Proceed, Seventh Pl. Breed. Conf.
May 4-5, 2011 (Alexandria)

Egypt. J. Plant Breed (15) 2: 111-125
Special Issue (2011)

EVALUATION OF NEWLY DEVELOPED INBRED LINES OF MAIZE

M.M.A.Osman, M.H.A Ibrahim and M.A.El- Ghonemy
Maize Research Section, Field Crops Research Institute, ARC, Giza, Egypt.

ABSTRACT

Eighteen yellow maize inbred lines were top crossed to each of two testers i.e., Gm 1002 and Gm 1021, at Agricultural Research Station, ARC, Egypt during 2009 summer growing season. Thirty-eight entries (36 top crosses + two checks; SC 162 and SC166) were evaluated at Gemmeiza and Mallawy Agricultural Research Stations, ARC, Egypt in 2009 summer growing season. Data were collected on number of days to 50% siliking date, plant height, ear height, resistance to late wilt disease, number of ears/ 100 plants, grain yield (Mg/ha). The obtained results indicated that mean squares of locations (Loc), lines (L), testers (T) and L × T were significant for most studied traits. The interaction was significant between crosses, locations and their partitions for most studied traits. Non–additive gene action played an important role in the inheritance of the studied traits comparing to additive gene action, while, the magnitude of specific combining ability K^2SCA x Loc. was higher than general combining ability K^2GCA × Loc. indicating that the non–additive gene action was more sensitive to locations, comparing to the additive gene action for most studied traits. Five, one and five inbred lines exhibited significant and desirable GCA effects for grain yield trait, under Gemmeiza, Mallawy and their combined, respectively, while, L7 inbred line considered the best combiner for grain yield, resistance to late wilt disease and number of ears/ 100 plants under the two locations and their combined analysis, respectively. While, L3 inbred followed by L14 were considered the best combiners for number of days to 50% silking date, plant and ear heights towards (earliness, shortness and lower ear position). On the other hand, the tester line, Gm1002, had desirable significant GCA effects for earliness, shortness and lower ear position. Furthermore, Gm1021 tester line had desirable significant GCA effects for resistance to late wilt, number of ears/100 plants and grain yield. Three top crosses i.e., (Gm 1021 × L1), (Gm 1021 × L4) and (Gm 1021 × L 7), gave highly values of grain yield, as follows (12.26, 10.52 and 11.39 Mg/ ha), (11.32, 10.45 and 10.8 Mg /ha) and (11.59, 9.91 and 10.75 Mg/ ha) and significantly out-yielded the two checks, SC162 and SC166 (9.56, 6.53 and 8.13 Mg/ ha) and (7.19, 9.31 and 9.58 Mg/ha), respectively, under the two locations and their combined analysis .These new crosses were considered promising hybrids and could be used as favorite and desirable hybrids in future.

Key words: Maize, Zea mays, line × tester, Combining ability, Top crosses.

INTRODCUTION

Its known that developing a high yielding hybrid yielding is based mainly on the development of inbred lines of high combining ability. Therefore, Top cross (test cross) method using broad and/ or narrow testers is used to evaluate new improved inbred lines for combining ability. Several procedures for developing and improving inbred lines of maize were reported by Singh and Singh (1998) and Nawar and El–Hosary (1984). Top cross procedure was suggested by Davis (1927) was the first who suggested the use of inbred lines x tester or top cross as a method for evaluating maize inbred lines. The concept of general GCA and specific (SCA) combining ability was firstly defined by Sprague and Tatum (1942).

Recently, testing resistance to late wilt disease is considered the most important test in the evaluation and registration of new released maize hybrids. Samara *et al* (1962) were the first to isolate the pathogen casing this disease from the roots and stalks of wilted maize plants.

Katta (1971) and Galal *et al.* (1987) 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 tester of choice for distinguishing the new inbred lines for their combining abilities.

Shehata and Dhawan (1975), El-Zeir (1999), Ibrahim (2001) and Ibrahim *et al.* (2007) found that SCA effects were higher than GCA effects for grain yield and most studied traits, while Mahmoud (1996), Soliman and Sadek(1999), El–Shenawy *et al.* (2003). and Barakat and Osman (2008) found the reverse. El-Sherbeiny *et al.* (2006) and Abd El–Aal (2007) reported that additive components of gene action had the major role in the inheritance of grain yield, number of days to 50 % silking date and plant and ear heights. While, non–additive gene action interacted more with the environmental conditions than the additive components of grain yield. Soliman *et al.* (2007) reported that the magnitude of dominance effects were the major source of the total genetic variance.

The main objectives of the present study were to: 1) evaluate 36 top crosses for grain yield and other agronomic traits, 2) estimate general combining ability effects, for lines and testers, and specific combining ability effects for new crosses and . 3) determine variance due to GCA and SCA and their interaction with the two locations.

MATERIALS AND METHODS

The materials used in the present study were eighteen new yellow maize inbred lines in S_4 generation (L1 to L18, Table 1) derived from a wide genetic base population through selection from segregating generations, in the disease nursery field at Gemmeiza Experimental Research Station In 2008 summer growing season, the eighteen lines were top crossed to each of two narrow base tester lines, i.e., Gm.1002 and Gm.1021, at Gemmeiza Experimental Research Station. The two tester lines are being used in seed production of commercial single and three way cross hybrids. The 36 resultant top crosses, in addition to the two commercial check hybrids; i.e., SC162 and SC166 were evaluated at Gemmeiza and Mallawy Agricultural Research Stations in 2009 summer season.

The experimental design was a randomized complete block design, with four replications. Plot size was one ridge, 6m long and 80 cm wide, and hills, were spaced at 25 cm along the ridge. Three kernels were sown per hill and thinned later to one plant per hill. All agronomic field operations were carried out as recommended.

Data recorded were number of days to 50% silking, plant height (cm), ear height (cm), resistance to late wilt disease % (was submitted to the arcsine of the square root transformation), number of ears/100 plants and grain yield(adjusted to15.5% grain moisture content and converted to (Mg/ha) . Statistical analysis 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 of the two locations was done, according to homogeneity test of the error variance of the two experiments.

Table (1): Names and pedigree of eighteen inbred lines studied:

Serial No.	Name		Pedigree
1	Gm 1401	L1	CIMMYT- pop- 31
2	Gm 1402	L2	CIMMYT- pop- 31
3	Gm 1403	L3	CIMMYT- pop- 31
4	Gm 1404	L4	CIMMYT- pop- 31
5	Gm 1405	L5	CIMMYT- pop- 31
6	Gm 1406	L6	COMP- 21
7	Gm 1407	L7	COMP-21
8	Gm 1408	L8	COMP- 21
9	Gm 1409	L9	COMP-21
10	Gm 1410	L10	COMP- 21
11	Gm 1411	L11	CIMMYT- pool-22
12	Gm 1412	L12	CIMMYT- pool-22
13	Gm 1413	L13	CIMMYT- pool-22
14	Gm 1414	L14	CIMMYT- pool-22
15	Gm 1415	L15	CIMMYT- pool-22
16	Gm 1416	L16	CIMMYT- pool-22
17	Gm 1417	L17	CIMMYT- pool-22
18	Gm 1418	L18	CIMMYT- pool-22

RESULTS AND DISCUSSION

Mean squares of the two locations and their combined analysis for the six studied traits are shown in Table 2. Mean squares due to crosses , lines and testers for the six studied traits under the two locations were significant, as well as mean squares due to (L× T) interaction were significant in most cases, except of number of ears/ 100 plants at Mallawy location. However, mean squares over two locations were significant as well as mean squares due to lines, testers and L× T interaction were significant, except some cases herein. While, mean squares due to L × Loc, T × Loc and L × T × Loc were significant in some cases for the studied traits. The obtained results indicated that there was a wide diversity among studied lines and testers in their contributions to the performance of top crosses. Where, Highly significant differences were detected among locations for all studied traits, indicating that the two locations differed in their environmental conditions. In addition, the interaction of tester x Loc was significant for plant height and resistance to late wilt disease. These results showed that the genotypes varied significantly among each other and ranked differently from location to another as reported by Shehata *et al.* (1997) and Abd El-Azeem *et al.* (2009).

Mean performance for the six traits at Gemmeiza, Mallawy and their combined are presented in Table 3. Mean performance of days to 50% silking ranged from 61.5 for (Gm 1021× L15) cross to 67.8 days for (Gm 1021× L8) and (Gm1021× L16) crosses (Gem), from 54.3 for (Gm1021× L 14) cross to 60.3 days for (Gm1002 × L5) and (Gm1021× L12) crosses (Mall) and from 58.0 for (Gm 1021× L14) cross to 63.9 days for (Gm 1021× L8) cross (Comb.). Thirty one top crosses were significantly earlier than the earliest check SC162 (62.4 day). These results indicated that these new crosses were more earlier than the two checks in the present study herein.

For plant height, means ranged from 245.5 cm for (Gm 1002× L3) cross to 290.3 cm for (Gm 1002× L7) cross (Gem.), from 202.8 cm for (Gm 1002× L3) cross to 267 cm for (Gm1021× L4) cross (Mall.) and from 214.8 cm for (Gm 1002 × L18) cross to 278 cm for (Gm 1021× L4) cross (Comb.). Number of these new top crosses were significantly shorter than the shortest check of (SC166). For ear height, means ranged from 128.8 cm for (Gm 1002× L3) cross to 165.8 cm for (Gm 1021× L7) cross (Gem.), from 102 cm for (Gm 1002 × L18) cross to 137.5.5 cm for (Gm 1021 × L4) cross (Mall.) and from 120 cm for (Gm 1002 × L14) cross to 149.3 cm for (Gm 1021 × L4) cross(Comb.). Twenty two new top crosses had a significantly lowest ear placement than the check of (SC162). For resistance to late wilt disease, means ranged from 91.5 % for (Gm 1021 × L17) cross to 100% for most the remaining crosses under the two locations and their combined data. This indicated that all these new top crosses have resistance to late wilt disease.

For number of ears/ 100 plants , means ranged from 100 for (Gm1021 × L17) cross to 135.1% for (Gm 1002 × L6) cross (Gem.), from 96.2% for (Gm 1002 × L9) cross to 117.0 % for (Gm1021× L3) cross (Mall) and from 100 for (Gm 1021×L17) to 119.1 for (Gm 1002 × L7) cross (Comb.).These results indicated that most of new top crosses have prolific trait. While, grain yield means ranged from 5.28 Mg/ha for (Gm 1002 × L11) cross to 12.26 Mg/ha for (Gm 1021 × L1) cross, from 6.96 Mg/ha for (Gm 1021 × L11) cross to 11.36 Mg/ha for (Gm 1021× L3) cross and from 6.25 Mg/ha for (Gm1002 × L11) cross to 11.39 Mg/ha for (Gm 1021× L1) cross under Gemmeiza, Mallawy locations and their combined, respectively. Also, in this respect, three top crosses; namely, (Gm 1021× L1), (Gm 1021 × L4) and (Gm 1021× L7) gave high values of grain yield as follows (12.26, 10.52 and 11.39 Mg/ha), (11.32, 10.45 and 10.89 Mg /ha) and (11.59, 9.91 and 10.75 Mg/ ha) comparing to the two checks SC162 and SC166 (9.56, 6.53 and 8.13 Mg/ha) and (7.19, 9.31 and 9.58 Mg/ha) under the two locations and their combined. These results in herein showed that means of studied traits differed from location to another and the obtained new crosses are considered promising hybrids and could be used as favorite and desirable hybrids in future. Estimates of variance for general and specific combining ability (K^2 GCA, K^2 SCA) and their interactions with locations are shown in Table (4).

The results revealed that K^2 SCA was higher than K^2 GCA for all studied traits, except resistance to late wilt disease under this study. These results indicated that the non-additive type of gene action was more important than the additive one in the inheritance of all studied traits. These results showed the importance to make crosses between these inbred lines to useful from non-additive effects and they are in agreement with those obtained by Shehata *et al.* (1997) , Amer (2002) , Ibrahim (2004) and Ibrahim *et al.* (2007)

On the other hand, the magnitude of K^2 SCA × Loc was higher than that of K^2 GCA × Loc for all studied traits indicating that the additive gene action interacted more with locations (environmental conditions) than the non-additive component for these traits. These results are in agreement with the findings of several investigators who reported that specific combining ability to be more sensitive to environmental changes than general combining ability Shehata and Dahawan (1975) Ibrahim and El-Ghonemy (2010) for grain yield and most studied traits.

Table (2): Analysis of variance for 36 top crosses at Gemmeiza and Mallawy research stations and their combined analysis, 2009 season.

Source	DF	No. of days to 50%	Plant height	Ear height	Resistance to late wilt	No of ears/ 100	Grain yield (Mg/ha)
GEMMEIZA							
Reps	3	0.55	28.45	60.9	5.01	204.1	0.623
Crosses (C)	35	6.66**	483.1**	267.2**	139.63	296.12**	12.192**
Lines(L)	17	9.1**	723.6**	390.12**	158.392	254.9**	16.19**
Testers(T)	1	2.3ns	12.84ns	27.56ns	146.612ns	281.96ns	0.149ns
L x T	17	4.5*	270.3**	158.4**	120.46**	338.18**	8.902**
Error	106	1.58	26.6	23.88	1.08	66.01	0.836
$\overline{X}$		58.6	270.0	150.8	87.16	108.9	8.317
CV%		2.15	1.91	3.24	1.19	7.46	10.99
MALLAWY							
Reps	3	2.34	94.25	69.82	1.241	66.51	4.019
Crosses (C)	35	10.40**	748.47**	265.53**	9.00**	70.73ns	4.363**
Lines(L)	17	14.63**	904.56**	319.52**	9.00**	85.8**	5.631**
Testers(T)	1	0.17ns	532.82**	2.25ns	9.00**	22.72ns	0.111ns
L x T	17	6.78**	605.1**	227.0**	9.00**	58.48ns	3.346*
Error	106	2.17	51.65	27.9	1.241	35.98	1.290
$\overline{X}$		65.8	220.4	117.4	89.75	103.4	8.889
CV%		2.24	3.27	4.5	1.24	5.8	12.78
COMBINED ANALYSIS							
Locations(Loc.)	1	3535.0**	166849.4**	80500.8**	483.61**	3080.6**	23.91*
Reps/Loc.	6	1.44	61.35	65.4	3.14	135.33	2.20
Lines(L)	17	21.16**	1245.15**	575.9**	87.039ns	187.32**	17.50**
Testers(T)	1	0.59ns	190.13ns	22.78ns	108.78ns	232.38ns	0.003ns
L x T	17	9.47**	584.57**	282.38**	72.97ns	223.67**	8.798*
L x Loc	17	2.57ns	383.01**	133.74**	80.35**	134.41**	4.321**
T x Loc	1	1.88ns	355.53**	7.03ns	46.83**	72.30ns	0.257ns
L x T x Loc	17	1.81ns	290.83**	103.02**	56.49**	172.99**	3.450**
Error	210	1.88	39.13	25.89	1.17	51.0	0.998
$\overline{X}$		62.2	245.2	134.1	88.5	106.2	8.60
C.V%		2.20	2.55	3.80	1.22	6.73	11.62

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

Table (3): Means of the six studied traits for the 36 top crosses and the two checks at Gemmeiza, Mallawy and their combined analysis in 2009 season.

Serial no.	Crosses	No. of days to 50 % Silking date			Plant height (cm.)			Ear height (cm.)		
		Gem.	Mal.	Comb.	Gem.	Mal.	Comb.	Gem.	Mal.	Comb.
1	L1×Gm1002	67.0	59.5	63.3	268.0	224.5	246.3	157.3	118.8	138.0
2	L1×Gm1021	66.3	58.8	62.5	270.3	218.3	244.3	158.0	120.5	139.3
3	L2×Gm1002	66.3	58.5	62.4	255.8	226.5	241.1	147.8	112.8	130.3
4	L2×Gm1021	64.5	59.3	61.9	269.3	224.8	247.0	147.8	115.5	131.6
5	L3×Gm1002	63.8	58.3	61.0	245.5	202.8	224.1	128.8	111.3	120.0
6	L3×Gm1021	65.5	58.8	62.1	260.3	220.8	240.5	141.3	122.8	132.0
7	L4×Gm1002	65.3	58.5	61.9	279.0	232.5	255.8	160.0	128.8	144.4
8	L4×Gm1021	65.0	59.3	62.1	289.0	267.0	278.0	161.0	137.5	149.3
9	L5×Gm1002	67.0	60.3	63.6	270.3	216.3	243.3	155.5	120.3	137.9
10	L5×Gm1021	67.0	59.0	63.0	263.5	216.3	239.9	140.8	117.5	129.1
11	L6×Gm1002	67.0	57.9	62.4	296.0	236.3	266.1	157.5	135.8	146.6
12	L6×Gm1021	66.5	58.5	62.5	274.5	228.3	251.4	152.5	116.0	134.3
13	L7×Gm1002	65.0	59.5	62.3	276.5	225.3	250.9	155.5	122.3	138.9
14	L7×Gm1021	66.5	59.5	63.3	290.3	223.5	256.9	165.8	115.5	140.6
15	L8×Gm1002	65.8	59.0	62.4	286.3	222.3	254.3	158.0	115.3	136.6
16	L8×Gm1021	67.8	60.0	63.9	271.5	222.0	246.8	158.5	119.8	139.1
17	L9×Gm1002	66.8	58.5	62.6	280.3	218.3	249.3	158.0	119.0	138.5
18	L9×Gm1021	67.0	59.8	63.4	280.3	228.8	254.5	158.3	119.0	139.0
19	L10×Gm1002	65.8	59.3	62.5	274.8	231.5	253.1	149.8	111.5	130.6
20	L10×Gm1021	66.5	60.0	63.3	264.3	228.8	246.5	153.0	134.8	143.9
21	L11×Gm1002	66.5	58.5	62.5	267.0	221.3	244.1	142.5	116.3	129.4
22	L11×Gm1021	64.3	58.5	61.4	280.0	220.5	250.3	160.5	117.8	139.1
23	L12×Gm1002	65.5	58.5	62.0	282.8	206.0	244.4	151.5	110.5	131.0
24	L12×Gm1021	65.0	60.3	62.6	267.8	223.3	245.5	147.5	117.0	132.3
25	L13×Gm1002	64.0	57.3	60.6	271.3	237.3	254.3	154.0	124.8	139.4
26	L13×Gm1021	65.3	58.9	62.0	258.5	216.5	237.5	143.5	105.3	124.4
27	L14×Gm1002	67.0	58.9	62.9	262.0	220.5	241.3	149.5	118.0	133.8
28	L14×Gm1021	61.8	54.3	58.0	251.5	216.8	234.1	135.5	104.5	120.0
29	L15×Gm1002	62.0	55.3	58.6	268.3	217.5	242.9	148.0	115.8	131.9
30	L15×Gm1021	61.5	56.5	59.0	267.0	220.3	243.6	158.8	120.3	139.1
31	L16×Gm1002	64.8	57.5	61.1	259.3	219.0	239.1	141.3	113.8	127.5
32	L16×Gm1021	67.8	59.5	63.6	261.5	219.0	240.3	151.0	116.8	133.6
33	L17×Gm1002	67.0	59.8	63.4	264.8	233.0	248.9	147.8	112.0	129.9
34	L17×Gm1021	67.3	58.8	63.0	268.0	214.5	241.3	146.8	102.3	126.0
35	L18×Gm1002	67.3	60.0	63.6	249.5	170.0	214.8	142.3	102.0	122.1
36	L18×Gm1021	67.0	59.8	63.4	269.0	220.8	244.9	141.0	107.3	124.1
Checks	SC 162	62.8	62.4	62.6	288.0	229.0	258.5	163.0	115.0	139.0
	SC166	64.0	63.0	63.5	280.0	230.0	255.0	158.0	124.2	141.1
L.S.D.	0.05	2.06	1.10	1.16	7.22	12.65	9.28	6.84	7.40	5.04
	0.01	2.69	1.39	1.52	9.41	16.48	9.49	8.92	9.64	6.56

Table (3): Cont.

Serial no.	Crosses	Resistance to late wilt disease			Number of ears/ 100 plants			Grain yield (Mg/ha)		
		Gem.	Mal.	Comb.	Gem.	Mal.	Comb.	Gem.	Mal.	Comb.
1	L1×Gm1002	90.0	90.0	90.0	102.6	100.0	101.3	7.20	8.04	7.62
2	L1×Gm1021	90.0	90.0	90.0	133.3	103.0	118.2	12.26	10.50	11.38
3	L2 × Gm 1002	90.0	90.0	90.0	102.6	98.9	100.8	8.47	8.99	8.73
4	L2 × Gm 1021	90.0	90.0	90.0	103.8	100.0	101.9	8.16	9.01	8.58
5	L3 × Gm 1002	90.0	90.0	90.0	100.0	101.1	100.5	8.51	8.01	8.26
6	L3 × Gm 1021	90.0	90.0	90.0	110.6	117.0	113.8	8.85	11.35	10.10
7	L4 × Gm 1002	90.0	90.0	90.0	102.4	100.0	101.2	8.77	11.19	9.98
8	L4 × Gm 1021	90.0	90.0	90.0	120.2	100.0	110.1	11.36	10.34	10.89
9	L5 × Gm 1002	90.0	90.0	90.0	115.7	105.0	110.3	11.13	10.04	10.59
10	L5 ×Gm 1021	90.0	90.0	90.0	104.8	102.0	103.4	7.89	8.84	8.37
11	L6× Gm 1002	90.0	90.0	90.0	115.6	100.0	107.8	11.22	8.77	9.99
12	L6 × Gm 1021	90.0	90.0	90.0	104.5	104.0	104.3	8.27	9.25	8.76
13	L7 × Gm 1002	90.0	90.0	90.0	135.1	103.0	119.1	11.54	9.91	10.72
14	L7 × Gm 1021	90.0	90.0	90.0	126.8	102.0	114.4	11.30	9.40	10.35
15	L8 × Gm 1002	77.2	80.9	79.1	108.5	97.6	103.1	7.34	8.96	8.15
16	L8 × Gm 1021	90.0	90.0	90.0	107.1	101.0	104.1	8.97	9.16	9.07
17	L9 × Gm 1002	74.9	90.0	82.4	108.1	96.2	102.2	7.11	7.41	7.26
18	L9 × Gm 1021	90.0	90.0	90.0	101.3	100.0	100.7	6.12	7.40	6.76
19	L10× Gm 1002	90.0	90.0	90.0	102.4	100.0	101.2	6.03	8.22	7.13
20	L10× Gm 1021	90.0	90.0	90.0	105.9	102.3	104.1	6.11	8.46	7.28
21	L11× Gm 1002	90.0	90.0	90.0	102.5	100.0	101.3	5.30	7.21	6.25
22	L11× Gm 1021	90.0	90.0	90.0	113.8	100.0	106.9	7.36	6.94	7.15
23	L12× Gm 1002	90.0	90.0	90.0	103.8	100.0	101.9	10.52	10.01	10.26
24	L12× Gm 1021	90.0	90.0	90.0	108.0	104.0	106.0	7.10	8.53	7.82
25	L13× Gm 1002	77.2	90.0	83.6	103.9	108.0	106.0	7.41	10.49	8.95
26	L13× Gm 1021	73.8	90.0	83.3	113.6	99.4	106.5	6.48	8.25	7.40
27	L14× Gm 1002	76.6	90.0	90.0	102.5	104.3	103.4	6.415	8.99	7.71
28	L14× Gm 1021	90.0	90.0	90.0	111.0	103.0	107.0	7.54	9.22	8.40
29	L15× Gm 1002	90.0	90.0	90.0	111.9	115.0	113.5	8.20	8.45	8.32
30	L15× Gm 1021	90.0	90.0	90.0	110.2	107.0	108.6	8.44	9.17	8.81
31	L16× Gm 1002	90.0	90.0	90.0	104.9	100.0	102.4	8.05	7.78	7.91
32	L16× Gm 1021	90.0	90.0	90.0	109.7	104.0	106.9	7.76	8.29	8.03
33	L17× Gm 1002	90.0	90.0	90.0	104.7	100.0	102.3	8.44	8.40	8.42
34	L17× Gm 1021	73.2	90.0	81.6	100.0	100.0	100.0	7.736	9.10	8.41
35	L18× Gm 1002	74.9	90.0	82.4	106.8	105.3	106.1	8.67	8.36	8.51
36	L18× Gm 1021	90.0	90.0	90.0	100.0	100.0	100.0	7.41	7.65	7.51
Checks	SC 162	90.0	90.0	90.0	132.0	98.0	115.0	9.56	6.53	8.13
	SC166	90.0	90.0	90.0	126.0	119.0	122.5	7.20	9.31	9.58
L.S.D.	0.05	1.51	1.10	1.64	8.04	5.94	7.07	0.91	1.12	1.20
	0.01	1.96	1.44	2.13	10.48	7.74	9.21	1.18	1.47	1.57

Table (4): Estimates of variance for general and specific combining abilities and their interactions with locations at Gemmeiza and Mallawy in 2009 season.

Variance	No. of days to 50 % Silking date	Plant height (cm.)	Ear height (cm.)	Resistance to late wilt disease	Number of ears/ 100plants	Grain yield (Mg/ha)
K^2 GCA	0.008	0.683	-145.61@	0.121	0.698	0.014
K^2 SCA	0.863	25.195	18.58	-0.925@	11.160	0.669
K^2GCA / K^2SCA	0.009	0.027	-7.84@	-0.131@	0.063	0.021
K^2 GCA × Loc.	0.006	1.961	0.318	0.292	-1.741@	-0.029@
K^2 SCA × Loc.	0.108	8.088	9.641	6.915	15.250	0.626
K^2 GCA × Loc. / K^2 SCA × Loc.	0.56	0.242	0.033	0.042	-0.114@	-0.093@

@ Variance estimates preceded by negative sign is considered zero.

General combining ability effects for eighteen inbred lines and two testers, under Gemmeiza, Mallawy locations and their combined data are given in Table (5). Five, one and five inbred lines exhibited significant and desirable GCA effects for grain yield trait under the two locations and their combined data, respectively, while, the inbred line, L7, was considered the best combiner for grain yield and number of ears/ 100 plants under the two locations and their combined data , respectively. These inbred lines herein could be directly used in hybrid breeding program after many yield trials. On the other hand, four inbreeds; i.e., (L3, L13, L14 and L15), exhibited significant and desirable GCA effects for number of days to 50% silking date under two locations and their combined data towards earliness. The inbreeds, (L3, L14 and L18), exhibited significant and desirable GCA effects for plant height. Also, the inbred lines (L3, L14, L17and L18), exhibited significant and desirable GCA effects for ear height , while, the inbred , L3 , followed by L14, were considered the best combiners for number of days to 50% silking date, plant and ear heights, towards (earliness, shortness and lower ear position).

In this respect, significant and desirable GCA effects of the testers were obtained for the tester line, Gm1002 for number of days to 50% silking date, plant height and ear height, towards (earliness, shortness and lower ear position), while, the tester line, Gm 1021 showed significant and desirable GCA effects for resistance to late wilt disease, number of ears/100 plants and grain yield. The superiority of inbred lines as good testers were noticed by several investigators such as Mahmoud (1996), Al-Naggar *et al.* (1997), Amer (2002) and Ibrahim and El- Ghonemy (2010).

Specific combining ability (SCA) effects of the 36 top crosses under the two locations and their combined data, are presented in Table (6). Results showed that the favorable SCA effects were observed in the top cross (Gm 1021 × L1) for grain yield under the two locations and their combined.

The top cross, (Gm1021× L14) exhibited significant and desirable SCA effects number of days to 50% silking data towards, earliness. For plant height, the top cross (Gm 1021× L13) gave significant and desirable SCA effects for this trait towards shortness.

Two top crosses i.e. (Gm1021×L14) and (Gm1002×L3) exhibited significant and desirable SCA effects for ear height towards lower ear position under Gemmeiza and Mallawy locations and their combined .Thus, plant breeder prefer to select for lower ear position and its known that early maturing varieties are shorter and late maturing ones are taller.

Also, the top cross (Gm 1021 × L1) exhibited significant and desirable SCA effects for number of ears/ 100 plants, while, the top cross (Gm1021 × L8) had significant and desirable SCA effects for resistance to late wilt disease. The previous top crosses in the present study considered the best top crosses for the different studied traits. In this context, The obtained results exhibited that number of new top crosses had specific combining ability (non-additive effects) which it leads the breeder to the importance of non- additive effects and to utilized hybrid vigor (useful heterosis) to maximize the yielding ability for these top crosses from through these yield components and to keep their parents as a source of favorite and desirable genetic materials.

Table (5): Estimates of general combining ability effects for eighteen inbred lines, two testers at Gemmeiza, Mallawy and their combined data in 2009 season.

Lines		No. of Days to 50 % Silking date			Plant height			Ear height		
		Gm	Mal	Comb	Gm	Mal	Comb	Gm	Mal	Comb
L 1		0.417	0.910	0.663*	-0.965	-0.576	-0.771	6.92**	2.361	4.64**
L 2		0.167	-0.340	-0.087	-7.590	3.674	-1.958	-2.95	-3.14	-3.045*
L 3		-0.808**	-1.090**	-0.849**	-17.215**	-10.201**	-13.708**	-15.70**	-5.30**	-7.983**
L 4		0.167	-0.590	-0.212	13.910**	27.80**	20.85**	9.80**	15.90**	12.80**
L 5		0.917**	1.285*	1.101**	-3.215	-5.701	-4.458	-2.576	1.611	-0.483
L 6		-0.583*	1.034*	0.226	15.160**	10.30**	12.73**	4.30*	8.60**	6.46**
L 7		0.792**	0.035	0.413	13.285**	2.424	7.85**	9.92**	1.60**	5.77**
L 8		0.792**	1.035*	0.913**	8.785**	0.174	4.48	7.55**	0.236	3.89
L 9		0.417	1.160*	0.788	10.160**	1.549	5.85*	7.40**	2.10	4.80**
L 10		0.917**	0.410	0.663*	-0.590	8.18*	3.792	0.674	5.86**	3.27*
L 11		-0.208	-0.340	-0.274	3.410	-1.076	1.167	0.700	-0.264	0.267
L 12		0.667*	-0.465	0.101	5.160**	-7.326*	-1.083	-1.201	-3.514	-2.358
L 13		-0.708**	-1.090*	-0.899**	-5.215**	4.924	-0.146	-1.951	-2.264	-2.108
L 14		-2.208**	-1.340**	-1.774**	-13.340**	-7.326*	-8.333**	-8.201**	-6.014**	-7.108**
L 15		-2.833**	-3.965**	-3.399**	-2.465	-3.076	-2.771	2.299	0.736	1.517
L 16		-0.208	0.535	0.163	-9.715**	-2.951	-6.333**	-4.576**	-2.264	-3.420*
L 17		0.542*	1.410**	0.976**	-3.715**	1.799	-0.958	-3.451*	-8.639**	-6.045**
L 18		1.167**	1.410**	1.288**	-5.840**	-26.58**	-16.208**	-9.076**	-12.639**	-10.858**
Testers										
1-Gm 1002		-0.185*	-0.035	-0.045	-1.299*	-1.924	-0.813	-1.438*	-0.125	-0.281
2-Gm 1021		0.185*	0.035	0.045	1.299*	1.924	0.813	1.438*	0.125	0.281
L.S.D. lines	0.05	0.53	1.03	0.604	3.61	6.33	4.815	3.42	3.70	3.08
	0.01	0.69	1.34	0.787	4.71	8.24	6.275	4.46	4.82	4.01
L.S.D. tesers	0.05	0.18	0.68	0.202	1.21	2.11	1.61	1.14	1.23	1.03
	0.01	0.23	0.89	0.263	1.57	2.75	2.09	1.49	1.61	1.34

Table (5): Cont.

Lines		Resistance to late wilt disease			Number of ears/100 plants			Grain yield (Mg/ ha)		
		Gm	Mal	Comb	Gm	Mal	Comb	Gm	Mal	Comb
L 1		2.844**	0.250	1.510	9.127**	-0.808	4.159*	1.412**	0.361	0.851**
L 2		2.844**	0.250	1.510	-5.661*	-2.846	-4.253*	-0.004	0.111	0.101
L 3		2.844**	0.250	1.510	-3.573	6.729**	1.578	0.363	0.736	0.601
L 4		2.844**	0.250	1.510	2.465	-2.308	0.078	1.744**	1.736**	1.601**
L 5		2.844**	0.250	1.510	1.390	1.192	1.291	1.193**	0.611	0.976**
L 6		2.844**	0.250	1.510	10.965**	1.192	6.078**	1.431**	0.361	0.976**
L 7		2.844**	0.250	1.510	12.327**	4.308*	5.509**	3.101**	0.836	1.913**
L 8		-3.582**	-4.250	-3.865	-1.035	-2.996	-2.016	-0.162	0.111	-0.86
L 9		-4.719**	0.250	-2.177	-4.123	-4.221*	-4.172	-1.701	-1.389**	-1.524**
L 10		2.844**	0.250	1.510	-4.698	-1.171	-2.934	-2.249	-0.639	-1.462**
L 11		2.844**	0.250	1.510	-0.723	-2.308	-1.516	-1.991	-1.764**	-1.837**
L 12		2.844**	0.250	1.510	-2.985	-0.308	-1.647	0.491	0.361	0.476
L 13		-11.669**	0.250	-5.552	-0.060	1.404	0.672	-1.371	0.486	-0.399
L 14		-3.856**	0.250	-1.740	-2.098	1.329	-0.384	-1.338	0.236	-0.524
L !5		2.844**	0.250	1.510	2.202	8.692**	5.447**	0.002	-0.139	-0.087
L 16		2.844**	0.250	1.510	-1.560	-0.308	-0.934	-0.411	-0.764	-0.649
L 17		-5.581**	0.250	-2.615	-6.523*	-2.308	-4.416*	-0.228	-0.389	-0.399
L 18		-4.719**	0.250	-2.177	-5.435	0.354	-2.541	-0.282	-0.764	-0.524
Testers										
1-Gm 1002		-1.009**	-0.280*	-0.615*	-1.399	-0.397	-0.898	0.32**	-0.280*	-0.44**
2-Gm 1021		1.009**	0.280*	0.615*	1.399	0.397	0.898	-0.32**	0.280*	0.44**
L.S.D. lines	0.05	0.73	0.78	1.54	5.59	4.20	4.04	0.64	0.80	0.60
	0.01	0.95	1.02	2.01	7.41	5.47	5.27	0.83	1.04	0.78
L.S.D. tesers	0.05	0.24	0.26	0.51	1.90	1.40	1.35	0.21	0.27	0.20
	0.01	0.32	0.34	0.67	2.47	1.82	1.75	0.28	0.35	0.26

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

Table (6): Estimates of specific combining ability effects for 36 top crosses at Gemmeiza, Mallawy and their combined for number of days to 50% silking date and plant and ear heights in 2009 season.

Serial no.	Crosses	Days to 50 % Silking			Plant height			Ear height		
		Gem	Mal	Comb.	Gem.	Mal	Comb.	Gem	Mal	Comb.
1	L1×Gm1002	0.340	0.500	0.420	-1.424	5.049	1.813	0.063	-0.750	-0.344
2	L1×Gm1021	-0.340	-0.500	-0.420	1.424	-5.049	-1.813	-0.063	0.750	0.344
3	L2×Gm1002	0.840	-0.250	0.295	-7.049*	2.799	-2.125	0.438	-1.250	-0.406
4	L2×Gm1021	-0.840	0.250	-0.295	7.049*	-2.799	2.125	-0.438	1.250	0.406
5	L3×Gm1002	-0.910	-0.125	-0.517	-7.674*	-7.076	-7.375*	-5.813**	-5.625*	-5.719**
6	L3×Gm1021	0.910	0.125	0.517	7.674*	7.076	7.375*	5.813**	5.625*	5.719**
7	L4×Gm1002	0.090	-0.250	-0.080	-5.299	-15.326**	-10.313*	-0.063	-4.250	-2.156
8	L4×Gm1021	-0.090	0.250	0.080	5.299	15.326**	10.313*	0.063	4.250	2.156
9	L5×Gm1002	-0.035	0.750	0.358	3.076	1.924	2.500	7.813**	1.500	4.656
10	L5×Gm1021	0.035	-0.750	-0.358	-3.076	-1.924	-2.500	-7.813**	-1.500	-4.656*
11	L6×Gm1002	0.215	-0.250	-0.017	10.451**	5.924	8.188*	2.938	10.000**	6.469**
12	L6×Gm1021	-0.215	0.250	0.017	-10.451**	-5.924	-8.188*	-2.938	-10.000**	-6.469**
13	L7×Gm1002	-0.785	0.125	-0.330	-7.174*	2.799	-2.188	-4.688	3.500	-0.594
14	L7×Gm1021	0.785	-0.125	0.330	7.174*	-2.799	2.188	4.688	-3.500	0.594
15	L8×Gm1002	-1.035	-0.375	-0.705	7.076*	2.049	4.563	0.188	-2.125	-0.969
16	L8×Gm1021	1.035	0.375	0.705	-7.076*	-2.049	-4.563	-0.188	2.125	0.969
17	L9×Gm1002	-0.160	-0.500	-0.330	-0.299	-3.326	-1.813	0.313	-0.250	0.031
18	L9×Gm1021	0.160	0.500	0.330	0.299	3.326	1.813	-0.313	0.250	-0.031
19	L10×Gm1002	-0.410	-0.250	-0.330	4.951	3.299	4.125	-1.188	-11.500**	-6.344**
20	L10×Gm1021	0.410	0.250	0.330	-4.951	-3.299	-4.125	1.188	11.500**	6.344**
21	L11×Gm1002	1.090	0.125	0.607	-6.799	2.299	-2.250	-8.563**	-0.625	-4.594*
22	L11×Gm1021	-1.090	-0.125	-0.607	6.799	-2.299	2.250	8.563**	0.625	4.594
23	L12×Gm1002	0.215	-0.750	-0.267	7.201*	-6.701	0.250	2.438	-3.125	-0.344
24	L12×Gm1021	-0.215	0.750	0.267	-7.201*	6.701	-0.250	-2.438	3.125	0.344
25	L13×Gm1002	-0.660	-0.625	-0.642	6.076	12.299**	9.188**	5.688**	9.875**	7.781**
26	L13×Gm1021	0.660	0.625	0.642	-6.076	-12.299**	-9.188**	-5.688**	-9.875**	-7.781**
27	L14×Gm1002	2.590**	2.375**	2.483**	4.951	3.799	4.375	7.438**	6.875*	7.156**
28	L14×Gm1021	-2.590**	-2.375**	-2.483**	-4.951	-3.799	-4.375	-7.438**	-6.875*	-7.156**
29	L15×Gm1002	0.215	-0.500	-0.142	0.326	0.549	0.438	-4.563	-2.125	-3.344
30	L15×Gm1021	-0.215	0.500	0.142	-0.326	-0.549	-0.438	4.563	2.125	3.344
31	L16×Gm1002	-1.535*	-0.875*	-1.205**	-1.424	1.924	0.250	-4.438*	-1.125	-2.781
32	L16×Gm1021	1.535*	0.875*	1.205**	1.424	-1.924	-0.250	4.438	1.125	2.781
33	L17×Gm1002	-0.160	0.625	0.233	-1.924	11.174**	4.625	0.938	3.500	2.219
34	L17×Gm1021	0.160	-0.625	-0.233	1.924	-11.174**	-4.625	-0.938	-3.500	-2.219
35	L18×Gm1002	0.090	0.250	0.170	-5.049	-23.451**	-14.250**	1.063	-2.500	-0.719
36	L18×Gm1021	-0.090	-0.250	-0.170	5.049	23.451**	14.250**	-1.063	2.500	0.719
L.S.D.	0.05	1.46	0.85	0.85	6.81	8.95	6.81	4.35	5.23	4.35
Sij	0.01	1.90	1.11	1.11	8.87	11.66	8.87	5.67	6.81	5.67
L.S.D.	0.05	2.06	1.07	1.21	7.23	12.65	9.63	6.84	7.39	6.15
Sij-Sik	0.01	2.69	1.39	1.58	9.41	16.48	12.55	8.91	9.64	8.02

Table (6): Cont.

No.	Crosses	Resistance to late wilt disease			Number of ears/ 100 plants			Grain yield (Mg/ha)		
		Gem.	Mal.	Comb.	Gem.	Mal.	Comb.	Gem.	Mal.	Comb.
1	L1×Gm1002	1.009	0.250	0.615	-13.926**	-8.103**	-7.514**	-2.563**	-1.222*	-1.934*
2	L1×Gm1021	-1.009	-0.250	-0.615	13.926**	8.103**	7.514**	2.563**	1.222*	1.934*
3	L2×Gm1002	1.009	0.250	0.615	0.837	-0.140	0.348	0.123	0.028	0.066
4	L2×Gm1021	-1.009	-0.250	-0.615	-0.837	0.140	-0.348	-0.123	-0.028	-0.066
5	L3×Gm1002	1.009	0.250	0.615	-3.876	-7.565*	-5.721	-0.200	-1.597**	-0.934
6	L3×Gm1021	-1.009	-0.250	-0.615	3.876	7.565*	5.721	0.200	1.597**	0.934
7	L4×Gm1002	1.009	0.250	0.615	-7.463	0.397	-3.533	-1.326**	0.403	-0.434
8	L4×Gm1021	-1.009	-0.250	-0.615	7.463	-0.397	3.533	1.326**	-0.403	0.434
9	L5×Gm1002	1.009	0.250	0.615	6.812	1.897	4.380	1.585**	0.528	1.066**
10	L5×Gm1021	-1.009	-0.250	-0.615	-6.812	-1.897	-4.380	-1.585**	-0.528	-1.066**
11	L6×Gm1002	1.009	0.250	0.615	16.712**	-0.103	8.305**	1.443**	-0.222	0.691
12	L6×Gm1021	-1.009	-0.250	-0.615	-16.712	0.103	-8.305**	-1.443**	0.222	-0.691
13	L7×Gm1002	1.009	0.250	0.615	-4.226	-0.603	-2.414	0.085	0.403	0.253
14	L7×Gm1021	-1.009	-0.250	-0.615	4.226	0.603	2.414	-0.085	-0.403	-0.253
15	L8×Gm1002	-5.416**	-4.250**	-4.760**	2.112	-1.290	0.411	-0.850	0.028	-0.372
16	L8×Gm1021	5.416**	4.250**	4.760**	-2.112	1.290	-0.411	0.850	-0.028	0.372
17	L9×Gm1002	-6.553**	0.250	-3.073**	4.799	-1.515	1.642	0.462	0.028	0.191
18	L9×Gm1021	6.553**	-0.250	3.073**	-4.799	1.515	-1.642	-0.462	-0.028	-0.191
19	L10×Gm1002	1.009	0.250	0.615	-0.376	-0.740	-0.558	-0.072	0.028	0.003
20	L10×Gm1021	-1.009	-0.250	-0.615	0.376	0.740	0.558	0.072	-0.028	-0.003
21	L11×Gm1002	1.009	0.250	0.615	-4.226	0.397	-1.914	-1.071*	0.153	-0.497
22	L11×Gm1021	-1.009	-0.250	-0.615	4.226	-0.397	1.914	1.071*	-0.153	0.497
23	L12×Gm1002	1.009	0.250	-0.615	-0.713	-1.603	-1.158	1.675**	0.778	1.191**
24	L12×Gm1021	-1.009	-0.250	-0.615	0.713	1.603	1.158	-1.675**	-0.778	-1.191**
25	L13×Gm1002	2.672**	0.250	1.427*	-3.438	4.685	0.623	0.432	1.153*	0.816
26	L13×Gm1021	-2.672**	-0.250	-1.427*	3.438	-4.685	-0.623	-0.432	-1.153*	-0.816
27	L14×Gm1002	-5.691**	0.250	-2.635**	-2.851	1.035	-0.908	-0.596	-0.097	-0.309
28	L14×Gm1021	5.691**	-0.250	2.635**	2.851	-1.035	0.908	0.596	0.097	0.309
29	L15×Gm1002	1.009	0.250	0.615	2.249	4.397	3.323	-0.156	-0.472	-0.247
30	L15×Gm1021	-1.009	-0.250	-0.615	-2.249	-4.397	-3.323	0.156	0.472	0.247
31	L16×Gm1002	1.009	0.250	0.615	-1.013	-1.603	-1.308	0.112	-0.097	0.059
32	L16×Gm1021	-1.009	-0.250	-0.615	1.013	1.603	1.308	-0.112	0.097	0.059
33	L17×Gm1002	1.009	0.250	4.740**	3.724	0.397	2.061	0.319	-0.222	0.066
34	L17×Gm1021	-1.009	-0.250	-4.740**	-3.724	-0.397	2.061	-0.319	0.222	-0.066
35	L18×Gm1002	1.009	0.250	-3.073**	4.812	3.060	3.936	0.598	0.403	0.441
36	L18×Gm1021	-1.009	-0.250	3.073**	-4.812	-3.060	-3.936	-0.598	-0.403	-0.441
L.S.D.	0.05	1.03	1.10	2.18	8.04	5.94	5.72	0.91	1.12	0.85
Sij	0.01	1.34	1.44	2.84	10.48	7.74	7.45	1.18	1.47	1.11
L.S.D.	0.05	1.45	1.56	3.08	11.38	8.40	8.08	1.28	1.59	1.20
Sij-Sik	0.01	1.89	2.03	4.02	14.82	10.94	10.53	1.67	2.07	1.56

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

REFERENCES

Abd El- Aal , A.M.M. 2007. Commercial inbred lines as testers for combining ability in new developd maize lines. Minufiya. J.Agric. Res. 32 (1) :219-235.

Abd El-Azeem,M.E.M ,A.M.M.Abd El- Aal and A.E.M.K.El-Galfy. 2010 .Top crosses analysis and combining ability for grain yield and other atributes in maize (***Zea mays L.***) J.Agric. Sci. 1(5) : 673 -688, Mansoura Univ., Egypt.

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

Amer, E.A. 2002. Combining ability on early maturing inbred lines of maize. Egypt. J. Appl. Sci. 42 (2) : 162 – 181.

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.

Davis, R.L. 1927. Report on Plant Breeding . Ann. Rep. Purto Rico Agric .Exp. Stat. P.14-15.

EL-Shenawy, A.A., E.A., Amer and H.E. Mosa. 2003. Combining of newly developed inbred lines of maize by (Line x Tester) analysis. J. Agric. Res. 4 : 2179 – 2190.

El-Sherbieny,H.Y., T.A.E , Abd Allah and A.M.M.Abd El- Aal .2006 .Comparative performance and combining ability of new yellow maize inbred lines in top crosses with three inbred testers. Proceedings of the First Field Crops Conference, 22-24, August 2006.

El-Zeir ,F. A. A. 1999. Evaluating some new inbred lines for combining ability using top crosses in maize (*Zea mays L.,*) .Minufiya . J.Agric. Res. (5) : 1609 – 1620 .

Galal,A.A., El-Triby, H.A.,Younis,M.A. and Sadek,S.E. 1987. Combining ability in Egyptian maize variety composite No. 5.Egypt J. Genet. Cytol., 16 :357-364.

Ibrahim, M.H.A. 2001. Studies on corn breeding, Ph.D. Thesis, Fac. Agric., Kafr El-Sheikh, Tanta, Univ., Egypt.

Ibrahim, M.H.A. 2004. Combining ability of new maize inbred lines by line x testers analysis .d. Agric. Sci. Mansoura Univ. 29 : 4349 – 4356.

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,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. J. of Res., Birsa Agric. Univ. 2 : 177 – 182.

Katta, Y.S.M. 1971. The comparative efficiency in evaluating the combining ability of inbred lines of maize . Ph. D. Thesis, Faculty of Agric., Univ. of Ain-Shams.

Kempthorn, O. 1957. An introduction to genetic statistics. John Willey and sons Inc., New York ,U.S.A.

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

Nawar, A.A. and A.A. El-Hosary .1984. Evaluation of eleven testes of different genetic sources of corn Egypt. J. Genet. Cytol., 13: 227-237.

Shehata , A.M. , F.A. EL-zeir and E.A. Amer (1997). Influence of tester lines on evaluating combining ability of some new maize inbred lines .J. Agric. Sci. Mansoura Univ. 22(7): 2159 – 2176.

Shehata, A.H. and N.L. Dhawan. 1975. Genetic analysis og grain yield in maize as manifested in genetically diverse varietal population and their crosses. Egypt. J. Genet. Cytol. 4: 96-116.

Singh, D.N. and I.S. Singh (1998), Line x Tester analysis in maize (Zea mays L.).

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 Unvi., 50 : 1-20.

Soliman, F.H.S., A.A. EL-Shenawy , F.A. EL-Zeir and E.A. Amer (1995). Estimates of combining ability and type of gene action in top crosses of yellow maize. Egypt. J. Appl. Sci., 10 (8) : 212 – 229.

Soliman, F.H.S., SH.A.Shafay, A.I.El-Agmy and M.A. Mostafa. 2007. Inheritance of grain yield and oil content in new maize high oil single crosses. Conf. of Egypt. J. Plant . Breed, 11 (2): 507-530.

Sprague, G.F. and L.A. Tatum 1942. General vs. specific combining ability in single crosses of corn J. Amer Soc. Agron., 34 : 923 – 932.

Steel, R.G. and J. H. Torrie .1980. Principles and Procedures of Statistics. 2 nd Ed. Mc Grow – Hill Book Co.,New York , USA.

الملخص العربى

تقييم بعض السلالات الجديدة من الذرة الشامية

محي الدين محمد أحمد عثمان ومحمد حسن علي إبراهيم ومحمد أحمد الغنيمي

قسم بحوث الذرة – معهد بحوث المحاصيل الحقليـــة – مركز البحوث الزراعية الجيزة – مصر

- تم تهجين ١٨ سلالة صفراء من الذرة الشامية مرباه تربية داخلية في الجيل الأخصابي الـــذاتي الرابـــع مـــع كشافين، وهما (سلالة جميزة ١٠٠٢ و سلالة جميزة١٠٢١) وذلك بمحطة البحوث الزراعية بالجميزة خـــلال الموسم الصيفي الزراعي ٢٠٠٨ للحصول على ٣٦ هجين قمي.

- تم تقييم الـ ٣٦ هجين قمي مع أثنين من الهجن التجارية(هـ ف ١٦٢ و هـ ف ١٦٦) وذلك بمحطة البحوث الزراعية بالجميزة وملوي في الموسم الصيفى الزراعي ٢٠٠٩.
- استخدمت طريقة تحليل السلالة × الكشاف المقترحة بواسطة العالم (كمبثرون ١٩٥٧) وأخذت القراءات على الصفات التالية وهى عدد الأيام حتى ظهور ٥٠ % للحرابر ، ارتفاع النبات (سم) وارتفاع الكوز سم والمقاومة لمرض الذبول المتأخر(%) (حيث تم تحويلها بطريقة الـ Arcsine) وعدد الكيزان لكل ١٠٠ نبات ومحصول الحبوب (مليون جرام/ هكتار). وكانت أهم النتائج المتحصل عليها هي:-

١- وجود اختلافات معنوية بين المواقع المختلفة.

٢- أظهرت التراكيب الوراثيه المختلفة ومكوناتها وهي السلالات والكشافات والتفاعل بينهما فروقا معنوية لمعظم الصفات المدروسة وكذلك تفاعلها مع المواقع.

٣- لعبت التأثيرات غير المضيفة دورا مهما في وراثة الصفات المدروسة مقارنة بالتأثير المضيف.

٤- كان حجم التفاعل بين التأثيرات الغير المضيفة مع المواقع أكثر أهمية مقارنة بالتأثيرات المضيفة لكل الصفات المدروسة.

٥- أظهرت خمس، ثلاث، خمس سلالات على الترتيب تأثيرات معنوية مرغوبة لصفة محصول الحبوب تحت الموقعين ومتوسطها.

٦- تعتبر السلالة L7 من أفضل السلالات لصفة محصول الحبوب والمقاومة لمرض الذبول المتأخر وعدد الكيزان/ ١٠٠ نبات.

٧- كما أظهرت السلاله L 3 تليها السلالة L 14 تأثيرات معنوية ومقبولة لكل من التبكير وقصر النبات وانخفاض موقع الكوز.

٨- أظهرت السلالة الكشاف ١٠٠٢" تأثيرات معنوية ومقبولة لصفة التبكير وقصر النبات وانخفاض موقع الكوز بينما أظهرت السلالة الكشاف ١٠٢١ تأثيرات معنوية ومقبولة لصفة المقاومة لمرض الذبول المتأخر وعدد الكيزان/ ١٠٠ نبات ومحصول الحبوب.

٩- تفوقت ثلاثة من الهجن القمية معنويا في صفة محصول الحبوب مقارنة بالهجينين التجاريين" هـ.ف ١٦٢ و هـ.ف ١٦٦ وهى

(Gm 1021× L1), (Gm 1021× L4) and (Gm 1021× L7), gave highly values of grain yield, as follows (12.26, 10.52 and 11.39 Mg/ha), (11.32, 10.45 and 10.8 Mg/ha) and (11.59, 9.91 and 10.75 Mg/ha) and significantly out-yielded the two checks, SC162 and SC166 (9.56, 6.53 and 8.13 Mg/ha) and (7.19, 9.31 and 9.58 Mg/ha), respectively

وتعتبر هذه الهجن مبشرة ومرغوبة ومقبولة كهجن جديدة في المستقبل.