Inheritance of quantitive characters through triple test cross in cotton (*Gossypium barbadense Linn.*)

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ABSTRACT

Estimating genetic components of variation in a triple-test cross analysis using 39 genotypes of cotton *(Gossypium barbadense* Linn). Epistasis overall components of variation were found to be insignificant for all the studied characters. Significant additive x additive type of epistasis was detected for boll weight and Pressley index, while additive x dominance type of epistasis was insignificant for all the studied characters, indicating that non-allelic interaction has not been of great importance in cotton. Additive components of variation were significant for lint cotton yield, boll weight, lint percentage, seed index, Micronaire reading, Pressley index and 2.5% span length. Large additive effects and additive x additive type of epistasis suggest that superior pure breeding lines would be developed by simple selection depending on heritability of these traits and the selection procedures based on the accumulation of additive effect were successful in improving most the above studied characters.

The estimates of deviation due to dominance components of variations were significant for only both seed index and 2.5% span length, additive genetic variance and deviation due to dominance have been estimates for these two characters assuming that their is no epistasis, hence the estimates obtained will be biased and their usefulness in predicting gain from selection be impaired. The degree of dominance values indicated existence of partial dominance for the above studied characters. (F) Value as correlation coefficient (r) between sums and differences were insignificant for all the studied characters, indicating that the direction of dominance was ambidirectional among parents. Significant positive additive correlation between lint yield/ plant and Micronaire reading was obtained.

INTRODUCTION

Knowledge of components of genetic variations of different plant populations are a prerequisite for planning a systematic and efficient breeding programme. The triple-test cross analysis has the least assumptions unaffected by differences in allelic frequencies, degree of inbreeding and gene linkage. Thus this biometrical techniques (Kearsey and Jinks, 1968) and various modifications (Jinks and Perkins, 1970) and (Kearsey and Sturley, 1984) are most efficient and more widely applicable for studying the genetic types.

Very discanity researchers work was conduced to detect epistasis, additive and dominance components of variation for genetic improvement using triple test cross analysis. Garge *et al* (1987a). Additive genetic variance components were significant for boll weight, seed index and ginning out turn, while epistasis effects were important for yield characters. EL-Mansy (2005) stated that additive genetic variance was significant for lint cotton yield; boll weight, lint percentage and seed index, whereas the dominance genetic variance was significant for Pressley index. Also he added that epitasis was significant for most studied characters. The main aim of this study to detect non-allelic interaction beside determine additive and dominance components of variation.

MATERIALS AND METHODS

A- Genetic materials and experimental procedures.

The mating design used for this experiment was triple test cross analysis. Two varieties Giza 86 and Karshenky$_2$ (Kar.2) were crossed to produce their F_1 cross. Each of these three males (Testers) were then crossed to 9 different females (lines) to produce 27 crosses. The female's parents were Giza 45, Giza 70, Giza 85, Giza88, Giza89, Giza90, Pima s$_6$, Suvin and CB 58.

Seeds of these 12 parental genotypes and 27 crosses were analyzed in a randomized complete block design with three replicates at Sakha Agricultural Research Station Kafer El-Sheikh Governorate in periods (2003-2005). Each replicate contained one row. The rows were 50 cm apart. Eight hills were planted in each row at 30 cm distance. At seedling stage plants of the 39 genotypes were thinned to one plant per hill. Control rows were sown on all the sides to eliminate border effects. Agricultural practices were applied as recommended by Cotton Research Institute for Sakha Agricultural Research Station. Data and measurements were lint cotton yield/plant (g), boll weight (g), lint percentage, seed index(g), micronaire reading, Pressley index and 2.5% span length (mm).

B- Statistical and genetic analysis.

In triple-test cross analysis, the population sum of squares from analysis of variances for genotypes were partitioned variations among three groups; parents, hybrids and hybrids *vs.* parents. The hybrids sum of squares was grater sub divided into variation due to lines (females), testers (males) and lines *vs.* testers.

Epistasis (non-allelic interaction) was detected by the comparison $[\bar{L}i1 + \bar{L}i2 - 2\bar{L}i3]$ for 9 sets of families with 9 degree of freedom to estimate the overall epistasis this item was further partitioned to (i) type of epistasis (additive x additive) with one degree of freedom and (i+ j) type (additive x dominance) and (dominance x dominance) with 8 degree of freedom.

The within families terms for (L_{1i}, L_{2i}) used to test the significance of additive effects $[\bar{L}1i + \bar{L}2i]$ and dominance effects $[\bar{L}1i - \bar{L}2i]$.

The additive (D) and dominance (H) components of the genetic variances were estimated by the analysis of sums $[\bar{L}1i + \bar{L}2i]$ and differences $[\bar{L}1i - \bar{L}2i]$ respectively. The degree of dominance was calculated as $\sqrt{H/D}$ by Jinks and Perkins(1970).

Correlation coefficient (r) of sums and differences was used to test the significance of (F) value Jinks *et al* (1969). The F value was computed from the covariance of sum/ difference, which is equal to (-1/8F) where F is the association dispersion of dominant alleles in the parental lines.

The phenotypic and genetic (additive, dominance and epistatic) various types of simple correlation coefficients were computed according to EL-Mansy (2005)

RESULTES AND DISCUSSION

The mean squares of the analysis of variance due to genotypes, hybrids, lines and testers (Table1) revealed highly significant differences for all the studied characters, indicating analysis of variance for triple test cross revealed a broad spectrum of genetic variability for these characters. Thus the choice of parents was appropriate and it could be exploited in breeding programme. Lines *vs*. testers mean squares were significant for lint cotton yield/plant, Micronaire reading and Pressley index. These results may be due to that some genotypes were superior and others were inferior compared with the parental lines and testers. Hybrids vs. parents mean squares were significant for lint cotton yield/plant, seed index and Micronaire reading. Also, the hybrid sum of squares show significant differences resulting from quantitative genetic theory, the probability of producing unique genotypes increases in population to the number of genes for which parents differ (genetic diversity)., agree with El-Akhedar (2001),EL-Lawendey (2003) and EL. Mansy (2005).

Table 1: Mean square estimates for the studied characters of triple test cross (G.86 x Karshenky$_2$.)

S.O.V.	d.f	Lint yield /plant (g)	Boll weight (g)	Lint %	Seed index (g)	Micron. reading	Pressley index	2.5% span length (mm)
Replications	2	41.266**	0.056	5.033**	5.602**	0.174*	0.341	4.640**
Genotypes	38	69.278**	0.325**	8.914**	1.729**	0.709**	0.96**	4.855**
Hybrids	26	64.046**	0.327**	8.482**	1.612**	0.697**	0.786**	3.836**
Parents	11	77.95**	0.348**	10.637**	2.044**	0.775**	1.48**	7.667**
Lines	8	42.343**	0.242**	8.444**	2.145**	0.552**	1.184**	9.720**
Testers	2	222.09**	0.906**	24.081**	2.083**	1.92**	3.088**	3.206**
LinesVs. Testers	1	74.50**	0.073	1.289	1.162	0.260*	0.701*	0.163
HybridsVs.parents	1	109.94**	0.017	1.197	1.286*	0.286*	0.005	0.423
Error	76	8.801	0.034	0.500	0.317	0.054	0.139	0.518

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

The average performance of the parental genotypes and their crosses are given in Table 2. The highest mean value for the studied characters was recorded by the cross G.89 x G.86 for lint cotton yield followed by the commercial variety G86. The cross G.90 x G.86 for boll weight followed by G.86.The cross G.88 x G.86 for lint percentage and Pressley index followed by G.86 and C.B 58 x.

Table2: Mean performances of lint cotton yield, yield components and fiber quality for 39 genotypes

Genotypes	Lint yield /plant (g)	Boll weight (g)	Lint %	Seed index (g)	Micronaire reading	Pressley index	2.5% span length (mm
G.45	17.2	2.15	32.7	8.8	3.2*+	11.4*+	36.7*+
G.70	21.4	2.86	37.0*	9.5	4.3	11.1+	36.7*+
G.85	23.0	2.83	36.4	11.0	3.8	10.6	32.4
G.88	25.3	2.79	36.4	9.5	3.9	11.2+	35.0
G.89	30.1*	2.55	37.1*	9.5	4.7	9.6	32.8
G.90	25.3	2.81	36.7*	10.2	4.1	9.8	32.1
Pima S6	21.9	2.65	33.9	9.9	3.7	10.9	35.2+
Suvin	26.8	3.21*+	36.0	10.8	4.3	10.2	33.6
CB.58	21.4	2.75	33.5	11.3*	3.9	10.4	32.9
G.86	32.5*+	3.31*+	38.4*+	11.3*	4.5	11.0+	35.0
Karshenky2.	17.0	2.24	32.9	9.6	2.9*+	9.1	32.9
G.86 x Karshenky2	31.3*	2.97	36.6	10.5	4.0	10.7	34.0
G.45 xG.86	28.5*	2.87	35.3	10.1	3.9	11.0+	35.4*+
G.45 x Karshenky2	18.3	2.26	31.7	9.5	3.2*+	9.8	32.6
G.45 x (G.86 x Kar2.)	24.5	2.51	34.1	9.8	3.7	11.0*	35.3*+
G.70 xG.86	28.0	3.08*	37.2*+	10.3	4.4	10.9	36.3*+
G.70 x Karshenky2	19.0	2.59	34.4	9.4	3.8	10.0	34.0
G.70 x (G.86 x Kar2.)	29.4*	2.75	36.0	10.3	4.0	10.6	35.2+
G.85 xG.86	29.4*	3.06*	37.9*+	11.4*	4.2	10.7	34.4
G.85 x Karshenky2	19.0	2.36	35.9	9.9	3.2*+	10.4	32.5
G.85 x (G.86 x Kar2.)	29.7*	2.81	37.7*+	10.6	3.8	10.5	32.9
G.88 xG.86	31.0*	3.02	38.6*+	10.7	4.5	11.4*+	35.5*+
G.88 x Karshenky2	22.4	2.56	34.4	9.6	3.5*	10.5	34.1
G.88 x (G.86 x Kar2.)	25.3	2.59	36.4	10.1	3.7	10.5	35.7*+
G.89 xG.86	37.1*+	3.13*	38.2*+	10.9	5.0	10.5	34.9
G.89 x Karshenky2	27.8	2.61	35.7	10.1	3.9	9.6	33.6
G.89 x (G.86 x Kar2.)	28.6*	2.75	36.7*	10.2	4.5	10.7	33.8
G.90 xG.86	31.8*+	3.40*+	38.3*+	11.1*	4.6	10.5	34.2
G.90 x Karshenky2	22.6	2.50	36.3	9.4	3.6*	9.4	32.9
G.90 x (G.86 x Kar2.)	29.2*	2.94	37.7*+	10.3	4.2	10.7	34.1
pima S6 xG.86	28.0	3.01	36.5	11.1*	4.8	11.2+	35.7*+
pima S6 xKarshenky2	23.0	2.41	34.1	9.4	3.9	10.3	35.0
Pima S_6 x G.86xKar$_2$.)	22.7	2.46	35.6	10.1	4.3	11.3*+	35.6*+
Suvin xG.86	33.3*+	3.39*+	36.5	11.8*+	4.6	10.1	34.0
Suvin x Karshenky2	24.8	3.13*	34.1	10.6	3.8	10.1	32.9
Suvin x (G.86 x Kar2.)	26.3	3.17*+	35.0	10.7	4.0	10.0	33.8
CB.58 xG.86	30.9*	3.08*	35.9	11.8*+	4.4	10.9	34.2
CB.58 x Karshenky2	21.3	2.34	33.8	9.6	3.3*+	10.2	32.2
CB.58 x (G.86 x ar2.)	24.3	2.48	33.8	11.5*+	4.0	10.9	33.5
X of lines	23.6	2.74	35.5	10.1	4.0	10.6	34.1
X of testers	26.9	2.84	36.0	10.5	3.8	10.3	34.0
X of hybrids	26.5	2.79	35.8	10.4	4.0	10.5	34.2
L.S.D .0.05	4.82	0.30	1.15	0.91	0.38	0.61	1.17

* Significant at 0.05 level of probability was of the difference among the genotype mean and lines mean. + Significant at 0.05 level of probability was of the difference among the genotype mean and testers mean

G.86 for seed index and by G.45 and Pima S_6(G.86 x Kar.2) for Pressley index. The Russian variety Karshenky$_2$, G45 x Karshenky$_2$, G85 x Karshenky$_2$, CB.58 x Karshenky$_2$ and G.45 for micronaire reading, whereas no cross surpassed for the two commercial varieties G.45 and G.70 for 2.5% span length.

Data in Table 3 show the combined mean for the above characters. The hybrids involving G.86 or G.89 exhibited the highest and significant values compared with lines mean for lint yield/ plant.

Table 3: Combined means of lint cotton yield and yield components and fiber quality for triple test cross.

Genotypes	Lint yield /plant (g)	Boll weight (g)	Lint %	Seed index (g)	Micron. reading	Pressley index	2.5% span length (mm)
3 hybrids for G.45	23.8	2.55	33.7	9.8	3.6*	10.7	34.4
3 hybrids for G.70	25.5	2.81	35.9	10.0	4.1	10.5	35.2
3 hybrids for G.85	26.0	2.74	37.2**	10.6	3.7	10.5	33.3
3 hybrids for G.88	26.2	2.72	36.5	10.1	3.9	10.8	35.1
3 hybrids for G.89	31.2*	2.83	36.9*	10.4	4.5	10.3	34.1
3 hybrids for G.90	27.9	2.95	37.4**	10.3	4.1	10.2	33.7
3 hybrids for PimaS_6	24.6	2.63	35.4	10.2	4.3	10.9	35.4**
3 hybrids for Suvin	28.1	3.23*	35.2	11.0	4.1	10.1	33.6
3 hybrids for CB.58	25.5	2.63	34.5	11.0	3.9	10.7	33.3
9 hybrids for G.86	30.9*	3.12*	37.2**	11.0	4.5	10.8	35.0
9 hybrids for Kar.2.	22.0	2.53	34.5	9.7	3.6	10.0	33.3
9 hybrids for F_1 (G.86 x Kar$_2$.)	26.7	2.72	35.9	10.4	4.0	10.7	34.4
Lines	23 6	2.74	35.5	10.1	4.0	10.6	34.1
Testers	26.9	2.84	36.0	10.5	3.8	10.3	34.0
L.S.D 0.05	4.82	0.30	1.15	0.91	0.38	0.61	1.17

The hybrids involving G.86 or Suvin varieties show the highest values and significant compared with lines mean or testers mean for boll weight. The highest values were achieved for lint percentage in hybrids including G.85, G.86, G.89 and G.90 varieties. The hybrids involving G.45 or Karshenky$_2$ and the same two parents were lower than line mean for micronaire reading

Estimates obtained of the pertinent variance components due epistasis, $[\overline{L}1i + \overline{L}2i - 2\overline{L}3i]$, Additive,(sums) $[\overline{L}1i + \overline{L}2i]$ and deviation from dominance, (differences) $[\overline{L}1i - \overline{L}2i]$ have been given in Table 4. The relative magnitudes of these components indicated the relative importance of the corresponding sources of variation.

Table4: Analysis of variance for sums, additive, $(L_{1i}+L_{2i})$ differences, dominance, $(L_{1i}-L_{2i})$ and testing epistasis $(L_{1i}+L_{2i}-2L_{3i})$ of studied characters of triple test cross (G.86 x Karshenky$_2$.)

S.O.V	d.f	Lint yield /plant (g)	Boll weight (g)	Lint %	Seed index (g)	Micro. reading	Pressle index	2.5% span length (mm)
Replications	2	51.841	0.155*	2.378	4.810**	0.100	0.725	0.823
Sums.	8	101.42**	0.474**	18.025**	2.460**	1.056**	1.359**	7.557**
Error	16	17.543	0.040	0.764	0.409	0.096	0.219	1.225
Replications	2	12.978	0.086	5.005**	0.083	0.009	0.463	0.274
Differences	8	7.799	0.100	1.754	0.813*	0.082	0.492	1.328*
Error	16	10.053	0.128	0.770	0.264	0.071	0.259	0.413
Over al Epis.	9	141.546	0.265	3.551	1.608	0.327	2.717	5.009
(i) Type	1	1.006	1.208*	0.290	0.107	0.073	9.013*	10.206
(i+j) Type	8	158.738	0.148	3.959	1.795	0.359	1.930	4.359
Pooled	18	65.137	0.203	2.938	2.917	0.476	1.186	3.679

These results indicate that epistasis overall components of variation were found to be insignificant for all the studied characters. When the overall epistasis was partitioned to (i) type (additive x additive) and to (i+j) type (additive x dominance and dominance x dominance). The results revealed significance of additive x additive (i) type of epistasis for boll weight and Pressley index, while additive x dominance and dominance x dominance (i+j)type of epistasis was insignificant for all the studied characters, indicating that non-allelic interaction had not been of great importance in cotton.

The additive components of genetic variation were significant for lint cotton yield, bolls weight, lint %, seed index, Micronaire reading, Pressley index and 2.5 % span length.

The deviation of dominance components of genetic variation was significant for seed index and 2.5% span length. Significant genotypic variation suggested that the selection procedures of early generations are to increase breeding efficiency through early identification of superior heterogeneous population and improve these characters.

Estimates of additive effect (D), dominance effect (H) degree of dominance $\sqrt{H/D}$ and covariance (r) between sums (additive) and differences(dominance) in triple test cross analysis are presented in Table 5. The results indicate that the magnitude of the additive components of genetic variation were larger than the corresponding dominance ones for all the studied characters, where $\sqrt{H/D}$ less than one indicating the partial degree of dominance.

Table 5: Estimates of additive (D) dominance (H) genetic components, degree of dominance $\sqrt{H/D}$ and covariance between sums and differences, PCV% and GCV% in triple test cross for the seven studied characters.

Components.	Lint yield /plant (g)	Boll weight (g)	Lint %	Seed index (g)	Micronaire reading	Pressley index	2.5% span length (mm)
D	111.8416**	0.5784**	23.0136**	2.7344**	1.2801**	1.520**	8.4424**
H	-3.0048	-0.0376	1.3112	0.7320*	0.0136	0.3104	1.2208*
$\sqrt{H/D}$	-0.164	-0.255	0.239	0.517	0.103	0.452	0.380
F	0.667	0.039	0.629	0.243	-0.018	-0.056	0.212
r	-0.063	-0.478	-0.298	0.457	0.160	0.184	-0.178
PCV%	17.42	11.83	4.69	7.06	11.96	4.87	3.30
GCV%	16.15	11.09	4.54	6.22	11.51	4.42	3.09

*and ** Significant at 0.05 aud 0.01 levels of probability, respectively

r = 0.666 for 7d.f at 0.05 level and 0.798 at 0.01 level

Hence, the additive gene effects were the predominant type and it played a major role in the inheritance of these characters These results agree with those of Gumber, et al(1983), EL-Okkia et al.(1989) Basu et al (1995) and Khedr (2002).

The direction of dominance as indicated by (F) value and the correlation coefficient (r) between sums and differences table 5 were insignificant for all characters. Insignificant F and (r) values indicated that dominant genes were umbidirection among the parental genotypes. F value was positive for lint cotton yield/plant, boll weight, lint percentage and 2.5% span length resulting from the increase of dominance alleles that more frequent for the first parent than the dominance reducers in the other parent. On the other hand, direction of dominance were negative for Pressley index and Micronaire reading, because the dominance reducers of alleles were more than the frequency for only two characters among the parental genotypes. Similar results were obtained by Jagtap and Kolhe (1986) and EL. Mansy (2005).

Phenotypic and genotypic coefficients of variation (PCV% and GCV%) in Table 5 were moderate for lint yield/ plant, boll weight and Micronaire reading, indicating that the magnitude of the genetic variability which persisted in these materials was sufficient for proving rather substantial amounts of improvement through the selection of superior hybrid. Also the data indicate slight discrepancy between PCV% and GCV% for all the studied characters.

The phenotypic (Rp) ,genotypic (Rg); additive (Ra) dominance (Rd), epistasis (Ri) and environmental (Re) correlation coefficients between studied traits are presented in Table 6.The phenotypic and genotypic correlation between lint yield /plant and boll weight, lint percentage, seed index, Micronaire reading and fiber length were positive and significant indicating that these characters were the most effective yield-contributing variables. Significantly positive additive correlation between lint yield /plant and Micronaire reading was obtained. These results indicate that selection for high lint yield gave corse fibers. The results provide evidence for positive and significant correlation between epistasis gene effects controlling lint yield /plant and boll weight and each of Micronaire reading and Pressley index. Rd was significant and positive between lint yield and fiber length. Khedr (2002) detected positive epistasis correlation between lint yield/plant and boll weight.

Rp and Rg were significant and positive between boll weight and each of lint percentage, seed index and Micronaire reading. Rp and Rg showed positive and significant between lint percentage and each of seed index and Micronaire reading. Rp, Rg and Re were positive and significant between seed index and Micronaire reading. Fiber quality showed positive and significant associations with theirs. Therefore, Rp, Rd, Ri, Rp and Rg values reported herein provide new information that may be used for cotton breeders attempting to maximize breeding efforts for the above characters.

Table 6: Estimates of phenotypic (Rp), genotypic (Rg), additive (Ra), dominance (Rd), epistasis (Ri.) and environmental (Re) correlation coefficients among seven characters of 27 hybrid populations

Correlation	Boll weight (g)	Lint %	Seed index (g)	Micronaire reading	Pressley index	2.5% span length (mm)
Lint cotton yield						
Rp	0.81**	0.75**	0.70**	0.82**	0.33	0.35*
Rg	0.90**	0.084**	0.79**	0.90**	0.39*	0.34*
Ra	0.58	0.44	0.52	0.71*	- 0.55	-0.17
Rd	0.19	0.03	- 0.27	- 0.05	- 0.002	0.73*
Ri	0.71*	0.61	0.32	0.11	- 0.18	- 0.12
Re	0.15	- 0.02	0.32*	0.18	0.004	0.16
Boll weight						
Rp		0.63**	0.73**	0.75**	0.20	0.29
Rg		0.67**	0.88**	0.85**	0.23	0.32
Ra		0.33	0.63	0.55	- 0.62	- 0.22
Rd		-0.44	0.52	0.42	0.37	0.13
Ri		0.65	-0 .21	0.28	0.02	- 0.26
Re		0.26	0.06	- 0.11	0.06	0.12
Lint percentage						
Rp			0.44*	0.67**	0.33	0.36
Rg			0.54**	0.73**	0.37	0.40*
Ra			0.18	0.46	- 0.28	0.00
Rd			- 0.60	- 0.27	0.48	0.28
Ri			- 0.35	0.05	0.06	0.06
Re			- 0.13	- 0.13	- 0.02	- 0.004
Seed index						
Rp				0.68**	0.36	0.15
Rg				0.73**	0.43*	0.18
Ra				0.24	- 0.33	- 0.58
Rd				0.61	- 0.30	- 0.39
Ri				0.38	0.10	0.10
Re				0.45**	0.07	0.04
Micronaire reading						
Rp					0.47*	0.55**
Rg					0.52**	0.59**
Ra					- 0.30	0.44
Rd					- 0.10	- 0.46
Ri					0.72*	- 0.19
Re					0.15	0.22
Pressley index						
Rp						0.68**
Rg						0.75**
Ra						0.50
Rd						0.35
Ri						- 0.01
Re						0.28*

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

REFERENCES

Basu, A.K.; P. Singh and S.S. Narayanan (1995). Progress of breeding barbadense cotton in India. J. Ind. Soc. Cott. Improve., 18: 95-102.

El-Akheder, A.A.A. (2001). Evaluation of some cotton crosses for earliness and economical traits. Ph.D. Thesis, Fac. Agric., Kafr El-Sheikh Tanta Univ., Egypt.

El-Lawendey, M.M.A. (2003). Effect of some selection procedures on lint yield and seed characters improvement in cotton. Ph.D. Thesis, Fac. Agric., Moshtohor, Zagazig Univ., Egypt.

El-Mansy, Y.M.E (2005). Using genetic components for predicting new recombinations in some cotton crosses Ph.D. Thesis, Fac. Agric., Mansoura, Univ., Egypt.

El-Okkia, A.F.H.; H.A. El-Harony and M.O. Ismail (1989). Heterosis, inbreeding depression, gene action and heritability estimates in an Egyptian cotton cross (*Gossypium barbadense* L.). Com. Sci. Dev. Res., Vol. 28..

Garge, H.R.; T.H. Singh and G.S. Chahal (1987). Genetical analysis through triple-test cross in the F_2 population of Upland Cotton. Indian. J. of Agric. Sci. 57(10): 701-704.

Gumber, R.K.; G.S. Chahal and T.H. Singh (1983). Genetical analysis of an intermating population in Upland cotton (*Gossypium hirsutum* L.). Cotton et-Fibers. Tropicales. 38(4): 329-333.

Jagtap, D.R. and A.K. Kolhe (1986). Genetic components of variation in Upland Cotton (Gossypium hirsutum L.) .J. IndianSoc. C otton Improve. 11(1): 8-11.

Jinks, J.L. and J.M. Perkins (1970). A general method for detection of additive, dominance and epistatic components of variation 111-F_2 and backcross populations. Heredity, 25: 419-429.

Jinks, J.L.; J.M. Perkisn and E.L. Breese (1969). A general method of detecting additive, dominance and epistasis variation for metrical traits: II. Application to inbred lines. Heredity, 24: 45-57.

Kearsey, M.J. and J.L. Jinks (1968). A general method of detecting additive, dominance and epistasis variation for a material trait. I. Theory. Heredity, 23, 403-409.
Kearsey, M.J. and Sturely,S.L. (1984). A model for the incorporation of epistasis into a computer simulation for three experimental designs. Heredity, London, 52: 373-82.
Khedr, A.H. (2002). Genetical studies on cotton. Ph.D. Thesis, Fac. Agric., Zagazig Univ., Egypt.

وراثة الصفات الكمية باستخدام التهجين الرجعي الثلاثي في القطن

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يهــدف هــذا البحث إلي تقدير التباينات الوراثية لبعض الصفات الكمية في ٣٩ تركيب وراثي للقطن ناتجة من التهجين الرجعي الثلاثي للهجين (جيزة ٨٦ × كارشنكي ٢) مع الأباء (جيزة ٤٥ ، جيزة ٧٠ ، جيزة ٨٥ ، جــيزة ٨٨ ، جــيزة ٨٩ ، جيزة ٩٠ ، بيما س٦ ، سيوفن ، س.ب٥٨) ولقــد تم تقييم الأباء مع الهجن في تجربة بتصميم قطاعات كاملة العشوائية ذات ثــلاث مكررات موسم ٢٠٠٥ بمحطة البحوث الزراعية بسخا ولقد تم دراسة كل من الصفات التالية :-

١- محصول القطن الشعر / نبات (جرام)
٢- وزن اللوزة (جرام) .
٣- معدل الحليج (نسبة الشعر) % .
٤- معامل البذر ة (جرام) .
٥- قراءة الميكرونير .
٦- معامل البريسلي .
٧- طول التيلة عند ٢,٥ % (مم) .

ويمكن تلخيص النتائج المتحصل عليها كما يلي :-

١- أظهــر اختــبار التفاعل غير الأليلي الكلي (التفوق) عدم وجود معــنوية لكــل الصــفات المدروسة بينما عند تجزئة التفاعل غير الأليلــي إلــي مكوناتــه (مضيف × مضيف ، مضيف × سيادي

سيادي × سيادي) أظهر الطراز المضيف × المضيف معنوية لوزن اللوزة ومعامل البريسلي فقط مما يوضح أن التفوق ليس له دورا هاماً في وراثة معظم الصفات المدروسة .

٢- أظهر طراز الفعل الجيني المضيف دوراً هاماً في وراثة كل الصفات المدروسة مما يوضح إمكان استعمال طرق الانتخاب المختلفة لتحسين هذه الصفات .

٣- أظهرت تقديرات الانحرافات الراجعة للسيادة معنوية لمعامل البذرة وطول التيلة عند ٢,٥ % فقط مما قد تعطي انحراف غير مفيد في التنبؤ بالتحسين الوراثي المتوقع بالانتخاب لهاتين الصفتين .

٤- أظهرت درجة السيادة وجود سيادة جزئية لكل الصفات المدروسة

٥- أظهرت اتجاه السيادة عدم وجود معنوية للصفات المدروسة مما يدل علي التوزيع المشتت للسيادة بين الآباء .

٦- وجد ارتباط بين الجينات المضيفة لكل من محصول القطن الشعر وقراءة الميكرونير.