TECHNOLOGICAL AND GENETICAL ESTIMATES FOR YIELD AND FIBER PROPERTIES OF SOME EXTRA-LONG EGYPTIAN COTTON PROMISING GENOTYPES

By

El-Feki T.A.*, M. G. I. Beheary and A.A.A. El-Akhedar***

* Cotton Research Institute, Agriculture Research Center, Giza

** Faculty of Agriculture (Saba-Basha),Alexandria University

ABSTRACT

Twelve advanced promising strains of extra-long staple Egyptian cotton were planted in a preliminary trial at The agricultural Research Station of Sakha, Kafr Elsheikh in 2002. In 2003, seven cotton genotypes included the best four strains and three commercial cultivars (Giza.45, Giza 70 and Giza 87) as a check were grown at two locations, Abo-kbeer, and Sahka to study yield, yield components, length parameters, tensile bundle strength, colour, maturity traits and cross-sectional dimensions. Besides, the variance components and heritability.

Results revealed that the highest mean values of seed cotton yield/feddan, earliness index were obtained by the promising hybrid {G.84 (G.74xG.68)} and the lowest mean values were attained by Giza45 cotton variety. The promising hybrid (Giza77xPimaS6) gave the highest mean values of the fiber maximum and staple lengths and length uniformity followed by the hybrid {G87 (G77xG70}. Meanwhile, the highest mean values of fiber effective and mean lengths and the lowest short fiber percentage was obtained from the cotton variety G 45 followed by G 70. The highest short fiber percentage was reached by the hybrid {G.84 (G.74xG.68)} The cotton variety Giza 70 recorded the highest mean values of the micronaire, maturity, fiber perimeter, cross-sectional area and bundle strength, whereas the lowest mean values of those traits were given by the new cotton variety Giza 87. Less accurate data were attained from the H.V.I., particularly short fiber index and maturity.

Studied hybrids could be divided into two colour groups according to the yellowness degree (+b): the **white group** includes: the white group includes: Giza 45, the hybrid {G 84 (G 74xG 68), Giza 70 and Giza 87, and the **creamy group** which includes: the hybrids

(G77×PimaS6), {G87 (G 77×G 70)}, and G 77{G 84 (G 70×G 51B)}, in the same order. Direct measurement of fiber perimeter revealed that the studied hybrid are placed in two categories: the **extra-fine** group: Giza87, the hybrids G.77 {G84 (G70 × G51B)}, (G77x Pima S6), Giza45 and G 84 (G74 × G68) and the **fine group**: the hybrid G87 (G77 × G70} and Giza 70, in the same respect.

The results showed that there were significant amounts of genetic variance and high heritabilites for lint %, seed cotton yield, mean length, length uniformity, strength, perimeter, diameter, wall area, reflectance and yellowness.

The promising hybrid G77×Pima S6, can replace Giza 45. The two hybrids {G77 × (G84 × G51B)} and {G87 × (G77 × G 70)} may replace the varieties G 87 and G 70, respectively.

INTRODUCTION

The free marketing system enabled cotton to restore its position as the first cash crop for farmer and national income in Egypt. Genotypic differences in yield and fiber properties cotton varieties are strongly affected by genotype × environment interactions (Abdel-Gawad *et al* (1991) and Beheary *et al* (1995). It is so important to conserve the desirable characteristics of the commercial varieties. Giza 70gave the highest mean value of 2.5%span length, Giza45possessed the lowest micronaire reading and the promising strain Giza 77 × Giza 45A (Giza 87) surpassed all studied varieties in fiber strength and stiffness (Beheary *et al* 1995). But some drop in production and deterioration in fiber properties usually occur from time to time .So it is desirable to develop promising strains to replace them.

The fiber perimeter, which is considered the only parameter of the intrinsic fiber fineness, is a varietal characteristic and is insignificantly affected by environment factors (Beheary (1993) and Lord (1961). The micronaire can not be generally used as measure of coarseness (Pellow *et al*,1996). Cotton fiber fineness determines yarn count, turns per inch, strength, regularity and appearance. The maximum yarn counts depends upon the number of fibers in the yarn cross- section, which controlled by the fiber fineness and fiber length. The finer and longer cotton the higher the number of fiber in yarn cross- section and higher cohesion points within the yarn and the lower the twist required during yarn formation (Sief,1994). The relatively coarse fibered cotton, Giza 70 reacted more sensitively to the higher

counts, such that the yarn spun from it lost strength and strength utilized (%) more rapidly than the fibered cottons with increasing the yarn count from 80'S to 160'S (Ismail *et al.* 1990).

Recent investigations clarify that once having a well established average fiber perimeter from direct cross sectional measurements for the commercial cotton varieties, quick independent estimates of fiber maturity parameters could be obtained from the micronaire or the fibrograph test (Beheary,1993).

El Feki and Mostaefa (1990) reported the presence of adequate genetic variability between cotton genotypes and found relatively unpredictable components of genotypic environment interaction. Abo El Zahab *et al* 1992 indicated that high heritability value and close estimate of phenotypic coefficient of variation to their corresponding genetic ones for all fiber traits. El-Feki *et al* 1995 reported that there were substantial amount of genetic variance and high heritability for micronaire and 2.5 span length.

The present investigations was conducted to study the traits of yield, fiber length parameters, H.V.I. properties and cross sectional dimensions of some Extra-Long cotton promising hybrids, developed by the Cotton Research Institute, Agriculture Research Center, compared with the commercial varieties of the same quality group and study genetic variability, heritability and genetic components.

MATERIALS AND METHODS

In 2002 season, 12 advanced promising strains of extra-long cotton were evaluated in a preliminary trial at The Agricultural Research Station of Sakha, Kafr El-Sheikh Governorate. In 2003 season, the best four promising hybrids and three varieties Giza 45, Giza70 and Giza 87 were grown in randomized complete block design with six replications at each of two locations (Sakha and Abo-kbeer). The genotypes were (H21); Giza 77× Pima S6, (H 25); Giza 87 × (Giza 77 × Giza 70), (H 27}; Giza. 77 (Giza 84 × (Giza 70 × Giza 51B)} and (H 30); Giza 84 × (Giza74 × Giza68). Experimental plots consisted of five rows 4m long and 60cm apart .The three central rows of each plot were hand harvested to determine seed and lint cotton yields.

Random sample of 50 open bolls harvested from outer two rows was used to obtain plot data for boll weight. After ginning, fiber properties were tested for three replication as follows:

Fiber properties were tested using the High Volume Instrument (H.V.I.) spectrum II following the standard method in the Cotton

Arbitration and Testing General Organization (C.A.T.G.O), Smouha, Alexandria.

Fiber length parameters were measured using a Shirley comb sorter (Array method) as designated by the slandered method of the A.S.T.M (D-1440-82) at the Fiber Technology Laboratory, Faculty of Agriculture (Saba Basha), Alexandria University.

Representative fiber bundles for each replicate were sectioned by a hand microtom as described in the previous work Beheary (1993).Major and minor axis of fifty fibers and their lumens were directly measured from the fiber cross sections for each replicate by the projection microscope (Projetena-Swesserland).The cross sectional area of the fiber and lumen were calculated using the equation proposed by Herbert et al.(1979) as follows: $A = \pi \times a \times b$, were, a = major axis/2, b= minor axis/2 and π =3.14. Other cross sectional parameters were calculated according to A.S.T.M. (D-1444-72).

Analysis of variance as a factorial experiment and the list significant differences (LSD) were computed according to Steel and Torrie (1961). The least significant range (LSR) was calculated by Duncan's Multiple range test (1955) The variance components and heritability were calculated according to Miller *et al* (1958) and Comostok and Mall (1962), Heritability (H^2)= $\sigma^2 g/\sigma^2 px100$. Similarity and taxonomic distance were calculated by hierarchical clustering analysis.

RESULTS AND DISCUSSION

The differences among the seven genotypes studied were highly significant for all characters except boll weight and short fiber axis (Table 1). Analysis also showed significant interaction between genotypes and environment for boll weight, earliness index, staple length, maximum length, effective length, short fiber, micronaire value, maturity ratio, fiber strength, elongation, reflectance and yellowness. Results obtained will be discussed in three main headings:

I-Mean performance:

Mean values of yield, yield component, H.V.I. fiber properties and fiber cross sectional traits as affected by cotton genotypes in two locations were shown in Table (2).

As for yield and yield components, the highest mean value of the boll weight. seed cotton yield/feddan and earliness index were attained by the promising hybrid G84X (G74xG68) followed by the hybrid(G77xPima S6) in seed cotton yield/feddan and earliness index. Meanwhile, the lowest mean value of the seed cotton yield/feddan and

Table (1): Mean square from ANOVA of yield, yield components, fiber length and fiber cross-sectional characters for the studied seven extra-long cotton genotypes at two locations in 2003.

S.O.Va.	D.f.	Yield and yield components				Fiber length					
		S.C.Y.	Lint %	B.W.	E.I.	St.L.	Max. L.	E.L.	M.L.	S.F. %	U.R.
Genotypes (G)	6	17.81 **	11.76 **	0.003897	449.9 **	14.89**	5.68**	8.72**	39.73**	23.46**	153.34**
Location (L)	1	1.137 **	123.5* *	0.063114**	3261.8**	3.5	9.86**	3.02	4.8610	0.07286	85.91**
G x L	6	1.083**	14.29**	0.007997	142.173	8.83**	2.83**	4.53**	2.3407	9.679**	22.9177
Error	42	0.06926	3.50823	0.005525	135.043	1.03	1.03125	0.8244	2.6354	2.1647	11.3179

S.O.Va.	D.f.	Mic.	Maturity	Bundle		color		Fiber cross-sectional characters					
				Strength	Elongation (%)	Rd %	+b	Perimeter	Diameter	Wall Thickness	Fiber Wall area	Lumen area	θ
Genotypes (G)	6	0.743**	0.003**	24.24**	0. 729**	59.66**	6.66**	34.4**	5.13**	1.51*	1226.4**	1073.4**	0.023*
Location (L)	1	0.086**	0.004**	168.36**	0.731**	48.47**	17.38**	2.56	0.34	0.04	335.36	283.95	0.013
G x L	6	0.174**	0.0007**	7.16**	0.298*	16.14**	0.883	0.54	0.93	0.38	158.95	15.43	0.016
Error	42	0.0041	0.00005	1.52077	0.0964	1.01815	0.064	2.51	0.47	0.58	13.19	142.99	0.010

S.C.Y. : Seed cotton yield Kentar / Feddan. L.% : Lint (%). M.L. : Mean length (mm). St. L. : Staple length (mm).

E.I. : Maturity earliness index. Mic : Micronaire value. S.F. % : Short fiber (%). Max. l. : Maximumlength(mm).

θ : Degree of wall thickening. B.W. : Boll weight (gm). U.R. : Length uniformity. E.L. : Effective length (mm)

earliness indexes were possessed by the revised strain of the cotton variety Giza 45.

Reading fiber length parameters, the highest mean values of staple and maximum length were reached by the promising hybrid (G77× Pima S6) followed by the hybrid {G87 (G77 × G70)}. The revised strain of Giza 45 cotton variety recorded the highest mean values of effective and mean length, length uniformity ratio and the lowest short fiber percentage. Insignificant differences in those traits were noticed among Giza 45,Giza70and Giza 87 studied cotton varieties as presented in Table (2) The lowest mean value of the fiber mean length and uniformity ratio as well as the highest mean value of fiber percentage were possessed by the hybrid G84 (G74 × G68).

Concerning H.V.I. fiber properties, the highest mean value of micronaire, maturity (%) and bundle strength were reached by the revised strain of cotton vairty of Giza 70, while, the lowest mean value of the same traits were possessed by the new cotton variety Giza 87. It should be noticed that the maturity percent was computed from the micronaire reading.

The promising hybrid (G77 × Pima S6) showed the lowest mean value of short fiber index .It is worthy to mention that these results related to staple and maximum lengths attained using the array method presented in Table (2). The highest mean value of the fiber bundle strength was reached by Giza 70 followed by the hybrid {G84 (G74 × G68)}.

Regarding colour trait, data showed that the highest mean values of the fiber reflectance percentage (Rd) and yellowness degree (+b) were obtained by the promising hybrid {G84 (G74 × G68), and the hybrid {G87 (G77 × G70}, respectively. In this concern, studied genotypes could be divided into two colour groups as follows:

-The **white group** includes: Giza45, the promising hybrid {G84 (G74 × G68)}, Giza70, and Giza 87.

-The **creamy group** includes: the hybrids G.77 {G84 (G70 × G51B)}, {G87 (G77 × G70)} and (G77× Pima S6) in decreasing order of yellowness degree (+b) values.

Respecting the fiber cross-sectional characteristics, the lowest mean value of the fiber perimeter (34.09u), as the intrinsic fiber fineness, was possessed by the new cotton variety Giza 87 (the most fine fibered). Meanwhile, the highest mean value of the fiber perimeter, cross sectional area and wall area were given by the cotton variety Giza

Table (2). Mean values of studied yield, fiber length, H.V.I. and cross-sectional traits as affected by genotype and environment in 2003.

characters	Genotypes							Environments	
	G. 45	G. 70	G. 87	H 21 G.77 x Pima S6	H 25 G87(G77 x G70)	H 27 G.77 x (G.84xG.70xG.510)	H 30 G. 84 (G.74xG.68)	Sakha	Abu – Kheer
Yield and yield components:-									
Seed cotton yield	5.69f	7.35e	7.64d	9.01b	8.64c	7.64d	10.45a	8.16a	7.88b
Lint %	34.9c	36.3abc	35.04c	37.05abc	35.89bc	37.28ab	38.26a	37.88a	34.91b
Boll weight	2.97a	2.99a	3.00a	2.94a	2.98a	2.98a	3.00a	3.01a	2.95b
Earliness %	57.38c	62.40bc	70.0a	76.0a	71.76ab	65.76abc	77.0a	61.46b	76.75a
Fiber length :-									
Staple length	40.37b	40.25b	39.12c	41.87a	41.0ab	38.50c	38.12c	40.14a	39.46a
Max length	41.75a	41.50ab	40.43bc	41.87a	41.43ab	39.81c	40.12c	41.41a	40.57b
Effective length	39.37a	39.00b	38.18b	38.37b	38.50ab	36.56c	36.87c	38.35a	37.89a
Mean length	34.06a	33.31a	33.68a	30.50b	33.18a	30.75b	27.68c	31.14a	32.03a
Length uniformity	86.49a	85.42a	85.57a	769.48b	86.19a	83.85a	74.81c	81.88b	84.85a
Short fiber (%)	5.37b	5.44b	6.68b	9.06a	9.00a	6.71b	9.22a	7.32a	7.39a
H.V.I. Fiber properties:-									
Micronaire reading	3.59cd	4.28a	3.37e	3.54d	3.87b	3.43e	3.66c	3.70a	3.62b
Maturity Index	0.89c	0.94a	0.88d	0.90c	0.91d	0.90c	0.91b	0.90a	0.92b
Strength g/tex.	42.11cd	45.66a	40.95d	43.35bc	42.73c	44.37ab	45.42a	45.25a	41.78b
Elongation %	6.48a	5.70b	5.65b	5.77b	5.68b	5.85b	5.62b	5.93a	5.71b
Fiber and lumen cross sectional dimensions (in Microns):-									
Perimeter	36.48b	39.60a	34.09c	35.65bc	39.42a	35.30bc	36.34b	36.91a	36.48a
Diameter	11.01b	17.04a	10.13c	10.94b	11.99a	10.06c	10.62bc	11.05a	10.82a
Wall thickens	3.52b	4.057c	3.75b	3.81ab	3.64b	3.20b	3.44b	3.74a	3.70a
Fiber area	83.87bc	96.31a	68.20c	80.42cd	94.18ab	65.72c	70.28bc	82.30a	77.41a
Lumen area	5.70ab	4.04bc	2.13c	4.86b	7.81a	4.67b	5.18b	5.02a	4.83a
Wall area	87.18bc	92.09a	66.02cd	74.93bcd	86.35ab	61.04c	65.09dc	77.07a	72.56a
θ	0.73a	0.73a	0.068ab	0.73a	0.69ab	0.62b	0.61b	0.70a	0.67a
Colour:-									
R d reflectance	73.12a	72.41a	73.06a	69.52b	67.57c	67.25c	73.47a	71.84a	69.98b
+b yellowness	8.86c	9.26d	9.65c	10.65b	10.88ab	11.01a	9.07dc	9.35b	10.47a

70. It could be noticed that the micronaire reading and maturity (%) of the same varieties in table (2) were in line with the aforementioned results. In this concern, the studied genotypes could be divided into two groups according to the average fiber perimeter as follows:

-**Extra-fine group** includes: Giza87, the hybrids G.77 {G84 (G70 × G51B)}, (G77x Pima S6), Giza45 and G 84 (G74 × G68),

-**Fine group** includes: the hybrid G87 (G77 × G70} and Giza 70, in the same respect. The highest mean value of the degree of wall thickening (θ) was possessed by Giza 45 cotton variety following by Giza70 and the promising hybrid (G77x Pima S6). Similar values of the average fiber perimeter for Giza70 were attained in previous work (Beheary(1993).

II-Genetic estimates and heritability:

The results in Table (3) show variance components and their standard errors, heritability estimates, expected genetic advance from selection and the genetic coefficient of variability.

Regarding yield traits, the data indicated presence of substantial amount of genetic variance for seed cotton yield and lint (%)while the variance component of interaction between genetic and environment was highly significant for boll weight and earliness index. The heritability of seed cotton yield and lint (%) were 68.11 and 82.2 %,respectively. The heritabilties for boll weight and earliness index were estimated as zero. The high coefficients of genetic variability and insignificant genetic variance and the significant interaction components indicates that the studied material did not offer considerable scope for improvement in the two traits. The value of genetic coefficient of variability were moderate.

As for length parameters, the data in Table (3) indicated the presence of substantial amount of genetic variance for all traits of length parameters except maximum length, while, significant interactions with environment were shown for staple length, short fiber and length uniformity. The heritabilities of staple, maximum, effective and mean lengths, short fibers and length uniformity was 40.68, 50.18, 48.06, 94.11, 58.73 and 85.05 %, respectively. Botony *et al* (1966) obtained heritability of 88.5 % for halo length and Abo El-Zahab *et al* (1992) obtained 97 % for 2.5% span length.The ratio of $\sigma^2 g/ \sigma^2 ge$ was higher for mean length, short fiber, length uniformity which reflects the

Table (3): Estimates of variance components. heritability and G.C.V. for cotton traits.

characters	Variance components			$\sigma^2 g/\sigma^2 ge$	Heritability	G.CV%
	$\sigma^2 g$	$\sigma^2 ge$	σ^2			
Seed cotton yield	1.453**	0.178	0.646	8.163	68.111	17.32
	(0.348)®	(0.172)				
Lint cotton yield	1.622**	-0.050	0.702	32.44	82.203	17.28
	(0.368)	(0.09)				
Boll weight	-4.09	10.791**	7.378	-	-	1.34
	(0.8)	(1.90)				
Earlines index	-7.77	66.09**	0.172	-	-	4.16
	(0.805)	(3.032)				
Staple length	1.010	2.601*	0.344	0.39	40.68	2.5
	(0.41)	(0.931)				
Max length	0.475	0.0650	0.878	7.31	50.18	1.68
	(0.28)	(0.44)				
Effective length	0.698*	1.235	0.275	0.57	48.06	2.19
	(0.34)	(0.64)				
Mean length	6.232**	-0.098	0.878	93.59	94.11	7.90
	(1.02)	(0.18)				
Short fiber	2.296**	2.505*	0.722	0.92	58.73	20.61
	(0.62)	(0.91)				
Length uniformity	21.737**	3.867**	3.773	5.62	85.05	5.61
	(1.90)	(4.14)				
Micronaire reading	0.075	0.057	0.001	1.67	-	8.42
	(0.12)	(0.13)				
Maturity	0.0004	0.0002	0.00001	2.00	-	5.92
	(0.208)	(0.008)				
Strength	2.846	1.870*	0.507	1.51	70.45	3.88
	(0.69)	(0.79)				
Elongation	0.072	0.067	0.032	1.07	-	4.61
	(0.11)	(0.15)				
Perimeter	5.647*	-0.657	0.838	8.60	98.42	6.48
	(0.97)	(0.47)				
Diameter	0.700*	0.152	0.157	4.61	81.94	7.65
	(0.34)	(0.22)				
Wall thichnes	0.187	-0.64	0.192	0.97	-	11.62
	(0.18)	(0.15)				
Lumen area	3.759**	-1.27	1.543	1.07	96.51	39.37
	(0.79)	(0.65)				
Wall area	153.785**	2.64*	47.49	58.08	85.98	16.58
	(5.06)	(0.94)				
Maturity %	0.001	-0.002	0.003	0.50	-	4.62
	(0.01)	(0.03)				
Reflectance(Rd%)	7.254**	5.04*	0.339	1.44	72.95	3.80
	(1.1)	(1.30)				
Yellowness (+b)	0.964**	0.273	0.21	3.53	86.76	9.91
	(0.41)	(0.3)				

®: Lower figure refer to SE of estimates.

importance of the heritable component. The G. C.V.% values ranged from 1.68 for max. length and 20.61% for the short fiber.

Concerning the micronaire reading, maturity and fiber tensile traits, data shown in Table (3) showed presence of substantial amount of genetic variability and interaction component for fiber strength only. The ratio σ^2g/σ^2ge reflects the importance of genetic components which is in harmony with the high heritability estimate. The heritabilities for the micronaire value, maturity ratio and elongation (%) were not estimated due to insignificant genetic components which is in partial agreement with El-Feki (1995).

For the colour traits, the genetic component were highly significant for reflectance (Rd %) and yellowness (+b) as presented in Table (3). The ratio σ^2g/σ^2ge reflects the importance of the genetic component for the inheritance of these traits which showed high heritability estimates as obtained by El-Feki (1995).

Respecting fiber cross-sectional characters, data presented in Table (3) indicated that the fiber perimeter, diameter, wall area and lumen exhibited significant genetic variation. High σ^2g/σ^2ge ratios reflect the importance of genetic component for each trait. The heritabilities for perimeter, diameter, lumen area and wall area were 98.42, 81.94, 96.51 and 85.98, respectively.

III-Similarity and taxonomic distance (Genetic diversity) for fiber quality :

Hierarchical clustering was applied to determine the relative genetic diversity and genetic distances within the tested gerplasm. Results are shown by the dendrogram in Figure (1). The likage dendrogram provides visual idea about clustering and variability presented between those genotypes. The Fig. (1) and Table (4) showed that the studied the studied genotypes were divided into two clusters.

The two clusters were joined at the distance level 16.49 with a similarity level 6.93%. The first cluster group G.45, (G. 77 x Pima S6), Giza 70 and {G. 87 x (G.77 x G.70)}. This group was divided into two subgroups at a distance 15.43 with similarity level 65.30. The first subgroup was represented by two genotypes G.70 and {G. 87 x (G.77 x G.70)}with similarity level 77.39 % and a distance level 10.06. The second subgroup was represented by the genotypes, G.45 and (G. 77 x Pima S6) with a similarity level 75.29 % and a distance level 10.99.

Table (4): Euclidean methods for seven genotypes including two groups of genotypes, distance and similarity for fiber characters.

Nod.	Cluster joint		Distance	Similarity	No Of genotypes
	G.1	G.2			
6	3	6	9.83	77.91	2
5	2	5	10.06	77.39	2
4	1	4	10.99	75.29	2
3	3	7	13.43	69.82	3
2	1	2	15.44	65.30	4
1	1	3	16.49	62.93	7

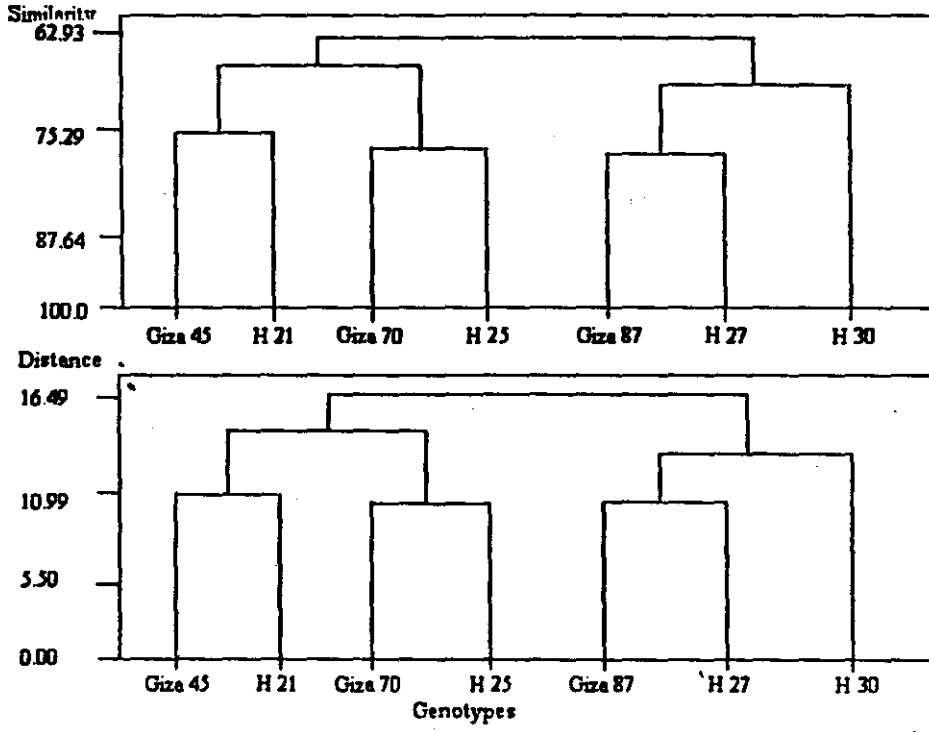

Figure (1) : Dendrograms of similarity and distance of seven genotypes.

The second group was, also, divided into two subgroups with similarity level 64.82 and distance level 13.43. The first subgroup included G 84 x (G 74 x G 68) and the second subgroup included two genotypes G.87 and {G 77 x(G 84 x G 70 x G 51B)}with a similarity level 77.91% and distance level 9.83.

From the previous results it could be concluded that the promising hybrid (G. 77 x Pima S6) corresponds to and can replace Giza 45, and the genotypes {G 77 x(G 84 x G 70 x G 51B)}and {G. 87 x (G.77 x G.70)} correspond to and can replace the varieties Giza 87 and Giza 70, respectively.

REFERENCES

Abdel-Gawad, A.A.; A.M. Samra; Y.A. Ashour and M.Kh. Abdel-Fattah. 1991. Effect of cultivar and growing season on the relative contribution of fiber properties to yarn strength and elongation. The Egyptian Cotton Gazette, No. 97 : 38-48.

A.S.T.M., The American Society for Testing and Materials.1982. (D-1444-72) and (D-1440-82). Philadelphia, Pa. 19103, U.S.A.

Abo El-Zahab, A.A.; F.F. Saod; M.A. El-Kelany and A.A. Abd El-Ghani 1992. Cultivar x environment interaction in Egyptian cotton. II- Fiber quality. 5th Conference of Egyptian Society of Science.

Beheary, M.G.I. 1993. Quick independent estimates of cotton fiber maturity. Part I: Cross-sectional characteristics as a parameter of cotton fiber fineness and maturity. Alex. J. Agric. Res., 38 (3): 217-230.

Beheary. M.G.I.; A.E. Hossam El-Din; S.M. Seyam and A.A. El-Akhdar. 1995. Studies on yield and yield components of some Egyptian cotton varieties. J. Agric. Res. Tanta Univ., 21 (3): 462-471.

Beheary, M.G.I. and S.S. Badr. 1995. Cotton yield and fiber maturity parameters as affected by cultivar and location. Communications In Science and Development Research, Vol. 52: 59-72.

Comstock, R. E. and Mull R.H. (1963). Genotype-environment interactions. Symp. On Stat. Genetics and plant Breeding, NRC. Pub. 982: 164 – 196.

El-Feki, T.A.; Hanaa F. Fahmy; H.A. Al-Naby; Sayeda El-Helw and G.M.I. Emam. 1995. Genetic analysis of lint yield and lint quality characters for Egyptian extra-long staple genotypes. J. Apple. Sci. 10 (9): 575 – 587.

Hebert, J.J.; E.K. Boylston and J.I. Wadsworth. 1979. Cross-sectional parameters of cotton fiber. Textile Research Institute, 49 (9): 540-542.

Ismail, A.M. and M.A. Abdel-Mohsen. 1990. The relationship between micronaire reading and yarn mechanical properties of the Egyptian extra-long staple cotton. J. Agric. Res., 64 (6) : 2263-2274.

Lord, E. 1961. The origin and assessment of cotton fiber maturity. The International Institute for cotton, Manchester, England.

Miller, P.A., D.S. Williams, H.F. Robinson, R.E. Comstock (1958). Estimates of genotypic and environmental variances and covariances in Upland cotton and their applications in selection.

Pellow, J.W.; H.B.J. Cooper; J.C. Palmer and K.E. McRae. 1996. Fineness, maturity, micronaire and dye ability of two Acala cottons. Proceedings Belt Wide Cotton Conferences, Vol. 2: 1691- 1693.

Sief, M.G. 1994. Comparative study on fiber and yarn properties of Egyptian and Pima cotton. Belt Wide Cotton Conference Procedures, pp. 1168-1171.

Skau, E.L. 1951. Simple expressions for circularity and fullness of fibers. Tex. Res. J. 21 : 14-17.

Steel, R.G.D. and J.H. Torrie 1961. Principles and procedures of statistics. McGrow-Hill Book Company Inc., New York. Pp.481.

الملخص العربى

تقديرات تكنولوجية ووراثية لصفات المحصول والألياف لبعض التراكيب الوراثية المبشرة فائقة الطول من القطن المصرى

د/ مشحوت جناب اسماعيل بحيرى* طعلت أحمد الفقى**

د/ عادل عبد العظيم أبو اليزيد الأخضر**

* كلية الزراعة (سابا باشا)، جامعة الإسكندرية

** معهد بحوث القطن، مركز البحوث الزراعية ، الجيزة

قيمت ١٢ سلالة مبشرة من القطن المصرى فائق الطول فى تجربة أولية بمحطة البحوث الزراعية بسخا، كفر الشيخ، موسم ٢٠٠٢. فى موسم ٢٠٠٣ زرعت سبعة تراكيب وراثية، شملت أفضل أربعة هجن وثلاث أصناف تجارية للمقارنة فى منطقتين (أبو كبير وسخا) لدراسة المحصول، مؤشرات الطول،خواص الألياف بجهاز ال H.V.I. وخواص المقطع العرضي الى جانب مكونات التباين وكفاءة التوريث.

أوضحت النتائج المتحصل عليها أن أعلى القيم المتوسطة لمحصول القطن الزهر (قنطار/فدان) ومعامل التبكير فى النضج تم الحصول عليها من الهجين المبشر (جيزة ٨٤ (جيزة ٧٤ x جيزة ٦٨) وأقل القيم المتوسطة لهذه الصفات تم الحصول عليها من صنف القطن جيزة ٤٥. الهجين المبشر (جيزة ٧٧ x بيما س ٦) أعطى أعلى القيم المتوسطة لأقصى طول للشعرات وطول تيلة إضافة الى نسبة انتظام الطول، يليه الهجين المبشر (جيزة ٨٧ (جيزة ٧٧ x جيزة ٧٠))، بينما أعطى صنف القطن جيزة ٤٥ أعلى قيم متوسطة للطول الفعال ومتوسط الطول بالإضافة الى أقل نسبة للشعيرات القصيرة، يليه جيزة ٧٠. أعلى القيم المتوسطة لنسبة الشعيرات القصيرة تم الحصول عليها من الهجين المبشر (جيزة ٨٤ (جيزة ٧٤ x جيزة ٦٨)).

سجل صنف القطن جيزة ٧٠ أعلى القيم المتوسطة لقراءة الميكرونير، النضج، محيط الشعيرات، مساحة المقطع العرضي للشعيرات ومتانة الخصلة، بينما أعطى صنف القطن جيزة ٨٧ أقل القيم المتوسطة لهذه الصفات. يمكن تقسيم الهجن التي درست الى مجموعتي لون تبعا لدرجة الاصفرار، المجموعة البيضاء: جيزة ٤٥، الهجين (جيزة ٨٤ (جيزة ٧٤ x جيزة ٦٨)) ، جيزة ٧٠ وجيزة ٨٧ والمجموعة الكريمية وتشمل: الهجين (جيزة ٧٧ x بيما س ٦) والهجين (جيزة ٨٧ (جيزة ٧٧ x جيزة ٧٠)) والهجين (جيزة ٧٧ x (جيزة ٨٤ x جيزة ٧٠ x جيزة ٥١ B)) بنفس الترتيب.

أوضحت القياسات المباشرة لمحيط الشعيرات أن الهجن التي درست يمكن تقسيمها الى مجموعة فائقة النعومة وهى: جيزة ٨٧، والهجن (جيزة ٧٧ x (جيزة ٨٤ x جيزة ٧٠ x جيزة ٥١ B)) و (جيزة ٧٧ x بيما س ٦) و (جيزة ٨٤ (جيزة ٧٤ x جيزة ٦٨)) وجيزة ٤٥، ومجموعة ناعمة وهى: جيزة ٧٠، والهجين المبشر (جيزة ٨٧ (جيزة ٧٧ x جيزة ٧٠)).

كما أظهرت النتائج وجود كميات معنوية من التباين الوراثي ودرجة توريث عالية لكل من نسبة الشعر، محصول القطن الزهر، متوسط الطول، درجة انتظام الطول، المتانة، المحيط، القطر، مساحة جدار الشعرة، درجة انعكاس الضوء ودرجة الاصفرار.

إنقسمت التراكيب الوراثية إلى ثلاث مجموعات متشابهة شملت الأولى الهجين المبشر (جيزة ٧٧ x بيما س ٦) والصنف جيزة ٤٥ ويمكن أن يحل محله، وضمت المجموعة الثانية الهجينان (جيزة ٧٧ x (جيزة ٨٤ x جيزة ٧٠ x جيزة ٥١ B)) و(جيزة ٨٧ (جيزة ٧٧ x جيزة ٧٠)) يقابلان جيزة ٨٧ وجيزة ٧٠ على التوالي ويمكن أن يحلا مكانهما فى حين توانى الهجين المبشر (جيزة ٨٤ (جيزة ٧٤x جيزة ٦٨) مجموعة منفردة.