J. Plant Production, Mansoura Univ., Vol. 5 (9): 1601-1609, 2014

COMBINING ABILITY FOR YIELD AND SOME AGRONOMIC TRAITS BY USING LINE × TESTER ANALYSIS

El Ghonemy, M. A. M.; H.A.A. Drwech and E. A. Amer
Maize Res. Dept., Field Crops Res. Inst., Agric. Res. Center, Giza, Egypt

ABSTRACT

Combining ability of maize germaplasm is of great value to maize breeders. Thus, combining ability for grain yield and agronomic traits was studied in a line x tester crossing program. Thirty six testcrosses produced by crossing (18 inbred lines x 2 testers) along with two commercial check hybrids *i.e*. SC 10 and SC 128 were grown in replicated yield trail using randomized complete block design with 4 replications in 2011 at two locations, *i.e.* Sakha and Sids Research Stations. Data were recorded for days to 50% silking, plant and ear heights, number of ears per plant and grain yield (ard./fed.). Mean squares of entries and entries x locations exhibited highly significant to indicate that the two locations differed between them as soon as mean squares due to lines and testers were highly significant for all studied traits, indicating the presence of wide diversity among inbred lines and among testers for these traits. The best performance and desirable GCA effects were recorded for L4 for grain yield and silking date , L14 and L18 for plant and ear heights and L3, L4 and L5 for number of ears / plant. Based on mean performance of F_1 crosses *per se,* cross L4 x T2 significantly out yielded the check hybrids SC 10 and SC 128. Significant positive SCA effects were found for the same single cross. The additive type of gene action played an important role in the inheritance of all studied traits except for grain yield and number of ears/plant, where non-additive gene effects played an important role in the inheritance of these traits. Moreover, the magnitude of $\sigma^2_{GCAxLoc}$ interaction was higher than σ^2SCA x E interaction for all studied traits, indicating that the additive type of gene action was affected more by environment than non-additive one.

Keywords: Maize, Corn, GCA, SCA, Line, Tester.

INTRODUCTION

The line x tester mating design suggested by Kempthorne (1957) has been extensively used in maize breeding programs. It is especially useful in testing procedures, where it is desired to study and compare the performance of inbred lines in hybrid combinations, and provide sufficient genetic information on the inheritance of characters. Many investigations used line x tester analysis to estimate general combining ability (GCA) and specific combining ability (SCA) of inbred parents. Since the development of new hybrids is a continuous process, thus information on combining ability of new lines remains important.Two types of combining ability, general and specific, has been recognized in quantitative genetics. According to Sprague and Tatum (1942) general combining ability is due to genes, which are largely additive in their effects and specific combining ability is due to the genes with dominance or epistatic effects.On the other hand , numerous investigators found that the additive effects more important in the inheritance of grain yield comparing to non-additive effects such as El-Hosary (1988 and 1989), Mosa (1996) , El-Zeir *et al* (1999) , Ibrahim (2001) , Ibrahim and El-Ghonemy (2010) and Osman *et al* (2011), while Mahmoud (1996) , Soliman and SadeK (1999) , Amer (2004), Ibrahim *et al* (2007), Barakat and Osman (2008) , Abd El- Moula (2011) and Ibrahim *et al* (2012) found the revers

This research was carried out : 1) to estimate GCA effects for 18 newly developed inbred lines and SCA effects of top crosses 2) to evaluate the performance of 36 white resulted top crosses and 3) to select the superior hybrids and inbred lines with high SCA and GCA effects, respectively.

MATERIALS AND METHODS

The experimental material used in this investigation comprised of eighteen genetically diverse white maize inbred lines, namely L1, L2, to L18. These inbred lines were developed at Sakha Agric. Res. Sta. During 2011 season they were crossed with two testers, namely line- 5140 (T1) and line 5068 (T2). The resultant 36 hybrids along with two white commercial check hybrids *i.e.*, SC 10 and SC 128 were evaluated in a replicated yield trail at two locations *i.e.*, Sakha and Sids Agric. Res. Sta. during 2011 season. The experiment was laid out in a randomized complete block design with four replications. Plot size was one row, 6 m long, 0.8 m apart, and 0.25 m between hills. All the inputs like irrigation and fertilization were applied as recommended at the proper time. Data were recorded for number of days to 50% silking, plant height (cm), ear height (cm), number of ears per 100 plants and grain yield adjusted to 15.5 % grain moisture and converted to ard./fed. (ardab = 140 Kg). Analysis of variance was carried out according to Steel and Torrie (1980) for combined data across two locations after testing homogeneity of error mean squares. The line x tester analysis was done as outlined by Kempthorne (1957).

RESULTS AND DISCUSSION

Analysis of variance

Mean squares of entries and entries x locations exhibited highly significant to indicate that the two locations differed between them, line x tester analysis was performed for all studied traits through which genotypes were significantly different and according to results of analysis of variance are summarized in Table (1). Mean squares due to inbred lines and testers were significant for all traits, indicating the presence of wide diversity among lines and among testers for these traits . Similer results were reported by El-Zeir *et al* (1999), Soliman and Sadek (1999) . Mean squares due to line x tester interaction were significant for all studied traits, except for grain yield and ear height, indicating that lines differed in their performance when crossed to the two testers. There were significant differences among locations for all traits indicating that the two locations differed in their environmental conditions for these traits. In addition, the interaction of lines with locations was significant for grain yield, plant height and number of ears/100 plants. Also, tester x location interaction was significant for days to 50 % silking, number of ears/100 plant and grain yield. Location × L × T interaction was significant only for number of ears /100 plants. These results indicated that both lines and testers performed differently under different location for these traits . These results are agreement with what obtained by Ibrahim (2001), Mahmoud (1996) and Mohmoud and Abd El-Azeem (2004)

Table (1): Mean squares for studied traits as combined over two locations (Sakha and Sids) in 2011 season.

S.O.V.	df	Mean squares				
		Grain yield	Days to 50% silking	Plant height	Ear height	No. of ears/100 plants
Locations (Loc)	1	20188.46**	1485.47**	744678.0 **	330264.47**	19857.50**
Reps /Loc	6	261.90	59.90	4452.91	1876.78	151.75
Entries (E)	37	55.80**	12.04**	730.03**	408.55**	646.31**
E x Loc	37	64.28**	2.42**	349.48**	127.55	334.93**
Error	222	21.70	1.09	170.74	162.16	69.65
Genotypes (G)	35	57.62**	11.73**	746.36**	376.85**	659.07**
Lines (L)	17	73.31**	6.13**	863.39**	527.22**	770.35**
Testers (T)	1	297.66**	262.58**	5503.81**	2058.66**	4277.6**
Lx T	17	27.81	2.57**	349.48**	127.55	334.93**
G x Loc	35	56.57**	2.50**	212.79	175.88	508.69**
L x Loc	17	55.72**	1.70	324.34**	242.43	423.75**
T x Loc	1	696.79**	39.76**	5.73	22.03	5812.35**
L x T x Loc	17	19.76	1.11	113.42	118.38	281.65**
Error	210	20.50	1.05	168.74	160.16	68.65

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

Mean Performance

Mean performance of grain yield and the studied agronomic traits for the 36 testcrosses and the two checks (SC10 and SC128) from the combined analyses across two locations are presented in Table (2).

Mean performance of the 18 lines across the two testers for grain yield ranged from 27.5 to 35.7 ard/fed for testcrosses with lines L18 and L4, respectively. The best performing lines were L3, L4, L9, L12, L14 and L16. These lines produced the highest average grain yield across the two testers. Cross L4 x T2 significantly outyielded (37.9 ard/fed) the best commercial check hybrid SC10 (31.8 ard/fed). Whereas, eight testcrosses (L1, L3, L7, L9, L10, L12 and L16 with T1 and L4 with T2) had significantly outyielded the check hybrid SC128 (29.3 ard/fed) and did not differ significantly from SC10. With respect to number of days to mid-silking, performance of the 18 lines across two testers ranged from 64.0 to 66.0 days for L11 and L13, respectively. None of the 36 single crosses was earlier than SC 128 but 18 out of them were earlier than SC 10.

For plant and ear heights, six testcrosses *i.e.* (L1 x T1, L12 x T1, L14 x T1, L15 x T1, L16 x T1 and L18 x T1) had significantly shorter plants and lower ear placement than the check hybrid SC128. The average mean performance revealed that the two parental lines L14 and L18 produced shorter plants and lower ear placement in their crosses with the two testers. Regarding number of ears per plant, six testcrosses *i.e.* (L3 x T2, L4 x T2, L5 x T2, L6 x T2, L12 x T2 and L15 x T2) significantly surpassed the check hybrid SC10, but four of them did not differ significantly from SC10 for grain yield. Across two testers, the mean average ranged from 98.0 to 125.0% for L18 and L5, respectively. The inbred lines L4, L3 and L5 were the best performing lines across the two testers regarding this trait.

Considering testers, the tester line T1 produced the highest grain yield across all crosses (32.8 ard/fed), the earliest silking date (64 days), the shortest plant and ear heights (265 and 148 cm, respectively) across all parental lines, whereas, the tester line T2 produce the highest value of number of ears per plants for the crosses across all parental lines.

Table (2): Mean performance of grain yield and 4 other traits for 36 testcrosses at Sakha and Sids locations evaluated in 2011 season.

Trait	Grain yield (ard/fed)			Days to 50% silking			Plant height (cm)			Ear height (cm)			No. of ears/100 plants		
Tester	T1	T2		T1	T2		T1	T2		T1	T2		T1	T2	
Line	Sk-5140	Sk-5068	Mean	Sk-5140	Sk-5068	Mean	Sk-5140	Sk-5068	Mean	Sk-5140	Sk-5068	Mean	Sk-5140	Sk-5068	Mean
L 1	33.8	31.8	32.8	64	65	64	257	268	262	137	144	140	99	100	99
L 2	29.5	32.2	30.8	64	66	65	264	284	274	147	159	153	96	104	100
L 3	34.6	32.3	33.5	64	66	65	273	279	276	158	163	160	106	119	113
L 4	33.5	37.9	35.7	63	65	64	259	281	270	146	157	151	110	141	125
L 5	32.2	26.2	29.2	64	65	65	277	277	277	148	152	150	105	119	112
L 6	30.5	25.2	27.9	63	67	65	271	279	275	151	154	153	100	116	108
L 7	34.8	30.8	32.8	65	66	66	271	276	273	151	151	151	97	101	99
L 8	33.4	32.0	32.7	64	65	65	269	277	273	150	153	151	106	101	103
L 9	34.2	31.9	33.1	64	65	65	279	271	275	155	163	159	99	100	99
L 10	34.1	30.1	32.1	64	66	65	271	263	267	153	149	151	99	106	102
L 11	33.4	30.3	31.9	63	65	64	258	271	264	155	154	154	101	103	102
L 12	34.7	32.6	33.6	63	66	65	254	279	266	140	161	151	98	116	107
L 13	32.8	29.9	31.3	65	67	66	284	289	286	161	161	161	100	97	98
L 14	32.9	33.3	33.1	63	65	64	259	259	259	142	143	143	98	103	101
L 15	30.3	30.2	30.3	64	66	65	254	271	262	142	148	145	99	115	107
L 16	34.2	32.9	33.6	65	67	66	254	266	260	141	150	146	104	112	108
L 17	31.2	29.1	30.2	64	66	65	263	276	269	149	155	152	101	107	104
L 18	29.8	25.1	27.5	64	65	65	257	265	261	141	146	144	99	97	98
Mean	32.8	30.8	31.8	64	66	65	265	274	270	148	154	151	101	108	105
SC10	**31.8**			**65.9**			**272.8**			**155.4**			**104.2**		
SC128	**29.3**			**63.0**			**259.4**			**135.9**			**94.4**		
LSD 5%	**4.6**			**1.0**			**12.8**			**12.5**			**8.2**		

General and specific combining ability effects in F_1's

Estimates of general combining ability (GCA) effects of the parental lines and two testers are presented in Table (3). High positive values of GCA effects would be of interest in all studied traits, except for days to 50% silking and plant and ear heights, where negative effects would be favorable.

Results revealed that parental line L4 exhibited significant positive GCA effects for grain yield, indicating that it is a good combiner for this trait. For days to 50% silking, the best general combiners L1, L4, L11 and L14 exhibited significant negative GCA effects. The best combiners were L1, L14, L15, L16 and L18 for plant height and inbred lines L1, L14 and L18 for ear height since they had significant negative GCA effects. The parental lines L3, L4 and L5 were good combiners for number of ears per plant. The tester line T1 had high and favorable GCA effects for days 50% silking and plant and ear heights, while tester line T2 showed high positive GCA effects for grain yield and number of ears per plant.

Once the best combiners are identified, they can be crossed together to obtain the promising hybrid combinations. In recurrent selection schemes, parents possessing high combining ability can be crossed to each other to accumulate desirable alleles within base populations (Christie and Shattuck 1992).

Table (3): General combining ability effects for 18 inbred lines and 2 testers for studied traits as combined over two locations (Sakha and Sids) in 2011 season.

Lines	Grain yield	Days to 50%silking	Plant height	Ear height	No.of ears/100plans
1	1.026	-0.649*	-7.003*	-10.361*	-5.724*
2	-0.943	-0.024	4.559	2.201	-4.456*
3	1.686	0.086	6.934*	9.326*	7.764*
4	3.904*	-0.524*	0.371	0.576	20.607*
5	-2.605*	-0.086	7.621	1.111	7.209*
6	-3.909*	0.163	5.121	1.707	3.345
7	1.013	0.913*	3.934	0.013	-6.056*
8	0.940	0.038	3.496	0.388	-1.723
9	1.316	-0.149	5.184	8.451*	-5.489*
10	0.364	0.038	-2.878	-0.173	-2.363
11	0.094	-1.086*	-5.253	3.201	-3.016
12	1.867	-0.149	-3.253	-0.173	2.083
13	0.424	1.288*	16.996*	10.138*	-6.473*
14	1.319	-0.961*	-10.566*	-7.986*	-4.158*
15	-1.520	0.413	-7.441*	-5.548	2.638
16	1.777	0.975*	-9.316*	-5.048	3.467
17	-1.601	-0.086	-0.066	1.451	-0.552
18	-4.306*	-0.024	-8.441*	-7.048*	-7.101*
T1	-0.538	-0.583*	-4.229*	-2.395*	-8.532*
T2	0.538	0.583*	4.229*	2.395*	8.532*
LSD gi (L)5%	2.282	0.511	6.402	6.239	4.089
LSD gi-gj (L)5%	3.13	0.71	9.00	8.76	5.74
LSD gi (T)5%	0.760	0.170	2.134	2.079	1.363
LSD gi-gj (T)5%	1.04	0.23	3.00	2.92	1.91

Estimates of specific combining ability effects (SCA) of the thirty six crosses for all studied traits are presented in Table (4). Specific combining ability results revealed that significant positive SCA effects were observed in the cross L4 x T2 for grain yield and two testcrosses L4 x T2 and L8 x T1 for number of ears/plant. Moreover, highly significant negative SCA effects were obtained in L6 x T1 for days to 50% silking. Therefore, these crosses could be exploited in maize breeding programs.

Table (4): Specific combining ability effects of 36 testcrosses for studied traits as combined over two locations (Sakha and Sids) in 2011 season.

Lines	Grain yield		Days to 50%silking		Plant height		Ear height		No. of ears/100plants	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
1	0.030	-0.030	0.579	-0.579	-1.065	1.065	-0.763	0.763	3.360	-3.360
2	-2.351	2.351	-0.170	0.170	-5.878	5.878	-3.451	3.451	-0.094	0.094
3	0.143	-0.143	-0.232	0.232	1.371	-1.371	0.048	-0.048	-2.646	2.646
4	-3.208*	3.208*	-0.045	0.045	-6.690	6.690	-2.451	2.451	-11.987*	11.987*
5	2.005	-2.005	0.517	-0.517	4.309	-4.309	0.486	-0.486	-2.966	2.966
6	1.658	-1.658	-0.982*	0.982*	0.309	-0.309	1.173	-1.173	-4.311	4.311
7	1.012	-1.012	0.392	-0.392	1.871	-1.871	2.361	-2.361	2.022	-2.022
8	-0.307	0.307	0.392	-0.392	0.684	-0.684	0.986	-0.986	6.360*	-6.360*
9	0.129	-0.129	0.204	-0.204	8.371	-8.371	-1.201	1.201	3.505	-3.505
10	0.978	-0.978	-0.232	0.232	8.434	-8.434	4.548	-4.548	0.270	-0.270
11	0.533	-0.533	-0.232	0.232	-2.315	2.315	3.173	-3.173	3.030	-3.030
12	0.004	-0.004	-0.545	0.545	-8.315	8.315	-7.701	7.701	-5.134	5.134
13	0.467	-0.467	0.267	-0.267	1.559	-1.559	3.111	-3.111	5.549	-5.549
14	-0.217	0.217	0.107	-0.107	4.746	-4.746	2.111	-2.111	1.483	-1.483
15	-0.942	0.942	0.107	-0.107	-4.128	4.128	-0.451	0.451	-4.127	4.127
16	-0.336	0.336	-0.170	0.170	-1.878	1.878	-1.701	1.701	-0.078	0.078
17	0.042	-0.042	0.017	-0.017	-2.128	2.128	-0.326	0.326	0.959	-0.959
18	1.358	-1.358	0.454	-0.454	0.746	-0.746	0.048	-0.048	4.802	-4.802
LSDs_{ij} (5%)	3.228		0.723		9.054		8.823		5.783	
LSDs_{ij}-s_{kl} (5%)	4.43		1.00		12.73		12.40		8.11	

Type of gene action

Estimates of general and specific combining ability variance components (σ^2 GCA and σ^2 SCA) and their interaction with locations (σ^2 GCA x loc and σ^2 SCA x loc) for all studied traits are presented in Table (5). Results revealed that σ^2 GCA played the major role in determining the performance of maize crosses for silking date and plant and ear heights. The magnitude of σ^2 GCA was larger than that of σ^2 SCA for silking date and plant and ear heights, indicating that the additive type of gene action played an important role in the inheritance of these traits. Whereas non-additive gene effects played an important role in the inheritance of number of ears per plant and grain yield. Similar results were reported by Todkar and Navale (2006), Dar *et al*. (2007), Gabr *et al*. (2008), Abdallah *et al*. (2009), Ibrahim *et al*. (2010) and Premlatha *et al*. (2011) who found that non-additive gene action was more important for grain yield and its components than additive gene action.

Moreover, the magnitude of $\sigma^2_{GCA\ x\ Loc}$ interaction was higher than $\sigma^2_{SCA\ x\ Loc}$ interaction for all studied traits, indicating that the additive type of gene action was affected more by environment than non-additive ones. These results are in agreement with those obtained by **El-Itriby *et al*. (1990),** El-Zeir *et al*. (2000), Amer and El-Shenawy(2007) and El-Hifny *et al*. (2010)

Table 5: Estimates of general and specific combining ability variances and their interactions with the two locations for studied traits in 2011 season.

Estimates	Grain yield	Days to 50%silkig	Plant height	Ear height	No. of ears/100plants
σ^2_{GCA}	-2.485	1.402	34.780	13.126	-11.156
σ^2_{SCA}	1.006	0.183	29.507	1.146	6.660
$\sigma^2_{GCAxLoc}$	76.620	0.973	28.528	0.348	77.030
$\sigma^2_{SCAxLoc}$	-0.500	0.075	-14.331	-10.944	52.999

Variance estimates preceded by negative sign is considered zero

REFERENCES

Abdallah,T. A. E; A. I. Gabr Afaf and A. A. El Kheshen (2009). Combining ability in line x tester crosses of maize (*Zea mays* L.). Annals of Agric. Sci., Moshtohor, 47(1): 11-20.

Abd El-Moula, M. A. (2011). Inheritance of grain yield and other attributes in new yellow maize inbred lines. Assiut J. of Agric. Sci., (Special Issue), Proc. of the 5th Conference of Young Scientists Fac. of Agric., Assiut Univ., May 8 (39-62).

Amer, E.A. (2004). Combining ability of new inbred lines of maize with three testers tested over two locations . Annals of Agric. Sci., Moshtohor .42(2): 461-474.

Amer, E. A. and A. A. El-Shenawy (2007). Combining ability for new twenty one yellow maize inbred lines. J. Agric. Sci.ith Mansoura Univ. 32(9):7053-7062.

Barakat, A.A. and M.M.A. Osman (2008). Gene action and combining estimates for some white promising maize inbred lines by top cross system. J. Agric. Sci., Mansoura Univ., 33 : 6995 – 7009.

Christie, B. R. and V. I. Shattuck (1992). The diallel cross, design, analysis, and use for plant breeders. Pl. breed. Rev., pp:9-36.

Dar, S. A., ; A. Gowhar ; A. C. Rather and M. N. Khan (2007). Combining ability for yield and maturity traits in elite inbred lines of maize (*Zea mays* L.). Inter. J. Agric. Sci. India. 3(2):290-293.

El-Hifny, M. Z.; E. A. Hassaballa ; M. A. Abd El-Moula and Kh.A.M.Ibrahim (2010) Combining ability and type of gene action in yellow maize (*Zea mays* L.).Assiut J. Agric. Sci. 41(1):1-27

EL-Hosary, A.A. (1988). Heterosis and combining ability of ten maize inbred lines as determined by diallel crossing over two planting dates. Egypt. J. Agron., 13 : 13 – 25.

EL-Hosary, A.A. (1989). Heterosis and combining ability of six inbred lines of maize in diallel crosses over two years. Egypt. J. Agron., 14 : 47 – 58.

El-Itriby, H. A. ; H. Y. El-Sherbieny ; M. M. Ragheb and M. A. K. Shalaby (1990). Estimation of combining ability of maize inbred lines in top crosses and its interaction with environments. Egypt. J. Appl. Sci. 5(8):354-370.

EL–Zeir, F.A.A.; E.A. Amer and A. Abd EL- Aziz (1999). Combining ability analysis for grain yield and other agronomic traits in yellow maize inbreeds (*Zea mays* L.) Minufiya. J. Agric., Res., 24 : 829 – 868.

El-Zeir, F.A. 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.

Gabr, Afaf A. I. ; Abd El-Azeem M. E. M. and Abdallah T. A. E. (2008). Combining ability analysis of grain yield and some agronomic traits of nine maize inbred lines. Egypt. J. Appl. Sci. 23: 520-529 (2008).

Ibrahim, M.H.A. (2001). Studies on corn breeding. Ph.D. Thesis, Fac. Agric., Kafer EL-Sheikh, Tanta Univ., Egypt.

Ibrahim, M.H.A. and M.M.A. Osman and M.A. El-Ghonemy (2007). Combining ability of new yellow maize inbred lines under two different locations. Minufiya J. Agric. Res. 32 (1) : 185 – 201.

Ibrahim, KH.A. M.; Abd El-moula M. A. and Abd El-Azeem M. E. M. (2010). Combining ability analysis of some yellow maize (*Zea mays* L.) inbred lines. Egypt. J. Agric. Res., 88(1): 29-46.

Ibrahim, M.H.A. and M.A. El-Ghonemy (2010). Evaluation of some new maize inbred lines for Combining ability using top cross method. Egypt. J. Plant Breed. 14 (1) : 217-228.

Ibrahim, M.H.A. ; M.A. El-Ghonemy and A.A.Abd El-Mottalb (2012). Evaluation of fifteen yellow maize inbred lines for Combining ability by their topcrosses. Egypt. J. Plant Breed. 16 (20) : 225-236.

Kempthorne, O. (1957). An Introduction to Genetic Statistics. John Wiley and Sons, New York, USA. pp. 191-200.

Premlatha, M. ; A. Kalamani and A. Nirmalakumari (2011). Heterosis and combining ability of grain yield and quality in maize (*Zea mays* L.). Advances in Env. Biology. 5(6): 1264-1266.

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

Mahmoud, A. A. and M. E. Abd El-Azeem (2004). Estimates of general and specific combining ability of some yellow maize inbred lines using top-crosses. Annals of Agric. Sci., Moshtohor, Zagazig Univ. 42 : 427-437.

Mosa, H.E. (1996). Studies on corn breeding. M.Sc. Thesis Faculty of Agriculture. Kafr El-Sheikh, Tanta University, Egypt.

Sedhom, S.A. (1994). Genetic study on some top crosses in maize under two environments. Annals Agric. Sc. Moshtohor, 32(1): 131- 141.

Soliman, F.H.S. and S.E. Sadek (1999). Combining ability of new maize inbred lines and its utilization in the Egyptian hybrid program. Bull. Fac. Agric., Cairo Univ. 50: 1-20

Sprague, G. F. and L. A. Tatum (1942). General *versus* specific combining ability in single crosses of corn. J. Amer. Soc. Agron. 34:923-932.

Steel, R. G. and J. Torrie (1980). Principles and procedures of statistics. Mc Graw. Hill Book Company, New York, USA.

Todkar, L. P. and P. A. Navale (2006). Selection of parents and hybrids through combining ability studies in maize. J. Maharashtra Agric. Univ., India. 31(3):264-267.

القدرة على التآلف لصفة المحصول وبعض الصفات المحصوليه فى بعض سلالات الذره الشاميه بإستخدام تحليل السلالة × الكشاف

محمد أحمد الغنيمى ، هانى عبد العاطى عبد الرحمن درويش و عصام عبدالفتاح عامر
قسم بحوث الذرة الشامية - معهد بحوث المحاصيل الحقلية - مركز البحوث الزراعية - الجيزة - مصر

من المهم لمربي النبات معرفة القدرة الائتلافيه لمواد التربية المستنبطه. ولهذا درست القدرة الإئتلافيه لعدد ١٨سلالة بيضاء الحبوب مع كشافين (السلالة سخا٥١٤٠ والسلالة سخا ٥٠٦٨). تم تقييم عدد ٣٦هجين قمى مع هجينين للمقارنه (الهجين الفردى ١٠ والهجين الفردى ١٢٨) فى محطتى البحوث الزراعية بسخا وسدس موسم ٢٠١١ بإستخدام تصميم القطاعات الكاملة العشوائية فى أربع مكررات فى كلا الموقعين. تم أخذ البيانات على صفات عدد الايام حتى ظهور٥٠% من الحريرة وإرتفاع النبات وإرتفاع الكوز وعدد الكيزان بالنبات ومحصول الحبوب (أردب / فدان). وقد أظهرت نتائج التحليل المجمع عبر المواقع وجود إختلافات عالية المعنوية بين التراكيب الوراثية فى جميع الصفات.أيضا أظهرت السلالة رقم (٤) افضل قدرة عامه على التآلف لصفتى محصول الحبوب والتبكيروالسلالتان رقمى ١٤،١٨ لإرتفاع النبات والكوز والسلالات أرقام ٣،٤،٥ لصفة عدد كيزان النبات .

أما بالنسبة للقدرة الخاصة على التآلف فقد أظهر الهجين القمى (L 4 × T 2) تأثير موجب ومعنوى للقدرة الخاصة على التآلف لصفة محصول الحبوب مع تفوق معنوى فى المحصول عن هجينى المقارنة (هجين فردى ١٠ ، هجين فردى ١٢٨). كما أظهرت النتائج أن التباين الراجع للفعل الوراثى المضيف له دور أكثرأهمية مقارنة بالتباين الوراثى غير المضيف لكل الصفات فيما عدا صفتى عدد الكيزان للنبات ومحصول الحبوب حيث كان التباين للفعل الوراثى غير المضيف لهما هو الأكثر أهمية . وكذلك كان تباين التفاعل بين التأثير المضيف والبيئة أعلى قيمة من تباين التفاعل بين التأثير غير المضيف والبيئة لجميع الصفات مما يدل على أن تأثير الفعل المضيف كان أكثر تأثرا بالعوامل البيئية السائدة فى كلا محطتى الإختبار مقارنة بتأثيرالفعل غير المضيف وذلك فى المواد الدراسية التى شملتها الدراسة.