GENETIC ANALYSIS OF YIELD AND SOME QUANTITATIVE CHARACTERS IN TWO INTRASPECIFIC CROSSES OF EGYPTIAN COTTON (*G. barbadense* L.)

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Abstract

A filed investigation was conducted at Sakha Agricultural Research Station, A.R.C., Egypt during 2000-2002 growing seasons. The two Egyptian cotton crosses, Giza 45 x Giza 75 and Giza 88 x Giza 89 with their six populations were evaluated for lint yield and lint yield components, seed characters and fiber quality. The data showed significant deviation from zero for the values of A, B and C, indicating the inadequacy of the additive-dominance model and the presence of non-allelic gene interactions for all studied characters, except micronaire reading. Significant epistatic deviations on the basis of F_2 mean (E_1) and back crosses mean (E_2) for most characters were in complete agreement with the outcome of A, B and C scaling test. All types of gene effects were significant and govern the inheritance of most studied characters. The potence ratio values indicated overdominance for bolls/plant, seed index and seed density in both crosses as well as 100-seed volume only in cross I, and lint yield/plant, lint/seed, lint percentage and heavy seed percentage in cross II. High to moderate heritability estimates in the narrow sense were found for all characters except seed density, in both crosses, 100-seed volume, heavy seed percentage and Pressley index in cross I and seeds/boll in cross II. Maximum predicted genetic advance values as a percent of F_2 mean ($\Delta g\%$) were detected for lint yield/plant and bolls/plant in both crosses .Genetic advances were also reported for lint/seed, 100-seed volume and heavy seed percentage in cross II.

INTRODUCTION

The plant breeder is interested in the determination of various types of gene effects to establish the most advantageous breeding programs for the improvement of desired characters in different crop species. Basic information is needed to understand the type of gene action in cotton breeding populations for yield and yield components. It is assumed in most analysis that non-allelic interaction are absent although these analysis rarely provide a valid test of this assumption. Information about epistatic gene effects would be of value to the plant breeder. Most of the literatures refer to the additive and dominance as the major components of gene effects. However, additional evidence for the incorporation of epistatic gene effect in the inheritance of different quantitative characters and the relative importance of the three types of gene effects in genetic variation is highly desired (Gamble, 1962). Jagtap (1993) reported that epistatis played a major role in the inheritance of lint percentage and bolls/plant over main effect. Hendawy (1994) indicated that the additive effect was highly significant for bolls/plant in the two crosses (Giza 69 x Giza 83 and Giza 75 x Tom 3).

Khalil and Khattab (1997) showed that both dominance and epistasis were significant for most of the studied characters. Gomaa *et al.* (1999) found that additive variance was the main component of the genetic variance for bolls/plant and seed index. Both additive and dominance controlled lint percentage. Abdel-Gelil (2001) observed that the additive x additive and additive x dominance were greater than dominance x dominance for lint yield/plant, lint percentage, lint index and seed index. Abd El-Bary (2003) revealed that the magnitude of additive genetic variances were positive and larger in magnitude than those of dominance variances for lint yield/plant, bolls/plant, lint percentage, seed index, Micronaire reading and Pressley index. The three types of epistatic variance contributed to the genetic expression of most studied characters. Khalil and Khattab (1997), Abdel-Gelil (2001) and Awad (2001) detected overdominance for lint yield/plant, bolls/plant, seeds/boll, lint percentage, seed index, Micronaire reading and Pressley index. . Hendawy (1994), Khalil and Khattab (1997), Gomaa *et al.* (1999) and Awad (2001) observed high expected genetic advances for lint yield/plant, bolls/plant, lint percentage, seed index and Micronaire reading.

MATERIALS AND METHODS

The present investigation was carried out at Sakha Experimental Farm, Sakha Agricultural Research Station, Agricultural Research Center, Egypt, during 2000, 2001 and 2002 growing seasons.

1. Genetic Materials:

Two Egyptian cotton crosses Giza 45 x Giza 75 and Giza 88 x Giza 89 were included to generate the experimental material in this study. The F_1 hybrids and the three segregating generations (BC_1, BC_2 and F_2) were developed in 2000 and 2001 seasons, respectively. The six populations of each cross were evaluated in randomized complete block design with two replications in 2002 season. Each replication consisted of 44 rows-16 rows for F_2, 8 rows for each of BC_1 and BC_2, 4 rows each for P_1, P_2 and F_1. Each row was 4.5 meter in length and 60 cm in width. Seeds were sown in hills spaced 30 cm apart, and two plants were left per hill at thinning time. Ordinary agricultural practices were done according to that followed in Sakha Experimental Farm.

Characters were assessed using individual guarded plants from the six populations (300 plants for F_2, 150 plants for each BC_1 and BC_2, 75 plants for each P_1, P_2 and F_1) as follows:

1. Lint yield: The weight in grams of lint yield per plant.
2. Bolls per plant: Average number of open bolls per plant at picking time.
3. Seeds per boll: Average number of seeds per boll determined from the five sound bolls sample after ginning and seed counts.
4. Lint per seed: Obtained by dividing lint weight of the five boll samples by seed counts.
5. Lint percent: Ratio of lint to seed cotton expressed as a percentage, using the formula:

$$\text{Lint \%} = \frac{\text{Weight of lint per plant}}{\text{Weight of seed cotton per plant}} \times 100$$

6. Seed index: The weight in grams of 100-seeds.
7. 100-seed volume. The volume in cubic cm of 100 delinted seeds.
8. Seed density: Ratio of seed index to 100-seed volume (g/cm^3).
9. Heavy seed %: Ratio of the seeds which settled down in water from the 100 delinted seeds as percentage. Percentages were transformed into arc-sin before statistical analysis.
10. Fiber fineness and maturity: Assessed in Micronaire reading according to A.S.T.M. (D 3818 - 79, 1998).
11. Fiber strength: (in lb/mg) by using the Pressley fiber strength tester at zero-gauge according to A.S.T.M. (D 1445 – 75, 1998).

The two fiber measurements were done under standard conditions of temperature (21° ± 2) and relative humidity (70% ± 2), at the laboratories of Cotton Technology Research Division, Cotton Research Institute in Giza.

2. Statistical and Genetical Analysis:

Data analysis followed the procedures and methods as outlined by Mather (1949), Smith (1952), Johnson *et al.* (1955), Miller *et al.* (1958), Allard (1960), Gamble (1962) and Marani (1968).

RESULTS AND DISCUSSION

1. Generation Means

The mean performance of the six populations P_1, P_2, F_1, BC_1, BC_2, F_2 of the two crosses (G. 45 x G. 75) and (G. 88 x G. 89) showed existence of substantial variability in the genetic material to allow improvements for most characters dealt with in this study (Table 1). parents showed wide divergence for lint yield/plant, bolls/plant and micronaire reading in both crosses. Also, parents showed wide variations for lint/seed, lint percentage and heavy seed percentage in cross I (G. 45 x G. 75). On the other hand, seeds/ boll, seed index, seed density and Pressley index in the two crosses did not exhibit substantial variations between parents.

Table (1) also shows that F_1 mean performance was better than either parents for seed index and seed density in the two crosses, 100-seed volume in cross I, lint yield/plant, bolls/plant and lint/seed in cross II, indicating overdominance.

With regard to both BC_1 and BC_2 mean performance results showed relative association with both P_1 and P_2 means, respectively for most characters investigated in the two crosses.

Concerning F_2 mean performance, it was lower than its F_1 mean for lint yield/plant, bolls/plant, seeds/boll, seed index and Pressley index in the two crosses, as well as, 100-seed volume and heavy seed percentage in cross I and seed density in cross II, suggesting the presence of dominance and epistatic interaction (Table 2). On the other hand, F_2 means were higher than F_1 mean for lint/seed, lint percentage and micronaire reading in both crosses, as well as, seed density in cross I, 100-seed volume and heavy seed percentage in cross II. This might indicate that no distinct depression occurred from F_1 to F_2.

2. Scaling Test, F_2-Deviation and BC-Deviation:

Results of the scaling tests (A, B and C) are shown in (Table 2). These tests demonstrated the presence of non-allelic gene interactions for all studied characters except micronaire reading in the two crosses. These results indicated the inadequacy of the additive-dominance model.

Regarding F_2-deviation (E_1) and BC-deviation (E_2), Table(2) shows significant epistatic E_1 and E_2 for all studied characters except seed index and micronaire reading in the two crosses, and heavy seed percentage in cross II. Also, epistatic deviations E_1 and E_2 for the studied characters were in the same direction with the outcome of A, B and C scaling tests indicating that there were non-allelic gene interactions. Similar results were reported by Awad (2001).

3. Gene Action Effects:

Genetic analysis of generation means to give estimates of additive (a), dominance (d) and the three epistatic effects, additive x additive (aa), additive x dominance (ad) and dominance x dominance (dd) were calculated according to the relationships illustrated by Gamble (1962).

Types of gene effects using generation means are shown in Table (3). Estimated mean effects parameters (m), which reflects the contribution due to the overall mean plus the locus effects and interaction of the fixed loci were found to be highly significant for all characters in both crosses. Initially, it is clear that all the studied characters were quantitatively inherited. The additive gene effects were significant and positive or negative for all studied characters except heavy seed percentage in both crosses, 100-seed volume in cross I, lint yield/plant and bolls/plant in cross II, suggesting the potentiality for attaining further improvements of most studied characters.

Dominance gene effects were found to be significant for lint percentage, seed index and 100-seed volume in both crosses, heavy seed percentgae and Pressley index in cross I, lint yield/plant, bolls/plant, seeds/boll, lint/seed and seed density in cross II.

Significant additive x additive epistatic type was detected for lint percentage, 100-seed volume and seed density in the two crosses, heavy seed percentage and Pressley index in cross I, lint yield/plant, bolls/plant, seeds/boll and lint/seed in cross II. Additive x dominance type of digenic epistasis was significant for all characters under investigation except seed density in cross I, and micronaire reading in both crosses. Dominance x dominance type of gene action was significant for lint percentage in the two crosses, lint yield and bolls/plant in cross I, seeds/boll, lint/seed, 100-seed volume and seed density in cross II.

Generally, it may be concluded from the abve results that all types of gene effects were significant and govern the inheritance of most studied characters with some exceptions indicating that selection index and phenotypic trait selection based on the accumulation of additive effects were successful in improving most of the characters under investigation. However to maximize selection advance, procedures known to be effective in shifting gene frequency such as recurrent selection, when both additive and non additive genetic variations are involved, would be preferred. These findings are in agreement with those obtained by Jagtap (1993), Khalil and Khattab (1997), Gomaa *et al.* (1999), Abdel-Gelil (2001) and Abd El-Bary (2003).

4. Potence Ratio and Heritability Estimates:

Potence ratio values (Table 4) indicated the existence of overdominance for bolls/plant, seed index and seed density in both crosses, 100-seed volume in cross I, lint yield/plant, lint/seed, lint percentage and heavy seed percentage in cross II, however, other characters under investigation expressed partial dominance. The existence of overdominance in lint yield/plant was previously reported (Abdel-Gelil, 2001, Awad, 2001) in bolls/plant and in seed index by Khalil and Khattab (1997) and Awad (2001).

Table 1. Generation means, standard errors for lint yield and lint components, seed characters and fiber quality in the two studied crosses.

Character	Cross	P_1	P_2	F_1	BC_1	BC_2	F_2
Lint yield/ plant (g)	I	9.59±0.261	16.15±0.310	11.55±0.33[illegible]	9.68±0.292	8.84±0.302	9.57±0.251
	II	8.73±0.343	12.81±0.385	13.01±0.346	10.75±0.319	10.82±0.325	9.68±0.267
Bolls/plant	I	13.87±0.374	15.43±0.280	13.55±0.373	12.68±0.342	10.25±0.315	11.64±0.274
	II	12.16±0.451	16.05±0.484	16.20±0.419	14.11±0.349	14.06±0.400	12.25±0.296
Seeds/boll	I	16.99±0.157	18.20±0.171	17.14±0.190	17.29±0.135	16.71±0.149	16.89±0.112
	II	16.41±0.149	17.53±0.151	16.44±0.143	17.69±0.144	16.04±0.142	15.60±0.107
Lint/seed (g)	I	0.040±0.0006	0.059±0.0007	0.048±0.0006	0.045±0.0005	0.050±0.0006	0.048±0.0004
	II	0.044±0.0007	0.046±0.0006	0.049±0.0005	0.042±0.0007	0.049±0.0007	0.050±0.0005
Lint percentage	I	32.49±0.219	38.21±0.217	32.90±0.220	32.45±0.195	34.23±0.193	33.83±0.158
	II	33.53±0.268	35.42±0.205	33.18±0.209	31.68±0.235	33.82±0.200	34.71±0.183
Seed index (g)	I	8.32±0.084	9.39±0.085	9.79±0.097	9.27±0.079	9.56±0.074	9.42±0.061
	II	8.86±0.095	8.31±0.095	9.90±0.088	9.11±0.081	9.67±0.083	9.34±0.066
100-seed volume (cm^3)	I	9.44±0.070	10.15±0.104	10.29±0.090	10.07±0.076	9.97±0.077	9.81±0.055
	II	9.51±0.082	7.93±0.030	8.82±0.078	9.25±0.061	8.15±0.059	9.24±0.054
Seed density (g/cm^3)	I	0.88±0.008	0.93±0.008	0.95±0.008	0.92±0.006	0.96±0.006	0.96±0.004
	II	0.93±0.010	1.05±0.009	1.13±0.010	0.99±0.007	1.19±0.007	1.01±0.005
Heavy seed (%)	I	41.48±1.668	67.28±1.213	59.99±1.714	52.01±1.279	55.50±1.266	50.09±0.938
	II	54.55±1.793	56.52±1.701	53.60±1.786	54.84±1.355	51.45±1.332	54.64±1.036
Micronaire reading	I	2.88±0.028	4.20±0.046	3.41±0.050	3.17±0.031	3.79±0.037	3.47±0.032
	II	3.13±0.047	3.93±0.055	3.43±0.049	3.36±0.039	3.63±0.041	3.55±0.034
Pressley index	I	10.85±0.068	10.65±0.072	10.79±0.067	10.99±0.056	10.39±0.057	10.44±0.042
	II	11.03±0.075	10.19±0.046	10.74±0.073	10.72±0.044	10.43±0.055	10.53±0.041

I = G. 45 x G. 75 II = G. 88 x G. 89

Table 2. Scaling test values (A, B and C) and epistatic deviations (E_1 and E_2) for the eleven cotton characters in the two studied crosses.

Character	Cross	Scaling test			Epistasis	
		A	B	C	E_1	E_2
Lint yield/ plant (g)	I	-1.78*±0.723	-10.02**±0.758	-10.56**±1.273	-2.64**±0.318	-5.90**±0.575
	II	-0.24±0.803	-4.18**±0.832	-8.84**±1.374	-2.21**±0.344	-2.21**±0.628
Bolls/plant	I	-2.06*±0.864	-8.48**±0.784	-9.84**±1.405	-2.46**±0.351	-5.27**±0.640
	II	-0.14±0.931	-4.13**±1.025	-11.61**±1.593	-2.90**±0.398	-2.14**±0.753
Seeds/boll	I	0.45±0.366	-1.92**±0.393	-1.91**±0.632	-0.48**±0.158	-0.74*±0.300
	II	2.53**±0.354	-1.89**±0.351	-4.42**±0.557	-1.11**±0.139	0.32±0.269
Lint/seed (g)	I	0.002±0.0013	-0.007**±0.0014	-0.003±0.0023	-0.001±0.0006	-0.003**±0.0011
	II	-0.009**±0.0016	0.003±0.0016	0.012**±0.0026	0.003**±0.0007	-0.003*±0.0012
Lint percentage	I	-0.49±0.498	-2.65**±0.495	-1.18±0.829	-0.30±0.207	-1.57**±0.384
	II	-3.35**±0.580	-0.96*±0.488	3.53**±0.908	0.88**±0.227	-2.16**±0.407
Seed index (g)	I	0.43*±0.204	-0.06±0.197	0.39±0.335	0.10±0.084	0.19±0.158
	II	-0.54**±0.208	1.13**±0.211	0.39±0.344	0.10±0.086	0.30±0.161
100-seed volume (cm^3)	I	0.41*±0.190	-0.50*±0.207	-0.93**±0.311	-0.23**±0.078	-0.05±0.154
	II	0.17±0.167	-0.45**±0.163	1.88**±0.289	0.47**±0.072	-0.14±0.129
Seed density (g/cm^3)	I	0.01±0.016	0.04*±0.016	0.13**±0.025	0.03**±0.006	0.03**±0.013
	II	-0.08**±0.020	0.20**±0.020	-0.20**±0.032	-0.05**±0.008	0.06**±0.016
Heavy seed (%)	I	2.55±3.502	-16.27**±3.289	-28.38**±5.484	-7.09**±1.371	-6.86*±2.691
	II	1.53±3.708	-7.22*±3.630	0.29±6.004	0.07±1.501	-2.85±2.886
Micronaire reading	I	0.05±0.085	-0.03±0.101	-0.02±0.170	-0.01±0.043	0.01±0.075
	II	0.16±0.104	-0.10±0.111	0.28±0.181	0.07±0.045	0.03±0.083
Pressley index	I	0.34*±0.148	-0.66**±0.151	-1.32**±0.235	-0.33**±0.059	-0.16±0.116
	II	-0.33*±0.137	-0.07±0.140	-0.58*±0.236	-0.15*±0.059	-0.20±0.111

I = G. 45 x G. 75 — E_1 refer to F_2-deviation — * Significant at 5% probability level (P<0.05)

II = G. 88 x G. 89 — E_2 refer to BC-deviation — ** Significant at 1% probability level(P<0.01)

Table 3. Types of gene effects using generation means of the eleven cotton characters in the two studied crosses.

Character	Cross	F_2 means m	Types of gene effects				
			a	d	aa	ad	dd
Lint yield/ plant (g)	I	9.57**	0.84*±0.420	-2.56±1.366	-1.24±1.308	4.12**±0.467	13.04**±2.109
	II	9.68**	-0.07±0.456	6.66**±1.470	4.42**±1.405	1.97**±0.524	0.00±2.283
Bolls/plant	I	11.64**	2.43**±0.465	-1.80±1.503	-0.70±1.437	3.21**±0.520	11.24**±2.331
	II	12.25**	0.05±0.531	9.44**±1.677	7.34**±1.589	2.00**±0.626	-3.07±2.656
Seeds/boll	I	16.89**	0.58**±0.201	-0.02±0.642	0.44±0.602	1.19**±0.232	1.03±1.023
	II	15.60**	1.65**±0.202	4.53**±0.615	5.06**±0.589	2.21**±0.228	-5.70**±0.981
Lint/seed (g)	I	0.048**	-0.005**±0.0007	-0.004±0.0023	-0.002±0.0022	0.005**±0.0009	0.007±0.0037
	II	0.050**	-0.007**±0.0010	-0.014**±0.0030	-0.018**±0.0029	-0.006**±0.0011	0.024**±0.0046
Lint percentage	I	33.83**	-1.78**±0.274	-4.41**±0.878	-1.96*±0.837	1.08**±0.315	5.10**±1.375
	II	34.71**	-2.14**±0.306	-9.14**±0.991	-7.84**±0.954	-1.20**±0.349	12.15**±1.522
Seed index (g)	I	9.42**	-0.29**±0.109	0.92**±0.348	-0.02±0.328	0.25*±0.12	-0.35±0.549
	II	9.34**	-0.56**±0.116	1.52**±0.368	0.20±0350	-0.84**±0.134	-0.79±0.578
100-seed volume (cm^3)	I	9.81**	0.10±0.108	1.34**±0.327	0.84**±0.308	0.46**±0.125	-0.75±0.533
	II	9.24**	1.10**±0.085	-2.06**±0.291	-2.16**±0.275	0.31**±0.103	2.44**±0.448
Seed density (g/cm^3)	I	0.96**	-0.04**±0.008	-0.035±0.025	-0.08**±0.023	-0.015±0.010	0.03±0.042
	II	1.01**	-0.20**±0.010	0.46**±0.032	0.32**±0.030	-0.14**±0.015	-0.44**±0.052
Heavy seed (%)	I	50.09**	-3.49±1.799	20.27**±5.570	14.66**±5.198	9.41**±2.074	-0.94±9.049
	II	54.64**	3.39±1.900	-7.92±6.028	-5.98±5.623	3.39*±1.720	11.67±9.685
Micronaire reading	I	3.47**	-0.62**±0.049	-0.09±0.169	0.04±0.159	0.04±0.055	-0.06±0.258
	II	3.55**	-0.27**±0.057	-0.32±0.187	-0.22±0.176	0.13±0.068	0.16±0.292
Pressley index	I	10.44**	0.60**±0.080	1.04**±0.245	1.00**±0.231	0.50**±0.094	-0.68±0.398
	II	10.53**	0.29**±0.071	0.31±0.232	0.18±0.216	-0.13*±0.060	0.22±0.368

I = G. 45 x G. 75 * Significant at 5% probability level ($P<0.05$)

II = G. 88 x G. 89 ** Significant at 1% probability level($P<0.01$)

Table 4. Phenotypic (PCV) and genotypic (GCV) coefficients of variation in F_2 generations, potence ratio (P), heritability in broad (h^2_b) and narrow (h^2_n) sense, and expected genetic advance (Δg%) of the eleven cotton characters in the two studied crosses.

Character	Cross	PCV %	GCV %	(P)	h^2_b	h^2_n	Δg %
Lint yield/ plant (g)	I	45.4	36.1	0.40	63.3	59.5	55.6
	II	47.8	35.5	-1.10	55.0	54.7	53.9
Bolls/plant	I	40.7	31.6	1.41	60.3	55.8	46.8
	II	41.8	26.9	-1.08	41.4	38.4	33.0
Seeds/boll	I	11.5	7.3	0.75	40.1	38.3	9.1
	II	11.9	8.6	0.95	52.7	22.8	5.6
Lint/seed (g)	I	14.8	9.4	0.16	40.7	38.0	11.6
	II	18.6	14.9	-4.00	64.1	43.0	16.4
Lint percentage	I	8.1	5.8	0.86	52.1	48.8	8.1
	II	9.1	7.1	1.37	60.9	60.6	11.4
Seed index (g)	I	11.3	7.8	-1.75	47.8	43.7	10.2
	II	12.2	8.6	-4.78	50.2	43.1	10.8
100-seed volume (cm^3)	I	9.7	5.7	-1.39	34.0	6.3	1.3
	II	10.2	6.9	-0.13	45.6	76.1	15.9
Seed density (g/cm^3)	I	7.5	2.4	-1.80	10.4	2.8	0.4
	II	9.0	3.9	-2.33	18.6	5.8	1.1
Heavy seed (%)	I	32.4	18.3	-0.43	31.9	15.9	10.7
	II	32.8	17.3	1.96	27.8	31.9	21.6
Micronaire reading	I	15.8	11.6	0.20	54.7	81.7	26.5
	II	16.4	10.9	0.25	44.0	56.0	18.9
Pressley index	I	6.9	3.8	-0.40	30.7	13.1	1.9
	II	6.7	4.0	-0.31	34.7	50.0	6.9

Phenotypic and genotypic coefficients of variation, broad and narrow sense heritabilities and expected genetic advance (Δg%) are presented in Table (4). The estimates of phenotypic and genotypic coefficients of variation (PCV % and GCV%) were higher for lint yield/plant, bolls/plant and heavy seed percentage in both crosses than all other characters. Generally, there were relatively distinct differences between phenotypic and genotypic coefficients of variation for most characters in the two crosses, indicating that environmental effects had their impact on these characters.

High heritability estimates in broad sense (> 50%) were detected for lint yield/plant and lint percentage in the two crosses, bolls/plant and micronaire reading in cross I, seeds/boll, lint/seed and seed index in cross II. Similar results were obtained by Hendawy (1994). Moderate heritability estimates in broad sense (from 30 to 50%), were obtained for the remaining characters in both crosses except seed density and heavy seed percentage in cross II. High to moderate narrow sense heritability estimates were found for all characters except seed density in the two crosses, 100-seed volume, heavy seed percentage and Pressley index in cross I and seeds/boll in cross II, where low narrow sense heritability values (< 30%) were recorded for these characters.The difference between broad and narrow sense heritabilities may be due to the presence of non-additive gene action in the inheritance of most characters. These results were in agreement with those reported by Khalil and Khattab (1997), Gomaa *et al.* (1999) and Awad (2001).

Regarding heritability estimates in narrow sense of some studied characters in both crosses (Table 4), it is noticeable that these estimates were higher than their corresponding broad sense heritability estimates. This may be attributed to using of different sample sizes .These results are in agreement with those obtained by Awad (2001).

5. Predicted Genetic Advance:

The highest predicted genetic advances as percentage of F_2 mean ($\Delta g\%$) (Table 4) were achieved for lint yield/plant and bolls/plant in the two crosses, lint/seed, 100-seed volume and heavy seed percentage in cross II. On the other hand, low predicted genetic advances were detected for seed density in the two crosses, 100-seed volume and Pressley index in cross I.

High to moderate values of heritability estimates in narrow sense were found to be associated with high and moderate genetic advance in most characters investigated, so selection for these characters may be effective. Similar conclusions were found by Hendawy (1994).

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التحليل الوراثى للمحصول وبعض الصفات الكمية لهجينين من القطن المصرى

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يهدف هذا البحث الى دراسة طبيعة الفعل الجينى ، درجة السيادة ، درجة التوريث والتحسين الوراثى المتوقع بالانتخاب لصفات محصول الشعر ومكوناته ، صفات البذرة وصفات التيله .
لتحقيق هذه الأهداف تم تقييم العشائر الست المتمثله فى عشائر الأبوين والجيلين الأول والثانى والجيلين الرجعيين لهجينين من القطن المصري وهما (جيزة ٤٥ × جيزة ٧٥) ، (جيزة ٨٨ × جيزة ٨٩) بمحطة البحوث الزراعية بسخا وذلك فى موسم ٢٠٠٢ وقد تم تحليل البيانات باستخدام طريقة جامبل (١٩٦٢م) .

ويمكن تلخيص النتائج المتحصل عليها كالآتى :

١- أظهر اختبار Scaling وانحرافات الجيل الثانى (E1) وانحرافات الهجن الرجعية (E2) معنوية لمعظم الصفات المدروسة فى الهجينين مما يؤكد أهمية التباين التفوقى فى وراثة هذه الصفات.

٢- أظهرت كل طرز الفعل الجينى دوراً هاماً فى وراثة معظم الصفات المدروسة مع وجود بعض الإستثناءات مما يوضح إمكان استعمال طرق الانتخاب المناسبة لتحسين هذه الصفات

٣- أظهرت درجة السيادة وجود السيادة الفائقة لصفات عدد اللوز /نبات ، معامل البذرة وكثافة البذرة فى الهجينين بالإضافة الى حجم المائة بذرة فى الهجين الأول فقط ومحصول القطن الشعر/نبات، وزن الشعر / بذرة ، معدل الحليج والنسبة المئوية للبذرة الثقيلة فى الهجين الثاني بينما كانت السيادة جزئية لبقية الصفات .

٤- أظهرت درجة التوريث بمعناها الدقيق قيما عالية الى معتدله لكل الصفات المدروسة فى الهجينين ما عدا كثافة البذرة فى الهجينين وحجم المائة بذرة ، النسبة المئوية للبذرة الثقيلة ومعامل البريسلى فى الهجين الأول وعدد البذور / لوزة فى الهجين الثاني .

٥- أظهرت النتائج قيماً عالية للنسبة المئوية للتحسين الوراثى المتوقع بالإنتخاب لكل من محصول القطن الشعر/ نبات وعدد اللوز / نبات فى الهجينين ووزن الشعر / بذرة ، حجم المائة بذرة والنسبة المئوية للبذرة الثقيلة فى الهجين الثاني .