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GENETIC STUDY ON SOME TOP CROSSES IN MAIZE UNDER TWO ENVIRONMENTS

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ABSTRACT

This study was carried out during three successive seasons to identify superior inbred lines and to evaluate some top crosses in maize. Seven newly developed inbred lines were crossed to each of ten testers giving a total of seventy top crosses. These top crosses were evaluated in two years. Data were recorded in grain yield/plant and other important agronomic characters and were analyzed according to Kempthorne (1957). General combining ability (g.c.a.) variances were predominant for plant height, ear height, ear diameter and number of rows/ear. Whereas, o^2 s.c.a. appeared to be more important in controlling grain yield/plant, ear length, number of grains/row, and silking date. Also, the interactions between s.c.a. x year were much higher than those between g.c.a. x year for all of the studied traits except for silking date. Inbred line M56 was the best combiner for grain yield/plant, ear length, and number of grains/row. Parental line M87 was a better combiner for short plant stature and earliness. The males D.C. Fatah and T.W.C. 320 were the best general combiner for grain yield/plant and some of its components. However, the male T.W.C. 310 expressed highly significant and negative gi effects for silking date. The best s.c.a. effects for grain yield/plant were obtained in the crosses (T.W.C. 320 x M73), (G 303A x M129), (D.C. 215 x M43), (D.C. 215 x M82) and (Giza 2 x M43). The top crosses (T.W.C. 320 x M 73) and (S.C.10 x M56) produced the highest significant increases in grain yield/plant relative to T.W.C. 310.

INTRODUCTION

Many efforts have been devoted by corn breeders to evaluate the newly developed inbred lines of maize. This will help in the identification of the superior inbred lines to be used in maize breeding programs. The top cross test is one of the most important tests used in the evaluation of maize inbred lines. However, the effectiveness of this test depends mainly upon the type of the tester to be used in the evaluation program. 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. He suggested a tester with broad genetic base for the testing of general combining ability of inbred lines. Grogan and Zuber (1957) indicated that some single crosses were as equally effective as double crosses for measuring general combining ability El-Ghawas (1963) and

Katta (1971) concluded that single cross 14 showed superiority as a narrow base genetic tester.

The estimation of general and specific combining ability in different top crosses in maize was reported by several researchers. Among those are: (El-Itriby *et al*, 1981; Nawar and El- Hosary, 1984; El- Hosary, 1985; and Sedhom, 1992). They found that specific combining ability was more important than general combining ability in the inheritance of grain yield/plant and some other traits in maize.

The current investigation was conducted to identify and assess superior inbred lines of maize, to estimate g.c.a and s.c.a effects for both inbred lines and testers, and to find out the best top crosses to be used immediately in maize breeding programs.

MATERIALS AND METHODS

This study was undertaken during three years at the Agricultural Research Center, Faculty of Agriculture Moshtohor. The plant materials of this study included seven new inbred lines (females) and ten maize testers (males). The inbred lines were Moshtohor (M) 43, 56, 73, 82, 87, 113 and 129. The first four lines were developed from Pioneer 514, whereas M87 was developed from Cairo 1. Lines M113 and M129 were developed from American Early and Composite 108, respectively. The ten testers were: one composite variety (Giza 2 - from Egypt), four double crosses (D.C 204 and D.C. 215 from Egypt; and D.C Taba and D.C. Fatah - from Pioneer Overseas Company); two three- way crosses(T.W.C 320, T.W.C 310 from Egypt), two inbred lines (G 303 A and M12 from Egypt). The line Moshtohor (M12) an elite inbred line - was developed from Giza 2.

In 1991 summer season, the seven inbred lines were top-crossed to each of the ten testers giving a total of seventy top-crosses. These top crosses along with a check (T.W.C. 310) were evaluated over two years (1992 and 1993). In each year, a randomized complete block design with three replications was used. The experimental unit was two rows, six meters long and 70 cm distant. Seedlings were thinned to one plant per hill spaced 30 cm apart. All other cultural practices were done properly during both growing seasons. A random sample of 20 guarded plants in each plot was taken to evaluate the following characters: grain yield/plant, plant height, ear height, ear length, ear diameter, number of rows/ear, number of grains/row and silking date. Grain yield/plant of each entry was adjusted to 15.5% moisture content.

The ordinary analysis of variance was made for each season then the combined analysis over the two seasons was processed after testing the homogeneity of error variances. Combining ability analysis was performed according to Kempthorne (1957) over the two growing seasons.

RESULTS AND DISCUSSION

Test of homogeneity revealed the validity of the combined analysis for the data of the two growing seasons. Results in Table (1) indicated that years mean squares were highly significant for all of the studied traits except for silking date. Significant lines and testers mean squares were obtained for all traits except for plant height and number of grains/row for the studied testers. Such results indicated a wide range of variability among both parental inbred lines and testers. Moreover, significant line x tester interaction mean squares was detected for all of the studied traits. This result led to the conclusion that the parental lines performed differently according to the tester to which it crossed. Significant interactions between males and year were obtained for ear height and silking date. Whereas, significant interactions between testers and years were detected for grain yield/plant, ear length, and silking date. This means that the studied genotypes responded differently to the growing summer seasons. Also, significant lines x testers x year mean squares were obtained for all characters under study except for ear length, number of grains/row and silking date. Similar results were recorded by El- Etriby *et al* (1981), Nawar and El- Hosary (1984), El- Hosary (1985) and Sedhom (1992).

The estimates of general combining ability (g.c.a.) and specific combining ability (s.c.a.) variances along with their interaction with year are presented in Table (1). Results indicated that the ratios between g.c.a. and s.c.a. were approximately 11.33: 0, 5.14: 1, 106: 1 and 2:1 for plant height, ear height, ear diameter and number of rows/ear, respectively. Such results indicated that the additive types of gene action were important in controlling the behavior of these traits. Whereas, the ratios of g.c.a. to s.c.a. were 0.30: 1, 0.32: 1, 0.98:1 and 0.46: 1, for grain yield/plant, ear length, number of grains/row and silking date, respectively. Therefore, non-additive type of gene action appeared to be the most important genetic component involved in the inheritance of these characters. The importance of δ^2s.c.a. in controlling grain yield/plant was reached by many investigators (Galal *et al.*, 1978; Nawar and El-Hosary, 1984; El- Hosary, 1985; and Sedhom, 1992). It is clear that the magnitude of the interaction between s.c.a. x year was higher than that of g.c.a. x year for all of the studied traits except for silking date. Consequently, non-additive gene effects seemed to be more affected by environments. These results are in good agreement with those reported by Gilbert (1958), El- Hosary (1985) and Sedhom (1992).

General combining ability effects ($\hat{g}i$) calculated for each female and male combined over two years are presented in Table (2). The results showed that the best general combiner over the ten males was the parental line M56 for grain yield/plant, ear length, and number of grains/row, since it expressed the highest significant and positive ($\hat{g}i$) effects. Whereas, inbred line M87 gave the highest significant and negative ($\hat{g}i$) effects for ear height and silking date

Table (1): Analysis of variance for all of the studied traits combined over two seasons.

S.O.V	d.f	Grain yield g/plant	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (mm)	No. of rows/ ear	No.of grains/ row	Silking date
Years (Y)	1	34399.05**	55637.04**	10761.61**	141.52**	904.64**	10.72**	278.32**	21.94
Blocks within (Y)	4	1905.33	699.54	437.95	10.73	11.51	0.11	22.85	42.61
Genotypes	69	1613.32**	568.17**	391.58**	8.04**	27.58**	7.92**	48.39**	27.52**
Females	6	4103.97**	1719.86**	978.06**	18.72**	82.32**	32.63**	242.50**	86.76**
Males	9	2804.83*	771.24	910.83**	15.24*	80.70**	19.14**	45.04	55.15**
Females x Males	54	1137.99**	406.36**	239.87**	5.66**	12.65**	3.31**	27.38**	16.33**
Genotypes x year	69	757.53**	477.78**	291.25**	2.49*	6.27	2.02**	15.70*	9.71*
Females x year	6	791.81	826.23	829.75**	3.09	1.50	3.43	20.50	26.06**
Males x year	9	1979.47**	550.79	292.02	4.55*	3.26	1.16	21.11	19.13**
Females x Males x year	54	550.06*	462.89**	231.24**	2.08	7.30*	2.01**	14.27	6.33
Error	276	383.88	193.11	136.02	1.75	4.85	0.78	10.49	6.38
Estimates:									
δ^2 g.c.a.		29.03	11.33	7.35	0.19	1.45	0.44	2.15	0.76
δ^2 s.c.a.		97.99	-3.42	1.43	0.60	0.89	0.22	2.19	1.67
δ^2 g.c.a. x year		32.77	10.26	12.93	0.07	-0.19	0.01	0.26	0.64
δ^2 s.c.a. x year		55.39	77.93	31.76	0.11	0.82	0.41	1.26	-0.02

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

Table (2): General combining ability effects of lines and testers combined over two years.

Parent	Grain yield/ plant	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (mm)	No of rows/ ear	No of grains/ row	Silking date
Females:								
M43 [1]	2.87	3.20	3.12*	0.13	-0.87**	-0.40**	0.03	1.24**
M56	15.23**	8.15**	5.13**	0.88**	-0.48	-0.22*	2.43**	-0.22
M73	0.70	-0.68	-0.26	0.03	-0.05	-0.24*	1.05*	-1.02**
M82	-8.51**	-3.12	-1.99	0.13	-1.28**	-0.79**	2.06**	0.37
M87	-3.54	-5.18**	-5.64**	0.14	-0.43	-0.31**	-1.11**	-1.66**
M113	2.17	-6.45**	-3.76*	-0.95**	2.07**	1.38**	-3.16**	-0.41
M129	-8.92**	4.08*	3.40*	-0.36*	1.05**	0.58**	-1.30**	1.72**
S.E. (gi)	2.53	1.79	1.51	0.17	0.28	0.11	0.42	0.33
S.E. (gi-gj)	3.58	2.54	2.13	0.24	0.40	0.16	0.59	0.46
Males:								
Giza 2	-4.47	-4.22*	0.85	-0.68**	-0.34	-0.39**	-1.05*	-1.04**
D.C. 204	-5.55	0.31	0.07	0.13	-1.15**	-0.35*	0.79	-0.24
D.C. 215	0.47	7.67**	6.14**	-0.01	2.36**	1.09**	-1.11*	1.33**
D.C. Taba	5.64	3.15	5.45**	-0.05	1.63**	0.74**	0.96	2.16**
D.C Fatah	10.47**	1.98	1.64	0.40*	1.06**	0.69**	-0.37	0.45
T.W.C. 320	10.28**	2.27	1.83	0.72**	-0.22	0.17	1.63**	0.28
T.W.C. 310	-3.95	0.51	-0.97	0.32	-0.69*	-0.10	0.04	-1.83**
S.C. 10	1.54	-0.39	-7.73**	0.24	-1.46**	-0.68**	-0.37	-0.14
M12	2.28	-4.03	0.45	0.28	0.65	0.15	0.88	-0.33
G 303 A	-16.71**	-7.25**	-7.73**	-1.35**	-1.84**	-1.02**	-1.40**	-0.64
S.E. (gi)	3.02	2.14	1.80	0.20	0.34	0.14	0.50	0.39
S.E. (gi-gj)	4.28	3.03	2.55	0.29	0.48	0.19	0.71	0.55

[1] M43 = Moshtohor 43

* and ** signifciant at 0.05 and 0.01 levels of probability, respectively.

Therefore, it seemed to be the best general combiner for short ear placement and earliness. Meanwhile, line M113 was the best combiner for plant height, ear diameter and number of rows/ear. Parental line M73 was among the good combiners for number of grains/row and silking date, whereas line M129 was the second best combiner for ear diameter and number of rows/ear. The effects of g.c.a. of males indicated that the double cross tester D.C Fatah was the best general combiner for grain yield/plant followed by the male three-way cross 320, since they expressed the highest significant and positive (gi) effects for this trait. Moreover, this particular double cross (D.C. Fatah) was among the good combiners for ear length, ear diameter, and number of rows/ear. Also, the three-way cross 320 was the best combiner for ear length and number of grains/row. The double cross male D.C. 215 appeared to be the best combiner for ear diameter and number of rows/ear. For date of silking, the best general combiner was the three-way cross 310. Line G303 A was the best combiner for both plant and ear heights. Also, D.C. Taba was among the good combiners for ear diameter and number of rows/ear. Single cross 10 seemed to be the best general combiner for ear height (Table 2).

It could be concluded that the double cross tester D.C. Fatah and the three-way cross 310 were the best general combiners among the studied ten males. The importance of the double crosses as good testers were reported by Grogan and Zuber (1957), Salem *et al* (1981) and Nawar and El- Hosary (1984).

The effects of specific combining ability of the top crosses for all traits combined over two years are presented in Table (3). The best s.c.a. effects for grain yield/plant were detected in the crosses: (T.W.C. 320 x M73), (G 303 A x M129), (D.C. 215 x M43), (D.C. 215 x M82) and (Giza 2 x M43). For plant height, the best s.c.a. effects were obtained in two top crosses (M12 x M73) and (S.C. 10 x M43). Three test crosses (D.C. Fatah x M129), (Giza 2 x M87) and (S.C. 10 x M82) expressed significant and negative s.c.a. effects for ear height. The best s.c.a. effects for ear length and number of rows/ear were detected for the top cross (T.W.C. 320 x M73). Also, this latter cross expressed desirable s.c.a. effect for ear diameter and silking date. However, the best s.c.a. effects for silking date was recorded for the cross (Giza 2 x M56) followed by the cross (T.W.C. 320 x M73). The cross (D.C. 215 x M43) produced the highest significant and positive s.c.a. effects for number of grains/row.

The relative increases in grain yield/plant over the check variety T.W.C. 310 (heterosis %) were estimated properly. However, for the sake of brevity results proved that the highest significant increases in grain yield/plant relative to T.W.C. 310 (31.06, and 26.44%) were obtained in the two top crosses: (T.W.C. 320 x M7), and (S.C. 10 x M56)), respectively.

Such test crosses are very important and could be used immediately in maize breeding programs to improve the yield potentiality of maize crop.

Table (3): Specific combining ability effects for all traits combined over two years.

Trait	Grain yield g/ plant							Plant height						
Male \ Female	M43	M56	M73	M82	M87	M113	M129	M43	M56	M73	M82	M87	M113	M129
Giza 2	16.62*	-1.07	-6.53	-6.32	-18.12*	2.66	12.76	5.39	-0.88	3.94	4.87	-10.55	-7.78	5.01
D.C. 204	-19.93*	4.83	2.36	-0.91	2.45	5.90	5.00	-0.98	7.06	0.89	1.83	4.73	-3.33	-10.20
D.C. 215	20.84**	11.64	-2.82	17.89*	-8.90	-17.62*	-21.02**	-0.01	-2.95	2.20	-2.52	2.20	-1.02	2.10
D.C. Taba	8.50	-10.69	-14.32	6.22	4.75	6.04	-0.52	1.51	-5.27	-0.77	-8.33	8.56	-3.33	7.63
D.C. Fatah	-0.82	-4.02	10.84	9.39	-0.57	0.20	-15.02	19.18**	1.56	0.73	-7.66	-6.26	2.66	-10.20
T.W.C. 320	-20.63**	3.5	32.36**	-2.25	7.11	-4.60	-15.50	1.72	-11.55*	5.44	11.87*	-2.22	-2.12	-3.15
T.W.C. 310	-22.06**	-20.09*	8.10	4.65	8.68	11.47	9.23	0.32	-9.95	5.04	-1.19	0.04	3.30	2.44
S.C. 10	-1.56	19.23	1.77	-27.17**	4.85	2.80	0.07	-14.60**	24.44**	4.27	-10.28	-3.38	1.87	-2.32
M 12	6.03	10.00	-15.96	2.25	5.61	-2.93	-5.00	-3.29	1.08	-16.07**	4.52	14.25*	-1.81	1.32
G 303 A	12.70	-13.33	-15.79*	-3.75	-5.88	-3.93	30.00**	-9.24	-3.53	-5.69	6.90	-7.36	11.56*	7.36
S.E. (Sij)	8.00							5.67						
S.E. (Sij-Sij)	11.31							8.02						
	Ear height							Ear length						
Giza 2	12.25**	2.07	-5.52	5.71	-11.64*	-8.19	5.31	1.01	-0.11	0.04	-1.01	-1.12*	0.22	0.97
D.C. 204	-6.45	-2.30	0.42	0.99	8.31	1.26	-2.23	-0.52	0.01	-0.66	0.42	1.07*	0.19	-0.51
D.C. 215	3.97	2.29	6.85	4.25	-2.92	-7.80	-6.64	1.81**	1.36*	0.03	0.77	-1.57**	-0.85	-1.55**
D.C. Taba	-1.16	-4.68	0.04	-0.38	8.93	-5.95	3.21	0.48	-2.90**	-0.55	0.91	0.72	0.44	0.90
D.C. Fatah	2.14	0.12	-0.80	-0.07	9.07	3.35	-13.80**	-1.14*	0.12	0.98	0.14	0.42	0.01	-0.53
T.W.C 320	3.28	-0.06	4.00	3.23	-6.61	-0.50	-3.33	-0.50	1.20*	1.84**	-0.43	-0.90	-0.20	-1.01
T.W.C. 310	-6.74	-6.09	-0.35	-3.62	1.85	3.14	11.80	-0.73	-0.44	0.59	-0.51	0.77	-0.32	0.64
S.C. 10	-0.64	14.33**	-2.09	-10.36*	-6.87	5.40	0.23	-0.95	1.00	-0.09	-1.07*	0.43	0.02	0.66
M 12	-2.00	0.48	-0.78	-3.21	2.93	4.71	-2.11	0.89	-0.46	-1.07*	0.12	-0.02	0.82	-0.28
G 303 A	-4.64	-6.16	-1.76	3.47	-3.04	4.57	7.57	-0.35	0.21	-1.11*	0.66	0.21	-0.33	0.71
S.E. (Sij)	4.76							0.54						
S.E. (Sij-Sij)	6.73							0.76						

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

Table (3): con't

Trait	Ear diameter							No. of rows/ear						
Female / Male	M43	M56	M73	M82	M87	M113	M129	M43	M56	M73	M82	M87	M113	M129
Giza 2	1.74	0.98	0.46	1.56	-0.15	-5.33**	0.74	0.69	0.08	0.16	0.63	-0.34	-1.65**	0.43
D.C. 204	-0.32	0.15	0.11	-0.54	-1.05	0.99	0.66	0.33	-0.30	-0.32	-0.80*	0.32	0.49	0.28
D.C. 215	0.62	-0.08	-0.97	0.70	0.74	0.13	-1.14	0.01	0.43	-1.50**	0.33	0.44	1.14**	-0.85*
D.C. Taba	-0.03	0.25	-1.45	1.26	-0.26	0.35	-0.12	0.26	1.12**	-1.11**	0.57	-0.72*	-0.32	0.22
D.C. Fatah	0.72	0.16	0.59	-0.48	0.06	-1.73	0.68	-0.42	-0.25	0.96**	-0.46	-0.11	-0.22	0.50
T.W.C 320	-2.00*	0.21	2.02*	-0.74	0.98	1.85*	-2.28*	-0.63	0.08	1.80**	-0.23	-0.18	-0.31	-0.53
T.W.C. 310	-0.77	-1.40	1.09	0.46	-1.51	2.22*	-0.09	-0.43	-0.65	-0.22	0.20	0.34	0.19	0.57
S.C. 10	-1.11	1.79*	1.42	-2.33**	-0.12	0.45	-0.10	0.43	0.45	-0.31	-0.51	0.08	0.14	-0.28
M 12	-0.01	-0.10	-0.91	0.41	0.62	0.90	-0.91	-0.14	-0.37	-0.33	-0.95**	1.29**	1.03**	-0.53
G303 A	1.20	-1.94*	-2.38**	-0.29	0.69	0.16	2.56**	-0.09	-0.59	0.87*	1.22**	-1.11**	-0.49	0.19
S.E. (sij)	0.90							0.36						
S.E. (Sij-Sij)	1.27							0.51						
	No of grains/ row							Silking date						
Giza 2	-2.23	0.16	0.46	2.15	-0.25	1.17	-1.46	3.54**	-3.65**	-1.18	-1.08	2.94**	0.19	-0.76
D.C. 204	-0.68	0.68	-0.22	1.21	-1.49	0.11	0.39	0.90	-0.29	2.83**	-2.56*	0.63	-0.44	-1.07
D.C. 215	5.03**	2.56	-1.24	-0.40	-1.71	-1.90	-2.34	-1.66	2.29*	0.60	0.20	-2.76**	0.48	0.85
D.C. Taba	2.90*	-6.34**	-0.44	2.53	-0.13	0.69	0.79	-0.16	-0.20	0.93	0.03	-1.43	-0.18	1.01
D.C. Fatah	0.31	-0.01	2.69*	-1.25	-1.48	0.74	-1.00	-0.78	1.34	0.31	-0.58	0.94	-0.13	-1.10
T.W.C. 320	-2.60*	1.19	2.44	-0.64	3.35*	-2.14	-1.60	2.54*	-1.15	-3.01**	-1.42	-0.55	1.86	1.73
T.W.C. 310	-0.78	-0.92	1.77	-0.59	1.75	-2.82*	1.59	0.83	-0.53	-0.07	1.70	-0.27	-0.68	-0.98
S.C. 10	-2.71*	3.30*	0.35	-1.25	-1.04	0.01	1.34	-1.19	0.27	0.91	0.67	-0.29	-0.70	0.33
M 12	0.35	-1.39	-3.73**	-0.32	1.17	3.28*	0.64	-1.83	0.47	-2.40*	0.70	0.57	0.98	1.51
G 303 A	0.41	0.76	-2.10	-1.43	-0.14	0.85	1.65	-2.19*	1.44	1.07	2.34*	0.21	-1.37	-1.50
S.E. (Sij)	1.32							1.03						
S.E. (Sij-Sij)	1.87							1.46						

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

Table (4): Mean values and ranking of females and males for grain yield/plant (combined over two years).

Males	Females							Average	ranking of Males
	M43	M56	M73	M82	M87	M113	M129		
Giza 2	181.3 (3)	176.0 (8)	156.0 (8)	147.0 (8)	140.2 (9)	166.7 (8)	165.6 (2)	161.8	(8)
D.C. 204	144.0 (9)	180.8 (6)	163.8 (6)	151.3 (3)	159.6 (7)	168.8 (6)	156.8 (6)	160.7	(9)
D.C. 215	190.5 (1)	193.7 (4)	164.7 (5)	176.2 (2)	154.3 (8)	151.3 (9)	136.8 (10)	166.7	(6)
D.C. Taba	183.3 (2)	176.5 (7)	158.3 (7)	169.7 (3)	173.2 (2)	180.2 (1)	162.5 (4)	171.9	(3)
D.C. Fatah	178.8 (4)	188.0 (5)	188.3 (2)	177.7 (1)	172.7 (3)	179.2 (2)	152.8 (8)	176.7	(1)
T.W.C. 320	158.8 (8)	195.3 (2)	209.7 (1)	165.8 (4)	180.2 (1)	174.2 (4)	152.2 (9)	176.6	(2)
T.W.C 310	143.2 (10)	157.5 (9)	171.2 (3)	158.5 (6)	167.5 (6)	176.0 (3)	162.7 (3)	162.3	(7)
S.C. 10	169.2 (6)	202.3 (1)	170.3 (4)	132.2 (10)	169.2 (5)	172.8 (5)	159.0 (5)	167.8	(5)
M12	177.5 (5)	193.8 (3)	153.3 (9)	162.3 (5)	170.7 (4)	167.8 (7)	154.7 (7)	168.5	(4)
G 303 A	165.2 (7)	151.5 (10)	134.5 (10)	137.3 (9)	140.2 (10)	147.8 (10)	170.7 (1)	149.6	(10)
Average	169.1	181.5	167.0	157.8	162.7	168.4	157.3	166.2	
Ranking of Females	(2)	(1)	(4)	(6)	(5)	(3)	(7)		

The mean values and ranking of females (lines) and males (testers) for grain yield/plant combined over two years are presented in Table (4). It is clear that individual males ranked the females differently. On the average of the ten studied males, the best three females were M56, M43, and M113. Moreover the double cross Fatah gave the highest grain yield followed by the male T.W.C. 320. These two testers were also expressed the highest desirable g.c.a. effects for grain yield/plant and some other traits.

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دراسة وراثية لبعض الهجن القمية من الذرة الشامية تحت بيئتين مختلفتين

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أجريت هذه الدراسة بمركز البحوث والتجارب الزراعية بكلية الزراعة بمشتهر بهدف تقييم سبعه سلالات جديده وكذلك تقييم مجموعة من الهجن القمية الناتجة من تهجين هذة السلالات مع عدة كشافات مختلفة من الذرة الشامية . ولتحقيق هذا الغرض تم تهجين سبعة سلالات نقية جديدة هي مشتهر ٤٣، ٥٦ ، ٧٣ ، ٨٢ ، ٨٧ ، ١١٣ ، ١٢٩ مع عشرة كشافات مختلفة هي جيزة ٢ ، أربعة هجن زوجية (٢٠٤ ، ٢١٥ ، طابا ، فتاح) هجينين ثلاثيين (٣١٠، ٣٢٠) ، هجين فردي ١٠ ، سلالتين نقيتين (جيزه ٣٠٣ أ ، مشتهر ١٢) . ففي موسم ١٩٩١ تم تكوين سبعون هجينا قميا ، وتم تقيم هذه الهجن القمية مع صنف مقارنة (هجين ثلاثى ٣١٠) في موسمين مختلفين ١٩٩٢ ، ١٩٩٣ باستخدام تصميم قطاعات كاملة العشوائية مع ثلاثة مكررات . وتم تقدير القدرة العامة والخاصة على التآلف حسب طريقة (Kempthorne, 1957) ويمكن تلخيص أهم النتائج فيما يلي:

١ - كان التباين الراجع الي كلا من السلالات والكشافات وكذلك تفاعلهما مع السنوات معنويا لمعظم الصفات المدروسة .

٢ - كان التباين الراجع للعوامل الوراثية المضيفة هو السائد لصفات أرتفاع النبات وأرتفاع الكوز ، وقطر الكوز وعدد صفوف الكوز . بينما كان التباين الراجع لعوامل الغير مضيفه هو الاهم بالنسبة لصفات محصول حبوب النبات ، وطول الكوز وعدد حبوب الصف ، وميعاد التزهير . وكان تفاعل القدرة الخاصة على التآلف مع السنوات أكثر أهمية من تفاعل القدره العامة مع السنوات لجميع الصفات المدروسة .

٣ - اظهر التحليل التجميعي أن أفضل السلالات الأبوية في القدرة العامة على التآلف هي مشتهر ٥٦ لصفة محصول الحبوب للنبات ، طول الكوز ، عدد حبوب السطر ، بينما كانت السلالة مشتهر ٨٧ هي أفضل لارتفاع الكوز وميعاد التزهير . وكانت السلالاة مشتهر ١١٣ أحسن السلالات بالنسبة لارتفاع النبات ، قطر الكوز ، وعدد صفوف الكوز . وأعطي الهجين الزوجي فتاح والهجين الثلاثي ٣٢٠ اعلى قدرة عامة على التآلف للمحصول وبعض مكوناته ، وكان الهجين الزوجي ٢١٥ هو الافضل لصفتي قطر الكوز وعدد صفوف الكوز .

٤- أعطت الهجن القمية : هجين ثلاثي (٣٢٠ × مشتهر ٧٣)، (جيزة ٣٠٣ أ × مشتهر ١٢٩)، (هجين زوجي ٢١٥ × مشتهر ٧٣)،(هجين زوجي ٢١٥ × مشتهر ٨٣)، (جيزه ٢× مشتهر ٤٣) أعلى قدرة خاصة مرغوبة لصفة محصول الحبوب للنبات . واعطى الهجين القمى (هجين ثلاثى ٣١٠ × مشتهر ٧٣) اعلى زيادة محصولية بالنسبة الى محصول الهجين الثلاثي ٣١٠ (٣١,٠٦ ٪)، يلية الهجين القمى (هجين فردى ١٠ × مشتهر ٥٦).