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DIALLEL ANALYSIS OF NINE YELLOW MAIZE INBRED LINES

H. E. Mosa

Maize Research Section, Sakha ARS, FCRI, ARC, Egypt

ABSTRACT

Diallel crosses among nine yellow inbred lines except reciprocals were made and the resultant 36 hybrids along with two commercial hybrids(SC 164 and SC 166)were evaluated in a randomized complete block design with four replications at three different locations (Sakha, Sids and Mallawy) in 2009 season to estimate general (GCA) and specific (SCA) combining ability effects and their interactions with environment and identify superior inbred lines and crosses. Highly significant mean squares due to locations were obtained for all studied traits. Mean squares due to both hybrids and hybrids x locations interaction were significant or highly significant for all traits. Mean squares due to general(GCA) and specific(SCA) combining abilities were significant or highly significant for all studied traits, except for GCA for ear diameter and number of rows/ear and SCA for number of ears/100 plant. However, GCA (additive gene effects) were more important in expression of days to 50% silking, plant height, number of ears/100plant, ear length and number of kernels/row, while SCA(non additive gene effects) were predominant in inheritance of ear diameter, number of rows/ear and grain yield. Significant or highly significant interactions between locations and GCA and SCA were detected for all traits, except for SCA x locations interaction for days to 50% silking. Inbred line Gz653 showed the best GCA effects for ear length, number of kernels/row and grain yield, while Sk6001 was the best general combiner for days to 50% silking, plant height and ear length. The cross Sk121 x Gz 653 exhibited the best SCA effects for grain yield. Six single crosses i.e Sk121 x Gz639 (29.37 ard/fed), Sk121 x Gz653 (32.11 ard/fed), Gz639 x Sk5027 (30.56 ard/fed), Gz653 x Sk5027 (30.09 ard/fed), Gz653 x Sk6001 (30.91 ard/fed) and Sk5027 x Sk6001 (29.35 ard/fed) were not significantly outyield to the best check SC164 (29.09 ard/fed) for grain yield. These six new crosses could be recommended for further testing in the hybrid development program.

Key words: ***Maize, Diallel analysis, Combining ability***

INTRODUCTION

Successful maize breeding programs depend on the efficiency of the procedures used to identify as soon as possible the lines to be crossed to develop single crosses that have high yielding ability (Hallauer and Lopez-Perez 1979 and Hallauer 1990). Combining ability of inbred lines is the ultimate factor determining future usefulness of the lines for hybrids. Combining ability initially was a general concept considered collectively for classifying an inbred line relative to its cross performance. Sprague and Tatum (1942) defined the concept of combining ability. General combining ability (GCA) and specific combining ability (SCA) have a significant impact on inbred line evaluation and population improvement in maize breeding. Nevado and Cross (1990), Lima *et al* (1995), Choukan (1999), Rameeh *et al* (2000), Desai and Singh (2001), Mosa (2005), Abd El-Aty and Darwish (2006) found that additive and non additive gene effects were important in inheritance of days to 50% silking, plant height, number of ears/100 plant, grain yield, ear length, ear diameter, number of rows/ear and number of kernel/row. However, Qadri *et al* (1983), Nawar and El-Hosary (1985), Zieger (1988), Mosa (2005) and Motawei and Mosa (2009) reported that GCA or additive gene effects were more important than SCA or non additive gene effects in inheritance of the above traits. While, Katta *et al* (1975), Saleem *et al* (1978), Inoue (1984), Anees (1987) and Amer *et al* (1998)found that the non additive gene effects were more important in expression of the same traits. These differences generally arise due to differences in the genetic materials and the environments under which the experiments were performed. Rojas and Sprague (1952), Mosa (1996) and El-Shenawy *et al* (2009) found that SCA x environment interaction was significant and larger than GCA x environment interaction for grain yield while, the reverse was obtained by Matzinger *et al* (1959) and Salama *et al* (1995) where they observed that GCA x environment interaction was significantly larger than SCA x environment interaction.

The main objectives of this study were to (1) estimate combining abilities effects and their interactions with locations for nine inbred lines of maize and (2) identify superior inbred lines and crosses to be utilized in the breeding program

MATERIALS AND METHODS

Nine yellow maize inbred lines i.e Sk121, Gz639, Gz653, Sk5003, Sk5026, Sk5027, Sk6001, Sk6056 and Sk8008 were involved in this study. In 2008 growing season, all possible cross combinations, without reciprocals, were made at Sakha Research Station. In 2009 growing season, the resultant 36 hybrids and two check hybrids (SC164 and SC166) were planted at three locations i.e Sakha, Sids and Mallawy Research Stations. Maize hybrids were planted in four replications of a randomized complete block design. Each plot was a single row, 6m long, 0.8m apart and 25cm between hills. After 21 days from planting date, plants were thinned to one plant per hill. The recommended cultural practices were applied at the proper time. Data were recorded on grain yield ardab/ feddan (1 ardab = 140 kg and 1 feddan = 4200m^2) adjusted to 15.5% grain moisture content, ear length (cm), ear diameter (cm), number of rows /ear and number of kernels/row, number of ears/100plant, plant height (cm) and number of days to 50% silking.

Analysis of variance for the data was performed for each location and when homogeneity of error mean squares was proved a combined analysis across three locations was done according to Steel and Torrie (1980). The hybrid effects were considered to be fixed while the location effects were considered random in the analysis of variance.

The variations among the 36 hybrids was partitioned into GCA and SCA and their interactions with locations according to Griffing (1956) method-4, model-1.

RESULTS AND DISCUSSION

The combined analysis of variance for 38 hybrids for eight studied traits are presented in Table (1). Mean squares due to Locations (L) were highly significant for all studied traits. Also hybrids and hybrids x locations mean squares were significant or highly significant for all studied traits, revealing that the hybrids differed from each other and their performances were not constant under the three locations.

Table1. Combined analysis of variance for 38 hybrids for eight traits across three locations.

S.O.V	d.f	Days to 50% silking	Plant height	No. of ears/100 plant	Ear length
Locations (L)	2	2648.19**	30893.86**	4076.99**	237.47**
Rep/L	9	8.39	715.72	67.93	9.01
Hybrids (H)	37	44.57**	904.67**	299.67*	22.24**
H x L	74	3.45**	228.05**	165.88**	3.42**
Error	333	1.28	90.25	55.41	1.48
S.O.V	**d.f**	**Ear diameter**	**No. of rows/ear**	**No. of kernels /row**	**Grain yield**
Locations (L)	2	18.57**	63.59**	783.56**	8328.99**
Rep/L	9	0.04	0.52	28.04	62.76
Hybrids (H)	37	0.08*	2.40*	54.15**	76.16**
H x L	74	0.05**	1.50**	15.47**	32.31**
Error	333	0.02	0.48	7.16	9.92

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

Means of 36 single cross and two check hybrids SC164 and SC166 for eight traits across three locations are presented in Table (2). For days to 50% silking, the single crosses ranged from 61.2 days for (Sk6001 x Sk6056) to 69.1 days for (Gz639 x Gz653). Sixteen single crosses were significantly earlier than the best check hybrid SC164, the best crosses from them were Sk121 x Sk6056, Sk6001 x Sk6056 and Sk6056 x Sk8008. For plant height, the single crosses ranged from 230cm for (Sk5003 x Sk6001) to 262.1cm for (Sk121 x Gz653). Eight crosses were not significantly shorter than the check hybrid SC166.Regarding number of ears/100plant, the single crosses ranged from 97.3 for (Sk5003 x Sk5027) to 118.5 for (Sk121 x Sk6056). Seven single crosses had more ears but were not significantly different from the best check SC166.Concerning ear length, the single crosses ranged from 17.95cm for (Sk5027 x Sk6056) to 22.50cm for (Gz653 x Sk6001). One cross was similar in ear length to the check hybrid SC166.For ear diameter, the single crosses ranged from 4.55 (cm) for (Gz639 x Sk8008) to 4.88cm for (Sk121 x Gz639). Four single crosses were not significantly different

Table 2. Means of 36 single cross and two check hybrids SC164 and SC166 for eight traits across three locations.

Cross	Days to 50% silking	Plant height (cm)	No. of ears/100 plant	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/row	Grain yield (ard/fed)
Sk121×Gz639	64.3	255.0	112.5	20.01	4.88	14.70	41.65	29.37
Sk121×Gz653	65.9	262.1	113.6	21.16	4.70	14.56	41.61	32.11
Sk121×Sk5003	62.9	245.5	98.9	19.18	4.68	15.21	38.93	23.03
Sk121× Sk5026	65.1	243.3	98.6	18.48	4.73	14.91	40.40	21.63
Sk121×Sk5027	65.8	253.6	110.2	19.25	4.78	15.40	39.76	27.33
Sk121×Sk6001	63.2	248.4	100.7	18.86	4.63	14.38	38.76	26.42
Sk121×Sk6056	61.9	252.3	118.5	18.28	4.81	15.53	39.11	26.79
Sk121×Sk8008	62.6	248.1	104.5	18.10	4.66	14.66	38.45	28.09
Gz639×Gz653	69.1	259.6	109.5	22.26	4.61	13.95	43.18	25.88
Gz639×Sk5003	64.7	241.3	100.3	18.71	4.75	15.10	39.86	23.26
Gz639×Sk5026	65.8	241.6	102.9	19.65	4.84	14.83	41.80	27.17
Gz639×Sk5027	66.6	244.1	103.9	20.63	4.78	14.81	43.98	30.56
Gz639×Sk6001	63.8	230.8	100.0	21.35	4.78	15.16	44.55	25.91
Gz639× Sk6056	63.1	251.4	108.1	20.81	4.71	15.09	41.90	27.91
Gz639×Sk8008	62.5	240.8	103.2	18.36	4.55	14.03	38.11	25.05
Gz653×Sk5003	66.2	262.0	100.5	22.21	4.71	14.56	44.10	28.47
Gz653×Sk5026	66.0	251.3	104.6	20.56	4.70	15.18	43.56	27.39
Gz653×Sk5027	67.9	258.3	106.3	21.06	4.78	15.11	42.46	30.09
Gz653×Sk6001	66.8	249.2	102.5	22.50	4.73	14.65	44.50	30.91
Gz653×Sk6056	62.1	249.3	112.7	17.96	4.58	14.51	38.31	24.63
Gz653×Sk8008	66.7	261.7	100.4	19.33	4.68	14.88	39.65	26.75
Sk5003×Sk5026	64.3	245.0	99.6	19.28	4.85	15.91	39.70	24.02
Sk5003×Sk5027	65.1	240.9	97.3	20.20	4.80	14.96	38.75	25.94
Sk5003×Sk6001	62.5	230.0	101.8	20.13	4.76	15.21	41.05	26.40
Sk5003×Sk6056	62.0	244.1	100.6	19.23	4.84	15.80	41.16	24.74
Sk5003×Sk8008	62.9	252.3	99.2	19.51	4.81	15.40	39.15	28.13
Sk5026×Sk5027	66.2	245.1	99.8	20.75	4.81	15.93	42.28	27.43
Sk5026×Sk6001	64.3	230.3	99.2	20.30	4.66	14.98	42.15	26.64
Sk5026×Sk6056	62.5	243.9	104.4	19.05	4.7	15.35	42.08	24.70
Sk5026×Sk8008	63.4	237.6	101.0	19.13	4.68	15.33	39.28	26.85
Sk5027×Sk6001	64.6	241.7	103.1	21.28	4.78	14.95	42.06	29.35
Sk5027×Sk6056	66.0	237.9	108.8	17.95	4.65	15.40	38.96	21.39
Sk5027×Sk8008	64.4	246.1	106.5	19.30	4.76	14.56	41.20	25.62
Sk6001×Sk6056	61.2	235.7	102.7	19.20	4.65	15.21	41.05	22.65
Sk6001×Sk8008	62.3	235.4	100.4	19.73	4.56	14.63	39.28	25.67
Sk6056×Sk8008	61.5	236.4	98.9	18.41	4.61	14.81	38.60	24.29
SC164	65.6	240.4	107.3	22.50	4.83	15.08	44.88	29.09
SC166	66.1	239.7	108.7	22.51	4.80	14.75	45.70	28.71
L.S.D 0.05	1.48	12.08	10.30	1.47	0.17	0.98	3.14	4.54

from the check hybrid SC164. Regarding number of rows/ear, the single crosses ranged from 13.95 for (Gz639 x Gz653) to 15.93 for (Sk5026 x Sk5027). Seventeen single crosses were not significantly different from the best check SC164.For number of kernels/row, the single crosses ranged from 38.11 for (Gz639 x Sk8008)to 44.55 for (Gz639 x Sk6001). The check SC166 possessed the highest number of kernels/row(45.7) compared to all other single crosses. Concerning grain yield/fed, the single crosses ranged from 21.39 ard/fed for (Sk5027 x Sk5056) to 32.11 ard/fed for (Sk121 x Sk653). Six single crosses i.e Sk121 x Gz639 (29.37 ard/fed), Sk121 x Gz653 (32.11 ard/fed), Gz639 x Sk5027 (30.56 ard/fed), Gz653 x Sk5027 (30.09 ard/fed), Gz653 x Sk6001 (30.91 ard/fed) and Sk5027 x Sk6001 (29.35 ard/fed) were significantly similar to the best check SC164 (29.09 ard/fed).

Analysis of variance for combining ability combined across three locations is presented in Table (3). Mean squares due to GCA and SCA were significant or highly significant for all studied traits, except for GCA for ear diameter and number of rows/ear and SCA for number of ears/100plant, indicating that both additive and non additive gene effects were involved in controlling most of the studied traits. These results are in agreement with those obtained by Nevado and Cross (1990), Desai and Singh (2001), Abd El-Aty and Darwish (2006)and El-Shenawy *et al* (2009).

Mean squares due to GCA x L and SCA x L interactions (Table 3),were significant or highly significant for all studied traits, except for SCA x L of days to 50% silking, meaning that both additive and non additive gene effects were influenced by the environmental conditions. These results are in agreement with those reported by Mahmoud (1996) and Mosa (2003).

Table 3. Analysis of variance for combining ability combined across three locations for eight traits.

S.O.V	d.f	Days to 50% silking	Plant height	No. of ears/100 plant	Ear length
GCA	8	165.31**	3153.16**	847.62*	52.08**
SCA	27	9.69**	276.34**	143.64	8.748**
GCA x L	16	10.11**	622.44**	339.04**	6.69**
SCA x L	54	1.35	125.44*	114.72**	2.63**
S.O.V	**d.f**	**Ear diameter**	**No. of rows/ear**	**No. of kernels /row**	**Grain yield**
GCA	8	0.15	6.61	114.73**	124.83**
SCA	27	0.06**	1.30*	23.64*	62.34**
GCA x L	16	0.07**	4.12**	29.46**	89.39**
SCA x L	54	0.03*	0.80**	12.22**	17.17**

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

Estimates of genetic and genetic x environment interaction for eight traits (Table 4), exhibited that the k^2GCA (additive gene effects) was higher than the k^2SCA (non additive gene effects) for days to 50% silking, plant height, number of ears/100 plant, ear length and number of kernels/row, meaning that the additive gene effects were the primary type of gene action operating in the expression of these traits. Whereas the non additive gene effects were predominant in the inheritance of ear diameter, number of rows/ear and grain yield. These results support the findings of Hallauer and Miranda (1988) and Abdel Sattar *et al* (1999) who reported that non additive gene effects for ear diameter and grain yield were more relevant than additive genetic effects. Mosa (2005) and Motawei (2006) found that additive gene effects were predomiant in the inheritance of silking date, plant height, number of ears/100plant and ear length.

Table 4. Estimates of genetic and genetic x environment interaction for eight traits.

Genetic component	Days to 50% silking	Plant height	No. of ears/100 plant	Ear length	Ear diameter	No. of rows/ear	No. of kernels/row	Grain yield
K^2 GCA	1.84	30.12	6.05	0.54	0.001	0.03	1.01	0.42
K^2 SCA	0.69	12.57	2.41	0.50	0.002	0.04	0.95	3.76
O^2 GCAxL	0.31	19.00	10.12	0.18	0.001	0.13	0.79	2.83
O^2 SCAxL	0.02	8.79	14.82	0.28	0.002	0.08	1.26	1.81

Regarding to results of Table 4, estimates of σ^2SCA x L were higher than σ^2GCA x L for number of ears/100 plant, ear length, ear diameter and number of kernels/row, indicating that non additive gene effects were much more influenced by changes in environments than additive gene effects while the reverse were obtained for days to 50% silking, plant height, number of rows/ear and grain yield. This conclusion is in agreement with Matzinger *et al.* (1959), Silva and Hallauer (1975), Mahmoud (1996), Mosa (2005) and El-Shenawy *et al* (2009).

Estimates of GCA effects of nine inbred lines for eight traits across three locations are presented in Table (5). Inbred line Gz653 had significantly positive general combining ability effects for grain yield, ear length and number of kernels/row. Significant desirable GCA effects were also obtained for inbred line Sk6001 for days to 50% silking, plant height and ear length and for inbred lines Sk6056 and Sk8008 for days to 50% silking.

Table 5. Estimates of general combining ability effects of nine inbred lines for eight traits across three locations.

Inbred line	Days to 50% silking	Plant height	No. of ears/100 plant	Ear length	Ear diameter	No. of rows/ear	No. of kernels/row	Grain yield
Sk121	-0.435	5.867*	3.913	-0.708*	0.013	-0.078	-1.185*	0.442
Gz639	0.743*	-0.370	1.456	0.501	0.018	-0.332	1.150	0.489
Gz653	2.279*	12.355*	2.830	1.265*	-0.041	-0.356	1.486*	2.079*
Sk5003	-0.578	-0.846	-4.573*	0.025	0.059	0.322	-0.611	-1.101
Sk5026	0.422	-4.156	-2.867	-0.155	0.025	0.360	0.610	-0.838
Sk5027	1.695*	0.082	0.830	0.306	0.051	0.174	0.355	0.859
Sk6001	-0.875*	-9.394*	-2.805	0.734*	-0.031	-0.104	0.917	0.325
Sk6056	-2.054*	-2.298	3.509	-1.053*	-0.033	0.243	-0.828	-2.082*
Sk8008	-1.197*	-1.239	-2.293	-0.915*	-0.062*	-0.228	-1.894*	-0.173
L.S.Dg_i 0.05	0.69	5.44	4.01	0.56	0.06	0.44	1.18	2.06
L.S.Dg_i-g_j 0.05	1.04	8.16	6.02	0.84	0.08	0.66	1.77	3.09

* significant at 0.05 level of probability.

Estimates of specific combining ability effects for 36 single crosses are presented in Table (6). For days to 50% silking, three crosses Gz639 x Sk8008, Gz653 x Sk5026 and Gz653 x Sk6056 exhibited significantly negative SCA effects (towards earliness).Regarding plant height, four crosses Gz653 x Sk6056, Sk5003 x Sk6001, Sk5027 x Sk6056 and Sk6056 x Sk8008 showed significantly negative SCA effects (towards shorter plants). Concerning number of ears/100 plant, one cross Sk121 x Sk6056 had significantly positive SCA effects (towards prolificacy). The desirable SCA effects for grain yield and its components were obtained for ear length; in crosses Sk121 x Gz653, Gz639 x Sk6056, Gz653 x Sk5003 and Sk5026 x Sk5027, for ear diameter; in crosses Sk121 x Gz639, Sk121 x Sk6056, Gz653 x Sk6001, Sk5003 x Sk6056 and Sk5003 x Sk8008, for number of rows/ear; in crosses Gz639 x Sk6001, Gz653 x Sk8008, for number of kernels/row; in crosses Gz653 x Sk5003, Sk5003 x Sk6056 and Sk5027 x Sk8008 and for grain yield; in crosses Sk121 x Gz653, Gz639 x Sk5027, Gz639 x Sk6056 and Sk5003 x Sk8008. Hence, it could be concluded that the present material could be used in improving earliness, plant height and grain yield.

Table 6. Estimates of specific combining ability effects for 36 single crosses for eight traits across three locations.

Cross	Days to 50% silking	Plant height	No. of ears/100 plant	Ear length	Ear diameter	No. of rows/ear	No. of kernels/row	Grain yield
Sk121×Gz639	-0.387	3.616	3.386	0.435	0.125*	0.119	0.810	1.976
Sk121×Gz653	-0.256	-2.027	3.070	0.821*	0.001	0.010	0.441	3.133*
Sk121×Sk5003	-0.399	-5.408	-4.193	0.078	-0.114*	-0.018	-0.145	-2.770*
Sk121× Sk5026	0.768*	-4.348	-6.232*	-0.441	-0.031	-0.356	0.101	-4.433*
Sk121×Sk5027	0.161	1.747	1.729	-0.136	-0.007	0.312	-0.278	-0.437
Sk121×Sk6001	0.149	6.057*	-4.144	-0.948*	-0.074	-0.425	-1.840*	-0.805
Sk121×Sk6056	0.077	2.795	7.307*	0.257	0.111*	0.376	0.255	1.971
Sk121×Sk8008	-0.113	-2.432	-0.923	-0.065	-0.010	-0.018	0.655	1.366
Gz639×Gz653	1.732*	1.711	1.394	0.711	-0.086*	-0.351	-0.328	-3.148*
Gz639×Sk5003	0.173	-3.420	-0.361	-1.598*	-0.053	0.119	-1.547	-2.591*
Gz639×Sk5026	0.339	0.223	0.550	-0.484	0.063	-0.185	-0.835	1.057
Gz639×Sk5027	-0.185	-1.515	-2.156	0.038	-0.012	-0.016	1.603	2.751*
Gz639×Sk6001	-0.363	-5.372	-2.454	0.326	0.070	0.612*	1.608	-1.365
Gz639× Sk6056	0.065	8.199*	-0.661	1.580*	0.006	0.098	0.703	3.042*
Gz639×Sk8008	-1.375*	-3.443	0.301	-1.008*	-0.114*	-0.397	-2.014*	-1.722
Gz653×Sk5003	0.137	4.688	-1.551	1.138*	-0.026	-0.389	2.351*	1.034
Gz653×Sk5026	-1.030*	-2.753	0.868	-0.332	-0.010	0.188	0.596	-0.310
Gz653×Sk5027	-0.387	0.009	-1.130	-0.293	0.047	0.307	-0.249	0.688
Gz653×Sk6001	1.018*	0.318	-1.277	0.795	0.080*	0.119	1.222	2.041
Gz653×Sk6056	-2.470*	-6.610*	2.565	-2.034*	-0.067	-0.361	-3.216*	-1.825
Gz653×Sk8008	1.256*	4.664	-3.939	-0.805	0.061	0.476*	-0.816	-1.613
Sk5003×Sk5026	0.161	4.116	3.238	-0.374	0.039	0.243	-1.173	-0.522
Sk5003×Sk5027	-0.363	-4.205	-2.676	0.080	-0.036	-0.520*	-1.868*	-0.282
Sk5003×Sk6001	-0.375	-5.650*	5.40	-0.415	0.013	0.007	-0.130	0.720
Sk5003×Sk6056	0.304	1.342	-2.148	0.473	0.082*	0.243	1.732*	1.463
Sk5003×Sk8008	0.363	8.533*	2.281	0.618	0.094*	0.314	0.782	2.948*
Sk5026×Sk5027	-0.280	3.271	-1.957	0.811*	0.013	0.407	0.443	0.948
Sk5026×Sk6001	0.375	-2.086	1.170	-0.067	-0.053	-0.263	-0.252	0.695
Sk5026×Sk6056	-0.196	4.485	-0.037	0.471	-0.017	-0.244	1.427	1.159
Sk5026×Sk8008	-0.137	-2.908	2.400	0.416	-0.005	0.210	-0.307	1.405
Sk5027×Sk6001	-0.565	5.092	1.281	0.454	0.037	-0.111	-0.080	1.704
Sk5027×Sk6056	2.030*	-5.753*	0.749	-1.074*	-0.093*	-0.008	-1.435	-3.843*
Sk5027×Sk8008	-0.411	1.354	4.161	0.121	0.051	-0.370	1.865*	-1.529
Sk6001×Sk6056	-0.232	1.473	-1.740	-0.270	-0.010	0.086	0.086	-2.051
Sk6001×Sk8008	-0.006	0.164	1.755	0.126	-0.064	-0.025	-0.614	-0.938
Sk6056×Sk8008	0.423	-5.932*	-6.036*	0.597	-0.012	-0.189	0.448	0.083
L.S.D S_{ij} 0.05	0.58	5.65	5.40	0.81	0.08	0.45	1.76	2.09
L.S.D S_{ij}-S_{KL} 0.05	0.80	7.80	7.46	1.13	0.12	0.62	2.43	2.88

* significant at 0.05 level of probability.

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تحليل التهجينات التبادلية لتسعة سلالات صفراء من الذرة الشامية

حاتم الحمادى موسى

قسم بحوث الذرة الشامية – محطة بحوث سخا– معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية

تم عمل الهجن التبادلية بين ٩ سلالات صفراء من الذرة الشامية (بدون الهجن العكسية) قيمت ٣٦ هجين فردى الناتجة مع اثنين من الهجن التجارية (هـ.ف١٦٤ و هـ.ف١٦٦) فى تصميم قطاعات كاملة العشوائية فى اربع مكررات فى ثلاث مناطق مختلفة (سخا وسدس وملوى) فى موسم ٢٠٠٩ .لتقدير تأثيرات القدرة العامة والخاصة على ألائتلاف وتفاعلها مع البيئة ولتحديد السلالات والهجن المتفوقة.

اظهر تباين المواقع معنوية عالية لجميع الصفات تحت الدراسة وكان تباين كل من الهجن وتفاعلها مع المواقع معنوى أو عالى المعنوية لجميع الصفات كذلك تباين كلاً من القدرة العامة والخاصة على الائتلاف كان معنويا أو عالي المعنوية لجميع الصفات ماعدا القدرة العامة على الائتلاف لكل من قطر الكوز وعدد الصفوف بالكوز والقدرة الخاصة على الائتلاف لصفة عدد الكيزان/١٠٠ نبات ومع ذلك كانت القدرة العامة على الائتلاف(التاثير الوراثى المضيف) اكثر اهمية فى وراثة صفات عدد الايام حتى ظهور حرائر ٥٠% من النورات المؤنثة

وارتفاع النبات وعدد الكيزان/١٠٠ نبات وطول الكوز وعدد الحبوب للصف بينما كانت القدرة الخاصة على الائتلاف(التاثير الوراثى غير المضيف) الاكثر اهمية فى وراثة صفات قطر الكوز وعدد الصفوف بالكوز ومحصول الحبوب. كان تفاعل كل من القدرة العامة والخاصة على الائتلاف مع المواقع معنويا أو عالى المعنوية لجميع الصفات ماعدا تفاعل القدرة الخاصة على الائتلاف مع المواقع لصفة عدد الايام حتى ظهور حرائر ٥٠% من النورات المؤنثة. السلالة جيزة ٦٥٣ كانت الافضل لتاثيرات القدرة العامة على الائتلاف لصفات طول الكوز، عدد الحبوب بالصف، ومحصول الحبوب بينما السلالة سخا ٦٠٠١ كانت الأفضل لصفات عدد الايام لظهور حرائر ٥٠% من النورات المؤنثة وارتفاع النبات و طول الكوز. الهجين سخا ١٢١ × جيزة ٦٥٣ اعطى افضل قيمة لتاثيرات القدرة الخاصة على الائتلاف لصفة المحصول. اعطت ستة هجن هى سخا١٢١× جيزة٦٣٩(٢٩.٣٧ أردب للفدان)، سخا ١٢١ × جيزة ٦٥٣(٣٢.١١ أردب للفدان)، جيزة٦٣٩ × سخا ٥٠٢٧ (٣٠.٥٦ أردب للفدان) ، جيزة٦٥٣ × سخا٥٠٢٧ (٣٠.٠٩ أردب للفدان)، جيزة٦٥٣ × سخا٦٠٠١ (٣٠.٩١ أردب للفدان) و سخا٥٠٢٧ × سخا٦٠٠١ (٢٩.٣٥ أردب للفدان) محصول غير معنوى الزيادة عن افضل هجن المقارنة هـ.ف١٦٤ (٢٩.٠٩ أردب للفدان) ولذلك توصى الدراسة باستخدام هذه الهجن في الاختبارات الاخرى المتقدمة فى برنامج انتاج الهجن الجديدة.

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