# GENETIC STUDIES ON SOME QUANTITATIVE CHARACTERS IN THE EGYPTIAN COTTON CROSS, (GIZA 80 X GIZA 86)

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***Abstract***

The main objective of this investigation was to estimate heterosis, genetic parameters, genetic advance under selection, heritability in broad and narrow sense for yield, its components, earliness, and fiber properties in an Egyptian cotton cross of Giza 80 x Giza 86. The results of the estimates of the parameters of gene effects indicated that additive, dominance and epistatic gene effects were involved in the inheritance of most traits. The non-additive components were greater in magnitude than additive component for most traits. Mid-parent heterosis was observed for all traits except for boll weight, while useful heterosis were detected only for seed cotton yield, days to first flower and micronaire value. Inbreeding depression was recorded only for seed cotton yield. Over-dominance appeared to control yield, boll numbers, days to first flower, fiber length, fiber strength and micronaire value. High or moderate broad sense heritability values were detected for all traits, while moderate narrow sense heritability was accounted only for lint percentage, days to first flower and all fiber properties. The phenotypic and genotypic correlation between seed cotton yield and each of lint yield, boll number, boll weight and seed index were positive and large in magnitude. Moreover, positive and significant genotypic correlations for seed cotton yield, lint yield and boll number with micronaire value and reflectance traits were detected. While negative genotypic correlation coefficient for the above mentioned yield traits were observed for days to first flower indicating that the increase in yield may improve earliness. Also, significant negative correlations were found between yield and both of fiber length, fiber strength and yellowness. Such undesirable associations need to be broken by suitable breeding techniques like recurrent selection or by biparental mating system to obtain newer and useful genetic recombinations for these characters.

## INTRODUCTION

The main objectives of most cotton breeding programs are intended for higher yield, early maturity and improvement of fiber properties. These breeding programs heavily depend on the knowledge concerning genetic parameters, the types of genetic components which influence the inherited traits, heritability estimates as well as the relationships among cotton characters. Several workers handled some of these parameters in their investigations; Okasha *et al* (1998), El-Disouqi *et al* (2000) and El-Adly (2004) with different results. Some investigators stated that all genetic variance components were detected for yield and its components except for lint percentage and fiber strength which were only controlled by dominant gene effects Al-Enani and

Ismail (1986) and Ismail *et al* (1991) reported that significant additive gene effects were detected for some yield components, while dominance, additive x additive and dominance x dominance gene effects were observed for earliness traits and micronaire value. Mohamed *et al.* (2001) reported that the epistasis components was greater in magnitude than additive or dominance components for boll weight, lint percentage, seed index, boll number and days to first flower. However, Mahmoud *et al.* (2004) pointed out that dominance gene action was the main type of gene effects for days to first flower, boll weight, boll number and lint index characters. Correlation coefficients among different traits were also studied by several researchers; Kloth (1998) studied the relationships among fiber traits; he found significant correlations between micronaire value and fiber strength characters at the phenotypic level only. On the other hand, Younis *et al.* (1989), on some Egyptian cotton varieties, observed phenotypic and genotypic correlations between lint yield and its components. Ismail *et al.* (1991) detected genotypic correlations between earliness index and days to first flower, seed cotton yield with boll number. The present work was carried out to study the genetic behavior, the relative importance of the genetic variance types and to determine the phenotypic and genotypic correlation coefficients for yield, its components, earliness and fiber properties in the Egyptian cotton cross (Giza 80 x Giza 86).

## MATERIALS AND METHODS

This investigation was carried out at Giza Experiment Station, Agricultural Research Center during three successive seasons 2002-2004. Two long staple Egyptian cotton cultivars were used as parents; Giza 80 which is characterized by high yield ability, high lint percentage and dark creamy lint, and Giza 86 which is distinguished by higher fiber quality and white lint colour.

In 2002 season the parental cultivars were crossed to produce F1 hybrid seeds. In 2003, the F1 was backcrossed to both parents. The parents were also crossed for more hybrid seeds. The F1 was selfed to obtain F2 seeds. In 2004, six populations, i.e. two parents (P1, P2), F1, F2 and the two backcrosses (BC1, BC2) were sown in a non-replicated experiment included three rows of each of the P1, P2 and F1, ten rows for the backcrosses and eighteen rows for F2. Rows 7m long, 60cm apart and comprised 10 hills each of one plant. All the conventional cotton agronomic practices were applied.

The following characters were recorded on an individual plant basis for the six populations:

- Seed cotton yield per plant in grams (SCY).
- Lint yield per plant in grams (LY).

- Number of bolls per plant (BN).
- Boll weight in grams (BW).
- Lint percentage; the ratio of lint cotton to seed cotton yield in percentage (LP).
- Seed index; weight of 100 seeds in grams (SI).
- Number of days from sowing date to the opening of the first flower (DFF).
- Position of first fruiting node (FFN).
- Fiber length in mm (FL).
- Fiber strength in gm/tex (FS).
- Fiber fineness by micronaire value (MIC).
- Fiber reflection as percentage (RD).
- Degree of Yellowness on the lint color (+b).

All fiber properties (FS, MIC, RD and +b) were measured By HVI (High Volume Instrument) in the laboratory of the Cotton Technology Research Department, Cotton Research Institute at Giza.

All the genetic analyses were made using generation means. A,B and C scaling test of Mather and Jinks (1971) were used to test the adequacy of additive-dominance model, the percentage of heterosis (MP and HP), inbreeding depression (ID), potence ratio (PR), heritabilities (Hb% and Hn%) and genetic advance (GA%) under selection, Phenotypic and genotypic correlation coefficients were determined according to Burton (1951).

## RESULTS AND DISCUSSION

Mean performances and standard errors of six populations for thirteen characters under study are presented in Table (1). The results showed that Giza 80 (P1) surpassed Giza 86 (P2) for yield and its components except for boll weight and seed index, while Giza 86 showed lengthier and stronger fiber properties than Giza 80. F1 generation mean values for seed cotton yield, lint yield and boll number were higher than their corresponding mid-parents as well as the better parent, indicating the presence of heterotic effects for these traits. Moreover, F2 mean performances slightly exceeded F1 for most studied characters with exception of lint percentage and yellowness traits. Similar results were obtained by Abdel-Zaher (1999), El-Disouqi and Zeina (2001) and Abdel-Zaher *et al* (2003).

The results of scaling test A, B and C are given in Table (2). It was worthy to mention that at least one of the three tests was significant except for boll number, indicating the role of non-allelic interaction governing the studied characters. The data revealed that the mean of F2 performance (m) was highly significant for all studied characters. Also, the additive effects (d) were significant positive for seed cotton yield, lint yield, boll weight, lint percentage, micronaire value and yellowness, negatively

Table 1. Mean performances and standard errors of the studied characters in the six populations of the cross (Giza 80 x Giza 86).

| Characters | P1 | P2 | F1 | F2 | BC1 | BC2 |
|---|---|---|---|---|---|---|
| SCY gm | 42.64±1.35 | 36.27±1.39 | 45.59±1.56 | 51.41±2.80 | 44.60±1.62 | 41.94±1.65 |
| LY gm | 17.50±0.56 | 13.64±0.54 | 18.34±0.62 | 20.08±1.06 | 17.10±0.62 | 15.57±0.60 |
| BN | 15.5 ± 0.49 | 12.1 ± 0.43 | 15.7 ± 0.54 | 16.2 ± 0.76 | 14.2 ± 0.50 | 13.8 ± 0.54 |
| BW gm | 2.8 ± 0.03 | 3.0 ± 0.02 | 2.9 ± 0.03 | 3.1 ± 0.05 | 3.1 ± 0.03 | 3.0 ± 0.03 |
| LP % | 41.0±0.12 | 37.6±0.10 | 40.3 ± 0.14 | 39.3 ± 0.24 | 38.4 ± 0.17 | 37.2 ± 0.18 |
| SI gm | 9.5 ± 0.06 | 10.6 ± 0.09 | 10.4 ± 0.09 | 10.8 ± 0.12 | 11.0 ± 0.07 | 11.2 ± 0.08 |
| DFF | 74.8 ± 0.25 | 75.4 ± 0.25 | 74.1 ± 0.17 | 75.0 ± 0.60 | 73.1 ± 0.46 | 74.5 ± 0.51 |
| FFN | 7.1 ± 0.09 | 7.4 ± 0.13 | 7.3 ± 0.08 | 7.7 ± 0.15 | 7.3 ± 0.10 | 7.1 ± 0.11 |
| FL mm | 32.4 ± 0.10 | 34.9 ± 0.07 | 32.3 ± 0.10 | 33.7 ± 0.19 | 32.0 ± 0.13 | 33.9 ± 0.15 |
| FS g/tex | 37.8 ± 0.14 | 39.6 ± 0.18 | 36.4 ± 0.19 | 38.4 ± 0.29 | 38.1 ± 0.22 | 39.5 ± 0.20 |
| MIC | 4.5 ± 0.03 | 4.4 ± 0.03 | 4.3 ± 0.03 | 4.6 ± 0.05 | 4.6 ± 0.04 | 4.4 ± 0.04 |
| RD % | 62.2 ± 0.03 | 71.2 ± 0.23 | 63.6 ± 0.23 | 68.1 ± 0.34 | 65.1 ± 0.25 | 71.0 ± 0.29 |
| +b | 12.6 ± 0.09 | 9.3 ± 0.08 | 11.5 ± 0.06 | 10.8 ± 0.13 | 11.8 ± 0.11 | 9.9 ± 0.08 |

significant for seed index, days to first flower, fiber length, fiber strength and fiber reflectance. While boll number and first fruiting node showed insignificant additive effects. On the other hand, the dominance effects (h) were significant and negative for most studied characters except for seed index which was highly positive significant, and insignificant for boll weight, fiber strength and yellowness traits. Generally the dominance gene effects were relatively greater in magnitude for most studied characters compared with the additive effects.

The type of epistatic interaction of additive x additive (i) was negatively significant for most traits with the exception of seed index which was positively significant, but insignificant for boll weight, days to first flower, fiber strength, reflectance and yellowness characters. With respect to the additive x dominance, boll weight, seed index and micronaire value characters exhibited positively significant values, while fiber length and reflectance showed negative significant values. Regarding the dominance x dominance (l) type of epistasis, significantly positive values were observed for lint yield, boll number, lint percentage, days to first flower, first fruiting node and fiber length characters, while negatively significant (l) epistasis was observed for boll weight, seed index, fiber strength and reflectance traits. It could be concluded from these results that the dominance x dominance type of epistasis was greater in magnitude than those of the other genetic components for most studied traits. These results, generally suggest the importance of non-additive gene effects in the inheritance of most of these traits, In this respect, El-Disouqi *et al.* (2000), Mohamed *et al* (2001) and Mahmoud *et al* (2004) reported high magnitude of epistatic components rather than other genetic components for most studied characters.

*Table 2. Scaling tests and gene effects for the studied characters of the cross (Giza 80 x Giza 86)*

| characters | Scaling test | | | Type of gene effects | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | m | d | h | i | j | l |
| SCY | 2.57 | 0.18 | 36.19 ** | 51.56 ** | 4.38* | -27.30 * | -33.44 * | -2.39 | 30.68 |
| LY | -0.95 | -1.50 | 12.70 * | 20.12 ** | 2.20 ** | -12.41 * | -15.16 ** | -0.54 | 17.61 ** |
| BN | -1.93 | -0.65 | 6.54 | 16.41 ** | 1.03 | -7.21 * | -9.14 ** | -1.27 | 11.74 * |
| BW | 0.53 ** | 0.13 * | 0.72 ** | 3.07 ** | 0.08 * | -0.02 | -0.05 | 0.40 ** | -0.61 * |
| LP | -4.40 ** | -3.42 ** | -1.96 | 39.28 ** | 1.23 ** | -4.89 ** | -5.86 ** | -0.98 | 13.69 ** |
| SI | 2.27 ** | 1.50 ** | 2.22 ** | 10.78 ** | -0.18 * | 1.92 ** | 1.54 ** | 0.78 ** | -5.31 ** |
| DFF | -2.60 ** | -0.45 | 1.49 | 74.95 ** | -1.36 * | -5.52 * | -4.54 | -2.16 | 7.59 * |
| FFN | -0.10 | -0.51 * | 1.81 ** | 7.73 ** | 0.07 | -2.31 ** | -2.42 ** | 0.40 | 3.03 ** |
| FL | -0.81 ** | 0.68 * | 2.87 ** | 33.68 ** | -1.98 ** | -4.37 ** | -3.00 ** | -1.48 * | 3.14 ** |
| FS | 2.01 ** | 2.91 ** | 3.44 ** | 38.43 ** | -1.36 ** | -0.77 | 1.48 | -0.89 | -6.40 ** |
| MIC | 0.18 ** | -0.04 | 0.93 ** | 4.62 ** | 0.20 ** | -0.90 ** | -0.79 * | 0.22* | 0.66 |
| RD | 4.49 ** | 7.06 ** | 11.69 ** | 68.08 ** | -5.82 ** | -3.21 * | -0.14 | -2.57 ** | -11.41 ** |
| +b | -1.20 ** | -1.74 ** | -3.31 ** | 10.75 ** | 1.92 ** | 1.62 | 0.37 | 0.54 | 2.56 |

*,** significantly different from zero at 5% and 1% probability, respectively.

The values of heterosis versus mid and better parent were presented in Table (3). Significant positive heterosis relative to mid-parent was detected for yield and its components except boll weight, while negatively significant heterosis values were found for fiber length and fiber strength. With respect to lint colour traits, the result showed significant mid parent heterosis for these traits directed to the creamy colour. These findings were in harmony with those of El- Okkia *et al.* (1989), Abo-Arab *et al.* (1992) and (2000) who found significant heterosis for lint color. Negative better parent heterosis were observed for most traits, while, no better parent heterosis were detected for yield characters (SCY, LY and BN). It could be concluded from the above results that the heterosis values differed according to the parents and the studied traits. El-Disouqi *et al.* (2000) reported that the amount of heterosis depends upon the origin of parents involved in hybridization and the character under study.

Concerning inbreeding depression (Table 3), the results showed significant negative inbreeding depression in F2 generation for seed cotton yield and insignificant for most traits, these findings might suggest a sort of linkage or incomplete segregation. Similar results were reported by Ismail *et al.* (1991), Mohamed *et al.* (2001), Abdel-Zaher *et al.* (2003) and El-Adly (2004).

Potence ratio was more than unit for seed cotton yield, lint yield, boll number, days to first flower and micronaire value towards the desired parent. While, fiber length and fiber strength estimates were observed towards the lower yielding parent, indicating over-dominance and / or repulsion linkage. On the other hand, the remaining characters exhibited positive or negative values of potence ratio, less than unit, indicating partial dominance. It seems from the aforementioned results (Table 3), that the heterosis was partially affected by the degree of dominance, Al-Adly (2004) indicated that the main cause of heterotic effects was over dominance and epistatic gene effects.

Heritability estimates in broad and narrow sense as well as the expected genetic advance are presented in Table (3). High or moderate broad sense heritability were detected for all traits, Mahmoud *et al* (2004) found high value of heritability for days to first flower. Also, high or moderate narrow sense heritability estimates were calculated for lint percentage, days to first flower and all fiber properties, suggesting that selection on the basis of phenotype could be highly effective for these traits. However, low narrow sense heritability were observed for seed cotton yield, lint yield, seed index, boll weight, boll number and first fruiting node indicating that selection during early segregation would be ineffective. Mohamed *et al.* (2001) and Al-Adly (2004) obtained similar results.

The expected genetic advance from selecting the highest 5% of population in F2 plants ranged from 0.64% for both fiber length and reflectance characters, to 4.49% for boll number. Moreover, seed cotton yield and lint yield characters ,also, gave high values; 3.80% and 3.58% respectively, such large estimates could be due to the wide variation obtained in the F2-progenies, Okasha *et al.* (1998), El-Disouqi and Zeina (2001) and El-Adly (2004) found that the genetic advance upon selection was high for seed cotton yield character.

Table 3. Estimates of the genetic parameter of the cross (Giza 80 x Giza 86).

| Traits | MP | HP | ID | PR | Hb% | Hn% | G% |
|---|---|---|---|---|---|---|---|
| SCY | 15.5 ** | 6.90 | -12.8 ** | 1.92 | 73.9 | 33.8 | 3.80 |
| LY | 17.83 ** | 4.83 | -9.46 | 1.44 | 70.9 | 32.8 | 3.58 |
| BN | 13.84 ** | 1.58 | -3.33 | 1.15 | 58.7 | 46.4 | 4.49 |
| BW | 1.03 | -2.77 ** | -7.44 | 0.26 | 72.8 | 33.7 | 1.16 |
| LP | 2.47 ** | -1.84 ** | 2.42 | 0.56 | 73.5 | 55.3 | 0.69 |
| SI | 3.75 ** | -1.85 | -3.51 | -0.66 | 54.0 | 43.0 | 0.98 |
| DFF | -1.30 ** | -0.92 * | -1.16 | 3.41 | 85.5 | 66.7 | 1.09 |
| FFN | 1.54 | 3.48 * | -5.41 | -0.82 | 51.5 | 47.8 | 1.90 |
| FL | -4.08 ** | -7.48 ** | -4.35 | 1.11 | 76.9 | 56.1 | 0.64 |
| FS | -5.84 ** | -3.58 ** | -5.46 | 2.50 | 65.6 | 51.4 | 0.80 |
| MIC | -2.32** | -4.31 ** | -6.55 | -1.12 | 58.4 | 53.3 | 1.15 |
| RD | -4.61 ** | 2.34 ** | -7.01 | 0.68 | 68.4 | 62.3 | 0.64 |
| +b | 5.28 ** | -8.53 ** | 6.78 | 0.35 | 60.6 | 58.7 | 1.46 |

*,** significantly different from zerc at 5% and 1% probability, respectively.

Phenotypic and genotypic correlation coefficients among different studied characters are presented in Table (4). In most cases, genotypic correlation coefficients were higher than phenotypic ones, Dhanda *et al* (1984) and Ismail *et al.* (1991). Since yield is a complex character, direct selection for it would be a reliable approach on account of being highly influenced by environmental factors. Therefore, it becomes essential to identify the component characters in which there correlations with yield are quite important to device in efficient selection criterion for yield. The phenotypic and genotypic correlation between seed cotton yield and each of lint yield, boll number, boll weight, and seed index were positive and large in magnitude. It is worthy to mention that each of the seed cotton yield, lint yield and boll number scored similar relationship with other traits. Significant negative correlation was detected for days to first flower with each of seed cotton yield, lint yield and boll number indicating that selection for earliness may improve the yield. Concerning the lint percentage, the results showed significant positive genotypic correlations with lint yield, fiber length, micronaire value and earliness traits. The results also showed that fiber length was genotypically correlated with fiber strength, fiber fineness (MIC), fiber reflectance and yellowness (white trend). However, negative correlation was observed between yield and both of fiber length and fiber strength. Such undesirable associations need to be broken by biparental mating or recurrent selection, as they create difficulties in simultaneous improvement of these important characters. These findings are in general accordance with those obtained by Younis *et al* (1989), Kloth (1998) and Azhar *et al* (2004)

**Breeding implication:**

Since most of the characters of economic importance, such as yield, are complex in inheritance and may involve several related characters, the degree of genotypic and phenotypic correlation of the characters is also important. These correlations are not only of interest from a theoretical consideration of the quantitative inheritance of the characters, but of practical value since selection is usually concerned with changing two or more traits simultaneously. According to the results of this investigation, it could be concluded that the yield and its components were genotypically and phenotypically correlated, in addition to the desired relationships found between yield and boll number (BN) with the days to first flower (DFF) as earliness trait. Therefore, selection for yield or its components may improve earliness. However, lower narrow sense heritability for yield comparable with its components (BN, BW and SI) and with (DFF), in addition to the complex nature of yield inheritance, might suggesting that selection based on yield components and (DFF) would be better for the breeder to improve yield. On the other hand, selection shouldn't be applied at early generations because of the prevalence of non-additive gene effects for most studied characters. In addition to the undesirable correlations which was observed between yield characters and fiber properties. Therefore, it might be valuable to include the segregated generations in a suitable technique such as the recurrent selection or biparental mating system for improvement of the attributes of the studied materials.

*Table 4. Phenotypic and Genotypic coefficient of correlations among the studied traits of the cross (Giza 80 x Giza 86).*

| Traits | Type of correlation | LY | BN | BW | LP | SI | DFF | FFN | FL | FS | MIC | RD | +b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SCY | P | 0.957 ** | 0.911 ** | 0.569 ** | 0.220 * | 0.458 ** | -0.407 ** | -0.187 | -0.040 | -0.312 * | 0.343 ** | 0.390 ** | -0.270 ** |
| | G | 0.982 ** | 0.977** | 0.877 ** | 0.184 | 0.664 ** | -0.602 ** | -0.250 * | -0.464 ** | -0.288 ** | 0.419 ** | 0.493 ** | -0.394** |
| LY | P | | 0.913 ** | 0.558 ** | 0.327 ** | 0.372 ** | -0.353 ** | -0.210 * | -0.048 | -0.340 ** | 0.388 ** | 0.386 ** | -0.262 * |
| | G | | 0.978 ** | 0.913 ** | 0.315 ** | 0.614 ** | -0.652 ** | -0.299 ** | -0.658 ** | -0.330 ** | 0.525 ** | 0.517 ** | -0.473 ** |
| BN | P | | | 0.400 ** | 0.196 * | 0.290 ** | -0.403 ** | -0.291 ** | -0.037 | -0.327 ** | 0.326 ** | 0.432 ** | -0.304 * |
| | G | | | 0.566 ** | 0.147 | 0.343 ** | -0.763 ** | -0.576 ** | -0.471 ** | -0.456 ** | 0.376 ** | 0.702 ** | -0.489 ** |
| BW | P | | | | -0.271 ** | 0.549 ** | -0.092 | 0.060 | -0.007 | -0.188 * | 0.133 | 0.021 | -0.120 |
| | G | | | | -0.696 ** | 0.955 ** | -0.068 | 0.366 ** | -0.101 | -0.454 ** | -0.056 | 0.089 | -0.195 * |
| LP | P | | | | | -0.587 ** | 0.142 | 0.131 | -0.050 | 0.030 | 0.081 | -0.059 | 0.065 |
| | G | | | | | -0.962 ** | 0.332 ** | 0.532 ** | 0.523 ** | -0.502 ** | 0.538 ** | -0.067 | 0.165 |
| SI | P | | | | | | -0.078 | 0.005 | 0.123 | -0.155 | 0.183 * | 0.126 | -0.186 * |
| | G | | | | | | -0.136 | 0.113 | -0.124 | 0.367 ** | 0.322 ** | 0.042 | -0.338 ** |
| DFF | P | | | | | | | 0.662 ** | 0.018 | 0.156 | -0.124 | -0.283 ** | 0.118 |
| | G | | | | | | | 0.746 ** | -0.232 * | 0.378 ** | -0.414 ** | -0.359 ** | 0.114 |
| FFN | P | | | | | | | | 0.123 | 0.128 | -0.074 | -0.147 | -0.028 |
| | G | | | | | | | | 0.066 | 0.341 ** | -0.384 ** | -0.042 | -0.041 |
| FL | P | | | | | | | | | -0.089 | -0.038 | 0.320 ** | -0.113 |
| | G | | | | | | | | | 0.565 ** | -0.973 ** | 0.659 ** | -0.407 ** |
| FS | P | | | | | | | | | | -0.088 | -0.251 ** | 0.477 ** |
| | G | | | | | | | | | | -0.143 | 0.170 | 0.979 ** |
| MIC | P | | | | | | | | | | | -0.024 | -0.042 |
| | G | | | | | | | | | | | 0.285 ** | -0.121 |
| RD | P | | | | | | | | | | | | -0.435 ** |
| | G | | | | | | | | | | | | -0.660 ** |

*P = represent the phenotypic correlation, and G = represent the genotypic correlations*

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# دراسات وراثية على بعض الصفات الكمية في هجين القطن المصرى (جيزة ٨٠ X جيزة ٨٦)

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أجرى هذا البحث بمزرعة الجيزة بمركز البحوث الزراعية خلال مواسم ٢٠٠٢-٢٠٠٤، ويهدف هذا البحث إلى تقدير الثوابت الوراثية مثل قوة الهجين ودرجة السيادة ومكونات التباين الوراثى وقيم التقدم المتوقع من الانتخاب ودرجة التوريث بالإضافة الى تقدير معامل الارتباط المظهرى والوراثى لصفات المحصول ومكوناته والتبكير وبعض صفات الجودة وذلك للاستفادة من بعض الهجن المتميزة في برامج التربية.

أشارت نتائج مكونات التباين الوراثى إلى أن التأثير الجينى غير المضيف كان أكبر من التأثير المضيف في توارث معظم الصفات محل الدراسة. وقد لوحظ وجود قوة هجين لمتوسط الأبوين لجميع الصفات ماعدا وزن اللوزة، كما وجد قوة هجين عن الأب الأفضل لصفة المحصول الزهر وتاريخ تفتح أول لوزة وقيمة الميكرونير، وقد أظهرت هذه الصفات أيضا وجود سيادة فائقة.

كانت قيم معامل التوريث بمعناها العام عالية إلى متوسطة لجميع الصفات، بينما كانت قيم معامل التوريث بمعناها الضيق عالية إلى متوسطة لصفات معدل الحليج وتاريخ تفتح أول زهرة وجميع صفات الجودة.

كانت قيم معامل الارتباط المظهرى والوراثى معنوية وموجبة بين محصول القطن الزهر وكلا من محصول الشعر، وعدد اللوز/ نبات، وزن اللوزة، ومعامل البذرة. كما كانت قيم معامل الارتباط الوراثى لمحصول الزهر والشعر وعدد اللوز موجبة ومعنوية مع قيمة الميكرونير ونسبة الانعكاس بينما كانت سالبة ومعنوية مع تاريخ تفتح أول زهرة مما يعنى أمكانية زيادة المحصول بالانتخاب للتبكير، كما لوحظ أيضا وجود تلازم معنوى سالب بين صفات المحصول مع متانة وطول التيلة ودرجة الاصفرار. ويمكن التغلب على بعض هذه العلاقات غير المرغوبة إما باستخدام الأنتخاب المتكرر أو بعمل اتحادات وراثية جديدة مثل طريقة استخدام التهجين الرجعى للجيل الثانى مع الآباء.