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WHITE MAIZE INBRED LINES SELECTION THROUGH LINE X TESTER ANALYSIS

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ABSTRACT

New 22 white inbred lines of maize were top crossed to two testers, inbred line Sd-63 and inbred line Sk-5 at Sakha Agricultural Research Station. The resulting top crosses and the commercial hybrid, SC10 as a check, were evaluated in a randomized complete block design trial with four replications at Sakha and Mallawi Agric. Res. Stations for number of days to mid silking, ear position, ear length, ear diameter and grain yield. The results of the present study at both locations could be summarized as fallows:

Mean squares due to lines, testers and their interaction were significant to highly significant for all studied characters, except testers, for grain yield at both locations and lines x testers for ear position at Mallawi and ear diameter for both locations.

The estimates of genetic variance indicated that the K^2 GCA (additive genetic variance) was the most important component controlling the inheritance of days to mid silking, ear postion and ear diameter at both locations while the K^2 SCA (or non-additive genetic variance) played the major contribution in the inheritance of grain yield and ear length at both locations.

The parental inbred lines, that revealed desirable GCA effects at both locations were Sk-5019/27 and Sk-5028/37 for earliness, Sk-5020/28, Sk-5037/43, Sk-5040/47 and Sk-5040/50 for ear position, Sk-5019/27, Sk-5025/33, Sk-5029/39 and Sk-5039/46 for grain yield, Sk-5019/27, Sk-5025/32, Sk-5029/38, Sk-5029/39 and Sk-5039/46 for ear length. The inbred line Sk-5 as a tester was the best general combiner for days to mid silking, ear position and ear diameter at both locations. While Sd-63 as a tester had the best GCA effects for ear length at both locations.

The best top crosses compared with check SC10 at both locations were, Sk-5019/27 x Sk-5, Sk-5035/40 x Sk-5 and Sk-5037/43 x Sk-5 for earliness, Sk-5037/43 x Sk-5 and Sk-5040/47 x Sk-5 for ear position, Sk-5019/27 x Sk-5, Sk-5025/33 x Sd-63 and Sk-5039/46 x Sd-63 for grain yield, Sk-5029/39 x Sd-63 and Sk-5039/46 x Sd-63 for ear length and Sk-5027/36 x Sk-5, Sk-5035/40 x Sk-5 and Sk-5040/48 x Sk-5 for ear diameter.

INTRODUCTION

The main objective of the breeding program is to develop high yielding hybrids of good agronomic attributes and resistant to major diseases and insects. Combining ability of inbred lines is the ultimate factor determining future usefulness of the lines for hybrids. Davis (1927) suggested the use of the top cross procedure, which is a type of progeny test, to evaluate the combining ability of inbred lines in a hybrid maize breeding program. After Jenkins and Brunson (1932) reported on the effective use of the top cross procedure. Rawling and Thompson (1962) and Hallauer (1975) indicated that a suitable tester should include simplicity in use, provide information that correctly classifies the relative merit of lines and maximize genetic gain. Darrah *et al*. (1972), Horner *et al*. (1973), Russell *et al*.(1973),

Ameha (1977), Zambezi *et al*.(1986), Liakat and Tepara (1986), Mahgoub *et al*. (1996), Al-Naggar *et al*. (1997) and Mosa *et al*.(2004) suggested that inbred tester can be effectively used for evaluation of both general GCA and specific SCA combining ability. Nawar and El-Hosary (1984), Sedhom (1992), El-Kielany (1999), Amer *et al*. (2002) and Mosa (2004) reported that non-additive genetic variance was more important in the inheritance of grain yield and ear length. Soliman and Sadek (1999) and El-Shenawy and Mosa (2005) indicated that additive genetic variance played an important role in the inheritance of days to mid silking and ear position.

The objective of this study was to estimate the combining abilities for inbred lines and to identify superior top crosses to be used in maize breeding programs.

MATERIALS AND METHODS

New 22 white inbred lines of maize derived by National Maize Program (NMP) at Sakha Research Station from the fifth generation and chosed on the base of their good performance. In 2005 season 22 inbred lines were mated to the two testers, Sd-63 and Sk-5 by ;hand pollinated; at Sakha Agricultural Research Station. In 2006 season, experiments were conducted at Sakha (Sk) and Mallawi (Mal) Agricultural Research Stations to evaluate the resultant of the 44 top crosses long with one check SC10. The experimental desigen was a randomized complete block one with 4 replications.

Plot size was one row, 6 m long and 80 cm apart. Three seeds were hand planted in hills spaced 25 cm within the row and thinned to one plant/hill to provide a population of approximately, 52000 plants/ha. All cultural practices were applied as recommended at the proper time. Data were recorded for number of days to mid-silking, ear position %, ears were weighed in kg/plot, shelled adjusted to 15.5% grain moisture and converted to grain yield (t/ha), ear length (cm) and ear diameter (cm).

Analysis of variance was carried out for each location according to Steel and Torrie (1980), followed by the procedure of Singh and Chaudhary (1979) to estimate combining ability of lines and testers.

RESULTS AND DISCUSSION

Mean squares of line x tester analysis for five characters at Sakha and Mallawi locations are presented in Table (1). Mean squares due to lines (L) were highly significant for all characters at Sakha and Mallawi. This indicates that the inbred lines significantly behaved different from each other in their respective top crosses. Besides, mean squares due to testers (T) were significant to highly significant for all characters except for grain yield at both locations. Such results indicate a wide range of variability among testers. Significant to highly significant lines x testers (L x T) interaction mean squares were exhibited for all characters except ear position at Mallawi and ear diameter at both locations. Suggesting that inbred lines might differently perform in top crosses, depending on the type of testers used for these characters.

Table (1): Mean squares of line x tester analysis for five characters at Sakha and Mallawi locations.

S.O.V	d.f	Days to mid silking (date)		Ear position %		Gain yield (t/ha.)		Ear length (cm)		Ear diameter (cm)	
		Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal
Replications	3	6.50*	21.97**	8.57	18.02	1.63	2.93	0.38	0.20	0.069	0.087
Lines (L)	21	9.82**	5.12**	47.60**	28.40**	9.16**	7.01**	11.28**	9.05**	0.139**	0.136**
Testers (T)	1	198.68**	61.45**	347.37**	385.86**	0.12	3.38	17.81**	8.46*	1.313**	1.146**
L x T	21	3.40*	1.59*	6.32*	6.92	4.81**	3.65**	3.93**	3.06**	0.035	0.064
Error	132+	1.76	0.96	3.80	6.880	1.25	1.22	1.09	1.15	0.037	0.042

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

The estimates of the genetic variance components for five characters at Sakha and Mallawi locations are shown in Table (2). The K^2 GCA (or additive genetic variance) value was the most important component controlling the inheritance of days to mid silking, ear positions and ear diameter at both locations. This results support the findings of Abdel-Aziz *et al*. (1994), Soliman and Sadek (1999) and Abd El-Azeem *et al*. (2004) for days to mid silking, Mosa *et al*. (2004) and El-Shenawy and Mosa (2005) for ear position and Nawar and El-Hosary (1984) and Amer *et al*.(2002) for ear diameter. On the other side, the results indicated that the K^2 SCA value (or non-additive genetic variance) was a more important component controlling the inheritance of grain yield and ear length at both locations. Similar results were reported by Nawar and El-Hosary (1984), El-Kielany (1999), Mosa (2004) and Motawei (2006).

Table (2): Estimates at genetic variance components for five characters at Sakha and Mallawi locations.

Genetical Estimates	Days to mid silking (date)		Ear position %		Gain yield (t/ha.)		Ear length (cm)		Ear diameter (cm)	
	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal
K^2 GCA	2.10	0.66	3.98	4.17	-0.003	0.03	0.22	0.11	0.014	0.012
K^2 SCA	0.41	0.15	0.63	0.01	0.89	0.61	0.71	0.47	-0.002	0.005

Mean performance of 44 top crosses and check SC10 for all the studied characters are presented in Table (3). 22 and 23 top crosses showed earliness compared with the check SC10 at Sakha and Mallawi locations, respectively, 19 top crosses from them were stable for earliness at two locations compared with SC10. The best top crosses for earliness at both locations were Sk-5019/27 x Sk-5, Sk-5035/40 x Sk-5 and Sk-5037/43 x Sk-5. Eight top crosses, Sk-5016/26 x Sk-5, Sk-5020/28 x Sk-5, Sk-5023/29 x Sk-5, Sk-5028/37 x Sk-5, Sk-5037/43 x Sk-5, Sk-5040/47 x Sd-63, Sk-5040/47 x Sk-5 and Sk-5040/50 x Sk-5 were the best crosses for ear position compared with SC10 at both locations.

Table (3): Mean performance of 44 top crosses and check SC10 for five characters at Sakha and Mallawi locations.

Cross	Days to mid silking (date)		Ear position %		Gain yield (t/ha.)		Ear length (cm)		Ear diameter (cm)	
	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal
Sk-5016/26 x Sd-63	69.00	64.75	53.28	54.85	10.28	10.83	22.55	22.90	5.10	5.15
Sk-5016/26 x Sk-5	66.00	64.25	51.39	49.95	11.07	10.74	21.55	21.00	5.20	5.05
Sk-5019/27 x Sd-63	66.25	63.00	56.81	57.10	13.05	12.98	24.35	22.70	5.00	4.90
Sk-5019/27 x Sk-5	64.75	61.50	55.70	52.68	14.17	14.50	23.20	22.80	5.20	5.15
Sk-5020/28 x Sd-63	66.00	62.50	53.27	51.93	12.05	12.82	24.00	23.50	5.05	5.05
Sk-5020/28 x Sk-5	66.00	62.50	51.80	51.07	11.98	11.88	22.95	20.45	5.15	5.20
Sk-5023/29 x Sd-63	69.00	62.00	56.02	52.78	10.02	10.98	22.50	20.85	4.80	4.80
Sk-5023/29 x Sk-5	67.25	63.00	51.22	50.86	10.56	11.68	21.65	21.45	4.90	4.95
Sk-5023/30 x Sd-63	68.25	64.75	53.31	54.28	11.72	12.54	22.45	22.20	5.10	5.25
Sk-5023/30 x Sk-5	66.00	62.75	51.65	53.88	11.03	10.58	21.85	21.75	5.20	5.15
Sk-5025/32 x Sd-63	69.50	64.75	58.66	56.24	11.55	12.71	23.95	23.00	4.65	4.85
Sk-5025/32 x Sk-5	66.25	62.50	53.57	52.50	11.82	13.56	24.05	23.00	5.10	5.00
Sk-5025/33 x Sd-63	70.00	63.25	57.20	54.62	12.80	15.61	23.70	22.85	5.05	5.05
Sk-5025/33 x Sk-5	67.00	62.75	54.55	52.35	13.35	12.83	23.15	21.55	5.30	5.15
Sk-5027/34 x Sd-63	70.00	65.50	59.53	57.37	9.93	9.87	20.65	19.85	4.85	4.85
Sk-5027/34 x Sk-5	68.00	62.75	55.93	54.63	10.63	12.63	24.55	21.85	5.10	5.10
Sk-5027/35 x Sd-63	68.75	62.75	59.09	55.57	12.96	13.80	22.80	21.40	5.10	5.10
Sk-5027/35 x Sk-5	67.25	62.00	55.97	51.72	13.73	11.99	23.00	22.60	5.20	5.15
Sk-5027/36 x Sd-63	69.25	64.50	58.07	57.42	13.47	11.35	23.95	21.70	5.20	4.95
Sk-5027/36 x Sk-5	67.00	62.25	53.25	53.55	11.38	13.20	21.80	21.95	5.40	5.55
Sk-5028/37 x Sd-63	66.50	62.50	52.07	54.56	12.99	12.47	22.50	23.20	4.95	5.25
Sk-5028/37 x Sk-5	65.75	62.00	52.07	51.52	12.16	12.58	21.30	22.00	5.15	5.35
Sk-5029/38 x Sd-63	68.25	63.25	60.42	54.35	13.58	12.61	24.60	23.55	4.80	4.85
Sk-5029/38 x Sk-5	66.75	62.25	55.84	53.28	10.53	12.49	25.35	23.10	4.95	5.05
Sk-5029/39 x Sd-63	70.50	65.00	58.57	56.47	14.24	12.89	25.65	25.05	5.20	5.25
Sk-5029/39 x Sk-5	68.75	64.25	59.49	56.16	11.78	13.33	23.90	22.05	5.00	5.20
Sk-5035/40 x Sd-63	70.50	63.50	57.27	56.37	9.11	12.01	20.80	20.55	5.05	5.05
Sk-5035/40 x Sk-5	65.50	62.00	55.42	54.79	13.37	12.22	22.20	20.75	5.35	5.45
Sk-5036/41 x Sd-63	69.75	63.75	58.00	59.78	12.75	11.72	23.65	22.35	4.80	5.20
Sk-5036/41 x Sk-5	66.50	62.50	52.56	52.10	11.41	12.84	22.35	22.20	5.10	5.25
Sk-5036/42 x Sd-63	68.50	63.50	56.94	56.48	12.06	12.59	23.30	22.10	4.95	4.95
Sk-5036/42 x Sk-5	66.25	62.50	51.58	53.03	12.52	11.00	20.40	20.40	5.05	5.10
Sk-5037/43 x Sd-63	68.25	62.75	51.32	53.78	10.05	10.26	22.75	21.65	4.65	4.80
Sk-5037/43 x Sk-5	66.25	61.50	48.89	47.54	8.77	11.61	21.95	21.05	4.90	5.15
Sk-5038/44 x Sd-63	68.00	63.25	54.60	57.00	11.35	12.49	21.45	21.35	5.10	5.30
Sk-5038/44 x Sk-5	67.25	62.75	51.76	53.25	12.05	13.48	21.45	22.45	5.10	5.35
Sk-5039/46 x Sd-63	70.25	65.50	56.32	57.51	13.47	13.85	25.60	24.15	5.05	5.15
Sk-5039/46 x Sk-5	70.50	64.00	53.26	53.84	12.27	13.65	23.45	24.00	5.15	5.35
Sk-5040/47 x Sd-63	68.25	63.00	52.38	50.97	11.36	12.52	23.50	21.90	4.75	4.95
Sk-5040/47 x Sk-5	67.00	62.00	48.40	49.68	12.80	14.16	22.55	21.75	5.05	5.30
Sk-5040/48 x Sd-63	70.50	63.50	55.22	54.68	10.80	11.30	20.70	20.40	4.95	5.05
Sk-5040/48 x Sk-5	66.75	62.00	54.51	52.76	11.22	11.90	20.15	19.85	5.25	5.40
Sk-5040/50 x Sd-63	70.50	65.00	54.41	51.43	11.83	12.24	22.05	20.00	5.00	5.10
Sk-5040/50 x Sk-5	66.25	62.25	52.15	49.52	11.67	12.41	20.65	19.55	5.15	5.00
SC 10	69.25	64.25	56.35	55.26	13.06	14.90	23.55	22.40	4.90	5.10
L.S.D. 0.05	1.83	1.35	2.70	3.63	1.54	1.53	1.44	1.66	0.26	0.28
0.01	2.4	1.78	3.55	4.78	2.03	2.01	1.90	2.19	0.35	0.37

Eight top crosses, Sk-5019/27 x Sk-5, Sk-5025/33 x Sk-5, Sk-5027/35 x Sk-5, Sk-5027/36 x Sd-63, Sk-5029/38 x Sd-63, Sk-5029/39 x Sd-63, Sk-5035/40 x Sk-5 and Sk-5039/46 x Sd-63 had higher grain yield compared with SC10 at Sakha location, while one top cross, Sk-5025/33 x Sd-63 had higher grain yield at Mallawi location. Generally, top crosses, Sk-5019/27 x Sk-5, Sk-5025/33 x Sd-63 and Sk-5039/46 x Sd-63 had the highest grain yield over two locations. Two top crosses, Sk-5029/39 x Sd-63 and Sk-5039/46 x Sd-63 had significant higher ear length than SC10 at both locations, while the best top crosses were Sk-5027/36 x Sk-5, Sk-5035/40 x Sk-5 and Sk-5040/48 x Sk-5 for ear diameter at both locations. These results suggest the use of these crosses as good hybrids in maize breeding programs.

The general combining ability effects for 22 inbred lines for the five characters at Sakha and Mallawi are shown in Table (4). The inbred lines Sk-5019/27, and Sk-5028/37 were the best general combiner for earliness, since it expressed significant and negative GCA effects at both locations. In addition, parental inbred line Sk-5020/28 at Sakha and inbred lines Sk-5027/35 and Sk-5037/43 at Mallawi exhibited desirable GCA effects for earliness.

Table (4): Estimates of the general combining ability effects for 22 inbred lines for five characters at Sahka and Mallawi locations.

Inbred	Days to mid silking (date)		Ear position %		Gain yield (t/ha.)		Ear length (cm)		Ear diameter (cm)	
	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal
Sk-5016/26	-0.335	1.352*	-2.294*	-1.369	-1.184*	-1.600*	-0.697	0.023	0.102	-0.019
Sk-5019/27	-2.335*	-0.897*	1.624*	1.116	1.756*	1.349*	1.027*	0.830*	0.052	-0.094
Sk-5020/28	-1.835*	-0.647	-2.091*	-2.270*	0.158	-0.039	0.727	0.048	0.052	0.005
Sk-5023/29	0.289	-0.647	-1.011	-1.950*	-1.567*	-1.054*	-0.672	-0.776	-0.197*	-0.244*
Sk-5023/30	-0.710	0.602	-2.153*	0.308	-0.481	-0.692	-0.597	0.048	0.102	0.080
Sk-5025/32	0.039	0.477	1.487*	0.600	-0.170	0.750	1.252*	1.073*	-0.172*	-0.194*
Sk-5025/33	0.664	-0.147	1.248	-0.282	1.217*	1.832*	0.677	0.273	0.127	-0.019
Sk-5027/34	1.164*	0.977*	3.103*	2.216*	-1.580*	-1.134*	-0.147	-1.076*	-0.072	-0.144*
Sk-5027/35	0.164	-0.772*	2.896*	-0.128	1.491*	0.511	0.152	0.073	0.102	0.005
Sk-5027/36	0.289	0.227	1.031	1.713	0.567	-0.112	0.127	-0.101	0.252*	0.130
Sk-5028/37	-1.710*	-0.897*	-2.558*	-0.867	0.719	0.140	-0.847	0.673	0.002	0.180*
Sk-5029/38	-0.335	-0.397	3.502*	0.044	0.197	-0.334	2.227*	1.398*	-0.172*	-0.169*
Sk-5029/39	1.789*	1.477*	4.400*	2.547*	1.154*	0.763*	2.027*	1.623*	0.052	0.105
Sk-5035/40	0.164	-0.397	1.712*	1.810*	-0.616	-0.270	-1.247*	-1.276*	0.152*	0.130
Sk-5036/41	0.289	-0.022	0.650	2.172*	0.223	-0.101	0.252	0.348	-0.097	0.105
Sk-5036/42	-0.460	-0.147	-0.372	0.986	0.433	-0.592	-0.897*	-0.676	-0.047	-0.094
Sk-5037/43	-0.585	-1.022*	-4.526*	-3.112*	-2.444*	-1.451*	-0.397	-0.576	-0.272*	-0.144*
Sk-5038/44	-0.210	-0.147	-1.454*	1.351	-0.154	0.603	-1.297*	-0.026	0.052	0.205*
Sk-5039/46	2.539*	1.602*	0.162	1.904*	1.008*	1.364*	1.777*	2.148*	0.052	0.130
Sk-5040/47	-0.210	-0.647	-4.242*	-3.444*	0.221	0.953*	0.277	-0.101	-0.147*	0.005
Sk-5040/48	0.789	-0.397	0.236	-0.047	-0.843*	-0.783*	-2.322*	-1.801*	0.052	0.105
Sk-5040/50	0.539	0.477	-1.351*	-3.297*	-0.106	-0.063	-1.397*	-2.151*	0.027	-0.069
L.S.D.(g_i) 0.05	0.91	0.67	1.35	1.81	0.77	0.76	0.73	0.83	0.13	0.14
LS.D(gi-g_j)0.05	1.3	0.96	1.91	2.39	1.09	1.08	1.02	1.05	0.18	0.20

The desirable general combining ability effects for ear position were obtained by the inbred lines, Sk-5020/28, Sk-5037/43, Sk-5040/47 and Sk-5040/50 at both locations, Sk-5016/26, Sk-5023/30, Sk-5028/37 and Sk-5038/44 at Sakha and Sk-5023/29 at Mallawi.

The best general combiner inbred lines for grain yield, were Sk-5019/27, Sk-5025/33, Sk-5029/39 and Sk-5039/46, had desirable GCA effects at both locations, Sk-5027/35 at Sakha and Sk-5040/47 at Mallawi.

The inbred lines Sk-5019/27, Sk-5025/32, Sk-5029/38, Sk-5029/39 and Sk-5039/46 had desirable GCA effects at both locations for ear length.

The inbreds, Sk-5027/36, Sk-5035/40 at Sakha and Sk-5028/37 and Sk-5038/44 at Mallawi exhibited desirable GCA effects for ear diameter.

These inbred lines could be utilized in making hybrids that had yielding ability, earliness and suitable ear position.

The general combining ability effects of the two testers for the five characters at Sakha and Mallawi locations are presented in Table (5). The inbred line Sk-5 as a tester was the best general combiner for days to mid silking, ear position and ear diameter at both locations, while the inbred lines Sd-63 as a tester was the best combiner for ear length at both locations. The homozygous inbred line as good tester was noticed by several investigators among them Liakat and Teparo (1986), Al-Naggar *et al*. (1997), Mosa (2004) and Motawei (2006).

Table (5): Estimates of the general combining ability effects for two testers for five characters at Sakha and Mallawi locations.

Tester	Days to mid silking (date)		Ear position %		Gain yield (t/ha.)		Ear length (cm)		Ear diameter (cm)	
	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal
Sd-63	1.0625*	0.5909*	1.4049*	1.4807*	0.0264	-0.1387	0.3182*	0.230*	-0.0864*	-0.0807*
Sk-5	-1.0625*	-0.5909*	-1.4049*	-1.4807*	-0.0264	0.1387	-0.3182*	-0.230*	0.0864*	0.0807*
L.S.D.(gi) 0.05	0.27	0.20	0.40	0.54	0.23	0.23	0.21	0.22	0.040	0.042
L.S.D.(g_i-g_j) 0.05	0.39	0.28	0.57	0.77	0.33	0.32	0.30	0.31	0.05	0.06

Estimates of specific combining ability effects for the 44 top crosses for the five studied characters at Sakha and Mallawi locations are shown in Table (6). Desirable and significant SCA effects were obtained for Sk-5023/29 x Sd-63 at Mallawi and Sk-5035/40 x Sk-5 at Sakha for earliness, Sk-5025/33 x Sd-63 and Sk-5027/34 x Sk-5 at Mallawi for grain yield, Sk-5020/28 x Sd-63 at Mallawi, Sk-5027/34 x Sk-5 at both locations and Sk-5036/42 x Sd-63 at Sakha for ear length and Sk-5027/36 x Sk-5 at Mallawi for ear diameter. Such crosses could be utilized in maize breeding programs for different purposes for breeding early and high yielding hybrids.

Table (6): Estimates of the specific combining ability for 44 top-crosses for five characters at Sakha and Mallawi locations.

Cross	Days to mid silking (date)		Ear position %		Gain yield (t/ha.)		Ear length (cm)		Ear diameter (cm)	
	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal	Sk	Mal
Sk-5016/26 x Sd-63	0.437	-0.340	-0.458	0.971	-0.419	0.180	0.181	0.730	0.036	0.130
Sk-5016/26 x Sk-5	-0.437	0.340	0.458	-0.971	0.419	-0.180	-0.181	-0.730	-0.036	-0.130
Sk-5019/27 x Sd-63	-0.312	0.159	-0.848	0.730	-0.586	-0.621	0.256	-0.269	-0.013	-0.044
Sk-5019/27 x Sk-5	0.312	-0.159	0.848	-0.730	0.586	0.621	-0.256	0.269	0.013	0.044
Sk-5020/28 x Sd-63	-1.062	-0.590	-0.671	-1.051	0.008	0.607	0.206	1.305*	0.036	0.005
Sk-5020/28 x Sk-5	1.062	0.590	0.671	1.051	-0.008	-0.607	-0.206	-1.305*	-0.036	-0.005
Sk-5023/29 x Sd-63	-0.187	-1.090*	0.995	-0.515	-0.300	-0.210	0.106	-0.519	0.036	0.005
Sk-5023/29 x Sk-5	0.187	1.090*	-0.995	0.515	0.300	0.210	-0.106	0.519	-0.036	-0.005
Sk-5023/30 x Sd-63	0.062	0.409	-0.574	-1.281	0.321	0.986	-0.018	0.005	0.036	0.130
Sk-5023/30 x Sk-5	-0.062	-0.409	0.574	1.281	-0.321	-0.986	0.018	-0.005	-0.036	-0.130
Sk-5025/32 x Sd-63	0.562	0.534	1.141	0.391	-0.160	-0.287	-0.368	-0.219	-0.138	0.005
Sk-5025/32 x Sk-5	-0.562	-0.534	-1.141	-0.391	0.160	0.287	0.368	0.219	0.138	-0.005
Sk-5025/33 x Sd-63	0.437	-0.340	-0.079	-0.346	-0.298	1.528*	-0.043	0.430	-0.038	0.030
Sk-5025/33 x Sk-5	-0.437	0.340	0.079	0.346	0.298	-1.528*	0.043	-0.430	0.038	-0.030
Sk-5027/34 x Sd-63	-0.062	0.784	0.394	-0.127	-0.376	-1.240*	-2.268*	-1.219*	-0.038	-0.044
Sk-5027/34 x Sk-5	0.062	-0.784	-0.394	0.127	0.376	1.240*	2.268*	1.219*	0.038	0.044
Sk-5027/35 x Sd-63	-0.312	-0.215	0.155	0.444	-0.411	1.042	-0.418	-0.819	0.036	0.055
Sk-5027/35 x Sk-5	0.312	0.215	-0.155	-0.444	0.411	-1.042	0.418	0.819	-0.036	-0.055
Sk-5027/36 x Sd-63	0.062	0.534	1.006	0.452	1.015	-0.787	0.756	-0.344	-0.013	-0.219*
Sk-5027/36 x Sk-5	-0.062	-0.534	-1.006	-0.452	-1.015	0.787	-0.756	0.344	0.013	0.219*
Sk-5028/37 x Sd-63	-0.687	-0.340	-1.404	0.174	0.386	0.082	0.281	0.380	-0.013	0.030
Sk-5028/37 x Sk-5	0.687	0.340	1.404	-0.174	-0.386	-0.082	-0.281	-0.380	0.013	-0.030
Sk-5029/38 x Sd-63	-0.312	-0.090	0.884	-0.941	1.497*	-0.297	-0.693	0.005	0.011	-0.019
Sk-5029/38 x Sk-5	0.312	0.090	-0.884	0.941	-1.497*	0.297	0.693	-0.005	-0.011	0.019
Sk-5029/39 x Sd-63	-0.187	-0.215	-1.866	-1.325	1.206*	-0.085	0.556	1.280*	0.186*	0.105
Sk-5029/39 x Sk-5	0.187	0.215	1.866	1.325	-1.206*	0.085	-0.556	-1.280*	-0.186*	-0.105
Sk-5035/40 x Sd-63	1.437*	0.159	-0.480	-0.690	-2.160	0.030	-1.018	-0.319	-0.063	-0.119
Sk-5035/40 x Sk-5	-1.437*	-0.159	0.480	0.690	2.160	-0.030	1.018	0.319	0.063	0.119
Sk-5036/41 x Sd-63	0.562	0.034	1.318	2.359	0.647	-0.421	0.331	-0.144	-0.063	0.055
Sk-5036/41 x Sk-5	-0.562	-0.034	-1.318	-2.359	-0.647	0.421	-0.331	0.144	0.063	-0.055
Sk-5036/42 x Sd-63	0.062	-0.090	1.275	0.247	-0.256	0.935	1.131*	0.630	0.036	0.005
Sk-5036/42 x Sk-5	-0.062	0.090	-1.275	-0.247	0.256	-0.935	-1.131*	-0.630	-0.036	-0.005
Sk-5037/43 x Sd-63	-0.062	0.034	-0.189	1.637	0.612	-0.534	0.081	0.080	-0.038	-0.094
Sk-5037/43 x Sk-5	0.062	-0.034	0.189	-1.637	-0.612	0.534	-0.081	-0.080	0.038	0.094
Sk-5038/44 x Sd-63	-0.687	-0.340	0.014	0.395	-0.376	-0.356	-0.318	-0.769	0.086	0.055
Sk-5038/44 x Sk-5	0.687	0.340	-0.014	-0.395	0.376	0.356	0.318	0.769	-0.086	-0.055
Sk-5039/46 x Sd-63	-1.187	0.159	0.126	0.358	0.573	0.238	0.756	-0.144	0.036	-0.019
Sk-5039/46 x Sk-5	1.187	-0.159	-0.126	-0.358	-0.573	-0.238	-0.756	0.144	-0.036	0.019
Sk-5040/47 x Sd-63	-0.437	-0.090	0.582	-0.834	-0.744	-0.682	0.156	-0.144	-0.063	-0.094
Sk-5040/47 x Sk-5	0.437	0.090	-0.582	0.834	0.744	0.682	-0.156	0.144	0.063	0.094
Sk-5040/48 x Sd-63	0.812	0.159	-1.048	-0.521	-0.237	-0.159	-0.043	0.055	-0.063	-0.094
Sk-5040/48 x Sk-5	-0.812	-0.159	1.048	0.521	0.237	0.159	0.043	-0.055	0.063	0.094
Sk-5040/50 x Sd-63	1.062	0.784	-0.273	-0.528	0.058	0.052	0.381	0.005	0.011	0.130
Sk-5040/50 x Sk-5	-1.062	-0.784	0.273	0.528	-0.058	-0.052	-0.381	-0.005	-0.011	-0.130
L.S.D. sij 0.05	1.3	0.96	1.91	2.58	1.09	1.08	1.02	1.05	0.18	0.20
L.S.D.(sij-Skl) 0.05	1.83	1.35	2.70	3.63	1.54	1.53	1.44	1.48	0.26	0.28

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انتخاب سلالات من الذرة الشامية البيضاء من خلال تحليل السلاله فى الكشاف

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

تم إجراء التهجينات بين ٢٢ سلاله بيضاء جديدة من الذرة الشامية واثنين من الكشافات (سلاله سدس ٦٣ وسلاله سخا ٥) وذلك بمحطة بحوث سخا. وقد قيمت الهجن القمية (٤٤) الناتجة مع هجين المقارنة هـ.ف ١٠ فى تصميم قطاعات كاملة العشوائية فى أربع مكررات وذلك بمحطتيى بحوث سخا وملوى.

تم قياس صفات عدد الأيام حتى منتصف ظهور الحرابر للنورات المؤنثة وموقع الكوز ومحصول الحبوب وطول الكوز وقطر الكوز.

أوضحت النتائج مايلى:-

- كانت تباينات كل من السلالات والكشافات والتفاعل بينهما معنوية الى عالية المعنوية لجميع الصفات فى الموقعين ما عدا تباين الكشافات لصفة المحصول فى الموقعين وتباين تفاعل السلالات x الكشافات لصفة موقع الكوز فى ملوى وقطر الكوز فى كلا الموقعين.
- كان التباين الوراثى المضيف أكثر أهمية من التباين الوراثى غير المضيف فى وراثة صفات عدد الأيام حتى منتصف ظهور الحرابر للنورات المؤنثة وموقع الكوز وقطر الكوز، بينما كان التباين الوراثى غير المضيف هو الأكثر أهمية فى وراثة محصول الحبوب وطول الكوز.
- كانت أفضل السلالات فى القدرة العامة على الائتلاف فى كلا الموقعين السلالات: سخا ٢٧/٥٠١٩، سخا٣٧/٥٠٢٨، فى التبكير وسخا٢٨/٥٠٢٠، وسخا ٤٣/٥٠٣٧، وسخا٤٧/٥٠٤٠، وسخا٥٠/٥٠٤٠ فى موقع الكوز. وسخا٢٧/٥٠١٩، وسخا ٣٣/٥٠٢٥، وسخا٣٩/٥٠٢٩، وسخا٤٦/٥٠٣٩، فى محصول الحبوب. وسخا٢٧/٥٠١٩، وسخا٣٢/٥٠٢٥، وسخا٣٨/٥٠٢٩، وسخا٣٩/٥٠٢٩، وسخا٤٦/٥٠٣٩ فى طول الكوز.

أظهرت السلاله الكشاف سخا٥ أفضل قدرة عامة على الائتلاف فى كلا الموقعين لصفة عدد الأيام حتى منتصف ظهور الحرابر للنورات المؤنثة وموقع الكوز وقطر الكوز. بينما السلالة الكشاف سدس٦٣ كانت الأفضل فى القدرة العامة على الائتلاف فى كلا الموقعين لصفة طول الكوز.

- كانت الهجن سخا٢٧/٥٠١٩ x سخا-٥، وسخا٤٠/٥٠٣٥ x سخا-٥، وسخا٤٣/٥٠٣٧ x سخا-٥ للتبكير ، وسخا٤٣/٥٠٣٧ x سخا-٥، وسخا ٤٧/٥٠٤٠x سخا-٥ لموقع الكوز، وسخا٢٧/٥٠١٩ x سخا-٥، وسخا٣٣/٥٠٢٥ x سدس-٦٣، وسخا٤٦/٥٠٣٩ x سدس-٦٣ لمحصول الحبوب ، وسخا ٣٩/٥٠٢٩x سدس-٦٣ ، وسخا٤٦/٥٠٣٩ x سدس-٦٣ لطول الكوز ، وسخا٣٦/٥٠٢٧ x سخا-٥، وسخا٤٠/٥٠٣٥ x سخا-٥ ، وسخا٤٨/٥٠٤٠ x سخا-٥ لقطر الكوز هى أفضل الهجن القمية مقارنة بالهجين فردى ١٠ فى كلا الموقعين.