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EVALUATION OF NEW INBRED LINES OF WHITE MAIZE VIA LINE X TESTER ANALYSIS OVER THREE LOCATIONS

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ABSTRACT

Twenty four white maize inbred lines were top crossed with two testers i.e. SC 162, SC 166 in 2009 growing season. Resulting 48 crosses in addition to two commercial check hybrids i.e. SC 162 and TWC 352 were evaluated at Sakha, Mallawy and Ismaelia Agriculture Research Station Farms during 2010 growing season. Data were estimated on the following traits: silking date, plant height, ear height, grain yield, number of ears /100-plant, ear length and ear diameter. Mean squares for Lines (L), testers (T) and L x T interaction were significantly for all studied traits, except for grain yield and ear length of tester and for ear height and No.of ears/100-plant of L x T interaction. The best GCA effects for grain yield, number of ears/100-plant, ear length and ear diameter were obtained by inbred lines SK5001/1, SK5001/2, SK5001/6 and SK5001/9, respectively. Also, the inbred lines SK5002/12, SK 5002/19 and SK5002/19 showed better GCA effects for silking date, plant height and ear height, respectively. The tester SC162 showed the best GCA effects for grain yield, number of ears/100-plant, ear length and ear height. Moreover, the tester SC166 was the best combiner for earliness, shorter plant type and ear diameter. The best crosses for specific combining ability were SK 5001/6 χ SC162 for earliness, SK5002/20 χ SC162 for plant height, SK5002/22 χ SC166 for grain yield, SK5001/2 χ SC162 for number of ears/100- plant and SK5002/10 χ SC166 for ear length and ear diameter. The highest mean values of crosses for grain yield were obtained from the SK5001/1 x SC162 (33.67 ard. /fed.), SK5001/7 x SC162 (33.59 ard./fed.). These three way crosses outyielding significantly than the commercial hybrids TWC 352 (27.54 ard./fed.) and SC 162 (30.86 ard./fed.). The additive gene effects were more important for silking date, plant height, ear height, grain yield, No.of ears/100-plant and ear diameter. While, the non additive gene effects were important for ear length. Moreover, non additive genetic effects was more interacted by locations than additive gene effects for all studied traits.

Keywords: Maize, *Zea mays L*., line x tester, Combining ability, crosses.

INTRODUCTION

Corn (*Zea mays L*.) hybrid development is an important factor in meeting the increasing world population during the past 40 years. Breeding programs are providing resources for hybrid development as an alternative to increase corn production either for domestic consumption or for trading in the world market. Selection of parents is of great importance in breeding programs. Jenkins (1978) stated that the top crossing have been widely used for the preliminary evaluation of combining ability of new inbred lines. Line X Tester analysis is an extension of the Top cross method in which several Testers are used(Kempthorne,1957). In this respect, Darrah *et al*., (1972)and Horner *et al*.(1976), AL- Nagger *et al* (1997) and Amer *et al*.(2003) used lines, single crosses, three way crosses and open- pollinated varieties as tester to evaluate combining ability of newly selected lines. Therefore, testers could be used for distinguishing the new inbred lines for their combining ability. Many investigators indicated that additive genetic effects played a major role in the inheritance of yield and it's components Mostafa *et al*., 1995; Amer *et al*., 2002; Mosa, 2001; Mosa, 2010; EL- Kady *et al* 2002 and EL Gazzar and Khalil 2012.

The objectives of this study were: to identify superior inbred lines in general combining ability effects and to determine the best three way crosses for use as commercial hybrids.

MATERIALS AND METHODS

The materials for this study consisted of 24 new inbred lines i.e. SK5001/1, 5001/2, SK5001/3, SK 5001/4, SK5001/5, SK5001/6, SK5001/7, SK5001/8, SK5001/9, SK5002/10, SK5002/11, SK5002/12, SK5002/13, SK5002/14, Sk5002/15, SK5002/16, SK5002/17, SK5002/18, SK5002/19, SK5002/20, SK5002/21, SK5002/22, SK5002/23 and SK5002/24 developmed at Sakha (SK) Agricultural Research Station. In 2009 summer season, the 24 inbred lines were top crossed to each of the two testers single crosses (SC162 and SC166). In 2010 summer season, producing 48 crosses and the two commercial check hybrids i.e. SC 162 and TWC 352 were evaluated in three trials conducted at three location i.e. Sakha, Mallawy and Ismailia Agric. Res. Stations. A randomized complete blocks design, with four replications was used at each location. The plot size was one row, 6m long and 0.8m width. Planting was made in hills spaced at 0.25m along the row at the rate of two kernels/ hill later, thinned to one plant per hill. All cultural practices were applied as recommended at the proper time. Data were taken for number of days to 50% silking, plant height (cm), ear height (cm), grain yield (ard*/fed**) adjusted to 15.5% grain moisture, number of ears/100-plant, ear length (cm) and ear diameter (cm). Analysis of variance was carried out for each location and when homogeneity of error mean squares for the three locations was proven, hence combined analysis of variance was done, according to Steel and Torrie (1980). The procedure of

* 1 ardab = 140 kg,

** 1 feddan = 4200 m^2.

Singh and Chaudhary (1979) was used for obtaining estimates of general and specific combining ability effects and variances.

RESULTS AND DISCUSSION

Analysis of variance of 50 crosses for seven traits combined over three locations are shown in Table 1. Mean squares of locations were highly significant for all studied traits. This is dued to the three locations differ for environmental variations and soil conditions. Significant to highly significant variation was observed among crosses (C) and crosses x locations (C x loc.) interaction for all studied traits. These results are in good agreement with those obtained by several authors among of them Amer *et al.* (2003), Mosa (2003). Yausif *et al*. (2003) and Abd EL-Hadi *et al*. (2009).

Table 1: Combined analysis of variance of 50 crosses for seven traits combined over three locations during 2010 season.

S.O.V	d.f	Silking date (day)	Plant height (cm)	Ear height (cm)	No. of ears/100-plant	Grain yield (ard/fed)	Ear length (cm)	Ear diameter (cm)
Locations (Loc)	2	523.75**	186563.31**	240176.91**	5255.94**	4318.33**	544.39**	24.37**
Rep/Loc	9	7.239	426.155	446.310	180.88	32.688	1.241	0.146
Crosses (C)	49	13.886**	1147.302**	656.288**	605.58**	31.505**	13.655**	0.365**
C x Loc	98	1.857**	188.492**	157.733**	237.37**	21.901**	1.472*	0.056*
Error	441	0.845	127.489	78.563	67.30	10.95	1.02	0.040

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

Mean squares of line x tester analysis for 48 crosses for seven traits combined over three locations are presented in Table 2. Significant to highly significant differences were among lines (L), tester (T) and L x T interaction for all studied traits, except grain yield and ear length of tester and ear height and no. of ears/100-plant of L x T interaction. This indicates that the inbred lines behaved differently in their respective crosses and that greater diversity existed between the two testers. Meanwhile, significant (L x T) interaction indicated that the inbred lines performed differently in their respective top crosses depending on the type of tester used for these traits .These results are in agreement with those conclusions of Nawar and EL-Hosary (1984), Habliza and khalifa (2005), Mosa *et al*. (2008), Abd EL- Hadi *et al*. (2009) and EL-Gazzar and Khalil (2012).

Table 2: Line x Tester analysis of 48 crosses for seven traits combined over three locations during 2010 season.

S.O.V	d.f	Silking date (day)	Plant height (cm)	Ear height (cm)	No. of ears/100-plant	Grain yield (ard/fed)	Ear length (cm)	Ear diameter (cm)
Lines (L)	23	21.52**	1734.96**	1288.46**	1139.05**	43.46**	20.36**	0.637**
Testers (T)	1	50.17**	8197.79**	170.08**	874.82**	15.08	0.68	1.210**
L x T	23	2.37**	239.06**	68.132	70.41	19.12**	2.71**	0.071*
L x Loc	46	5.247**	470.823**	468.429**	748.04**	57.355**	4.45**	0.14**
T x Loc	2	2.727*	49.941	637.758**	229.33*	14.633	2.57	0.180*
L x T x Loc	46	2.385**	291.599**	162.717**	146.27**	29.759**	1.56	0.075*
Error	441	0.845	127.489	78.563	67.30	10.95	1.02	0.040

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

Mean squares due to (L x Loc.), (T x Loc.) and (L x T x Loc.) interactions were significant to highly significant for all studied traits, except plant height, grain yield and ear length of (T x Loc.), and ear length of (L x T x Loc.), meaning that L, T and L x T interaction were affected by change of locations. These results are in agreement with those conclusion of Nawar and EL Hosary (1984), Habliza and khalifa (2005), Mosa *et al*. (2008), Abd EL- Hadi *et al*. (2009) and EL-Gazzar and Khalil (2012).

Mean performance of crosses for seven traits over three locations are shown in Table3. The mean values of crosses for silking date ranged from 57.58 days for SK5002/13 x SC 166 to 62.08 days for SK5001/5 x SC162, with three crosses i.e SK5002/5 x SC166, SK5002/12 x SC166 and SK5002/13 x SC166 were earlier than the best check TWC352 for earliness. For plant height, it was crosses ranged from 251.83 cm for SK5002/19 x

SC162 to 294.25 cm for SK5001/2 x SC162. For ear height, it was ranged from 135.58 cm for SK5002/19 x SC166 to 162.83 cm for SK5001/7 x SC166, with five crosses SK5002/15 x SC166, SK5002/19 x SC162, SK5002/19 x SC166, SK5002/23 x SC162 and SK5002/24 x SC162 had significant shorter ear height than the best check TWC352. For no. of ears/100-plant, it was ranged from 98.6 for SK5002/18 x SC166 to 132.4 SK501/2 x SC162, with two crosses SK5001/1 x SC 162 and SK5001/2 X SC166 had significantly more ears/ 100-plant compared to the best check SC162. Grain yield, crosses ranged from 27.55 ard./fed. for SK5002/23 x SC162 to 33.67ard./fed. for SK5001/1 x SC162 and nineteen new three way crosses significantly outyielded check three way cross 352, two out of them; SK5001/1 x SC162 and SK5001/7 x SC162 were significantly superior than check single cross 162.These results suggest that use of these two crosses as good three way crosses for maize breeding programs. Ear length, of crosses ranged from 18.35 cm for TWC 352 to 23.08 cm for SC162. Ear diameter, crosses ranged from 4.39 cm for SK5002/19 x SC162 to 5.06 cm for SK 5002/20 x SC166, with five crosses SK5001/7 x SC166, SK 5001/9 x SC166, SK5002/20 x SC166, SK5002/24 x SC162 and SK 5002/24 x 166 were increased significantly than the best check TWC 352. In general three way crosses (SK5001/1 x SC162, Sk5001/2 x SC162, Sk5001/4 x SC162, SK5001/4 x SC166, SK5001/7 x SC162, SK5001/7 x SC166, SK5001/9 x SC162 and SK5002/17 x SC162) were better for grain yield and most studied traits than the commercial hybrid TWC352.

Estimates of general combining ability effects of twenty four inbred lines and two testers for seven traits over three locations are presented in Table 4. The best inbred lines for general combining ability were inbred lines SK 5002/7 for all trait except no. of ears/100-plant and ear diameter; inbred lines SK5002/13, SK 5002/14and SK 5002/15 for silking date, plant and ear heights and ear diameter; inbred line SK5002/19 for silking date, plant and ear heights and ear length; inbred line SK5002/24 for silking date, plant and ear heights and ear diameter; inbred line SK5001/4 for no. of ears/100-plant, grain yield and ear length; inbred line SK5001/7 for no. of ears/100-plant, grain yield and ear diameter; SK5002/12 for silking date, ear height and ear diameter; inbred line SK5002/18 for silking date, ear height and ear length; inbred line SK5002/23 for silking date, plant height and ear height; inbred line SK5001/1 for no. of ear /100-plant and grain yield; inbred line SK5001/9 for grain yield and ear diameter; inbred line SK5002/11 for plant height and no. of ears/100-plant, inbred line SK5002/20 for ear length and ear diameter; inbred lines SK5001/2 and SK5001/3 for no of ears/100-plant and inbred lines SK5001/5, SK5001/6 and SK5001/21 for ear length. The above inbred lines can be used in maize breeding program to improve these traits. The best tester for determining general combining ability effects was tester SC162 for grain yield, number of ears/100plants,ear length and ear height, and tester SC166 for earliness, shorter plant type and ear diameter. The superiority of single cross as good tester was noticed by several investigators among them EL-Ghawas (1963), Horner *et al*.(1976), EL-Shenawy and Mosa (2005), Mosa (2010) and EL-Gazzar and Khalil (2012).

Table 3: Mean performance of 48 crosses and two checks(SC162 and TWC352) for seven traits combined over three locations during 2010 season .

Traits / crosses		Silking date (day)	Plant height (cm)	Ear height (cm)	No. of ears/100-plants	Grain yield (ard/fed)	Ear length (cm)	Ear diameter (cm)
Sk5001/1	×SC162	59.75	293.33	123.14	33.67	156.25	19.66	4.48
	×SC166	59.50	278.33	119.40	31.32	159.41	20.05	4.65
Sk5001/2	×SC162	60.66	294.25	132.40	32.08	155.91	19.81	4.53
	×SC166	59.83	275.91	121.08	30.03	157.00	19.93	4.66
Sk5001/3	×SC162	60.25	278.50	109.37	28.57	155.33	18.38	4.61
	×SC166	59.58	268.75	110.99	28.70	157.83	18.43	4.64
Sk5001/4	×SC162	61.25	287.58	113.14	32.12	155.33	21.11	4.69
	×SC166	61.08	286.25	115.14	32.44	161.00	20.43	4.62
Sk5001/5	×SC162	62.08	276.58	101.70	29.77	152.66	20.68	4.59
	×SC166	60.00	269.41	102.11	28.62	154.58	21.45	4.70
Sk5001/6	×SC162	60.58	282.58	110.30	28.12	159.75	21.70	4.36
	×SC166	61.50	274.83	109.75	29.65	159.83	22.60	4.59
Sk5001/7	×SC162	60.75	272.16	119.02	33.59	154.75	20.73	4.75
	×SC166	59.33	273.08	112.08	32.32	162.83	19.76	5.00
Sk5001/8	×SC162	59.91	271.16	107.90	29.40	150.08	20.81	4.70
	×SC166	59.25	267.41	100.99	29.22	155.66	20.35	4.75
Sk5001/9	×SC162	60.66	286.75	101.66	33.10	152.50	20.48	4.92
	×SC166	60.33	273.25	101.48	30.73	150.50	19.91	5.04
Sk5002/10	×SC162	58.41	275.41	108.06	31.57	155.66	19.85	4.57
	×SC166	57.83	258.83	107.74	29.09	154.41	20.56	4.72
Sk5002/11	×SC162	59.66	269.58	113.82	29.99	148.25	20.23	4.50
	×SC166	59.50	262.66	110.47	31.93	146.25	19.91	4.64
Sk5002/12	×SC162	58.33	278.41	104.63	31.57	145.83	19.88	4.85
	×SC166	57.91	264.75	101.79	29.67	141.08	18.85	4.95
Sk5002/13	×SC162	59.00	264.00	103.31	30.55	142.08	19.56	4.89
	×SC166	57.58	259.66	101.66	31.29	141.25	18.85	4.86
Sk5002/14	×SC162	59.33	263.33	102.02	31.69	142.16	19.95	4.79
	×SC166	58.08	258.66	100.72	28.85	143.16	19.00	4.85
Sk5002/15	×SC162	59.16	271.25	105.95	31.30	143.41	19.66	4.93
	×SC166	58.25	254.83	99.94	28.98	138.66	18.63	4.96
Sk5002/16	×SC162	59.66	273.33	109.29	27.89	146.25	19.63	4.56
	×SC166	58.50	275.83	105.13	29.90	151.58	19.30	4.46
Sk5002/17	×SC162	59.33	272.33	105.75	33.16	143.66	22.21	4.57
	×SC166	58.83	257.75	104.41	30.48	141.08	21.68	4.66
Sk5002/18	×SC162	59.25	270.50	105.39	28.88	144.00	20.81	4.58
	×SC166	58.83	263.25	98.60	29.48	142.83	20.93	4.67
Sk5002/19	×SC162	59.00	261.50	105.78	29.78	136.08	21.13	4.39
	×SC166	58.58	251.83	100.63	29.49	135.58	21.38	4.57
Sk5002/20	×SC162	60.83	273.91	104.01	27.61	150.50	21.02	4.70
	×SC166	59.83	277.66	100.34	30.08	152.66	22.20	5.06
Sk5002/21	×SC162	59.91	278.83	100.69	28.70	151.16	20.71	4.62
	×SC166	60.41	270.50	101.95	28.71	149.75	21.48	4.56
Sk5002/22	×SC162	59.58	264.75	102.01	28.31	140.91	20.10	4.75
	×SC166	59.08	261.75	104.03	30.92	143.58	20.68	4.74
Sk5002/23	×SC162	58.75	267.58	101.33	27.55	138.50	20.51	4.69
	×SC166	58.50	261.33	101.42	29.30	142.83	20.73	4.85
Sk5002/24	×SC162	58.33	259.16	101.03	29.65	136.83	20.28	5.02
	×SC166	58.16	259.16	100.67	29.65	140.58	20.18	5.02
TWC352		58.83	252.16	103.43	27.54	146.75	18.35	4.83
SC162		62.00	263.75	115.19	30.86	156.66	23.08	4.58
L.S.D $_{0.05}$		0.735	9.034	6.564	2.647	7.092	0.808	0.160

Table 4: Estimates of general combining ability effects of twenty four inbred lines and two testers for seven traits combined over three locations during 2010 season.

Traits / Inbred line	Silking date (day)	Plant height (cm)	Ear height (cm)	No. of ears/100-plant	Grain yield (ard/fed)	Ear length (cm)	Ear diameter (cm)
Sk5001/1	0.149	15.154*	9.043*	14.519*	2.295*	-0.481*	-0.147*
Sk5001/2	0.774*	14.404*	7.668*	19.986*	0.857	-0.465*	-0.118*
Sk5001/3	0.441*	2.946	7.793*	3.425*	-1.560*	-1.931*	-0.089*
Sk5001/4	1.691*	16.237*	9.376*	7.385*	2.078*	0.434*	-0.060
Sk5001/5	1.566*	2.321	4.835*	-4.848*	-1.006	0.726*	-0.072
Sk5001/6	1.566*	8.029*	11.001*	3.268	-1.312	1.809*	-0.239*
Sk5001/7	0.566*	1.946	10.001*	8.797*	2.756*	-0.090	0.160*
Sk5001/8	0.107	-1.387	4.085*	-2.308	-0.883	0.243	0.014
Sk5001/9	1.024*	9.321*	2.710	-5.186*	1.718*	-0.140	0.264*
Sk5002/10	1.350*	-3.553	6.251*	1.148	0.134	-0.131	-0.068
Sk5002/11	0.107	-4.553*	-1.539	5.388*	0.766	-0.265	-0.143*
Sk5002/12	-1.350*	0.904	-5.331*	-3.543*	0.420	-0.973*	0.181*
Sk5002/13	-1.184*	-8.845*	-7.123*	-4.268*	0.723	-1.131*	0.160*
Sk5002/14	-0.767*	-9.678*	-6.123*	-5.383*	0.068	-0.865*	0.106*
Sk5002/15	-0.767*	-7.637*	-7.748*	-3.812*	-0.052	-1.190*	0.231*
Sk5002/16	-0.392*	3.904	0.126	0.453	-1.300	-0.873*	-0.201*
Sk5002/17	-0.392*	-5.637*	-6.414*	-1.676	1.662*	1.609*	-0.097*
Sk5002/18	-0.434*	-3.803	-5.373*	-4.760*	-1.016	0.534*	-0.089*
Sk5002/19	-0.684*	-14.012*	-12.956*	-3.550*	-0.561	0.918*	-0.235*
Sk5002/20	0.857*	5.112*	2.793	-4.580*	-1.353*	1.272*	0.169*
Sk5002/21	0.691*	3.987	1.668	-5.434*	-1.492*	0.759*	-0.122*
Sk5002/22	-0.142	-7.428*	-6.539*	-3.73*	-0.582	0.051	0.031
Sk5002/23	-0.850*	-6.220*	-8.123*	-5.380*	-1. 770*	0.284	0.056
Sk5002/24	-1.225*	-11.512*	-10.081*	-5.905*	-0.550	-0.106	0.306*
Tester SC162	0.295*	3.772*	-0.543	1.232*	0.161	0.034	-0.045*
Tester SC166	-0.295	-3.772*	0.543	-1.232*	-0.161	-0.034	0.045*
L.S.D $(g_L)_{0.05}$	0.367	4.517	3.273	3.28	1.323	0.404	0.080
L.S.D $(g_T)_{0.05}$	0.106	1.304	1.023	0.947	0.382	0.116	0.023

*** significant at 0.05 level of probability.**

Estimates of specific combining ability effects of the 48 top crosses for seven traits combined over the three locations are presented in Table 5. The desirable SCA effects were obtained for the crosses SK5001/5 x SC166, SK5001/6 x SC162 and SK5002/21 x SC162 for earliness, SK5002/20 x SC162 for plant height, SK5001/2 x SC162 for number of ears/100-plant, SK5002/22 x SC166 for grain yield and SK5002/20 x SC166 for ear length and ear diameter.

Estimates of additive gene actions (K^2 GCA) and non-additive gene actions (K^2 SCA) and their interaction with locations are given in Table 6.The results showed that K^2 GCA for silking date, plant height, ear height, grain yield, No of ears/100 plants and ear diameter were higher than K^2 SCA, while, the ear length gave the reverse. These results indicated the importance of additive gene actions in the inheritance of these studied traits, except for ear length. On the other side, the magnitude of the interaction for K^2 SCA x loc. was markedly higher than K^2 GCA x loc. for all studied traits. These results indicated that the non-additive gene actions were more sensitive to location differences than additive for all studied traits. These conclusion similar those obtained by EL- Zeir (1999), Nawar and EL-Hosary (1984), Ibrahim (2001), Osman and Ibrahim (2007), Amer (2004), Mosa (2010) and EL-Gazzar and Khalil (2012).

Table 5: Estimates of specific combining ability effects of 48 crosses for seven traits combined over three locations during 2010 season.

Traits / crosses		Silking date (day)	Plant height (cm)	Ear height (cm)	No. of ears/100-plant	Grain yield (ard/fed)	Ear length (cm)	Ear diameter (cm)
Sk5001/1	**×SC162**	-0.170	3.727	0.637	1.013	-1.039	-0.226	-0.041
	×SC166	0.170	-3.727	-0.637	-1.013	1.039	0.226	0.041
Sk5001/2	**×SC162**	0.121	5.394	4.642*	0.862	0.001	-0.092	-0.020
	×SC166	-0.121	-5.394	-4.642*	-0.862	-0.001	0.092	0.020
Sk5001/3	**×SC162**	0.038	1.102	-2.042	-0.226	-0.706	-0.059	0.033
	×SC166	-0.038	-1.102	2.042	0.226	0.706	0.059	-0.033
Sk5001/4	**×SC162**	-0.211	-3.105	-2.228	-0.321	-2.289	0.307	0.079
	×SC166	0.211	3.105	2.228	0.321	2.289	-0.307	-0.079
Sk5001/5	**×SC162**	0.746*	-0.189	-1.437	0.411	-0.414	-0.417	-0.008
	×SC166	-0.746*	0.189	1.437	-0.411	0.414	0.417	0.008
Sk5001/6	**×SC162**	-0.753*	0.102	-0.954	-0.929	0.501	-0.484	-0.066
	×SC166	0.753*	-0.102	0.954	0.929	-0.501	0.484	0.066
Sk5001/7	**×SC162**	0.413	-4.230	2.237	0.474	-3.498	0.448	-0.083
	×SC166	-0.413	4.230	-2.237	-0.474	3.498	-0.448	0.083
Sk5001/8	**×SC162**	0.038	-1.897	2.220	-0.073	-2.248	0.198	0.020
	×SC166	-0.038	1.897	-2.220	0.073	2.248	-0.198	-0.020
Sk5001/9	**×SC162**	-0.128	2.977	-1.139	1.020	1.543	0.248	-0.012
	×SC166	0.128	-2.977	1.139	-1.020	-1.543	-0.248	0.012
Sk5002/10	**×SC162**	-0.003	4.519	-1.071	1.074	1.168	-0.392	-0.029
	×SC166	0.003	-4.519	1.071	-1.074	-1.168	0.392	0.029
Sk5002/11	**×SC162**	-0.211	-0.314	0.445	-1.130	1.543	0.123	-0.020
	×SC166	0.211	0.314	-0.445	1.130	-1.543	-0.123	0.020
Sk5002/12	**×SC162**	-0.086	3.060	0.185	0.785	2.918	0.482	-0.004
	×SC166	0.086	-3.060	-0.185	-0.785	-2.918	-0.482	0.004
Sk5002/13	**×SC162**	0.413	-1.605	-0.408	-0.529	0.960	0.323	0.058
	×SC166	-0.413	1.605	0.408	0.529	-0.960	-0.323	-0.058
Sk5002/14	**×SC162**	0.329	-1.439	-0.580	1.257	0.043	0.440	0.012
	×SC166	-0.329	1.439	0.580	-1.257	-0.043	-0.440	-0.012
Sk5002/15	**×SC162**	0.163	4.435	1.773	0.999	2.918	0.482	0.029
	×SC166	-0.163	-4.435	-1.773	-0.999	-2.918	-0.482	-0.029
Sk5002/16	**×SC162**	0.288	-5.022	0.846	-1.168	-2.123	0.132	0.095
	×SC166	-0.288	5.022	-0.846	1.168	2.123	-0.132	-0.095
Sk5002/17	**×SC162**	-0.045	3.519	-0.564	1.176	1.835	0.232	0.000
	×SC166	0.045	-3.519	0.564	-1.176	-1.835	-0.232	0.000
Sk5002/18	**×SC162**	-0.086	-0.147	2.160	-0.458	1.126	-0.092	0.000
	×SC166	0.086	0.147	-2.160	0.458	-1.126	0.092	0.000
Sk5002/19	**×SC162**	-0.086	1.060	1.339	-0.015	0.793	-0.159	-0.045
	×SC166	0.086	-1.060	-1.339	0.015	-0.793	0.159	0.045
Sk5002/20	**×SC162**	0.204	-6.647*	0.598	-1.395	-0.539	-0.622*	-0.133*
	×SC166	-0.204	6.647*	-0.598	1.395	0.539	0.622*	0.133*
Sk5002/21	**×SC162**	-0.545*	0.394	-1.864	-0.160	1.251	-0.417	0.075
	×SC166	0.545*	-0.394	1.864	0.160	-1.251	0.417	-0.075
Sk5002/22	**×SC162**	-0.045	-2.272	-2.244	-1.965*	-0.789	-0.326	0.054
	×SC166	0.045	2.272	2.244	1.965*	0.789	0.326	-0.054
Sk5002/23	**×SC162**	-0.170	-0.647	-1.277	-1.038	-1.623	-0.142	-0.037
	×SC166	0.170	0.647	1.277	1.038	1.623	0.142	0.037
Sk5002/24	**×SC162**	-0.211	-3.772	-1.056	-0.161	-1.331	0.015	0.045
	×SC166	0.211	3.772	1.056	0.161	1.331	-0.015	-0.045
L.S.D($S_{LT)0.05}$		0.520	6.388	4.641	1.872	5.015	0.571	0.113

***significant at 0.05 level of probability.**

Table 6: Estimates of additive gene effects (K^2GCA) and non additive gene effects (K^2SCA) and their interaction with locations for seven traits combined over three locations during 2010 seasons.

	Silking date (day)	Plant height (cm)	Ear height (cm)	No. of ears/100 plant	Grain yield (ard/fed)	Ear length (cm)	Ear diameter (cm)
K^2GCA	0.116	30.50	2.334	3.807	0.007	0.037	0.004
K^2SCA	-0.001@	-4.378@	-3.941@	-6.321@	-0.889@	0.240	-0.004@
K^2GCA x Loc.	0.032	-0.600@	7.506	6.584	0.12	0.037	0.001
K^2SCA x Loc.	0.382	41.02	21.038	19.742	4.709	0.094	0.008

@ Variance estimates preceded by negative sign is considered zero.

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تقييم سلالات جديدة من الذرة الشامية البيضاء من خلال تحليل السلالة × الكشاف فى ثلاث مواقع

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تم التهجين بين أربعة وعشرون سلالة بيضاء جديدة من الذرة الشامية مع اثنين من الكشافات هجين فردى١٦٢وهجين فردى١٦٦فى موسم ٢٠٠٩. تم تقييم ٤٨ هجين مع اثنين من الهجن التجارية هجين فردى ١٦٢ وهجين ثلاثي ٣٥٢ في محطات بحوث سخا وملوى والإسماعيلية خلال موسم ٢٠١٠ أخذت النتائج على الصفات التالية: ميعاد ظهور الحريرة وارتفاع النبات وارتفاع الكوز ومحصول الحبوب وعدد الكيزان لكل ١٠٠نبات وطول الكوز وقطر الكوز.

كان التباين الراجع الى كلا من السلالات والكشافات والتفاعل بين السلالات X الكشافات معنويا فى كل الصفات تحت الدراسة، ماعدا صفة محصول الحبوب وطول الكوز بالنسبة للكشافات كذلك ارتفاع النبات وعدد الكيزان لكل١٠٠نبات بالنسبة لتفاعل السلالات X الكشافات.

كانت أفضل السلالات للقدرة العامة على الائتلاف لصفة محصول الحبوب وعدد الكيزان لكل ١٠٠ نبات وطول الكوز وقطر الكوز هى سلالة سخا ١/٥٠٠١و سخا ٢/٥٠٠١ وسخا ٦/٥٠٠١ وسخا ٩/٥٠٠١ على التوالى. وأظهرت ايضا السلالات سخا ١٢/٥٠٠٢ وسخا ١٩/٥٠٠٢ وسخا ١٩/٥٠٠٢ قدرة عامة على الائتلاف بالنسبة لصفة التزهير وارتفاع النبات وارتفاع الكوز ، على التوالى . بينما أظهر الكشاف هجين فردى ١٦٢ قدرة عامة على الائتلاف مرغوبة لصفة محصول الحبوب وعدد الكيزان لكل ١٠٠ نبات وطول الكوز وارتفاع النبات. كذلك أظهر الكشاف هجين فردى ١٦٦ أفضلية للقدرة العامة لصفات التبكير ونباتات قصيرة وقطر الكوز.أفضل الهجن فى القدرة الخاصة على الائتلاف هى سخا ٦/٥٠٠١ X هـ.ف ١٦٢ لصفة التبكير و سخا٢٠/٥٠٠٢ X هـ.ف ١٦٢ لارتفاع النبات و سخا ٢/٥٠٠١ X هـ.ف ١٦٢ لعدد الكيزان / ١٠٠ نبات

و سخا ٢٢/٥٠٠٢ X هـ.ف ١٦٦ لمحصول الحبوب و سخا ١٠/٥٠٠٢ X هـ.ف ١٦٦ لصفة طول الكوز وقطر الكوز.

اظهرت الهجن: سخا ١/٥٠٠١ X هـ .ف١٦٢ (٣٣,٦٧أردب /فدان) وهجين وسخا ٧/٥٠٠١ Xهـ.ف ١٦٢ (٣٣,٥٩أردب /فدان) أعلى محصول حيث زاد معنويا عن محصول هجن المقارنة هـ.ث ٣٥٢ (٢٧,٥٤أردب /فدان) وهـ.ف ١٦٢(٣٠,٨٦أردب /فدان) .

كان الفعل الوراثى المضيف أكثر أهمية فى وراثة صفات التزهير وارتفاع النبات وارتفاع الكوز وعدد الكيزان /١٠٠نبات ومحصول الحبوب وقطر الكوز. بينما كان الفعل الوراثى غير المضيف أكثر اهمية فى وراثة صفة طول الكوز . علاوة ذلك الفعل الوراثى غير المضيف أكثر تأثرا بالمواقع مقارنة بالفعل الوراثى المضيف فى كل الصفات المدروسة.

قام بتحكيم البحث

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