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FIBER AND YARN QUALITY AS AFFECTED BY LOCATIONS, CULTIVARS AND THEIR INTERACTION IN SOME EGYPTIAN COTTON CULTIVARS

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By
K.M.M.Hussein and A.A.Hassan

Cotton Research Institute, Agricultural Research Center, Giza , Egypt.

ABSTRACT

Five different locations (Damanhor, Tanta, Kafr el Sheikh, Beni-Sweef and El Maragha) were allocated for planting four cultivars, *viz.* Giza 88, Giza 86, Giza 80 and Giza 90, during 2008 season. Two grades were taken (Good to Fully Good and Good). Randomized complete block design was used. Simple correlation and stepwise analysis were done. The traits studied were micronaire reading, fiber length, uniformity %, fiber strength and short fiber % in raw cotton. Also skein strength, neps count and yarn C.V.% in yarn.

The results showed that the effects of locations, cultivars and their interactions were significant with all fiber and yarn traits. The highest skein strength, the lowest neps, and yarn (C.V. %) for all cultivars under GFG grade, were at Damanhor. Giza 88 was the best cultivar in yarn properties.

Simple correlation coefficients within each location, cultivar and grade, with fiber properties and skein strength were positive and significant except short fiber, which showed negative correlation. On the contrary, the situation was completely adversed, when yarn C.V.% was considered.

The stepwise multiple regression analysis indicated that, the most contributors to skein strength were fiber strength and short fiber. For yarn C.V.%, length uniformity and short fiber were the most ones, at the four cultivars. While at the five locations, the best contributors to skein strength and yarn irregularity C.V.%, respectively, fiber strength, fiber length, length uniformity and short fiber.

Key words: *cotton cultivars , fiber quality, locations, yarn quality.*

1. INTRODUCTION

Cotton is unique among other field crops, for its sensitivity to environmental conditions and management decisions. Fiber and yarn quality, mean quite different things to cotton processors, at yarn spinning and when significant defects appear in yarn and finished fabrics. Therefore, fiber and yarn technological properties are the critical goals in cotton production.

Grade is a composite assessment of three factors; color, leaf, and preparation (Munro, 1987; USDA, 1993 and Moore, 1996). Color and trash (leaf and stem residues) can be quantified instrumentally, but traditional, manual cotton grade classification is still provided by USDA-AMS, in addition to the instrumental HVI trash and color values. Higher grades usually get price premium for the lower non-lint content and the higher levels of fiber quality properties (USDA, 1993).

Micronaire, which is often treated as the fiber maturity measurement data provides an empirical composite of fiber cross section and relative wall thickening. Greatly vary micronaire measures fineness of genotype and maturity as a result of environmenthas been detected. Micronaire or maturity data now appear in most cotton improvement reported by Green and Culp, 1990; Meredith, 1990; May and Green, 1994; Tang *et al.*, 1996 and Smith and Coyle, 1997.

Locations are limited by latitude and longitude lines. The latitude that cotton is growing will affect the length of the growing season, the maturity of the varieties selected and the flexibility that growers can employ in variety selection. Longitude can also impact quality. Also, management schemes must account and adjust for these limitations to realize the highest possible production and hopefully, the best quality. David, 2005 pointed out that some varieties grown in the northern latitudes produced markedly lower micronaire values and marginally higher staple and strength. The regional comparison of fiber quality indicated that varieties planted in the south had lower micronaire values than when grown in the Mid South.

Krieg (2002) used variety tests conducted for 12 years in different 15 locations in Texas. He stated that micronaire had significant genetic variation, with very strong environmental variation within each variety, and all varieties evaluated had mean micronaire values in the base range. However genetic control is quite strong for fiber length and strength as well as fiber diameter or circumference, which determines cellular volume and temperature, especially. The daily minimum temperature has major impact on the deposition of cellulose in secondary wall which influences micronaire and strength.

In *Gossypium barbadense* L. staple length is classified as long (29–34 mm) and extra-long (>34 mm). Additionally, short fiber is defined as the percentage of fiber less than 12.7 mm. Fiber length is primarily a genetic trait, but short-fiber content is dependent upon genotype and growing conditions. Fiber length is directly related to yarn fineness, strength, and spinning efficiency. Bradow and Davidonis (2000) found that the percentage of short-fibers was lower when temperatures were higher. The apparent improvement in fiber length uniformity may be related to increased assimilate availability to the fibers because there were fewer seeds per boll. (Fransen and Verschraege, 1985; Behery, 1993; Moore 1996 and Bradow *et al.,* (1999).

Hassan *et al.* (2006), found that the effect of varieties was significant for fiber properties. While, the first order interactions (varieties x locations) and (varieties X years) were significant for the 2.5% span length (length of the longer fiber). But the second order interaction was insignificant for all fiber properties.

Significant losses in productivity and quality are related to short fibers so the amounts of short fibers in cotton bales is unanimously identified as a high priority issue for the cotton industry (Tallant *et al.,* 1960). Lord (1961) defined the short fiber as the percentage of fibers shorter than half of the effective length. He also introduced the percentage of fibers shorter than a fixed length as a possible useful definition for some particular purposes. Ultimately, all definitions involved into a single measure arbitrarily defined as the percentage of fibers less than ½" in length, and designated as the Short Fibers.

Fiber length is impacted to a lesser extent by the environment while fiber strength is least affected by the environment. Fiber strength, the inherent breaking strength of individual cotton fibers, is considered to be the most important factor for determining the strength of the yarn spun from those fibers (Munro, 1987 and Moore, 1996). Measuring fiber strength by Pressley apparatus (Flat-bundle measurements of fiber strength), is considered satisfactory for acceptance testing and for research studies of the influence of genotype, environment, and processing on fiber (bundle) strength, (Munro, 1987 and ASTM, 1994). Sasser and Shane, 1996 mentioned that growth environment, and genotype play a part for determining fiber strength and strength variability. The same researchers found a close general association between fiber strength and environment indicating that fiber strength is more responsive to the growth environment than fiber length. Many investigators reported that fiber strength was correlated with genotype only (Green and Culp, 1990 and Smith and Coyle, 1997).

Spinning technique, machine parameters, operation stages, processing conditions and the physical characteristics of fiber determine its processing behavior, production efficiency and final yarn and fabric quality. Therefore, predicting the quality characteristics of yarns, especially tensile properties, have been the main target of many studies in the last century. The tensile properties of a spun yarn especially CSP (Count Strength Product) and/or skein strength have always been very important in determining the quality of the yarn (Mustafa and Kadoglu, 2007).

In the study of Hassan and Sanad (2006) all characters showed highly significant mean square for genotypes, locations, genotypes by location. Giza 90 was superior to the other studied genotypes in most fiber and yarn properties (Single yarn strength and yarn evenness) in most locations. The promising hybrid (G.81XG83) ranked lower in most fiber and yarn properties.

The present investigation aimed to study the effect of location, cultivars and their interaction on fiber and yarn properties of some Egyptian cotton cultivars.

2. MATERIALS AND METHODS

The present investigation included four cultivars namely; Giza88 (Extra long staple cotton) and Giza86, Giza80, and Giza90 (long staple cotton). The cultivars were grown at five different locations, distributed across cotton belt during 2008 season. These locations are Damanhor, Tanta, Kafr El Sheikh, Beni-Sweef and El Maragha. Samples were drawn from each cultivar at all locations, as usual.

Two lint grades ; Good Fully Good (G/FG) and Good (G) were taken from each aspect. From the raw cotton of each lint grade three repetitions were drawn, each sample repeat was further divided into two parts. The first one was used for determining fiber properties , the second part was spun into 60s count carded yarns at 3.6 (T. M.) for tests of yarn properties. Lint cotton samples were obtained from annual trials carried out by the regional evaluation research section of the cotton research institute. All fiber and yarn tests were carried out in the laboratories of the cotton Research Institute, Giza, under controlled atmospheric conditions of 65 to 75 F° temperatures and 63 to 67% relative humidity.

Some important fiber properties were studied including micronaire value (ASTM:D-1448-68), upper half mean length (U.H.M) (mm),uniformity index(UI%), fiber strength (g/tex.) (at 0.0 with gauge length),(P.I) (ASTM:D-1445-67), and short fiber (ASTM:D-1447-67). Individual instruments were used for obtaining the measurements.

For yarn properties, skein strength was measured according to (ASTM: D-1578-67; 1998). Neps in yarn and yarn evenness (C.V. %), was measured by Uster Evenness tester according to (ASTM: D-1425-60; 1998).

A R.C.B.D. was used. Simple correlation coefficients and L.S.D. test α 0.05 were carried out according to Snedecore and Cochran (1981). Stepwise multiple regression analysis was performed according to Draper and Smith (1966). The contributions of the studied fiber traits to each skein strength and yarn unevenness were calculated within each cultivar over locations and within each location over cultivars.

3. RESULTS AND DISCUSSION

3.1. Effect of location, cultivars and their interaction within each grade:

The results for fiber properties are shown in Table (1). It is obvious that the effect of locations with the two grades, was significant for all fiber properties, due to location diversity, within the two grades. In (G/FG) the highest fineness, *i.e*. 3.6 was recorded in El Maragha. The other four locations gave the same micronaire reading, *i.e.* 3.8. This means that fineness was not greatly affected by varying environmental conditions. As regards fiber length, it was found that the tallest fiber, *i.e.* 31.2 m.m. was measured in Tanta. It seemed that the environment in Tanta allows good fiber elongation more than the other locations. The shortest length was recorded in Kafr El Sheikh (29.9 m.m.) and Beni-Sweef. (29.8 m.m.). These results refer to the importance of cotton growing in moderate locations. The maximum uniformity index, *i.e*. 86.1% was observed in Damanhor, without significant difference with both Tanta (85.4%) and Kafr El Sheikh (85.8%). This means that UI% trait may well benefit from the environmental conditions in the Delta regions. In the two valley locations, lower and equal UI% values (84.8%) were obtained.

Strength as expressed by Pressley index (P.I.) was the maximum in Damanhor (9.6), without significant differences with Kafr El Sheikh (9.3). These results re-assure the positive value of growing cotton in the Delta regions. Finally, SFI showed significant superiority in Kafr El Sheikh (22.1 %) over all other locations. Again, a location with moderate climate is the most suitable to most fiber quality traits in cotton, with the grade (G/FG). According to (G) grade, similar trends were obtained, Table (1). However, the best figures on fiber traits were shown in the same locations as in (G/FG) grade. In addition, the values on traits were always lesser than the corresponding one with (G/FG) grade except with SFI, where the opposite was quite true. Such exception , however means lesser fineness, length, uniformity index (UI %) and strength, beside higher short fiber (SFI). These findings are in the same line with Hassan *et al.* (2006) as well as Hassan and Sanad (2006).

The second factor in the study; cultivars significantly affected all traits. The cultivar Giza 90 significantly out yielded the other four ones with respect to fineness, giving a micronaire reading of 3.4. The most immature fiber was observed in Giza 86, as the micronaire reading was 4.2. Length of fibers. The maximum was (33.1 m.m.) in Giza 88, followed by Giza 86 which achieved (30.9 m.m.). Typical results were obtained with respect to UI%. However the cultivars Giza 88 and Giza 86 gave 86.5% and 85.7%, respectively.

Similar superiorities of the previous two cultivars were observed on (P.I.) too. It is expected with such finding the super two cultivars gave the lowest two values as regards SFI, viz, 14.2 and 16.5. This means that Giza 80 significantly out yielded the others with respect to fineness and SFI. Also, Giza 88 significantly exceeded the others with fiber length, (UI %) and (P.I.) traits. Such different results could be attributed to the differences in genotype. In the grade (G), as in (G/FG) grade, Giza 90 gave the highest fineness (3.1) and SFI (28.8), meanwhile, Giza 88 showed the greatest values on length (33.1m.m.) and UI% (84.2%). The only difference was detected on P.I on Giza 80, whereas P.I was the highest (10.3). This means that the comparison among different values between the two grades showed that the three traits fiber length, UI%, and P.I may raise the grade of cotton from (G) to (G/FG).

The interaction among locations and cultivars significantly affected all the studied traits, either with (G/FG) or (G) grades, Table (1). With respect to (G/FG) grade, Giza 90 and Giza 80 with all locations produced the highest fineness except (Beni-Sweef X Giza 80) where micronaire reading was 4.7. For fiber length the extra long staple cultivar (Giza 88), produced, with all locations, the greatest values. However, its combinations in delta significantly exceeded those in the valley. Within the main two regions, the locations did not significantly vary from each other. Also Giza 88 approved its superiority with respect to UI%, with all locations. The combinations of (Giza 88) in the Delta significantly surpassed the corresponding ones in the valley. Moreover, (Kafr El Sheikh X Giza 88) showed a significant difference with the other two combinations of Giza 88 in the Delta. Strength, as expressed by (P.I.), was the highest in the combinations (Kafr El Sheikh X Giza 88) as well as both Damanhor and Tanta with Giza 86. It seemed that pronounced fineness was somewhat correlated with SFI, which expressed its highest value, *i.e.* 31.5 in the combination (Damanhor X Giza 90). Such positive relation between fineness and SFI was detected in many studies too.

Within the grade good (G), similar trends, with minor deviation, were shown on all the studied traits. Therefore, it may be concluded herein that the grade may had not a great effect on the studied fiber traits. Moreover, it may be concluded that the combinations of the Delta governorates with either Giza 88 or Giza 86 could give pronounced fiber length, UI% and strength. In the valley regions, higher fineness and SFI could be giving by growing Giza 80 and Giza 90. Sawires *et al.* (1989), Green and Culp (1990) and Badr and El-Sayed (2004), came to similar findings.

Table (2) declares that the effect of locations (environment) on yarn properties was significant, Damanhor was the best region, the highest skein strength (2460), the lowest neps (90), yarn C.V. % (17.8) at G/FG grade, while Giza 88 was the best cultivar (genotype effect) in yarn properties; skein strength (2780), neps (96) and yarn C.V.% (16).

Table (2) presents the yarn studied properties as affected by (location x cultivar) interactions. All traits were significantly affected under the two grades. With the grade (G/FG), Giza 88 produced in all locations of Delta the highest skein strength.

The products in the Delta Governorates did not significantly vary each other, while they significantly exceeded the corresponding ones in the valley Governorates. This means that such trait required the moderate climate as in the Delta. The lowest skein strength, *i.e*. 1960 was measured in Giza 90 grown in Damanhor.

Neps count was the greatest, *i.e*. 120 in the combination (Damanhor x Giza 90). Such product did not significantly differ from those of (Kafr El Sheikh x Giza 90), *i.e.* 110, (Beni-Sweef X Giza 88), *i.e*. 116 and (Beni-Sweef X Giza 86), *i.e.* 116. On the contrary, the lowest neps counts were recorded on the combinations (El Maragha X Giza 90), *i.e.* 48, (El Maragha X Giza 80), *i.e*. 57 and (Kafr El Sheikh X Giza 86), *i.e.* 58, yielding the most clean cotton without significant differences among these three combinations.

The variation within the yarn as expressed in C.V% was the greatest on Giza 90 grown in Damanhor, *i.e*. 21.8%, Kafr El Sheikh, 21.6% and El Maragha, 21.3%. These three coefficients of variability insignificantly varied from each other.

The most homogenous yarn was measured on (Beni-Sweef X Giza 88), *i.e*. 14.5% and (El Maragha X Giza 88) 14.5%, indicating that such trait had good contribution in the valley specially with Giza 88. For the grade good (G), the maximum skein strength, all over the study *i.e.* 2930 was obtained by (Damanhor X Giza 88) combination. Oppositely, the combinations of Giza 90 in Damanhor, Tanta, Kafr El Sheihk and Beni-Sweef produced the most weak skein strength. This means that Giza 90 must be grown in ElMaragha if skein strength is needed.

Table(1) Effect of locations ,cultivars and their interactions on fiber properties within each grade, during 2008 season.

Locations	Cultivars	Good Fully Good					Good				
		MIC	length	UI%	pressley	SFI	MIC	length	UI%	pressley	SFI
DAMANHOR	Giza 88	4.1	34.0	89.1	9.2	7.7	4.0	33.6	86.9	8.7	10.8
	Giza 86	4.3	32.2	87.9	10.8	12.2	4.0	31.2	86.1	10.7	16.4
	Giza 80	3.5	29.2	86.0	9.5	26.3	3.1	28.3	84.6	8.6	28.4
	Giza 90	3.4	27.4	81.5	8.8	31.5	3.2	26.6	80.0	8.3	32.5
TANTA	Giza 88	3.7	33.8	87.9	9.0	8.0	3.6	34.2	86.5	8.6	11.6
	Giza 86	4.7	33.2	89.0	10.2	6.4	4.2	32.3	87.3	9.1	14.4
	Giza 80	3.4	30.1	85.2	8.6	16.5	3.3	29.2	81.8	8.2	21.7
	Giza 90	3.4	27.5	79.6	7.7	21.5	3.1	25.9	77.6	7.5	31.2
KAFR ELSHEIKH	Giza 88	4.1	34.1	87.1	10.1	16.5	3.9	33.6	86.5	9.2	19.9
	Giza 86	4.3	30.9	87.5	9.6	19.7	4.0	29.9	86.2	9.3	25.6
	Giza 80	3.4	28.5	85.5	9.3	25.6	3.0	26.5	83.1	8.1	29.8
	Giza 90	3.4	25.9	83.2	8.3	26.6	3.0	24.3	79.6	7.7	30.8
BENI-SWEEF	Giza 88	3.4	32.0	84.7	8.8	20.2	3.0	31.5	80.1	8.0	22.1
	Giza 86	3.7	29.5	81.1	8.2	20.5	3.3	28.2	79.4	8.0	25.4
	Giza 80	4.7	30.6	88.4	9.8	13.7	3.8	29.1	85.5	9.4	18.3
	Giza 90	3.5	26.9	85.1	9.7	17.3	3.2	25.7	84.7	9.0	24.2
EL MARAGHA	Giza 88	3.6	31.9	84.0	8.4	17.7	3.1	31.2	81.4	7.6	24.9
	Giza 86	3.8	28.8	83.4	8.3	24.1	3.6	27.6	79.1	7.8	25.4
	Giza 80	3.5	30.9	85.5	9.3	20.1	3.3	30.4	84.1	8.6	24.2
	Giza 90	3.5	28.8	84.5	9.1	19.2	3.3	27.5	82.1	8.6	25.4
L.S.D at 0.05 (LXC)		0.3	0.8	1.6	0.6	2.4	0.3	0.9	1.8	0.8	3.3
Locations	Damanhor	3.8	30.7	86.1	9.6	19.4	3.6	29.9	84.4	9.1	22.0
	Tanta	3.8	31.2	85.4	8.9	13.1	3.6	30.4	83.3	8.4	19.9
	Kafr el sheikh	3.8	29.9	85.8	9.3	22.1	3.5	28.6	83.8	8.6	26.5
	Bani-sweef	3.8	29.8	84.8	9.1	17.9	3.3	28.6	82.4	8.6	22.7
	El maragha	3.6	30.1	84.8	8.8	20.3	3.3	29.2	81.7	8.2	25.0
L.S.D at 0.05 (L)		0.2	0.4	0.8	0.3	1.2	0.1	0.5	0.9	0.3	1.6
Cultivars	Giza 88	3.7	33.1	86.5	9.7	14.2	3.5	32.1	84.2	8.4	17.8
	Giza 86	4.2	30.9	85.7	9.4	16.5	3.8	29.2	83.6	8.9	21.4
	Giza 80	3.7	29.8	86.1	9.3	20.4	3.3	28.7	83.8	10.3	24.4
	Giza 90	3.4	27.3	82.7	8.7	23.2	3.1	26.8	80.8	8.2	28.8
L.S.D at 0.05 (C)		0.1	0.4	0.7	0.3	1.1	0.1	0.4	0.8	0.3	1.5

L= Locations C= Cultivars

Table(2) Effect of locations ,cultivars and their interactions on yarn properties within each grade, during 2008 season.

Locations	Cultivars	Good Fully Good			Good		
		Skein strength	Neps	c.v.%	Skein strength	Neps	c.v.%
DAMANHOR	Giza 88	3025	65	16.80	2930	95	18.30
	Giza 86	2490	68	15.20	2360	118	16.90
	Giza 80	2360	110	21.20	1875	130	22.10
	Giza 90	1960	120	21.80	1745	136	21.80
TANTA	Giza 88	2875	110	16.50	2650	123	18.70
	Giza 86	2505	80	16.40	2410	119	17.80
	Giza 80	2035	98	20.60	1900	115	22.20
	Giza 90	2060	115	20.80	1850	138	22.90
KAFR EL SHEIKH	Giza 88	2860	89	17.90	2725	105	18.50
	Giza 86	2555	58	16.70	2365	103	18.00
	Giza 80	2080	105	20.80	1900	115	22.70
	Giza 90	2005	110	21.60	1845	120	23.00
BENI-SWEEF	Giza 88	2615	116	14.50	2560	142	21.20
	Giza 86	2180	116	20.60	2045	133	22.90
	Giza 80	2250	71	17.60	2030	96	18.90
	Giza 90	2030	76	18.50	1825	106	19.80
EL MARAGHA	Giza 88	2515	103	14.50	2405	140	21.30
	Giza 86	2075	121	21.20	1925	155	22.60
	Giza 80	2155	57	20.00	1990	120	22.80
	Giza 90	2105	48	21.30	1915	48	22.50
L.S.D at 0.05 (LXC)		222.21	1339	0.77	110.87	13.12	1.04
Locations	Damanhor	2460	91	17.80	2230	119	19.70
	Tanta	2359	101	18.50	2205	123	20.40
	Kafr el sheikh	2375	91	19.20	2210	110	20.50
	Bani-sweef	2269	94	18.70	2115	119	20.70
	El maragha	2213	82	19.20	2060	128	22.30
L.S.D at 0.05 (L)		111.11	6.69	0.38	55.43	6.56	0.52
Cultivars	Giza88	2778	96	16.00	26.55	121	19.60
	Giza86	2360	88	18.00	2220	125	19.70
	Giza80	2175	88	20.00	1940	115	21.70
	Giza90	2030	93	20.80	1835	119	22.10
L.S.D at 0.05 (C)		99.37	5.98	0.34	99.58	5.86	0.46

L= Locations C= Cultivars

Neps count showed that the most clean cotton gave 48. Such a figure was recorded on (Kafr El Sheikh X Giza 90). The greatest neps count, *i.e.* 155 were calculated on (ElMaragha X Giza 86). Similar cotton neps were observed in (Damanhor X Giza 90), *i.e*. 136, (Tanta X Giza 90), *i.e*. 138 and (ElMaragha X Giza 88), *i.e.* 140.

For C.V.%, the greatest variation, *i.e*. 22.9% was recorded on (Tanta X Giza 90) or (Beni-Sweef X Giza 86). Insignificant differences were noticed when comparing some combinations including (Damanhor X Giza 80), *i.e*. 22.1%, (Tanta X Giza 80), *i.e*. 22.2% and (Kafr El Sheikh X Giza 80), *i.e*. 22.7%. This means that with such trait higher variation could be expected in the Delta in special with Giza 80. In contradicting, the homogenous yarn was measured on the combinations in Tanta X either Giza 88 (8.7%) or Giza 86 (17.6%), Kafr Elsheikh with either Giza 88 (18.5%) and Giza 86 (18.0%). This means that variability could be minimized by Giza 88 or Giza 86 grown in the area of middle to north of the Delta.

In Tables (1 and 2) it could be noticed that, regions Damanhor, Tanta, Kafr El Sheikh were the best locations for most characters(fiber and yarn). In such locations, Giza 88, Giza 86 were the superiors. While Giza 80, Giza 90 surpassed in Beni-Sweef , ElMaragha regions. Generally, the effects of locations , cultivars and the interaction (location x cultivar) were significant for all fiber and yarn properties. This could be due to, characters, *viz.* micronaire reading, length engaged with cultivars and others, *viz.* short fiber, uniformity and micronaire reading- in the same cultivars- are committed with locations. These findings are in line with El-Tabakh *et al.* (1985), Sasser and Shane (1996) and Smith and Coyle (1997), Who reported that the effect of location, cultivars was significant for some fiber and yarn properties.

3.2.Simple correlation between both skein strength and yarn C.V.% and fiber properties:

Simple correlation coefficients were computed at good (G) grade, within each location over all cultivars, and within each cultivar over all locations. Table (3) shows the simple correlation coefficients, in locations over all cultivars. Skein strength was highly significant correlated with length in all locations.

Similar correlation was observed with both micronaire reading and uniformity index in the Delta Governorates. As for Pressely Index (P.I.), it was found that its correlation with skein strength was highly significant only in Tanta and Kafr El Sheikh. But all correlations of short fiber (SFI) were negative, where they were highly significant in the Delta locations, Sawires *et al.*(1989) and Bradow *et al* . (1999).

Table(3) Simple correlation coefficients between both skein strength and yarn C.V.% with fiber properties within each location, for good grade over all cultivars.

	Locations	MIC	Length	UI%	P.I.	SFI
Skein Strength	**Damanhor**	***0.70	***0.89	***0.77	0.24	*****-0.86**
	Tanta	***0.54	***0.89	***0.78	***0.59	***-0.82
	Kafr el sheikh	***0.83	***0.94	***0.77	***0.66	***-0.86
	Beni-Sweef	0.18	***0.88	0.14	0.23	-0.19
	El maragha	0.15	***0.78	0.20	0.20	-0.53
Yarn C.V. %	**Damanhor**	***-0.88	***-0.82	***-0.72	***-0.67	***0.87
	Tanta	***-0.81	***-0.87	**-0.88	***-0.81	***0.90
	Kafr el sheikh	***-0.91	***-0.83	***-0.80	***-0.70	***0.80
	Beni-Sweef	***-0.64	*-0.54	***-0.92	**-0.84	***0.77
	El maragha	**-0.58	***-0.63	*-0.47	-0.20	***0.73

MIC = Micronaire	*	Significance at 0.05
UI%= Uniformity P.I.= Presseley	**	Significance at 0.01
Index – SFI = Short Fiber	***	Significance at 0.001

In Table (4), all fiber properties, with all cultivars showed positive correlation, with the two aspects, significant and highly significant, except SFI. Such later trait was negatively correlated with skein strength. The situation was completely adversed when yarn C.V.% replaced skein

Table(4) Simple correlation coefficients between both skein strength and yarn C. with fiber properties within each cultivar, for good grade over all locations.

	Cultivars	MIC	length	UI%	P.I.	SFI
Skein Strength	Giza 88	***0.780	***0.180	***0.380	***0.640	***-0.790
	Giza 86	***0.83	***0.38	***0.390	***0.720	***-0.620
	Giza 80	0.290	0.270	*0.640	*0.500	-0.160
	Giza 90	***0.760	***0.70	*0.380	*0.320	***-0.690
Yarn C.V. %	Giza 88	***-0.820	***-0.84	***-0.900	***-0.570	***0.760
	Giza 86	***-0.850	***-0.88	***-0.940	***-0.880	***0.730
	Giza 80	****-0.840	*-0.450	***-0.730	***-0.670	***0.720
	Giza 90	-0.270	-0.280	**-0.580	***-0.630	***0.580

MIC = Micronaire	*	Significance at 0.05
UI%= Uniformity P.I.= Presseley	**	Significance at 0.01
Index – SFI = Short Fiber	***	Significance at 0.001

strength in the correlation. These findings are in the same line with El-Hariry *et al*.(1990),Tang *et al.(*1996),Abdel-Fattah (1998) and Urania (2000), who mentioned that skein strength is explained mostly by tenacity, length, micronaire (or fineness), short fibers and/or uniformity ratio. Evenness of yarn (C.V. %) is connected to fiber length, fineness, tenacity and short fibers.

3.3. Contribution of cotton fiber properties to skein strength and yarn C.V.%:

The prediction equations and coefficient of determination (R^2) of the best model to estimate the relative contribution of each fiber property to skein strength and yarn C.V.% at good (G) grade in the five locations over all the four cultivars, are presented in Table (5). For the four cultivars over all the five locations, Table (6) was prepared.

In Table (5) it could be noticed that the best contributors to skein strength were fiber length and fiber strength, in Damanhor and El Maragha. in Tanta, Kafr El Sheikh and Beni-Sweef fiber length and micronaire reading were the most

Table (5): The best equation amount, coefficient of determination (R^2) and rank of contribution of the studied fiber properties to skein strength and yarn C.V.% within each location over the four cultivars.

	Locations	Best Equation	R^2	Rank of Contribution				
				First	Second	Third	Fourth	fifth
Skein strength	Damanhor	Y1=-3236.36447 +(X2)142.67786+(X3)21.68479+(X4)-63.72000	0.80	X2	X4	X3	X1	X5
	Tanta	Y1=903.46175+(X2)122.41491+(X3)-23.53777+(X4)-29.13909+(X5)-8.87546	0.81	X2	X1	X5	X4	X3
	Kafr el sheikh	Y1=71.34019+(X1)181.27036+(X2)94.49479+(X3)-14.20297	0.94	X2	X1	X3	X4	X5
	Beni-Sweef	Y1=-487.34992+(X1)-217.52451+(X2)117.08451+(X4)35.37083+(X5)-13.41813	0.87	X2	X1	X5	X4	X3
	El maragha	Y1=1594.37690+(X2)80.5574+(X4)-143.15693+(X5)-27.88945	0.78	X2	X4	X5	X3	X5
Yarn C.V.%	Damanhor	Y2=11.21608+(X1)-1.46238+(X3)0.20584+(X4)-0.87739+(X5)0.19670	0.89	X5	X1	X4	X2	X3
	Tanta	Y2=31.19690+(X1)-1.46574+(X2)-0.26328+(X5)0.11060	0.88	X3	X5	X4	X2	X1
	Kafr el sheikh	Y2=54.91613+(X1)-3.32170+(X3)-0.26906	0.90	X3	X1	X2	X4	X5
	Beni-Sweef	Y2=51.08510+(X1)0.30712+(X3)-0.41790+(X5)0.13361	0.88	X3	X5	X1	X4	X2
	El maragha	Y2=22.41917+(X2)-0.25926+(X4)0.14466+(X5)0.24134	0.64	X3	X3	X1	X2	X1

Y1= Skein strength, Y2= Yarn C.V%, X1= MIC, X2= length, X3= UI%, X4= Pressley Index, X5= SFI%

Table (6): The best equation amount, coefficient of determination R^2 and rank of contribution of the studied fiber properties to skein strength and yarn C.V.% within each cultivar over the five locations

	Cultivars	Best Equation	R^2	Rank of Contribution				
				First	Second	Third	Fourth	fifth
Skein strength	Giza 88	Y1 = - 2873.67 +(X1) 246.66 -(X2)27.49 + (X4)23.98 -(X5)21.00	0.84	X4	X1	X2	X5	X3
	Giza 86	Y1 = - 3885.00 +(X2)77.17 +(X3)42.11 +(X5)10.91	0.97	X4	X2	X5	X1	X3
	Giza 80	Y1= -2361.77 +(X2)34.94 +(X3)53.28 -(X4)114.53 -(X5)7.278	0.60	X5	X2	X3	X4	X1
	Giza 90	Y1 = 630.79 +(X1)351.90 +(X2)30.31 -(X4)69.12 -(X5)4.20	0.57	X5	X2	X4	X1	X3
Yarn C.V.%	Giza 88	Y2 = 42.96 -(X1)2.18 -(X3)0.30 +(X4)1.16 +(X5)0.02	0.92	X5	X1	X3	X4	X2
	Giza 86	Y2 = 70.85 -(X2)0.25 -(X3)0.463 -(X4)0.526	0.96	X3	X5	X2	X1	X4
	Giza 80	Y2 = 43.01 +(X2)0.34 -(X3)0.45 +(X5)0.25	0.67	X5	X3	X2	X4	X1
	Giza 90	Y2= 75.251 -(X3)0.39 -(X4)1.40 -(X5)0.33	0.84	X3	X5	X4	X1	X2

Y1= Skein strength, Y2= Yarn C.V%, X1= MIC, X2= Length, X3=UI%, X4= Pressley Index,X5= SFI%

important contributors to skein strength. At locations, Tanta, Kafr El Sheikh, Beni-Sweef, the best contributor to yarn C.V.% was length uniformity while the best one in Damanhor and El Maragha was short fiber. The best two contributors to yarn C.V. % at all locations were length uniformity and short fiber.

Generally, at all locations, the best contributors to skein strength and yarn irregularity C.V.% were fiber strength, fiber length, length uniformity and short fiber. In Table (6), the best contributor with Giza 88, Giza 86 to skein strength was fiber strength while short fiber was the best one with Giza 80 and Giza 90. The best two contributors to skein strength were short fiber, length in Giza 80 and Giza 90.

Therefore, the most contributors to skein strength were fiber strength and short fiber with all cultivars. To yarn C.V.%, the most important contributors were short fiber, length uniformity with all cultivars. The best one for Giza 88, Giza 80 was short fiber. For Giza 86 and Giza 90 length uniformity seemed to be the best contributor.

Generally, with all cultivars, the most important contributors to skein strength were fiber strength and short fiber. Meanwhile the corresponding ones to yarn C.V.% were length uniformity and short fiber, indicating the positive value of short fiber.

Yarn irregularity (C.V. %) increases as short fiber increases and the larger the share of short fiber the lower the skein strength and higher yarn C.V.%, on the contrary, the larger the share of fiber strength the higher the skein strength and less yarn C.V.%. These findings are in the same line with Tallant *et al.* (1960), fransen *et al*. (1985), Abdel-Fattah (1988)Sawires *et al* .,(1989), El-Hariry *et al.,(*1990), Abdel-Fattah (1998) and Hussein (2001).

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تأثير المناطق والاصناف والتفاعل بينهما على صفات التيلة والخيط في بعض أصناف القطن المصري المنزرعة

خالد محمد محمد حسين - عبد الباسط عبد الكريم حسان

معهد بحوث القطن – مركز البحوث الزراعية- الجيزة- مصر

ملخص

أجريت هذه الدراسة بمعهد بحوث القطن- مركز البحوث الزراعية وذلك فى خمس مناطق (دمنهور – طنطا – كفر الشيخ – بني سويف – المراغة) حيث زرعت أربعة أصناف مصرية (جيزة 88 , جيزة 86 , جيزة 80 , جيزة 90) خلال موسم 2008 , وقد مثل كل صنف رتبتان (جود فولى جود - جود) من القطن الشعر. حيث استخدم تصميم القطاعات كاملة العشوائية فى ثلاثة مكررات. قدرت صفات التيلة (قراءة الميكرونير - الطول - نسبة انتظام التيلة - متانة التيلة و نسبة الشعيرات القصيرة) وكذلك الغزل (متانة الشلة - عدد العقد في الخيط ومعامل الإختلاف). وكان تقدير الإرتباط البسيط بين صفات التيلة السابقة وكلا من متانة الشلة - معامل الإختلاف فى الخيط وكذلك قدرت المساهمة النسبية لصفات التيلة فى صفتى متانة الشلة ومعامل الإختلاف فى الخيط . وكانت اهم النتائج كما يلى:

- كان تأثيرمناطق الزراعة و الأصناف و التفاعل بينهما (الأصناف × المناطق) معنويا لمعظم صفات التيلة و الغزل وخاصة نسبة الشعرات القصيرة وقراءة الميكرونير . وجد انه مع متانة الشلة العالية يقل معامل الإختلاف وكذلك عددالعقد فى الخيط لكل الأصناف فى كلا الرتبتين, بينما كان الصنف جيزة 88 أفضل الأصناف فى صفات الغزل .
- كان معامل الإرتباط البسيط معنويا وموجبا فى جميع المناطق و الأصناف وذلك بين متانة الشلة و جميع صفات التيلة ماعدا نسبة الشعيرات القصيرة حيث لوحظ العكس. وقد لوحظ نتائج مخالفة تماما عند دراسة إرتباط معامل الإختلاف مع صفات التيلة الخمس.
- إختلفت نسبة مساهمة صفات التيلة فى متانة الشلة ومعامل الإختلاف فى الخيط من منطقة لأخرى ومن صنف لأخر و كانت صفات الطول - متانة التيلة - والشعيرات القصيرة أعلا مساهمة فى متانة الشلة اما صفات نسبة انتظام طول التيلة والشعيرات القصيرة . وكانت الاعلى مساهمة فى معامل الإختلاف فى الخيط .

تؤكد النتائج على أهمية تأثير الظروف البيئية والأصناف وكذلك تفاعل الصنف مع البيئة على صفات التيلة و الغزل وكذلك على مساهمة صفات التيلة فى صفات الغزل .

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