Proceed. Third Pl. Breed. Conf.
April 26, 2003 (Giza)

Egypt. J. Plant Breed. 7 (1): 229-239
Special Issue (2003)

COMBINING ABILITY OF NEW MAIZE INBRED LINES VIA LINE X TESTER ANALYSIS

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ABSTRACT

This experiment was carried out at two locations (Sakha and Nubaria). In 2001 season 28 top crosses derived from crossing between four testers and seven new yellow inbred lines of maize were evaluated. Significant differences were detected between the locations for all studied traits. Mean squares due to crosses and their partitioning into lines and testers were significant for all studied traits except no. of kernels/row for testers. Mean squares due to lines x testers interaction were also significant for grain yield and no. of rows/ear. Additive was more important than non- additive genetic variance for all traits. Moreover, additive more interacted by locations than non-additive variance for grain yield, ear length, no. of rows/ear and no. of kernels/row traits. While the non-additive more influenced by locations than additive variance for days to mid-silk, plant height, ear height and ear diameter traits. The best desirable GCA effects for grain yield and most yield components were obtained by the inbreds,SK-8203/4-1,SK-8203/1-4 and SK-8203/3-1. Also, the inbred lines SK-8212/1-2 and 8263 showed the best GCA effects for earliness and short plants.

The inbred tester L-121 showed the best desirable GCA effect for grain yield and ear length. Moreover, the testers, S.C. SK-21 and S.C.SK-22 were the best general combiners for ear height and ear diameter. Six top crosses (SK-8203/3-1 x L-121), (SK-8203/4-1 x L-121),(SK-8203/3-1 x S.C.SK-21), (8203/3-1 x T.W.C 351), (SK-8203/4-1 x S.C.SK-21) and (SK-8203/1-4 x S.C.SK-21) were significantly better than the commercial SC155 for grain yield and most yield components, meanwhile the same six top crosses did not differ significantly from the same single cross for earliness and short plant. These crosses can be used in maize breeding program.

Key words: ***Maize, Zea mays L., Line x tester, Combining ability, Top crosses.***

ITRODUCATION

Developing a high yielding maize hybrid is based mainly on the development of better inbred lines. Jenkins (1978) stated that the top crossing have been used fairly widely for the preliminary evaluation of combining ability of new inbred lines. Moreover Ali and Tepora (1986) and

AL-Naggar *et al* (1997) used open- pollinated maize varieties, three way crosses, single crosses and inbred lines as testers to evaluate the combining ability and found that inbred lines with narrowest genetic base and lowest yield potential exhibited the highest genetic variation in the test crosses progenies for most of the studied traits and could be considered as the tester of choise for distinguishing the new inbreds for their combining abilities.

Numerous investigators suggested that the estimates of additive genetic variance played an important role in the inheritance of grain yield than non-additive genetic variance (Matzinger *et al* 1959, EL-zeir *et al* 1993, Mostafa *et al* 1995, EL-zeir *et al* 2000 and Amer *et al* 2002 b). While, Lonnquist and Gardner (1961) and Mosa (2001) concluded that the opposite was true for the same trait. Amer *et al* (2002 a) showed that additive type of gene action was more affected by location than non- additive of gene action for silking date, plant and ear height, grain yield, no.of rows/ear and no. of kernels/row, while, the opposite was true for grain yield and plant height traits.

The main objectives of this investigation were as follows:

1- Evaluation of combining ability effects for a new group of inbred lines.

2- Determing the most important mode of gene action, which controls grain yield and its components, earliness and plant height traits.

3- Recognizing the best lines and top crosses to be recommended for future use.

MATERIALS AND METHODS

New seven yellow inbred lines of maize derived at Sakha Agricultural Research Station, Maize Section were chosen for this study (Table 4). These inbred lines were crossed with four testers i.e. the inbred line L-121, two promising single crosses (SK-21 and SK-22) and one three-way cross T.W.C 351 during 2000 season. In 2001 season, the 28 top crosses were evaluated at Sakha and Nubaria Research Station. The tested crosses were arranged in Randomized Complete Block Design with four replications. Plot size was one row, 6 m long, 80 cm apart and 25 cm between hills. All recommended cultural practices were done. Data recorded were, days to mid silk, plant height, ear height, grain yield (ard/fad) adjusted to 15.5% grain moisture content, ear length, ear diameter, number of rows/ear and number of kernels/row. Statistical analysis of the combined data over two locations was performed according to Steel and Torrie (1980). Combining ability analysis was computed using the line x tester procedure suggested by kempthorne (1957). Combined analysis among the two locations was done based on the homogeneity test.

RESULTS AND DISCUSSION

Combined analysis of variance for the eight studied traits over the two locations are shown in Table (1). Mean squares due to locations were highly significant for all studied traits indicating that these traits differed from one location to another. This is logic because Nubaria Research Station is located in a sandy area. This result agreed with that reported by EL-Zeir *et al* (2000) and Amer *et al* (2002a).

Mean squares due to crosses (C) and their two partitioning: lines (L) and testers (T) were highly significant for all traits except no.of kernels/row for testers. Mean squares due to line x testers were not significant for all traits except grain yield and no.of rows/ear. On the other hand, the mean squares due to the interaction between C x Loc. and their partitions were not significant for all traits except plant height for C x Loc. and L x T x Loc, ear height for C x Loc., L x Loc. and L x T x Loc., grain yield for C x Loc., L x Loc. and T x Loc. These results indicated that the genotypes varied significantly from each other and ranked differently from one location to another.

Mean performance for the studied traits of 28 top crosses over two locations are given in Table (2). The results showed that six top crosses [SK-8203/3-1 x L-121 (28.02 ard/fad), SK-8203/4-1 x L-121 (26.24ard/fad), SK-8203/3-1 x S.C.SK-21 (25.15 ard/fad), SK-8203/3-1 T.W.C351 (25.13 ard/fad), SK-8203/4-1 x S.C.SK-21 (24.84 ard/fad), and SK-8203/1-4 x S.C.SK-21 (24.26 ard/fad)] were significantly superior than the commercial single cross SC-155 (21.50 ard/fad) for grain yield and most yield components. Moreover, most of these six top crosses did not differ significantly from the check variety (S.C.155) for both earliness and short plant. These results indicated that these six top crosses could be recommended for future use in maize hybrid breeding programs.

Estimates of variance for general (σ^2GCA) and specific (σ^2SCA) combining ability and their interactions with locations are presented in Table (3). The results exhibited that σ^2GCA was higher than σ^2SCA for all studied traits. This indicates that the additive played more important role than non- additive genetic variance in inheritance of all studies traits.

Table 1. Combined analysis of Mean squares for eight traits over the two locations.

S.O.V	d.f	Mean squares							
		Days to mid-silk	Plant height	Ear height	Ear length	Ear diameter	No.of rows/ear	No.of kernels/row	Yield Ard/fad
Location (Loc.)	1	768.86**	284643.86**	143471.25**	160.48**	0.18**	16.29**	155.78**	620.52**
Rep/ Loc.	6	9.56	1498.52	399.09	2.88	0.02	0.80	12.24	26.84
Crosses (c)	27	48.03**	1868.24**	2288.24**	7.99**	0.22**	4.63**	33.37**	66.22**
Lines (L)	6	201.45**	5600.12**	8319.51**	26.64**	0.69**	11.19**	118.18**	213.96**
Testers(T)	3	19.71**	4278.54**	3255.71**	6.95**	0.33**	8.36**	3.36	78.28**
L x T	18	1.61	222.56	116.58	1.96	0.04	1.81**	10.11	14.96**
C X Loc.	27	1.22	249.33*	271.56**	1.63	0.03	0.50	9.63	18.72**
L x Loc.	6	0.94	191.83	720.16**	1.49	0.02	0.76	15.26	56.14**
T x Loc.	3	0.39	119.72	102.03	3.09	0.02	0.39	6.92	16.57*
L x T x Loc.	18	1.46	290.10**	150.28*	1.42	0.03	0.43	8.18	6.59
Error	162	1.65	153.36	91.81	1.63	0.03	0.72	9.02	4.43

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

Table 2. Mean performances for 28 top crosses as an average of the two locations.

Top crosses		Days to mid-silk	Plant eight (cm)	Ear eight cm)	Ear length (cm)	Ear diameter (cm)	No. of Rows/ear	No.of kernels /row	Grain yield ard/fad
Sk-8128 X L-121		64.00	246.75	139.75	18.06	4.91	15.75	34.90	19.49
Sk-8128 X S.CSK-21		62.50	243.13	131.00	17.38	4.78	14.60	36.33	21.78
Sk-8128 X S.CSK –22		63.00	229.88	128.38	16.75	4.69	14.58	34.05	20.48
Sk-8128 X T.W.C 351		63.75	242.75	138.38	16.39	4.94	16.50	35.40	20.79
Sk-8130 X L-121		65.50	258.50	155.75	17.23	4.58	13.60	36.30	20.70
Sk-8130 X S.CSK–21		64.63	234.50	131.88	17.09	4.44	13.33	36.0	18.66
Sk-8130 X S.CSK–22		66.25	239.75	137.75	17.83	4.38	13.73	38.8	17.83
Sk-8130 X T.W.C351		65.75	251.00	151.38	17.64	4.54	13.95	38.05	18.46
Sk-8203/4-1 X L-121		66.63	256.88	148.88	19.45	4.98	14.10	37.70	26.24
Sk-8203/4-1 X S.CSK-21		64.50	248.38	131.50	18.99	4.73	13.80	39.75	24.84
Sk-8203/4-1 X S.CSK-22		65.00	232.50	123.75	18.13	4.79	14.40	36.73	21.33
Sk-8203/4-1 X T.W.C351		66.25	234.38	131.00	18.15	4.86	15.20	36.81	20.58
Sk-8203/1-4 X L-121		65.75	267.75	154.38	19.75	4.78	13.83	41.45	21.92
Sk-8203/1-4 X S.CSK-21		64.50	253.63	135.88	18.78	4.74	15.03	39.08	24.26
Sk-8203/1-4 X S.CSK -22		64.13	243.63	132.25	18.56	4.70	14.48	39.30	21.53
Sk-8203/1-4 X T.W.C351		65.88	253.88	143.50	18.69	4.83	14.73	40.81	22.98
Sk-8203/3-1 X L-121		65.25	258.50	146.25	19.58	4.84	14.55	41.40	28.02
Sk-8203/3-1 X S.CSK-21		64.25	251.25	135.25	19.85	4.73	13.73	39.50	25.15
Sk-8203/3-1 X S.CSK-22		64.38	233.75	131.25	17.83	4.70	14.33	38.98	22.68
Sk-8203/3-1 X T.W.C351		65.88	237.25	134.63	19.16	4.86	14.98	39.30	25.13
Sk-8212 X L-121		59.88	228.25	109.500	17.13	4.61	12.95	35.78	19.15
Sk-8212 X S.CSK –21		59.63	217.88	98.38	17.14	4.58	13.95	34.85	18.73
Sk-8212 X S.CSK–22		59.88	202.75	93.00	17.38	4.71	14.40	35.40	17.60
Sk-8212 X T.W.C351		60.63	215.63	106.88	17.08	4.61	14.45	36.18	18.60
Sk-8263 X L-121		60.25	230.63	116.88	17.40	4.75	13.45	37.23	22.10
Sk-8263 X S.CSK–21		59.75	226.63	108.00	17.48	4.78	13.45	36.8	18.68
Sk-8263 X S.CSK–22		59.50	215.50	105.25	16.71	4.36	13.88	37.33	17.33
Sk-8263 X T.W.C351		60.38	230.38	113.50	17.00	4.50	13.98	35.88	18.05
S.C.155		64.38	242.0	134	17.53	4.95	14.7	35.90	21.50
L.S.D	0.05	1.26	12.136	9.39	1.251	0.175	0.83	2.948	2.063
	0.01	1.659	15.975	12.361	1.647	0.231	1.093	3.88	2.715

This agree with reports of Matzinger *et al* (1959), EL-Zeir *et al* (1993) and Mostafa *et al* (1995) for grain yield and by Amer *et al* (2002 b) for silking date, plant height and grain yield. Moreover Amer *et al* (2002 a) showed that ear height, ear length, ear diameter and no.of rows/ear were controlled mainly by additive genetic variance.

Table 3. Estimates of variance of general (σ^2GCA) and specific combining ability (σ^2SCA) and their interaction with locations.

Genetic parameters	Days to mid-silk	Plant height	Ear height	Ear length	Ear diameter	No.of rows/ear	No.of kernels/row	Grain yield
σ^2GCA	2.495	110.252	122.960	0.317	0.011	0.1777	1.0854	2.304
σ^2SCA	0.0194	-8.442@	-4.213@	0.067	0.001	0.1726	0.241	1.046
σ^2GCA/ σ^2SCA	128.60	-13.05	-29.10	4.73	11.00	1.03	4.50	2..2
σ^2GCAxLoc.	-0.0363@	-6.1055@	11.855	0.040	-0.0005@	0.0065	0.1321	1.352
σ^2SCAxLoc.	0.0490	34.184	14.618	-0.052@	0.001	-0.0713@	-0.2168@	0.541
σ^2GCAxLoc/ σ^2SCAxLoc.	-0.74	-018	0.81	-0.77	-0.5	-0,09	-.61	2.5

@ Variance estimate preceded by negative sign is considered zero.

On the other hand, the magnitude of the σ^2GCA x Loc. interaction was higher than σ^2SCA x Loc for grain yield, ear length, no.of rows/ear and no.of kernels/row. This result revealed that the additive was more influenced and interacted by locations than non-additive gene action. Meanwhile, the non-additive was more sensitive to environment than additive genetic variance for days to mid-silk, plant height, ear height and ear diameter traits. Amer *et al* (2002 a) also found that σ^2GCA x Loc was more affected by locations than σ^2SCA x Loc. for grain yield, no. of rows/ear and no. of kernels/row. While, Amer *et al* (2002 b) reported that σ^2SCA x Loc was much higher than σ^2GCA x Loc for plant height.

General combining ability effects for the seven inbred lines and four testers over two locations are given in Table (4). Positive (favorable) and high significant GCA effects for grain yield and most yield components were detected in inbred lines SK-8203/4-1,SK-8203/1-4 and SK-8203/3-1.These lines could be directed to the hybrid breeding program to produce new high yielding crosses. Also, the results in Table (4) revealed that lines SK-8212/1-2 and SK-8262/6-3 had the highest negative (favorable) and significant GCA effects for silking date, plant and ear height towards, earliness and short plants.

On the other hand, high desirable GCA effects for the testers were obtained from the inbred line L-121 for grain yield and ear length, the single crosses S.C.SK-21 for earliness, short ear height and ear diameter and the single crosses S.C.SK-22 for short plant height, ear height and ear diameter. Moreover, the 3- way cross T.W.C 351 was the best tester for no. of rows/ear. These results revealed that the inbred tester L-121 had a high frequency of favorable dominant alleles, which contributed to the yield of top crosses. Ameha (1977), Ali and Tepora (1986), Mahmoud (1996) and AL-Naggar *et al* (1997) reported that most efficient testers for grain yield were inbred lines (narrowest genetic base and lowest yield potential).

Table 4. Estimates of general combining ability effects for seven inbreds and four testers as an average of the two locations.

Parents	Days to mid-silk	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No.of rows/ear	No.of kernels/row	Grain yield ard/fad
Lines								
Sk-8128	-0.1741	1.8527	5.2991**	-0.8045**	0.1371**	1.0830**	-2.3331**	-0.546
Sk-8130	2.0446**	7.1652**	15.1116**	-0.5045*	-0.2097**	-0.6232**	-0.2143	-2.269**
Sk-8203/4-1	2.1071**	4.2589	4.7054**	0.7297**	0.1463**	0.1018	0.2452	2.069**
Sk8203/1-4	1.5759**	15.9464**	12.4241**	0.9957**	0.0683*	0.2393	2.6577**	1.490**
Sk8203/3-1	1.4509**	6.4152**	7.7679**	1.1548**	0.0903**	0.1205	2.2919**	4.062**
Sk-8212	-3.4866**	-22.6473**	-27.1384**	-0.7700**	-0.0632*	-0.3357*	-1.9518**	-2.662**
Sk-8263	-3.5179**	-12.9911**	-18.1696**	-0.8013**	-0.1692**	-0.5857**	-0.6956	-2.143**
Testers								
L-121	0.4063*	10.8348**	9.6920**	0.4215*	0.0858**	-0.2411*	0.3196	1.335**
S.CSK-21	-0.6652**	0.5670	-4.5223**	0.1499	-0.0553*	-0.2911	-0.0304	0.545
S.C.SK-22	-0.3259	-10.5223**	-7.4152**	-0.3517*	-0.0735**	-0.0196	-0.2768	-1.356**
T.W.C351	0.5848**	-0.8795	2.2455	-0.2197	0.0430	0.5518**	-0.0124	-0.525
L.S.D for GCA of lines								
0.05	0.446	4.291	3.320	0.442	0.062	0.294	1.042	0.729
0.01	0.587	5.648	4.370	0.582	0.082	0.386	1.372	0.960
L.S.D for GCA of testers								
0.05	0.337	3.244	2.510	0.334	0.0469	0.222	0.788	0.551
0.01	0.443	4.269	3.303	0.440	0.0617	0.292	1.037	0.726

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

Table 5. Estimates of specific combining ability effects for 28 top crosses over the two locations for eight traits.

Top crosses	Days to mid silk	Plant height	Ear height	Ear length	Ear diameter	No.of rows/ear	No.of kernels/row	Grain yield ard/fad
Sk-8128 X L-121	0.2813	-4.709	-4.317	0.4978	-0.0011	0.6348*	-0.5884	-2.479**
Sk-8128 X S.CSK-21	-0.1473	1.933	1.147	0.0814	0.0021	-0.4652	1.1866	0.596
Sk-8128 X S.CSK –22	0.0134	-0.228	1.415	-0.0421	-0.0678	-0.7616*	-0.8419	1.198
Sk-8128 X T.W.C 351	-0.1473	3.005	1.754	-0.5371	0.0668	0.5920	0.2436	0.685
Sk-8130 X L-121	-0.4375	1.728	1.871	-0.6402	0.0077	0.1911	-1.3071	0.455
Sk-8130 X S.CSK–21	-0.2411	-12.004*	-7.790*	-0.5066	0.0118	-0.0339	-1.2571	-0.802
Sk-8130 X S.CSK–22	1.0446*	4.335	0.978	0.7329	-0.0330	0.0946	1.7893	0.278
Sk-8130 X T.W.C351	-0.3661	5.942	4.942	0.4139	0.0135	-0.2518	0.7749	0.069
Sk-8203/4-1 X L-121	0.625	3.009	5.402	0.3505	0.0516	-0.0339	-0.3666	1.654*
Sk-8203/4-1 X S.CSK-21	-0.4286	4.777	2.241	0.1591	-0.0572	-0.2839	2.0334	1.048
Sk-8203/4-1 X S.CSK-22	-0.2679	-0.009	-2.616	-0.2013	0.030	0.0446	-0.7452	-0.560
Sk-8203/4-1 X T.W.C351	0.0714	-7.777	-5.027	-0.3083	-0.0175	0.2732	-0.9216	-2.142**
Sk-8203/1-4 X L-121	0.2813	2.196	3.183	0.3845	-0.0703	-0.4464	0.9709	-2.092**
Sk-8203/1-4 X S.CSK-21	0.1027	-1.661	-1.103	-0.3189	0.0337	0.8036*	-1.0541	1.039
Sk-8203/1-4 X S.CSK -22	-0.6116	-0.571	-1.835	-0.0293	0.0140	-0.0179	-0.5827	0.215
Sk-8203/1-4 X T.W.C351	0.2277	0.036	-0.246	-0.0363	0.0225	-0.3393	0.6659	0.838
Sk-8203/3-1 X L-121	-0.0938	2.478	-0.286	0.0505	-0.0293	0.3973	1.2866	1.439
Sk-8203/3-1 X S.CSK-21	-0.0223	5.496	2.929	0.5971	-0.0012	-0.3777	-0.2634	-0.640
Sk-8203/3-1 X S.CSK-22	-0.2366	-0.915	1.821	-0.9263*	-0.0080	-0.0491	-0.5419	-1.211
Sk-8203/3-1 X T.W.C351	0.3527	-7.058	-4.464	0.2789	0.0385	0.0295	-0.4814	0.412
Sk-8212 X L-121	-0.5313	1.290	-2.129	-0.4747	-0.1008	-0.7464*	-0.0946	-0.700
Sk-8212 X S.CSK–21	0.2902	1.183	0.959	-0.1901	0.0023	0.3036	-0.6696	-0.336
Sk-8212 X S.CSK–22	0.2009	-2.853	-1.522	0.5484	0.1575*	0.4821	0.1268	0.433
Sk-8212 X T.W.C351	0.0402	0.379	2.692	0.1164	-0.0590	-0.0393	0.6374	0.603
Sk-8263 X L-121	-0.125	-5.991	-3.723	-0.1685	0.1422	0.0036	0.0991	1.722*
Sk-8263 X S.CSK–21	0.4464	0.277	1.616	0.1781	0.0083	0.0536	0.0241	-0.905
Sk-8263 X S.CSK–22	-0.1429	0.241	1.759	-0.0823	-0.0855	0.2071	0.7956	-0.353
Sk-8263 X T.W.C351	-0.1786	5.473	0.348	0.0727	-0.0650	-0.2643	-0.9189	-0.464
L.S.D for SCA 0.05	0.8912	8.528	6.640	0.885	0.124	0.587	2.0844	1.459
0.01	1.1731	11.296	8.740	1.165	0.163	0.773	2.7438	1.920

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

Specific combining ability (SCA) effects of the 28 top crosses over two locations are shown in Table (5). The results showed that the best SCA effects were observed in the top crosses L-121 x SK-8203/4-1 and L-121 x SK- 8263 for grain yield, L-121 x SK-8128 and S.C.SK-21 xSK- 8203/1-4 for no.of rows/ear. Also, the top cross S.C.SK-21 x SK-8130 exhibited desirable SCA effects for short plant and ear height. These results demonstrated that the inbred line L-121 was the most favorable and the best tester for evaluating combining ability of the inbred lines for grain yield traits than other testers under study.

REFERENCES

Ali, M.L. and N.M.Tepora (1986). Comparative performance of four types of testers for evaluating corn inbred lines from two populations. Crop.Sci. 11(3):175-179.

AL-Naggar, A.M., H.Y.EL-Sherbieny and A.A.Mahmoud (1997). Effectiveness of inbreds, single crosses and populations as testers for combining ability in maize. Egypt. J.Plant Breed., 1:35-46.

Ameha, M.(1977). Comparison of S_2 progeny and inbred tester methods for improving maize. Ph. D.Thesis, Fac.Agric., Iowa State Univ., USA.

Amer, E.A., A.A.EL-Shenawy and H.E.Mosa (2002 a). Evaluation of some new inbred lines of maize for combining ability. Annals of Agric Sc. Moshtohor, 40 (2): 791-802.

Amer, E.A., A.A. EL-Shenawy and H.E.Mosa (2002 b). A comparison of four testers for the evaluation of maize yellow inbreds .Egypt. J. AppL. Sci. 17 (10): 597-610.

EL-Zeir, F.A., A.A Abdel-Aziz and A.A.Galal (1993). Estimation of heterosis and combining ability effects in some new top crosses in maize. Menofyia J.Agric. Res. 4 (1) :2179-2190.

EL-Zeir, F.A., E.A.Amer, A.A. Abdel-Aziz and A.A.Mahmoud (2000). Combining ability of new maize inbred lines and type of gene action using top crosses of maize. Egypt.J.Appl.Sci. 15 (2): 116-128.

Jenkins, M.T. (1978). Maize breeding during the development and early years of hybrid maize. In Walden, D.B. (ed) Maize breeding and genetics. New York, Wiley- Interscience Pupl.

Kempthorne, O.(1957). An introduction to genetic statistical. John Wiley- Sons Inc., New York.

Lonnquist, J.H. and Gardener,C.O.(1961).: Heterosis in intervarietal crosses in maize and *its implication* in breeding procedures. Crop Sci. 1:179-183.

Mahmoud, A.A.(1996). Evaluation of combining ability of newly developed inbred lines of maize. Ph.D. Thesis, Fac.Agric., Cairo University.

Matzinger, D.T., G.F.Sprague and C.C Cockerham (1959). Diallel crosses of maize in experiments repeated over locations and years. Agron .J.51:346-349.

Mosa,A.E.(2001).A comparative study of the efficiency of some maize testers for evaluation a number of white maize inbred lines and their combining ability under different environmental conditions. Ph.D.Thesis, Fac. Agric., Kafr EL-Sheiekh, Tanta University.

Mostafa,M.A., F.A. Salama and A.A.Abdel-Aziz (1995).Combining ability of white maize populations with inbred testers. J.Agric. Sci. Mansoura Univ. 20 (1): 143-149.

Steel, R.G.and J.H. Torrie (1980). Principal and procedures of statistics. Mc.Grow Hill Book Inc., New York., USA.

تقيم القدرة على الائتلاف في سلالات جديدة من الذرة الشامية من خلال تحليل السلالة x الكشاف

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تم إجراء التهجين بين ٧ سلالات تربية ذاتية جديدة من الذرة الشامية واربعة من الكشافات في موسم ٢٠٠٠ثم قيمت الهجن القمية الناتجة (٢٨هجين قمى) في محطة البحوث الزراعية بسخا والنوبارية وذلك في موسم ٢٠٠١ .

وكانت أهم النتائج ما يلي :

١- وجدت اختلافات معنوية بين الموقعين وذلك لكل الصفات تحت الدراسة. كذلك وجدت اختلافات معنوية بين الهجن القمية ومجزئاتها(السلالات والكشافات) لكل الصفات المدروسة ما عدا صفة عدد الحبوب/السطر للكشافات.كما كانت هناك اختلافات معنوية فقط لتفاعل السلالات مع الكشافات لصفتي محصول الحبوب وعدد السطور / الكوز.

٢- كـــان تبايـــن الفعل الوراثي المضيف أهم من الفعل الوراثي الغير مضيف لكل الصفات المدروسة. عـــلاوة علـــى ذلك كان تباين الفعل الوراثي المضيف اكثر تأثرا وتفاعلا بالمواقع لصفات محصول الحبوب ، طول الكوز ، عدد السطور /الكوز، عدد الحبوب /السطر. بينما كان الفعل الوراثي الغير مضيف اكثر تأثرا و تفاعلا مع المواقع لصفات ٥٠% ظهور حريرة، ارتفاع النبات ، ارتفاع الكوز ، قطر الكوز.

٣- كانـــت افضل السلالات للقدرة العامة على الائتلاف لصفه محصول الحبوب ومعظم صفات مكونات المحصـــول هـــي ســـخا ٨٢٠٣/٤-١ ، ســـخا ٨٢٠٣/١-٤ ، سخا٨٢٠٣/٣-١ كذلك أظهرت الســـلالتان سخا ٨٢١٢/١-٢، سخا ٨٢٦٣ احسن قدرة عامة على الائتلاف لصفات التبكير في النضج وقصر النبات.

٤- كانت السلالة ١٢١ افضل كشاف لتأثير القدرة العامة على الائتلاف لصفة محصول الحبوب وطول الكوز. كذلك أظهرت الكشافات هجين فردى سخا ٢١، وهجين فردى سخا ٢٢ احسن قدرة ائتلاف عامة مرغوبة لصفتي ارتفاع الكوز وقطر الكوز.

٥-زادت ســـت هجـــن قمية عن الهجين الفردي التجاري ١٥٥ زيادة معنوية لصفه محصول الحبوب ومعظـــم مكوناته وفي نفس الوقت لم تختلف هذه الهجن معنويا عن هذا الهجين في صفتي ٥٠% ظهور الحريرة وارتفاع النبات وبذلك يمكن الاستفادة من هذه الهجن في المستقبل فى برامج تربية الذرة الشامية.

مجلد المؤتمر الثالث لتربية النبات-الجيزة ٢٦ أبريل ٢٠٠٣
المجلة المصرية لتربية النبات ٧ (١):٢٢٩-٢٣٩ (عدد خاص)