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

Egypt. J. Plant Breed (15) 2: 127- 136
Special Issue (2011)

DIALLEL ANALYSIS FOR YIELD AND YIELD COMPONENTS OF YELLOW MAI ZE UNDER TWO DIFFERENT LOCATIONS

M.A.EL-Ghonemy, M.H.A.Ibrahim and M.M.A. Osman
Maize research section, field crops research Institute, A.R.C. Giza

ABSTRACT

Eight yellow inbred lines were made at Gemmeiza Research Station and crossed in a diallel cross system in the growing season 2009. The eight parents were (Gm1340, Gm1343, Gm. 1346, Gm. 1342, Gm. 1345, Gm. 1347, Gm. 1341 and Gm1344). The 28 crosses in addition to two checks (SC 162, SC 166) were evaluated at Gemmeiza and Mallawy Agricultural Research Stations in 2010 growing season. Data were collected on number of days to 50% silking date (day), plant and ear heights, resistance to late wilt disease, grain yield (Mg/ha), ear length (cm.), ear diameter (cm), number of rows/ear, number of kernels/row and weight of 100–kernels (g) and analyzed according to Griffing (1956) method-4 model-1 fixed model. Mean squares of locations were highly significant for all studied traits except, number of days to 50 % silking date. Significant differences were obtained among general (GCA) and (SCA) specific combining ability as well as their interaction with locations for most studied traits. Additive gene action played an important role in the in heritance of most studied traits, except number of days to 50% siliking date, ear length and ear diameter according to the ratio K^2 GCA/ K^2 SCA as well as their interactions with locations for all studied traits, except ear diameter, indicating the importance additive type of gene action in the inheritance of these studied traits and more affected by environmental conditions (locations) according to K^2GCA × loc/K^2 SCA × loc ratio. The inbred line Gm1343 exhibited desirable and significant GCA effects for resistance to late wilt disease, ear length, number of kernels/row and grain yield, seemed the best combiner for these traits, two inbred lines (Gm 1340 and Gm.1345) exhibited desirable and significant GCA effects for earliness. Two new crosses i.e. 2×5 and 2×7 (11.59 and 11.36 Mg./ha) surpassed significantly and out yielded the check SC162 (8.97 Mg/ha). While, the single cross 2×5 (11.59 Mg/ha) surpassed significantly and out yielded comparing to the highest check SC166 (9.48 Mg/ha). These crosses were defined as superior and promising genotypes for grain yield and can be used in maize breeding programs.

Kay words: Combining ability, Diallel, GCA, SCA, Gene action, Maize.

INTRODUCTION

Maize (*Zea mays L.*) is the world's most widely grown cereal and is the primary staple food in many developing countries. The concept of general combining ability (GCA) and specific combining ability (SCA) was introduced by Sprague and Tatum (1942) and its mathematical modeling was set about by Griffing (1956) in his classical paper in conjunction was the diallel crosses. Diallel crosses have been widely used in genetic research to investigate the inheritance of important traits among asset of genotypes. These were devised, specifically, to investigate the combining ability of the parental lines for the purpose of identification of superior parents for use in hybrid development programs. Analysis of diallel data is usually conducted according to the methods of Griffing (1956) which partition the total variation of diallel data into GCA of the parents and SCA of the crosses (Yan and Hunt. 2002). A diallel is simple manipulate in maize and supplies important information about the studied population for various genetic parameters (Vacaro *et al.*, 2002). The analysis is also useful for evaluation of population per se. Therefore, the objectives of the present investigation were; 1) to estimate general combining ability for inbred lines and specific combining ability for new crosses and their interaction with locations. 2) to identify superior parental lines and their prospective crosses to be used in hybrids maize breeding programs.

MATERAILS AND METHODS

Eight S_8 yellow maize inbred lines i.e. Gm 1340 –Gm 1343– Gm 1346– Gm 1342– Gm 1345– Gm1347- Gm1341 and Gm 1344 and its pedigree are presented in Table (1).

All possible combination, without reciprocals, were made between the eight inbred lines at Gemmeiza Agricultural Research station in 2009 season. The 28 single crosses and two checks (SC 162 and SC 166) were evaluated in 2010 growing season at two locations (Gemmeiza and Mallawy) Agricultural Research Stations. Randomized Complete Block Design with four replication were used at each location. Plot size was one row, 6 m long and 80 cm width and 25 cm between hills. All cultural operation were applied as recommended. Data were recorded for grain yield (Mg/ha) adjusted to 15.5% moisture, days to 50% silking date, plant height, ear height, resistance to late wilt % (was submitted to the arcsine of the square root transformation), ear length, ear diameter, number of rows/ear, number of kernels/ row and weight of 100–kernels. The analysis of variance was done for every locations and over two locations. Also in each location the deviation sum squares among genotypes were partitioned into variation among general and specific combining ability. The genetic analysis for the diallel crosses was computed according to Griffing (1956) Method – 4 model -1 (fixed model) for all studied traits.

Table (1) Names and pedigree the used inbred lines in this study

No.	Lines.	Name	Pedigree
1	P1	Gm. 1340	Comp-45
2	P2	Gm. 1343	Comp-21
3	P3	Gm. 1346	CIMMYT-pop-31
4	P4	Gm. 1342	CIMMYT-pop-445
5	P5	Gm. 1345	CIMMYT-pop-24
6	P6	Gm. 1347	CIMMYT-pool-22
7	P7	Gm. 1344	CIMMYT-pool-446
8	P8	Gm. 1341	CIMMYT-pool-18

RESULTS AND DISUSSION

Mean squares of the ten studied traits are shown in Table (2). Locations mean square were highly significant for all studied traits except, days to 50% silking date. This would indicated that the genotypes were affected from location to another. These results agreed with that obtained by Soliman *et al.* (1995) and El-Zeir *et al.* (1999). Highly significant differences were obtained among crosses and their partition (GCA and SCA) and their interaction with location for most studied traits. These results indicate that the genotypes and their partitions were differed in performance from one location to anther for most studied traits as reported by Mahmoud *et al.* (1990), El-Shamarka (1994). The GCA and SCA mean squares were highly significant of their combined for most studied traits, indicting that additive and non–additive effects were very important for the ten studied traits. The ratios of GCA/SCA was greater than unity for all studied traits ,except ear length and ear diameter indicating that the additive effects played an important role in the inheritance of these traits. These results are agreement with Abdel- Aziz *et al.* (1994), Mosa (1996), Ibrahim (1996), Amer *et al.* (1998), Ibrahim

(2001), Amer (2003) and El- Ghonemy and Ibrahim(2010). While, the ratios of GCA × Loc./ SCA × Loc. was more than unity for number of days to 50% silking date, plant height, ear height, resistance to late wilt disease, ear length, number of rows/ear, number of kernels/row, weight of 100 – kernels and grain yield (Mg/ha), this indicate that these traits were affected by additive effect with location than non- additive effects as reported by El –Hosary (1988), El– Hosary (1989), Mahmoud (1996) , Soliman and Sadek (1999) and Ibrahim *et al.* (2007).

Mean performance of crosses for combined data are shown in Table 3 Mean performance of crosses as the average of the two locations (their combined). Mean performance of grain yield trait ranged from (7.43 Mg/ ha) for (2×7) cross to (11.54 Mg/ ha) for (2×5) cross, two new crosses i.e. 2×5 and 2×7 (11.59 and 11.36 Mg./ha) surpassed significantly and out yielded the check SC162 (8.97 Mg/ha). While, the single cross 2×5 (11.59 Mg/ha) surpassed significantly and out yielded comparing to the highest check SC166 (9.48 Mg/ha), indicating that these crosses have favorite and desirable genes for yield potentiality, means of number of days to 50% silking date trait ranged from 54.6 day for (5×6) cross to 61.8 day for (2×8) cross and most of these crosses have earliness trait, means of plant height trait ranged from 222.1 cm. for (5×7) cross to 261.3 cm. for (2×8) cross, means of ear height trait ranged from 114.6 cm. for (5×7) cross to 146.1 cm. for (2×8) cross, means of resistance to late wilt trait ranged from 92.2 % for (6×7) cross to 100% for the remaining crosses, means of ear length trait ranged from 16.1 cm. for (4×8) cross to 21.2 cm. for (2×4) cross, means of ear diameter trait ranged from 4.4 cm for (4×8) cross to 5.1cm. for (3×8) cross, means of number of rows/ear trait ranged from 14.0 rows for (4×5) cross to 17.0 rows for (2×3) cross , means of number of kernels /row trait ranged from 32.5 kernels for (4×8) cross to 42.1 kernels for (3×8) cross and means of weight of 100- kernels trait ranged from 29.6 gm. for (4×6) cross to 37.4 gm. for (2×7) cross. Also and in this respect, two new single crosses i.e. 2×5 and 2×7 (11.59 and 11.34 Mg/ha) surpassed significantly and out-yielded the check SC162 (8.97 Mg/ha), while, the single cross 2×5 (11.59 Mg/ha) did not differ significantly than the highest check SC 166 (9.48 Mg/ha). These results are agreement with what obtained by Mosa (2003), Abd El-Azeem *et al* (2009) and Abd El-Moneam *et al* (2009). These crosses were defined as superior and promising genotypes for grain yield and can be used in maize breeding programs.

Estimates of general combining ability effects for eight inbred lines for combined data are presented in Table (4) high positive values would be of interest for all traits in question except; days to 50% silking date, plant and ear heights, high negative ones would be useful from the breeder point of view. The inbred line Gm 1343 gave desirable positive significant GCA effects for grain yield, resistance to late wilt disease, ear length and number of kernels/ row and it seemed to be the first best combiner for these traits. The two inbred lines (Gm 1340 and Gm 1345) exhibited desirable and negative significant GCA effects for number of days to 50% silking date towards (earliness). These results exhibited that the three previous lines Gm 1340 , Gm1345 and Gm1343 possessed favorable genes for improving hybrids with earliness and yielding ability as reported by El-Shamarka *et al.* (1994) and Motawei *et al.* (2009).

Estimates of specific combining ability effects of 28 crosses for combined are presented in Table (5). Single cross (3×6) gave desirable and significant SCA effects for resistance to late wilt disease, ear length and grain yield , where, it considered the best combiner for these traits. The single crosses 1×2, 3×4, 3×7, 4×8, 5×6, 5×7 and 6×8) exhibited desirable and significant SCA effects for number of days to 50 % siliking date towards (earliness), while the single cross 1×2 considered the best combiner for earliness, shortness and lower ear position. These results are similar with reported by El-Ghonemy and Ibrahim (2010). These crosses would interest and favorite and it recommended to be use it in maize breeding programs.

Table (2): Mean squares of combined analysis for the ten studied traits under the two locations (Gemmeiza and Mallawy) in 2010 season.

Sourc	DF	No.of days to 50% Silking date	Plant height	Ear height	Resistance to late wilt	Ear Length	Ear diameter	No.of rows/ear	No. of Kernels /row	100-kernels weight	Grain yield (Mg/ha)
Locations	1	0.004 ns	23636.6**	26600.4**	75.56**	20.89**	6.97**	17.78**	211.8**	238.22**	4.732**
Rep/loc.	6	2.44	80.5	88.3**	2.63	6.79	0.12	2.0	23.73	16.84	1.858
GCA	7	28.08**	2591.2ns	968.2ns	302.80*	10.0**	0.08ns	5.68ns	45.52ns	45.52ns	23.064*
SCA	20	24.80**	302.4ns	337.6ns	147.93*	10.96**	0.16ns	3.36ns	28.40ns	28.40ns	4.55 ns
GCAxLoc.	7	3.28**	867.44**	484.96**	114.74**	2.96ns	0.08ns	4.80**	55.20**	48.80**	6.66**
SCAxLoc	20	2.24**	154.96**	163.52**	52.74**	2.24ns	0.096ns	3.20**	21.92ns	30.40*	3.381**
Error	162	0.80	36.4	28.7	11.17	2.74	0.07	0.88	13.40ns	9.13	0.665
$\overline{X}$		58.3	240.5	131.1	86.3	18.7	4.80	15.5	38.5	34.61	9.44
C.V%		1.54	2.51	4.1	3.87	8.9	5.51	6.1	9.51	8.73	8.65
K^2GCA/K^2SCA		0.183	9.091	3.021	2.229	0.931	0.529	1.885	1.729	1.91	5.552
$\frac{K^2GCAxLoc}{K^2SCAxLoc}$		9.02	5.937	3.094	2.288	1.830	0.139	1.598	2.942	1.722	1.063

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

Table (3): Means performance of the crosses for the ten studied traits from the combined analysis for the two locations in 2010 season.

Crosses		No. of days to 50% silking date	Plant height	Ear height	Resistance to late wilt disease	Ear length	Ear diameter	No .of rows/ear	No. of kernels/row	100-kernels weight	Grain yield (Mg/ha)
1 × 2		55.3	240.8	134.4	90.0	18.7	4.9	16.2	41.9	33.6	10.21
1 ×3		57.6	252.0	143.5	82.5	18.1	4.6	14.9	39.2	35.1	9.33
1 × 4		59.0	222.9	120.6	90.0	19.0	4.9	15.8	36.8	33.5	9.0
1 × 5		58.0	228.4	123.8	90.0	18.7	4.6	15.7	36.6	36.3	9.87
1 × 6		57.3	235.6	129.3	88.6	17.7	4.9	15.2	36.0	33.1	8.12
1 × 7		58.1	237.5	127.0	77.6	19.7	4.8	14.7	38.5	34.4	8.75
1 × 8		57.3	240.0	134.5	90.0	18.1	4.9	15.8	34.9	31.4	7.96
2 × 3		59.5	256.5	131.0	90.0	19.1	5.0	17.0	38.0	36.4	10.74
2 × 4		59.6	254.9	142.5	90.0	21.2	4.9	15.5	40.5	37.0	10.40
2 × 5		59.3	256.1	135.9	90.0	18.3	4.8	16.4	40.8	36.5	11.60
2 × 6		59.4	256.4	139.5	86.6	19.3	5.0	15.7	39.2	37.2	9.88
2 × 7		59.6	258.6	143.3	86.3	18.7	4.9	14.3	40.0	37.4	11.36
2 × 8		61.5	261.3	146.1	90.0	20.8	4.8	14.8	41.9	34.1	10.35
3 × 4		56.3	241.0	130.5	90.0	17.6	5.0	15.8	36.6	36.3	9.58
3 × 5		58.0	238.3	121.3	90.0	17.5	4.8	16.5	38.4	36.5	10.85
3 × 6		59.1	239.4	135.6	90.0	19.4	4.8	16.3	38.7	36.3	10.82
3 × 7		55.6	238.9	128.4	83.0	16.6	4.8	15.7	37.1	32.7	8.43
3 × 8		58.0	239.3	135.5	86.8	19.4	5.1	15.7	42.1	32.5	9.48
4 × 5		61.4	238.0	137.1	84.1	19.4	4.9	14.0	39.0	32.6	7.80
4 × 6		60.1	238.5	130.3	86.5	19.5	4.7	14.8	37.3	29.6	7.43
4 × 7		60.1	236.8	133.5	90.0	19.9	4.9	15.0	41.4	33.9	9.41
4 × 8		58.1	233.1	127.3	83.8	16.1	4.4	14.3	32.5	36.2	7.83
5 × 6		54.6	230.0	119.3	74.8	16.7	4.9	15.4	37.8	34.2	8.80
5 × 7		55.3	222.8	114.6	77.5	19.2	4.8	15.5	39.3	35.1	9.4
5 × 8		57.5	235.0	131.9	90.0	18.6	4.9	15.1	38.2	36.9	9.44
6 × 7		58.9	236.0	122.5	75.60	18.8	4.9	16.0	36.9	32.3	9.44
6 × 8		57.0	231.3	125.6	85.3	18.1	4.8	15.4	39.4	32.6	8.53
7 × 8		60.0	234.9	127.1	90.0	19.2	4.8	15.6	38.2	35.7	9.14
Checks	SC162	62.5	268.0	151.0	90.0	22.4	5.0	15.8	40.9	36.8	8.97
	SC166	64.0	265.0	142.5	90.0	22.6	5.2	16.0	39.8	37.1	9.48
L.S.D	0.05	1.62	18.89	16.11	8.50	1.60	0.31	1.95	5.66	6.08	2.11
	0.01	2.19	25.53	21.76	11.49	2.16	0.42	2.63	7.66	8.21	2.69

Table 4. General combining ability effects of eight inbred lines for combined data in 2010 season.

Lines		No. of days to 50% Silking date	Plant height	Ear height	R. .to late wilt	Ear Length	Ear diameter	No .of rows/ear	No. of kernels/row	Weight of 100-kernels	Grain yield (Mg/ha)
1-Gm1340		-0.891**	-4.391	-0.818	0.682	-0.118 *	-0.036	0.010	-0.894	-0.815	-0.453
2- Gm1343		1.047**	16.84**	9.120**	3.337*	0.927**	0.079	0.273	3.153**	1.650	1.359**
3- Gm1346		-0.620**	3.630	1.307	1.224	-0.479**	0.014	0.591	0.135	0.579	0.484
4- Gm1342		1.130**	-3.057	0.641	1.62	0.175*	-0.015	-0.528	-1.865	-0.540	-0.724
5- Gm1345		-0.641*	-5.828	-5.693	-1.681	-0.365**	-0.034	0.033	0.123	0.969	0.318
6- Gm1347		-0.245	-2.724	-2.650	-2.880	-0.350**	0.014	0.106	-0.673	-1.185	-0.557
7- Gm1341		-0.035	-3.016	-3.589	-4.109**	0.252**	.0014	-0.223	0.365	-0.152	-0.057
8- Gm1344		0.255	-1.453	1.682	.1.807	-0.042	-0.036	-0.262	-0.344	-0.506	-0.370
LSD	0.05	0.64	9.03	6.75	3.28	0.12	0.090	0.67	2.28	2.14	.079
gi	0.01	0.71	9.94	7.43	3.62	0.14	0.095	0.78	2.51	2.36	0.87
LSD	0.05	0.84	13.65	10.20	4.96	0.28	0.13	0.95	3.44	3.24	1.20
gi-gj	0.01	0.92	15.03	11.24	5.47	0.31	0.14	1.12	3.79	3.56	1.32

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

Table (5): Specific combining ability effects of 36 crosses for combined data in 2010 season

Crosses		No.of days to 50% Silk. date	Plant height	Ear height	R.to late wilt disease	Ear length	Ear diameter	No.of rows/ear	No. of Kern./row	100-kerne weight	Grain yield (Mg/ha)
1 x 2		-3.170**	-12.19**	-5.06*	-0.098	-0.798	0.005	0.490	2.190	-1.871	-0..241
1 x3		0.872	12.26**	11.88**	-5.786*	-0.032	-0.205*	-1.178**	1.532	0.700	-0.116
1 x 4		0.497	-10.17*	-10.33*	1.318	0.238	0.124	0.815*	0.057	0.256	0.842
1 x 5		1.268**	-1.90	-0.87	4.318	0.553	-0.157	0.155	-1.081	1.535	0.551
1 x 6		0.122	2.24	1.59	4.443	-0.462	0.070	-0.343	-0.935	0.489	-0.324
1 x 7		0.789	4.41	0.28	-5.327*	0.861*	-0.005	-0.539	0.552	0.768	-0.199
1 x 8		-0.378	5.35	2.51	1.131	-0.370	0.170	0.599	-2.314	-1.877	-0.512
2 x 3		0.810**	-4.46	-10.56 *	-0.640	-0.003	0.030	0.634	-2.789	0.415	-0.679
2 x 4		-0.815	0.600	1.61	-1.036	1.468**	0.034	0.303	0.761	1.254	0.280
2 x 5		0.580	4.62	1.32	1.964	-0.918*	-0.034	0.593	0.023	-0.692	1.588**
2 x 6		0.310	1.76	1.90	0.089	0.093	0.055	-0.105	-0.756	2.112	-0.387
2 x 7		0.351	4.31	6.59	0.943	-1.110	-0.020	-1.201**	-1.018	1.266	1.238*
2 x 8		1.935**	5.37*	4.19	-1.223	1.259*	-0.070	-0.714	1.590	-1.654	-0.199
3 x 4		-2.524**	-0.07	-2.58	0.777	-0.726	0.174	0.234	-1.173	1.662	0.405
3 x 5		0.997**	-0.05	-5.49	3.77	-0.287	-0.032	0.386	-0.335	0.329	0.613
3 x 6		1.726**	-2.03	5.84	5.277*	1.570**	-0.080	0.151	0.786	2.283	1.363*
3 x 7		-1.982**	-2.24	-0.47	-0.494	-1.803**	-0.030	-0.120	-1.852	-2.363	-1.512*
3 x 8		0.101	-3.42	1.38	-2.911	1.278**	0.145	-0.107	3.832*	-2.196	-0.074
4 x 5		2.622**	6.39*	11.05**	-2.494	0.884	0.072	-1.007	1.290	-2.415	-1.179*
4 x 6		0.976**	3.79	1.13	1.281	0.057	-0.126	-0.230	0.336	-3.286	-0.679
4 x 7		0.768*	2.33	5.32	6.110*	0.818	0.074	0.299	3.473*	-0.069	0.821
4 x 8		-1.524**	-2.86	-6.20	-6.057*	-2.739**	-0.351**	-0.414	-4.743**	2.598	-0.491
5 x 6		-2.753**	-1.94	-3.54	-7.369**	-1.291**	0.068	-0.241	-0.177	-0.244	-0.345
5 x 7		-2.336**	-8.90*	-7.22	-3.390	0.657	-0.007	0.263	0.336	-0.315	-0.220
5 x 8		-0.378	1.79	4.76	3.193	0.401	0.093	-0.149	-0.056	1.802	0.092
6 x 7		0.893*	1.24	-2.39	-3.765	0.218	-0.005	0.640	-1.218	-0.986	-0.220
6 x 8		-1.274*	-5.07	-4.59*	-0.057	-0.189	0.093	0.128	1.965	-0.369	0.592
7 x 8		1.518**	-1.15	-2.10	5..923*	0.359	-0.005	0.657	-0.273	1.698	0.592
LSD	0.05	0.93	7.77	7.99	4.54	0.93	0.19	1.12	2.92	3.44	1.15
Sij	0.01	1.28	10.60	10.90	6.18	1.27	0.26	1.52	3.99	4.70	1.57
LSD	0.05	1.43	11.88	12.20	6.93	1.43	1.43	1.71	4.47	5.26	1.75
SijSik	0.01	1.95	16.19	16.63	9.41	1.95	1.95	2.33	6.09	7.17	2.39
LSD	0.05	1.78	10.62	7.31	6.20	1.28	1.28	1.53	3.99	4.70	1.57
Sij-Skl	0.01	1.74	14.48	9.97	8.45	1.74	1.74	2.08	5.45	6.42	2.14

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

REFERENCES

Abd El-Azeem,M.E.M. and M.A. Abd El-Moula 2009. Gene action and combining ability for grain yield and other attributes yellow maize. Egypt. J. Plant Breed. 13 : 123-139.

Abd El-Moneam, M.A; A.N. Attia, M.I.El.Emery and E.A.Fayed 2009. Combining ability and Heterosis for some agronomic traits in crosses of maize. Pak.J. Biol. Sci. 12:433–438.

Amer, E.A. (2003). Diallel analysis for yield and it's components of maize under two different location. Minufiya. J. Agric. Res. 28 : 1363 – 1373.

Amer, E.A., A.A. EL- Shenawy and F.A.A. EL-Zeir (1998). Diallel analysis for ten inbred lines of maize (Zea may's L.) Egypt. J. Appl. Sci., 13 : 79 – 91.

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 may's L.) Minufiya. J. Agric., Res., 24 : 829 – 868.

El- Ghonemy , M.A. and M.H.A. Ibrahim (2010) . Diallel analysis of yellow maize for combining ability and heterosis . J . Agric .Sci. Mansoura univ., 1 (6): 779 – 792

El- Shamarka, Sh.A. (1995). Estimation of heterotsis and combining ability for some quantitative characters in maize under two nitrogen levels. Minufiya J. Agric. Res., 20: 441 – 462.

EL-Hosary, A.A. (1988). Heterosis and combining ability of ten maize inbred lines as determined by diallel crossing over twoplanting dates. Egypt. J. Agric. 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. Agric. 14: 47 – 58.

El-Shamarka, Sh.A.; AM.I. Dawood and A.M. Shehata (1994). Genetic analysis of diallel crosses in maize under two nitrogen levels. Minufiya J. Agric. Res., 19: 1051 – 1064.

Griffing, B. (1956). Concept of general and specific combining ability in relation to diallel crossing systems. Australian J. Sci. 9: 363 – 493.

Ibrahim, M.H.A (2005). Heterosis and combining ability in yellow maize (*Zea may's* L.) over two locations (Sakha and Nubaria). Egypt. d. plant Breed. 9: 65 – 75. Special Issus.

Ibrahim, M.H.A. (1996). Studies on corn breeding M. SC. Thesis, fac. Agric., Kafr EL-Sheikh, Tanta Univ. Egypt.

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: 185 – 201.

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

Mahmoud, I.M.; M.A. Rashed; Eman, M. Fahmy and M. H. Abo-Dheaf(1990). Heterosis, combining ability and types of gene action in a 6x6 diallel of maize. Annals Agric.Sci., Special Issue, 307-317.

Mosa, H.E.(2003). Heterosis and combining ability in maize *(Zea mays* L) Minufiya J. Agric. Res. 28 : 1375-1386.

Mosa, H.E. (1996). Studies on corn breeding .M. SC. Thesis, fac. Agric., Kafr EL-Sheikh, Tanta Univ. Egypt.

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

Motawei, A.A. and H.E. Mosa (2009). Genetic analysis for some quantitative traits in yellow maize via half diallel. Egypt. J. Plant Breed. 13 : 223 – 233.

Soiliman, 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 : 212 – 229.

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 vs. specific combining ability in single crosses of cro. J. Amer Soc. Agron., 34 : 923 – 932.

Vacaro, E., J. Fernandes, Neto, D.G. pegoraro, C.N. Nuss and L.H. Conceicao (2002). Combining ability of twelve population. Pesq. Agropec. Brasilia, 37 : 67 – 72.

Yan, W. and L. A. Hunt (2002). Biplot analysis of diallel date. Crop Sci., 42 : 21 – 30

الملخص العربى

تحليل الهجن التبادلية للمحصول ومكوناته في الذرة الصفراء تحت موقعين

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

قسم بحوث الذرة الشامية – معهد بحوث المحاصيل الحقليــة – مركز البحوث الزراعية بالجيزة – مصر

- تم تهجين ثمانية سلالات نقية من الذرة الشامية في جيل الإخصاب الذاتي الثامن بنظام الداياليل النصف كامــل لتعطي ٢٨ هجين بمحطة البحوث الزراعية بالجميزة للموسم الزراعي ٢٠٠٩م.
- تم تقييم الــــ ٢٨ هجين فردي الناتجة مع أثنين من الهجن التجارية وهما (هــــ ف ١٦٢ ، هــــ ف ١٦٦) في محطتي البحوث الزراعية بالجميزة وملوي للموسم الزراعي الصيفي ٢٠١٠ وأخذت القراءات التالية وهي. عدد الأيام حتى ظهور ٥٠ % حرايرٍ، ارتفاع النبات سم، ارتفاع الكوز سم، المقاومة لمرض الذبول المتــأخر (%) حيث تم تحويلها بطريقة(الــ Arcsine)، ومحصول الحبوب (مليون جرام\هكتار)، طول الكوز ســم، قطر الكوز سم، عدد الصفوف بالكوز، عدد الحبوب بالصف الواحد، وزن الــــ ١٠٠ حبه بالجرام) وتم تحليل البيانات وراثيا تبعا للطريقة الرابعة الموديل الأول للعالم جرفنج ١٩٥٦ الموديل الثابت وكانت النتائج كالتالي:

١. التباين الراجع إلى المواقع كان معنويا لمعظم الصفات المدروسة ما عدا صفة عدد الأيام حتى ظهور ٥٠% للحراير.
٢. التباين الراجع إلى الهجن ومجزئاتها وهي كلا من القدرة العامة والخاصة على الائتلاف كان معنوياً لمعظــم الصفات المدروسة وكذلك التفاعل بينها وبين المواقع أظهر فروقاً معنوية أيضاً.
٣. أظهر التباين المضيف أكثر أهمية فى وراثة الصفات المدروسة وكذلك التفاعل بينها وبين المواقــع لمعظــم الصفات المدروسة مقارنة بالتباين الغير مضيف
٤. أظهرت السلالة (جميزة ١٣٤٣) تأثرات معنوية مقبولة وجيدة لصفة المقاومة لمرض الذبول المتأخر وطول الكوز وعدد الحبوب فى الصف و محصول الحبوب كما أظهرت السلالتين جميــزة١٣٤٠ وجميــزة١٣٤٥ تأثيرات معنوية ومقبولــــة لصفة عدد الأيام حتى ظهور ٥٠ % حراير (نحو التبكير).
٥. أظهر الهجينين الفرديين الجديدين وهما ٢ × ٥ و ٢ × ٧ (١١,٥٩– ١١,٣٦ مليون جرام لكل هكتــار) تفوقا معنويا لمحصول الحبوب وذلك بالنسبة للهجين الفردى التجارى ١٦٢ (٨,٩٧ مليون جرام /هكتــار) بينما تفوق الهجين ٢ × ٥ معنويا على الهجين الفردى التجارى ١٦٦ (٩,٤٨ مليون جرام/هكتار)..
٦. تعتبر هذه الهجن مبكرة و متفوقة محصوليا وذات تراكيب وراثية مبشرة وجيدة ويمكن استخدامها في برنامج الذرة الشامية

مجلد المؤتمر السابع لتربية النبات– الإسكندرية ٤–٥ مايو ٢٠١١

المجلة المصرية لتربية النبات ١٥ (٢): ١٢٧– ١٣٦ (عدد خاص)