INFERIOR LINT QUALITY AS A RESULT OF OFFTYPE COTTON PLANTS EXISTENCE IN SOME EGYPTIAN COTTON VARIETIES

By

El-Mansy, Y.M.; M.M. El-Lawendey and M.E. Abd Elsalam

Cotton Research Institute, Agric. Res. Center, Egypt

ABSTRACT

Genetical changes in seed fuzz and lint colour were studied in two Egyptian cotton cultivars, Giza 70 and Giza 89 as well as their offtypes. Significant differences were observed between the standard parents and their offtypes for yield and lint characters in both cultivars indicating presence a lot of genetic variability. Moreover, the offtypes differ among each other. The standard cultivars surpassed their offtypes for all fibre characters and most yield characters. The naked seed offtypes in both cultivars were inferior in fibre characters compared with either original parent or the other offtypes. Degree of yellowness was a primary source of variation and the largest coefficient followed by fibre length in the first PC axis among Giza 70 genotypes. Lint index and lint percentage exhibited the largest coefficients in the second PC axis respectively. While lint reflectance followed by degree of yellowness were a primary sources of variation having the largest coefficients in the first PC axis. Lint percentage showed the largest coefficient followed by fibre fineness in the second PC axis among Giza 89 genotypes. The first PC axis accounted for about 70% and 62% of total variation among Giza 70 and Giza 89 genotypes, respectively. The first three PC axis accounted for 98% of variation. Analysis of divergence showed that the naked seed offtypes in both cultivars formed a wide group having divergent distance from the other genotypes original parents and other offtypes.

High estimates values of genotypic variance in F_2 derived from offtypes x Giza 70 standard were detected for lint percentage, lint index, degree of yellowness and fibre fineness reflecting high broad sense heritability estimates. Thus, the breeder could safety to condense selection for better characters to eliminate such offtypes from the original cotton varieties for preventing their degenerations.

Keyword: Offtype – cotton plants – genetical changes – multivariate – principal component – genetic diversity

INTRODUCTION

Homogeneity and uniformity of yield and lint quality characters represent the practical criteria for identification and judging the purity of cotton cultivars. Maintaining of genetic purity among cotton genotypes offers a measure of protection against degeneration of yield potentials. Some Egyptian cotton varieties showed a sort of changes in heir homogenity and uniformity as well as eventually some offtypes are spontaneously induced. This offtypes include changes in seed characters, naked and full fuzz, or in lint colour, brown to reddish, and lint quality, shorter and coarser lint, and yield characters such as low lint percentage. These could lead to degeneration of the Egyptian cottons and to market rejection of such varieties, if they haphazardly multiplication.

Changes of the Egyptian cottons were studied by several researchers; El-Shazly (1987) and Kamal *et al.* (1988) they found that the fibres of discoloured cotton were shorter, less mature, coarser and weaker than the corresponding fibres of the white cotton. El-Okkia *et al.* (1990) pointed out that the brown lint isolated from the "Giza 70" cultivar showed depresession of yield characters and reduction in lint characters. Hemaida (2000) found that the offtypes of "Giza 80" and "Giza 83" showed back in yield characters and having shorter and coarser fibres as well as later in maturity compared with the standard type.

Multivariate techniques could resolve phenotypic measurements into fewer and easily visualized dimensions. This analysis which used principal components seemed to elucidate patterns of variation in agronomic attributes which are of economic importance and to obtain the initial factor using eigen values. The usage of multivariate methods, more common in other disciplines, is seen increasing in plant breeding literature. You *et al.* (198) used principal components analysis to classify three cultivars and five inbreeding lines into four groups. Esbroak *et al.* (1999) investigated multivariate technique by using principal components analysis. They found that the six principal components accounted for 87% of the variation among cultivars. Hemaida *et al.* (2006) applied multivariate techniques by using canonical discriminate analysis and revealed that lint percentage characters showed the highest discrimination among the studied varieties and their offtypes.

The importance of this study as one of the main research point in maintenance of genetic purity for Egyptian cottons. In the analysis presented here, principal components analysis and cluster analysis used for agronomic trial data to show interrelationships of cotton genotypes based on agronomic performance and fibre quality measurements. The analysis also gives a general overview of genetic variability between some offtypes which occurred in the Egyptian cotton varieties.

MATERIALS AND METHODS

Materials:

Two Egyptian cotton cultivars i.e. "Giza 70" and "Giza 89" as well as their offtypes, two offtypes for each, were used in this study. The characteristics of these genotypes are shown in Table 1. Selefed seeds of both standard cultivars and their offtypes were sown and crossed. Each standard variety was crossed with it's two offtypes. F_1 seed's for the cross Giza 70 x Naked seed offtypes were sown and selefed to obtained F_2 seeds. The present investigation was carried out at Sakha Agricultural Research Station, during two growing seasons of 2006 and 2007.

2. Methods:

A. Field procedures:

To study the genetical changes, a randomized complete blocks design was conducted with three replicates, each replicate consisted of 7 rows for Giza 70 and its offtypes and 5 row for Giza 89 with its offtypes. For studying the genetic consequences of the haphazard transfer of naked seed offtype gene on some yield and lint characters. Seeds of the F_1's and their F_2 populations along with selfed seeds of their parents of a cross (Giza 70 x naked seed offtype were grown in the season of 2007. The ordinary practices of cotton cultivation were applied.

At the end of season, plants from each entry were separately harvested and ginned. Data were recoded on lint percentage %, seed index (SI) (g), lint index , LI (g), number of seeds/boll (S/B), fibre fineness (F.F), fibre strength (F.S), fibre length (F.L), degree of yellowness (+b) and lint reflectance (Rd %).

Table (1): Characteristics of the standard varieties (Giza 70 and Giza 89) and their offtypes.

Giza 70		
Characters	Standard variety Giza 70	Offtype (naked-seed)
Seed	Moderate size, dark brown to black colour, 50-75 fuzzy. The fuzz colour is oily brown to rusty green	Small size, dark brown to black with snake of the end and naked
Vegetative and growth	Small cotyledon leaves and thin with limited pale red spots on the leaves. Normal plant size and spreading with medium internodes. Plant colour "stem & branches" is greenish purple small and deep lobbed leaves rough with dingy green and there is one nectar gland at the lower surface. Tubular flower and yellow colour with dark red spots at the bottom of petioles. Dark green boll with conical shape, (rough), medium bract with 1 nectar glands	Large and thicker cotyledon leaves with diffused and dense red spots. Abundant branching plant with long internodes, shiny green plant colour and profusely leaves, smooth shiny green leaves with slight lobes and there are 3 glands at lower surface. Some wheat cub flower and pale yellow with light spots. Shiny green boll and somewhat globular. With title on the tip, and smooth, large bract with 2-3 red nectar glands
Lint	Extra long staple, fine and stronger lint with chalky white colour	Short to medium staple coarse and weak lint with dark creamy (yellowish brown) lint
Yield	Kind of early, medium lint percentage 35%	Very late in maturity, inferior in lint%
Giza 89		
Characters	Standard variety Giza 89	Offtype (naked-seed)
Seed	Moderate size, brownish to black colour and 75% fuzzy	Small size, dark brown colour and naked with small snack
Vegetative and growth	Limited pale spots on the cotyledon leaves normal plant size erect stem and compact lower internodes). The fruiting branches make 45° with the main stem. The first fruiting node at 5-6 node. Smooth dingy green "silver" leaves with deep lobbed, tubular and yellow flower with short standard dark red spots on the bottom of petals. Dark green with rough boll non-tapering shape (tity) with large bracts	Diffused red spots on the cotyledon leaves large plant size having abundant branches with longer internodes, loose in base, first fruiting node at 7-8, "relatively high" smooth and shiny green leaves with three glands at the low surface pale yellow flower with tall stand and tubular flower. Smooth shiny green boll with medium bract and somewhat globular.
Lint	Long staple, medium fine and strong lint with extra white colour	Inferior lint quality. coarse and weak lint with light creamy colour.
Yield	High yield, high lint percentage, very early in maturity	Low yield, low lint percentage late in maturity.

B. Statistical procedure:

All the studied characters were statistically analyzed on plot mean basis. A separate analysis of variance for each genotype was done to detect the significance of the observed differences. Multivariate technique were conducted by using principal components analysis and cluster analysis according to Haire *et al.* (1987) and Anderberg (1973), respectively. All these computations were performed using SPSS (1995) computer procedure.

The frequency distributions, ranges, means and variances of P_1, P_2, F_1 and F_2 were calculated for lint percentage, lint index, yellowness and fibre fineness. The genotypic and environmental components of variation were computed from the data of the segregating and non-segregating generation variances. Heritability in broad sense was calculated according to the following formula:

$$h^2_b \text{ (in } F_2) = \frac{VF_2 - (VP_1 + VP_2 + VP_3)/3}{VF_2} \times 100$$

RESULTS AND DISCUSSION

Analysis of variance for all studied characters are shown in Tables 2 and 3. The data showed significant mean squares of genotypes and parents for all studied characters in both "Giza 70" and "Giza 89" except for seed index of "Giza 89", indicating the presence a lot of genetic variability that could be assessed by means of these genotypes. Significant differences were observed between the original parents and their derived offtypes as a result of significant differences between original parents Giza 70 or Giza 89 versus offtypes for most studied characters. Moreover, the offtypes of each parent showed differences among each other, indicating that such changes appeared to be genetical alterations. In this regard, Abo-Arab *et al.* (2000) found significant differences between each of the original varieties Giza 45 and Giza 76 with its offtypes. Mean squares of F_1 crosses were significant for fibre strength, lint colour (+b and Rd %) of Giza 70 with its offtypes revealed that such changes could be transmitted across generations". Furthermore, parents versus crosses mean squares were significant for some characters in both varieties showing some sort of heterotic effects. In this respect, El-Okkia etal. (1990), Abo-Arab *et al.* (1992) and Hemaida (2000) found similar findings.

The mean values of the two standard varieties Giza 70 and "Giza 89" with their offtypes as well as their F_1 progenies derived from crossing them for all studied characters are given in Figure 1. The data showed that the original varieties either "Giza 70" or " Giza 89" surpassed offtypes for all fibre characters and most yield characters. While, the naked-seed offtypes surpassed either original varieties or full fuzzy offtypes for number of seeds/boll.

Table (2): Analysis of variance for yield and lint characters among the original varieties Giza 70 and Giza 89 and its offtypes as well as their F hybrid.

S.O.V.	d.F	M.S								
		F.F	F.S	F.L.	+b	Rd %	LF	SI	LI	N.S./B
Giza 70 genotypes										
Rep.	2	0.0234	0.1062	0.2233	0.2134	0.7129	0.0791	0.0185	0.0026	0.3962
Genotype	(6)	0.8865*	1.24005**	14.6419**	6.1432**	42.6800**	9.2769*9*	2.4262**	0.6503*	6.0230**
Parents	(2)	0.8344**	2.4034**	31.5834*9*	12.1911**	94.8746**	19.6536**	3.2118**	1.5056**	8.0311**
Off.	1	1.6016**	0.6016*	35.0416**	11.2066**	39.5263**	15201	6.3448**	1.8150**	12.3267**
89 v. off.	1	0.0673	4.2051*	28.1251**	13.1756**	148.22229***	37.787**	0.0787	1.1961*	3.7355
Crosses	3	1.1119**	0.8211**	8.2254**	4.1519**	21.0207**	1.3077	1.8646**	0.2958	6.3142**
P.V.C.	1	0.3144*	0.1727	0.0084	0.0211	3.2686*	12.4311**	2.5400**	0.0033	1.1334
Error	12	0.0506	0.0829	0.3300	0.2189	0.4912	0.8446	0.2436	0.1437	0.7889
Giza 89 genotypes										
Rep.	2	0.0020	0.0687	0.6045	0.0127	0.2285	0.1325	0.0540	0.0187	2.4667
Genotype	(4)	0.3964**	1.0157**	3.6693*	2.8877**	29.3173**	10.2556**	0.831	1.3823*	12.0667**
Parents	2	0.5345**	1.1700**	6.4434**	4.5478**	36.8933**	19.110**	1.5411	2.5745**	12.4444**
Off.	1	1.0416**	1.2150**	6.4066**	5.8016**	38.5063**	2.9400*	0.2816	0.2400	24.0000**
89 v. off.	1	0.0275	1.1250**	6.4801**	3.2940**	35.2807**	35.2800**	2.8006*	4.9089**	0.8889
Crosses	1	0.4816**	0.2016	0.0266	0.9610*	23.6013**	0.2016	0.0266	0.0067	20.1667**
P.V.C.	1	0.0322	1.5210**	1.7637	1.4940**	19.8807**	2.6006*	0.2152	0.3737	3.2110
Error	8	0.0462	0.0687	0.5339	0.0951	0.9304	0.4303	0.3965	0.2003	1.2167

Table (3): Principal component coefficients of each character associated with "Giza 70" and "Giza 89" genotypes for the first three components.

Characters	Giza 70 genotypes			Giza 89 genotypes		
	PC1	PC2	PC3	PC1	PC2	PC3
F.F	-0.341	-0.289	-0.402	0.260	-0.453	0.304
F.S	0.368	-0.250	-0.007	-0.399	0.049	0.431
F.L.	0.393	0.004	-0.039	-0.393	0.035	0.349
+ b	-0.394	0.042	-0.036	0.404	-0.156	-0.201
Rd %	0.376	-0.222	0.057	-0.406	0.117	0.095
LP%	0.185	-0.582	-0.328	-0.263	-0.461	-0.191
S.I	-0.336	-0.224	0.646	-0.279	-0.430	-0.303
S/B	-0.364	-0.120	-0.450	0.242	-0.420	0.607
LI	-0.127	-0.632	0.323	-0.291	-0.423	-0.234

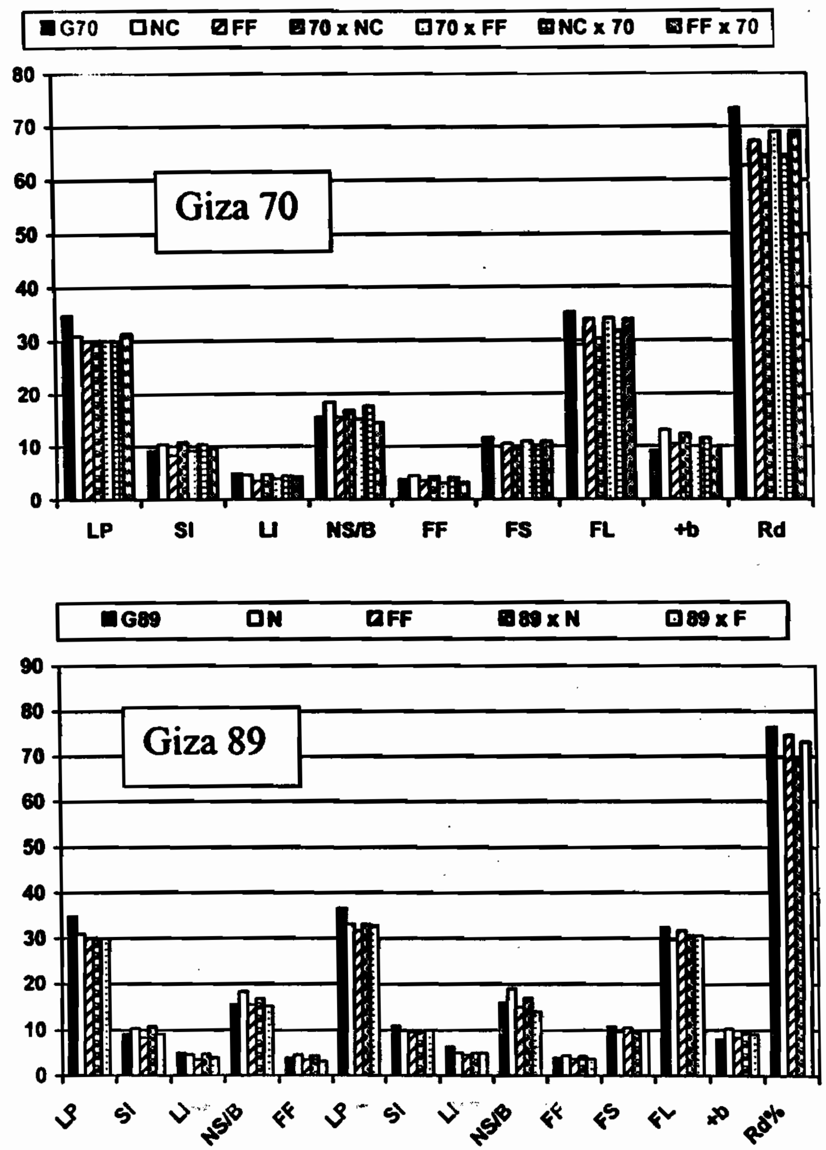

Fig. (1): Mean performance of original Giza varieties and their offtypes as well as their F_1 progenies for the studied characters.

It is likely to mention that the naked-seed offtypes appeared to possess conspicuous characteristics, in both varieties, surpassing in N.S/B, high fertility, with decreasing in other yield potentials and very inferior in lint characters as a compared with either original varieties or other offtype. However, the full fuzz offtypes were nearly in their behaviour with the original varieties for lint quality with low lint percentage, lint and low fertility. In this connection El-Okkia *et al.* (1990), Abo-Arab *et al.* (2000) confirmed the dangerous effects of spontaneous offtypes of Egyptian cotton degeneration.

It could be concluded from the results of Figure 1 that the behviour of naked-seed offtypes were approximately similar. Such similar behaivour were clearly pronounced for most characters, but it varied from each other in lint colour, this variability may be due to the accumulative number of plus modifiers which were high in Giza 70. Geng *et al.* (1998) found that the coloured fibre genes had negative effects on lint yield and fibre quality characters.

After the previous results assured the differences among Giza group and its offtypes as well as their F_1 crosses, we need to know which characters, variables, had greater importance in contribution than other. Also to measure the explained variance associated with each factor, variable, therefore, principal components analysis was conducted on nine characters.

In an analysis with nine variables, nine axis were existed, however, only three of those which exhibited high multivariate variations were considered. The relative magnitude of the coefficient of each trait relating to the first three principal components from the component analysis can often provide an agronomic interrelation for each components axis for each of Giza 70 and Giza 89 are shown in Table 3. The data showed that the degree of yellowness (+b) was a primary source of variation with the largest coefficient in the first PC axis among Giza 70 genotypes. Fibre length appeared to have the second largest coefficient followed by lint reflectance. On the other hand, lint index had the smallest coefficient in the first PC axis but exhibited the largest coefficient in the second PC axis followed by lint percentage. The same trend was appeared among Giza 89 genotypes, lint reflectance followed by degree of yellowness were a primary source of variation having the largest coefficients in the first PC axis. While, lint index and fibre fineness exhibited the smallest coefficients, but the latest was the largest coefficient in the second PC axis.

It is worth to note that fibre quality characters such as fibre length, yellowness and lint reflectance showed the highest coefficients among the two studied varieties and their offtypes as well as their F_1 progenies. While, yield characters showed the smallest coefficients indicating that fibre quality were more importance in PCA. Hemaida *et al.* (2006) found that lint percentage followed by lint index showed the highest discrimination among Giza 80 and Giza 83 as well as their offtypes.

Each component score is a liner combination of the trait. similar to an index, the maximal amount of variation is shown on the first principal components Table 4, showed that the first PC axis accounted for about 70% and 62% of variation among genotypes showing the highest eigen values, for Giza 70 and Giza 89 genotypes, respectively. While, the first three PC axis accounted for 98% of variation. In this regard Brown (1991) reported that the first three PC axes accounted for no less than 62% of the total variance of all characters. However, Hemaida *et al.* (2006) found that the variance explained by the first and second canonical discrimination functions were 69.3 and 27.6 of Giza 80 and its offtypes.

Table (4): Percent variation among cotton genotypes accounted by the first three principal components (PC) separately and totaled.

Parameters	PC axes		
	1	2	3
	Giza 70 genotypes		
Eigen values	6.2585	2.1385	0.4182
PC % of variation %	0.6950	0.238	0.046
Cumulative	0.6950	0.933	0.979
	Giza 89 genotypes		
Eigen values	5.6055	2.8013	0.4525
PC % of variation %	0.623	0.311	0.050
Cumulative	0.623	0.934	0.984

Therefore, the first two PC axes were used to representation of 7 and 5 genotypes for each Giza 70 and Giza 89 genotypes, respectively, as shown in Figures 2.

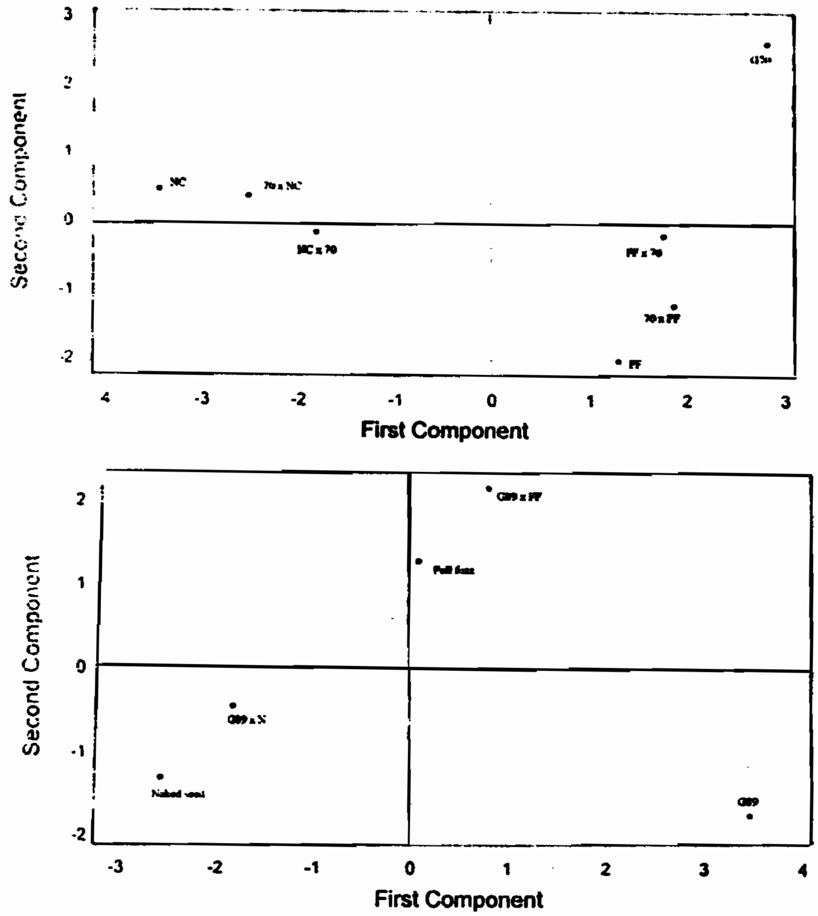

Fig. (2): Plot of the first two PCA axes from the principle component analysis between the cotton genotypes.

It is clear that the second PC axis separated the naked-seed offtype with its F_1 progenies from the other genotypes for "Giza 70". While, the original parent "Giza 70" was separate as common parent by the first PC axis. The reverse trend was observed for "Giza 89" genotypes the first PC axis separated the offtypes naked-seed with its F_1 progenies. While G. 89 original variety was separated by second PC axis. Abd El-Sayed *et al.* (2000) studied genetic variability among some Egyptian cottons using principal components analysis and found that the second PC axis were important to separate these offtypes.

It is interesting to note that the multivariate analyses were important and very efficient for exploiting the genetic variability existing among the Egyptian cottons varieties, standard variety and their offtypes. Since such analysis over time would be useful in describing any movement in the genetic bases of our cottons.

Figure 3 presents results of the hierarchical cluster analysis in the form of dendrograms. It is clear evident that the naked seed offtypes in both varieties were wide divergent from their original parents rather than other offtypes, which were less divergent. This was true especially in Giza 70. These results assure the occurrence of double spontaneous alterations. Such alterations might be induced simultaneously in seed and lint characters after some time.

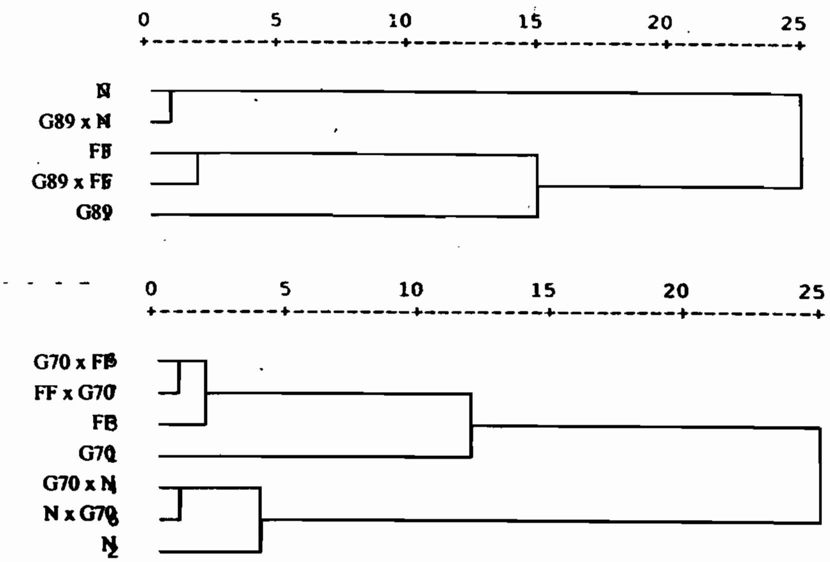

Fig. (3): Results of hierarchical cluster analysis shown as a dendrogram

All plant breeders must have a through knowledge of the variability in their crop, and all have an intuitive feel for how different genetic groups relative to one another when considering many traits simultaneously. Generally, the results of principal components analysis and clustering analysis appeared to be in complete accordance. The components analysis could provide no clear grouping but give a special idea for genetic variability and wide of contribution for each character, however, cluster analysis could efficiently describe the characteristics of groups of various genotypes and both gave a sensible and useful integration of the data.

Genetic consequences of the haphazard transfer of the offtype naked seed genes on some characters of Giza 70 Egyptian cotton variety were investigated in F_1 and F_2 generations derived from crossing naked seed offtypes to their original parental genotype "Giza 70".

Frequency distribution curves, ranges and means for lint percent, lint index, degree of yellowness (+b) and fibre fineness of the parents and their F_1 as well as F_2 generations are given in Figures 4, 5 and Table 5, respectively. The differences between the two parents, Giza 70 and naked seed offtype were clearly distinctive. The naked seed offtype showed lower values for lint percentage and lint index, but higher values for degree of yellowness and fibre fineness than the original variety "Giza 70".

Distribution of F_1 generation tend to behave as their common parents exhibiting a case of slightly partial dominance towards their original parent. Fayed *et al.* (1990) found partial dominance controlling lint colour in F_1's between some varieties and their lint colour offtypes.

The F_2 frequency distribution curves were characterized by a sort of unimodality indicating the continuous type of variation for the studied characters due to the joint action of polygenes in addition to the major genes for degree of yellowness. This polygenic additive system is involved in the control of such variations in F_2. The presence of transgressive segregation in negative direction (lower values), for lint percentage and lint index, also in positive direction for fibre fineness and degree of yellowness. This segregation as a result of divergence between two parents were undesirable.

The means of F_2 population behaved in the same manner as their offtype parents and F_1 showing that the genes controlling the characters of naked seed offtype could be easily transmitted to their progenies. Meanwhile, the differences between F_1 and F_2 for some characters might indicate a case of inbreeding effects towards degeneration. Our results are in harmony with those reported by Abo-Arab *et al.* (2000).

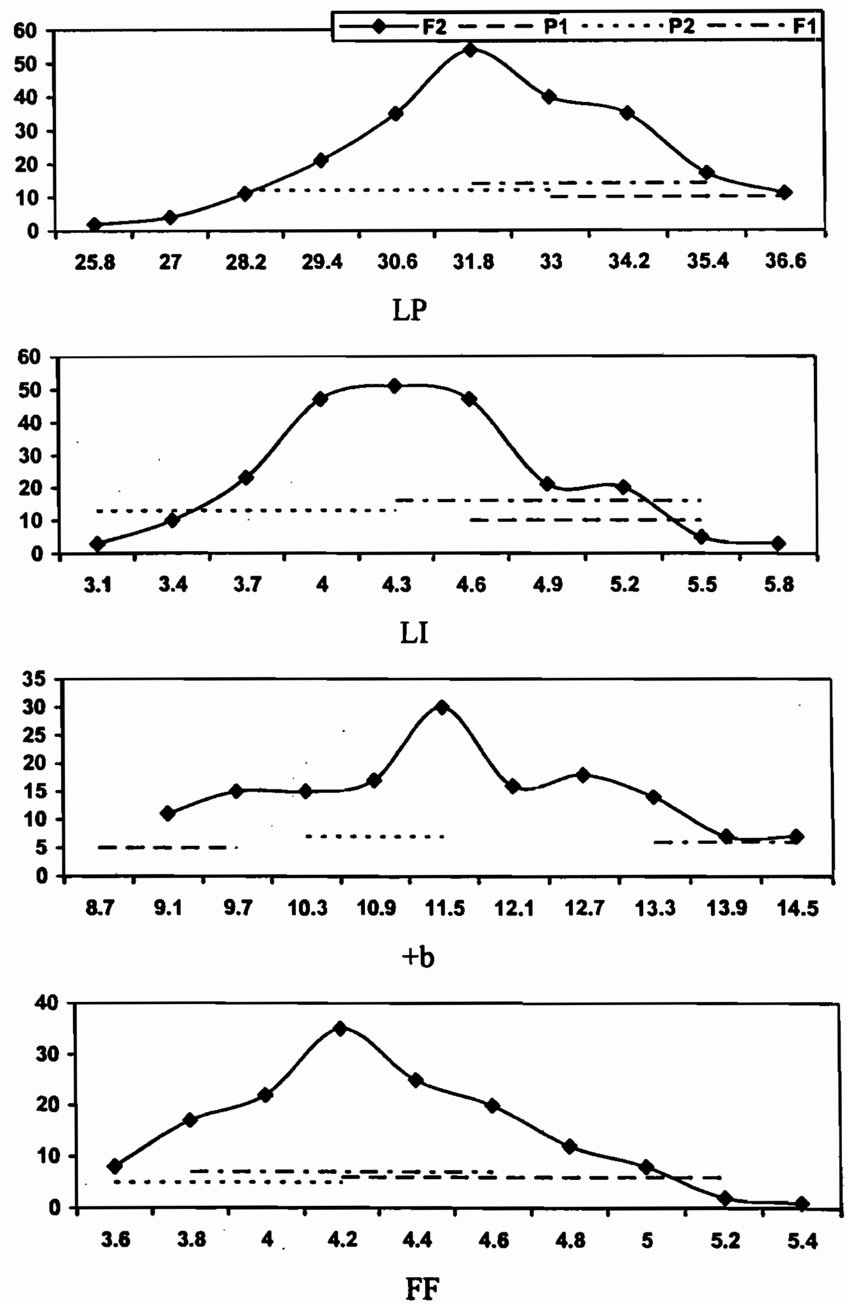

Fig. (4): Frequency distribution curves and ranges of the studied population of the cross Giza 70 x offtype

Components of phenotypic variance and heritability estimates for the studied characters in the F_2 population were presented in Table (5). The data showed that the genotypic variances of F_2 were relative high for lint percentage and degree of yellowness than for the other characters. This was reflected in high broad sense heritability estimate and assured by high scores of genetic coefficients of variations. It could be noticed that lint percentage and degree of yellowness were less affected by environmental factors, since differences between phenotypic and genotypic variance appeared to be relatively low.

From the previous results the breeder can easily got valuable information from the characterizing of such offtypes which possessed coarseness and darkness genes as well as lower lint percentage. The breeder could safety to condense selection for better lint percentage and lint quality values to eliminate such offtypes from the original cotton varieties for preventing their degenerations.

Table (5): Generation means, standard errors, components of variance and heritability estimates for yield and fibre characters of the studied population in cotton cross (Giza 70 x offtypes).

Parameters / Characters	$\bar{X} \pm$ S.E.				Components of variance				H^2_b%
	P_1	P_2	F_1	F_2	σ^2E	σ^2G	σ^2P	G.C.V.	
Lint %	34.8 ± 0.128	30.0 ± 0.237	33.3 ± 0.171	32.1 ± 0.149	1.0152	4.0763	5.0915	6.2897	80.06
Lint index	5.0 ± 0.047	3.7 ± 0.060	4.7 ± 0.060	4.3 ± 0.035	0.0948	0.1914	0.2862	10.1743	66.88
N. seed/boll	19.1 ± 0.257	21.9 ± 0.269	20.1 ± 0.329	19.2 ± 0.177	2.4631	4.7495	7.2126	11.3507	65.85
Yellowness	9.2 ± 0.063	14.0 ± 0.088	11.0 ± 0.095	11.5 ± 0.120	0.1731	1.9720	2.1451	12.2111	91.93
Fibre fineness	3.9 ± 0.043	4.7 ± 0.050	4.1 ± 0.053	4.2 ± 0.033	0.0593	0.1000	0.1593	7.5292	62.77

REFERENCES

Abd El-Sayed, S.M.; A.R. Abo-Arab and Y.M. El-Mansey (2000). Genetic divergence among cotton genotypes. J. Agric. Sci. Mansoura Univ., 25(11): 6643-6657.

Abo-Arab, A.R.; A.A. Okasha and S.M. Abd El-Sayed (1992). Genetic evaluation of some spontaneous changes in fibre properties in some Egyptian cottons. J. Agric. Res. Tanta Univ. 18(4): 600-613.

Abo-Arab, A.R.; S.M. Abd El-Sayed and Y.M. El-Mansy (2000). Genetical studies on offtypes of some Egyptian cottons. J. Agric. Sci. Mansoura Univ. 25(11): 6797-6807.

Anderberg, M.R. (1973). Cluster analysis for applications. Acad. Press, New York.

Brown, J.S. (1991). Principal component and cluster analysis of cotton cultivars variability across the US. Cotton Belt. Crop. Sci., 31: 915-921.

El-Okkia, A.F.H.; I.A.I. Helal; M.M. El-Shishtawy and E.A. El-Desoqui (1990). The brown seed cotton locks in the variety Giza 70 and their relation to depress in yield and quality. Agric. Res. Rev. 68: 1129-1140.

El-Shazly, W.M.O. (1987). Studies on cotton lint "variation in Giza 75 cotton cultivar". M.Sc. Thesis, Fac. Agric. Tanta Univ., Egypt.

Esbroack, G.A.; D.T. Bowman; O.L. May and D.S. Calhoun (1999). Genetic similarity indices for ancestral cotton cultivars and their impact on genetic diversity estimates of modern cultivars crop. Sci. 39(2): 323-328.

Fayed, A.H; M.Y. Heakel and A.R. Abo-Arab (1990). Genetic approach to solve the problem of spontaneous lint colour changes in Egyptian cotton, Zagazig. J. Agric. Res. 17(4A): 1167-1178.

Geng, J.Y.; G.Y. Wang; X.J. Zhai; Z.S. Li and Y.Z. Li (1998. Effects of coloured fibre gene on economic properties of upland cotton and analysis of its inheritance. CAB Abst. 1998/08-1999/10).

Haire, J.F.; Jr. R.E. Anderson and R.L. Tatham (1987). Multivariate data analysis with reading. MacMillan Publ. Co. New York.

Hemaida, G.M. (2000). Off-type cotton plants of Giza 80 and Giza 83 cotton cultivars and their effects on varietal deterioration. Ann. Agric. Sci., Moshtohor, 38(3): 1373-1382.

Hemaida, G.M.; M.A. Nagib and G.H. Abdel-Zaher (2006). Assessment of genetic variation among two cotton varieties Giza 80 and Giza 83 with their off-types. J. Agric. Sci. Mansoura Univ. 31(3): 1409-1419.

Kamal, M.M.; M.T. Ragab and Nafisa, T. Ahmed (1988). Inferior quality characteristics associated with discoloration of cotton. Fayoum. J. Agric. Res. 2: 860-877.

SPSS (1995). SPSS computer user's guide SPSS in USA.

You, J.; J.L. Liu and J.Z. Sun (1998). Analysis of heterosis and its components in interspecific crosses and breeding lines developed from primitive race stocks (*G. hirsutum*). Acta Agrono-Sinica, 34(6): 834-839 (C.F. CAB Abst. 1999/10).

الملخص العربى

التراجع فى صفات جودة التيلة نتيجة لوجود النباتات المغايرة فى بعض أصناف القطن المصرى

ياسر محمد المنسى ، محمد محمد اللاوندى ، محمد عزت عبدالسلام
معهد بحوث القطن ـــ مركز البحوث الزراعية

يهدف البحث لدراسة التغيرات الوراثية فى صفات توزيع الزغب على البذرة ولون التيلة فى صنفين من القطن المصرى هما جيزه ٧٠ ، جيزه ٨٩ حيث تم استخدام طرازين من الطرز المغايرة لكل صنف وهى البذرة العارية والبذرة الملبسة وتم تهجين الصنف الأصلى مع الطرز المغايرة له. تم تقييم الأباء مع الطرز المغايرة والجيل الأول فى تجربة قطاعات كاملة العشوائية من ثلاث مكررات.

- أظهرت النتائج اختلافات بين الأباء الأصلية والطرز المغايرة لها فى صفات المحصول والتيلة مما يدل على وجود اختلافات وراثية. كما اختلفت الطرز المغايرة فيما بينها.
- تفوقت الأباء الأصلية عن الطرز المغايرة فى صفات التيلة ومعظم صفات المحصـــول كما أظهر الطراز المغاير (بذرة عارية) تراجع فى صفات التيلة وصفات المحصـــول مقارنة بالأباء الأصيلة والطرز المغايرة الأخرى.
- باستخدام تحليل المكونات الأساسية Principal component analysis أظهـــرت النتائج أن صفة درجة الإصفرار +b كانت الأكثر أهمية فى التباين يليها صفة طـــول التيلة وذلك على PC_1 axis بينما كانت صفة معامل الشعر يليها معدل الحليج الأكثـــر أهمية فى التباين الكلى على PC_2 axis لصنف جيزه ٧٠ والتراكيب الوراثية له.
- بالنسبه لصنف جيزه ٨٩ والتراكيب الوراثية له كانت صفة درجة الانعكاس يليها درجة الإصفرار الأكثر أهمية فى التباين على PC_1 axis بينما كانت صفة معدل الحليج يليها صفة نعومة التيلة المكون الأكثر فى التباين على PC_2 axis.
- كانت المكونات الثلاثة الأولى تمثل حوالى ٩٨% من التباين الكلى Total variance أظهر تحليل التباعد الوراثى divergence أن الطراز المغاير(بذرة عارية) فى كـــلا الصنفين كان الأكثر تباعدا عن الأباء الأصلية والطرز الأخرى.
- كانت قيم التباين الوراثى مرتفعة فى الجيل الثانى الناتج من التقليح الذاتى للهجين "جيزه ٧٠ × بذرة عارية" لصفات معدل الحليج ومعامل الشعر وكذلك صفات النعومة واللون مما يمكن المربى من تركيز الانتخاب لأفضل الصفات وذلك للـــتخلص مـــن الطـــرز المغايرة والتى تظهر فى القطن المصرى للحد من سرعة التدهور.