EVALUATION OF SOME LONG STAPLE EGYPTIAN COTTON GENOTYPES FOR YIELD, SEED QUALITY AND SEED VIABILITY CHARACTERS

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ABSTRACT

The present investigation aimed to evaluate some Egyptian long staple cotton genotypes i.e, two promising hybrids (G. 89 × G. 86) and (G. 89 × Bima S6) and three cultivars i. e, G. 85, G. 86, G. 89 under three different locations. Seed cotton yield k/fed, boll weight (g.), lint (%), seed index (g.), seed volume (mm^3), seed relative density, seed coat %, seed oil (%), free fatty acid %, acid value, protein %, and seedling vigor characters were studied.

All studied characters showed highly significant mean squares for genotypes expect seed cotton yield, free fatty acid %, acid value and seed coat %. (G. 89× G. 86) significantly surpassed all studied genotypes for seed index, except G. 86 for boll weight, on G. 89 for lint (%). (G. 89 × Bima S6) surpassed G. 89 and (G. 89× G. 86) for lint (%) as well as G. 85 and (G. 89× G. 86) in protein (%).

Giza 85 surpassed G.89 in boll weight, lint (%) and oil (%), on all genotypes for seed relative density, except (G. 89× G. 86) in seedling dry weight. Giza 85 and G. 86 surpassed the other genotypes for oil %. Giza 86 surpassed G. 89 and (G. 89× G. 86) in boll weight, on all studied genotypes except (G. 89 × Bima S6) in lint (%), except (G. 89× G. 86) for seed index and on G. 89 in relative density. Giza 89 surpassed all studied genotypes for protein (%) and on the two new studied hybrids in oil (%).

The growing location showed significant effect for all studied characters except free fatty acid %, acid value, relative density and seed coat %. Effect of the growing year was significant on seed cotton yield, boll weight, and seedling vigor.

Effect of the interaction between genotype and growing location was significant for all studied characters except seed coat %. (G. 89× G. 86) at El-Menofia region surpassed all studied

genotypes at all locations for seed cotton yield, seed index and seed volume. Giza 85 growing in El-Gharbia location gave the highest oil % than the other genotypes at the other locations. Giza 89 growing in El-Menofia location gave the highest protein (%).

Effects of the interactions (genotype ×year), (location ×year), and the second order interaction were significant for most traits.

Positive correlation coefficients were between (seed cotton yield and boll weight), among (seed index and both seed oil %, shoot length), between (oil % and seed volume), among (free fatty acid and acid value), among (seedling dry weight, radical length and shoot length). Negative correlation coefficient were obtained between the following characters (lint % and free fatty acid), (lint percentage and acid value), (lint % and protein %), between (seed moisture and both seed index, oil %), (seed moisture and seed volume), between (oil % and seedling dry weight), and among (seed volume and relative density). It is recommended by this correlations in the breeding program to improve seed cotton yield, seed quality and seed viability characters.

Key word: cotton genotype, growing location, growing year, seed cotton yield, yield components, seed quality and viability.

INTRODUCTION

Improving cotton quality through introducing new varieties is the most important objective of the cotton research program. Cotton yield and seed quality are important characteristic, the performance of cotton varieties under different environments was studied by several workers, i.e, Abo El-Zahab et al. (1992); Abdel-Rahman et al. (1994); Badr (1994); Seyam et al. (1994); Kill and O. Gerces, (1995); Abou-Tour et al. (1996); Badr et al. (1998). Sorour et al. (1998); Abd-El-Salam (2000), Attcia (2001), El-Desouky (2002) Bader (2003) and El-Oraby (2003). who reported that the effects of genotypes, location, year and the interactions between them were significant for some cotton characters.

Many investigation studied the relation and correlations between different traits, i.e, Leffler and Willians, 1983 reported that Both seed size and density are correlated with planting seed quality in cotton, Badr and Abd- El-Azix (2000), obtained positive significant correlation between seed cotton yield, and each of boll

weight (g.) and lint percentage. Abd El-Salam (2000) and Badr et al. (2001), reported positive significant correlation between seed cotton yield, and each of boll weight, seed index and lint percentage, Atteia (2001) reported positive significant correlations between (seed density and planting seed quality), among (seed index and seed volume) ,while the correlation between seed density and seed volume was negative and significant. However El-Kilany et al (1980) and El-Desouky (2002) reported negative significant correlation between seed oil % and seed protein %. Many investigation studied the improved seed quality characters, i.e. Gipson and Johan, 1969 reported good quality is indicated by high oil and protein content and low free fatty acid content, however good quality is associated with seed capable of germination promptly and vigorously under a wide range of moisture and temperature conditions to produce a good stand of plant. Quisenberry and Gipson (1974) who reported that seeds of high quality and vigor generally perform well even under relatively adverse environmental conditions. Thomson (1979), to sum up, high quality seed should be of high germination and capacity and vigor, of low moisture content. Powell et al 1984 reported that In generally, poorer- quality seed will show symptoms typical of seed aging, such as low viability, reduced germination. Meena et al. (1994) stated that the seeds are highest in quality at their physiological maturity and have maximum viability and vigor. Finch- Savage (1995) reported that seed production practices favoring high-quality seed; to include accurate vigor testing and , select for maximum seed density, which must include the optimization of seed size. The chance successful seedling emergence are greatly influence by seed quality. Hopper and Mc Daniel (1999) who reported that improved seed vigor through genetic improvement programs.

The aim of the present investigation was to evaluate some Egyptian long staple cotton genotypes i.e, two promising hybrids (G. 89 × G. 68) and (G. 89 ×Bin S6) and three cultivars i.e, G. 85, G. 86 and G. 89 at three locations during two seasons. Correlations between characteristics were also determined. It also aimed at find the best characters for genotype grown in each location.

MATERIALS AND METHODS

The materials consisted of two promising hybrids (G.89×G. 86) and (G. 89 × Bima S6) and three cultivars, i. e: G. 85, G. 86, G. 89 under three different environments. during the two successive years 2002 and 2003 as follows: El-Menofia (Tala), El-Charkia (Abo Kber) and El-Gharbia (Tanta) location.

A randomized complete block design with three replications was used at each location. Each plot included 5 ridges, 4m long and 0.65m apart. The distance between hills was 25 cm and each hill was thinned to two plants. Sowing date was at the first week of April. Normal cultural practices were followed. All tested genotypes were evaluated for seed cotton yield (S.C.Y.k/fed. = Estimated as the weight of seed cotton yield in kentar per feddan.

- boll weight in grams (B.W.). The overage boll weight in grams of 25 bolls picked at random from each plot.
- Lint (%): The weight of lint obtained a seed cotton sample:

$$L\% = \frac{\text{weight of lint in the sample}}{\text{weight of seed cot ton in the sample}}$$

Seed properties, carried out by the Seed Technology Res. Sec. Sakha Agric. Res. Field Crops Res. Inst.

Physical properties of seed cotton

-Seed index and seed volume: hundred seeds were counted and weighed. Seed volume was measured by absolute displacement method (Kramer and Twigg 1962). - Relative density of seeds was calculated accorded to Kramer and Twigg (1962) as follows:

$$\text{Relative Density} = \frac{100 - \text{seeds(g.)}}{100 - \text{seeds}\ (\ mm^3)} = gm/mm^3$$

-Seed coat: One hundred-gram of seeds of both samples were decorticated. The decorticated seeds and seed coats were weighed separately (Youssef, 1978 and Shehata et al., 1985a). Percentage of seed coat was calculated as follows:

$$\text{Seed coat \%} = \frac{\text{wt.of seed coats (g.)}}{\text{wt.of seed coat + wt. of decorticatd seeds}} \times 100$$

Standard Germination:- Test was carried out under optimum conditions according to international rules Testing (ISTA, 1999).

-Seed vigour (seedling growth and evaluation test), radical, shoot length and seedling dry weight were measured according to procedures reported in the seed vigor testing handbook (ISTA, 1995). Seed vigour tests do not predict percentage field emergence, but neither does standard germination. However, seed vigour tests do relate better to field emergence under stressful soil conditions than does standard germination. Values obtained from seed vigour tests are relative values, not absolute values

Chemical composition characters:-Seed sample were taken at random from each plot and grounded to fine powder to pass through 2 mm mesh for chemical analysis; i.e., moisture content, fat %, protein %, free fatty acids (F.F.A) and acid value (A.V) were determined according to procedures outline in AOAC (1990).

Analysis of variance was carried out as a combined analysis for the three locations and the two seasons according to Snedecor and Cochran (1982) and treatment means were compared by Duncan's multiple range test, (Duncan, 1955). Correlations were performed according to Singh and Chaudhary (1979).

RESULTS AND DISCUSSION

The long staple cotton varieties are usually grown in Delta location of Egypt. The commercially grown varieties G. 85, G. 86, and G. 89 are used as a standard for comparison with the two new cotton promising hybrids (G. 89× G. 86) and (G. 89 × Bima S6).

1. Cotton genotypes: -The combined analysis of the two seasons and three regions are shown in Table (1). The results of the combined analysis of variance showed that the effects of the cotton genotypes were significant for all studied characters except seed cotton yield, F.F.A, A.v and seed coat %. (G. 89× G. 86) gave the significant highest boll weight (3.15 g.) than the other genotypes except G. 86, it significantly surpassed all studied genotypes in seed index (10.07 g.), shoot length (11.98 cm), it also surpassed (G. 89 × Bima S6) in oil (20.24 %), and seed volume (12.37 mm^3) as well as superiority all genotypes except G. 85 in radical length (15.36 cm) and seedling dry weight (56.26 mg.).

The promising hybrid (G.89 × Bima S6) significantly surpassed all studied genotypes except G. 86 for lint % (39.21), and surpassed

Table (1) : Mean performance of long staple cotton genotypes for seed cotton yield and viability and quality character

Character	Sig	Giza 85	Giza 86	Giza 89	G. 89 × G. 86	G. 89× Bima S6
Seed cotton yield k/f	N.S	10.50	1066	10.26	11.12	10.77
Lint (%)	**	38.81 bc	39.47 a	37.31 d	38.33 c	39.21 ab
Boll weight (g)	**	3.06 bc	3.12 ab	2.97 d	3.15 a	2.98 cd
Seed index (g)	**	9.33 c	9.61 b	9.26 c	10.07 a	9.43 c
Oil (%)	**	21.77 a	21.74 a	20.93 b	20.24 c	19.66 d
I.F.A (%)	N.S	0.206	0.205	0.211	0.227	0.216
A.V	N.S	0.415	0.412	0.423	0.436	0.433
Crude protein (%)	**	23.74 c	22.58 d	26.86 a	22.56 d	24.13 b
Moisture (%)	**	11.99 cd	12.41 b	11.84 d	12.07 c	12.63 a
Seed volume (mm^3)	**	10.62 c	12.43 a	12.52 a	12.37 a	11.83 b
Relative density (w/v)	**	0.882 a	0.757 c	0.726 d	0.815 b	0.799 b
Seed coat (%)	N.S	37.13	38.37	38.56	38.98	39.04
Seedling vigor						
Radical length (cm)	**	16.02 a	13.59 d	14.90 c	15.36 b	15.01 c
Shoot length (cm)	**	11.52 b	10.04 c	9.22 d	11.98 a	11.45 b
Seedling dry weight (mg)	**	56.29 a	52.21 c	46.82 d	56.26 a	54.51 b

Means of genotype followed by the same lower case letter within a character are not significantly different, P= 0.05 N.S=Not significant, * = significant, ** = highly significant.

all genotypes except G. 89 for protein (24.13 %), but it was high in moisture content (12.63 %), it surpassed G. 85 for seed volume (11.83 mm^3), as well as superiority G. 86 and G. 89 for relative density (0.799), shoot length (11.45 cm) and seedling dry weight (54.51 mg.).

Giza 85 cultivar significantly surpassed G. 89 for boll weight (3.06 g.) and lint % (38.81), surpassed all genotypes except G. 86 in oil % (21.77), beside that superiority G. 86 and (G. 89× G. 86) in protein % (23.74) seedling dry weight, The superiority was clear for relative density (0.882).

Giza 86 cultivar significant surpassed G. 89 and (G. 89 × Bima S6) in boll weight (3.12 g.), surpassed all genotypes except (G. 89 × Bima S6) for lint % (39.47), it also surpassed all genotypes except (G. 89× G. 86) for seed index (9.61 g.), on G. 85 and (G. 89 × Bima S6) in seed volume (12.43 mm^3) and it surpassed G. 89 in seedling dry weight (52.21 mg.).

Giza 89 significant surpassed (G. 89× G. 86) and (G. 89 × Bima S6) in oil % (20.93), surpassed all genotypes in protein % (26.86), on G. 85 and (G. 89 × Bima S6) for seed volume (12.52 mm^3.).The data indicated that the genotypes superior in boll

weight, seed index and seedling dry weight: (G. 89× G. 86), in lint % G. 86, in oil % : G. 85 and G. 86, in protein % : G. 89, low moisture content (%): G. 89, seed volume (mm^3.): G. 86, G. 89 and (G. 89× G. 86), and relative density: G. 85. These results are similarly in agreement with those obtained by Seyam et al. (1994); Abd El- Rahman et al. (1994); Badr (1994); Abou-Tour et al. (1996); Badr et al. (1998, 2000, 20001 and 2003); Sorour et al. (1998), Atteia (2001) and El-Desouky (2002). They reported that the effect of genotype was significant on some cotton characters.

2. Effect of growing locations on studied characters:

Table (2): shows the average values of studied cotton characters as affected by different growing locations. The data indicated that the average values of seed cotton yield, boll weight, seed index, seed volume, seedling vigor, protein %, and less moisture (%) were significantly differed highest at values were obtained from genotypes grown at El-Menofia region. This may be due to the environment of El-Menofia region which helped to improve these characteristics. The highest lint % was obtained from genotypes grown at El-Gharbia region, but the highest values of oil % were obtained from genotypes grown at both El-Gharbia and El-Menofia location. These results are in agreement with those obtained by Abo El- Zahab et al. (1992); Seyam et al. (1994); Badr (1994); Abou-Tour et al. (1996); Badr et al. (1998); Sorour et al. (1998); Atteia (2001); El-Desuki (2002) and Badr. (2003), who reported that the effect of location was significant for some cotton characters.

3. Effect of different growing seasons:

Result in Table (2) show the average values of yield, seed quality and seed viability characters as affected by different growing seasons. The cotton genotypes grown in the second Season (2003) gave the highest significant values for seed cotton and boll weight. However the produced seeds from the cotton genotypes grown in second season gave the less seedling vigor characters than the first season, but the other studied characters was not significantly effected by different growing seasons. These results are generally in agreement with those obtained by Badr (1994);

Table (2) : Effect of growing season and growing locations on seed cotton yield and viability and quality character

Characters	Location				Year		
	Sig	El-Gharbia	El-Charkia	El-Menofia	Sig	2002	2003
Seed cotton yield k/f	**	10.51 b	9.92 c	11.56 a	**	9.30 b	12.02 a
Lint (%)	**	39.94 a	37.89 b	38.04 b	N.S	38.74	38.51
Boll weight (g)	**	2.96 b	3.00 b	3.11 a	**	2.95 b	3.16 a
Seed index (g)	**	9.19 b	8.95 c	10.48 a	N.S	9.57	9.50
Oil (%)	**	21.71 a	19.34 b	21.55 a	N.S	20.84	20.89
F.F.A (%)	N.S	0.204	0.216	0.218	N.S	0.215	0.211
A.V	N.S	0.420	0.435	0.439	N.S	0.432	0.424
Crude protein (%)	**	22.61 c	24.17 b	25.15 a	N.S	23.96	23.99
Moisture (%)	**	12.36 b	12.92 a	11.28 c	N.S	12.13	12.25
Seed volume (mm^3)	**	11.45 b	10.96 c	13.46 a	N.S	12.02	11.89
Relative density (w/v)	N.S	0.806	0.802	0.779	N.S	0.787	0.804
Seed coat (%)	N.S	39.45	37.97	37.82	N.S	38.53	38.30
Seedling vigor							
Radical length (cm)	**	12.97 b	16.33 a	16.25 a	**	15.80 a	15.26 b
Shoot length (cm)	**	9.07 c	11.38 b	12.07 a	**	10.97 a	10.71 b
Seedling dry weight (mg)	**	46.68 c	54.76 b	58.22 a	**	53.58 a	52.86 b

Means of genotype followed by the same lower case letter within a character are not significantly different, P= 0.05 N.S=Not significant, * = significant, ** = highly significant.

Seyam et al. (1994); Abou-Tour et al. (1996); Badr et al. (1998); Sorour et al. (1998); Abd El-Salam (2000); Atteia (2001); El-Desuky (2002) and Badr. (2003), who reported that the effect of different growing seasons was significant for some cotton characters.

4. Effect of interaction between genotypes and growing locations:

Data in Table (3) and Fig (1-7) show that the genotypes × location interaction was significant for all studied characters except seed coat (%). The highest mean values for seed cotton yield. were exhibited by (G. 89× G. 86) hybrid (12.75 k/fed.) at El-Menofia location it was significantly surpassed all studied genotype at all studied locations except G. 89 at El-Menofia location. The highest seed cotton yield was given from G. 86 grown in El-Gharbia (11.26 k/fed.) and El-Menofia region (11.05 k/fed.). However both (G. 89 × Bima S6) and G. 85 were not significantly affected by different growing locations for seed cotton yield also seed cotton yield at El-Gharbia region for all studied genotypes was not

Table (3): Effect of genotype ×growing location interaction on seed cotton yield, viability and seed quality characteristics

Character	Sig	G.85			G.86			G.89			Giza 89 × Giza 86			G. 89× Dima S6		
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Seed cotton yield k/f	**	10.60 $^{b-e}$	10.02 ^{de}	10.88 $^{b-e}$	11.26 $^{b-d}$	11.05 $^{b-d}$	9.68 ^{ef}	10.21 $^{c-e}$	8.82 ^{f}	11.76 $^{a-b}$	10.33 $^{c-e}$	10.27 $^{c-e}$	12.75 ^{a}	10.17 $^{c-e}$	10.80 $^{b-e}$	11.35 ^{bc}
Lint (%)	**	40.93 ^{a}	37.97 ^{ef}	37.53 ^{fg}	40.63 ^{ab}	39.13 ^{cd}	38.65 ^{de}	38.31 $^{d-f}$	36.80 ^{g}	36.82 ^{g}	39.95 ^{bc}	37.38 ^{fg}	37.65 ^{fg}	39.88 ^{bc}	37.92 ^{ef}	39.83 ^{bc}
Boll weight (g)	**	3.08 $^{b-d}$	3.01 $^{b-d}$	3.08 $^{b-d}$	3.07 $^{b-d}$	3.15 ^{ab}	3.15 ^{ab}	2.76 ^{e}	3.02 $^{b-d}$	3.12 $^{a-c}$	2.95 ^{cd}	3.09 $^{b-d}$	3.25 ^{a}	2.92 ^{d}	3.05 $^{b-d}$	2.96 ^{cd}
Seed index (g)	**	9.30 $^{d-f}$	9.40 ^{de}	9.28 $^{d-f}$	9.07 $^{e-h}$	9.20 ^{dg}	10.57 ^{b}	8.90 ^{gh}	8.73 ^{h}	10.14 ^{c}	9.47 ^{d}	9.03 $^{f-h}$	11.71 ^{a}	9.20 $^{d-g}$	8.40 ^{i}	10.69 ^{b}
Oil (%)	**	23.13 ^{a}	20.59 $^{f-h}$	21.58 ^{cd}	22.43 ^{b}	20.47 ^{gh}	22.32 ^{b}	21.37 ^{cd}	19.54 ^{i}	21.87 ^{bc}	21.41 ^{cd}	18.44 ^{j}	20.85 $^{c-g}$	20.23 ^{h}	17.65 ^{k}	21.11 $^{d-f}$
Free fatty acid (%)	**	0.199 ^{cd}	0.219 $^{a-d}$	0.201 ^{bc}	0.189 ^{d}	0.220 ^{ab}	2.05 $^{b-d}$	0.204 $^{b-d}$	0.231 $^{a-b}$	0.197 ^{cd}	0.210 ^{b}	0.224 $^{a-b}$	0.247 ^{a}	0.219 $^{a-b}$	0.189 ^{d}	0.240 ^{ab}
Acid value	**	0.399 ^{cd}	0.439 $^{a-b}$	0.406 $^{b-d}$	0.380 ^{d}	0.443 $^{a-c}$	0.412 $^{b-d}$	0.410 $^{b-d}$	0.464 ^{ab}	0.395 ^{cd}	0.421 $^{b-d}$	0.450 $^{a-c}$	0.497 ^{a}	0.439 $^{a-d}$	0.380 ^{d}	0.481 ^{a}
Crude protein (%)	**	23.94 ^{f}	23.28 ^{g}	24.02 ^{f}	22.30 ^{i}	22.91 ^{gh}	22.53 ^{hi}	25.52 ^{d}	27.25 ^{b}	27.83 ^{a}	18.74 ^{j}	22.25 ^{i}	26.68 ^{c}	22.56 ^{hi}	24.59 ^{e}	25.25 ^{d}
Moisture (%)	**	11.84 ^{d}	12.95 ^{b}	11.20 ^{e}	12.35 ^{c}	13.26 ^{ab}	11.62 ^{d}	11.97 ^{d}	12.37 ^{c}	11.17 ^{e}	12.49 ^{c}	12.56 ^{c}	11.17 ^{e}	13.16 ^{ab}	13.45 ^{a}	11.27 ^{e}
Seed volume (ml)	**	10.27 ^{hi}	10.02 ^{i}	11.58 ^{f}	12.10 ^{d}	11.45 ^{f}	13.75 ^{bc}	11.63 ^{ef}	11.65 ^{ef}	13.90 ^{b}	11.98 ^{de}	11.05 ^{g}	14.24 ^{a}	11.28 ^{fg}	10.62 ^{h}	13.60 ^{c}
Relative density (w/v)	**	0.907 ^{a}	0.938 ^{a}	0.802 $^{b-d}$	0.749 ^{de}	0.754 ^{de}	0.768 ^{cd}	0.767 ^{cd}	0.701 ^{e}	0.748 ^{de}	0.790 $^{b-d}$	0.823 ^{bc}	0.822 ^{bc}	0.816 ^{bc}	0.794 $^{b-d}$	0.785 $^{b-d}$
Seed coat (%)	N.S	37.57	35.87	37.94	41.28	34.79	39.04	36.55	39.61	39.53	40.19	39.91	37.08	41.69	39.91	35.53
Seedling vigor																
Radical length (cm)	**	16.30 ^{ab}	15.46 ^{cd}	16.31 ^{ab}	10.50 ^{h}	15.79 ^{bc}	14.49 ^{f}	6.07 ^{i}	15.17 ^{de}	14.94 $^{d-f}$	14.59 ^{ef}	16.17 ^{ab}	15.33 ^{cd}	13.68 g	14.87 $^{d-f}$	16.47 ^{a}
Shoot length (cm).	**	11.29 ^{b}	11.65 ^{b}	11.63 ^{b}	7.40 ^{e}	10.33 ^{c}	12.38 ^{a}	5.52 ^{f}	10.40 ^{c}	11.75 ^{b}	11.42 ^{b}	12.78 ^{a}	11.74 ^{b}	9.75 ^{d}	11.74 ^{b}	12.85 ^{a}
Seedling dry weight (mg)	**	51.27 ^{f}	59.20 ^{b}	58.42 ^{b}	42.44 ^{g}	58.67 ^{b}	55.53 ^{cd}	3375 ^{h}	54.04 ^{de}	52.68 ^{ef}	55.05 ^{d}	61.73 ^{a}	52.01 ^{ef}	50.91 ^{f}	57.48 ^{bc}	55.16 ^{d}

Means of genotype followed by the same lower case letter within a character are not significantly different, P= 0.05 * = significant, ** = highly significant.

L1 = El-Gharbia L2 El-Charkia L3 = El-Menofia

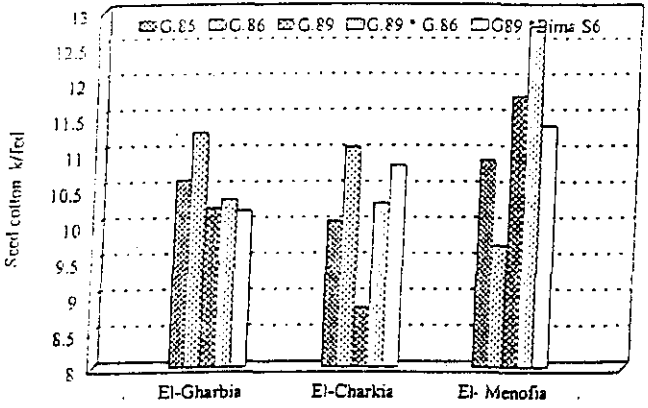

fig (1):Effect of long genotype and location on seed cotton yield

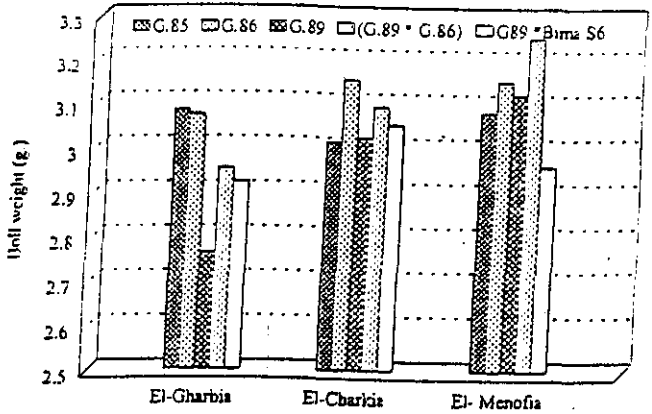

fig (2):Effect of long genotype and location on boll weight

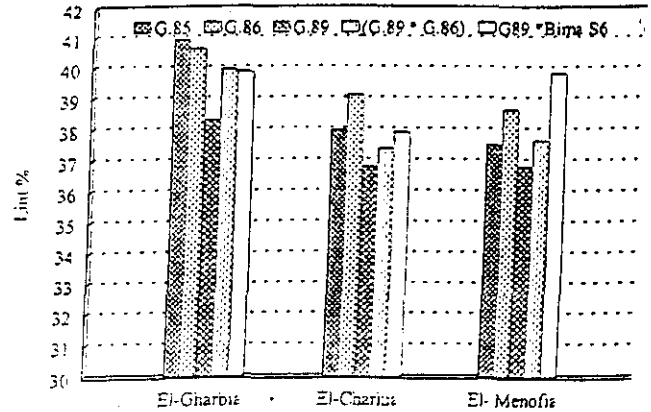

fig (3):Effect of long genotype and location on Lint %

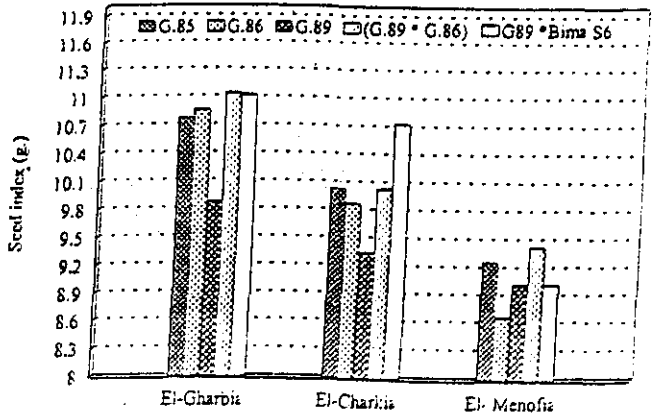

fig (4):Effect of long genotype and location on seed index (g)

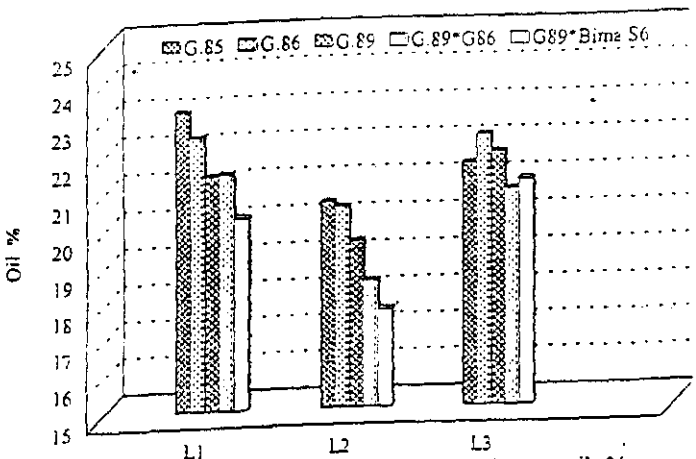

fig (5):Effect of long genotype and location on oil %.

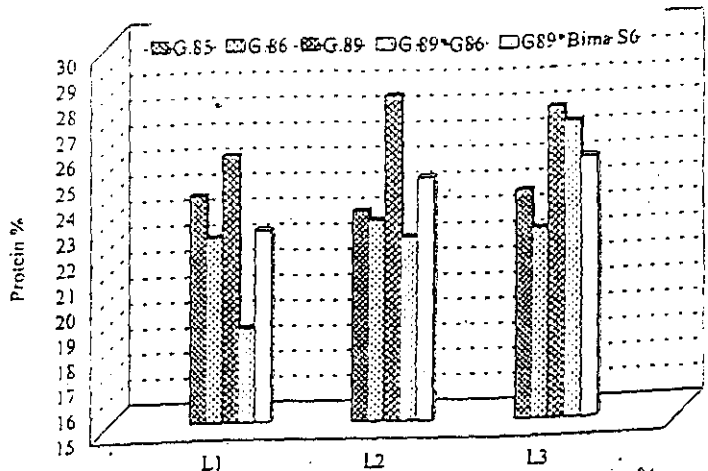

fig (6):Effect of long genotype and location on protein %.

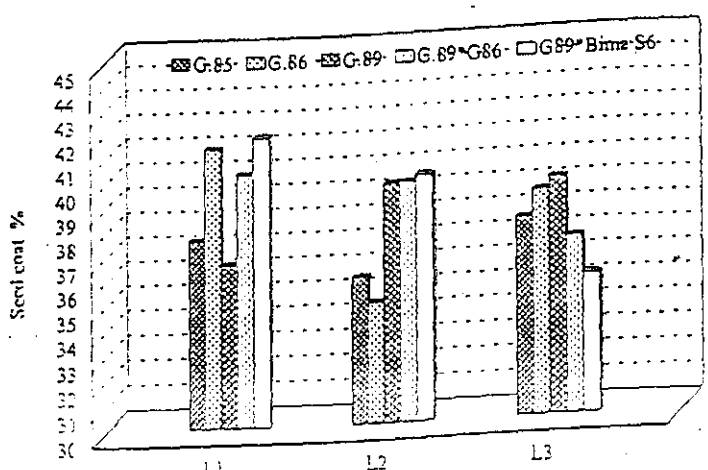

fig (7):Effect of long genotype and location on seed coat %.

significant, at El-Charkia for studied genotypes was significant surpassed G. 89,but at El-Menofia (G. 89× G. 86) was significantly surpassed all studied genotypes except G. 89 in this character. For boll weight (G. 89× Giza 86) at El-Menofia gave (3.25 g.) it surpassed all genotypes at all locations except G. 89 at El-Menofia region and G. 86 at both El-Charkia region and El-Menofia. For lint percentage G. 85 at El-Gharbia gave (40.93 %) it was surpassed all studied genotypes at all studied locations except G. 86 at El-Gharbia. For seed index and seed volume (G. 89× G 86) gave (11.71g.) and (14.24mm^3.) respectively it was significant the highest values. For oil % G. 85 at El-Gharbia location gave (23.13%) it was significant the highest value. For F.F.A and A.V (G. 89× G. 86) at El-Menofia gave the highest values. For protein % G. 89 at El-Menofia region gave the highest value (27.83 %), it was significant effect than the other genotypes at all studied locations. For moisture (%) all genotypes at El-Menofia location except G. 86 gave less values than the other location. For relative density G. 85 at both El-Gharbia and El-Gharbia locations gave (0.907 and 0.938 respectively) it was significant surpassed all studied genotype at all locations. Radical length ranged from 16.47 cm for (G. 89 × Bima S6) at El-Menofia region to (6.07cm) for G. 89 at El-Gharbia location. Shoot length ranged from 12.85 cm for (G. 89 × Bima S6) at El-Menofia region to 5.52 cm for G. 89 at El-Gharbia. Seedling dry weight ranged from (61.73mg.) for (G. 89× G. 86) at El-Gharbia location to 33.75 mg. For G. 89 at El-Gharbia . . These results generally corresponded with the finding of Abo El- Zahab et al. (1992); Abd El- Rahman et al. (1994); Seyam et al. (1994); Kill and Gencer (1995) Abou-Tour et al. (1996); Badr et al. (1998); Sorour et al. (1998); Nawar et al. (1999); Atteia (2001); El-Dusky (2002); and Badr. (2003). They reported that the effect of genotype × location interaction was significant for some cotton characters.

5. Effect of the interaction between genotypes and growing seasons:

Table (4) shows the average values of studied cotton characters. For the five Egyptian cotton genotypes grown during the two successive seasons (2002 and 2003),ten characters showed significant effects. Boll weight for both G. 85,G. 86 and

Table (4) : Effect of genotype ×growing season interaction on seed cotton yield, viability and seed quality characteristics

Character	Sig	Giza 85		Giza 86		Giza 89		Giza 89 × Giza 86		G. 89× Dima S6	
		2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Seed cotton yield k/f	N.S	8.91	12.9	9.36	11.96	9.00	11.52	9.75	12.48	9.48	12.07
Lint (%)	N.S	38.79	38.83	39.56	39.39	37.91	36.70	38.32	38.33	39.12	39.30
Boll weight (g)	* *	2.90 ^{cd}	3.21 ^{a}	2.96 $^{b-d}$	3.29 ^{a}	2.85 ^{d}	3.08 ^{b}	3.08 ^{b}	3.21 ^{a}	2.95 $^{b-d}$	3.00 $^{b-c}$
Seed index (g)	*	9.49 $^{b-d}$	9.16 ^{e}	9.59 ^{bc}	9.63 ^{b}	9.30 ^{de}	9.21 ^{e}	9.95 ^{a}	10.19 ^{a}	9.53 $^{b-d}$	9.33 $^{c-e}$
Oil (%)	N.S	21.64	21.89	21.90	21.58	20.76	21.09	20.23	20.24	19.68	19.65
F.F.A (%)	*	0.222 ^{ab}	0.191 ^{c}	0.208 $^{a-c}$	0.202 $^{b-c}$	0.206 ^{bc}	0.215 $^{a-c}$	0.217 $^{a-c}$	0.237 ^{a}	0.223 ^{ab}	0.208 $^{a-c}$
A.V	* *	0.445 ^{ab}	0.384 ^{c}	0.418 ^{bc}	0.406 ^{bc}	0.414 ^{bc}	0.433 ^{ab}	0.436 ^{ab}	0.476 ^{a}	0.448 ^{ab}	0.419 ^{bc}
Crude protein (%)	* *	23.85 ^{d}	23.64 ^{d}	22.84 ^{e}	22.32 ^{f}	26.38 ^{b}	27.35 ^{a}	22.86 ^{e}	22.25 ^{f}	23.86 ^{d}	24.40 ^{c}
Moisture (%)	* *	12.10 ^{cd}	11.88 ^{de}	12.45 ^{ab}	12.37 ^{bc}	11.72 ^{e}	11.95 ^{de}	11.82 ^{de}	12.33 ^{bc}	12.54 ^{ab}	12.71 ^{a}
Seed volume (mm^3)	*	10.72 ^{e}	10.52 ^{e}	12.39 ^{ab}	12.48 ^{ab}	12.42 ^{ab}	12.62 ^{a}	12.57 ^{a}	12.17 ^{bc}	12.01 ^{c}	11.66 ^{d}
Relative density (w/v)	N.S	0.892	0.872	0.741	0.773	0.720	0.732	0.790	0.840	0.794	0.803
Seed coat (%)	N.S	37.71	36.55	39.61	37.12	37.00	40.12	39.19	38.77	39.16	38.93
Seedling vigor											
Radical length (cm)	* *	15.48 ^{bc}	16.57 ^{a}	15.19 $^{b-d}$	12.00 ^{e}	13.23 ^{e}	13.12 ^{e}	15.57 ^{b}	15.16 $^{b-d}$	15.06 ^{cd}	14.95 ^{d}
Shoot length (cm)	* *	10.78 ^{c}	12.26 ^{a}	10.88 ^{c}	9.19 ^{de}	9.49 ^{d}	8.96 ^{e}	12.20 ^{a}	11.76 ^{b}	11.48 ^{b}	11.41 ^{b}
Seedling dry weight (mg)	* *	54.06 ^{e}	58.53 ^{a}	55.80 $^{b-d}$	48.63 ^{f}	46.74 ^{g}	46.90 ^{g}	56.53 ^{b}	55.99 ^{bc}	54.78 $^{c-e}$	54.25 ^{de}

Means of genotype followed by the same lower case letter within a character are not significantly different, P= 0.05
N.S=Not significant, * = significant, ** = highly significant.

(G. 89×G.86) during the second season were the highest significant values. (G. 89× G. 86) hybrid during the two growing season gave the highest seed index (9.95 and 10.19 g.). F.F.A and A.V ranged from 0.237 % and 0.476 for (G. 89× G. 86) to 0.191 % and 0.384) for G. 85 during the second season. G. 89 during the second season gave the highest significant value for protein percentage (27.35) and it gave the lowest moisture 11.72 % during the first season. G. 85 during the two season gave the less seed volume (10.72 and 10.52 mm^3.) and it gave the highest significant values for seedling vigor characters during the second season. The data indicated that genotypes under study reacted differently in different seasons. These results were generally in accordance with those obtained by Seyam et al. (1994); Abou-Tour et al. (1996); Badr et al. (1998); Nawar et al. (1999); Abd El-Salam (2000); Atteia (2001); El-Dusky (2002); and Badr. (2003). They reported that the effect of genotype growing season was significant for some cotton characters.

6. Effect of the interaction between growing location and season :

Table (5) shows the average values of the studied cotton characters for the three locations during the two successive seasons (2002 and 2003) and indicated of that eight characters were significant due to the interaction of locations and season. The highest seed cotton yield of (13.40 k/fed.), and boll weight (3.28 g.) were obtained from cotton genotypes grown at El-Menofia during the second season, relative density (0.840) at El-Charkia region during the second season, the lowest cotton yield (8.79 k/fed.) at El-Charkia location in the first season, the lowest boll weight (2.91 and 2.84 g.) at both El-Charkia location and El-Gharbia region during the first season. The highest protein (25.47 %) was obtained from cotton genotypes grown at El-Menofia location during the second season but the lowest values was (22.68 % and 22.54 %) were obtained from cotton genotypes grown at El-Gharbia region during the two season. The highest seed volume (13.54 and 13.37 mm^3.) were obtained from cotton genotypes grown at El-Menofia region during the two seasons respectively, but the value (10.59 ml.) at El-Charkia during the second season. The produced seeds from

Table (5) : Effect of growing location × growing season interaction on seed cotton yield, viability and seed quality characteristics

Character	Sig	El-Gharbia		El-Charkia		El-Menofia	
		2002	2003	2002	2003	2002	2003
Seed cotton yield k/f	**	9.40 cd	11.63 b	8.79 d	11.05 b	9.71 c	13.40 a
Lint (%)	N.S	40.00	39.87	38.00	38.08	38.21	37.58
Boll weight (g)	**	2.84 c	3.07 b	2.91 c	3.12 b	3.09 b	3.28 a
Seed index (g)	N.S	9.16	9.21	9.05	8.85	10.50	10.45
Oil (%)	N.S	21.71	21.72	19.30	19.37	21.52	21.58
F.F.A (%)	N.S	0.202	0.206	0.222	0.211	0.222	0.215
A.V	N.S	0.406	0.414	0.445	0.425	0.446	0.431
Crude protein (%)	**	22.68 c	22.54 c	24.38 c	23.96 d	24.82 b	25.47 a
Moisture (%)	N.S	12.36	12.36	12.75	13.09	11.27	11.30
Seed volume (mm^3)	**	11.20 c	11.71 b	11.33 c	10.59 d	13.54 a	13.37 a
Relative density (w/v)	**	0.823 a	0.789 b	0.764 b	0.840 a	0.776 b	0.783 b
Seed coat (%)	N.S	38.32	40.59	39.21	36.72	38.07	37.58
Seedling vigor							
Radical length (cm)	**	12.95 c	11.51 d	15.15 b	15.83 a	15.94 a	15.44 b
Shoot length (cm)	**	9.62 d	8.53 e	11.01 c	11.74 b	12.28 a	11.87 b
Seedling dry weight (mg)	**	47.53 d	45.83 e	57.64 a	58.81 a	55.58 b	53.94 c

Means of genotype followed by the same lower case letter within a character are not significantly different, P= 0.05 N.S=Not significant, * = significant, ** = highly significant.

El-Gharbia region during the second season gave the lowest values for seedling vigor characters, but the highest seedling dry weight was obtained from cotton genotypes grown at El-Gharbia region during the two growing seasons. seasons. These some results were in accordance with those obtained by Badr (1994); Abou-Tour et al. (1996); Badr et al. (1998); Sorour et al. (1998); Nawar et al. (1999); Atteia (2001); El-Desuky (2002); and Badr. (2003). They reported that the effect of interaction between growing location and growing season was significant for some cotton characters.

7. Effect of second order interaction:

Genotype × location × season was significant for all studied characters

8. Correlations between studied characters:

Results in Table (6) indicated association for possible combinations significant positive between (seed cotton yield and boll weight), between (seed index and each of oil %, F.F.A %, A.V, seed volume and shoot length), among (seedling dry weight, shoot and radical length).

Significant negative correlations were obtained between (seed cotton and its seed volume), between (lint % and each of F.F.A %,

Table (6): Correlation coefficients between studied characters of five long Egyptian cotton genotypes combined over two years on three location

Characters		X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15
X1	Seed cotton yield k/f	0.0150	0.4571**	-0.2492	-0.2549	-0.1010	-0.0887	-0.0847	0.2181	-0.2983*	0.1746	0.0042	-0.0476	-0.218	0.0837
X2	Lint (%)		-0.1895	-0.1953	0.2289	-0.3124*	-0.3333*	-0.5051**	0.2167	-0.2689	0.2136	0.1336	-0.1119	-0.1787	-0.1629
X3	Boll weight (g)			0.1972	-0.0735	0.0394	0.0402	0.0406	-0.1214	0.0972	0.1163	-0.1127	0.1432	0.1412	0.1915
X4	Seed index (g)				0.3290*	0.3247*	0.3020*	0.1956	-0.5930**	0.7675**	0.0590	-0.0949	0.1984	0.3226*	0.0576
X5	Oil (%)					-0.1261	-0.1190	-0.0702	-0.4736**	0.3008	0.0134	-0.0252	-0.0976	-0.1366	-0.3045*
X6	F.F.A (%)						0.9724**	0.1333	-0.0903	0.1497	0.0214	-0.0806	0.0934	0.1076	0.0059
X7	A.V							0.1345	-0.0680	0.1435	0.0076	-0.0798	0.1037	0.1100	0.0205
X8	Crude protein (%)							1.00	-0.2968*	0.2776	-0.2304	0.0708	-0.0279	-0.0409	-0.1696
X9	Moisture (%)								1.00	-0.6311**	0.1399	0.1143	-0.0149	-0.1233	0.1599
X10	Seed volume (mm^3)										-0.4850**	0.1092	-0.0042	0.1347	-0.0824
X11	Relative density (w/v)										1.00	-0.2517	0.1890	0.1840	0.1509
X12	Seed coat (%)											1.00	-0.0094	-0.0528	-0.0743
X13	Seedling vigor: Radical length (cm)												1.00	0.8571**	0.8432**
X14	Seedling vigor: Shoot length (cm)													1.00	0.8443**
X15	Seedling vigor: Seedling dry weight (mg)														1.00

* = significant ** = highly significant. r at 5% = 0.282 r at 1% = 0.563

A.V and protein %), among (seed index and seed moisture %), between (oil % and both seed moisture % and seedling dry weight), among (protein % and moisture %), between (seed moisture % and seed volume) also among (seed volume and relative density). Some our results were in accordance with those obtained by Nawar et al. (1999), Abd El-Salam (2000); Badr and Abd El-Aziz. (2000); Badr. (2001 and 2003); who reported that the relationship between seed cotton yield and boll weight was positive and significant, Atteia (2001) and El-Desuky (2002) reported that the correlation between (seed index and seed volume), was positive and significant. While the correlation between (seed density and seed volume was negative and significant. El-Kilany et al. (1977), Shaver and Dilday (1982) and El-Desuky (2002) reported that the correlation between (seed index and oil %) was positive and significant

It worth to be mentioned that the pattern of association between oil % and seed index was variable in Egyptian germplasm according to genotypes used. This correlations in the breeding program to improve seed cotton yield, seed quality and seed viability characters.

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محمد عبد الله الكيلاني ، اعتدال طه عيد و محمد سمير عبد العال (١٩٧٧). نسبة الزيت والبروتين لأصناف القطن المصري وعلاقاتها بالمحصول الشعرا ومعامل البذرة . مجلة الفلاحة العدد ال٥٧ يناير / فبراير / ديسمبر ١٩٧٧.

تقييم بعض التراكيب الوراثية طويلة التيله من القطن المصري من حيث صفات المحصول وجودة وحيوية البذور

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اجري هذا البحث لتقييم الهجينان المبشران (جيزه ٨٩ × جيزه ٨٦) و(جيزه ٨٩ × بيما س ٦) مقارنا بأصناف القطن الثلاثة طويل التيلة وهي (جيزه ٨٥، جيزه ٨٦ وجيزه ٨٩) وشملت الدر اسه تاثير التراكيب الوراثية ومنطقة وموسم الزراعة والتفاعلات بينهما على صفات المحصول وجودة وحيوية البذور في ثلاث محافظات بجمهورية مصر العربية (الغربيه– طنطا، المنوفيه– تلا، الشرقيه– أبو كبير) خلال موسمي ٢٠٠٢ ، ٢٠٠٣:

الصفات التي تم دراستها هي: – محصول القطن الزهر ق/ف– وزن اللوزة بالجرام– معدل الحليج

– صفات جودة البذور:– معامل البذرة بالجرام– حجم مائه بذره (مم^3) – الكثافة النوعية للبذور– نسبة القصره ٪ – نسبة الزيت ٪ نسبة الأحماض الدهنية الحره ٪ رقم الحموضة – نسبة البروتين ٪ – صفات قوة البادره (طول الجذير–سم ، طول الريشة –سم ، الوزن الجاف للبادره– مجم) ويمكن تلخيص النتائج المتحصل عليها فيما يلي

– تأثير التركيب الوراثي كان معنويا على جميع الصفات التي تم دراستها فيما عدا محصول القطن الزهر ق/ف ونسبة الأحماض الدهنية الحره ٪ ورقم الحموضة ونسبة القصره ٪ .

– أوضحت النتائج تفوق الهجين المبشر (جيزه ٨٩ × جيزه ٨٦) معنويا على التراكيب الوراثية تحت الدر اسه فيما عدا جيزه ٨٦ في وزن اللوزة وعلى جميع التراكيب الوراثية في معامل البذرة كما تفوق على الصنف جيزه ٨٩ في معدل الحليج كما اشترك مع جيزه ٨٦ وجيزه ٨٩ في إنتاج بذور ذات حجم أكبرمن (جيزه ٨٩×بيما س٦) وجيزه ٨٥ واشترك مع جيزه ٨٥ في التفوق على باقي التراكيب لصفة الوزن الجاف للبادره

-- تفـوق الهجين (جيزه ٨٩ × بيما س ٦) معنويا على كل من جيزه ٨٩ و(جيزه ٨٩ × جيزه ٨٦) في معدل الحليج وعلى كل من جيزه ٨٥ و(جـيزه ٨٩ × جيزه ٨٦) في نسبة البروتين ٪ وتفوق على جيزه ٨٦ وجيزه ٨٥ في الوزن الجاف للبادره

-- تفـوق الصـنف جـيزه ٨٥ معنويا على جيزه ٨٩ في وزن اللوزة ومعدل الحليج ونسبة الزيت ٪ وعلى جميع التراكيب الوراثية في الكثافة النوعـية للبذور كما تفوق على جميع التراكيب ماعدا (جيزه ٨٩ × جيزه ٨٦) في الوزن الجاف للبادره

- تفـوق الصنف جيزه ٨٦ معنويا على جيزه ٨٩ و (جيزه ٨٩ × بيما س ٦) فـي وزن اللـوزه بينـما تفوق على كل التراكيب الوراثية ماعدا (جيزه ٨٩ × بيما س ٦) في معدل الحليج وتفوق ايضا على كل التراكيب مـاعدا (جـيزه ٨٩ × جيزه ٨٦) في معامل البذره وعلى جيزه ٨٩ في الكثافة النوعيه للبذور والوزن الجاف للبادره.

- تفوق الصنف جيزه ٨٩ معنويا على الهجينان المبشران (جيزه ٨٩ × جـيزه ٨٦) و (جيزه ٨٩ × بيما س ٦) في نسبة الزيت ٪ وعلى جميع التراكيب الوراثية المدروسه في نسبة البروتين ٪ .

-- تأثـير البيئة : كان هناك تأثير معنويا لمنطقة الزراعة على الصفات المدروسـة فـيما عدا نسبة الأحماض الدهنية الحره ٪ ورقم الحموضة والكـثافة النوعية ونسبة القصره ٪ . تفوقت التراكيب الوراثية المنزرعة فـي مـنطقة المنوفية معنويا على المناطق الأخرى في صفات محصول القطـن الزهـر ق/ف ووزن اللـوزة ومعامل البذرة ونسبة البروتين ٪ ومعدل الحليج.

-- تأثـير موسـم الزراعة:- لوحظ تأثيرا معنويا على محصول القطن الزهر ق/ف ووزن اللوزة وصفات قوة البادره فقط.

تأثير التفاعل بين التركيب الوراثي ومنطقة الزراعة :- كان معنويا على جميع الصفات التي تم دراستها حيث تفوق الهجين المبشر (جيزه ٨٩ × جـيزه ٨٦) المنزرع في منطقة المنوفيه معنويا على جميع الأصناف فـي كـل المناطق بالنسبة لمحصول القطن الزهر ق/ف ومعامل البذره وحجم ١٠٠ بذره. سجل الصنف جيزه ٨٥ في منطقة الغربيه أعلى نسبه

زيت ٪ معنويا عن باقي الأصناف في كل المناطق بينما أعلى نسبة بروتين ٪ سجلها الصنف جيزه ٨٩ في منطقة المنوفيه

تأثير التفاعلات بين (التركيب الوراثي وموسم الزراعة) وبين (المنطقة وموسم الزراعة) كان معنويا على معظم الصفات المدروسة.

-- أوضحت أهم النتائج لدراسة الارتباط بين الصفات المدروسة أن هناك ارتباط معنوي موجب الاتجاه بين (محصول القطن الزهر ق/ف ووزن اللوزة جم) وبين (معامل البذره وكل من نسبة الزيت ٪ وطول الريشه سم) ، وبين (نسبة البروتين ٪ وحجم البذور سم^3) ، وبين (نسبة الأحماض الدهنية الحره ٪ ورقم الحموضة)، وبين (طول الجذير-سم وكل من طول الريشة -سم والوزن الجاف للبادره مجم).

كان الارتباط معنوي سالب الاتجاه بين (محصول الزهر وحجم البذور مم^3) وبين (معدل الحليج وكل من نسبة الأحماض الدهنية الحره ٪ ورقم الحموضة ونسبة البروتين ٪) وبين (معامل البذرة ونسبة الرطوبة) ، وبين(نسبة الزيت ٪ ونسبة الرطوبة ٪) ، وبين (نسبة الزيت ٪ والوزن الجاف للبادره)، وبين (نسبة البروتين ونسبة الرطوبة) ، وبين (نسبة الرطوبة وحجم البذور) وبين (حجم البذور والكثافة النوعية).

دراسة الارتباط بين هذه الصفات هامة للمربي لإدخالها في برامج التربية لتحسين تلك الصفات في التراكيب الوراثية المختلفة.

يمكن استخدام الهجين المبشر جيزه ٨٩ × جيزه ٨٦ لتحسين صفات المحصول وجيزه ٨٥ لتحسين نسبة الزيت أما جيزه ٨٩ يمكن استخدامه لتحسين نسبة البروتين في هذه الطبقة.