EVALUATION OF SOME NEW PROMISING STRAINS AND EGYPTIAN COTTON COMMERCIAL CULTIVARS GROWN AT DIFFERENT LOCATIONS

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Abstract

Four promising Egyptian cotton genotypes were evaluated compared with the four commercial cultivars grown in seven different locations in lower Egypt during five successive seasons from 2007 to 2011. Randomized complete block design with four replications was used at each location. The traits studied were seed cotton yield (k/f), lint yield (k/f), boll weight, lint percentage, seed index and lint index.

Highly significant differences between genotypes, locations, seasons and the interaction between locations by seasons were obtained for yield and yield components traits. The effect of the interaction between genotypes by locations, genotypes by years and the second interaction were highly significant for all studied traits.

The results showed that the extra long staple promising strain [G.84 (G. 70 × G. 51 b)] × Pima 62 and the new variety of the same category Giza 92 produced the highest values for yield and most yield components traits than the commercial cultivar Giza 88. Also, the extra long staple promising strain (G.77 × Pima S6) surpassed the commercial cultivar Giza 87 in most studied traits.

From the results, the long staple promising strain (10229 × G.86) exceeded the commercial cultivar Giza 86 in all studied traits.

Adaptation to different environments was high for the promising strain of extra long staple [G.84 (G. 70 × G. 51 b)] × Pima 62 and the commercial cultivar of the same category Giza 92 at El-Gharbia governorate for most traits. The promising strain of long staple (10229 × G.86) exceeded the commercial cultivar Giza 86 for all studied traits at El-Sharkia governorate.

Therefore, it seems necessary to continue evaluating new cotton genotypes by growing them at several locations over an adequate number of years before recommending any variety for a certain location.

INTRODUCTION

Cotton (*Gossypium barbadense L*) is one of the most important fiber crops in the world and Egypt. In Egypt, cotton is important for both export and local textile industry. Cotton area of cultivation extends longitudinally about 1000 Km from northern to southern of Egypt. Because environmental conditions vary or likely to vary from one location to another and / or from year to year in this extended area, evaluation process of the commercial varieties as well as the newly released or promising strains over different locations and over different years is of great importance to the breeder. It is essential to develop new varieties characterized by high yielding abilities and better fiber qualities to replace old ones or those which had deteriorated.

Therefore, the Regional Evaluation Research Section, C. R. I., carries out yearly regional variety tests in all cotton locations with the main objective of identifying the best locations for the new varieties and the levels of degeneration or deterioration of the latter. Several workers studied the performance of cotton varieties under different environments (Abo El–Zahab *et al.*, 1992; Gutierres, and El-Zik 1992; Abou–Tour *et al.*, 1996 and Badr and El-Sayed 2004). They reported that the effects of genotypes, location, years and the interactions between them were significant for some cotton traits. Many investigators studied the improvement of cotton yield and quality traits. Abdel – Salam *et. al.* (1985) found that the combined analysis of variance indicated that most of the variation in the quality properties studied was due to varieties effects and followed in descending order by the varieties × years and varieties × subregions interactions. Abd El-Rahman and El-Mazar (1987) showed that genotypes × locations interactions were significant for seed cotton yield and lint percentage at North Delta. Badr (1994) reported that the interaction between genotypes and locations were significant for seed cotton yield, lint yield, boll weight, lint percentage and seed index. Seyam and Abd El-Rahman (1994) showed that genotypes x locations interactions were significant for seed and lint cotton yield / plot, boll weight, lint percentage and seed index. Bahtade *et. al.* (1995) reported that the first order interaction (genotype × location) and (genotype × year) was significant for seed cotton yield. Hassan (2000) reported that the first order interaction of genotypes × years was statistically significant for all traits except seed index. The genotypes × locations interactions were highly significant for all traits. The second order interaction (genotype × location × year) was highly significant for lint yield and boll weight. Badr (2003) reported that all traits showed highly significant mean squares for environments and genotype × environment interaction. Hassan *et. al.* (2005) showed that the effects of genotypes, years, locations, (genotype × location) and the second order interaction were highly significant for seed cotton yield and seed index. While the first order interaction (genotype × year) was insignificant for seed index. Hassan *et. al.* (2006) showed that the effect of genotypes, years, locations, and the interactions between them were highly significant for most yield and yield components. The first order interaction (genotype × year) and (genotype × location) were significant for most traits. The second order interaction was insignificant for all fiber properties. El-Feky and Hassan (2011) showed non significant differences were obtained for fiber properties due to growing G.86 and G.85 for some locations.

The main objective of the present study was to determine the effect of genotypes, locations, years and their interactions on yield and some yield components of the same cotton genotypes.

MATERIALS AND METHODS

This study included four Egyptian cotton cultivars, Giza 86, Giza 87, Giza 88 and Giza 92 and four new promising strains (G.77 × Pima S6), (G.89 × G.86), [G.84 (G. 70 × G. 51 b)] × Pima 62 and (10229 × G.86) which were grown in five successive seasons, from 2007 to 2011 at seven locations of lower Egypt i.e., El-Menufia, El-Gharbia, El-Sharkia, El-Dakahlia, Kafr El-Sheikh, El-Beheira and Damiatta. Data of yield and yield components of the studied genotypes were obtained from the yield miniature experiments conducted by Regional Evaluation Research Section of the Cotton Research Institute. The experimental design was a randomized complete block with four replications at each location. The plot size was 62.4 m^2 containing 12 ridges of eight meters long and 65 cm wide. Distance between hills was 25 cm apart and each hill was thinned to two plants per hill after six weeks. The first irrigation was given three weeks after sowing, and the second was three weeks later. Culture practices were carried out as recommended in cotton fields. Data were collected for the following traits:

- Seed cotton yield (k/f): obtained as weight of seed cotton yield per plot and converted to kentar per feddan (kentar = 157.5 k.g.).
- Lint cotton yield: calculated as follows: weight of seed cotton yield per feddan × lint percentage (kentar = 50 k.g).

A random sample of 50 bolls was harvested at random from each plot and was used to obtain plot mean values for:

a- Boll weight in grams: the average weight in grams of 50 bolls.

b- Lint percentage (L.P): ratio of lint weight to seed cotton weight in the sample expressed as percentage.

c- Seed index (S.I): weight of 100 seeds in grams.

d- Lint index: the weight of lint produced by 100 seeds in grams:

$$\text{- Lint index} = \frac{SI \times L.P}{100 - L.P} \times 100$$

Statistical analysis:

Analysis of variance was done according to Snedecor and Cochran (1982) for each location. Combined analysis for all regions was performed on all the studied traits as outlined by Micntosh (1983). Differences between means were compared by using the Least Significant Differences (L.S.D.)

RESULTS AND DISCUSSION

The results reported in this investigation included the evaluation of four promising strains and four Egyptian cotton cultivars in the five seasons from 2007 to 2011 at seven different locations of Lower Egypt in order to study the effects of genotypes, locations, years and their interactions.

The combined analysis of the genotypes, locations, years and the interactions between them are shown in Table (1). The results of the combined analysis of variance showed that the effect of genotypes, locations and years were highly significant for all studied traits. Also, the effect of the first order interaction (location by year), (genotypes x locations) and (genotypes x years) were highly significant for all studied characters. The second order interactions were highly significant for all studied traits.

Table 1. Mean squares for all characters of eight Egyptian cotton genotypes grown at seven locations over five years (2007 to 2011).

Characters	S.O.V	Genotypes (G)	Locations (L)	Years (Y)	L × Y	G × L	G × Y	G× L× Y
	d.f	7	6	4	24	42	28	168
Seed cotton yield (k/f)		119.3**	77.10**	69.32**	77.07**	5.811**	4.463**	3.57**
Lint cotton yield (k/f)		434.8**	105.1**	94.53**	106.4**	8.46**	7.279**	5.545**
Boll weight (g)		3.502**	4.883**	1.235**	2.231**	0.135**	0.084**	0.083**
Lint percentage		904.5**	41.51**	31.34**	18.76**	2.514**	4.209**	1.841**
Seed index (g)		18.14**	21.32**	39.63**	19.13**	1.247**	1.558**	0.866**
Lint index (g)		102.8**	14.36**	10.51**	4.644**	0.706**	0.941**	0.357**

***, ** Significant at the 0.05 and 0.01 probability levels, respectively.**

The results indicated that comparisons among these cotton genotypes for the studied traits should be independently estimated at each sub region over several years. These results agreed with the findings of Abd El-Rahman and El-Mazar (1987),Badr (2003), Hassan *et. al.* (2005) and Hassan *et. al.* (2006), who reported that genotypes, locations, years and the interactions between them were significant for some yield components.

Cotton varietals differential:

Data in Table (2). Showed the effect of different cotton genotypes on the yield and yield components traits. These genotypes under study were significantly different with regard to these studied traits. Comparing the promising strain of extra long staple [G.84 (G.70 X G 51b)] × Pima 62 as a potential substitute for G.88, it could be observed from Table (2) that this promising strain exceeded significantly G.88 in seed cotton yield and lint cotton yield by 0.59 k/f (7%) and 1.14 k/f (11.5%), respectively. The promising strain [G.84 (G.70 X G 51b)] × Pima 62 produced significantly higher boll weight, lint percentage and lint index than G.88.

Table 2. Effect of different cotton genotypes on yield and yield components over five years and seven locations.

Genotypes	Seed cotton yield (k/f)	Lint cotton yield (k/f)	Boll weight (g)	Lint %	Seed index (g)	Lint index (g)
G. 86	9.56	11.98	2.96	39.79	10.28	6.78
G. 87	7.83	8.27	2.55	33.45	9.62	4.84
G. 88	8.42	9.92	2.83	37.40	10.16	6.07
G. 92	9.30	10.60	2.83	36.22	10.02	5.68
(G.77 × Pima S6)	7.92	8.80	2.59	35.31	9.83	5.36
(G.89 × G.86)	9.64	11.66	2.81	38.40	9.92	6.17
[G.84 (G.70 X G 51b)] × Pima 62	9.01	11.06	2.93	38.94	9.94	6.35
(10229 × G.86)	10.52	13.69	2.96	41.29	10.82	7.62
LSD 0.05	0.27	0.33	0.04	0.21	0.13	0.08

The new promising strain (G.77 × Pima S6) produced higher seed cotton yield k/f than the new variety G.87, but the difference between them was non significant for this trait. The new promising strain (G.77 × Pima S6) produced higher lint cotton yield k/f than the new variety G.87 and the differences between them was significant for this trait. This promising strain produced significantly higher boll weight, lint percentage, seed index and lint index than the new variety G.87.

Comparing the new variety of extra long staple G.92 as a potential substitute for G.88, it could be observed from Table (2) that this new variety exceeded significantly G.88 in seed cotton yield and lint cotton yield by 0.88 k/f (10.5%) and 0.68 k/f (6.8%), respectively. But G.88 produced significantly higher lint percentage and lint index than G.92.

Comparing the promising strain of long staple (10229 × G.86) as a potential substitute for G.86, it could be observed from Table (2) that this promising strain exceeded significantly G.86 in seed cotton yield and lint cotton yield by 0.96 k/f (10%) and 1.71 k/f (14.3%), respectively. Also, this promising strain produced significantly higher lint percentage, seed index and lint index than G.86.

Comparing the promising strain of long staple (G.89 × G.86) as a potential substitute for G.86, it could be observed from Table (2) that the G.86 cultivar exceeded significantly the promising strain (G.89 × G.86) in most traits.

These results are in agreement with those obtained by Abo El-Zahab *et. al.* (1992), Badr (2003), Hassan *et. al.* (2005) and Hassan *et. al.* (2006).

Effect of locations on the studied traits:

Table (3) showed the average values of studied traits as affected by different locations. The data indicated that the average values of seed cotton yield k/f and lint cotton yield k/f were significantly different. The highest values were obtained from genotypes grown at El-Gharbia region. El-Sharkia region produced the highest values of boll weight and seed index, surpassing significantly the other locations. But the lowest boll weight and seed index were reported at Damiatta region. El-Menufia and El-Gharbia regions produced the highest values of lint percentage, surpassing significantly the other locations. But the lowest lint percentage was reported at Damiatta governorate.

Table 3. Average of studied traits as affected by different growing locations.

Locations	Seed cotton yield (k/f)	Lint cotton yield (k/f)	Boll weight (g)	Lint %	Seed index (g)	Lint index (g)
El-Menufia	8.23	9.93	2.91	38.23	10.15	6.28
El-Gharbia	10.08	12.17	2.84	38.18	10.25	6.37
El-Sharkia	9.67	11.44	3.12	37.13	10.63	6.31
El-Dakahlia	8.36	10.02	2.74	37.85	10.06	6.16
Kafr El-Sheikh	8.82	10.50	2.77	37.60	10.00	6.04
El-Beheira	8.67	10.34	2.68	37.69	10.02	6.11
Damiatta	9.34	10.84	2.58	36.74	9.41	5.48
LSD 0.05	0.25	0.30	0.04	0.20	0.12	0.08

El-Gharbia and El-Sharkia regions produced the highest values of lint index, significantly surpassing the other locations. But the lowest lint index was reported at Damiatta. These results were in agreement with those obtained by Abo El-Zahab *et.*

al. (1992), Abou-Tour *et. al.* (1996), Badr (2003), Hassan *et. al.* (2005) and Hassan *et. al.* (2006).

Effect of seasons on cotton yield and yield components:

Table (1) and (4) showed that the values of cotton yield properties were affected by the growing season. Table (1) showed that all traits were highly significant. The data in Table (4) indicated that seed cotton yield and lint cotton yield recorded the highest values during the first season (2007) and the fifth season (2011), and the differences between it and the other seasons were significant for these traits. While, boll weight recorded the highest value during the first season (2007).

Table 4. Average of studied traits as affected by different growing seasons.

Seasons	Seed cotton yield (k/f)	Lint cotton yield (k/f)	Boll weight (g)	Lint %	Seed index (g)	Lint index (g)
2007	9.66	11.38	2.89	37.26	10.43	6.23
2008	8.54	10.10	2.83	37.21	10.24	6.11
2009	8.50	10.13	2.79	37.68	9.63	5.86
2010	8.85	10.68	2.69	38.11	9.61	5.95
2011	9.57	11.44	2.83	37.75	10.45	6.40
LSD 0.05	0.21	0.26	0.03	0.17	0.10	0.07

The cotton genotypes grown in the fourth season (2010) gave the highest values of lint percentage. The data in Table (4) indicated that seed index recorded the highest values during the first season (2007) and the fifth season (2011), the differences between it and the other seasons were significant for this trait. The cotton genotypes grown in the fifth season (2011) gave the highest values of lint index, and the differences between it and the other seasons were significant for this trait. This may be due to the variation in climatic conditions from year to year. These results were in harmony with those obtained by Abo El-Zahab *et. al.* (1992), Abou-Tour *et. al.* (1996), Badr (2003), Hassan *et. al.* (2005) and Hassan *et. al.* (2006).

Effect of the interaction between growing locations and growing seasons on cotton yield and yield components:

With respect to the locations × seasons interaction, it could be observed from Table (5) that this interaction was significant for all traits. The highest seed cotton yield (12.34 k/f) and lint cotton yield (14.35 k/f) were obtained from cotton genotypes grown at Damiatta region during the second season (2008). The highest value of boll weight (3.61 g) was obtained from cotton genotypes at El-Sharkia region during the third season (2009), but El-Sharkia region during the fourth season (2010) recorded the highest value of lint percentage (38.89 %).

With respect to the seed index, it could be observed that the highest values was obtained from cotton genotypes at Kafr El-Sheikh region during the first season (11.47 g). The highest value of lint index (6.71 g) was obtained from cotton genotypes at El-Menufia region during the fifth season (2011).

Table 5. The interaction between growing locations and growing seasons on the studied traits.

Characters	Seasons	El-Menufia	El-Gharbia	El-Sharkia	El-Dakahlia	Kafr El-Sheikh	El-Beheira	Damiatta	LSD 0.05
Seed cotton yield (k/f)	2007	9.26	10.80	11.36	9.23	9.20	9.17	8.58	0.56
	2008	5.95	10.90	6.80	7.08	9.19	7.50	12.34	
	2009	9.90	7.60	9.64	9.67	7.62	6.75	8.34	
	2010	6.49	9.74	9.80	8.48	8.26	11.04	8.16	
	2011	9.54	11.38	10.77	7.34	9.82	8.87	9.25	
Lint cotton yield (k/f)	2007	11.08	12.93	13.35	10.81	10.53	10.99	9.99	0.68
	2008	7.13	12.99	7.90	8.44	10.99	8.91	14.35	
	2009	11.92	9.11	11.14	11.56	9.20	8.21	9.77	
	2010	7.87	11.92	12.07	10.47	10.04	12.71	9.71	
	2011	11.64	13.91	12.72	8.84	11.74	10.85	10.38	
Boll weight (g)	2007	2.87	3.14	3.01	2.65	3.08	2.77	2.70	0.08
	2008	2.58	2.90	3.08	3.02	2.78	2.52	2.94	
	2009	3.02	2.83	3.61	2.91	2.74	2.40	2.05	
	2010	2.88	2.58	2.79	2.51	2.53	3.08	2.45	
	2011	3.20	2.74	3.12	2.63	2.73	2.65	2.76	
Lint %	2007	37.87	37.84	37.28	37.04	36.09	37.96	36.74	0.44
	2008	37.44	37.79	35.92	37.49	37.77	37.17	36.87	
	2009	37.98	37.94	36.32	37.82	38.17	38.47	37.05	
	2010	38.33	38.65	38.89	38.83	38.28	36.23	37.57	
	2011	38.51	38.68	37.21	38.06	37.70	38.63	35.47	
Seed index (g)	2007	10.57	10.90	10.38	9.59	11.47	10.42	9.70	0.28
	2008	9.39	10.64	11.29	11.06	10.03	8.98	10.28	
	2009	10.01	9.96	10.92	10.34	9.56	9.07	7.56	
	2010	10.17	9.58	9.47	9.00	8.91	11.10	9.06	
	2011	10.63	10.17	11.09	10.30	10.01	10.50	10.44	
Lint index (g)	2007	6.48	6.66	6.21	5.70	6.48	6.40	5.65	0.18
	2008	5.70	6.50	6.39	6.66	6.12	5.39	6.03	
	2009	6.17	6.12	6.26	6.33	5.94	5.70	4.47	
	2010	6.36	6.09	6.07	5.74	5.55	6.37	5.47	
	2011	6.71	6.46	6.63	6.38	6.13	6.69	5.79	

Therefore, it could be concluded that the mean values of the different traits varied from location to another according to the year of production. These results were corresponded with the finding of Abd El-Rahman and El-Mazar (1987), Badr

(1994), Abou-Tour *et. al.* (1996), Hassan (2000) and Hassan *et. al.* (2006), who reported that the interaction between locations and seasons were significantly different on some yield components and fiber properties.

Effect of the interaction between cotton genotypes and growing locations on cotton yield and yield components:

Table (6) shows that the genotypes × Locations interactions were significant for all traits. Comparing the promising strain [G.84 (G.70 X G 51b)] × Pima 62 as an expected substitution for the commercial cultivar Giza 88, it could be observed that this promising strain produced the highest values for seed cotton yield (k/f) at El-Gharbia and Damiatta regions, the differences between this promising strain and the commercial cultivars G.88 was significant at this region only. Also, the promising strain [G.84 (G.70 X G 51b)] × Pima 62 produced the highest values for lint cotton yield (k/f) than G.88 at El-Gharbia region yet, the differences between them were non significant.

The promising strain [G.84 (G. 70 × G. 51 b)] × Pima 62 produced the highest values for boll weight and lint index at El-Sharkia region and lint percentage at El-Dakahlia region, the differences between the new strain and G.88 were significant for these traits. But, the promising strain exceeded the commercial cultivar Giza 88 for seed index was non significant. Adaptation to different environments were high in the promising strain [G.84 (G. 70 × G. 51 b)] × Pima 62 at El-Gharbia region for lint cotton yield (k\f) trait, hence, this promising strain could be recommended to be grown at this region.

Comparing the promising strain (Giza 77 × Pima S6) as an expected substitution for the commercial cultivar Giza 87, it could be seen that this promising strain produced the highest values for seed cotton yield (k\f), lint cotton yield (k\f), boll weight, seed index and lint index at El-Sharkia region and lint percentage at El-Gharbia region and the differences between them were significant for these traits.

The new variety G.92 exceeded the commercial cultivar Giza 88 in seed cotton yield and lint cotton yield (k\f) at El-Gharbia region, but the differences between them were insignificant for these traits.

Comparing the promising strain of long staple (10229 × G.86) as a potential substitute for G.86, it could be observed from Table (6) that this promising strain exceeded significantly G.86 in seed cotton yield (k\f), lint cotton yield (k\f), boll weight, seed index and lint index at El-Sharkia region by 2.75 k/f (28.6%), 3.98 k/f (33.2%) for seed cotton yield and lint cotton yield (k\f), respectively.

Adaptation to different environments were high for the promising strain (10229 × G.86) at El-Sharkia region for most traits, hence, this promising strain could be recommended to be grown at this region to replace the commercial cultivar G.86.

These results generally corresponded with the findings of Abo El-Zahab *et. al.* (1992), Badr (1994), Abou-Tour *et. al.* (1996), Hassan (2000), Badr (2003), Hassan *et. al.* (2005) and Hassan *et. al.* (2006) who reported that the effects of genotypes × locations interactions were significant for some yield, yield component.

Table 6. The interaction between genotypes and growing locations on the studied traits.

Genotypes	El-Menufia	El-Gharbia	El-Sharkia	El-Dakahlia	Kafr El-Sheikh	El-Beheira	Damiatta	LSD 0.05
Seed cotton yield (k/f)								
Giza 86	8.36	10.33	9.62	9.12	9.99	9.32	10.16	0.72
Giza 87	6.88	9.25	7.75	7.35	7.58	7.35	8.68	
Giza 88	7.18	10.03	9.62	7.56	7.73	7.72	9.07	
Giza 92	8.56	10.73	9.45	8.85	9.06	8.74	9.68	
(G.77 × Pima S6)	7.87	8.71	9.23	6.77	7.28	7.74	7.86	
(G.89 × G.86)	8.86	10.61	10.35	9.12	9.63	8.90	10.00	
[G.84 (G.70 X G 51b)] × Pima 62	7.97	10.06	9.00	8.14	8.93	8.88	10.10	
(10229 × G.86)	10.16	10.97	12.37	9.96	10.34	10.69	9.14	
Lint cotton yield (k/f)								
Giza 86	10.64	13.10	12.00	11.57	12.30	11.71	12.56	0.86
Giza 87	7.39	9.97	7.99	7.68	8.02	7.80	9.02	
Giza 88	8.51	12.01	11.30	8.92	9.13	9.10	10.48	
Giza 92	9.86	12.42	10.68	10.16	10.33	10.01	10.74	
(G.77 × Pima S6)	8.72	9.81	10.22	7.59	8.13	8.60	8.56	
(G.89 × G.86)	10.94	13.03	12.43	10.99	11.58	10.68	11.95	
[G.84 (G.70 X G 51b)] × Pima 62	9.93	12.64	10.90	10.29	10.92	10.94	11.79	
(10229 × G.86)	13.44	14.39	15.98	12.97	13.59	13.84	11.59	
Boll weight (g)								
Giza 86	2.99	3.01	3.25	2.89	3.03	2.81	2.75	0.10
Giza 87	2.62	2.59	2.73	2.47	2.54	2.42	2.48	
Giza 88	2.96	2.91	3.21	2.80	2.78	2.54	2.62	
Giza 92	2.91	2.94	3.13	2.74	2.83	2.61	2.66	
(G.77 × Pima S6)	2.73	2.57	2.90	2.56	2.50	2.51	2.36	
(G.89 × G.86)	2.91	2.85	3.08	2.76	2.75	2.70	2.64	
[G.84 (G.70 X G 51b)] × Pima 62	3.05	2.89	3.32	2.86	2.84	2.86	2.67	
(10229 × G.86)	3.13	2.96	3.35	2.87	2.90	3.03	2.45	
Lint percentage								
Giza 86	40.32	40.32	39.19	40.22	39.16	40.05	39.24	0.56
Giza 87	34.17	34.20	32.42	33.22	33.52	33.78	32.87	
Giza 88	37.54	37.93	37.18	37.49	37.52	37.44	36.72	
Giza 92	36.44	36.80	35.78	36.62	36.34	36.34	35.21	
(G.77 × Pima S6)	35.23	35.72	35.11	35.64	35.48	35.38	34.62	
(G.89 × G.86)	39.12	39.00	38.00	38.22	38.26	38.22	38.02	
[G.84 (G.70 X G 51b)] × Pima 62	39.44	39.90	38.32	39.99	38.88	39.16	36.94	
(10229 × G.86)	41.96	41.59	41.00	41.38	41.66	41.16	40.28	
Seed index (g)								
Giza 86	10.34	10.51	10.62	10.08	10.64	10.20	9.55	0.35
Giza 87	9.68	10.05	9.86	9.69	9.68	9.35	9.06	
Giza 88	10.20	10.38	10.63	10.18	10.08	9.86	9.78	
Giza 92	9.77	10.28	10.74	9.95	10.01	9.74	9.64	
(G.77 × Pima S6)	10.17	9.77	10.43	9.84	9.64	9.68	9.26	
(G.89 × G.86)	10.08	9.93	10.41	10.02	9.83	9.80	9.33	
[G.84 (G.70 X G 51b)] × Pima 62	9.92	9.99	10.76	9.87	9.67	10.08	9.31	
(10229 × G.86)	11.06	11.11	11.58	10.82	10.42	11.39	9.32	
Lint index (g)								
Giza 86	7.00	7.09	6.83	6.76	6.84	6.81	6.16	0.22
Giza 87	5.03	5.22	4.72	4.82	4.86	4.77	4.43	
Giza 88	6.14	6.34	6.29	6.10	6.04	5.90	5.68	
Giza 92	5.62	5.98	5.97	5.75	5.67	5.56	5.24	
(G.77 × Pima S6)	5.53	5.43	5.64	5.45	5.28	5.30	4.90	
(G.89 × G.86)	6.47	6.34	6.35	6.19	6.05	6.07	5.72	
[G.84 (G.70 X G 51b)] × Pima 62	6.47	6.63	6.66	6.56	6.16	6.49	5.46	
(10229 × G.86)	8.00	7.92	8.04	7.64	7.45	7.98	6.28	

Effect of the interaction between cotton genotypes and growing seasons on cotton yield and yield components:

Table (7) shows the average of the studied cotton traits for the eight Egyptian cotton genotypes grown during the five successive seasons (2007 to 2011). All traits exhibited significant differences.

Seed cotton yield (k/f) ranged from 7.20 k/f for the promising strain (Giza 77 × Pima S6) during the second season (2008) to 11.17 k/f for the promising strain (10229 × G.86) during the fifth season (2011). But, lint cotton yield k/f ranged from 7.78 k/f for G.87 during the second season to 14.77 k/f for the promising strain (10229 × G.86) during the fifth season.

The promising strain (10229 × G.86) gave the highest values for boll weight, lint percentage, seed index and lint index in the fifth season (2011). But the new variety G.87 gave the lowest values for seed index and lint index in the third season (2009). The data indicated that genotypes under study reacted differently in different seasons. These results are in partial agreement with those obtained by Abo El-Zahab *et. al.* (1992), Badr (1994), Abou-Tour *et. al.* (1996), Hassan (2000), Hassan *et. al.* (2005) and Hassan *et. al.* (2006), who found that the interaction between genotypes and seasons was significantly affected for yield traits.

Effect of the interaction between cotton genotypes, growing locations and growing seasons on cotton yield and yield components:

Data reported in Table (1) showed that the second order interaction of genotypes x locations x seasons were significant for all traits indicating that the cotton genotypes under study responded differently under different environments for these traits. The results obtained might also suggest that this differential varietals response might be due to location effects rather than year. These results were in agreement with those obtained by Abo El-Zahab *et. al.* (1992), Badr (1994), Abou-Tour *et. al.* (1996), Hassan *et. al.* (2005) and Hassan (2006), who reported that such effect was significant for some yield and yield components.

From the above results, it is recommended that the promising strain of extra long staple (Giza 77 × Pima S6) may be grown in El-Gharbia region. Also, the promising strains [G.84 (G. 70 × G. 51 b)] × Pima 62 of extra long staple exceeded the commercial cultivars Giza 88 for seed cotton yield and lint cotton yield (k\f). It is evident that the two promising strains produced the highest values for most yield components at El-Gharbia region, these promising strains may be recommended to be grown at El-Gharbia governorate.

Table 7. The interaction between genotypes and growing seasons on the studied traits.

Genotypes	2007	2008	2009	2010	2011	LSD 0.05
Seed cotton yield (k/f)						
Giza 86	10.34	8.74	9.26	9.65	9.79	0.60
Giza 87	8.20	7.37	7.54	7.53	8.53	
Giza 88	9.65	7.98	7.44	8.15	8.85	
Giza 92	10.68	8.71	8.58	8.81	9.70	
(G.77 × Pima S6)	8.49	7.20	7.53	7.61	8.78	
(G.89 × G.86)	10.44	9.09	8.82	9.72	10.12	
[G.84 (G.70 X G 51b)] × Pima 62	9.01	8.53	9.27	8.66	9.58	
(10229 × G.86)	10.46	10.68	9.57	10.70	11.17	
Lint cotton yield (k/f)						
Giza 86	12.76	10.78	11.70	12.29	12.39	0.73
Giza 87	8.50	7.78	8.01	8.03	9.02	
Giza 88	11.39	9.27	8.80	9.66	10.49	
Giza 92	11.95	9.94	9.79	10.28	11.04	
(G.77 × Pima S6)	9.44	8.00	8.34	8.48	9.75	
(G.89 × G.86)	12.46	10.86	10.71	11.98	12.28	
[G.84 (G.70 X G 51b)] × Pima 62	11.04	10.17	11.48	10.82	11.78	
(10229 × G.86)	13.52	13.99	12.22	13.93	14.77	
Boll weight (g)						
Giza 86	3.04	3.02	2.95	2.81	3.00	0.08
Giza 87	2.63	2.57	2.53	2.41	2.61	
Giza 88	2.92	2.83	2.82	2.72	2.86	
Giza 92	2.98	2.83	2.81	2.74	2.80	
(G.77 × Pima S6)	2.69	2.63	2.59	2.46	2.58	
(G.89 × G.86)	3.01	2.88	2.73	2.65	2.80	
[G.84 (G.70 X G 51b)] × Pima 62	2.93	2.93	2.97	2.88	2.93	
(10229 × G.86)	2.92	2.96	2.94	2.84	3.10	
Lint percentage						
Giza 86	39.18	38.89	40.11	40.55	40.20	0.48
Giza 87	32.88	33.29	33.77	33.91	33.41	
Giza 88	37.42	36.83	37.53	37.64	37.59	
Giza 92	35.51	36.21	36.20	37.07	36.12	
(G.77 × Pima S6)	35.21	35.22	35.30	35.55	35.29	
(G.89 × G.86)	37.89	37.90	38.53	39.19	38.51	
[G.84 (G.70 X G 51b)] × Pima 62	38.95	37.77	39.37	39.67	38.96	
(10229 × G.86)	41.04	41.55	40.62	41.31	41.94	
Seed index (g)						
Giza 86	10.85	10.69	9.76	9.53	10.57	0.30
Giza 87	9.97	9.89	9.19	9.18	9.89	
Giza 88	10.68	10.27	9.57	9.78	10.49	
Giza 92	10.71	9.84	9.70	9.58	10.26	
(G.77 × Pima S6)	10.31	9.88	9.38	9.41	10.16	
(G.89 × G.86)	10.52	10.02	9.48	9.26	10.29	
[G.84 (G.70 X G 51b)] × Pima 62	9.94	10.22	9.64	9.61	10.29	
(10229 × G.86)	10.51	11.09	10.31	10.54	11.64	
Lint index (g)						
Giza 86	6.98	6.80	6.54	6.50	7.11	0.19
Giza 87	4.89	4.94	4.69	4.70	4.97	
Giza 88	6.39	5.99	5.75	5.90	6.31	
Giza 92	5.89	5.60	5.50	5.63	5.80	
(G.77 × Pima S6)	5.61	5.38	5.12	5.18	5.54	
(G.89 × G.86)	6.41	6.11	5.94	5.95	6.44	
[G.84 (G.70 X G 51b)] × Pima 62	6.35	6.20	6.27	6.32	6.60	
(10229 × G.86)	7.32	7.90	7.04	7.41	8.42	

Also from the above results, it is recommended that the promising strain of long staple (10229 × G.86) may be grown in El-Sharkia governorate to replace Giza 86 since it exceeded it significantly in the most yield components.

However, further evaluation of cotton genotypes, old or newly produced, by growing them at several locations over an adequate number of years before recommending any variety for a certain location.

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تقييم بعض الهجن المبشرة الحديثة والأصناف التجارية من القطن المصري المنزرعة في مناطق مختلفة

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تمت مقارنة أربعة هجن مبشرة من القطن المصري مع أربعة أصناف تجارية منزرعة في سبعة مواقع بدلتا مصر خلال خمس سنوات من موسم ٢٠٠٧ إلى موسم ٢٠١١ حيث صممت التجارب على نظام القطاعات الكاملة العشوائية ذات أربع مكررات وقد اختبرت صفات محصول القطن الزهر والشعر (قنطار/فدان) ، وزن اللوزة ، معدل الحليج ، معامل البذرة ، معامل الشعر وقد أوضحت النتائج ما يلي:

كان تأثير كل من التراكيب الوراثية والمناطق والسنوات والتفاعل بين المناطق والسنوات عالي المعنوية لصفات المحصول ومكوناته.

كان تأثير التفاعل بين التراكيب الوراثية والمناطق ، والتراكيب الوراثية والسنوات وكذلك التفاعل من الدرجة الثانية عالي المعنوية لجميع الصفات تحت الدراسة.

أوضحت نتائج متوسطات التراكيب الوراثية تفوق الهجين المبشر من طبقة الأقطان فائقة الطول [جـ٨٤ (جـ٧٠ × جـ٥١ ب)] × بيما ٦٢ والصنف الجديد جيزة ٩٢ على الصنف التجاري المنزرع جيزة ٨٨ في معظم صفات المحصول ومكوناته. بينما تفوق الهجين المبشر (جـ٧٧ × بيما س٦) في معظم الصفات المحصولية على الصنف التجاري جيزة ٨٧.

أوضحت النتائج تفوق الهجين المبشر (١٠٢٢٩ × جيزة ٨٦) من طبقة الأقطان طويلة التيلة على الصنف التجاري جيزة ٨٦ في كل الصفات المحصولية تحت الدراسة.

كانت درجة الأقلمة عالية بالنسبة للهجين المبشر [جـ٨٤ (جـ٧٠ × جـ٥١ ب)] × بيما ٦٢ وللصنف التجاري المنزرع جيزة ٩٢ في محافظة الغربية لمعظم الصفات.

تفوق الهجين المبشر من طبقة الأقطان طويلة التيلة (١٠٢٢٩ × جيزة ٨٦) على الصنف التجاري من نفس الطبقة جيزة ٨٦ في كل الصفات تحت الدراسة بمحافظة الشرقية.

أوضحت النتائج المتحصل عليها أهمية الدور الذي يلعبه كل من التركيب الوراثي والظروف البيئية وكذلك التفاعل بينهما في صفات المحصول ومكوناته مما يدل على انه من الضروري استمرار التقييم لهذه التراكيب الوراثية في جهات متعددة ولعدة سنوات حتى يمكن التوصية بزراعتها في المناطق المناسبة للحصول على أعلى محصول.