J. Agric. Sci. Mansoura Univ., 27(11): 7203 - 7213, 2002

DIALLEL ANALYSIS OF SOME AGRONOMIC TRAITS OF MAIZE

Nawar, A. A.[1]; S.A. El-Shamarka[1] and E.A. El-Absawy[2]
1 Agronomy Dept. Minufiya University.
2 Genetic Engineering and Biotechnology, Research Institute, Minufiya University.

ABSTRACT

This investigation aimed to study combining ability and heterosis through a half diallel cross mating design in Gemiza maize population using six S_5 parental lines to produce fifteen crosses. The data were recorded on ten quantitative characters i.e. grain gield/ plant, ear length, ear diameter, number of rows/ear, number of kernels/ row, 100- kernel - weight, plant height, ear height, tasseling date, and silking date. Combining ability were estimated according to Griffing's procedure (1956). Method-4 - model-I.

The results showed that, Generally, the best crosses (G2 x G6), (G3 x G4) and (G3 x G5) for grain yield/ plant and its components, and towards earliness; and crosses (G2 x G4) and (G4 x G5) for plant height (towards shortness and ear height (twards low ear placement) Genotypes mean squares showed highly significant differences for all studied traits. Significant estimates of specific combining ability (S.C.A.) along with insignificant (G.C.A.) variances were detected for grain yield/plant, ear length, ear diameter, number of kernel/row, 100-kernel-weight and plant heights, revealing that non-additive type of gene action was the more important part of the total genetic variability for these traits. For other traits i.e, silking and tasseling dates exhibited high G.C.A./ S.C.A. ratios which exceeded the unity indicating the predominance of additive gene action in the inheritance of such traits.Desirable significant (G.C.A.) effects (gi) were obtained by G3 and G5 for number of rows/ ear; G4 for plant height, G5 for ear height (towards shortness); and G3 and G4 for tasseling and silking dates (towards earliness). Estimates of specific combining ability (S.C.A) effects (Sīj). Generally, the best crosses were (G3 x G4), (G2 x G5), and (G1 x G6) these crosses may be of prime importance in breeding programmes for hybrid maize production providing that the additive genetic system present in the good combiner as the complementary and epistatic effects that act in the same direction to reduce undesirable plant characteristics and maximize the character in view. The crosses showed non-significant heterotic effects either positive or negative values for the check variety (Sc. 129) where the heterotic values ranged from (6. 18% to 18.77%) positive values and (-2. 56% to 37.49%) negative values.

INTRODUCTION

The diallel mating design has been used and abused more extensively than any other in maize and other plant species. The design can be useful if properly analyzed and interpreted. Although extensive theoretical research and discussion have been represented, the main problem seems to arise from interpretations and inferences that can be made about estimates obtained from analysis of the diallel crosses (Hallaur and Miranda 1981).

Mukherjee and Dhawan, (1970), Murthy *et al.,* (1981). Nawar et al. (1979, 1981 and 1994), El-Absawy (1990) Sedhom (1992, 1994), Sfakianakis *et al.*, (1996), Rabie *et al.*, (1997), Abdel-sattar *et al.*, (1999) El-shamarka, (1999), Bader, (1999), El-Absawy (2000a,b,c) reported the importance of S.C.A (non additive genetic variance in the inheritance of grain yield and its components. On the other hand, Luchsiger *et al.,* (1971), Dhillon and Singh, (1976), Mason and Zuber, (1976), Mynbaev (1976), Younes and Andrew (1978), Hassaballa *et al.* (1980a,b), Nawar and El-Hosary (1985 c). El-Hosary *et al.,* (1990a, 1990b), Beck *et al.*, (1991) Altinbes (1995), Tulu and Ramachandrappa (1998), El-Hosary *et al.,* (1999), Sadek, (2000), and Nigussie and Zelleke (2001), reported that general combining ability variance (additive genetic variance) played the major role in the inheritance of grain yield and some of its components.

The main objectives of this study were: 1) to estimate the type of gene action in Gemiza maize population through a group of S_5 lines and their crosses per se, 2) to estimate the general and specific combining ability variances, 3) to study general and specific combining ability effects of parental S_5 lines and their crosses in Gemize maize population, and 4) to estimate the heterotic values for grain yield/plant through mid and high parent values, and the chech variety (Sc 129).

MATERIALS AND METHODS

This part of the investigation was conducted at Agricultural Research Station of the Faculty of Agricultural Minufiya University at Shebin El-Kom during the normal maize growing season, 2000, 2001 and 2002. Gemiza maize population which was used in this study was developed by Agricultural Research Center (ARC). In 2000 season, 50 ears of S4 from Gemiza maize population were planted and selfed to produce S5 lines.

In 2001 season all possible combinations, without reciprocals were made among six S5 lines. In 2002, season, 15 hybrids were planted and evaluated in randomized complete block design with three replications. Each entry was represented by three rows, 6m. long and 70 cm. apart with three kernels per hill on one side of the ridge. The seedlings were thinned to one plant per hill. Normal agricultural practices of maize were followed during the growing season. Data were measured on grain yield/plant, ear length, ear diameter, number of rows/ ear, number of kernels/row, 100-kernel-weight, plant height, ear height, tasseling date and silking date. Random samples of 10 guarded plants in each plot were taken to measure the previous traits. Grain yield/plant was adjusted based on 15.5% moisture and shelling percentage, general ad specific combining ability estimates were estimated by using Griffing's (1956) procedure, Method-4, Model-1 (fixed model).

RESULTS AND DISCUSSION

I- Mean performances:

Mean performances of fifteen single crosses resulted from six S_5 lines of Gemiza maize population are presented in Table (I).

Table (1): Mean performance of 15 genotypes resulted from six S_5 lines of Gemiza maize population:

Characters / Genotypes	Grain yield/plant (gm)	Ear length (cm.)	Ear diameter (cm.)	No. of rows/ear	No. of kernels /row	100-kernel-weight (gm.)	Plant height (cm.)	Ear height (cm.)	Tasseling date (days)	Silking date (days)
G1×G2	145.75	17.27	5.00	11.43	30.20	31.61	177.98	69.35	67.67	69.67
G1×G3	117.21	17.07	4.87	12.13	31.57	28.13	179.15	74.32	66.33	68.33
G1×G4	163.68	18.40	5.00	11.40	33.50	30.20	182.65	70.80	64.00	66.00
G1×G5	174.02	18.27	4.67	12.27	31.27	35.28	184.32	72.38	66.00	68.00
G1×G6	200.88	20.53	4.97	10.97	35.13	36.79	203.19	84.94	65.00	67.00
G2×G3	182.70	18.27	4.80	12.40	36.00	29.87	194.47	82.87	64.67	66.67
G2×G4	146.89	17.67	5.47	12.33	33.27	25.06	157.52	64.17	65.00	67.00
G2×G5	199.08	20.00	5.20	12.40	36.13	35.33	182.44	76.15	64.00	66.00
G2×G6	201.50	20.93	5.00	11.60	38.80	33.45	219.55	89.44	66.00	68.00
G3×G4	222.69	21.00	5.33	12.40	35.27	38.94	192.79	82.63	60.00	62.00
G3×G5	155.81	18.27	5.07	13.73	37.27	30.75	180.10	72.96	63.67	65.67
G3×G6	133.10	17.73	4.73	13.07	28.73	32.54	173.93	68.22	63.67	65.67
G4×G5	137.83	16.40	5.00	12.43	28.40	30.64	171.05	65.94	64.67	66.67
G4×G6	170.75	17.45	4.70	13.13	26.73	28.72	175.70	85.66	67.67	69.67
G5×G6	165.65	20.07	5.50	12.80	30.60	30.41	177.54	73.78	68.67	70.67
L.S.D.0.05	54.53	2.18	0.48	1.65	6.37	6.72	30.01	15.04	2.82	2.82
L.S.D.0.01	73.56	2.94	0.65	2.23	8.60	9.06	40.49	20.29	3.80	3.80

For grain yield/plant, ear length, number of kernels/row, l00 –kernel-weight, and earliness, the best crosses were (G2 x G6), (G3 x G4) where they showed the highest mean values. The best crosses were (G5 x 6) and (G2 x G4); for ear diameter, (G3 x G5) and (G4 x G6) number of rows/ear. For plant and ear heights the best crosses exhibited dwarfism were (G2 x G4) and (G4 x G5).

Generally, the best crosses (G2 x G6), (G3 x G4) and (G3 x G5) for grain yield/ plant and its components, and towards earliness; and crosses (G2 x G4) and (G4 x G5) for plant height (towards shortness and ear height (twards low ear placement)

II- Analysis of variance:

The analysis of variance for the resulted crosses are presented in Table (2).

Genotypes mean squares showed highly significant differences for all studied traits. These results indicated that the behavior of the tested genotypes varied from each other. The same results were agreement with those obtained by El-Hosary *et al.* (1988); Nawar *et al.* (1990); Abdel-sattar *et al.* (1999), El-Hosary *et al.* (1999) and EL-Absawy (2000a, b,c). Significant specific combining ability (S.C.A) along with insignificant (G.C.A.) variances were detected for grain yield/plant, ear length, ear diameter, number of kernel/row, 100-kernel-weight and plant heights, revealing that non-additive type of gene action was the more important part of the total genetic variability for these traits. For other traits i.e, silking and tasseling dates exhibited high G.C.A./ S.C.A. ratios which exceeded the unity indicating the predominance of additive gene action in the inheritance of such traits.

These results are in hormony with that reported by Nawar *et al.* (1979, 1980, 1981 and 1994); and Sedhom (1992). Rabie *et al.* (1997); Abdel-Sattar *et al.* (1999); (El-Absawy 2000c); and EL-Shamarka (1999) for grain yield; Kalsy and Sharma (1970), Nawar *et al.* (1981); Sedhom (1992), Rabie *et al.* (1997); and Abdel-Sattar *et al.* (1999) for ear diameter, number of Kernels/ row, 100-kernel-weight; and El-Absawy (2000c) for grain yield/ plant, ear length, number of kernels/row number of rows/ ear, 100-kernel-weight; and ear height, they found dominance gene effects were more important than additive ones.

III. General and specific combining ability effects:

General combining ability effects (gi) for all traits of the parents resulted from Gemiza maize population are tabulated in Table (3). Desirable significant (G.C.A.) effects (gi) were obtained by G3 and G5 for number of rows/ ear; G4 for plant height, G5 for ear height (towards shortness); and G3 and G4 for tasseling and silking dates (towards earliness).

Estimates of specific combining ability (S.C.A) effects (Sîj) for the studied characters are presented in Table (4). Most of the studied traits showed desirable and significant (S.C.A.) values were detected in crosses (G1 x G6), (G2 x G5), (G3 x G4), (G1 x G2), (G1 x G4), (G2 x G4), (G2 x G6), (G3 x G5), (G4 x G5), (G4 x G6) and (G5 x G6) for grain yield/plant and some of its components; for plant growth habits (towards shortness) the crosses

Table (2): Observed mean squares for ordinary analysis and combining ability for all studied traits in diallel cross.

S.O.V	D.F	Mean squares									
		Grain yield/Plant	Ear length	Ear diameter	No. of rows/ear	No. of kernels/row	100 kernel -weight	plant height	Ear height	Tasseling date	Silking date
Blocks	2	3343.62*	8.25*	0.10	1.85	30.42	13.89	1183.96*	40.86	0.87	0.87
Genotypes	14	2623.14**	6.71**	0.20**	1.61*	38.07**	39.19**	637.51*	181.12**	13.28**	13.28**
G.C.A.	5	698.36	3.29	0.14	3.34*	29.89	11.03	491.72	150.08	17.50**	17.5**
S.C.A	9	3692.47**	8.61**	0.24**	0.65	42.62**	54.84**	718.50**	198.37**	10.93**	10.93**
Error	28	1063.27	1.70	0.08	0.98	14.52	16.14	322.01	80.87	2.84	2.84
K^2G.C.A/K^2.S C.A.		0.19	0.38	0.56	5.18	0.70	0.20	0.68	0.76	1.60	1.60

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

Table (3): Estimates of general combining ability (G.C.A) effects of parental S_5 lines for studied characters resulted from Gemiza population.

Parental S_5 lines	Traits									
	Grain yield/ plant	Ear length	Ear diameter	No. of rows/ear	No. of kernels/ row	100-kernel-weight	Plant height	Ear height	Tasseling date	Silking date
G1	-9.41	-0.39	-0.15	-0.83	-0.66	0.69	2.46	-1.52	0.83	0.83
G2	9.19	0.26	0.09	-0.33	2.53*	-0.98	3.62	1.03	0.42	0.42
G3	-6.92	-0.19	-0.08	0.56*	1.14	0.25	0.75	0.78	-1.83**	-1.83**
G4	0.67	-0.55	0.10	0.05	-1.78	-1.42	-9.44*	-2.17	-1.08*	-1.08*
G5	-1.70	-0.03	0.08	0.53*	-0.16	0.79	-5.50	-4.16*	0.33	0.33
G6	8.18	0.90*	-0.05	0.02	-1.07	0.67	8.11	6.04	1.33	1.33
L.S.D. 0.05 (gi)	N.S	N.S	N.S	0.53	2.06	N.S	9.68	4.84	0.91	0.91
L.S.D. 0.01 (gi)	N.S	N.S	N.S	0.53	2.77	N.S	13.07	6.55	1.23	1.23
L.S.D.(gi-gj) 0.05	N.S	1.09	N.S	0.83	3.19	N.S	15.00	7.52	1.41	1.41
L.S.D. (gi-gj) 0.01	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	1.90*	1.90

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

Table (4): Estimates of (S.C.A) pecific combining ability effects for all characters Studied of Gemiza maize population.

Genotypes	Traits									
	Grain yield/plant	Ear length	Ear diameter	No. of rows/ear	No. of kernels/row	100-kernelweight	plant height	Ear height	Tasseling date	Silking date
G1×G2	-21.86*	-1.22*	0.04	0.29	4.53**	0.05	-11.59*	-5.73*	1.28*	1.28*
G1×G3	-34.30*	-0.97*	0.07	0.10	-1.77	-4.66**	-7.55	-0.52	2.20**	2.20**
G1×G4	4.59	0.72	0.03	-0.13	3.08*	-0.92	6.14	-1.08	-0.88	-0.88
G1×G5	17.29	0.07	-0.29*	0.26	-0.78	1.95	3.88	2.49	-0.30	-0.30
G1×G6	34.28*	1.40*	0.15	-0.53	4.00*	3.58*	9.13	4.84	-2.30*	-2.30**
G2×G3	12.60	-0.42	-0.24*	-0.13	-0.52	-1.25	6.61	5.49*	0.95	0.95
G2×G4	-30.80*	-0.66	0.26*	0.32	-0.34	-4.39*	-20.16*	-10.27*	0.53	0.53
G2×G5	23.76*	1.15**	0.01	-0.10	0.90	3.67*	0.83	3.71	-1.88*	-1.88*
G2×G6	16.30	1.15**	-0.06	-0.38	4.49**	1.92	24.32**	6.79*	-0.88	-0.88
G3×G4	61.11**	3.12**	0.29*	-0.51	3.05*	8.27**	17.99*	8.44*	-2.22**	-2.22**
G3×G5	-3.41	-0.14	0.04	0.34	3.43*	-2.14	1.37	0.77	0.03	0.03
G3×G6	-35.99*	-1.60**	-0.16	0.19	-4.19*	- 0.22	-18.42*	-14.18**	-0.97*	-0.97*
G4×G5	-28.97*	1.65**	-0.20*	-0.45	-2.52*	-0.59	2.50	-3.30	0.28	0.28
G4×G6	-5.92	1.53**	-0.37**	0.77	-3.27*	-2.38*	-6.47	6.21*	2.28**	2.28**
G5×G6	-8.66	0.57	0.45**	-0.05	-1.03	-2.90*	-8.56	-3.67	1.87*	1.87*
L.S.D.0.05(Sij)	29.87	1.19	0.27	N.S	3.49	3.68	16.44	8.24	1.54	1.54
L.S.D.0.01(Sij)	40.29	1.61	0.36	N.S	4.71	4.96	22.17	11.11	2.08	2.08
L.S.D.0.05(Sij-Sik)	47.22	1.89	0.42	N.S	5.52	5.82	25.99	13.02	2.44	2.44
L.S.D.0.01(Sij-Sik)	63.71	2.55	0.57	N.S	7.44	7.85	35.06	17.57	3.29	3.29
L.S.D.0.05(Sij-Skl)	38.56	1.54	0.34	N.S	4.51	4.75	21.22	10.63	1.99	1.99
L.S.D.0.01(Sij-Skl)	52.03	2.08	0.46	N.S	6.08	6.41	28.63	14.35	2.69	2.69

(G1 x G2), (G2 x G4) and (G3 x G6); for the tasseling and silking dates the crosses (G1 x G6), (G2 x G5), (G3 x G4) and (G3 x G6), (towards earliness).

Generally, the best crosses were (G3 x G4), (G2 x G5), and (G1 x G6) these crosses may be of prime importance in breeding programmes for hybrid maize production providing that the additive genetic system present in the good combiner as the complementary and epistatic effects that act in the same direction to reduce undesirable plant characteristics and maximize the character in view. These results were partially agreement with those obtained by (El-Absawy 2000a).

IV- Heterosis:

Data for heterotic effects for grain yield/plant relative to high parent, mid parent and check variety (Sc. 129) are calculated in Table (5). The crosses showed non-significant heterotic effects either positive or negative values for the check variety (Sc. 129) where the heterotic values ranged from (6. 18% to 18.77%) positive values and (-2. 56% to 37.49%) negative values.

Table (5): percentage of useful heterosis over to check variety (Sc. 129) for the grain yield per plant at Gemiza maize population:

Characters / Genotypes	Grain yield / plant Check variety (Sc. 129)
G1×G2	-22.27
G1×G3	-37.49
G1×G4	-12.70
G1×G5	-7.19
G1×G6	7.14
G2×G3	-2.56
G2×G4	-21.66
G2×G5	6.18
G2×G6	7.47
G3×G4	18.77
G3×G5	-16.90
G3×G6	-29.01
G4×G5	-26.49
G4×G6	-8.93
G5×G6	-11.65

REFERENCES

Abdel-Sattar, A.A; A.A. EL- Hosary, and M. H. Motawea, (1999). Genetic analysis of maize grain yield and its components by diallel crossing, Minufiya J. Agric. Res., 24 (1):43-63.

Altinbes, M. (1995). Heterosis and combining ability in maize for grain yield and some plant characters. Anadolu, 5 (2): 35-51 (c.f Plant Breed. Abst, 66,4716,643,1996).

Bader, M. M.H. (1999). Genetical studies on corn (Zea mays,L.). Ph. D. Thesis Fac. of Agric. Moshtohor Zagazig Univ.

Beck, D.L.; S. K. Vasal and J. Crossa, (1991). Heterosis and combining ability among subtropical and temperate intermediate maturity maize germplasm. Crop Sci., 31: 38-73.

Dhillon, B.S. and J. Singh, (1976). Diallel analysis of yield and other traits of maize varieties –Sabrao J.,B: 147-152.

El-Absawy, E.A. (1990). Comparison between some experimental genetic designs in two populations of maize. Ph.D. Thesis Fac. of Agric. Moshtohor Zagazig Univ.

El-Absawy, E.A. (2000a). Evaluation of some new inbred lines and their crosses of maize to general and specific combining abilities under two nitrogn levels. Proc 9th Conf. Agron, Minufiya, Univ., 223-237.

El-Absawy, E.A (2000b). Effects of nitrogen fertilizer levels on combining abilities and heterotic effects of maize. Proc 9th Conf. Agron, Minufiya, Univ., 225-239.

El-Absawy, E.A. (2000c). Combining ability and heterosis estimates in four sets of diallel crosses of maize. Proc 9th Conf. Agron, Minufiya, Univ., (257-278)

EL-Hosary A.A.; H.A. Dawwam, and Hendawy, F.A. (1988). Diallel analysis of some quantitative traits in nine inbred lines of maize. Annals of Agric.Sc., Moshtohor, vd. 26 (2) 969-979.

El-Hosary, A. A.; G.A. Sary and A.A. Abdel- Sattar (1990a). Studies on combining ability and heterosis in maize (*Zea mays*, L.). II. Yield and yield components. Egypt. J. Agron., 15 (1-2): 9-22.

EL-Hosary, A.A.; G.A. Sary and A.A. Abdel-Sattar, (1990b). Studies on combining ability and heterosis in maize (*Zea mays*, L.). I. Growth attributes. Egypt. J. Agron., 15 (1-2): 23-34.

EL-Hosary, A.A.; Abdel- Sattar, A.A. and M.H. Motawea, (1999). Heterosis and combining ability of seven inbred lines of maize in diallel crosses over two years. Minufiya J. Agric. Res., 24(1): 65-84.

EL-Shamarka Sh. A (1999). Estimates of genetic effects of some quantitative attributes of maize (*Zea mays*,L.). Egypt- J. plant Breed, 3: 101-113.

Griffing, B. (1956). Concept of general and specific combing ability in relation to diallel crossing system. Australian, J. Biol. Sci., 9: 463-493.

Hallauer, A.R., and J.B. Miranda- Fo, (1981). Quantitative genetics in maize breeding. Iowa State Univ., Press, Amess. U.S.A. First edition.

Hassaballa, E.S; M.A. El-Morsheidy; M. A. Khalifa, and EM. Shalaby (1980a). Combining ability analysis in maize. I. Flowering dates. Rescarch Bulletin, Fac. of Agric. Ain Shams Univ., No. 1291, 8pp. Egypt.

Hassaballa, E.S; M.A. El-Morsheidy; M. A. Khalifa, and M.M. Abdallah (1980b). Genetical analysis of diallel crosses in maize II. Plant and ear height. Research Bulletin, Fac. of Agric. Ain Shams Univ., No 1294, 8pp Egypt.

Kalsy, H.S and D. Sharma (1970). Study of genetic parameters and heterotic effects in crosses of maize (Zea mays, L.) varieties with varying chromosome knob numbers. Euphytica, 19: 522- 530.

Luchsinger, L.A.; M.A,.V. Violic and B.R. Burnier, (1971). General and specific combing ability for yield and its components in ten lines of maize (*Zea mays*, L.) Agric. 31: 144-150. Faculted de Aagronomia Universidad de Child, Santiago. (C.F. plant breed . Abst, 43, (4): 2633, 1973).

Mason, L., and M.S Zuber, (1976). Diallel analysis of maize for leaf angle, leaf area, yield, and yield components. Crop Sci. 16: 693-696.

Mukherjee, B.K., and N.L. Dhawan, (1970). Genetic studies in varieties of maize. I. Genetic analysis of grain yield and other quantitative characters. Inkushuhaku Zasshi/ Jap. J. Breed. 20 (1): 47-5l (C.F. plant breed. Abst. 999, 1971).

Murthy, A.R.; N.B.K ajjari and J.V. Gound, (1981). Diallel analysis of yield and maturity components in maize. Indian J. Genetics Plant Breed.Abst., 41(1) 30-33.

Mynbaev, T.T., (1976). Single hybrids of maize. Referativnyi Zhurnal, 2.55. 195 . (C.F. Plant breed. Abst., 47(9): 8385, 1977).

Nawar A.A. and El-Hosary (1985a). A comparison of two experimental diallel cross design. Minufiya J. of Agric. Res. 10, (4): 2019-2039.

Nawar A.A. and El-Hosary (1985b). Hybrid vigor and combining ability in inbred lines of corn (*Zea mays*, L.) 2nd Agric. Corn. Bot. Sci. 21-24 sept. 1985. 234:244.

Nawar A.A. and El-Hosary (1985c). General vs Specific Combining ability in top crosses of maize (*Zea mays*, L.) 2nd Agric. Corn. Bot. Sci , 21-24 sept 1988: 222-232.

Nawar A.A.; M.E. Gomaa and M.S. Rady (1979). Heterosis and combining ability in maize. Egypt. J. Genet. Cytol, 9: 255- 269.

Nawar, A.A.; A.A. Abul- Naas and M.E. Gomaa (1981). Heterosis and general vs. specific combining ability among inbred lines of corn. Egypt. J. Genet. Cytol., 10:19-29.

Nawar A.A; K.M. EL- Sayed; A.N.M. Khalil and M. E. Ibrahim (1990). Variability of the heterotic effects in diallel maize hybrids under nitrogen fertilizer levels. Annals of Agric.Sci., Moshtohor Zagazig Univ., 28 (1): 115-130.

Nawar A.A.; MI. Dawood; Sh. A. El-Shamarka and A. M. Shehata (1994). Heterosis and combining ability for some new inbred lines of maize (*Zea mays*,L.)in different levels of self generations. Minufiya J. Agric.Res., 19 (26):1023-1035.

Nigussie, M., and H.zelleke (2001), Heterosis and combining ability in a diallel among eight elite maize populations. African Crop Science Journal, 9 (3): Nazret Research Canter P.O. Box 436. Nazareth, Ethiopia.

Rabie, H. A., A.R. Alkaddoussi and S. Th.M.Mousa (1997). Diallel analysis of some physiochemical characters and grain yield under two different locations in maize (*Zea mays*,L.) Zagazig J. Agric. Res. 4: 615-626.

Sadek, M. S. El. (2000). Utilization of modern genetic techniques in studing Resistance of maize to common smut disease. Msc. Thesis, Minufiya Univ.

Sedhom, S.A (1992). Development and evaluation of some new. inbred lines of maize. Proc. 5 th Conf. Agron. Zagazig Univ., 269-280.

Sedhom, S.A, (1994). Genetic analysis of diallel crosses in maize (*Zea mays*, L.) over two years. Annals of Agric. Moshtohor, 32 (1): 95-107.

Sfakianakis, J.,N. Fotiadis, G.Evgenidis and N.Katranis, (1996). Genetic analysis of maize variety diallel crosses and related populations. Maydica 41: 113-117. (C.F. Plant breed Abst.66,11323,1547).

Tulu, L. and Bk. Ramachandrappa (1998). Combining ability of some traits in a seven parent diallel cross of selected maize (Zea mays, L.) population, Crop Research. Hisar Ethiopia, 15 (2-3): 232 - 237.

Younes, M.H., and R.H. Andrew, (1978). Productivity and prolificay in a diallel series of market sweet cron hybrids. Crop. Sci., 18: 224-226.

تحليل الهجن التبادلية لبعض الصفات المحصولية للذرة الشامية

عبد الحميد أحمد نوار[1] – شعبان أحمد الشمارقة[1] – السيد عبد الخالق العبساوى[2]
١– قسم المحاصيل –كلية الزراعة– جامعة المنوفية.
٢– معهد الهندسة الوراثية والتكنولوجيا الحيوية – مدينة السادات – جامعة المنوفية.

تم إجراء هذا البحث بهدف دراسة نظام الهجن التبادلية فى اتجاه واحد لعدد ستة سلالات ملقحه ذاتيا لمدة خمسة أجيال فى عشيرة من الذرة الشامية – (جميزة) وقد نتج من التهجين خمسة عشر هجينا ثم تحليل الصفات المحصولية بطريقة جريفنج ١٩٥٦ الطريقة الرابعة – الموديل الثابت لدراسة قوة الهجين والقدرة على التآلف العامة والخاصة وكانت الصفات تحت الدراسة هى محصول النبات الفردي من الحبوب، طول الكوز، قطر الكوز، عدد الحبوب فى الصف، عدد السطور بالكوز، وزن ١٠٠ حبة، طول النبات، ارتفاع الكوز على النبات، ميعاد التزهير للنورة المذكرة وميعاد التزهير للنورة المؤنثة. حيث زرعت الهجن الناتجة بنظام القطاعات الكاملة العشوائية فى ثلاث مكررات وكانت الناتج كالتالي:

١) أظهرت قيم المتوسطات أن الهجين (جميزة ٢ × جميزة٦) و (جميزة ٣ × جميزة٤) و(جميزة ٣ × جميزة٥) حازت على أعلى قيم للمتوسطات بالنسبة لصفات محصول الحبوب للنبات الفردي ولصفات مكونات المحصول وبالنسبة لصفات التبكير والهجن (جميزة –٢ × جميزة–٤)، (جميزة –٤ × جميزة–٥) لارتفاع النبات القصير وارتفاع الكوز المنخفض.

٢) كانت تباينات متوسطات التراكيب الوراثية عالية المعنوية لكل الصفات المدروسة.

٣) كانت تباينات القدرة العامة على الائتلاف معنوية لصفة عدد الصفوف فى الكوز وغير معنوية لصفات محصول الحبوب للنبات الفردى وطول الكوز وقطر الكوز وعدد الحبوب فى السطر ووزن المائة حبة وارتفاع النبات دلالات على أن فعل الجين السيادى هو المتحكم فى وراثة هذه الصفات بينما كانت بقية الصفات مثل ميعاد التزهير للنوره المذكرة والنورة المؤنثة قد أظهرت أن النسبة بين القدرة العامة إلى القدرة الخاصة على الائتلاف أكبر من الوحدة مما يدل على أن فعل الجين الإضافى هو المتحكم فى هذه الصفات تجاه التبكير.

٤) كانت نباتات القدرة الخاصة على الائتلاف معنوية لكل الصفات المدروسة عدا صفة عدد الصفوف بالنسبة للكوز.

٥) كانت تأثيرات القدرة العامة على الائتلاف معنوية ومرغوبة بالنسبة للسلالات الأبوية جميز–٣ وجميزة ٥ بالنسبة لصفة عدد الصفوف فى الكوز وجميزه ٢ وجميزة ٣ وجميزة ٤ لمعيادى التزهير تجاه التبكير

٦) أظهرت النتائج بالنسبة لتأثيرات القدرة الخاصة على الائتلاف أن أحسن هجين لتحسين صفة المحصول وطول الكوز وقطر الكوز وعدد الحبوب فى الصف ووزن ١٠٠ حبة وميعادي التزهير تحقق فى الهجين (جميزة –٣ × جميزة –٤) (وجميزة –٢ × جميزة –٥) (وجميزة –١ × جميزة٦). وبالنسبة للارتفاع النبات وميعادى التزهير كان الهجين (جميزة ٣ × جميزة ٦) وبالنسبة للهجين (جميزة ١ × جميزة ٢) و (جميزة ٢ × جميزة ٤) للارتفاع النبات وارتفاع الكوز على النبات.

٧) أظهرت النتائج أن قوة الهجين على أساس الأب الثابت (هجين فردى – ١٢٩). قد تراوحت بين ٦,١٨% إلى ١٨,٧٧%.