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EVALUATION OF SOME NEW MAIZE INBRED LINES FOR COMBINING ABILITY USING TOP CROSS METHOD

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ABSTRACT

Fifteen S_4 maize inbred lines isolated from different yellow populations were crossed with three narrow elite inbred testers (Gm. 1001, Gm. 1002and Gm.1021) in 2007 growing season. The 45 top-crosses plus three checks (S.C. 155 , S.C. 162 and S.C. 3084) were evaluated at two locations (Gemmeiza and Mallawy) in 2008 growing season. Significant differences were detected between the two locations for most studied traits. Mean squares due to crosses and their partitions (lines and testers) were highly significant for all traits except for resistance to late wilt % and plant height traits. Mean squares due to crosses x location. interaction and their partitions (Lines x Loc., testers x Loc. and L. x T. x Loc.) were significant for most studied traits . Non-additive was more important than additive genetic variance for all studied traits while, the additive effects was more influenced by locations than non-additive effects for number of ears /100 plants and grain yield. Desirable and significant GCA effects for grain yield and some studied traits were obtained by the inbreds, Gm.502 , Gm.520 , Gm.525 and Gm.530. Also, the inbred line Gm.510 showed desirable and significant GCA effects for earliness and low plant height .The line tester Gm. 1002 showed desirable and significant GCA effects for earliness and number of ears /100 plants while, the line tester Gm. 1021 considered the best combiner for grain yield. Ten top crosses surpassed significantly the three commercial hybrids (S.C. 155, S.C. 162 and S.C. 3084) for grain yield and most yield components.

Meanwhile, the same ten top crosses did not differ significantly from the three single crosses for earliness and plant shortness. These crosses could be used in maize breeding program .

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

INTRODUCTION

Inbred lines are selected on their general and specific combining abilities. Developing a high yielding maize hybrid is based mainly on the development of better inbred line in combining ability. Davis (1927) was the first to suggest the use of inbred lines x tester (top cross method) for evaluating maize inbred lines for combining ability. Galal *et al* (1987) reported the superiority of single crosses as narrow genetic base testers. Nawar (1985) studied 49 new inbred lines for general and specific combining ability that derived from the composite variety 108 by using line x tester. Numerous breeders found that estimates of non-additive genetic variance played an important role in the inheritance of grain yield, plant

Ibrahim *et al* 2007. On the other hand, Mahmoud 1996 , Soliman and Sadek 1999 , El-Shenawy *et al* 2003 , Mosa *et al* 2004 , Ibrahim *et al* 2005 and Barakat and Osman 2008 found that the additive genetic variance played an important role in the inheritance of days to silking , ear diameter and number of rows/ear .

The aims of this study were: 1) to estimate combining ability effects for fifteen new inbred lines of maize 2) to determine additive and non-additive genetic variance for studied traits in this respect and 3) to obtain better single crosses than the commercial hybrids (checks) in grain yield and other studied traits.

MATERIALS AND METHODS

New fifteen inbred lines of yellow maize in the S_4 generation derived at Gemmeiza Agricultural Research Station. These inbred lines were isolated by Maize Section from different populations (Gm.Y.Pop., Comp. # 21 and Comp. # 45) and crossed with three inbred testers i.e. inbred lines Gm. 1001 , Gm. 1002 and Gm. 1021 during 2007 growing season. In 2008 growing season, the 45 top crosses plus three checks (S.C. 155 , S.C. 162 and S.C. 3084) were evaluated at Gemmeiza and Mallawy Research Stations. Entries were arranged in a randomized complete block design (RCBD) 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 were taken on days to 50 % silking (days to mid silk), plant height (cm), ear height (cm) while, ear position % and resistance to late wilt % (were submitted to the arcsine of the square root transformation), number of ears/100 plants and grain yield (ard/fad).

Statistical analysis of the combined data under 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 in the two locations was performed after carrying out the homogeneity test.

RESULTS AND DISCUSSION

Combined analysis of variance for the seven studied traits in the two locations is presented in Table (1). Mean squares due to locations for grain yield , ear position, resistance to late wilt % and number of ears / 100 plants were highly significant, indicating that these traits differed under both locations, this is logic because Mallawy Research Station is located in middle Egypt while Gemmeiza at Delta region which are different in their environmental conditions. This result in agreement with that reported by El-Zeir (1999) and Ibrahim *et al* (2007).

Table 1. Mean squares of the combined analysis of variance for seven traits of maize in two locations (Gemmeiza and Mallawy).

Source	Df	Mean squares						
		Days to 50% Silking	Plant height	Ear height	Ear position	Resistance to late wilt	Number of ears/100 plants	Grain yield
Locations (Loc.)	1	7.90	728.80	30.90	113.12**	411.10**	2071.90**	49.20**
Rep/Loc.	6	4.10	122.40	21.0	2.50	32.56	366.60	9.30
Crosses	44	60.30**	3709.90**	2728.40**	27.13**	35.86	324.60**	82.8**
Lines (L)	14	82.40**	3406.40**	3509.5**	28.13**	26.80	365.60**	118.0**
Tasters (T)	2	67.10**	233.30	2107.5**	18.92**	63.31**	233.10**	20.70*
L x T	28	48.80**	4109.90**	2382.30**	27.22**	38.42*	310.60**	69.70**
Crosses x Loc.	44	23.11**	2472.10**	1472.0**	11.11**	36.11	84.20	11.72
Lines x Loc.	14	34.83**	3923.70**	2541.60**	9.16*	20.37	60.50	12.50
Testers x Loc.	2	7.09	668.70	317.80**	8.92*	50.05*	196.10**	13.50
L x T x Loc.	28	18.37**	1875.10**	1019.60**	12.25**	42.98*	88.10	11.20
Error	308	4.50	375.60	232.20	3.6	18.80	45.30	9.80
C.V. %		3.50	8.10	12.39	4.13	4.89	6.52	10.87

*,** indicate significance at 0.05 and 0.01 levels of probability, respectively.

Mean square due to crosses (C) and their partitions, lines (L) and testers (T) were highly significant for all traits except resistance to late wilt for crosses and lines and plant height for testers. Mean squares due to lines x testers were significant and highly significant for all studied traits. On the other hand, mean squares due to the interactions crosses x Loc. and lines x Loc. were highly significant for days of 50% silking , plant height , ear height and ear position, T. x Loc. mean squares were significant for ear height , ear position, number of ears/ 100 plants and grain yield. While, L. x T. x Loc. were significant for days of 50 % silking , plant height, ear height, ear position and resistance to late wilt . These results showed that the genotypes varied significantly and ranked differently from one location to another.

Mean performance for the seven studied traits of 45 top crosses as an average of two locations is presented in Table (2). Mean grain yield ranged from 21.7 ard/fed for the cross Gm.502 x Gm. 1002 to 34.8 ard/fed for the cross Gm.507 x Gm. 1021. The results showed that 10 top crosses Gm.507 x Gm. 1021 (34.8 ard/fed), Gm.520 x Gm. 1021 (33.8 ard/fed), Gm.520 x Gm. 1021 (33.6 ard/fed), Gm.525 x Gm.1001 (33.4 ard/fed), Gm.502 x Gm.1001 (33.3 ard/fed), Gm.525 x Gm. 1001 (33.4 ard/fed) , Gm.530 x Gm. 1002 (32.9 ard/fed), Gm.512 x Gm.1021 (32.7 ard/fed) , Gm.501 x Gm.1021 (32.5 ard/fed) and Gm.520 x Gm.1001 (31.7 ard/fed) surpassed than the commercial hybrids i.e. S.C. 155, S.C. 162 and S.C. 3084 (30.9 , 31.3 and 30.3 ard/fed , respectively) for grain yield and most studied traits .

Moreover, most of these top crosses did not differ significantly from the commercial hybrids which were used as checks for both earliness and plant heights. These results indicates that these top crosses could be recommended for future use in maize hybrid breeding program.

Estimates of variance due to specific (δ^2SCA) were higher than that due to general (δ^2GCA) combining ability for all studied traits (Table 3). This indicates that the non-additive genetic variance played more important than the additive genetic variance in the inheritance of all studied traits. These results are in agreement with those reported by Ibrahim (2001), Mosa (2001) and Ibrahim *et al* (2007).

On the other hand, the magnitude of the δ^2 SCA x Loc. interaction variance was higher than that of δ^2GCA x Loc. variance for grain yield and other studied traits. This result revealed that the non-additive gene action was more influenced and interacted by locations than the additive gene action as reported by Amer (2004) for plant height.

General combining ability effects for fifteen inbred lines and three testers combined in two locations are presented in Table (4). Positive and highly significant GCA effects for grain yield and number of ears /100 plants were detected for the inbred lines Gm502, Gm.520 , Gm.525 and Gm. 530. Seven , four, four and two inbred lines have desirable GCA effects for days of 50 % silking ,plant height ,ear height and ear position , respectively. While , the inbred line Gm.510 have desirable significant GCA effects and considered the best combiner for days of 50 % silking , plant height and ear height towards, earliness and shortness ,these inbred lines could be directed to the hybrid breeding program to produce new high yielding crosses. Moreover, desirable and significant GCA effects for the testers were obtained from the inbred line Gm. 1001 for days of 50 % silking i.e towards earliness. The inbred line Gm. 1002 showed desirable GCA effects for days of 50 % silking and number of ears/ 100 plants.

Also, the line tester Gm. 1021 have desirable and significant GCA effects for grain yield and resistance to late wilt % . These results revealed that the inbred tester Gm. 1021 plays important role in the inheritance highly grain yield and stability for resistance to late wilt disease in top crosses. Mahmoud (1996), Al-Naggar *et al* (1997) and Ibrahim *et al* (2007) reported that the most efficient testers for grain yield were inbred lines (narrowest genetic base and lowest yield potential).

Table 2. Mean performance of maize top crosses for combined data in two locations (Gemmeiza and Mallawy).

Top crosses	Days to 50 % Silking	Plant Height (cm)	Ear Height (cm)	Ear Position (%)	Resistance to late wilt (%)	Number of ears/ 100 plants	Grain yield (ard /fed)
Gm.501 x Gm. 1001	59.00	215.90	111.30	45.10	84.29	101.80	25.70
" " " x Gm. 1002	59.30	255.80	140.00	47.50	90.00	104.40	28.70
" " " x Gm. 1021	67.40	289.10	161.40	43.11	90.00	106.30	32.50
Gm. 502 x Gm.1001	60.60	286.10	160.60	46.64	88.56	103.70	21.70
" " " x Gm.1002	63.10	284.10	147.60	48.53	87.46	107.30	26.50
" " " x Gm. 1021	67.50	207.00	106.00	46.55	90.00	98.90	33.30
Gm. 504 x Gm. 1001	60.80	253.90	117.40	45.01	90.00	99.60	26.90
" " " x Gm. 1002	60.40	219.80	105.10	45.2	87.46	101.00	25.60
" " " x Gm. 1021	60.90	230.30	123.60	46.71	90.00	99.80	27.50
Gm. 506 x Gm. 1001	58.40	222.30	118.80	46.3	90.00	100.40	26.90
" " " x Gm.1002	58.10	281.40	169.50	46.91	90.00	102.10	27.00
" " " x Gm. 1021	62.90	234.90	139.10	43.35	90.00	100.90	31.20
Gm. 507 x Gm. 1001	56.90	237.90	111.90	42.46	84.93	104.90	25.00
" " " x Gm 1002	58.60	221.90	110.50	44.85	90.00	100.50	28.70
" " " x Gm 1021	65.90	235.00	139.60	48.96	88.39	101.10	34.80
Gm. 508 x Gm. 1001	56.30	233.50	111.00	44.15	90.00	101.10	27.40
" " " x Gm. 1002	59.60	244.00	114.50	44.60	90.00	101.40	29.10
" " " x Gm. 1021	60.90	253.80	135.10	45.21	90.00	102.30	30.70
Gm.509 x Gm. 1001	59.40	239.80	123.10	46.50	88.39	103.10	28.30
" " " x Gm. 1002	60.10	248.60	116.90	44.50	90.00	101.40	29.60
" " " x Gm. 1021	63.30	256.00	145.90	45.71	90.00	100.10	29.60
Gm. 510 x Gm.1001	58.10	222.10	110.00	43.15	82.81	99.20	23.80
" " " x Gm. 1002	59.10	229.40	102.30	44.91	87.13	96.40	29.10
" " " x Gm. 1021	59.50	210.90	101.50	44.05	90.00	100.00	29.60
Gm. 511 x Gm. 1001	59.00	241.90	120.50	44.71	90.00	99.8	24.70
" " " x Gm. 1002	58.40	209.30	120.10	43.93	81.26	99.5	25.50
" " " x Gm.1021	60.40	255.10	139.60	49.03	90.00	100.9	27.40
Gm. 512 x Gm. 1001	59.80	262.10	135.90	47.24	90.00	110.10	23.70
" " " x Gm. 1002	58.40	229.30	118.40	45.86	84.34	99.30	24.90
" " " x Gm. 1021	62.0	242.80	117.30	45.36	90.00	102.90	29.20
Gm. 515 x Gm. 1001	59.10	250.50	125.00	46.20	88.56	106.90	22.10
" " " x Gm. 1002	60.10	212.40	107.10	45.79	90.00	100.20	25.00
" " " x Gm. 1021	66.10	218.40	113.80	47.74	90.00	100.00	31.30
Gm. 516 x Gm.1001	59.40	228.60	117.50	46.35	88.39	94.80	28.50
" " " x Gm. 1002	58.60	193.00	93.30	44.01	90.00	97.80	29.10
" " " x Gm. 1021	61.90	235.50	112.50	45.01	90.00	103.50	29.80

Table 2. Cont.

Top crosses		Days to 50 % Silking	Plant height (cm)	Ear height (cm)	Ear Position (%)	Resistance to late wilt (%)	Number of ears/100 plants	Grain yield (ard / fed)
Gm. 520 x Gm. 1001		62.40	241.60	114.40	44.06	90.00	101.00	31.70
" " " x Gm. 1002		62.90	265.80	144.60	46.73	88.56	109.40	33.60
" " " x Gm.1021		67.10	252.60	143.60	48.80	87.81	110.50	33.80
Gm. 525 x Gm. 1001		60.30	246.50	138.00	48.89	87.46	106.20	27.40
" " " x Gm. 1002		63.10	242.30	117.60	44.34	87.46	110.80	32.90
" " " x Gm. 1021		65.00	215.90	106.10	46.15	87.81	102.90	33.40
Gm. 530 x Gm. 1001		59.50	234.60	120.10	46.15	90.00	101.00	27.80
" " " x Gm. 1002		60.80	241.40	143.10	50.49	90.00	137.80	29.10
" " " x Gm. 1021		64.10	247.90	151.60	48.83	88.39	102.90	32.90
Checks	S.C. 155	62.90	257.40	144.80	48.20	90.00	101.80	30.90
	S.C. 162	64.10	275.90	137.60	45.30	90.00	111.80	31.30
	S.C. 3084	62.60	256.90	140.10	48.00	90.00	101.70	30.30
L.S.D	0.05	2.10	18.90	14.90	3.70	2.80	6.60	3.10
	0.01	2.74	25.00	19.70	4.80	3.70	8.70	4.10

Table 3. Estimates of general (δ^2 GCA) and specific (δ^2 SCA) combining ability variances of combined data in two locations (Gemmeiza and Mallawy).

Variance	50 % Silking	Plant height	Ear height	Ear position	Resistance to late wilt	Number of ears/ 100 plants	Grain yield
δ^2GCA	0.324	0.044	0.224	0.066	0.069	0.227	0.060
δ^2 SCA	1.746	23.275	0.013	6.913	0.938	31.263	0.163
δ^2 GCA / δ^2 SCA	0.186	0.018	0.011	0.009	0.074	0.007	0.368
δ^2GCA x Loc.	0.072	11.697	11.392	0.004	0.086	1.111	0.880
δ^2 SCA x Loc.	3.468	374.875	196.850	5.875	2.200	0.700	0.350
δ^2GCA x Loc. / δ^2SCA x Loc.	0.021	0.031	0.058	0.040	0.039	0.104	0.246

Specific combining ability SCA effects of the 45 top-crosses under two locations are presented in Table (5). The results showed that seven top crosses i.e. Gm.501 x Gm. 1021 , Gm.506 x Gm. 1021 , Gm.507 x 1002, Gm.507 x 1021 , Gm.512 x Gm.1021 , Gm.515 x Gm.1001 and Gm.530 x Gm.1002 have desirable and positive significant SCA effects for grain yield Also, six, ten, eight and six top crosses exhibited desirable and negative significant SCA effects for days of 50 % silking, plant height ,ear height and ear position, respectively. Moreover, the top cross Gm. 506 x Gm.1001 considered the best combiner for days of 50% silking , plant height and ear height towards (earliness and short plants) while , five top crosses have desirable SCA effects for resistant to late wilt disease. Four top–crosses ,

Table 4. Estimates of general combining ability effects of fifteen inbred lines and three testers for combined data in two locations (Gemmeiza and Mallawy).

Genotypes		Days to 50 % Silking	Plant Height	Ear height	Ear Position	Resistance to late wilt	Number of ears /100 plants	Grain yield
Inbred lines								
Gm. 501 (Gm.Y.pop.)		1.003	14.022	13.311	-0.681	-0.559	1.175	0.236
Gm. 502 (Gm.Y.pop.)		2.078	19.522	13.853	1.331**	0.020	4.258**	2.819**
Gm. 504 (Gm.Y.pop.)		-0.872*	-4.936	-8.856**	-0.264	0.499	-2.825	-1.972
Gm. 506 (Gm.Y.pop.)		-1.081*	6.564	18.228	-0.385	1.345	-1.867	-0.389
Gm. 507 (Gm.Y.pop.)		-3.081**	-7.978*	-3.564	-0.481	-0.884	-0.867	-3.639
Gm. 508 (Gm.Y.pop.)		-1.956**	4.189	-4.022	-1.252	1.345	-1.367	0.319
Gm. 509 (Gm.Y.pop.)		0.079	8.564	4.269	-0.335	0.808	-1.450	0.403
Gm. 510 (Gm.Y.pop.)		-1.956**	-18.769**	-23.231**	-1.869	-2.009	-4.533	-1.220
Gm. 511 (Comp. 21)		-1.622**	-4.144	-4.481	-0.019	-1.567	-2.908	-2.806
Gm. 512 (Comp. 21)		0.836	5.147	-0.397	0.248	-3.542	1.008	0.194
Gm. 515 (Comp. 21)		0.961	-12.478**	-8.939**	0.669	0.866	-0.658	-2.514
Gm. 516 (Comp. 21)		-0.914*	-20.519**	-16.481**	-0.781	0.808	-4.325	0.403
Gm. 520 (Comp. 45)		3.253	13.772	9.894	0.623	0.137	3.929**	4.319**
Gm. 525 (Comp. 45)		1.919	-4.686	-3.647	0.615	-1.076	3.550**	2.736**
Gm. 530 (Comp. 45)		0.586	1.730	14.061	2.581**	0.808	10.883**	1.111**
Testers								
Gm. 1001		-0.481*	1.589	-2.564	-0.381	-0.429	-0.758	-0.161
Gm. 1002		-0.381*	-1.019	-2.272	-0.030	-0.410	1.608**	-0.311
Gm. 1021		0.862	-0.570	4.836	0.411	0.840*	-0.850	0.472**
L.S.D. g_i lines	0.05	0.85	7.76	6.10	0.87	1.87	2.69	0.70
	0.01	1.12	10.22	8.00	1.14	2.43	3.55	0.93
L.S.D. $g_i - g_j$ lines	0.05	1.21	11.08	8.71	1.24	2.65	1.90	1.79
	0.01	1.58	14.43	11.35	1.61	3.43	2.48	2.33
L.S.D. g_i testers	0.05	0.38	3.47	2.70	0.39	0.84	1.20	0.31
	0.01	0.50	4.57	3.60	0.51	1.09	1.59	0.41
L.S.D. $g_i - g_j$ testers	0.05	0.54	4.95	3.90	0.55	1.19	1.72	0.80
	0.01	0.71	6.46	5.08	0.72	1.54	2.24	1.04

Table. 5. Estimates of specific combining ability effects top crosses of combined data in two locations (Gemmeiza and Mallawy).

Top crosses	Days to 50 % Silking	Plant Height	Ear height	Ear position	Resistance to late wilt	Number of Ears/100 plants	Grain yield
Gm. 501 x Gm. 1001	-2.394**	-39.297**	-23.728**	0.219	-3.379	1.700	-3.411
" " " x Gm. 1002	-2.244**	3.186	4.731	2.305	2.314	-1.317	-0.686
" " " x Gm. 1021	4.639	36.111	18.997	-2.524**	1.066	3.017	4.097**
Gm. 502 x Gm.1001	-4.111**	25.453	25.106	-0.219	0.316	1.217	-4.611
" " " x Gm.1002	-0.244	26.061	11.814	1.318	-0.803	2.350	-2.903
" " " x Gm. 1021	4.356	-51.514**	-36.919**	-1.099	0.486	-3.567	1.631
Gm. 504 x Gm. 1001	-1.986	17.661	4.564	-0.248	1.274	0.300	-1.228
" " " x Gm. 1002	0.756	-13.856*	-7.978	-0.411	-1.282	-0.692	-0.078
" " " x Gm. 1021	1.231	-3.806	3.414	0.660	0.007	0.392	1.306
Gm. 506 x Gm. 1001	-2.528**	-25.464**	-21.144**	1.160	0.429	-0.033	-1.661
" " " x Gm.1002	-0.936	36.269	29.314	1.422	0.410	-0.650	-0.778
" " " x Gm. 1021	3.464	-10.806	-8.169	-2.582**	-0.839	0.683	2.439*
Gm. 507 x Gm. 1001	-0.778	4.703	-6.228	-2.581**	-2.417	3.592	-0.536
" " " x Gm 1002	-0.436	-8.689	-7.894	-0.545	2.639	-3.275	2.981**
" " " x Gm 1021	1.214	3.986	14.122	3.126	-0.222	-0.317	3.439**
Gm. 508 x Gm. 1001	-0.903	-11.839	-6.644	-0.123	0.429	0.217	-2.019
" " " x Gm. 1002	-0.186	1.269	-3.436	-0.024	0.410	1.775	-0.119
" " " x Gm. 1021	1.089	10.569	10.081	0.147	-0.839	1.558	2.139
Gm. 509 x Gm. 1001	-1.061	-9.964	-2.436	1.310	-0.646	2.425	-1.078
" " " x Gm. 1002	0.411	1.519	-9.353	-1.041	0.947	-1.817	0.272
" " " x Gm. 1021	1.472	8.444	11.789	-0.270	-0.301	-0.608	0.806
Gm. 510 x Gm.1001	-0.311	-0.256	0.814	-0.506	-3.404	1.383	-3.194
" " " x Gm. 1002	-0.278	9.603	3.522	0.905	0.889	-3.733	1.297
" " " x Gm. 1021	0.589	-9.347	-4.336	-0.399	2.516	2.350	1.897
Gm. 511 x Gm. 1001	-0.494	4.869	3.314	-0.794	3.341**	0.508	-1.519
" " " x Gm. 1002	-0.231	-25.147**	-18.353**	-1.932	-5.415	-2.108	-0.619
" " " x Gm.1021	0.264	20.278	15.039	2.726	2.074	1.600	2.139
Gm. 512 x Gm. 1001	-2.953**	15.828	14.606	1.464	2.316	6.812**	-4.394
" " " x Gm. 1002	-1.478	-14.439*	-3.186	-0.261	-3.365	-6.275	0.131
" " " x Gm. 1021	4.431	-1.389	-11.419*	-1.203	1.049	-0.567	4.264**
Gm. 515 x Gm. 1001	-2.328**	21.828	12.272	0.006	-0.530	5.258*	-4.436
" " " x Gm. 1002	-0.569	-13.689*	-5.894	-0.757	0.889	-3.733	-0.653
" " " x Gm. 1021	2.897	-8.139	-6.378	0.751	-0.359	-1.525	5.089**
Gm. 516 x Gm.1001	-0.953	7.994	12.314	1.606	-0.646	-3.200	-0.978
" " " x Gm. 1002	-0.103	-25.022**	-12.228*	-1.082	0.947	-2.567	-0.078
" " " x Gm. 1021	1.056	17.028	-0.086	-0.524	-0.301	5.767*	1.056

Table 5. Cont.

Top crosses		Days to 50 % Silking	Plant Height (cm)	Ear height (cm)	Ear position	Resistance to late wilt	Number of Ears /100 plants	Grain yield (ard / fed)
Gm. 520 x Gm. 1001		-1.269	-13.267	-17.186**	-2.086**	1.637	-5.200	-1.494
" " " x Gm. 1002		-0.869	-13.436*	12.522	0.226	0.181	0.761	0.231
" " " x Gm.1021		2.139	-0.139	4.664	1.860	-1.818	4.392	1.264
Gm. 525 x Gm. 1001		-1.653	10.036	19.981	2.748	0.312	0.300	-3.278
" " " x Gm. 1002		0.714	8.394	-0.686	-2.153**	0.293	2.558	1.439
" " " x Gm. 1021		0.939	-18.431**	-19.294**	-0.594	-0.605	-2.858	1.839
Gm. 530 x Gm. 1001		-1.478	-8.256	-15.603	-1.956*	0.966	-11.908	-1.653
" " " x Gm. 1002		-1.194	1.103	7.106	2.030	0.947	22.225**	-0.911
" " " x Gm. 1021		2.672	7.153	8.497	-0.074	-1.914	-10.317	2.564*
L.S.D. S_{ij}	0.05	1.85	13.43	10.56	1.52	3.25	4.67	2.17
	0.01	1.95	17.68	13.90	1.97	4.21	6.14	2.86
L.S.D. S_{ij}-S_{ik}	0.05	1.49	13.57	10.67	1.52	3.25	4.71	2.19
	0.01	1.94	17.68	13.90	1.97	4.21	6.14	2.86
L.S.D. S_{ij}-S_{kl}	0.05	2.10	19.20	15.10	2.16	4.59	6.66	3.10
	0.01	2.74	25.00	19.66	2.80	5.95	8.68	4.04

Gm.512 x Gm.1021 ,Gm.515 x Gm.1021, Gm.516 x Gm.1021 and Gm.530 x Gm.1002 exhibited positive and significant SCA effects for number of ears /100 plants. These top crosses considered promising new crosses and could be used for improving maize in future.

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تقييم بعض السلالات الجديدة من الذرة الشامية للقدرة العامة على التآلف باستخدام طريقة الهجن القمية

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قسم بحوث الذرة – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية الجيزة

- تم تهجين ١٥ سلالة تربية داخلية جديدة من الذرة الشامية في الجيل الأخصابي الذاتي السادس مع ٣ كشافات وهي السلالات جميزة ١٠٠١ وجميزة ١٠٠٢ وجميزة ١٠٢١ وذلك بمحطة البحوث الزراعية بالجميزة موسم ٢٠٠٧ الصيفي وذلك للحصول على ٤٥ هجين قمي.
- تم تقييم الـ ٤٥ هجين قمي مع ثلاثة من الهجن التجارية وهي (هـ.ف ١٥٥ – هـ.ف ١٦٢ – هـ.ف ٣٠٨٤) كهجن للمقارنة وذلك بمحطتي البحوث الزراعية بالجميزة وملوي موسم ٢٠٠٨ الصيفي.
- استخدمت طريقة تحليل السلالة × الكشاف المقترحة بواسطة العالم (Kempthorne 1957) وأخذت القراءات على الصفات التالية: (عدد الأيام حتى خروج ٥٠% من الحراير – ارتفاع النبات سم – ارتفاع الكوز سم – موقع الكوز(%) – نسبة النباتات المقاومة لمرض الذبول المتأخر(%) – عدد الكيزان/ ١٠٠ نبات – محصول الحبوب بالإردب/فدان). وكانت أهم النتائج كما يلي :-

١. وجدت اختلافات معنوية بين الموقعين للصفات المدروسة.
٢. أظهرت الهجن ومجزئاتها (السلالات والكشافات) تباين عالي المعنوية لكل الصفات المدروسة ما عدا نسبة النباتات المقاومة لمرض الذبول المتأخر وصفة ارتفاع النبات.
٣. التفاعل بين الهجن والمواقع كان معنوياً وكذلك بين مجزئات الهجن والمواقع كان معنوياً لمعظم الصفات المدروسة.
٤. كان تباين الفعل الوراثي غير المضيف أكثر أهمية من التباين الوراثي المضيف لكل الصفات المدروسة علاوة على ذلك كان تباين الفعل الوراثي غير المضيف أكثر تأثراً وتفاعلاً بالمواقع عن الفعل الوراثي المضيف لمعظم الصفات المدروسة بينما كان الفعل الوراثي المضيف أكثر تأثراً وتفاعلاً لصفات عدد الكيزان/ نبات وصفة محصول الحبوب.
٥. كانت أفضل السلالات للقدرة العامة على التآلف لصفة محصول الحبوب وعدد الكيزان لكل ١٠٠ نبات هي جميزة (٥٠٢) – جميزة (٥٢٠) – جميزة (٥٢٥) – جميزة (٥٣٠). كذلك أظهرت السلالة جميزة(٥١٠) أحسن قدرة عامة للتآلف لصفة التبكير في النضج .
٦. كانت السلالة جميزة ١٠٢١ أفضل كشاف لتأثير القدرة العامة على التآلف لمحصول الحبوب . كذلك أظهر الكشاف جميزة ١٠٠٢ قدرة عامة على التآلف مرغوبة ومفضلة لصفتي عدد الأيام حتى خروج (٥٠%) من الحراير وعدد الكيزان لكل ١٠٠ نبات.

- تفوقت ١٠ هجن قمية وهي

Gm. 507 x 1021 (34.8 ard/fed.),	Gm. 520 x 1021 (33.8 ard/fed.),
Gm. 520 x 1021 (33.6 ard/fed.),	Gm. 525 x 1021 (33.4 ard/fed.),
Gm. 502 x 1001 (33.3 ard/fed.),	Gm. 525 x 1002 (32.9 ard/fed.),

Gm. 530 x 1002 (32.9 ard/fed.), Gm. 512 x 1021 (32.7 ard/fed.), Gm. 501 x 1021 (32.5 ard/fed.) and Gm. 520 x 1001 (31.7 ard/fed.).

عن الهجن التجارية المستخدمة كهجن للمقارنة وهي

S.C. 155 (30.9 ard/fed.) , S.C.162 (31.3 ard/fed.) , S.C. 3084 (30.3 ard/fed.)

زيادة معنوية لصفة المحصول ومعظم الصفات المدروسة وكذلك لم تختلف هذه الهجن معنويا عن هجن المقارنة في صفتي عدد الأيام حتى خروج ٥٠% من الحراير وارتفاع النبات ويمكن استخدام هذه الهجن في المستقبل في برنامج تربية الذرة الشامية.

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