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HETEROSIS AND COMBINING ABILITY IN YELLOW MAIZE (*Zea mays* L.) OVER TWO LOCATIONS (SAKHA AND NUBARIA)

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ABSTRACT

Half diallel cross among eight inbred lines were made at Sakha Research Station during the growing season 2002. The eight parents i.e. (L-121, Gm-1004, SK-6241, SK-7266, SK-8249, SK-9074, SK-9108 and SK-9115) and their F_1 crosses were evaluated at Sakha and Nubaria Agricultural Research Stations in 2003 growing season. Data were collected on silking date (days), plant and ear height (cm), grain yield (ard/fed.), ear length (cm), ear diameter (cm), No. of rows/ear, No. of kernels/row and weight of 100-kernels (gm). The data were genetically analyzed by using Griffing (1956) method-2 model I.

Location mean squares were highly significant for all studied traits and genotypes exhibited highly significant differences. The variances associated with general and specific combining abilities (GCA and SCA) were highly significant for all traits. High ratio of GCA/SCA mean square was detected for number of rows/ear and weight of 100-kernels/row indicating that the largest part of the total genetic variability associated with the two traits was a result of additive and additive by additive type of gene action, while, low ratio for the remaining traits were detected suggesting non-additive types of gene action. The interaction between locations and both types of combining abilities were highly significant for all traits except silking date.

The inbred line L121 could be considered as the best combiner for grain yield (ard/fed.) and the inbred line SK7266 is the best combiner for earliness. The highest desirable SCA effects were detected in the crosses; (L121 x GM1004) followed by (SK7266 x SK8249) for grain yield, (L121 x SK9074) for weight of 100-kernels, (GM 1004 x SK9108) for number of kernels/row, (L121 x SK9074) for number of rows/ear and ear diameter and (Gm 1004 x SK 6241) for ear length. These crosses could be used as superior and promising hybrids in maize breeding program.

Percentage of heterosis for grain yield in F_1 hybrids relative to the check varieties S.C. 155 and S.C. 3080 and to the mean of all crosses ranged from (-39.32 to 31.24) ,(-26.51 to 32.84) and (-50.47 to 25.74), respectively. The cross (L121 x Gm 1004) surpassed by (31.24, 32.84 and 25.74) percentage relative to the three checks; S.C. 155, SC 3080 and mean of all crosses (over two locations). Seven crosses out yielded the high check variety S.C. 155.

Key words: *Maize, Combining ability, Heterosis, Gene action.*

INTRODUCTION

Diallel crosses have been used in genetic research to determine the inheritance of important traits among a set of genotypes and to identify superior parents for hybrid or cultivar development. Conventional diallel analysis is limited to partitioning the total variation of the data into general combining ability (GCA) of each genotype and specific combining ability (SCA) of each cross. In this context, Sprague and Tatum (1942) defined general combining ability as the average performance of a line in hybrid combination, and it's considered as a measure of additive type of gene action, while, specific combining ability is a measure of non-additive type of gene action. Odemah (1973), Nawar *et al* (1980), Sedhom (1992), El-Shamarka (1995) and El-Shenawy *et al* (2002) found that the non additive effects were important in the inheritance of grain yield, ear length, ear diameter, number of kernels/row, plant and ear heights. But El-Shamarka *et al* (1994), Mosa (1996), Ibrahim (2001) reported that the additive effects were more important in the inheritance of number of rows/ear and weight of 100 kernels. Heterosis was also studied for different yield components of hybrid maize plants El-Hosary (1989), Ibrahim (2001) and Mosa (2001).

The aim of this investigation was 1: to study the relative importance of general and specific combining ability and their interactions with environments for certain quantitative characters in a diallel crosses of maize, 2) to determine the magnitude of heterosis in single crosses for grain yield over two locations, and 3) to identify superior parental lines and their prospective crosses to be used in hybrids maize breeding programs.

MATERIALS AND METHODS

Eight yellow maize inbred lines i.e. L-121, Gm 1004, SK-6241, SK-7266, SK-8249, SL-9074, SK-9108 and SK-9115 were used to establish the experimental materials for this study.

These inbred lines were obtained by maize research programs and had high combining ability. All possible cross combinations were made without reciprocals among the eight inbred lines in 2002 growing season at Sakha Research Station. The eight parents, 28 crosses and two check varieties, S.C. 155 and S.C 3080 were evaluated at two locations i.e. Sakha and Nubaria Agricultural Research Stations. Randomized complete block design experiments with four replications was used. Plot size was one row, 6 m long and 80cm width and hills were spaced at 25 cm. All cultural practices were applied as recommended. Data were recorded for silking date, plant height, ear height, grain yield (ard/fed.) adjusted to 15.5% moisture content, ear length, ear diameter, number of rows/ear, number of kernels/row and weight of 100-kernels.

General and specific combining ability estimates were obtained by using Griffing's (1956) diallel cross analysis designated as method 2 Model I for each location. The combined analysis of the two locations was carried out whenever homogeneity of variance was detected. Heterosis expressed as the percentage deviation of F_1 mean performance from the check varieties (S.C. 155, S.C. 3080) and the mean of all crosses (combined data) for grain yield.

RESULTS AND DISCUSSION

The analysis of variance for combining ability combined over the two locations (Sakha and Nubaria) for the nine studied traits are presented in Table (1). Mean squares of locations were highly significant for all studied traits, silking date, plant height, ear height, ear length, ear diameter, number of rows/ear, No. of kernels/row, weight of 100 grains and grain yield (ard./fed.). Genotypes and genotypes x locations mean squares exhibited highly significant differences for all traits except silking date, indicating that the performance of genotypes differed from location to another. These result are in agreement with those obtained by El-Hosary (1988) and Amer (2002). The variance associated with general and specific combining ability was highly significant in all traits, indicating that both additive and non additive types of gene action were involved in determining the performance of single cross progeny and to reveal the nature of genetic variance which had the greater role. GCA/SCA ratios were computed for number of rows/ear and weight of 100 grains, were high and largely exceed the unity revealing the importance of additive and additive gene action types that represent the great part of the total genetic variability. These results are in agreement with those obtained by Ogunbodede *et al* (2000), Katna *et al* (2002) and Wu *et al* (2003).

For the remainder traits GCA/SCA ratios indicate that the non additive gene action types played important role in the inheritance of these traits. The results are similar with Talleei and Kochaksaraei (1999), Geetha and Jayadraman (2000) and San *et al* (2001).

The interaction between location and both general and specific combining ability were highly significant for most traits, indicting that the magnitude of all types of gene action differ from location to other. The magnitude of the interaction for GCA x location was higher than SCA x location for most studied traits. This means that SCA x loc. was more stable than GCA x loc. for most traits. Also, this indicates that locations had major effect on the behaviour of all genotypes. These results are in harmony with

Table 1. Analysis of variance for the studied traits over two locations (Sakha and Nubaria)

S.O.V.	df	Silking date (day)	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/row	100-grains weight	Grain yield ard./fed.
Location (loc.)	1	138.24**	1046222.20**	474790.12**	200.89**	35.18**	166.83**	1323.06**	1092.51**	18144.454**
Rep./loc.	3	57.745	2088.75	935.60	1.606	0.38	0.93	9.39	20.80	29.733
Genotypes (G)	35	62.784**	8179.61*	3594.76**	23.908**	0.94**	14.09**	238.833**	24.99**	379.83**
SCA	7	57.00**	7155.96**	2352.46**	7.469*	0.81**	54.324**	128.806**	48.71**	145.231**
SCA	28	64.23**	8435.52**	3905.33**	28.02*	0.97**	4.03**	266.34**	19.06**	438.521**
G x loc.	35	7.723	1590.672**	837.25**	3.898**	0.44**	2.071**	20.027**	20.60**	51.103**
GCA x loc.	7	8.885*	1781.36**	1125.59**	2.784*	0.68**	1.654*	16.517**	22.6**	29.571**
SCA x loc.	28	7.432	1543.0**	765.17**	4.177**	0.38*	2.175**	20.905**	20.1*	56.786**
Error	213	4.391	236.19	116.193	1.230	0.161	0.727	5.640	7.850	10.10
GCA/SCA		0.887	0.850	0.602	0.266	0.831	13.49	0.484	2.56	0.331
GCA x L/SCA x L		1.196	1.154	0.602	0.266	0.831	0.103	0.790	1.124	0.524
X		61.18	189.43	101.34	18.26	4.53	14.58	33.92	34.93	18.91
C.V. %		3.41	8.11	10.6	6.1	8.86	5.85	7.0	8.02	16.81

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

those previously reached by Matzinger *et al* (1959), El-Hosary (1989) and El-Zeir *et al* (1999).

Mean performance of genotypes for nine studied traits as an average over two locations are shown in Table (2) there are higher differences between the parents and F_1's for grain yield trait. The mean values for parents ranged from 4.88 (ard/fed.) for inbred SK 7266 to 11.06 (ard/fed.), for SK 9074, while the mean values for crosses ranged from 14.74 (ard/fed.) for cross SK 7266 x SK 9115 to 29.87 (ard/fed.) for cross L121 x Gm 1004. The highest averages for grain yield were obtained from the crosses, L121 x Gm 1004 29.87, L121 x SK9074 27.10, Gm 10.04 x SK6241 26.61, L121 x SK9108 26.00, SK 8249 x SK 9108 25.25, SK9074 xSK9108 24.28, SK Gm 1004 x SK 6241 23.88 and L121 x SK 9115 23.84. These crosses surpassed significantly the high check variety S.C. 155 for grain yield and some yield components.

Table 2. Means performance of maize genotypes over two locations (Sakha and Nubaria.).

Genotypes		Silking date (day)	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/ row	100-grains weight	Grain yield ard./fed.
L 121		65.9	155.9	71.9	14.45	3.8	12.4	21.2	37.1	8.94
Gm 1004		67.5	134.9	66.8	13.70	4.4	17.9	21.8	26.8	6.14
SK 6241		65.0	152.0	75.4	15.73	3.8	12.3	26.6	29.2	8.32
SK 7266		55.9	112.6	55.5	14.73	4.2	14.4	27.3	24.9	4.88
SK 8249		66.0	100.8	48.9	16.50	4.3	14.9	26.6	30.7	6.17
SK 9074		63.0	138.0	61.5	15.90	3.9	14.3	21.7	32.0	11.06
SK 9108		67.9	134.4	65.7	16.65	4.2	12.5	24.5	26.3	5.08
SK 9115		57.5	118.3	54.6	16.35	4.0	13.4	29.6	21.5	6.13
L 121	x Gm 1004	59.6	219.5	125.9	19.25	4.8	16.2	37.3	34.9	29.87
	x SK 6241	60.4	223.9	117.5	19.25	4.7	13.9	37.2	42.2	21.14
	SK 7266	59.3	223.0	119.9	19.40	4.9	14.6	36.8	39.8	21.53
	x SK 8249	58.8	211.6	107.6	18.95	4.8	14.5	37.7	40.2	22.98
	x SK 9074	59.4	222.0	124.4	18.58	5.0	16.1	32.8	44.0	27.10
	x SK9108	62.0	224.0	128.8	20.10	4.7	13.2	33.5	42.3	26.00
	x SK 9115	59.3	212.6	124.8	190.40	4.9	14.6	36.2	40.5	23.84
Gm 1004	x SK 6241	61.0	208.3	117.0	20.25	5.0	16.4	41.1	34.7	23.88
	x SK 7266	60.8	212.3	114.5	19.05	4.9	17.5	39.9	29.3	18.73
	x SK 8249	63.6	198.4	108.8	19.03	4.8	16.1	36.9	34.5	20.44
	x SK 9074	59.8	204.8	122.1	19.43	4.9	16.5	32.3	35.5	22.70
	x SK 9108	62.6	211.8	122.5	19.98	4.9	14.7	39.6	35.1	26.61
	x SK 9115	60.6	194.5	116.5	18.76	4.7	15.8	36.3	32.7	21.20
SK 6241	x SK 7266	58.0	205.3	101.9	18.7	4.7	15.2	37.5	32.2	18.60
	x SK 8249	58.0	193.6	99.3	16.75	4.6	13.5	38.6	37.2	23.39
	x SK 9074	58.0	200.4	109.3	18.35	5.9	15.1	37.4	37.1	22.17
	x SK 9108	59.9	211.1	118.1	19.85	4.6	13.1	38.6	37.0	22.69
	x SK 9115	58.8	190.4	98.6	18.88	4.5	13.3	37.3	32.3	18.84
SK 7266	x SK 8249	59.9	195.4	100.1	[illegible]	[illegible]	14.8	[illegible]	[illegible]	[illegible]
	x SK 9074	58.1	204.6	103.1	18.93	4.7	14.6	35.2	36.8	18.83
	x SK 9108	59.9	219.1	113.6	19.93	4.6	13.6	37.7	37.2	18.94
	x SK 9115	58.0	187.0	95.4	19.15	4.6	14.6	36.8	33.7	14.74
SK 8249	x SK9074	59.0	194.4	106.0	17.78	4.7	14.7	34.0	37.2	22.53
	x SK 9108	80.6	204.6	111.8	18.58	4.6	13.1	37.7	38.7	25.25
	x SK 9115	60.0	163.0	91.3	18.70	4.5	14.1	35.9	34.9	19.45
SK 9074	x SK 9108	61.0	204.0	109.6	20.00	4.6	14.5	32.9	38.7	24.28
	x SK 9115	60.6	183.6	97.0	17.28	4.3	14.7	31.4	34.5	18.23
SK 9108	x SK 9115	60.8	198.6	109.0	19.83	4.6	14.5	35.0	36.8	23.29
$\overline{X}$		61.18	189.43	101.34	18.26	4.53	14.58	33.92	34.93	18.91
S.C. 155		59.9	213.3	122.1	18.08	4.8	13.9	32.7	44.8	20.54
S.C. 3080		59.0	204.4	122.4	18.25	5.1	15.7	37.3	40.2	20.06
L.S.D.	0.05	2.07	15.21	10.67	1.10	0.40	0.84	2.35	2.77	3.15
	0.01	2.70	19.83	13.91	1.43	0.52	1.10	3.06	3.61	4.10

Estimates of GCA effects for the parental inbred lines in each studied traits are presented in Table (3). Inbred line L 121 showed highly significant positive and GCA effect considered the best combiner for grain yield, inbred line SK 9074 showed highly significant positive estimates of GCA effect for weight of 100-grains. Highly significant positive estimates of GCA effects were shown by the inbred line SK-6241 for kernels number, by the inbred line Gm1004 for number of rows/ear and by the inbred line SK9108 for ear length. The two inbred lines SK9074 and SK-9115 exhibited negative desirable GCA effects for silking date and plant and ear heights towards earliness and shortness, respectively.

Table 3. Estimates of general combining ability effects for studied traits over two locations (Sakha and Nubaria).

Genotypes	Silking date (day)	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/ row	100-grains weight	Grain yield ard./fed.
L 121	-0.022	12.969**	8.041**	-0.050	0.042	-0.350**	-0.898**	-5.623**	2.016**
Gm 1004	1.241**	-1.156	4.866**	-0.120	0.178**	1.750**	0.158	-1.903**	0.554
SK 6241	-0.659**	4.219*	0.028	-0.088	-0.132**	-0.625**	1.562**	-0.323	-0.287
SK 7266	-0.922**	11.394**	-0.659	-0.050	0.045	0.225*	0.932**	-2.173**	-2.032**
SK 8249	0.128*	-9.906**	-8.959**	-0.232	0.032	-0.080	0.470	0.358	0.012
SK 9074	-0.847**	-4.531*	-1.759**	-0.220	-0.092	0.335**	-2.612**	1.348**	0.774
SK 9108	1.191**	-4.531*	3.253**	0.722**	0.015	-0.960**	0.130	0.408	0.704
SK 9115	-0.109	-8.458**	-4.811**	0.038	-0.088	-0.295**	0.258	-2.616**	-1.741**

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

The estimates of specific combining ability effects for the F_1 crosses in this study for nine traits are shown in Table (4). Significant desirable SCA effects were detected for, silking date (fourteen crosses), ear length (seventeen crosses), number of rows/row (seven crosses), number of kernels/row (eighteen crosses), weight of 100 grains (fourteen crosses) and grain yield ard/fed. (sixteen crosses). The highest desirable SCA effects were obtained in the crosses, (L121 x Gm 1004) for grain yield (ard/fed.), (L121 x SK 9074) for weight of 100-grains, (Gm 1004 x SK 6241) for number of kernels/row, (L121 x SK 9074) for number of rows/ear and (L121 x Gm 1004) for silking date towards earliness. These crosses can be of practical importance in maize breeding programs.

Heterosis percentage relative to S.C. 155, SC 3080 and mean of all crosses from combined data are shown in Table (5). Most crosses showed highly significant positive heterotic effects over the two checks and mean of all crosses. The values of heterosis percentage ranged from -39.32 to 31.24 for the check variety S.C. 155 and seven crosses, (L121 x Gm 1004), L121 x SK 9074, L121 x SK 9108, Gm 1004 x SK 6241, Gm 1004 x SK 9108, SK 8249 x SK 9074 and SK 9074 SK 9108 surpassed the same check variety (S.C. 155). Nine crosses out yielded the second check (S.C. 3080 while five crosses surpassed the general mean of crosses over the two locations for

Table 4. Estimates of specific combining ability effects for 28 crosses over two locations (Sakha and Nubaria.)

Genotypes		Silking date (day)	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/ row	100-grains weight	Grain yield ard./fed.
L 121	x Gm 1004	-2.771**	14.292*	11.625*	1.162**	0.034	0.172	4.118**	-2.50	8.394**
	x SK 6241	-0.121	16.892**	8.088	1.129**	0.281	0.297	2.613**	4.80**	0.505
	SK 7266	-0.983	13.617*	11.150*	1.242**	0.241	0.097	2.868**	2.40	2.636*
	x SK 8249	-2.533**	22079**	7.200	0.974*	0.217	0.302	4.055**	2.80**	2.044
	x SK 9074	-0.933	19.729**	16.750*	0.587	0.491**	1.487**-	2.363**	6.60**	5.404**
	x SK9108	-0.346	16.504**	16.113**	1.169**	0.059	0.068	2.920**	4.90**	4.366**
	x SK 9115	-1.796**	21.404**	20.175**	1.154**	0.361*	0.667*	2.868**	3.10**	4.653**
Gm 1004	x SK 6241	-0.758	14.192*	10.763*	2.174**	0.395**	0.697*	5.408**	2.00	4.702**
	x SK 7266	-0.746	15.792*	8.950	0.962*	0.130	0.897**	4.863**	-3.40**	1.299
	x SK 8249	1.079	21.754**	11.500*	1.119**	0.056	-0.198	2.375**	1.80*	0.966
	x SK 9074	-1.821*	15.404*	17.675	1.507**	0.230	-0.213	0.783	2.80**	2.467
	x SK 9108	-0.983	17.179**	13.038**	1.114**	0.185	-0.8*	5.415**	2.40	6.442**
	x SK 9115	-1.683*	16.204*	15.100**	0.599	0.050	-0.233	1.913*	5.00**	3.480**
SK 6241	x SK 7266	-1.596*	7.017	1.163	0.579	0.253	0.972**	1.058	-0.23	2.011
	x SK 8249	-2.646**	15.229*	6.838	-1.188**	0.166	-0.423	2.645**	4.77**	4.760**
	x SK 9074	-1.671*	9.254	9.637*	0.399	-0.437**	0.812**	4.553**	4.67**	2.725*
	x SK 9108	-1.833*	14.779*	13.500**	0.957*	0.220	0.107	3.010*	4.57**	3.361**
	x SK 9115	-1.658*	10.304	2.063	0.667	-0.135	-1.408	1.558	-0.13	1.960
SK 7266	x SK 8248	-0.508	14.579*	8.400	1.249**	-0.111	0.027	0.950	0.69	7.019**
	x SK 9074	-1.2863	11.104	4.200	0.937*	0.163	-0.538	2.908**	3.69**	1.181
	x SK 9108	-1.571*	20.379**	9.688*	0.994*	0.030	-0.243	2.740**	4.09**	1.359
	x SK 9115	-2.146**	4.529	-0.500	0.904*	0.145	0.042	1.688	0.59	-0.393
SK 8249	x SK9074	-1.458	20.692**	15.375*	-0.031	0.239	-0.133	2.140	0.57	2.838*
	x SK 9108	-1.871*	25.717**	16.113**	-0.173	0.031	-0.438	3.203**	2.07	5.629**
	x SK 9115	-1.196	0.367	3.675	0.637	0.021	-0.103	1.225	1.73	2.270
SK 9074	x SK 9108	-0.521	12.367	6.788	1.239**	0.168	0.497	1.435	2.02	3.894**
	x SK 9115	0.404	8.267	2.225	-0.801	-0.030	0.082	-0.217	-2.18	0.292
SK 9108	x SK 9115	-1.508	18.042**	9.213	0.807	0.137	1.127**	0.640	3.56**	5.414**
L.S.D.sij	0.05	1.33	12.69	9.56	0.809	0.288	0.599	1.764	1.778	2.54
	0.01	1.73	16.53	12.46	1.054	0.376	0.780	2.298	2.582	3.31
L.S.D.sij-sik	0.05	1.97	18.77	14.15	1.197	0.427	0.885	2.609	3.364	3.76
	0.01	2.69	24.46	18.43	1.559	0.556	0.154	3.400	4.384	4.90
L.S.D.sij-skl	0.05	1.86	17.80	13.34	1.128	0.402	0.835	2.460	3.204	3.55
	0.01	2.42	23.06	17.38	1.470	0.524	1.088	3.206	4.174	4.62

Table 5. Percentage of heterosis for crosses relative to the two checks and mean of all crosses for grain yield over two locations (Sakha and Nubaria).

Crosses		Heterosis for grain yield (ard./fed.) relative to		
		S.C. 155	S.C. 3080	Mean of all crosses
L 121	x Gm 1004	31.24**	32.84**	25.74**
	x SK 6241	2.85	5.12	-1.04
	SK 7266	4.59	6.82	-3.05
	x SK 8249	10.62	12.71	3.46
	x SK 9074	24.22**	26.00**	18.15*
	x SK9108	20.98**	22.83**	14.66*
	x SK 9115	13.83	15.85	4.18
Gm 1004	x SK 6241	21.00**	22.50**	14.27*
	x SK 7266	-9.67	-7.11	-18.45
	x SK 8249	-0.49	1.86	-8.53
	x SK 9074	9.53	11.64	2.29
	x SK 9108	22.80**	24.61**	16.63*
	x SK 9115	3.12	5.38	-4.64
SK 6241	x SK 7266	-10.42	-7.84	-19.26
	x SK 8249	12.20	14.25*	5.17
	x SK 9074	7.36	9.52	-5.86
	x SK 9108	9.47	11.58	2.22
	x SK 9115	-9.02	-6.47	-17.74
SK 7266	x SK 8248	14.10	16.09*	7.21
	x SK 9074	-9.10	-6.53	-17.81
	x SK 9108	-8.45	-5.92	17.13
	x SK 9115	-39.32	-26.51	-50.47
SK 8249	x SK9074	8.84	10.97	1.54
	x SK 9108	18.68**	20.58**	12.17
	x SK 9115	-5.61	-3.14	-14.06
SK 9074	x SK 9108	15.40*	17.38*	8.63
	x SK 9115	-12.65	-10.02	-21.67
SK 9108	x SK 9115	11.79	13.85	4.73
L.S.D.	0.05	14.14	14.14	14.14
	0.01	18.43	18.43	18.43

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

grain yield (ard/fed.). The desirable heterotic effects relative to the check variety S.C. 155 ranged from 15.40 to 31.24%. High heterotic effects were detected in the cross (L 121 x Gm 1004) followed by cross (L 121 x SK 9074). Many investigators reported high heterosis for yield of maize, i.e. El-Rouby and Galal (1972), Mohamed (1984), Abdel-Sattar *et al* (1999), Geetha (2001), Ibrahim (2001) and others.

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قوة الهجين والقدرة على الائتلاف فى الذرة الشامية الصفراء تحت ظروف موقعين مختلفين (سخا ــ النوبارية)

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قسم بحوث الذره الشامية–معهد بحوث المحاصيل الحقلية–مركز البحوث الزراعية

تم إجراء التهجينات بين ٨ سلالات من الذرة الصفراء بنظام الداي اليل الغير كامل لنحصل على ٢٨ هجين فردى بمحطة بحوث سخا موسم ٢٠٠٢ وتم تقييم الهجن والآباء بالإضافة إلى صنفين تجارين للمقارنة هما (هــ.ف. ١٥٥–هــ.ف. ٣٠٨٠) فى تجربتين بمحطتي البحوث الزراعية بسخا والنوبارية خلال موسم النمو ٢٠٠٣ وقد اشتملت الدراسة على صفة محصول الحبوب (الأردب/فدان(عدد الصفوف فى الكوز عدد الحبوب فى الصف وزن ١٠٠ حبة وطول وقطر الكوز وارتفاع النبات والكوز وميعاد التزهير بظهور ٥٠% للنورة المؤنثة وتم تحليل النتائج وراثيا طبقا للطريقة الثانية الموديل الأول للعالم جريفنج ١٩٥٦ والنتائج كانت كما يلى:

١. أظهرت النتائج أن التباين الراجع إلى المواقع كان معنويا لكل الصفات المدروسة.
٢. كان تباين التراكيب الوراثية لكل من القدرة العامة والقدرة الخاصة على الائتلاف معنويا لجميع الصفات المدروسة.
٣. تبين أن الفعل الغير أضافى للجين كان أكثر أهمية لكل الصفات المدروسة ما عدا صفة عدد الصفوف فى الكوز ووزن ١٠٠ حبة.
٤. أظهرت النتائج أن التفاعل بين القدرة العامة والخاصة على الائتلاف كان معنويا لمعظم الصفات المدروسة وأن الفعل الإضافى للجين كان أكثر تأثرا بالظروف البيئية (المواقع) لمعظم الصفات المدروسة.
٥. كانت السلالة لــ ١٢١ أفضل السلالات فى القدرة العامة على الائتلاف لصفة محصول الحبوب والسلالة سخا ٧٢٦٦ لصفة تزهير ٥٠% للنورة المؤنثة (التبكير.(
٦. أظهرت النتائج أن متوسطات بعض الهجن الفردية الناتجة تتفوق معنويا على متوسطات الهجن التجارية للمقارنة منها سبعة هجن فردية: سلالة ١٢١ × جميزة ١٠٠٤ (٣١,٢٤%) ، وسلالة ١٢١ × سخا ٩٠٧٤ (٢٤,٢٢%) ، جميزة ١٠٠٤ × سخا ٩١٠٨ (٢٢,٨%) وجميزة ١٠٠٤ × سخا ٦٢٤١ (٢١%) وسلالة ١٢١ × سخا ٩١٠٨ (٢٠,٩٨%) ، سخا ٨٢٤٩ × سخا ٩١٠٨ (١٨,٦٨%) وسخا ٩٠٧٤ × سخا ٩١٠٨ (١٥,٤%) تفوقت معنويا عن هجين المقارنة هــ.ف ١٥٥. ويمكن الاستفادة بهذه الهجن المتفوقه والمبشرة فى برنامج تربية الذرة الشامية.

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