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GENETIC ASPECTS OF COMBINING ABILITY IN A DIALLEL CROSS AMONG OLD AND NEW COTTON VARIETIES CULTIVATED IN FAYOUM

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ABSTRACT

Five Egyptian cotton genotypes were crossed in a diallel pattern (without reciprocal) and their 10 F_1's and 10 F_2's hybrids were evaluated during 2005, 2006 and 2007 summer seasons. The data obtained generally revealed that there were noticeable differences between the varieties as for their positive significant general combining ability (GCA) for the studied characters. Correlation coefficients between GCA effects and parental means were significant and positive in most studied traits. The mean performance of the parental variety gave a good indication of intrinsic performance of its GCA effects. Choosing the parental variety for initiating any proposed breeding programme could be practiced either on mean performance or GCA effects basis with similar efficiency, as well as the breeding value of genotype may be determined by its performance. The cotton varieties; Giza 83 (P_4), followed by Giza 85 (P_2) exhibited highly significant or significant GCA effects for most traits. Moreover, Giza 75 (P_1) and Giza 90 (P_5) showed desirable GCA effects in some cases, revealing that these varieties, old and new ones could be considered as good combiners in breeding programs for developing high yielding genotypes. The most pronounced specific combining ability (SCA) effects were found in the crosses i.e. $P_1 x P_2$, $P_1 x P_4$, $P_1 x P_5$, $P_2 x P_4$, $P_2 x P_5$, $P_3 x P_4$, $P_3 x P_5$ and $P_4 x P_5$ and could be considered as promising hybrids for cotton yield and its components. Heterotic and inbreeding depression effects were exhibited for most traits by number of crosses $P_2 x P_5$, $P_1 x P_5$, $P_4 x P_5$, $P_2 x P_4$ and $P_1 x P_3$. The variety Giza 85 (P_2) showed the highest seed cotton yield and boll weight , Giza 83 (P_4) exerted higher mean values among the tested genotypes for lint yield per plant and number of open bolls, Giza 90 (P_5) for lint percentage and Giza 75 (P_1) for both seed index and lint index traits.

Key words: ***Cotton, Gossypium barbadense, Crosses, Combining ability, Heterosis, Inbreeding depression.***

INTRODUCTION

Cotton (*Gossypium barbadense* L.) is one of the most important commercial crops and forms the back of bone Egypt textile industry. Cotton breeders in Egypt has largely used pedigree methods breeding which mainly depend on choosing the parents for intervarietal crosses .Both old and newly released Egyptian commercial cotton varieties are used as parental types in the breeding programs .As for Fayoum region,it was known that the varieties; Giza 75 , Giza 85 , Giza 81 were cultivated since 1975and replaced by the varieties Giza 83 and Giza 90. However, most of the old varieties proved to be good combiners as judged by their ability to transmit high yield to their progenies and were employed in crosses to develop new promising cotton varieties.

Saravanan and Gopalan (2003) and Reddy and Satyanarayana (2004) reported that, choice of suitable parents for hybridization and adoption of proper breeding procedure are very important in any crop improvement programme. Information on the nature of combining ability as a powerful tool to discriminate between good and poor general combiners and for choosing appropriate parental lines to produce superior hybrids, is considered very essential before beginning any breeding program.

Abo El-Zahab and Amein (2000 a and b) found, significant general (GCA) and specific(SCA) combining abilities and heterotic effects for seed cotton yield per plant, boll weight, lint percentage , lint index and seed index. Sorour *et al* (2000) indicated desirable heterosis relative to mid-parents for seed cotton yield per plant, lint yield per plant , lint percentage, boll weight and seed index .

El-Adl *et al* (2001) elucidated that, the mean squares of GCA were larger in magnitude than for SCA and showed highly significant values for the number of bolls per plant, boll weight, lint percentage, seed and lint indices and seed cotton and lint yields per plant .Heterosis and inbreeding depression , each the converse of the other, are both expression of the same phenomenon . Further, the expression of heterosis in F_1 was followed by considerable reduction in F_2 performance (inbreeding depression) . The high level of heterosis and the presence significant breeding depression suggest that a major portion of the genetic effects are non-additive . The over-dominance in F_2 generation might be due to the presence of linkage in F_1 or a change in environment in the F_2 . The upward estimate of dominance in F_2 was probably due to linkage (Moll *et al* 1963).

Abdel–Zaher *et al* (2003) elucidated significant heterosis relative to mid- parents and inbreeding depression for some yield components studied. Mosalem *et al* (2003) found that SCA values were significant and positive for seed cotton and lint yield traits. Therefore, the objectives of this study were; to estimate the general and specific combining ability, heterosis, inbreeding depression effects and their variance and to obtain the individual variances of general and specific combining abilities associated with each parents.

MATERIALS AND METHODS

The present study was carried out at the experimental Farm of the Faculty of Agriculture, El-Fayoum Univ., during the three successive growing seasons of 2005, 2006 and 2007. Plants grown from selfed seeds of five old and new cotton different genotypes were selected and crossed in a diallel mating excluding reciprocal in 2005 summer season. Artificial self pollination was conducted on 10 F_1's to produce F_2's in 2006 season. In the following season of 2007, 25 entries comprising 5 parents, 10 F_1's and F_2's were sown on 15 March .The experimental lay out was a randomized complete block design, with three replications. Plot size was one row, 0.60 m. wide x 4 m. long (17 plants spaced 25 cm. within the row). Restricted randomization was applied where single rows of F_1 and F_2 of specific cross combinations were surrounded by its two respective parents. The used parents are presented in Table (1).

Table 1. Pedigree and Year release of the cotton varieties used.[1]

Genotypes	Origin	Year release
Giza 75 (p_1)	Giza 67x Giza 69	1975
Giza 85 (p_2)	Giza 67 x C.B.58	1993
Giza 81(p_3)	Giza 67x (A 5844)	1983
Giza 83 (p_4)	Giza 72x Giza 67	1992
Giza 90 (p_5)	Giza 83 and Dandara	2000

(1) Cotton Research Institute, Agric. Res. Center, Ministry of Agric., Giza, Egypt.

The cultural practices were applied as recommended for cotton production in Fayoum region. Ten individual random guarded plants were mentored and tagged to collect data. The studied traits were; seed cotton yield per plant (SCY/P), lint yield per plant(LY/P), number of bolls per plant (No B /P), boll weight (BW) , lint percentage (L%), seed index (SI) and lint index (LI). Estimates of both GCA and SCA were computed according to Griffing (1956) method 2 model 1. Forms of analyses was as given by Griffing (1956) and Singh and Chaudhary (1979) were applied. Heterosis was expressed as percentage increase of F_1 above mid-parents (M.P%) and inbreeding depression (I.D.%) as the percentage reduction of F_2 below F_1 performance were calculated.

RESULTS AND DISCUSSION

Analysis of variance

The analysis of variance exerted significant differences among entries for each trait in F_1 and F_2 generations (Table 2) due to Parents (P), and genotypes (G) vs parent and their hybrid combinations for cotton yield and its component traits. The significant variation of genotypes indicated that the data are suitable for further analysis by diallel mating procedure as suggested by Griffing (1956). The mean square values of general and specific combining ability for the most studied yield and its contributing variables were highly significant in both F_1 and F_2 generations (Table 2). The relative magnitude of additive to non-additive effects expressed as GCA/SCA ratio, exceeded the unity for traits: seed cotton yield per plant in both F_1 and F_2, boll weight in F_1 and lint percentage in F_2, the exerted values were 1.49, 2.04, 1.02, and 1.58, respectively. While the reminder traits showed less ratios than the unity of GCA/SCA for two generations.

Table 2. Mean squares of data for genotypes, general combining ability, specific combining ability, GCA/SCA ratios, RI and. correlation coefficients for yield and yield components calculated in F_1 and F_2 generations

S.O.V.	S.C.Y/P.		L.Y./P.		No. B. /P.		B.W.		L%		S.I.		L.I.	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
Genotypes (G)	9.04**	6.64**	7.57**	1.09*	5.59**	3.49*	0.11**	0.08*	0.006**	0.002**	0.72**	0.23**	3.35*	0.85
Parents (P)	10.76**	10.76**	1.65*	1.65	2.33	2.33	0.04	0.04	0.001	0.001	0.54*	0.54*	0.67	0.67
Crosses	6.01**	3.19*	7.53**	0.85*	6.47**	1.79	0.15**	0.07	0.007**	0.002**	0.46**	0.05	4.48*	0.93
P vs C	29.34**	21.14	31.56	1.11	10.67	23.51	0.01	0.28	0.011	0.0004	0.07	062	4.02	0.76
GCA	18.93**	15.58**	7.97**	1.23	7.15**	1.39	0.19**	0.05	0.004**	0.003**	0.652**	0.401*	1.27	1.27
SCA	5.08**	3.06*	7.41**	1.05	4.96**	4.33**	0.07**	0.09	0.006**	0.0009*	0.757**	0.165*	4.19**	0.67
Pooled error	0.41	0.84	0.27	0.29	0.46	0.78	0.02	0.03	0.0004	0.0003	0.069	0.042	0.98	0.49
GCA/SCA	1.49	2.04	0.43	0.46	0.57	0.12	1.02	0.26	0.25	1.58	0.344	0.96	0.12	0.76
RI	0.85	0.92	0.54	0.48	0.53	0.29	0.61	0.34	0.31	0.75	0.52	0.72	0.16	0.61
r (p,gca)	0.95**	0.97**	0.71**	0.75**	0.73**	0.89**	0.86**	0.85**	0.39*	0.81**	0.80**	0.99**	0.03	0.67**

* , ** Significance at 5% and 1% levels, respectively.

Generally, the magnitude of GCA mean squares were mostly greater than SCA mean squares indicated that the magnitude of additive and additive x additive genetic effects were considerable in the inheritance of each character than non-additive . On the other hand, low GCA/SCA ratios which showed values less than the unity in some cases indicating the predominance of non- additive gene action. Baker (1978) suggested that the relative importance (RI) of general and specific combining ability in determining progeny performance should be assessed by estimating the components of variance and expressing them in the ratio $2\delta^2gca / 2\delta^2gca^+2\delta^2$ sca. RI values were 0.85, 0.92, 0.61, and 0.75 for SCY/P, in F_1 and F_2 BW in F_1 and L% in F_2, respectively .Correlation coefficients between GCA effects and parental means were strongly positive in the most studied traits and showed values of 0.95,0.97, 0.71, 0.75, 0.73,0.89,0.86 ,0.85,0.80 and 0.99 in the respective following traits; SCY , LY , NB, BW and SI, respectively in the first and second generations. These findings indicated that the mean performance of the parental variety gave a good index of intrinsic performance of their GCA effects, therefore selection among the tested parental cultivars for initiating any breeding program could be practiced either on mean performance or GCA effects basis with similar efficiency, as well as the breeding value of genotype may be determined by its phenotypic performance. These results agreed with those obtained by Reddy and Satyanarayana (2004), Jun *et al* (2006), Khan *et al* (2006) and Esmail (2007).

Combining ability

Estimates of general and specific combining ability effects for the five cotton varieties and their hybrids in yield and its component traits at both generations are shown in Table (3). The results showed high positive values of GCA and SCA effects in the studied yield and its contributing variables. These findings indicated that the cotton varieties; Giza 83 (P_4), followed by Giza 85 (P_2) exhibited highly significant or significant GCA effects for most traits. Moreover, Giza 75 (P_1) and Giza 90 (P_5) showed desirable GCA effects in some cases, revealing that these varieties could be considered as good combiners in breeding programs for developing high yielding genotypes. While, the variety Giza 81(P_3) showed negative GCA effects and considered as poor combiner for the studied traits. Significant or highly significant positive SCA effects were obtained for seed cotton yield per plant by the crosses; P_1 x P_2, P_1 x P_4, P_1 x P_5, P_3 x P_5 and P_4 x P_5 in F_1 . Further, desirable SCA effects for SCY/P and L % were exerted by three crosses; P_2 x P_4, P_2 x P_5 and P_3 x P_4 in F_1. The pronounced SCA effects were detected by the cross P_1 x P_5 in the two generations for boll weight trait. Concerning seed index, estimates of SCA effects were significant and

Table 3. Estimates of general and specific combining ability effects for yield and yield component traits in F_1 and F_2 generations.

Genotypes	S.C.Y/P.		L.Y./P.		No. B. /P.		B.W.		L%		S.I.		L.I.	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
P1	0.354**	0.108	-0.421**	0.013	0.267	0.114	-0.027	-0.012	-0.016*	-0.001	0.296**	0.183**	-0.274	0.094
P2	0.633**	1.051**	-0.126	-0.363**	-0.829**	-0.076	0.171**	0.087*	-0.009*	-0.022**	-0.002	0.107*	-0.096	-0.425**
P3	-1.591**	-1.326**	-0.654**	-0.068	-0.305*	-0.409*	-0.064*	-0.031	-0.002	0.013**	-0.029	-0.119**	-0.135	0.207
P4	0.731**	0.285	0.898**	0.275*	0.695**	0.114	-0.052*	0.008	0.018*	0.005	-0.120*	-0.049	0.331	0.098
P5	-0.127	-0.118	0.303**	0.142	0.171	0.257	-0.028	-0.052	0.010*	0.006	-0.000	-0.122**	0.174	0.025
$P_1 \times P_2$	0.779*	0.012	-0.244	-0.401	0.539	0.651	-0.041	-0.119	-0.011	-0.011	-0.278*	-0.497**	-0.624	-0.671
$P_1 \times P_3$	0.070	-0.735	0.484	0.269	1.349**	-0.015	-0.183**	-0.065	0.012	0.017	0.976**	-0.105	0.345	0.227
$P_1 \times P_4$	1.398**	-0.752	0.198	-0.973**	0.349	-1.206*	0.027	0.156	-0.011	-0.022*	-0.029	-0.091	-0.412	-0.621
$P_1 \times P_5$	1.502**	0.017	-0.673*	-0.206	-0.460	-1.683**	0.160*	0.325**	-0.033*	-0.006	0.302*	0.055	-0.797	-0.158
$P_2 \times P_3$	0.434	0.005	-0.577	0.412	0.445	-0.492	-0.051	0.102	-0.021*	0.011	0.001	-0.049	-0.790	0.176
$P_2 \times P_4$	0.255	-1.541**	1.136**	-0.630*	-1.222**	-1.349**	0.220**	0.150	0.026*	-0.004	0.192	-0.169	0.729	-0.185
$P_2 \times P_5$	-0.796*	-0.356	2.698**	-0.130	-1.032**	-0.492	0.119	0.050	0.090**	-0.002	0.184	0.094	2.471**	-0.064
$P_3 \times P_4$	-0.374	-0.798	1.932**	0.674*	0.587	-1.016*	-0.119	0.135	0.665**	0.031**	0.056	0.003	1.552**	0.652
$P_3 \times P_5$	1.314**	-0.189	-0.139	-0.125	0.444	0.508	0.001	-0.118	-0.021*	0.001	0.345*	0.013	-0.399	-0.191
$P_4 \times P_5$	1.128**	-0.510	1.108**	-0.002	2.450**	-0.015	-0.254**	-0.054	0.016	0.007	0.312*	-0.083	0.037	-0.082
LSD 5% (Gi)	0.256	0.366	0.205	0.216	0.273	0.352	0.051	0.074	0.007	0.007	0.105	0.082	0.396	0.279
LSD 1% (Gi)	0.345	0.494	0.277	0.291	0.369	0.476	0.069	0.100	0.051	0.009	0.141	0.111	0.534	0.376
LSD 5% (Sij)	0.661	0.945	0.531	0.558	0.707	0.911	0.132	0.192	0.020	0.018	0.271	0.212	1.023	0.721
LSD 1% (Sij)	0.891	1.275	0.717	0.753	0.954	1.229	0.179	0.259	0.074	0.025	0.365	0.286	1.380	0.973

*,** Significance at 5% and 1% levels, respectively.
G_i and S_{ij} denote general and specific combining ability effects.

/or highly significant for the three hybrids; P_1x P_3, P_3x P_5 and P_4 x P_5. Out of 10 hybrids, two hybrid combinations; P_2 x P_5 and P_3 x P_4 showed highly significant positive specific combining ability effects at F_1 for three traits; LY/P, L % and LI, in the meantime, specific combining ability effects were significantly different from zero for number of bolls per plant for two hybrids out of ten crosses studied. It is worth to mention that the excellent combinations were obtained from crossing between good by good, good by low or low by low combiners. Similar results were noted by Mosalem *et al* (2003), Saravanan and Gopalan (2003), Saravanan *et al*(2003), Subhan *et al* (2003), Iqbal *et al* (2005), Abdalla (2007) and Abdel-Hafez *et al* (2007).

Mean performance of genotypes

Mean performances of the five parental varieties and their hybrid combinations in F_1 and F_2 generations for the studied yield and yield component traits are illustrated in Table (4). The variety Giza 85 showed the highest seed yield and boll weight while Giza 81 was the lowest parent .This result showed that the performance of Giza 85 and Giza 81 was corresponded to their GCA effects Table (3). The variety Giza 83 exerted higher mean values among the tested genotypes for LY/P and NB/P while the varieties Giza 90 for L% and Giza 75 for both SI and LI. The high mean values of the tested genotypes and were transmitted to most of their hybrids,where the values were 12.63,15.33,0.37,10.17 and 5.93 for the aforementioned traits, respectively. The F_1 hybrids higher value of means fluctuated between their parental means, expect for four hybrids P_1 x P_2 , P_1 x P_4 , P_1 x P_5 and P_4 x P_5 that showed the values of 36.37, 36.33, 37.08 and 36.33 (g) for SCY/P , respectively. While, the mean performances of this trait the in F_2 generation showed lower values than that of the corresponding F_1 generation. The performances of F_1 hybrids showed higher values than their parents for the most hybrids studied for LY/P , and F2 showed mostly inbreeding depression Table(5). The values of F_1's were higher than their respective parents for the crosses P_1 x P_3, P_1 x P_4 and P_3 x P_4, where the values were 16.33 , 16.33 and 16.00 bolls per plant respectively and the highest value was expressed by the cross P_4 x P_5 (18.33). The mean values for the tested crosses at two generations ranged from 1.99 to 2.66 (g) in F_1 and 2.25 to 2.72 in F_2 for boll weight. The obtained mean values of lint percentage indicated similar trend as for seed and lint indices. These results are in agreement with those obtained by Abo El-Zahab and Amein (2000 a and b) and El-Adl *et al* (2001) working Egyptian cotton varieties.

Table 4. Mean performance of parental genotypes and their crosses in F_1 and F_2 generations for seed cotton yield and its components.

Parents	S.C.Y/P.		L.Y./P.		No. B. /P.		B.W.		L%		S.I.		L.I.	
P_1	33.43		12.30		14.66		2.29		0.36		10.17		5.93	
P_2	36.53		11.27		14.00		2.54		0.31		10.01		4.65	
P_3	30.70		10.87		13.00		2.25		0.35		9.32		5.11	
P_4	34.86		12.63		15.33		2.28		0.36		9.56		5.44	
P_5	32.77		12.13		14.67		2.37		0.37		9.20		5.42	
Crosses	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
P_1 x P_2	36.37	33.66	12.23	10.87	15.00	14.00	2.42	2.41	0.33	0.32	10.08	9.27	4.74	4.12
P_1 x P_3	33.43	30.54	12.43	11.83	16.33	13.00	2.05	2.35	0.37	0.38	11.31	9.44	5.67	5.65
P_1 x P_4	37.08	32.13	13.70	10.93	16.33	12.33	2.27	2.61	0.36	0.34	10.21	9.53	5.38	4.70
P_1 x P_5	36.33	32.50	12.23	11.57	15.00	12.00	2.43	2.72	0.33	0.35	10.52	9.60	4.83	5.09
P_2x P_3	34.08	32.22	11.67	11.60	14.33	12.33	2.38	2.61	0.34	0.36	10.03	9.42	4.71	5.08
P_2x P_4	36.22	32.28	14.93	10.90	13.67	12.00	2.66	2.70	0.41	0.33	10.13	9.37	6.70	4.61
P_2 x P_5	34.31	33.07	15.90	11.27	13.33	13.00	2.58	2.54	0.46	0.34	10.10	9.56	8.28	4.66
P_3x P_4	33.37	30.65	15.20	12.50	16.00	12.00	2.09	2.57	0.45	0.40	9.97	9.32	7.48	6.09
P_3x P_5	34.20	30.86	12.53	11.57	15.33	13.66	2.23	2.25	0.36	0.36	10.23	9.26	5.37	5.17
P_4 x P_5	36.33	32.15	15.33	12.03	18.33	13.67	1.99	2.36	0.42	0.37	10.11	9.23	6.28	5.17
LSD 5%	1.12	1.60	0.90	0.94	1.20	1.54	0.22	0.32	0.03	0.03	0.46	0.36	1.73	1.22
LSD 1%	1.55	2.22	1.25	1.31	1.66	2.14	0.31	0.45	0.04	0.04	0.63	0.50	2.41	1.69

Heterosis and inbreeding depression

The cross P_2 x P_5 showed significant and highly significant positive heterosis and inbreeding depression for LY/P, L% and LI with estimated values of 35.89%, 29.14%, 35.92%, 27.14%, 64.46% and 43.70% respectively. However, the cross combinations of P_1 x P_5, P_4 x P_5, P_2 x P_4 and P_1 x P_3 also showed highly significant positive heterotic and inbreeding depression effects for SCY/P,NB,BW and SI where the obtained values were 9.74%, 10.55%, 22.0%, 25.45%, 10.37%, -1.62% ,16.04% and 16.47% for the aforementioned crosses respectively Table (5). If high value of heterosis in F_1 is followed by inbreeding depression in F_2 this indicates the presence of allelic interaction. Similar results were noted by Sorour *et al* (2000) and Abdel–Zaher *et al* (2003).

Table 5. Heterosis and inbreeding depression for yield and yield component traits

Crosses	S.C.Y/P.		L.Y./P.		No. B. /P.		B.W.	
	M.P.	I.D.	M.P.	I.D.	M.P.	I.D.	M.P.	I.D.
$P_1 x P_2$	5.46**	7.44**	3.81**	11.17**	4.65**	6.67**	0.41**	-14.82**
$P_1 x P_3$	4.26**	8.66**	7.33**	4.82**	18.07**	20.40**	-12.09**	-14.97**
$P_1 x P_4$	8.56**	13.35**	9.89**	20.19**	8.88**	24.48**	-0.58**	-12.97**
$P_1 x P_5$	9.74**	10.55**	0.13	5.44**	2.27**	20.00**	6.90**	-12.08**
$P_2 x P_3$	2.90**	5.45**	5.42**	0.57*	6.17**	13.95**	-3.19**	-10.09**
$P_2 x P_4$	2.91**	10.86**	24.96**	27.00**	-6.81**	12.19**	10.37**	-1.62**
$P_2 x P_5$	0.46**	3.62**	35.89**	29.14**	-6.97**	2.50**	7.78**	1.54**
$P_3 x P_4$	1.79**	8.14**	29.36**	17.76**	12.94**	25.00**	-10.30**	-23.16**
$P_3 x P_5$	7.75**	9.76**	8.98**	7.71**	10.84**	10.86**	-3.53**	-1.19**
$P_4 x P_5$	7.44**	11.52**	23.82**	21.52**	22.00**	25.45**	-12.40**	-18.79**
LSD 5%	0.97	1.45	0.74	0.48	0.99	1.30	0.18	0.05
LSD 1%	1.25	1.95	1.00	0.68	1.33	1.09	0.25	0.07
Crosses	L%		S.I.		L.I.			
	M.P.	I.D.	M.P.	I.D.	M.P.	I.D.		
$P_1 x P_2$	-1.46	3.96**	-0.09	7.96**	-10.39**	12.93**		
$P_1 x P_3$	2.77	-4.50**	16.04**	16.47**	2.71**	0.23		
$P_1 x P_4$	0.45	7.27**	3.51**	6.69**	-5.39**	12.63**		
$P_1 x P_5$	-8.59**	-5.94**	8.58**	8.71**	-14.82**	-5.23**		
$P_2 x P_3$	2.48	-4.85**	3.82**	6.07**	-3.41**	-7.92**		
$P_2 x P_4$	20.58**	17.88**	3.57**	7.50**	32.76**	31.09**		
$P_2 x P_5$	35.92**	27.14**	5.15**	5.31**	64.46**	43.70**		
$P_3 x P_4$	27.44**	10.94**	5.65**	6.51**	41.81**	18.66**		
$P_3 x P_5$	0.46	-3.66**	10.53**	9.54**	1.99**	3.78**		
$P_4 x P_5$	14.54**	10.31**	7.80**	8.70**	15.48**	17.63**		
LSD 5%	2.82	0.0005	0.38	0.07	1.43	0.82		
LSD 1%	3.81	0.0006	0.51	0.09	1.93	1.09		

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السمات الوراثية للقدرة الائتلافية فى الهجن التبادلية لبعض أصناف القطن المصرى القديمة والحديثة المنزرعة فى الفيوم

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يهدف هذا البحث إلى تقييم بعض أصناف القطن المصرى القديمة والمنزرعة حاليا بمحافظة الفيوم من حيث استخدامها كآباء تدخل فى برامج التهجين بغرض إنتاج أصناف متفوقة وكذلك معرفة مدى احتمالات تحسين محصول القطن ومكوناته. وللوصول إلى هذا الهدف – استخدمت فى الدراسة فى خمسةأصناف من القطن المصرى قديمة و حديثة وكانت هذه الأصناف كالتالى جيزة ٧٥, جيزة ٨٥, جيزة ٨١, جيزة ٨٣و جيزة ٩٠ و تم التهجين بين هذه الأصناف (تهجين دائرى) ما عدا الهجن العكسية، تم إجراء التحليلات الإحصائية وتقدير القدرة العامة والخاصة على الائتلاف ، تقديرات قوة الهجن و الانخفاض الراجع للتربية الداخلية، ويمكن إيجاز أهم النتائج المتحصل عليها فيما يلى:

١- أظهرت النتائج أن القيم المحسوبة للقدرة العامة على الائتلاف كانت عالية المعنوية لمعظم الصفات موضع الدراسة وكانت أكبر من مثيلتها المحسوبة للقدرة الخاصة على الائتلاف فى الهجن الناتجة .

٢- أوضحت قيم معاملات الارتباط معنوية عالية وموجبة بين الأداء الإنتاجى للآباء والقدرة العامة الائتلافية و يدل ذلك على إمكانية الاعتماد على كل منهما أو أحدهما فى انتخاب أفضل الآباء فى برامج التربية .

٣- أظهر الصنف جيزة ٨٣ يليه الصنف جيزة ٨٥ معنوية عالية وموجبة فى القدرة العامة على الإئتلاف فى معظم الصفات وكذلك الاصناف جيزة ٧٥ وجيزة ٩٠ فى بعض الصفات والتى تعكس الفعل الوراثى التجميعى و أن هذه الاصناف معطية من صفاتها لأنسالها والتى يمكن إستخدامها فى برامج تربية القطن.

٤- أظهر عدد من الهجن تأثيرات مرغوبة للقدرة الخاصة على الائتلاف وهى جيزة٧٥ X جيزة٨٥ ، جيزة٧٥ X جيزة٨٣، جيزة٧٥ X جيزة٩٠، جيزة٨٥ X جيزة٨٣، جيزة٨٥ X جيزة٩٠، جيزة٨١ X جيزة٨٣،جيزة٨١ X جيزة٩٠ و جيزة٨٣ X جيزة٩٠.

٥- كان تأثير ظهور صفة قوة الهجين فى الجيل الأول والانخفاض الراجع للتربية الداخلية فى الجيل الثانى معنوى فى كل من الهجن وهى جيزة٨٥ X جيزة٩٠ ، جيزة٧٥ X جيزة٩٠ ، جيزة٨٣ X جيزة٩٠ ، جيزة٨٥ X جيزة٨٣و جيزة٧٥ X جيزة٨١ وهذا يؤكد وجود القدرة الخاصة على الائتلاف لهذه الهجن .

٦- وأخيرا تشير أهم النتائج المتحصل عليها من هذه الدراسة فى مجملها إلى أنه لا يجب إهمال الاصناف القديمة التى كانت تزرع بمنطقة الفيوم و التوصية بإستخدامها مع الاصناف المنزرعة حاليا أو استخدامها كآباء فى برامج تربية القطن لإنتاج أصناف جديدة تصلح للزراعة فى هذة المحافظة.