GENETIC STUDIES OF SOME QUANTITATIVE TRAITS IN TWO COTTON CROSSES (*Gossypium barbadense* L.)

ABOU EL-YAZIED, M.A., A.M.R. ABD EL-BARY AND M.A.M. ALLAM

Cotton Breeding Dept., Cotton Res. Inst., ARC, Giza

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Abstract

The knowledge of gene action would be of great importance to plant breeders as it provides information about possible improvement of different yield, yield components and fiber properties traits. Hence, this investigation has been done to partition the genetic variance to its components through studies on different generations of two cotton crosses i.e. Giza 89 x Suvin and Giza 86 x Karshenky at Sakha Agricultural Station, during four successive growing seasons (2003-2006).

The results showed presence of significants differences among generations in the two crosses for all studied traits. Since, the parents Suvin and Giza 86 have transmitted their performances into their offspring, it could utilize these parents in cotton breeding program for improving these traits. Highly significant positive heterosis was observed relative to mid-parents for most studied traits. In addition, heterosis relative to the better parent was significantly positive, for boll weight, lint cotton yield/plant, lint percentage and 2.5% span length in cross I and for all studied traits in cross II except number of bolls/ plant and fiber strength. Highly significant positive inbreeding depression values were recorded in values F_2 and F_3 for boll weight, seed cotton yield /plant, lint cotton yield /plant and 2.5% span length in the two crosses as well as, lint percentage, number of bolls /plant and fiber fineness in cross I and seed index in cross II. Over dominance appeared to be controlling most studied traits in F_1 hybrids and F_2 generations in the two crosses and the other remaining traits were controlled by partial dominance.

Results of scaling test (C and D) suggested the presence of non-allelic interaction for boll weight, seed index, lint index, fiber strength and fiber fineness in the crosses indicating that the epistasis effects plays important role in the inheritance of these traits, while number of bolls /plant was the least affected trait. The additive gene effects were positively significant or highly significant for 2.5% span length and fiber strength in the two crosses and almost studied traits in cross II except for lint index. While, dominance effects were positive and highly significant for boll weight, seed cotton yield /plant, lint cotton yield /plant and number of bolls /plant in cross I only and fiber fineness in cross II. Among the epistatic components, the dominance x dominance component (L) was quite positive highly significant and greater in magnitude than additive or dominance components for most studied traits in the two crosses.

INTRODUCTION

Cotton is considered the most important cash crop in Egypt hence great efforts have been devoted to increase the yield capacity and fiber properties through breeding programs which depends on the knowledge concerning multiple factors such as heterosis, inbreeding depression and the nature of the interactions of genes controlling the quantitative traits. Many authors studied these factors. El-Disouqui *et al.* (2000) pointed out to the occurrence of positive and significant heterosis relative to mid-parents for boll weight, seed index in two crosses and for lint yield /plant in one cross. Meanwhile, significant positive heterosis relative to better parent was detected for seed index in the second cross. On the other hand, they found significant positive inbreeding depression in F_2 and F_3 generation for boll weight, seed index and lint index. The additive gene effects were significantly positive for seed cotton yield/ plant, lint yield /plant and boll weight in all crosses. Whereas, dominance gene effects were significant for most studied traits in cross I. Epistatic components were greater in magnitude than additive or dominance components for most studied traits. Also, El-Disouqi and Zeina (2001) reported that the roles of non-allelic interaction were governing most of studied traits in two crosses. The additive gene effects were significantly positive or negative for all studied traits except seed cotton yield/plant in cross I and dominance gene effects were important in the inheritance of most studied traits in both crosses and were relatively high in magnitude compared with additive effects in all variables. They also added that, heritability values in narrow sense were 23.22% for seed cotton yield/plant in cross I. While, Zeina (2002) stated that additive genetic variances accounted for the major proportion of phenotypic variance for all traits studied. He also added that, this resulted confirmed the high heritabilities in narrow sense for all studied traits, suggesting that high values of additive genetic variances and small values of environmental variances in these respect. On the other hand, Soliman (2003) showed that highly significant positive heterosis relative to mid and better -parents for seed cotton yield /plant, lint yield /plant, fiber strength and 2.5% span length in all crosses were observed. Also, highly positive significant inbreeding depression values in F_2 and F_3 generation for all most studied traits. All types of gene action effects were significant for yield and cotton properties. While, dominance and epistatic effects were higher in magnitude than additive in some traits. The aim of the present investigation was to study heterosis, inbreeding depression and type of gene action in two intra-specific crosses to obtain additional information about some genetic parameters to help the breeder in the future studies in the segregating generations.

Table 1. Means and their standard errors of the five populations for ten studied characters.

Cross	Generation	Characters									
		Boll weight (gm)	Seed cotton yield / plant (gm)	Lint cotton yield / plant (gm)	Lint %	Seed index (gm)	Lint index	No. Bolls /plant	2.5% Span length (m.m)	Fiber strength (gm tex.)	Micronaire reading
Cross I G.89 x Suvin	P_1	2.59±0.05	90.98±2.44	30.23±0.98	33.41±0.30	9.3±0.10	4.6±0.08	33.45±1.17	31.42±0.22	10.01±0.09	3.28±0.04
	P_2	2.92±0.05	152.03±2.07	51.60±0.93	33.91±0.24	10.48±0.05	5.38±0.06	52.21±1.05	30.89±0.14	8.93±0.11	4.07±0.03
	F_1	3.22±0.03	158.17±2.90	54.98±1.12	34.73±0.16	9.72±0.07	5.17±0.05	49.36±1.15	32.37±0.15	9.92±0.10	4.28±0.04
	F_2	3.08±0.03	104.68±1.96	34.59±0.78	32.85±0.19	10.93±0.07	5.36±0.06	34.29±0.71	31.52±0.13	9.68±0.07	4.06±0.03
	F_3	2.94±0.03	93.07±1.9	30.86±0.70	33.02±0.16	10.8±0.07	5.48±0.04	31.94±0.73	31.89±0.13	9.83±0.06	4.10±0.03
Cross II G.86 x Kar.	P_1	2.84±0.05	93.76±3.04	31.48±1.17	34.46±0.24	10.73±0.08	5.40±0.07	33.17±1.16	33.98±0.20	10.78±0.11	4.03±0.04
	P_2	2.65±0.05	78.43±3.62	26.27±1.25	33.42±0.25	9.6±0.07	4.72±0.08	29.76±1.42	32.56±0.22	9.84±0.08	3.14±0.07
	F_1	3.12±0.03	100.75±2.48	35.98±0.94	35.69±0.26	11.3±0.07	5.91±0.07	32.3±0.77	34.18±0.18	10.32±0.10	4.12±0.03
	F_2	2.76±0.04	83.45±2.67	29.5±1.02	35.17±0.27	10.27±0.06	5.61±0.07	30.65±1.09	31.69±0.12	9.48±0.08	4.33±0.04
	F_3	3.01±0.03	89.46±2.65	31.63±1.03	35.15±0.23	10.57±0.06	6.75±0.07	29.7±0.99	32.19±0.11	10.19±0.08	3.47±0.04

Table 2. Heterosis over mid and better parents, inbreeding depression and potence ratio for ten studied characters in the two cotton crosses.

Parameters	Characters									
	Boll weight (gm)	Seed cotton yield / plant (gm)	Lint cotton yield / plant (gm)	Lint %	Seed index (gm)	Lint index	No. Bolls / plant	2.5% Span length (m.m)	Fiber strength (gm tex.)	Micronaire reading
Cross I (G.89 x Suvin)										
H.M.P %	16.88**	30.18**	34.38**	3.18**	-1.72	3.61*	15.25**	3.90**	4.79**	16.43**
H.B.P %	10.27**	4.04	6.55*	2.42**	-7.25**	-3.90*	-5.46	3.02**	-0.88	30.49**
ID F_2 %	4.35**	33.82**	37.09**	5.41**	-12.45**	-3.68*	30.53**	2.63**	2.46*	5.05**
ID F_3 %	8.70**	41.16**	43.87**	4.92**	-11.11**	-5.99**	35.29**	1.48*	0.97	4.11**
P.R F_1	-2.82	-1.20	-1.32	-4.28	0.29	-0.46	-0.70	4.58	0.84	-1.53
P.R F_2	-3.94	1.10	1.18	6.48	-3.53	-1.90	1.82	2.75	0.77	-1.96
Cross II (G.86 x Kar.)										
H.M.P %	13.66**	17.02**	24.61**	4.007**	11.17**	16.79**	2.62	2.74**	0.097	14.92**
H.B.P %	9.86**	7.46*	14.29**	5.49**	5.31**	9.44**	-2.62	1.97*	-4.27**	31.21**
ID F_2%	11.54**	17.17**	18.01**	0.85	8.94**	5.08**	5.11	7.28**	8.14**	-5.097**
ID F_3%	3.53*	11.21**	12.09**	0.42	6.46**	2.71	8.05*	5.82**	1.26	15.78**
P. R F_1	3.95	1.91	2.73	2.60	2.01	2.50	0.49	1.28	0.021	1.20
P. R F_2	0.32	-0.69	0.48	4.08	0.44	3.24	-0.96	-4.45	-3.53	3.35

H.M.P= Heterosis over mid-parent ID = Inbreeding depression
H.B.P.= Heterosis over better parent P.R.= Potence ratio
*, ** Significant and highly significant at 5% and 1% levels, respectively.

Table 3. Scaling test values for ten studied characters in the two cotton crosses.

Traits	Scaling test	Crosses I	Crosses II	Total
Boll weight (gm)	C	0.37** ±0.134	-0.69** ± 0.17	2
	D	0.09 ±0.137	1.03** ± 0.17	
Seed cotton yield / plant (gm)	C	-140.63** ±10.27	-39.89** ± 10.69	1
	D	-80.09** ±9.14	18.75 ± 10.78	
Lint cotton yield / plant (gm)	C	-53.43** ±4.06	-11.71** ± 4.04	1
	D	-6.57** ±3.49	9.78** ± 3.74	
Lint %	C	-5.38** ±0.90	1.52 ± 1.01	1
	D	-0.94 ±0.82	2.72** ± 0.81	
Seed index (gm)	C	4.50** ±0.33	-1.77** ± 0.30	2
	D	1.56** ±0.32	137** ± 0.29	
Lint index	C	1.12** ±0.27	0.50 ± 0.33	2
	D	1.22 ±0.22	1.66** ± 0.32	
No. Bolls /plant	C	-47.22** ±3.99	-4.93± 4.99	0
	D	-26.48** ±3.61	-5.43 ± 4.90	
2.5% Span length	C	-0.97 ±0.66	-8.14** ± 0.66	1
	D	2.21** ± 0.63	-1.16* ± 0.59	
Fiber strength (gm tex	C	-0.068 ± 0.38	-3.34** ± 0.38	2
	D	1.012** ± 0.33	1.18** ± 0.35	
Micronaire reading	C	0.34 ± 0.15	1.91** ± 0.15	2
	D	0.94**± 0.15	-1.95** ± 0.14	
Total		6	8	14

*,** Significant at 5% and 1%, respectively

Table 4. The estimates of gene effects and type of epistasis for ten studied characters in the two cotton crosses.

Traits	Crosses	Gene effects					Type of Epistasis
		m	d	h	L	i	
Boll weight (gm)	I	3.08**±0.03	-0.17**±0.03	0.467**±0.09	-0.37+0.22	-0.33±0.10	Dupli
	II	2.76**±0.04	0.095**±0.04	-0.43**±0.12	2.29**±0.28	-0.61**±0.12	Dupli
Seed cotton yield / plant (gm)	I	104.68**±1.96	-30.53**±1.60	66.62**±6.69	80.72**±16.76	-31.10**±6.44	Compl
	II	83.45**±2.66	7.67**±2.36	-4.49±9.02	78.19**±21.51	-3.8**±8.78	Dupli
Lint cotton yield / plant (gm)	I	34.59**±0.78	-10.69**±0.67	23.54**±2.55	34.48**±6.44	-11.90**±2.55	Compl
	II	29.5**±1.03	2.61**±0.86	-1.36±3.50	28.64**±6.50	-3.25**±3.31	Dupli
Lint %	I	32.85**±0.19	-0.25±0.19	0.80±0.57	5.92**±1.40	-0.77±0.62	Compl
	II	35. **±0.27	0.52** ± 0.17	-0.2 ± 0.59	1.6±1.53	-0.52±0.62	Dupli
Seed index (gm)	I	10.93**±0.07	-0.59**±0.06	-0.46*±0.23	-3.92**±0.55	-1.47±0.22	Compl
	II	10.29**±0.062	0.57**±0.06	-0.07**±0.21	4.19**±0.51	-0.078±0.21	Dupli
Lint index	I	5.36**±0.06	-0.39**±0.05	-0.447**±0.17	0.133±0.42	-1.41**±0.17	Dupli
	II	5.61**±0.07	-0.34**±0.05	-0.17±0.24	1.55*±0.57	-0.34**±0.20	Dupli
No. Bolls /plant	I	34.29**±0.71	-9.38**±0.79	16.31**±2.53	27.65**±6.33	-8.98**±2.68	Compl
	II	30.65**±1.09	1.71*±0.92	3.63±2.67	-0.67±8.32	6.20*±2.74	Dupli
2.5% Span length (m.m)	I	31.52**±0.13	0.27*±0.13	-0.42±0.44	4.24**±1.07	-1.11*±0.45	Dupli
	II	31.69**±0.12	0.71**±0.14	0.33±0.41	9.31**±1.03	0.84±0.46	Compl
Fiber strength (gm tex)	I	9.68**±0.07	0.54**±0.07	-0.23±0.23	1.44*±0.55	0.40±0.25	Dupli
	II	9.48**±0.08	0.47**±0.07	-1.33**±0.26	6.03**±0.63	-0.41±0.25	Dupli
Fiber fineness	I	4.064**±0.03	-0.40**±0.02	0.037±0.11	0.79*±0.25	-1.36**±0.10	Compl
	II	4.33**±0.04	0.45**±0.03	2.15**±0.12	-5.15**±0.24	2.51**±0.10	Dupli

*,**Significant at 5% and 1%, respectively.

Table 5. Scaling test for genotype x environment interaction for ten studied characters in the two cotton crosses.

Scaling tests	Characters									
	Boll weight (gm)	Seed cotton yield / plant (gm)	Lint cotton yield / plant (gm)	Lint %	Seed index (gm)	Lint index	No. Bolls / plant	2.5% Span length (m.m)	Fiber strength (gm tex.)	Micronaire reading
Cross I (G.89 x Suvin)										
VP1/VP2	1.18	1.39	1.12	1.69	2.09*	1.70	1.24	2.53*	0.67	1.52
VP1/VF1	2.86*	0.71	0.77	3.63**	1.74	1.85	1.04	1.95	0.90	1.17
VP2/VF1	2.43*	0.51	0.68	2.23*	0.83	1.54	0.84	0.87	1.33	0.77
Cross II (G.86 x Kar.)										
VP1/VP2	1.40	0.92	1.04	0.96	1.38	1.30	1.16	1.02	1.87	0.75
VP1/VF1	3.50**	1.50	1.46	0.91	1.64	1.00	1.94	1.12	1.12	1.50
VP2/VF1	2.50*	1.62	1.35	0.95	1.68	0.77	1.34	1.10	0.60	1.95

VP_1= Variance of first parent VP_2= Variance of second parent VF_1= Variance of F_1 hybrid

*,** Significant and highly significant at 5% and 1% probability statistically levels, respectively.

MATERIALS AND METHODS

This study was carried out at Sakha Agricultural Research Station, Egypt, during the 2003, 2004, 2005 and 2006 growing seasons. Crossing is used between Giza 89 with Suvin and between Giza 86 with Karshenky. The filial generations F_1, F_2 and F_3 were obtained, the five populations, P_1, P_2, F_1, F_2 and F_3 of each cross were evaluated through 2006 season. Each non-segregating generation (P_1, P_2 and F_1) was consisted of five rows, while F_2 and F_3 contained 20 rows. Each row was 4.2m in length and 60 cm in width. Hills were spaced at 35cm within row and plants were thinned one plant/ hill. All the agronomic practices were done according to the ordinary cotton culture. Data and measurements were recorded for ten characters on individual guarded plants, (30 for each of P_1, P_2 and F_1 and 150 for each of F_2 and F_3), to study performance of the ten following traits:

I -Yield and yield components including boll weight, seed cotton yield /plant, lint cotton yield /plant, lint percentage, seed index, lint index and number of bolls/plant

II - Fiber properties including fiber length (2.5% span length in mm), fiber strength as Pressely index and fiber fineness as Micronaire reading

Statistical procedure:

Means and variances were computed, then the following estimations were calculated:

Heterosis over the mid-parents (H.M.P %) = $\dfrac{[\overline{F1}-\overline{MP}}{\overline{MP}}x100]$

Heterosis over the better-parent (H.B.P %) = $\dfrac{[\overline{F1}-\overline{BP}}{\overline{BP}}x100]$

Inbreeding depression from F_1 to F_2 (I.D. F_2%) = $\dfrac{[\overline{F1}-\overline{F2}}{\overline{F1}}x100]$

Inbreeding depression from F_1 to F_3 (I.D. F_3%) = $\dfrac{[\overline{F1}-\overline{F3}}{\overline{F1}}x100]$

Nature and degree of dominance were determined by means of potence ratio method outlined by Smith (1952), which can be defined as follows:

Potence ratio in F_1 (P.R.F_1) = $\dfrac{\overline{F}_1 - \overline{M.P}}{\frac{1}{2}(\overline{p1} - \overline{P}_2)}$

Potence ratio in F_2 (P.R.F_2) = $\dfrac{2(\overline{F}_2 - \overline{M.P})}{\frac{1}{2}(\overline{P}_1 - \overline{P}_2)}$

The population means and variances were used to compute the scaling tests C and D and to estimate the type of gene effects according to Mother and Jinks (1971).

Estimation of both scaling tests and gene effects were tested for significance from zero using student's *t*- test. Scaling test for independence of genetic from environmental effects variance of non-segregating generations i.e., P_1. P_2 and F_1 ratio, if proves significance there is genotype x environment interaction

$$F = \frac{VP1}{VP2}, \frac{VP1}{VF1} \text{ and } \frac{VP2}{VF1}$$

RESULTS AND DISCUSSION

The five generations in this investigation included four parents and their $2F_1$ hybrids,$2F_2$ and $2F_3$ generations, the mean performances are presented in Table (1).The results showed that the genotype Suvin gave the highest values for boll weight, seed cotton yield /plant, lint cotton yield /plant , lint percentage ,lint index and number of bolls /plant followed by Giza 86 for all studied yield traits and fiber properties except fiber fineness .Whereas, variety Giza 89 exhibited to be the same trend for these traits except for boll weight and seed index, while the genotype Karshenky showed lower values for seed cotton yield /plant, number of bolls /plant and fiber strength.

Moreover, Giza 89 x Suvin, F_1 and F_2 generations showed best values for boll weight, seed cotton yield /plant, lint cotton yield /plant and number of bolls /plant. While, Giza 86 x Karshenky, F_1 hybrid was the best for most studied traits. These findings reflected the presence of heterotic effects and the higher frequency of dominant genes controlling these traits. Also, F_3's generation showed superiority for most studied traits compared with the F_2's generation values in two crosses. These results indicated that the parents Suvin and Giza 86 could had transmitted their performances to their offspring, hence could be utilized for the improving these traits. These results were in agreement with those obtained by El- Disouqi et al. (2000), El-Disouqi and Zeina (2001) and Soliman (2003).

The values of heterosis over the mid and better-parents, inbreeding depression and potence ratio were calculated and presented in Table (2). The results showed highly significant positive heterosis relative to mid-parents for all studied traits except for seed index in cross I as well as number of bolls /plant and fiber strength in cross II. Moreover, positive highly or significant heterosis relative to better-parent were obtained for boll weight, lint cotton yield /plant , lint percentage and 2.5% span length in cross I and for all studied traits except , number of boll/ plant and fiber strength in cross II. In addition, positive and undesirable highly significant heterosis values were observed for fiber fineness relative to both mid and better-parent for fiber fineness in the two crosses.

Concerning inbreeding depression, the results indicated highly significant positive inbreeding depression in F_2 and F_3 generations for boll weight, seed cotton yield /plant, lint cotton yield /plant and 2.5% span length in the two crosses as well as lint percentage ,number of bolls /plant and fiber fineness in cross I only and seed index in cross II. The reduction in performance of the F_2 and F_3 generations with respect to their corresponding F_1 hybrids was negatively associated with the amounts of heterosis obtained in these hybrids. When the large amount of heterosis is obtained for any trait, large inbreeding depression can occur and may be due to fixation of unfavorable recessive genes in F_2 and F_3 generation, i.e. the depression of dominance effects of genes.

On the other hand, negative and highly significant inbreeding depression were noticed in F_2 and F_3 generation for seed index and lint index in cross I and also in F_2 generation for fiber fineness in cross II , suggesting the increase of mean performance of F_2 and F_3 generation than F_1 hybrid for these traits. El-Helw (2002) reported highly significant positive heterotic effects relative to mid-parents for seed cotton yield /plant, lint cotton yield /plant and boll weight and highly significant positive inbreeding depression values for seed cotton yield /plant, lint cotton yield /plant and lint percentage.

With respect to potence ratio the results illustrated presence of over-dominance for most studied traits in F_1 hybrid and F_2 generations in the two crosses. El-Akheder (2001) stated that the over-dominance controlled inheritance of seed and lint cotton yield/plant in the two crosses, seed index in the second cross and fiber fineness in the first cross. While, partial dominance controlled the rest of the traits. Also, he indicated that additive, dominance and most types of epistatic effects controlled the inheritance of fiber fineness. Concerning these results, if the parental values and F_1 or F_2 generation were nearly equal, then the relatively small error in estimated could magnify the potence values (Petr and Frey, 1966), also, could obtained from the failure of the parents of equal phenotypic values to carry the same dominant and duplication genes in different genomes may underestimate or overestimate the potence ratio which would exist if the genes were acting in a diploid state.

Results of scaling tests C and D for the studied traits are presented in Table (3) and suggested the presence of none allelic interaction for boll weight, seed index, lint index, fiber strength and fiber fineness in the two crosses, since, one or both of C and D showed significance, also, the cross II exhibited significant non-allelic effects in all studied characters except for number of bolls /plant and 2.5% span length. Generally, 14 out of 20 crosses gave similar trends of significance of non-allelic interaction for one or more of the studied traits.

The data in Table (4) showed that the mean effect of F_2 performance (m) were highly significant for all studied traits in the two crosses. Initially, it was noted that these characters were quantitatively inherited. Also, the additive gene effects (d) were significant or highly significant positive for 2.5% span length and fiber strength in the two crosses.

Dominance effects (h) were positive and highly significant for boll weight, seed cotton yield /plant, lint cotton yield /plant and number of boll /plant in cross I and for fiber fineness in cross II. Hence, improvement of these traits could be achieved through recurrent selection procedure (Singh and Naryanana 2000). Among the epistatic components, the dominance x dominance component (L) was quite high and positive for most studied characters in comparison to additive x additive components (i). El- Akheder and El- Mansy (2006) stated that overall epistasis play important role in inheritance of all yield and its component traits except for boll weight as well as fiber properties

Finally, all types of gene action effects (d, h and epistasis) were highly significant or significant, but dominance x dominance component (L) epistatic effect was higher in magnitude and played a major role in the inheritance of these traits. Similar results were reported by EL-Akheder (2001), El-Helw (2002) and Soliman (2003).

Duplicate epistasis was observed as revealed by differences in signs of h and L in crosses which exhibited significant epistasis for boll weight, lint index and fiber strength in the two crosses and for other studied traits in cross II only except for 2.5% span length.

In duplicate type of epistasis (the ratio 15:1) identical substance of substances interchangeable in effect are presumably produced by the dominant alleles at both loci. It showed complementary epistasis for seed cotton yield /plant, lint cotton yield /plant, lint percentage, seed index, number of bolls /plant and fiber fineness in cross I and for 2.5% span length in cross II only where similar signs were obtained for both h and L. In complementary type of epistasis (the ratio 9:7) they probably produce different substances both of which were needed for the phenotypic manifestations of some property.

Table (5) showed the results that the F-ratio between VP_1/VP_2 were insignificant for almost all traits in the two crosses which indicated that the genotype x environment interactions in the parents are not significant except for seed index and 2.5% span length in cross I. While, on the basis of VP_1/VF_1 and VP_2/VF_1, F values exhibited quite highly significant effect for boll weight in the two crosses and in lint percentage in cross I only.

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دراسات وراثية لبعض الصفات الكمية في هجينين من القطن

محمد عبد الفتاح أبو اليزيد ، عبد الناصر محمد رضوان عبد الباري ، محمد علاءالدين محمد علام

قسم بحوث تربية القطن، معهد بحوث القطن ، مركز البحوث الزراعية ، جيزة

اجرى هذا البحث بمحطة البحوث الزراعية بسخا خلال أربعة مواسم (٢٠٠٣-٢٠٠٦) لتقسيم التباين الوراثي في الأجيال المتعاقبة لهجينين من القطن هما جيزة ٨٩ × سيوفين و جيزة ٨٦ × كارشنكى لدراسة تأثير الفعل الجينى للإستفاده به في إمكانية تحسين صفات المحصول ومكوناته وكذا صفات الجودة وكانت أهم النتائج المتحصل عليها كما يلي:-

- أظهرت النتائج وجود اختلافات معنوية بين الأجيال المتعاقبة داخل كل هجين بالنسبة لكل الصفات المدروسة وكان للآباء سيوفين وجيزة ٨٦ القدرة على توريث ونقل صفاتهما الى الأجيال المتعاقبة وبالتالي يمكن الاستفادة من هذه الآباء في برامج تربية القطن لتحسين صفات المحصول ومكوناته وكذا صفات الجودة.
- لوحظ وجود قوة هجين موجبة وعالية المعنوية بالمقارنة بمتوسط الأبوين لمعظم الصفات المدروسة .وكذا بالمقارنة بالأب الأفضل لصفات متوسط وزن اللوزة ومحصول القطن الشعر/نبات وتصافى الحليج ومتوسط الطول عند ٢,٥% في الهجين الأول وبالنسبة لكل الصفات في الهجين الثاني ماعدا صفة عدد اللوز/نبات ومتانة التيلة.
- كانت قيم الإنخفاض الناتج عن التربية الداخلية بالنسبة لمتوسط الآباء والجيل الثاني والثالث موجبة وعالية المعنوية لصفات متوسط وزن اللوزة ومحصول القطن الزهر /نبات ومحصول القطن الشعر/نبات ومتوسط الطول عند ٢,٥% في الهجينين وبالنسبة لصفات تصافى الحليج وعدد اللوز/نبات ومتانة التيلة في الهجين الأول ومعامل البذرة في الهجين الثاني.
- تحكمت السيادة الفائقة في توريث معظم الصفات المدروسة في كلا من الجيل الأول الهجين والثاني أما باقي الصفات فقد تحكم في توريثها السيادة الجزئية.
- أوضحت نتائج اختبار الـ Scaling وجود تفاعل غير اليلى (تفوق) لصفات متوسط وزن اللوزة ومعامل البذرة والشعر و متانة ونعومة التيلة مما يدل على أهمية دور الفعل الوراثي التفوقى في وراثة هذه الصفات والاستفادة من ذلك في حال استخدامها في انتاج القطن الهجين.
- كان التأثير المضيف معنويا أو عالي المعنوية لصفات متوسط الطول عند ٢,٥% ومتانة التيلة في كلا الهجينين ولمعظم الصفات المدروسة في الهجين الثاني ماعدا صفة معامل الشعر بينما كان التأثير السيادى موجب وعالي المعنوية لصفات متوسط وزن اللوزة ومحصول القطن الزهر /نبات ومحصول القطن الشعر/نبات وعدد اللوز/نبات في الهجين الأول فقط وصفة نعومة التيلة في الهجين الثاني.
- من بين مكونات التفوق كان التأثير السيادى × السيادى موجب ومعنوي واكثر أهمية من التأثير المضيف والسيادى لمعظم الصفات المدروسة.