	2.40	1.29
0.01	0.56	0.54	0.39	4.76	4.23	3.18	4.00	3.41	2.63	1.30	3.16	1.70

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

Table (5): Estimate of specific combining ability effects for top crosses at Sakha (SK) and Sids (SD) locations and their combined for eight traits.

Crosses	Grain yield ard/fed			Ear length			No of rows/ear			No of kernels/ row		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
SK-8003/1-2 x Sd-34	-6.096**	1.398	-2.351*	-0.924	-0.323	-0.622	0.343	0.00	0.089	-5.976**	-0.976	-3.479**
SK-8003/1-2xS.C SK-1	1.626	-0.260	0.785	-0.271	-0.410	-0.343	0.431	-0.395	0.069	2.560	0.321	1.443
SK-8003/1-2 x S.C 122	2.273	0.488	1.377	1.097*	0.414	0.756*	-0.343	0.248	0.008	2.210	-0.065	1.075
SK-8003/1-2xT.W.C 322	1.996	-1.625	0.188	0.096	0.319	0.210	-0.431	-0.014	-0.166	1.204	0.721	0.959
SK-8171/1-1 x Sd-34	5.938**	4.845**	5.391**	0.278	-0.175	0.052	0.293	0.423	0.381	3.423*	1.109	2.265*
SK-8171/1-1 x S.C SK-1	-1.698	-0.153	-0.922	0.230	0.736	0.481	0.081	-0.282	-0.108	-1.539	1.908	0.188
SK-8171/1-1 x S.C 122	-3.171	-1.544	-2.360*	-0.180	-0.338	-0.258	-0.493	0.210	-0.149	-0.930	0.321	-0.309
SK-8171/1-1xT.W.C 322	-1.063	-3.148**	-2.108*	-0.329	-0.223	-0.275	0.118	-0.351	-0.124	-0.945	-3.340	-2.145*
SK-8171/3.2 x Sd-34	-0.491	-0.711	-0.601	-1.126*	-0.585	-0.855**	-0.156	0.223	0.058	-1.101	-2.490	-1.794
SK-8171/3.2 x S.CSK-1	1.451	0.219	0.835	0.305	0.126	0.213	0.231	-0.182	0.016	1.535	1.109	1.318
SK-8171/3.2 xS.C 122	-0.921	-1.761	-1.342	0.424	0.401	0.413	0.056	0.410	0.225	-1.314	1.070	-0.119
SK-8171/3.2 xT.W.C 322	-0.068	2.254*	1.108	0.395	0.056	0.227	-0.131	-0.451	-0.299	0.879	0.390	0.594
SK-8174/7-2 x Sd-34	-0.106	-0.216	-0.161	-0.149	-0.123	-0.135	-0.631	0.223	-0.180	-0.039	-1.640	-0.841
SK-8174/7-2 x S.C SK-1	-0.913	-0.255	-0.585	0.0534	-0.510	-0.226	-0.343	-0.182	-0.270	-0.601	0.459	-0.069
SK-8174/7-2 x S.C122	-0.856	0.583	-0.132	-0.727	-0.135	-0.436	0.481	0.110	0.288	-0.651	-1.478	-1.066
SK-8174/7-2 xT.W.C322	1.876	-0.110	0.878	0.823	0.769	0.797*	0.493	-0.151	0.163	1.292	2.659	1.977
SK-8174/3-2 x Sd-34	0.890	-0.631	0.133	0.333	-0.048	0.142	-0.306	-0.151	-0.205	2.285	1.021	1.655
SK-8174/3-2 xS.C SK-1	-0.545	-0.340	0.450	0.005	0.014	0.011	-0.318	0.442	0.054	-0.726	-0.778	-0.751
SK-8174/3-2 x S.C- 122	1.100	0.338	0.722	-0.145	0.189	0.021	0.506	-0.764	-0.136	-0.926	0.034	-0.449
SK-8174/3-2xT.W.C 322	-1.445	0.634	-0.406	-0.194	-0.155	-0.175	0.118	0.473	0.288	-0.632	-0.278	-0.455
SK-8174/3-2 x Sd-34	3.165	-1.819	0.668	1.158*	0.964*	1.062**	0.168	-0.101	0.056	1.073	3.459	2.268*
SK-8174/3-2 x S.CSK-1	-1.650	1.031	-0.305	-0.589	-0.173	-0.378	-0.143	0.192	0.016	-1.039	-2.090	-1.569
SK-8174/3-2 x S.C-122	-0.934	1.570	0.317	-0.070	-0.848	-0.358	-0.418	-0.214	-0.324	1.010	-0.928	0.043
SK-8174/3-2xT.W.C322	-0.580	-0.783	-0.681	-0.499	-0.143	-0.325	0.393	0.123	0.250	-1.045	-0.440	-0.742
SK-8174/7-1 x Sd-34	-2.146	-1.611	-1.873	-0.759	-0.323	-0.542	-0.181	-0.751	-0.443	-1.326	-0.990	-1.159
SK-8174/7-1 x S.C SK-1	-0.193	-0.840	-0.517	0.823	0.189	0.506	0.306	0.242	0.266	0.110	-0.640	-0.266
SK-8174/7-1 x S.C-122	1.113	0.998	1.055	-0.357	0.264	-0.043	0.331	0.735	0.525	0.710	1.021	0.865
SK-8174/7-1 xT.W.C322	1.266	1.454	1.336	0.293	-0.130	0.080	-0.456	-0.226	-0.349	0.504	0.609	0.559
SK-8174/1-1 x Sd-34	-1.151	-1.251	-1.206	1.188*	0.614	0.897*	0.468	-0.026	0.244	1.660	0.509	1.083
SK-8174/1-1 xS.C SK-1	1.721	0.599	1.160	-0.559	0.026	-0.263	-0.243	0.167	-0.045	-0.301	-0.290	-0.294
SK-8174/1-1 xS.C-122	1.398	-0.671	0.362	-0.040	-0.148	-0.093	-0.118	-0.735	-0.436	-0.101	0.021	-0.041
SK-8174/1-1 xT.W.C322	-1.968	1.324	-0.316	-0.589	-0.493	-0.540	-0.106	0.598	0.238	-1.257	-0.240	-0.747
L.S.D 0.05	3.25	2.11	1.94	1.06	0.99	0.72	0.81	0.84	0.59	2.96	2.83	2.04
0.01	4.28	2.78	2.55	1.40	1.30	0.95	1.07	1.11	0.77	3.90	3.72	2.69

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

Table (5) :Continue.

Crosses	Silking date			Plant height			Ear height			Late wilt resistance%.		
	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb.	SK	SD	Comb
SK-8003/1-2 x Sd-34	1.726**	0.070	0.897*	-5.468	3.437	-1.016	1.5	3.039	2.278	-0.053	-2.314	-1.182
SK-8003/1-2xS.C SK-I	-0.585	-0.742	-0.663	4.218	1.937	3.077	-1	2.195	0.607	0.066	1.274	0.668
SK-8003/1-2 x S.C 122	-0.367	0.445	0.036	1.781	4.437	3.107	1.25	2.070	1.669	0.680	0.518	0.600
SK-8003/1-2xT.W.C322	-0.773	0.226	-0.27	-0.531	-9.812*	-5.167	-1.75	-7.304	-4.555	-0.694	0.521	-0.085
SK-8171/1-1 x Sd-34	-0.148	-0.304	-0.23	4.156	7.562	5.858	10.25*	4.789*	7.525**	-0.053	2.588	1.270
SK-8171/1-1x S.C SK-1	-0.460	0.132	-0.16	5.343	4.562	4.952	0.25	2.445	1.354	0.066	-6.963*	-3.45
SK-8171/1-1 x S.C 122	0.257	-0.679	-0.211	-3.343	-4.437	-3.887	-5.25	-1.179	-3.202	0.680	2.230	1.452
SK-8171/1-1xT.W.C322	0.351	0.851	0.602	-6.156	-7.687	-6.922	-5.25	-6.054	-5.677*	-0.694	2.144	0.726
SK-8171/3.2 x Sd-34	-0.398	0.507	0.057	5.968	0.375	3.173	0.437	-1.648	-0.596	-0.053	-0.962	-0.51
SK-8171/3.2 x S.CSK-1	0.289	-0.054	0.116	-0.093	-5.875	-2.982	1.437	-0.249	-0.517	-0.933	-4.173	-2.55
SK-8171/3.2 xS.C 122	0.507	0.382	0.446	-5.531	5.125	-0.202	-0.812	4.632	1.914	0.680	2.920	1.802
SK-8171/3.2xT.W.C322	-0.398	-0.835	-0.62	-0.343	0.375	0.012	-1.062	-0.492	-0.800	0.305	2.214	1.256
SK-8174/7-2 x Sd-34	-0.585	-0.367	-0.477	-2.218	-1.562	-1.391	1.125	-0.210	0.463	0.446	1.370	0.907
SK-8174/7-2x S.C SK-1	0.351	0.070	0.211	-5.531	0.937	-2.297	-5.125	0.195	-2.457	1.566	-0.931	0.318
SK-8174/7-2 x S.C122	0.070	0.007	0.041	-0.718	-5.312	-3.017	2.375	-2.679	-0.145	-2.819*	-0.117	-1.47
SK-8174/7-2xT.W.C322	0.164	0.289	0.225	8.468	4.937	6.707	1.625	2.695	2.139	0.805	-0.323	0.244
SK-8174/3-2 x Sd-34	-0.398	-0.054	-0.225	2.906	-1.812	0.548	0.187	-4.523	-2.161	0.946	0.138	0.540
SK-8174/3-2 xS.C SK-1	0.039	-0.117	-0.036	-11.656*	1.437	-5.107	-5.312	-0.867	-3.082	-0.933	2.317	0.69
SK-8174/3-2 x S.C-122	0.007	0.320	0.163	3.656	0.687	2.172	-0.312	3.257	1.479	-0.319	-2.199	-1.257
SK-8174/3-2x T.W.C322	0.351	-0.148	0.097	5.093	-0.312	2.387	5.437	2.132	3.764	0.305	-0.255	0.026
SK-8174/3-2 x Sd-34	-1.210	0.382	-0.412	-7.781	-3.437	-5.606	-8.062	0.289	-3.879	0.996	-0.564	0.200
SK-8174/3-2 x S.CSK-1	0.976	-0.179	0.396	7.156	-5.937	0.607	8.687*	-3.804	2.449	-1.000	3.114	1.06
SK-8174/3-2 x S.C-122	0.445	-0.492	-0.023	-0.781	0.812	0.017	0.187	-0.679	-0.237	-0.296	-1.242	-0.767
SK-8174/3-2xT.W.C322	-0.210	0.289	0.04	1.406	8.562	4.982	-0.812	4.195	1.667	0.328	-1.308	-0.493
SK-8174/7-1 x Sd-34	0.539	-0.367	0.087	0.031	-5.875	-2.924	-3.25	-2.398	-2.814	-0.053	-1.529	-0.79
SK-8174/7-1 xS.C SK-1	-0.023	0.820	0.396	-0.031	0.375	0.169	4.00	-0.242	1.884	0.066	2.009	1.04
SK-8174/7-1 x S.C-122	-0.304	0.257	-0.023	2.031	3.125	2.579	-0.25	0.132	-0.052	0.680	0.303	0.492
SK-8174/7-1xT.W.C322	-0.210	-0.710	-0.46	-2.031	2.375	0.174	-0.25	2.507	0.982	-0.694	-0.793	-0.743
SK-8174/1-1 x Sd-34	0.476	0.132	0.302	2.406	0.312	1.358	-2.187	0.664	-0.816	-2.15	1.273	-0.437
SK-8174/1-1 xS.C SK-1	-0.585	0.070	-0.258	0.593	2.562	1.582	-2.937	2.570	-0.237	1.099	3.352	2.223
SK-8174/1-1 xS.C-122	-0.617	-0.242	-0.428	2.906	-4.437	-0.767	2.812	-5.554	-1.425	0.713	-2.414	-0.855
SK-8174/1-1xT.W.C322	0.726	0.039	0.385	-5.906	1.562	-2.172	2.312	2.320	2.479	0.338	-2.210	-0.930
L.S.D 0.05	1.22	1.16	0.84	10.23	9.09	9.68	8.60	7.33	5.65	2.79	6.79	3.67
0.01	1.60	1.53	1.10	13.47	11.97	12.74	11.32	9.65	7.44	3.68	8.94	4.83

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

Table:(6) Estimates of genetic variances of general and specific combining ability and their interaction with locations

Genetic componentes	Grain yield			Ear length			No. of rows/ear			No. of kernels/row		
	Sk	SD	Comb.	SK	SD	Comb	SK	SD	Comb	SK	SD	Comb
GCA	5.46	1.12	-0.717	0.9	0.68	0.717	0.27	0.09	0.193	0.25	-0.07	-0.175
SCA	4.06	2.11	1.13	-0.22	-0.02	0.26	0.001	0.03	-0.01	2.05	0.81	1.46
GCA x Loc	—	—	4.01	—	—	0.079	—	—	-0.006	—	—	0.36
SCA xLoc	—	—	1.95	—	—	-0.15	—	—	0.03	—	—	-0.025
	Silking date			Plant height			Ear height			Late wilt resistance %		
	Sk	SD	Comb.	SK	SD	Comb	SK	SD	Comb	SK	SD	Comb
GCA	0.81	0.53	0.46	31.7	36.92	21.74	61.71	22.1	31.3	0.123	4.81	0.32
SCA	0.11	-0.09	0.003	4.89	7.46	4.39	2.66	0.67	2.801	-0.795	-4.339	-0.012
GCA x Loc	—	—	0.204	—	—	12.56	—	—	10.59	—	—	2.14
SCA xLoc	—	—	0.007	—	—	1.78	—	—	-1.13	—	—	-2.55

REFERNCES

Ali, M.L and N.M. Tepora (1986). Comparative performance of four types of testers for evaluating corn inbred lines from two populations. Crop. Sci., 11 (3): 175-179.

Allison, J.C. and R.N. Curnow (1966). On the choice of tester parent for the breeding of synthetic varieties of maize (*Zea mays* L.). Crop Sci., 6: 541-544.

Davis, R.L. (1927). Report of the plant breeder. Rep. Puerto Rico. Agric. Exp. Sta. P., 14-15.

EL-ltriby, H.A.; A.R. Selim and A.H. Shehata, (1981). Genotype × environment interaction from combining ability estimates in maize (Zea mays L.). Egypt, J. Gent. Cytol. 10: 175-186.

El-Shenawy, A.A. (1995). Breeding for disease resistance in maize. Ph. D. Thesis, Fac. Agric. Menofiya Univ. Egypt.

EL-Zeir, F.A.; E.A. Amer; A.A. Abd EL-Aziz and A.A. Mahmoud (2000). Combining ability of new maize inbred lines and type of gene action using top-crosses of maize. Egypt . J. Appl. Sci; 15 (2) :116-128.

Kempthorne, O. (1957). An Introduction to Genetic Statistics. John wiley-sone Inc., NewYork.

Liakat, M.A and N.M. Teparo (1986). Comparative performances of four types of testers for evaluating corn inbred lines from two populations. Philippine J.Crop Sci., 4(5): 175-179.

Lonnquist,J.II and C.O. Gardner (1961). Heterosis in intervarietal crosses in maize and its implications in breeding procedure .Crop Sci. 1: 179-183.

Mahmoud, A.A. (1996). Evaluation of combining ability of newly developed inbred lines of maize. Ph. D. Thesis, Fac. Agric., Cairo, Univ., Egypt.

Matzinger, D.F.(1953). Comparison of three types of testers for the evaluation of inbreed lines of corn. Agron. J., 45: 493-495.

Mosa, A.E. (2001). A comparative study of the efficiency of some maize testers for evaluation a number of white maize inbred lines and their combining ability under different environmental conditions. Ph.D. Thesis, Fac. Agric., Kafr El-Sheikh, Tanta Univ., Egypt.

Nawar, A.A. and A.A. EL-Hosary (1984). Evaluation of eleven testers of different genetic sources of corn. Egypt. J.Genet. Cytol., 13:227-237.

Russell, W.A.; A.A. Ebrhart and U.A. Vega (1973). Recurrent selection for specific combining ability for grain yield in to maize populations. Crop Sci., 13: 257-2361.

Salama, F.A.; Sh. F. Aboel-Saad and M.M.Ragheb (1995). Evaluation of maize (*Zea mays* L.) top-crosses for grain yield and other agronomic traits under different environmental condition.J. Agric. Sci. Mansoura Univ. 20:127-140.

Shehata, A.H. and N.L. Dhawan (1975). Genetic analysis of grain yield in maize as manifested in genetically diverse varietal populations and their crosses. Egypt . J. Genet. Cyrol. 4: 96-116.

Shehata, A.M. (1992). Breeding and genetical studies of maize. Ph.D. Thesis,Agric. Minofiya Univ. Egypt.

Sokolov, B.P. and V.I. Kostyuchenko (1978). Choice of testers for the evaluation of combining ability in maize lines in top-crosses. Sl, Skokhazyaistvennaya biolog., 13 (1): 44-48.

Soliman, F.H. and S.E. Sadek (1999). Combining ability of new maize inbred lines and its utilization in the Egyptian hybrid program. Bull. Fac. Agric. Cairo Univ., 50: 1-20.

Sprague, G.F. and L.A. Tatum (1942). General vs. specific combining ability in single crosses of corn. J. Amer.Sco. Agron., 34: 923-932.
Steel, R.G. and J.H.Torrie (1980) .Principles and procedures of statistics Mc.Grow Hill Book Inc., New York ,USA.

الملـــخص العـــربى

تقدير القدرة الإئتلافية لسلالات جديدة من الذرة الشامية باستخدام تحليل السلالة × الكشاف

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هجنت ثمانية سلالات جديدة بيضاء من الذرة الشامية مع اربع كشافات (سلالة ٣٤ – هجيـــن فردى سخا-١- وهجين فردى ١٢٢ وهجين ثلاثى٣٢٢) وذلك بمحطة البحوث الزراعـــية بســـخا فـــى موسم ٢٠٠٠. قيمت الأباء والهجن القمية الناتجة منها فى موسم ٢٠٠١ فـــى محطتى بحوث سخا وسدس وذلك فى تصميم القطاعات الكاملة العشوائية وتم التحلـــيل الوراثى باستخدام تصميم (سلالة × الكشاف) طبقا Kempthorne 1957 بهدف تقديـــر القـــدرة الأئتلافـــية لهـــذة السلالات لصفة المحصول وبعض الصفات المحصولية الأخرى. وقد اظهرت النتائج ما يلى :

١- كـــان التباين الراجع الى تاثير المواقع والتراكيب الوراثية المختلفة والتفاعل بينهما معنويا فى معظم الصفات المدروسة.
٢- اظهـــرت الســـلالة SK8003/1-2 تاثـــيرات معنوية مرغوبة للقدرة العامة على الائتلاف لصفة محصول الحبوب وطول الكوز بينما اظهرت السلالة SK8174/7- 12 تاثـــيرات معـــنوية مـــرغوبة للقدرة العامة على الائتلاف لصفة قصر ارتفاع النبات والكوز والمقاومة لمرض الذبول المتاخر.
٣- اوضـــح تباين القدرة العامة على الائتلاف اهمية الفعل الإضافى للجينات فى وراثة صـــفات طـــول الكوز وعدد السطور وتاريخ ظهور ٥٠% من الحريرات وارتفاع النـــبات والكوز والمقاومة لمرض الذبول التاخر .بينما اظهر تباين القدرة الخاصة للائـــتلاف اهمـــية الفعل غير الإضافى للجينات فى وراثة صفة محصول الحبوب وعدد الحبوب للسطر .
٤- كانـــت القـــدرة العامـــة على الإئتلاف اكثر تأثرا بالمواقع من القدرة الخاصة على الإئتلاف بالنسبة لجميع الصفات المدروسة ما عدا صفة عدد السطور بالكوز.
٥- اوضحت النتائج ان عشرة هجن قمية وهى:
(Sk-8003/1-2×S.C. Sk-1), (Sk-8003/1-2×S.C.122), (Sk-8003/1-2× T.W.C 322), (Sk-8171/1-1×Sd-34), (Sk-8171/3-2×S.C.Sk-1), (Sk-8171/3-2×T.W.C322), (Sk-8174/7-2×T.W.C322), (Sk-8174/7-1× T.W.C322), (Sk-8174/1-1×S.C.Sk-1) and (Sk-8174/1-1×T.W.C.322)
لاتخـــتلف معنويا مع الهجينين التجاريين S.C122 وT.W.C322 لصفة محصول الحـــبوب ومعظم الصفات المدروسة ويمكن الاستفادة بهذه الهجن فى برنامج تربية الذرة الشامية.