DIALLEL ANALYSIS AND HETEROSIS OF EIGHT YELLOW MAIZE INBRED LINES (*ZEA MAYS* L.)

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ABSTRACT

Eight yellow maize inbred lines were selected for general combining ability from top-cross experiments in 2003 season and crossed in diallel cross system without reciprocal during summer season of 2004. The obtained twenty eight single crosses and two checks were evaluated under the two locations Sakha and Sids Agriculture Research Stations in summer season of 2005. Combined analysis were done for silking date, plant and ear heights, grain yield ard/fed, ear length, ear diameter, number of rows /ear, number of kernels/row and weight of 100 kernels. Griffing's Mothed-4 Model-1 was used to estimate the GCA and SCA effects. Both GCA and SCA effects were important in the inheritance of these traits. However, the SCA played the major role in inheritance of grain yield and weight of 100 kernels while, the GCA played that role in the inheritance for other traits. The inbred lines Sk-121, Gm-1004 and Sk-7078 had positive and significant GCA effects that were high in magnitude for grain yield ard/fed and ear diameter. The desirable GCA effects for ear length was obtained by inbred lines Sku-14, Sk-121, Sk-8008, Sk-9203/2 and Sk-9203/3. The highest desirable GCA effects for silking date, plant and ear heights were obtained from inbred line, Sk-7078, for number of rows/ear by Gm1004 and for number of kernels/row and 100 kernels weight by Sk-121.

The crosses i.e.; Sk-121 x Gm-1004, Sk-121 x Sk-9203/3, Sk-121 x Sk-9203/2, Gm1004 x Sk-9203/2, Gm1004 x Sk-9203/3, Sk-7078 x Sk-9203/2 and Sk-7078 x Sk9203/3 had grain yield of 34.44 , 34.02, 33.86, 34.34, 32.74, 33.48 and 32.69 ard/fed, respectively. These hybrids were superior for grain yield and most other traits.

INTRODUCTION

Hybrid vigour is one of the most important role and greater partition of genetics at the field of agriculture in the world. Maize is one of the most important crops, where heterosis can be used for increasing yields. Diallel cross is a system for mating among different parents to determine the general (GCA) and specific (SCA) combining ability effects of parents. Both GCA and SCA were studied by Sprague and Tatum (1942), Cokrhana (1961) and Hallauer and Miranda (1981), they suggested the use of this evaluation to produce and evaluate new inbred lines and hybrids. El-Rouby and Galal (1972), Nawar and El-Hosary (1985), Galal *et al.*, (1987), Melchinger *et al.*(1990), El-Zeir *et al.*(1993), Damborsky *et al.*(1994), Zelleke (2000), El-Shenawy and Tolba (2001), Amer (2003) and Amer (2005), El-Shenawy (2005) and Motawei (2005) found that both GCA and SCA effectes were important in the inheritance of grain yield and most traits.

The term heterosis was given by Shull in (1914), heterosis refers to the superiority of F_1s hybrid in one or more characters over its parent. The aims of this study were to estimate GCA, SCA and heterosis. choose the best new inbred lines for GCA and SCA and choose superior new single crosses for grain yield and other traits.

MATERALS AND METHODS

Eight yellow lines i.e., Skug-14, Sk-121, Gm-1004, Sk-7078, Sk-8008, Sk-9203/2, Sk-9203/3 and Gm-1001. were selected for general combining ability from privious studies in top-cross experiments in 2003 season. These inbred lines are derived from different sources by maize breeding program. All possible combinations excluding reciprocal were made during summer season of 2004. The 28 F_1's and two checks (SC 155 and SC 3084) were evaluated under two locations Sakha and Sids Agriculture Research Stations in 2005 season. A randomized Complete Block Design with four replications was used. Experimental plot was one row, 6m long 80 cm apart and 25 cm between hills. All agronomic operation were done from sowing up to harvesting.

The data were recorded for silking date (days from planting at 50% silking), plant and ear heights (cm), grain yield ard/fed adjusted at 15% grain moisture content, ear length (cm), ear diameter (cm), No.of rows/ear, No.of kernels/row and weight of 100 kernels(g).

The analysis of variance for combined data was done according to Steel and Torri (1980). General and specific combining ability effects were estimated according to Griffing's (1956) Method-4 Model-1.

Heterosis% was .estimated in comparison to the a best checks for each trait.

$$\text{heterosis (CH)\%} = \frac{F_1 - CH}{CH} x 100$$

RESULTS AND DISCUSSION

The combined analysis data over two locations are presented in Table (1). Significant differences were detected between locations (L) for all traits except for plant and ear heights and grain yield ard/fed. These appeared different results between the two locations must be return to climate and soil. Genotypes (G)mean squares were highly significant for all traits, while the G x L interaction mean squares were significant or highly significant for all studied traits except for plant and ear heights. These results indicated that genotypes response and their interaction with locations differed from one location to another. These results are in agreement with those of many investigators. Galal *etal.*,(1978), El-Zeir (1998), El-Shenawy and Tolba (2001), EL-Shenawy (2005), Amer (2003), Metawei (2005).

Both, GCA and SCA mean squares were significant for all studies traits, meaning that both additive and non-additive gene effects are important in the inheritance of these traits. These results are in agreement with those of El-Rouby and Galal (1972), Nawar and El-Hosary (1985), Galal *et al.*, (1987), Melchinger *et al.*(1990), El-Zeir *et al.*(1993), Damborsky *et al.*(1994), Zelleke (2000). El-Shenawy and Tolba (2001), Amer (2003), Amer (2005), El-Shenawy (2005) and Motawei (2005). However, the mean squares values for GCA were higher than the mean squares values for SCA for all traits except for grain yield (ard/fed) and weight of 100 kernels. These results indicated that the additive gene effects played the mojer partition in the inheritance of these traits. These results are confirmed by that of Abdel–Aziz *et al.*(1994), Amer *et al.*(1998) and Amer (2002). While, the non-additive gene effects played the major role in the inheritance of grain yield and weight of 100 kernels. Debnath *et al.* (1988), Crossa *et al.*(1990), Pal and Prodhan (1994), Lima *et a*l. (1995) Geetha and Jayaraman (2000), El-Shenawy (2001) and Mosa (2003) found that the SCA played an important role in the expression of grain yield.

The GCA x L and SCA x L interaction mean squares were significant for all studied traits except for GCA x L for plant and ear heights, ear length, number of rows/ear and number of kernels/row and SCA x L for plant and ear height.

Table (1): Analysis of variance for nine traits over two locations.

S.O.V	d.f	Silking date	Plant height (cm)	Ear height (cm)	Grain yield ard/fed	Ear length (cm)	Ear diameter (cm)	No.of rows/ear	No.of kernels/row	100-kernels weight (g)
Locations (L)	1	252.15**	806.66	102.70	244.02	21.12**	5.25**	72.71**	1555.50**	14249.01**
Rep/L	6	6.56	662.94	782.51	75.22	0.22	0.05	1.048	6.21	5.811
Genotypes (G)	29	39.31**	1139.93**	902.40**	229.96**	18.74**	0.60**	32.29**	59.171**	128.19**
GCA	7	87.30**	3138.4**	2883.52**	155.61**	22.88**	0.848*	118.20**	31.32*	343.56**
SCA	20	22.31**	370.48**	208.46**	273.2**	14.98**	0.280*	4.77**	66.64**	24.84*
G x L	29	3.55**	77.71	70.30	25.20**	1.067*	0.038**	1.28*	10.55*	16.82**
GCA x L	7	4.23**	73.05	137.3	35.20**	1.068	0.136**	1.005	10.45	30.92**
SCA x L	20	3.40**	85.98	37.38	13.53*	1.032*	0.1336**	1.59*	9.614*	9.11**
Error	174	1.58	99.80	72.64	8.64	0.59	0.020	0.88	5.86	4.955

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

Mean performance of the 28 F_1s single crosses and the two commercial single crosses over the two locations are shown in Table (2). Data show that 26 single crosses in this diallel were earler compared with commercial SC 3084, while ten single crosses were earlier than SC155. The best crosses for earlier were, SC Sk-7078 x Sk-9203/2, SC Sk-7078 x Sk-9202/3 and SC Sku-14 x Sk 8008 showing 60.87, 60.87 and 61.0 days to heading, respectively.

Twenty two single crosses had short for plant and ear height than the two check hybrids SC 155 and SC 3084, while, SC Sku-14 x Sk-8008 and SC Sk-7078 x Gm-1001 were more shorter than the checks for plant height and SC Sku-14 x Sk-7078 and Sk-7078 x Sk-9203/3 were more shorter than the two checks for ear height. The grain yields ard/fed. of eleven new single crosses were increased than the commercial cross SC 155 (31.25 ard/fed), from these single crosses found Seven single crosses were more than second check hybrid SC 3084 (32.57 ard/fed.).

The crosses i.e., SC Sk-121 x Gm-1004, Gm1004 x Sk-9203/2, Sk-121 x Sk-9203/3, Sk-121 x Sk-9203/2, Sk-7078 x Sk-9203/2, Gm1004 x Sk-9203/3 and Sk-7078 x Sk9203/3 had grain yield of 34.44 , 34.34, 34.02,33.86, 33.48, 32.74 and 32.69 ard/fed., respectively. These hybrids were superior for grain yield. Ear length ranged from 15.7 cm for Sk-9203/2 x Sk-9203/3 to 22.6 cm for SC3084 while, ear diameter ranged from 4.62 cm for Sk-8008 x Sk-9203/2 to 5.38 cm for Gm-1004 x Sk-7078. Number of rows/ ear ranged from 13.05 for Sk-9203/2 x Sk-9203/3 to 21.45 for Gm-1004 x Sk-7078 also, number of kernels/row ranged from 28.7 for Sk-9203/2 x Sk-9203/3 to 43.4 for SC3084 and weight of 100 kernels ranged from 21.67 g for Gm-1004 x Gm-1001 to 37.75 g for SC3084.

Table (2): Mean performance of 28 F_1 and two commercial hybrids for nine traits over two locations.

Crosses	Silking date	Plant height (cm)	Ear height (cm)	Grain* yield ard/fed	Ear length (cm)	Ear diameter (cm)	No.of rows/ear	No.of kernels/row	100-kernels weight (g)
Sku-14xSk-121	63.62	256.1	138.0	31.47	20.00	4.82	15.70	41.10	32.33
xGm-1004	63.00	254.4	139.4	30.98	18.62	4.98	19.80	39.50	24.13
xSK-7078	62.50	244.3	121.1	25.07	17.80	4.88	18.10	37.20	24.52
xSk-8008	61.00	241.4	127.7	28.45	20.32	4.63	15.30	39.05	30.94
xSk9203/2	61.75	250.1	129.5	28.44	21.45	4.56	15.65	38.35	29.72
xSk9203/3	62.00	252.6	126.4	31.97	21.52	4.77	15.70	38.02	32.34
xGm-1001	63.12	249.7	133.3	27.36	18.52	4.81	17.67	37.07	26.68
Sk-121xGm-1004	65.12	273.0	151.3	34.44	19.10	5.26	19.70	39.22	27.77
xSk-7078	61.62	264.6	140.8	31.54	18.85	5.11	16.30	38.05	31.03
xSk-8008	63.25	270.5	154.4	29.22	20.00	4.82	14.85	38.55	34.69
xSk9203/2	64.50	277.5	158.3	33.86	21.17	4.82	15.20	42.02	34.15
xSk-9203/3	65.50	275.9	155.3	34.02	21.77	4.87	14.85	41.57	37.19
xGm-1001	63.87	273.0	154.6	24.18	19.52	5.10	17.55	39.55	29.10
Gm-1004xSk-7078	61.87	251.4	130.9	27.27	18.07	5.38	21.45	35.97	23.83
xSk-8008	64.37	260.7	152.1	30.65	20.30	4.97	16.45	41.60	28.23
xSk9203/2	65.37	263.9	143.8	34.34	20.20	5.07	16.65	41.92	27.67
xSk9203/3	66.37	264.0	145.0	32.74	20.27	5.08	17.65	41.05	26.85
xGm1001	68.37	245.5	136.4	16.88	16.27	5.05	19.50	35.67	21.67
Sk7078xSk8008	62.25	249.3	135.3	31.34	19.55	5.11	16.55	37.60	32.42
xSk9203/2	60.87	252.6	126.6	33.48	19.82	4.95	16.30	39.82	27.90
xSk9203/3	60.87	244.6	125.8	32.69	19.72	4.98	16.13	40.82	28.8.
xGm1001	64.37	239.8	128.8	25.75	18.90	5.12	20.20	37.42	24.54
Sk8008xSk9203/2	63.25	244.6	136.0	26.0	20.82	4.62	13.90	39.60	31.56
xSk-9203/3	64.12	244.6	137.0	28.69	21.57	4.71	13.95	41.22	32.68
xGm1001	63.50	249.0	143.5	28.69	19.57	4.81	15.80	38.75	29.27
Sk9203/2 x Sk9203/3	70.62	235.1	123.1	8.61	15.7	4.82	13.05	28.70	26.43
xGm1001	64.87	255.3	142.7	29.06	19.52	4.97	17.70	39.82	27.10
Sk9203/3 x Gm1001	65.12	247.1	136.1	29.62	18.85	4.91	17.20	38.90	30.14
Check -SC 155	63.12	264.1	147.9	31.25	18.57	4.90	15.30	36.70	35.18
Check -SC 3084	67.00	274.6	150.6	32.57	22.62	5.03	14.75	43.40	37.75
L.S.D. 0.05	1.23	9.79	8.35	2.88	0.75	0.138	0.919	2.37	2.18

Estimates of the general combining ability effects of the eight inbred lines are presented in Table (3). The desirable significant GCA effect for silking date to (negative values) were obtained by inbred lines Sku-14, Sk-7078 and Sk-8008. Negative and significant GCA effects for plant height and ear height were obtained by inbred lines Sku-14, Sk-7078 and Sk-9203/3 and inbred lines Sk-8008 and Gm-1001 for plant height only. Such results (crosses) are valuable for loding resistant hybrids. The inbred lines Sk-121, Gm-1004 and Sk-7078 had desirable positive GCA effects and significant for grain yield ard/fed and ear diameter. Positive GCA effects for ear length were obtained by inbred lines Sku-14, Sk-121, Sk-8008, Sk-9203/2 and Sk-9203/3, while, useful GCA effects for number of rows/ear were obtained by inbred lines Gm-1004 and Sk-7078 and Gm-1001. Also, desirable GCA effects were shown for Sk-121 and Sk-8008 for number of kernels/row and inbreds Sk-121, Sk-8008 and Sk-9203/3 for weight of 100 kernels.

Table (3): Estimates of general combining ability effects for nine traits over two locations.

Genotypes	Silking date	Plant height (cm)	Ear height (cm)	Grain yield ard/fed	Ear length (cm)	Ear diameter (cm)	No.of rows/ear	No.of kernels/row	100-kernels weight (gm)
Sku-14	-1.630*	-5.656*	-8.807*	0.322	0.224*	-0.013	0.156	-0.390	-0.411
Sk-121	0.119	18.010*	14.046*	2.781*	0.515*	0.093*	-0.468*	1.442*	3.838*
Gm-1004	1.286*	5.052*	5.088*	0.864*	-0.734*	0.156*	2.343*	0.484	-3.911*
Sk-7078	-2.067*	-5.989*	-9.849*	0.906*	-0.734*	0.135*	1.322*	-0.828*	-1.807*
Sk-8008	-0.838*	-3.843*	2.963*	0.322	0.890*	-0.093*	-1.843*	0.734*	2.755*
Sk-9203/2	0.744*	-0.552	-1.369	-1.302	0.307*	-0.197*	-1.489*	-0.307	0.213
Sk-9203/3	1.307*	-3.197*	-3.265*	-0.552	0.453*	-0.135*	-1.447*	0.307	1.755*
Gm-1001	1.078*	-3.822*	1.192	-3.343*	-0.921	0.072*	1.427*	-0.828*	-2.432*
L.S.D. 0.05	0.33	2.64	2.2	0.77	0.20	0.03	0.24	0.64	0.58

* significant at the 0.05 level of probability.

Estimates of specific combining ability in diallel crosses between eight parents for nine traits over two locations are presented in Table (4). Eight single crosses showed negative and significant SCA for silking date (earliness) i.e. Sku-14 x Sk-9203/2, Sku-14 x Sk-9203/3, Sk-121 x Gm-1001, Gm-1004 x Sk-7078, Sk-7078 x Sk-9203/2, Sk-7078 x Sk-9203/3, Sk-9203/2 x Gm-1001 and Sk-9203/3 x Gm-1001. The single crosses Sku-14 x Sk-121, Gm-1004 x Gm-1001, Sk-8008 x Sk-9203/2 and Sk-9203/2 x Sk-9203/3 had negative and significant SCA effects for plant height. Also, the same single crosses besides the single crosses Sku-14 x Sk-8008 and Sk-121 x Gm-1004 had negative and significant SCA effects for ear height. The desirable single crosses for SCA effects for grain yield and most yield components were obtained by Sku-

14 x Sk-9203/3, Sk-121 x Gm-1004, Sk-121 x Sk-9203/2, Sk-121 x Sk-9203/3, Gm-1004 x Sk-9203/2, Gm-1004 x Sk-9203/3, Sk-7078 x Sk-9203/2, Sk-7078 x Sk-9203/3 and Sk-9203/3 x Gm-1001. These single crosses seem useful and can be used in maize program.

Table (4): Estimates of specific combining ability effects of diallel crosses among 8 inbred lines for nine traits over two locations.

Crosses	Silking date	Plant height (cm)	Ear height (cm)	Grain yield ard/fed	Ear length (cm)	Ear diameter (cm)	No.of rows/ear	No.of kernels/row	100-kernels weight (g)
Sku-14xSk-121	1.310*	-10.88*	-5.56*	-0.67	-0.458*	0.0001	-0.571*	1.185*	-0.137
xGm-1004	-0.482	0.33	4.78*	0.88	-0.458*	-0.062	0.616*	0.393	-0.637
xSK-7078	2.372	1.24	1.46	-5.04*	-1.333*	-0.41*	-0.113	-0.545	-2.366*
xSk-8008	-0.357	-3.78	-4.72*	-0.83	-0.333	-0.187*	0.054	-0.232	-0.304
xSk9203/2	-1.190*	1.68	1.36	0.54	1.375*	0.041	0.199	0.060	0.98
xSk9203/3	-1.503*	6.83*	0.13	3.42*	1.354*	0.229*	0.283	-0.315	1.821*
xGm-1001	-0.149	4.58	2.55	1.71	-0.146	0.020	-0.467	-0.545	0.634
Sk-121xGm-1004	-0.107	-4.71	-6.20*	1.79*	-0.250	-0.062	1.116*	-1.565*	-1.137
xSk-7078	-0.253	-2.05	-1.76	-1.00	-0.500*	-0.166*	-1.238*	-1.003	-0.241
xSk-8008	0.143	1.68	-0.95	-2.52*	-0.875*	0.062	0.304	-2.44*	-0.929
xSk9203/2	-0.190	5.39	7.26*	3.58*	0.583*	0.166*	0.449	2.226*	1.113
xSk-9203/3	0.247	6.41*	6.15*	2.96*	1.188*	0.104*	0.033	1.601*	2.571*
xGm-1001	-1.149*	4.16	1.07	-4.13*	0.313	-0.104*	-0.092	-0.003	-1.241
Gm-1004xSk-7078	-1.170*	-2.34	-2.68	-3.33*	-0.250	0.145*	1.074*	-2.545*	0.509
xSk-8008	0.101	4.89	5.76*	0.63	0.500*	0.000	-0.759*	1.643*	0.321
xSk9203/2	-0.482	4.72	1.71	6.00*	0.958*	0.104*	-0.988*	2.810*	2.363*
xSk9203/3	-0.045	4.49*	4.86*	3.50*	1.063*	0.041	0.095	2.06*	-0.304
xGm1001	2.185*	-10.38*	-8.22*	-9.46*	-1.563*	-0.166*	-1.155*	-2.795*	-1.116
Sk7078xSk8008	1.330*	4.43	3.82	1.33	-0.125	0.020	0.137	-1.170*	2.342*
xSk9203/2	-1.628*	4.51	-0.47	5.33*	0.833*	0.125*	-0.217*	1.997*	0.509
xSk9203/3	-2.190*	-0.84	0.55	3.46*	0.583*	0.062	-0.384	3.122*	-0.408
xGm1001	1.539*	-4.96	-0.91	-0.75	0.813*	-0.145*	0.741*	0.143	-0.345
Sk8008xSk9203/2	-0.482	-5.63*	-3.91	-1.83*	0.208	-0.020	0.449	0.435	-0.554
xSk-9203/3	-0.170	-3.61	-1.01	0.29	0.563*	0.041	0.408	1.935*	-0.845
xGm1001	-0.565	2.01	1.03	2.96*	0.063	0.083	-0.592*	-0.170	-0.033
Sk9203/2 x Sk9203/3	4.747*	-15.78*	-10.56*	-18.46*	-4.604*	-0.604*	-0.946*	-9.649*	-4.679*
xGm1001	-0.774	5.10	4.80*	4.83*	0.646*	0.187*	1.054*	2.122*	0.259
Sk9203/3 x Gm1001	-1.086*	-0.51	-0.12	4.83*	-0.125	0.125*	0.512	1.247	1.842*
L.S.D. Sij 0.05	0.73	5.7	4.7	1.72	0.44	0.084	0.54	1.41	11.30

* significant at the 0.05 level of probability.

Heterosis relative to the best checks for nine studies traits are presented in Table (5). Data show that the six single crosses Sku-14 x Sk-8008, Sku-14 x Sk-9203/2, Sk-121 x Sk-7078, Gm-1004 x Sk-7078, Sk-7078 x Sk-9203/2 and Sk-7078 x Sk-9203/3 had negative and significant heterosis compared with the best check Sc 155 for earliness. Fifteen and seventeen single crosses for plant and ear heights, respectively showed negative and significant heterosis compared with the best check single cross 155.

The single crosses Sk-121 x Gm-1004, Sk-121 x Sk-9203/2, Sk-121 x Sk-9203/3, Gm-1004 x Sk-9203/2, Gm-1004 x Sk-9203/3 and Sk-7078 x Sk-9203/2 and Sk-7078 x Sk-9203/3 revealed positive but not significant heterotic effects compared with the best check SC 3084 for grain yield ard/fed. Nine single crosses had positive and significant heterotic effects compared with the best check SC3084 for ear diameter while, 6,16,16 and 17 single crosses were desirable where they showed significant heterotic effects compared with the best check SC155 for silking date, plant and ear heights and number of rows/ear, respectively.

Table (5): Heterosis relative to best check for nine traits over two locations.

Crosses	Silking date	Plant height (cm)	Ear height (cm)	Grain yield ard/fed	Ear length (cm)	Ear diameter (cm)	No.of rows/ear	No.of kernels/row	100-kernels weight (g)
4xSk-121	0.79	-3.02	-6.67*	-3.37	-11.69*	-1.63	2.61	-5.21	-14.35*
xGm-1004	-0.19	-3.69	-5.74*	-4.88	-17.68*	1.63	29.41*	-8.98*	-36.0*
xSK-7078	-0.98	-7.52*	-18.09*	-23.07*	-21.13*	-0.04	18.31*	-14.28*	-35.04*
xSk-8008	-3.35*	-8.61*	-13.60*	-12.64*	-10.16*	-5.5*	0.0	-10.02*	-18.39*
xSk9203/2	-2.17*	-5.30*	-12.42*	-12.68*	-5.17*	-6.93*	2.28	-11.63*	-21.12*
xSk9203/3	-1.77	-4.35*	-14.53*	-1.84	-4.86*	-2.65*	2.61	-12.39*	-14.33*
xGm-1001	0.0	-5.44*	-9..88*	-15.99*	-18.12*	-1.83	15.49*	-14.58*	-29.32*
Sk-121xGm-1004	3.16*	3.36	2.28	5.74	-15.56*	7.34*	28.75*	-9.63*	-26.43*
xSk-7078	-2.37*	0.18	-4.81	-3.16	-16.66*	4.28*	6.53*	-12.32*	-17.80*
xSk-8008	0.20	2.41	4.39	-10.28*	-11.58*	-1.63	-2.94	-10.92*	-8.10*
xSk9203/2	2.18*	-5.6*	7.01*	3.96	-6.41*	-1.63	-0.65	-2.90	-9.53*
xSk-9203/3	3.77*	4.44*	4.99	4.45	-3.75*	-0.62	-2.93	-3.94	-1.48
xGm-1001	1.18	3.36	4.56	-25.75*	-13.70*	4.08*	14.7*	-8.61*	-6.064*
Gm-1004xSk-7078	-1.98*	-4.82*	-11.49	-16.27*	-20.11*	9.79*	40.19*	-16.88*	-36.87*
xSk-8008	1.98*	-1.27	2.87	-5.89	-10.25*	1.42	7.51*	-3.87	-25.21*
xSk9203/2	3.56*	-0.09	-2.78	5.43	-10.69*	3.46*	8.82*	-3.13	-26.7*
xSk9203/3	5.14*	0.045	1.94	0.52	-10.38*	3.64*	15.35*	-5.14	-28.87*
xGm1001	8.31*	-7.05*	-7.77*	-48.17*	-28.07*	3.06*	27.45*	-17.57*	-42.59*
Sk7078xSk8008	-1.37	-5.63*	-8.53*	-3.77	-13.57*	4.28*	8.16*	-13.11*	-14.11*
xSk9203/2	-3.56*	-4.35*	-14.37*	2.79	-12.37*	1.02	6.53*	-7.98*	-26.09*
xSk9203/3	-3.56*	-7.38*	-14.95*	0.36	-12.82*	1.63	5.42*	-5.67*	-23.68*
xGm1001	1.98*	-9.18*	-12.93*	-20.93*	-16.44*	4.48*	32.02*	-13.53*	-34.99*
Sk8008xSk9203/2	0.20	-7.38*	-8.02*	-20.17*	-7.95*	-5.71*	-9.15*	-8.49*	-16.39*
xSk-9203/3	1.58	-7.61*	-7.35*	-11.91*	-4.64*	-3.87*	-8.8*	-4.75	-13.43*
xGm1001	0.60	-5.72*	-2.95	-11.91*	-13.48*	-1.83	3.26	-10.45*	-22.46*
Sk9203/2xSk9203/3	11.8	-10.97*	-16.73*	-73.56*	-30.59*	-1.63	-14.7*	-33.68*	-29.98*
xGm1001	2.77*	-3.31	-3.46	-10.77*	-13.70*	-1.42	15.68*	-7.98*	-28.21*
Sk9203/3xGm1001	3.16*	-6.43*	-7.94*	-9.05*	-17.90*	0.20	12.41*	-10.11*	-20.15*

* significant at the 0.05 level of probability.

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الملخص العربي

تحليل التهجينات التزاوجية الدائرية وقوة الهجين لثماني سلالات صفراء من الذرة الشامية

عباس عبد الحي الشنلوى

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

تم انتخاب ثماني سلالات صفراء من الذرة الشامية للقدرة العامة على الائتلاف من تجارب الهجن القمية موسم ٢٠٠٣ وتم عمل جميع التهجينات بينها في نظام التزاوج الدائري واستبعاد الهجن العكسية موسم ٢٠٠٤م.

تم تقييم ٢٨ هجينا الناتجة و اثنين من الهجن التجارية في محطتي بحوث سخا وسدس موسم ٢٠٠٥. تم عمل التحليل المشترك لصفات تاريخ ظهور ٥٠% من النورات المؤنثة وارتفاع النبات والكوز ومحصول الحبوب

وطول الكوز وقطر الكوز وعدد الصفوف فى الكوز وعدد الحبوب بالصف ووزن ١٠٠ حبه.
استخدم لتقدير القدرة العامة والخاصة على الائتلاف النموذج الرابع الموديل الأول لجرفنج ١٩٥٦م.
تبين أن كلا من القدرة العامة والخاصة على الائتلاف لها تأثيرات ذات دور مهم فى وراثة جميع الصفات ومع ذلك كانت تأثيرات القدرة الخاصة على الائتلاف أكثر أهمية في وراثة صفات محصول الحبوب ووزن ١٠٠ حبه بينما كانت تأثيرات القدرة العامة على الائتلاف الأكثر أهمية فى وراثة باقي الصفات الأخرى.
أظهرت السلالات سخا ١٢١ وجميزة ١٠٠٤ وسخا ٧٠٧٨ تأثيرات هامة فى القدرة العامة على الائتلاف لصفات محصول الحبوب وقطر الكوز كذلك أظهرت السلالات سخا ن ١٤ وسخا ١٢١ وسخا ٨٠٠٨ وسخا ٢/٩٢٠٣ وسخا ٣/٩٢٠٣ قيما مرغوبة لتأثيرات القدرة العامة على الائتلاف لصفة طول الكوز ، كانت أفضل السلالات فى تأثيرات القدرة العامة على الائتلاف السلالة سخا ٧٠٧٨ لصفة تاريخ ظهور ٥٠% من النورات المؤنثة وارتفاع النبات والكوز والسلالة جميزة ١٠٠٤ لصفة عدد السطور فى الكوز والسلالة سخا ١٢١ لصفة عدد الحبوب فى الصف ووزن ١٠٠ حبه.
أعطت الهجن سخا ١٢١ x جميزة ١٠٠٤ وسخا ١٢١ x سخا ٩٢٠٣ /٣وسخا ١٢١ x سخا ٢/٩٢٠٣ وجميزة ١٠٠٤ x سخا ٢/٩٢٠٣ وجميزة ١٠٠٤ x سخا ٣/٩٢٠٣ وسخا ٧٠٧٨ x سخا ٢/٩٢٠٣ وسخا ٧٠٧٨ x سخا ٣/٩٢٠٣ محصولا وصل الى ٣٤,٤٤و ٣٤,٠٢و ٣٣,٨٦و ٣٤,٣٤و ٣٢,٧٤و ٣٣,٤٨و ٣٢,٦٩ أردب /فدان على التوالي وكانت هذه الهجن متفوقة فى المحصول ومعظم الصفات الأخرى.