EFFECT OF DIFFERENT ENVIRONMENTS ON YIELD, YIELD COMPONENTS, FIBER AND OPEN – END YARN QUALITY PROPERTIES OF SOME EGYPTIAN LONG STAPLE COTTON GENOTYPES

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Abstract

The present investigation was carried out on four Egyptian Long Staple cotton genotypes i.e., the promising hybrid (G.81 x G.83) and three cultivars i.e. Giza 80, Giza 83 and Giza 90 during the two successive seasons, 2002 and 2003 at six different locations at Middle and Upper Egypt (El – Mattana, Sohag, Assiut, El – Minia, Beni – Soueif and El – Fayium) in order to study the effects of genotypes, locations, years and their interaction on some yield, yield components, fiber and open - end yarn properties.

All characters showed highly significant mean squares for genotypes, locations, genotype by location and the second order interaction. While genotypes by years interactions was insignificant for yield and yield components traits except, lint percentage %. But, it was significant for all fibers and open - end yarn properties except, micronaire reading.

The new genotype Giza 90 was superior to the other studied genotypes in seed cotton yield k/f, lint yield k/f and most fiber and yarn properties. On the other hand the promising hybrid (G.81 x G.83) showed higher seed cotton yield k/f and lint yield k/f, but ranked lower in most of fiber and yarn properties than the other genotypes. The results also showed that Giza 90 surpassed all the studied genotypes in single yarn strength and yarn evenness in most locations.

The Egyptian cotton breeder must be concerned with fiber quality as well as yield if Egyptian cotton is to maintain a strong, competitive edge in today's world market. Fiber quality is important to the textile industry because it relates directly to processing performance, productivity, and yarn quality. Improvement in fiber properties is important to the textile industry in utilizing highspeed yarn spinning technology (open-end spinning) and in expanding the array of yarn products.

INTRODUCTION

Cotton is one of the most important fiber crops in the world and is likely to enjoy this advantage in the future. In Egypt, cotton is important for both export and local textile industry. Cotton area of cultivation extends longitudinally about 700 Km from north to south 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, the 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.

The spinner today needs to produce quality yarn meeting exactly of the yarn users specified or intended requirements. This requires yarn to be engineered by choosing appropriate raw material and process parameters. The recent trend other than ring spinning to open – end spinning in coarse medium counts may require cotton breeders to modify their fiber quality breeding objectives and evaluated regionally to specify the most appropriate agroclimatic areas for each specific variety, which is considered as one of the most important objectives of the cotton research program carried out by Cotton Research Institute (CRI). 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); Badr and El – Sayed (2004) and Hassan *et al.*, (2005), they reported that the effects of genotypes, location, years and the interactions between them were significant for some cotton characters. Many investigators studied the improved cotton quality characters. 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 x years and varieties x subregions interactions. Sawires *et al.* (1989) found significant effects of cultivars, locations and cultivars x locations on the relative contribution of fiber properties. William *et al.* (1991) reported that variety and the interaction between variety and environment showed highly significant effects on some fiber properties. He also indicated the importance of variety identification for preferred fiber properties and noted that bundle strength should have a high priority in fiber quality breeding programs. Deussen (1992) illustrated that the fiber fineness plays an important role in cotton spinning, since the number of fiber in yarn cross – section determines the spinning limit, and yarn quality. Abdel – Mohsen *et al.* (2003) reported that regarding yarn quality; particularly yarn strength, elongation % and unevenness; it could be recommended that the Egyptian Long – Staple cotton varieties could be used for the production of rotor spun yarns up to count 40s. El – Sayed (2003) showed that for open end yarns spun, the Egyptian cotton Giza 85, Giza 86, Giza 80 and Giza 83 varieties exhibited higher lea product, while the Upland cotton recorded the lowest lea product because of its lower fiber strength, shorter staple and coarser fibers.

The main objective of the present study was to determine the effect of genotypes, locations, years and their interactions on some yield, yield components, fiber and open - end yarn properties.

MATERIALS AND METHODS

Materials of this study included three Egyptian cotton cultivars, Giza 80, Giza 83, Giza 90 and one the promising hybrid (G.81 x G.83) were grown in two successive seasons, i.e., 2002 and 2003 at six locations of Middle and Upper Egypt (El – Mattana, Sohag, Assiut, El – Minia, Beni – Soueif and El – Fayium). Data of yield and yield components of the studied varieties 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 for each location. Seeds were grown on March in the two growing seasons at all locations. The plot area was 13 m^2 containing five rows of four meters long and 65 cm wide. Distance between hills was 25 cm apart. Plants were thinned to two plants per hill after six weeks and the conventional field practices were applied at each location. The yield was obtained from the three middle rows of each plot. Data were collected for the following characteristics:

- Seed cotton yield (k/f): obtained from the three middle rows of the plot and converted to Kentar per feddan.
- Lint cotton yield (k/f): calculated as follows: (weight of seed cotton yield per feddan x lint percentage).
- A random sample of 25 bolls was harvested from each plot and was used to obtain plot mean values for:

a – Boll weight in grams.

b – Lint percentage (%):lint weight to seed cotton weight in the sample expressed as percentage.

C – Seed index: weight of 100 seed in grams.

Samples of lint cotton from each genotype under all environments were tested for fiber quality in the laboratories of the Cotton Technology Research Division, CRI to obtain rotor spun yarns, the drawn slivers were spun at Auotocoro 288 OE spinning into 30 Ne with twist multiplier 4.2. - The spinning conditions for all cotton varieties included a 31-mm diameter rotor (cotton type) running at 100.000 rpm. The second card sliver (0.26 Hank slivers) was processed at opening roller speed for 8200 rpm, as recommended by El – Sayed and suzan (2003). Fiber and yarn properties were determined according to A.S.T.M designations. Fiber length was measured by Fibrograph 630 D (A.S.T.M., D – 1440 – 67), and fiber strength was measured by Stelomter (A.S.T.M., D – 1445 – 75, 1984). Micronaire reading (fiber fineness and maturity) were tested by Micromat (A.S.T.M., D – 1448 – 59, 1984). Yarn strength expressed in terms of lea count strength product (L.C.S.P), was measured by using the Good – Brand lea Tester. The broken leas were weighed by a Sauter Alfred Balance to estimate its actual count (A.S.T.M., D – 1578 – 67). The single yarn tenacity and breaking extension were determined on Zwick 1511 Automatic Tensile Tester (A.S.T.M., D – 2256 – 84) and the yarn unevenness (C.V.%) was measured on the Uster tester III (A.S.T.M., D – 1425 – 84). Fiber and yarn properties were determined under standard condition of 65 ± 2 % relative humidity and 21 ± 1°C temperatures for all samples.

Analysis of variance was carried out as a combined analysis for the six locations and two seasons according to Senedcor and Cochran (1982).

RESULTS AND DISCUSSION

The results reported in this investigation include the evaluation of three Egyptian cotton cultivars and one promising hybrid in the two seasons, i.e.2002 and 2003 at six different locations of Middle and Upper 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 years (Y) and genotypes by years (G x Y) were insignificant for all yield and yield components, except boll weight (g) for years effect and lint percentage % for the interaction between genotype by years. While the effect of genotypes, locations and the first order interactions, i.e. locations by years, genotypes by locations and the second order interaction (genotypes x year x location) were significant for all yield and yield components. However, the effect of genotypes, locations, years and the first order of interactions, i.e. locations by years, genotype by location and genotype by years were highly significant for all fiber and yarn properties except genotype by years for micronaire reading trait and yarn unevenness for years effect. However, the second order interaction (genotype x year x location) was significant for all fiber and yarn properties. The results suggest that comparisons among these cotton genotypes for the studied traits should be independently estimated at each sub region over several years.

These results confirm the findings of Abo–Tour *et al.* (1996), Badr and El – Sayed (2004) and Hassan *et al.* (2005), who reported that genotypes, locations, years and the interactions between them were significant for some yield components.

Effect of growing locations on yield, yield components, fiber and yarn properties

Table 2 and Figures (1 - 6) show the average values of yield, yield components, fiber and yarn quality characters as affected by different growing locations.

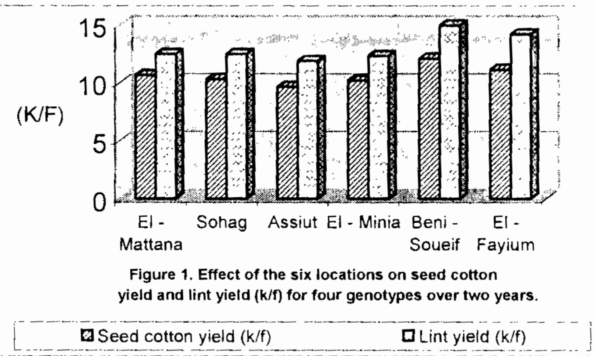

Figure 1. Effect of the six locations on seed cotton yield and lint yield (k/f) for four genotypes over two years.

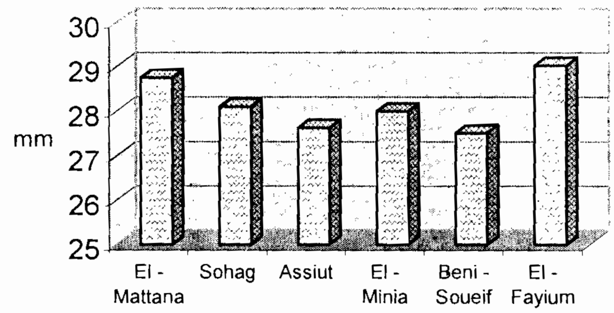

Figure 2. Effect of the six locations on 2.5 % span length trait for four genotypes over two years.

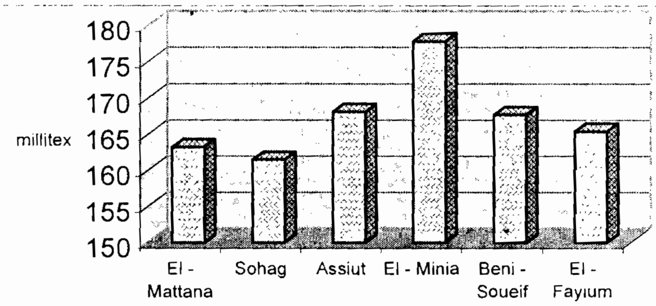

Figure 3. Effect of the six locations on fineness for four genotypes over two years.

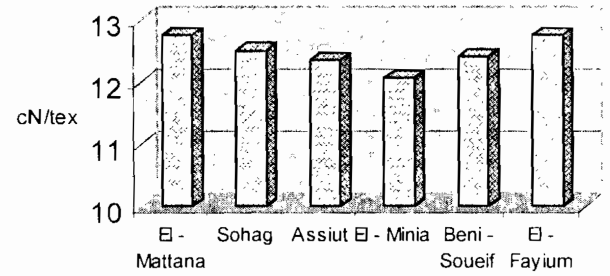

Figure 4. Effect of the six locations on single yarn strength (cN/tex) for four genotypes over two years.

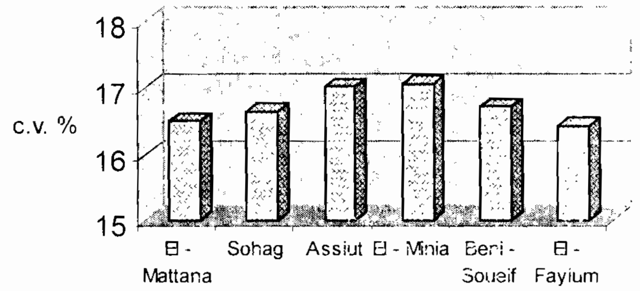

Figure 5. Effect of the six locations on unevenness (c.v. %) for four genotypes over two years.

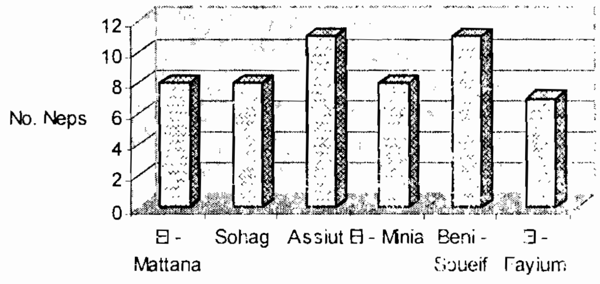

Figure 6. Effect of the six locations on No. Neps for four genotypes over two years.

Table 1. Combined analysis of variance of yield components, fiber and yarn properties for four cotton genotypes growing in six locations during the two seasons.

Characters	Years (Y)	Location (L)	L x Y	Genotype (G)	G x Y	G x L	G x Y x L
Yield and yield components							
Seed cotton yield (k/f)	NS	**	**	**	NS	**	**
Lint yield (K/F)	NS	**	**	**	NS	**	**
Boll weight(g)	*	**	**	**	Ns	**	**
Lint percentage(%)	NS	**	**	**	**	**	**
Seed index(g)	NS	**	**	**	NS	*	NS
Fiber properties							
2.5 % span length	**	**	**	**	**	**	**
Micronaire reading	*	*	**	**	NS	**	**
Fineness	**	**	**	**	**	**	**
Strength (g/tex)	**	**	**	**	**	**	**
Elongation (%)	**	**	**	**	**	**	**
Yarn properties							
Lea product	**	**	**	**	**	**	**
Single yarn strength	**	**	**	**	**	**	**
Unevenness (c.v. %)	NS	**	**	**	**	**	**
No. Neps	**	**	*	**	**	**	**
Elongation (%)	**	**	**	**	**	**	**

*and** significant at the 0.05 and 0.01 probability levels, respectively. NS = insignificant

Table 2. Average of studied traits as affected by different growing locations.

Characters	El - Mattana	Sohag	Assiut	El - Minia	Beni - Soueif	El - Fayium	LSD (0.05)
Yield and yield components							
Seed cotton yield (K/F)	10.65	10.28	9.64	10.16	12.08	11.11	0.47
Lint yield (K/F)	12.48	12.48	11.87	12.31	14.96	14.19	0.57
Boll weight(g)	2.95	2.47	2.58	2.99	2.86	2.67	0.08
Lint percentage(%)	37.3	38.6	39.1	38.4	39.4	40.5	0.30
Seed index(g)	10.81	9.85	9.78	10.81	9.96	9.40	0.23
Fiber properties							
2.5 % span length	28.75	28.10	27.63	28.00	27.51	29.03	0.18
Micronaire reading	4.51	4.48	4.60	4.64	4.53	4.48	0.09
Fineness	163.2	161.5	168.1	177.8	167.7	165.4	0.70
Strength (g/tex)	31.47	29.22	28.54	28.71	29.94	30.28	0.19
Elongation (%)	7.49	7.06	6.90	7.10	7.54	6.92	0.10
Yarn properties							
Lea product	2112	2050	1980	1941	2029	2111	26
Single yarn strength	12.76	12.52	12.35	12.07	12.42	12.77	0.08
Unevenness (c.v. %)	16.50	16.65	17.03	17.06	16.72	16.43	0.19
No. Neps	8	8	11	8	11	7	2
Elongation (%)	5.92	5.77	5.87	6.21	5.83	5.96	0.07

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

Characters	2002 Season	2003 Season	L.S.D (0.05)
Yield and yield components			
Seed cotton yield (K/F)	10.54	10.77	NS
Lint yield (K/F)	12.92	13.17	Ns
Boll weight(g)	2.72	2.78	0.05
Lint percentage(%)	38.9	38.8	NS
Seed index(g)	10.07	10.13	NS
Fiber properties			
2.5 % span length	28.42	27.92	0.10
Micronaire reading	4.57	4.51	0.05
Fineness	166.54	167.96	0.38
Strength (g/tex)	30.03	29.35	0.11
Elongation (%)	6.82	7.51	0.06
Yarn properties			
Lea product	2053	2021	15
Single yarn strength (cN/tex)	12.61	12.35	0.04
Unevenness (c.v. %)	16.76	16.70	NS
No. Neps	12	5	0.96
Elongation (%)	5.63	6.22	0.04

Table 4. Mean performances of genotypes combined over years and locations.

Characters	G.80	G.83	G.90	G.81 x G.83	LSD (0.05)
Yield and yield components					
Seed cotton yield (K/F)	9.84	10.83	10.87	11.07	0.39
Lint yield (K/F)	12.34	13.46	13.19	13.20	0.47
Boll weight(g)	2.86	2.70	2.77	2.68	0.06
Lint percentage(%)	39.7	39.4	38.5	37.9	0.30
Seed index(g)	10.45	9.98	10.20	9.77	0.19
Fiber properties					
2.5 % span length	28.61	28.26	28.14	27.67	0.14
Micronaire reading	4.59	4.51	4.41	4.66	0.08
Fineness	171.71	162.44	162.01	172.84	0.54
Strength (g/tex)	29.63	29.44	29.79	29.92	0.15
Elongation (%)	6.97	7.38	7.41	6.91	0.08
Yarn properties					
Lea product	1998	2077	2050	2024	21
Single yarn strength (cn /tex)	12.39	12.54	12.65	12.34	0.06
Unevenness (c.v.%)	17.05	16.38	16.67	16.82	0.15
No.Neps	9	7	8	11	1.35
Elongation (%)	5.76	6.14	6.12	5.71	0.06

The data indicated that the average values of seed cotton yield k/f and lint cotton yield k/f were the highest at Beni–Soueif region. But the highest values of boll weight (g) and seed index (g) were obtained when genotypes were grown at El – Mattana and El – Minia regions, while the highest lint percentage (%) was obtained when genotypes were grown at El – Fayium location.

Also, it could be noticed that the Upper Half-Mean Length at Beni – Soueif and Assiut regions were lower than the intended level for the long staple cotton genotypes. The highest Lea product, single yarn strength and yarn evenness (the least c.v. %) were obtained from genotypes grown at El – Fayium and El – Mattana, but El – Fayium gave higher values for yield and yield components than El – Mattana. This may be due to the variation in the environmental conditions between El – Fayium and El - Mattana regions. These results are in general agreement with those obtained by Abdel – Salam *et al.* (1985), Abo El – Zahab *et al.* (1992), Gutierres and El – Zik (1992), Abou – Tour *et al.* (1996), Badr and El – Sayed (2004) and Hassan *et al.* (2005), who reported that the effect of location was significant for some yield components and fiber properties.

Growing season effect

Table 3 shows that average values of the studied characters as affected by the two growing years. The combined analysis showed highly significant differences between the two growing seasons in all the studied traits except, seed cotton yield k/f, lint cotton yield k/f, lint percentage (%), seed index (g) and unevenness (c.v. %). The first season 2002 gave better values for the most fiber and yarn properties except, for No. Neps trait, that gave lower values at the second season. This may be due to the variations in climatic conditions from year to year.

These results are in harmony with those obtained by Abdel – Salam *et al.* (1985), Abou – Tour *et al.* (1996) and Badr and El – Sayed (2004), they reported that the effect of different seasons was significant for seed cotton yield and some fiber properties.

Genotype effect

Means of varietal performance for all the studied traits averaged over the six locations and two years are presented in Table 4 and Figures (7 – 12). The data showed that the effect of different cotton genotypes on all the studied characters were significantly different for most studied traits.

The promising hybrid (G.81 x G.83), Giza 90 and Giza 83 produced the highest overall seed cotton yield (11.07,10.87 and 10.83 k/f, respectively) and the difference between them was insignificant. Also, these genotypes produced the highest lint yield (13.20, 13.19 and 13.46 k/f, respectively) and the difference between them was insignificant. However the difference between these genotypes and the cultivar Giza 80 was significant for seed cotton yield and lint yield k/f. On the other hand Giza 80 gave the highest boll weight (g), lint percentage (%) and seed index (g). The differences between it and all other genotypes were significant for these traits.

Regarding fiber properties, it could be observed that Giza 80 produced the best 2.5 % SPAN length trait and the difference between it and all the other genotypes were significant. Giza 90 gave the best quality for most fiber and yarn properties, but the promising hybrid (G.81 x G.83) was lower in most fiber and yarn properties than the other studied genotypes. Comparing the four long – staple Egyptian cottons; the commercially grown Giza 80, Giza 83, Giza 90 and the promising hybrid (G.81 x G.83), it could be noted that Giza 90 was generally better than the other genotypes in single yarn strength and yarn evenness due to the lowest micronaire reading and fineness, whereas, finer fibers are essential for open – end spinning, because there are more individual fibers in a bundle of given diameter or weight, resulting in greater strength and enables higher processing speeds (Deussen 1992). However, as coarseness is required and enables higher preferred by many mills, Giza 90 could be regarded as comparable to Giza 80 and to be grown commercially so as to meet the requirements of many local textile mills that do not use open – end spinning. These results are in harmony with those obtained by Abdel – Salam *et al.* (1985), Sawires *et al.* (1989), William *et al.* (1991), Abou–Tour *et al.* (1996), Badr and El – Sayed (2004) and Hassan *et al.* (2005), who reported that the effect of genotypes was significant on most of cotton yield and quality characters.

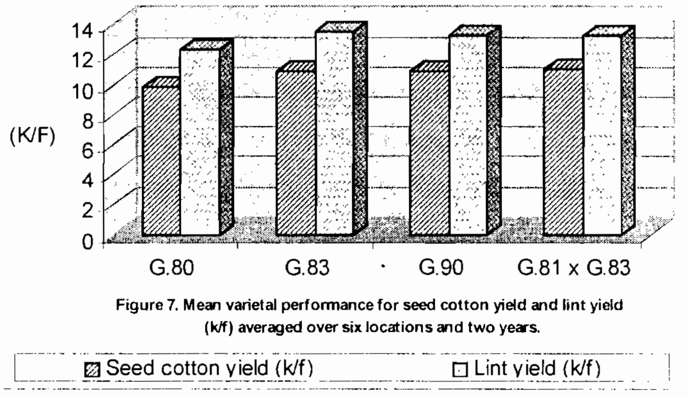

Figure 7. Mean varietal performance for seed cotton yield and lint yield (k/f) averaged over six locations and two years.

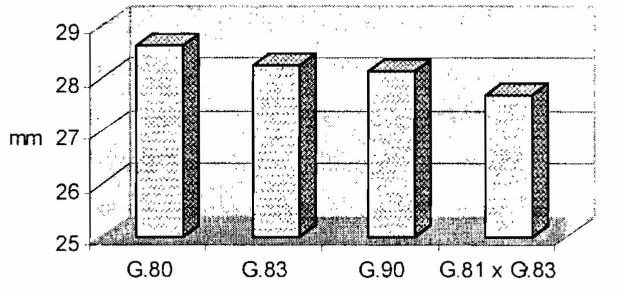

Figure 8. Mean varietal performance for 2.5 % span length trait averaged over six locations and two years.

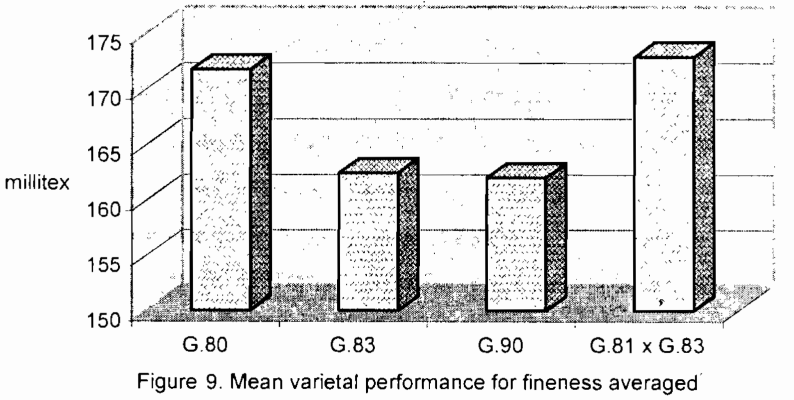

Figure 9. Mean varietal performance for fineness averaged over six locations and two years.

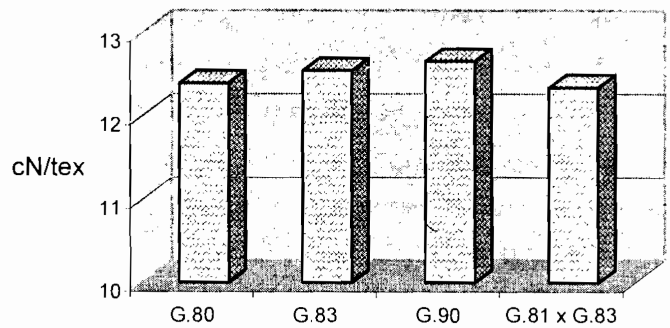

Figure 10. Mean varietal performance for single yarn strength (cN/tex) averaged over six locations and two years.

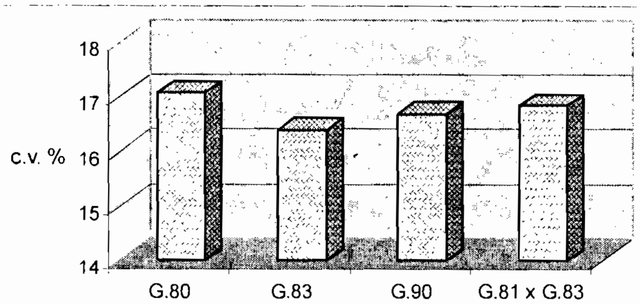

Figure 11.Mean varietal performance for unevenness (c.v.%) averaged over six locations and two years.

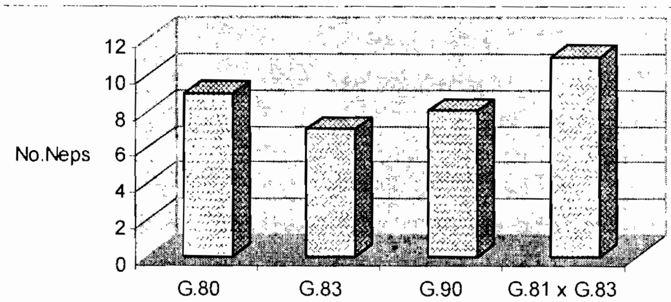

Figure 12. Mean varietal performance for No. Neps averaged over six locations and two years.

Effect of the interaction between genotypes and locations

Data in Table 5 shows that the genotype by locations interaction was significant for all the studied traits. Data indicated that each genotype behaved differently at different locations. That was probably due to the differences between genotypes, as well as the variations in the environmental conditions in the different locations.

The highest mean values of seed cotton yield k/f were produced by Giza 90 and the promising hybrid (G.81 x G.83) at Beni – Soueif region (12.33 and 12.62 k/f, respectively), while these genotypes produced 11.60 and 11.57 k/f, respectively at El – Mattana region and the differences between them were insignificant for this trait.

The results in Table 5. show that all genotypes gave the highest values for lint yield k/f grown at Beni – Soueif region and the differences between them were insignificant. But El – Mattana region gave the highest values for boll weight (g) for all genotypes under study. However, all genotypes gave the highest values for lint percentage % at El – Fayium region.

Regarding to fiber and yarn properties, it could be noticed that Giza 80 was superior to the other genotypes at El – Mattana and El – Fayium regions. However, it behaved different at El – Minia region, which gave lower values for these quality properties. The promising hybrid (G.81 x G.83) gave the lowest fiber and yarn properties for all locations except, El – Minia region which gave the best quality of fiber and open – end yarns. From the results of yield and yield components, fiber and yarn properties, the promising hybrid (G.81 x G.83) could be grown at El – Minia region where it produced higher seed cotton yield, lint yield k/f and possessed the best quality of fiber and open – end yarns.

Concerning fiber and yarn properties, Giza 80 and Giza 90 gave the highest values of most characters at El – Mattana and El – Fayium regions. However, at El – Fayium, they showed higher values of yield and yield components than El – Mattana. This may be due to favorable environmental conditions at El - Fayium that helped to improve these characteristics, while severe environmental conditions at El – Mattana could have negatively affected these some characters.

Giza 80 and Giza 90 showed higher lea product and single yarn strength at El – Mattana and El – Fayium regions, whereas fiber length, fiber strength and their interactions were the most contribution to yarn strength. These results are generally corresponded with the finding of Sawires *et al.* (1989), William *et al.* (1991), Abo El – Zahab *et al.* (1992), Gutierres and El – Zik (1992) and Badr and El – Sayed (2004), who found that the effect of genotype by location interaction was significant for some cotton yield and quality characters.

Effect of the interaction between location and season

Table 6 shows the average values of the studied cotton characters for the six locations during the two successive seasons (2002 and 2003). The results indicated that the interaction of location and seasons showed significant effect on all of these characters. The highest seed cotton yield of 12.91 k/f and lint cotton yield of 15.93 k/f were obtained from cotton genotypes grown at Beni–Souief during the first season and lint percentage of 41.6 % at El – Fayium region in the first season. But the lowest seed cotton yield and lint cotton yield (7.60 and 9.45 k/f, respectively) were recorded at Assiut region during the first season. However, in the second season the highest mean of seed cotton yield was obtained when the genotypes were grown at Assiut and El – Minia regions.

The highest mean values of 2.5 %span length (29.01) and fineness (183.6) were recorded at El – Minia region during the first season, but the lowest mean value for micronaire reading was recorded at Sohag region in the first season. While, the highest value for the strength (g/tex) of (31.61) was obtained from cotton genotypes grown at El – Mattana region during the second season.

The highest lea product and single yarn strength were obtained from genotypes grown at El – Mattana and El – Fayium locations in the first season. In the second season (2003), the best quality for number of neps (lower number) were obtained for all studied locations, also in the second season, the best quality was obtained for unevenness c.v. % (Lower values) trait at all locations except El – Minia region which, gave the best quality for this trait in the first season. Also, the lowest lea product and single yarn strength were recorded at El – Minia region in the second season. Therefore, it could be concluded that the mean values of different traits varied from location to another according to the year of production. These results corresponded with the finding of William *et al.* (1991), Abou – Tour *et al.* (1996) and Badr and El – Sayed (2004),who reported that the interaction between location and years was significantly different for some cotton characters.

Effect of the interaction between genotypes and growing seasons.

Table 7 show the average values of the studied cotton characters for the interaction between genotypes and seasons. Ten of the studied characters showed significant effects. Lint percentage for Giza 80 (40.1 %) during the first season gave the highest significant value.

Giza 80, gave the highest 2.5 % span length and fineness in the first season (28.94 and 173.3, respectively), but Giza 90 and the promising hybrid (G.81 x G.83) gave the highest values of strength (g/tex) and elongation % (30.31 at the first season and 7.92 % at the second season, respectively).

Table 5. Effect of the interaction between genotypes and locations.

Characters	Genotype	El - Mattana	Sohag	Assiut	El - Minia	Beni - Soueif	El - Fayium	LSD (0.05)
Yield and yield components								
Seed cotton yield (K/F)	G.80	8.40	9.70	10.73	8.71	11.25	10.25	
	G.83	11.03	10.83	9.27	10.57	12.12	11.17	
	G.90	11.60	10.62	9.58	10.02	12.33	11.10	0.94
	G.81 x G.83	11.57	9.98	8.98	11.34	12.62	11.92	
Lint yield (K/F)	G.80	9.95	12.22	13.52	10.82	14.25	13.30	
	G.83	13.25	13.10	11.56	13.21	15.30	14.32	
	G.90	13.40	12.77	11.62	11.94	15.20	14.19	1.14
	G.81 x G.83	13.31	11.82	10.80	13.28	15.07	14.94	
Boll weight(g)	G.80	2.99	2.42	2.76	3.21	2.98	2.82	
	G.83	2.85	2.60	2.52	2.88	2.76	2.61	
	G.90	3.02	2.41	2.63	2.99	2.88	2.66	0.16
	G.81 x G.83	2.94	2.43	2.42	2.88	2.80	2.59	
Lint percentage(%)	G.80	37.6	39.8	40.1	39.0	40.2	41.2	
	G.83	38.1	38.5	39.6	39.6	40.1	40.7	
	G.90	36.7	38.2	38.6	37.7	39.1	40.5	0.63
	G.81 x G.83	36.6	37.7	38.2	37.2	38.0	39.8	
Seed index(g)	G.80	11.11	9.87	10.39	11.30	10.22	9.83	
	G.83	10.43	9.88	9.48	10.51	9.99	9.60	
	G.90	11.23	9.97	10.00	11.01	9.88	9.11	0.46
	G.81 x G.83	10.46	9.68	9.27	10.41	9.76	9.5	
Fiber properties								
2.5 % span length	G.80	30.12	28.80	28.05	27.22	27.82	29.67	
	G.83	28.58	28.32	27.25	28.50	27.53	29.40	
	G.90	28.25	28.15	28.00	28.00	27.48	28.97	0.35
	G.81 x G.83	28.05	27.13	27.23	28.30	27.20	28.10	
Micronaire	G.80							
reading	G.83	4.51	4.59	4.76	4.60	4.51	4.55	
	G.90	4.40	4.29	4.44	4.53	4.73	4.65	
	G.81 x G.83	4.28	4.41	4.54	4.72	4.33	4.16	0.19
		4.86	4.63	4.65	4.72	4.54	4.57	
Fineness	G.80							
	G.83	170.9	171.5	179.3	177.8	156.3	174.5	
	G.90	148.7	157.9	155.4	168.6	179.6	164.4	
	G.81 x G.83	152.8	155.1	164.3	182.7	164.0	153.2	1.33
		180.2	161.5	173.3	181.9	170.9	169.3	
	G.80							
Strength	G.83	33.22	29.72	28.07	25.77	30.07	30.94	
(g/tex)	G.90	29.67	29.32	27.62	29.62	29.81	30.57	
	G.81 x G.83	32.68	28.01	28.61	29.99	29.90	29.55	0.37
		30.30	29.83	29.86	29.46	29.97	30.07	
	G.80							
	G.83	7.30	7.05	6.39	7.37	7.34	6.37	
Elongation (%)	G.90	7.75	7.22	7.57	6.52	7.79	7.42	
	G.81 x G.83	7.78	7.61	6.86	7.06	8.20	6.95	0.20
		7.12	6.37	6.77	7.44	6.83	6.94	

Table 5. Cont.

Characters	Genotype	El - Mattana	Sohag	Assiut	El - Minia	Beni - Soueif	El - Fayium	LSD (0.05)
Yarn properties								
Lea product	G.80	2168	2104	1953	1698	1906	2160	
	G.83	2106	2112	1918	2085	2028	2212	
	G.90	2134	1918	2077	1930	2137	2103	52
	G.81 x G.83	2040	2067	1972	2051	2046	1971	
Single yarn strength (cN/tex)	G.80	13.11	12.84	12.36	11.03	11.84	13.16	
	G.83	12.78	12.81	11.95	12.58	12.33	12.81	0.15
	G.90	12.75	11.98	12.98	12.13	13.06	13.03	
	G.81 x G.83	12.41	12.43	12.12	12.54	12.44	12.10	
Unevenness (c.v. %)	G.80	16.72	17.54	17.18	17.45	17.08	16.35	
	G.83	16.11	15.60	17.06	16.66	16.99	15.89	0.37
	G.90	16.47	16.41	17.27	17.37	15.77	16.74	
	G.81 x G.83	16.68	17.06	16.62	16.78	17.02	16.75	
No. Neps	G.80	9	10	14	8	9	6	
	G.83	6	5	8	4	14	4	3
	G.90	8	5	10	6	7	12	
	G.81 x G.83	11	13	11	11	13	6	
Elongation (%)	G.80	5.61	5.23	5.80	6.13	5.61	6.16	
	G.83	5.87	5.92	5.78	6.38	6.27	6.59	
	G.90	6.78	5.96	5.63	5.85	6.28	6.20	0.15
	G.81 x G.83	5.42	5.96	6.28	6.51	5.17	4.90	

The highest Lea product was obtained from the yarn Giza 83 in both seasons, but Giza 90 recorded the highest value of single yarn strength and lea product during the first season only. The data indicated that genotypes under study reacted differently in different seasons. These results were generally in agreement with those obtained by Abou – Tour *et al.* (1996), and Hassan *et al.* (2005), who reported that the effect of genotype by growing season was significant for some cotton characters.

The second – order interaction of genotypes x locations x years was highly significant for all the studied traits. This means that significant portion of the interaction exhibited by these traits was not attributable to years or locations alone and that it is essential to test cotton genotypes over a number of different environments (years and locations) in the growing areas to obtain reliable estimates of genotypes relative performances for these traits. These results agreed generally with those obtained by Abo El-Zahab et al. (1992), Abou-Tour et al. (1996), Badr and El-Sayed (2004) and Hassan et al. (2005), they reported that the second – order interaction of genotypes x locations x years was significant for some yield, its components and fiber properties.

Table 6. Effect of the interaction between locations and seasons on the characters studied.

Characters	Year	El - Mattana	Sohag	Assiut	El - Minia	Beni - Soueif	El - Fayium	LSD (0.05)
Yield and yield components								
Seed cotton yield (K/F)	2002	10.48	11.60	7.60	9.47	12.91	11.18	0.67
	2003	10.82	8.96	11.68	10.85	11.25	11.04	
Lint yield (K/F)	2002	12.46	14.06	9.45	11.02	15.93	14.61	0.81
	2003	12.49	10.90	14.29	13.61	13.98	13.76	
Boll weight(g)	2002	2.98	2.44	2.47	3.03	2.98	2.48	0.11
	2003	2.93	2.49	2.69	2.95	2.74	2.86	
Lint percentage (%)	2002	37.8	38.5	39.4	37.0	39.2	41.6	0.44
	2003	36.8	38.6	38.9	39.8	39.5	39.5	
Seed index(g)	2002	10.76	9.39	9.51	11.57	10.30	8.89	0.33
	2003	10.85	10.31	10.05	10.05	9.63	9.90	
Fiber properties								
2.5 %span length	2002	28.70	28.07	28.05	29.01	28.38	28.32	0.25
	2003	28.80	28.13	27.22	27.00	26.64	29.75	
Micronaire reading	2002	4.50	4.39	4.66	4.75	4.59	4.55	0.13
	2003	4.53	4.57	4.54	4.53	4.47	4.42	
Fineness	2002	157.9	152.3	166.7	183.6	170.7	168.1	0.94
	2003	168.4	170.6	169.5	171.9	164.7	162.6	
Strength (g/tex)	2002	31.33	29.01	28.98	29.70	30.29	30.88	0.26
	2003	31.61	29.43	28.10	27.72	29.58	29.68	
Elongation (%)	2002	7.27	6.92	6.35	6.68	7.22	6.50	0.14
	2003	7.70	7.20	7.44	7.51	7.86	7.35	
Yarn properties								
Lea product	2002	2117	2044	2034	1966	2048	2112	37
	2003	2107	2056	1926	1916	2010	2111	
Single yarn strength(cN/tex)	2002	12.89	12.55	12.66	12.19	12.52	12.87	0.11
	2003	12.63	12.48	12.05	11.95	12.31	12.68	
Unevenness (c.v. %)	2002	16.49	17.02	17.18	16.57	16.92	16.40	0.26
	2003	16.50	16.28	16.88	17.56	16.51	16.46	
No. Neps	2002	11	11	15	10	15	9	2
	2003	5	6	6	5	6	5	
Elongation (%)	2002	5.57	5.33	5.63	6.15	5.26	5.85	0.11
	2003	6.27	6.20	6.11	6.28	6.41	6.07	

Table 7. Effect of the interaction between genotypes and seasons.

Characters	Years	G.80	G.83	G.90	G.81 x G.83	L.S.D (0.05)
Yield and yield components						
Seed cotton yield (K/ F)	2002 2003	9.57 10.11	10.72 10.95	10.68 11.06	11.19 10.95	NS
Lint yield (K/F)	2002 2003	12.15 12.54	13.28 13.63	13.00 13.37	13.26 13.15	NS
Boll weight(g)	2002 2003	2.84 2.89	2.72 2.69	2.70 2.83	2.65 2.70	NS
Lint percentage (%)	2002 2003	40.1 39.2	39.3 39.5	38.6 38.4	37.7 38.1	0.36
Seed index(g)	2002 2003	10.43 10.48	9.82 10.14	10.30 10.09	9.73 9.82	NS
Fiber properties						
2.5 % span length	2002 2003	28.94 28.28	28.64 27.89	28.45 27.83	27.64 27.69	0.20
Micronaire reading	2002 2003	4.62 4.56	4.53 4.49	4.44 4.38	4.71 4.61	NS
Fineness	2002 2003	173.3 170.1	160.9 164.0	159.8 164.2	172.2 173.5	0.77
Strength (g/tex)	2002 2003	30.01 29.25	29.68 29.20	30.31 29.27	30.13 29.70	0.22
Elongation (%)	2002 2003	6.75 7.19	6.87 7.89	6.90 7.92	6.78 7.04	0.11
Yarn properties						
Lea product	2002 2003	1989 2007	2080 2074	2109 1990	2035 2013	30
Single yarn strength(cN/tex)	2002 2003	12.37 12.41	12.63 12.46	13.08 12.23	12.38 12.30	0.09
Unevenness (c.v. %)	2002 2003	16.94 17.17	16.48 16.29	16.68 16.66	16.96 16.68	0.22
No. Neps	2002 2003	11 8	9 5	11 4	17 5	2
Elongation (%)	2002 2003	5.45 6.06	5.86 6.41	5.92 6.31	5.30 6.11	0.09

REFERENCES

1. Abdel – Mohsen, M. A, Suzan H. Sanad and M. A. M. El – Sayed. 2003. ossibility of spinning Egyptian long – staple cottons into fine counts on rotor spinning machine. Egypt. J. Agric. Res., 81(1): 193 – 203.
2. Abdel – Salam, M. S, M. M. Seyam and F. M. El – Rays. 1985. Quality evaluation of some newly introduced promising cotton hybrids. Agric. Res. Rev., 63(6): 121 – 137.
3. Abo El – Zahab, A. A., F. F. Soad, M. A. El – Kilany and A. A. El – Ghani. 1992. Cultivar x environment interaction in Egyptian cotton. 1 – seed cotton yield and its components. Proc. 5th Conf. Agron. Zagazig, vol. 2: 775 – 788.
4. Abou Tour, H. B., S. M. A. Seyam and L. M. A. Abd El- Rahman. 1966. Analytical study on the economic characters of new and commercial Egyptian cotton varieties. Egypt. J. Agric. Res., 74(3): 781 – 791.

5. A. S. T. M. 1984. American Society for Testing and Materials. Standard on textile materials., Philadelphia, Pa.

6. Badr, S. S. M. and S. A. El–Sayed. 2004. Evaluation of some long staple Egyptian cotton genotypes for yield, seed quality and viability characters. J. Agric. Res. Tanta Univ. 30(2): 304 – 326.

7. Deussen, H. 1992. Improve cotton fiber properties the textile industry's – key to success in global competition presentation to the " cotton fiber cellulose, structure, function and utilization conference " October 29 – 1992. Radiation Plaza Hotel Savannah, Georgia 1 – 24.

8. El Sayed, M. A.M. 2003. Open – end rotor spinning of Egyptian long staple and Upland medium staple cottons. Egypt. J. Agric. Res., 81(1): 255 – 266.

9. El – Sayed, M. A. M. and Suzan H. Sanad. 2003. Determination of a standard spinning technique on the open – end rotor spinning system for routine testing of long – staple cottons. Part1: processing variables. Egypt. J. Agric. Res., 81(2): 689 - 698.

10. Gutierres, J. D and K. M. El – Zik. 1992. Genotype – environment interactions of Upland cotton yield, earliness and fiber quality traits in Spain. Proceeding Beltwide Cotton Conferences. Vol. 2: 588 – 590.

11. Hassan, I. S. M., Amal S. Mohamed and Laila M. A. Abdel – Rahman. 2005. Comparative study on seed cotton yield, oil and protein contents in the seed of some Egyptian cotton cultivars grown at different locations. Egypt. J. Agric. Res, 82(2): 735 – 750.

12. Sawires, E. M. S, M. H. M. El – Hariry and F. S. Mansour. 1989. Effect of cotton cultivars, locations and their interaction on the relative contribution of fiber properties to yarn strength. Agric. Res. Rev., 67(5): 813 – 824.

13. Senedcor, G. W. and W. G. Cochran. 1982. Statistical methods applied to experiments in Agriculture and biology. 7th ed. seventh reprinting. The Iowa State Univ. Press, Ames., Iowa, U. S. A.

14. William, R. Meredith, JR., T. W. Culp, K. Q. Robert, G. F. Ruppenicker, W. S. Anthony and J. R. Williford. 1991. Determining future cotton variety fiber quality objectives. Tex. Res. J. 61(12): 715 – 720.

تأثير البيئات المختلفة على المحصول ومكوناته وجودة صفات التيلة وخيوط غــزل الطرف المفتوح لبعض أصناف القطن المصري طويلة التيلة

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أجرى هذا البحث لتقييم الهجين المبشر (جيزة ٨١ × جيزة ٨٣) وثلاثة أصـــناف تجاريـــة منزرعة من القطن المصري طويلة التيلة وهى جــ٨٠ ، جــ٨٣ ، جــ٩٠ والمنزرعـــة فـــي عـــدة مناطق في مصر الوسطى ومصر العليا (المطاعنة – سوهاج – أسيوط – المنيا – بنـــى ســـويف – الفيوم) خلال موسمي ٢٠٠٢ – ٢٠٠٣ وذلك لدراسة تأثير الصنف والمنطقة والسنوات وتفاعلاتهـــا على بعض صفات المحصول ومكوناته وصفات جودة التيلة والصفات الطبيعية ,والميكانيكية لخيـــوط غزل الطرف المفتوح.

ويمكن تلخيص النتائج المتحصل عليها فيما يلي :

كان تأثير كل من الأصناف والمناطق والتفاعل بين الصنف والمنطقة وكذلك التفاعـــل بـــين الصنف والمنطقة والسنوات عالي المعنوية لمعظم الصفات تحت الدراسة. بينما أوضحت النتـــائج أن التفاعل بين الصنف والسنوات كان غير معنوي لجميع صفات المحصول ومكوناته فيما عـــدا صـــفة معدل الحليج % وكان هذا التفاعل معنوي لجميع صفات التيلة وصفات خيـــوط الغـــزل ذو الطـــرف المفتوح ماعدا صفة قراءة الميكرونير.

تفوق الصنف الجديد جيزة ٩٠ على باقي الأصناف التجارية المنزرعة معـــه فـــي صـــفتي المحصول الزهر والشعر قنطار / فدان وكذلك في معظم صفات التيلة وصفات متانة الشـــلة وكـــذلك تفوق الهجين المبشر (جيزة ٨١ × جيزة ٨٣) في صفتي المحصول الزهر والشعر قنطـــار / فـــدان ولكن لوحظ انخفاض صفات التيلة والشلة مقارنة بالأصناف المنزرعة معه.

أظهر الصنف الجديد جــ٩٠ تفوقا ملحوظا في صفتي متانة الخيط المفرد وخواص الانتظـــام في معظم المناطق.

يجب على مربى القطن المصري إنتاج أصناف عالية المحصول مع المحافظة علـــى جـــودة ونعومة ومتانة التيلة حتى تناسب متطلبات الغزل الحديثة على نظام غزل الطرف المفتـــوح ولســـد حاجة الصناعة المحلية. وكذلك تحسين صفات جودة التيلة للهجين (جيزة ٨١ × جيـــزة ٨٣) ســـواء بالانتخاب أو التهجين .