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Fiber and Yarn Quality Measurements in Relation to Short Fiber Content in Some Egyptian Cotton Varieties

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Abstract

This study was carried out at during 2019 and 2020 seasons on the laboratory at Cotton Technology Research Division, Cotton Research Institute, Agricultural Research Center, Giza, Egypt, to investigate the effect of six Egyptian cotton varieties (Giza 92, Giza 96, Giza 86, Giza 94, Giza 95 and Giza 90) and three categories of short fiber content (5.50, 6.75 and 8.25 %) which obtained from three lint cotton grades, *i.e.* fully good, good and fully good fair respectively, from each cotton variety on fiber and yarn quality measurements under using the new technique of the ring spinning system. Extra long staple as Giza 92 and Giza 96 significantly recorded the maximum upper half mean length (UHML), fiber bundle strength (FBS), lea count strength product at yarn count of 40's (LCSP40), lea count strength product at yarn count of 60's (LCSP60), single yarn strength at yarn count of 40's (SYS40), single yarn strength at yarn count of 60's (SYS60) and yarn evenness at yarn count of 60's (YE60) as well as gave the lowest short fiber index (SFI), fiber elongation percentage (FEP), micronaire value (MIC), trash area (TA) and trash content (TC) in both seasons. The greatest fiber uniformity index (FUI), MIC and fiber maturity (FM) as well as the minimum yarn evenness at yarn count of 40's (YE40) and YE60 in both seasons were obtained from Giza 86 cotton variety. Giza 94 cotton variety recorded the highest fiber brightness degree (Rd) as well as the lowest linear density (LD), fiber yellowness degree (+b), LCSP60 and SYS60 in both seasons. The highest SFI and +b were obtained from Giza 95 cotton variety in both seasons. Giza 90 cotton variety gave the highest FEP, LD, TA, TC and YE40, as well as gave the lowest UHML, FUI, FBS, FM, RD, LCSP40 and SYS40 in both seasons. Increasing short fiber content from 5.50, 6.75 to 8.25 % caused significant increments in SFI, FEP, +b, TA, TC, YE40 and YE60. On the other hand, UHML, FUI, FBS, MIC, FM, LD, Rd, LCSP40, LCSP60, SYS40 and SYS60 were significantly decreased in both seasons. Giza 92 cotton variety at fewest short fiber content (5.50 %) gave the maximum FBS, SYS40 and SYS60, while at highest short fiber content (8.25 %) recorded the minimum MIC and the highest YE60 in both seasons. Giza 96 cotton variety at lowest short fiber content gave the highest UHML, LCSP40 and LCSP60, as well as gave the lowest SFI, FEP, TA and TC in both seasons. The maximum FUI, MIC, FM as well as the lowest YE40 and YE60 in both seasons were produced from Giza 86 cotton variety with lowest short fiber content. The maximum Rd and lowest +b were obtained from Giza 94 cotton variety at lowest short fiber content, while, with the same cotton variety with highest short fiber content recorded the lowest LD, LCSP60 and SYS60 in both seasons. The fibers which obtained from Giza 95 cotton variety with highest short fiber content significantly recorded the greatest SFI and +b in both seasons. The maximum FEP, TA, TC, YE40 as well as the minimum UHML, FUI, FBS, FM, Rd, LCSP40 and SYS40 were obtained from Giza 90 cotton variety when used highest short fiber content, while, under the same cotton variety at lowest short fiber content recorded the highest LD in both seasons. There were significant negative correlation coefficients between (SFI, FEP, +b, TA, TC and YE40) and (UHML, FUI, FBS, MIC, FM, LD, Rd, LCSP40 and SYS40).

Keywords: Egyptian cotton varieties, short fiber content, fiber quality and yarn quality.

Introduction

American standard test method defined the short fiber content as the percentage of fibers (by weight or number) shorter than ½ inch **(ASTM, 2012 c).** Otherwise, the Chinese standards test methods defined the short fiber content as the percentage of fibers (by weight or number) shorter than 16 mm. **(CSTM, 2006).**

Several researcher reported that significantly increases in short fiber index, fiber elongation percentage, fiber yellowness degree, trash area, trash content and yarn evenness at yarn counts of 40's and 60's with increasing short fiber content. On the other hand, upper half mean length, fiber uniformity index, fiber bundle strength, micronaire value, fiber maturity, linear density, fiber brightness degree as well as lea count strength product and single yarn strength at yarn counts of 40's and 60'swere significantly decreased by increasing yarn counts **(Bradow and Davidonis 2000; Stuart 2002; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ibrahim 2018 and Haitham 2019).**

Several investigators showed that materials of cotton varieties were significant differed in mean values of all fiber quality measurements, *i.e.* short fiber index, upper half mean length, fiber uniformity

index, fiber elongation percentage, fiber bundle strength, micronaire value, fiber maturity, linear density, brightness degree, yellowness degree, trash area and trash content as well as yarn quality measurements, *i.e.* lea count strength product, single yarn strength and yarn evenness at yarn counts of 40's and 60's, **(Hequet and Ethridge 2000; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Saleem *et al*. 2010; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ahmed *et al*. 2014; Hager and Hassan 2016; Parsi *et al*. 2016; Rizk *et al*. 2016; Abdel-Khalik *et al*. 2017; El-Gedwy *et al*. 2018; Ibrahim 2018; Abdel-Ghaffar *et al*. 2019 and Haitham 2019).**

The interaction between material of cotton varieties and short fiber content were significant on mean values of almost fiber and yarn technological properties **(Bradow and Davidonis 2000; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ibrahim 2018 and Haitham 2019).**

The main objective of this investigation was designed to study the effect of materials of Egyptian cotton varieties and contents of short fiber on fiber and yarn quality measurements.

Materials and Methods

This study was carried out at Cotton Research Institute, Agricultural Research Center, Giza, Egypt, during the two successive seasons of 2019 and 2020 to study the effect of six Egyptian cotton varieties, *i.e.* Giza 92 and Giza 96 as extra long staple, Giza 86 and Giza 94 as long staple Delta as well as Giza 95 and Giza 90 as long staple upper Egypt and three categories of short fiber content (5.50, 6.75 and 8.25 %) which obtained from three lint cotton grades, *i.e.* fully good, good and fully good fair respectively, from each cotton variety on fiber and yarn quality measurements**,** as well as correlation coefficients among traits under using the new technique of the ring spinning system at two yarn counts of 40's with 4.0 twist multiplier and 60's with 3.6 twist multiplier. The studied treatments were arranged in completely randomized design in three replicates. The Egyptian cotton materials were obtained from Cotton Research Institute, Agricultural Research Center, Egypt, in both seasons. All fiber and yarn measurements were tested under controlled atmospheric condition of (20 C°± 2 C°) temperature and (65 % ± 5 %) relative humidity **(ASTM, 2004)** at the Egyptian International Cotton Classification Center laboratories, Cotton Research Institute, Agricultural Research Center, Giza, Egypt.

Studied measurements

a) Fiber quality measurements

1) Short fiber index (SFI).
2) Upper half mean length in mm (UHML).
3) Fiber uniformity index (FUI).
4) Fiber elongation percentage (FEP).
5) Fiber bundle strength in g/tex (FBS).
6) Micronaire value (MIC).
7) Fiber maturity (FM).
8) Linear density in millitex (LD).
9) Fiber brightness degree (Rd).
10) Fiber yellowness degree (+b).
11) Trash area (TA).
12) Trash content (TC).

The Cotton Classifying System Version-5.2 instrument (CCS-V5.2) used for determination of SFI, UHML, FUI, FEP, FBS, Rd and +b according to **(ASTM, 2012 a, b, c and d).** MIC, FM and LD were determined using the Wira micronaire according to **(ASTM, 1997 and 1998).** Measurements of TA and TC by Neps and Trash Digital Analyzer (NT-DA-FM30) according to **(ASTM, 2012 d).**

b) Yarn quality measurements

1) Lea count strength product at yarn count of 40's (LCSP40).
2) Lea count strength product at yarn count of 60's (LCSP60)

Where, Lea product = Corrected breaking load in pounds x nominal count

3) Single yarn strength in cN/tex at yarn count of 40's (SYS40).
4) Single yarn strength in cN/tex at yarn count of 60's (SYS60).
5) Yarn evenness at yarn count of 40's (YE40).
6) Yarn evenness at yarn count of 60's (YE60).

LCSP and SYS were measured by using the Good-Brand Lea Tester and Statimat ME **(ASTM, 1967),** while YE was measured by Uster tester III **(ASTM, 1984).**

c) Simple correlation coefficients between all measurements using IBM SPSS statistics version 10.

Statistical analysis:

The analysis of variance was carried out according to the procedure described by **Gomez and Gomez (1984).** Data were statistically analyzed according to using the MSTAT-C Statistical Software Package **(Freed, 1991).** Where the F-test showed significant differences among means L. S. D. test at 0.05 level was used to compare between means.

Results and Discussion

Fiber quality measurements

Effect of Egyptian cotton varieties

Results presented in **Table 1** showed that all fiber quality measurements (short fiber index, upper half mean length, uniformity index, fiber elongation percentage, fiber bundle strength, micronaire value, fiber maturity, linear density, fiber brightness, yellowness, trash area and trash content) under study were different significantly among the six Egyptian cotton varieties (Giza 92, Giza 96, Giza 86, Giza 94, Giza 95 and Giza 90) during 2019 and 2020 seasons. The highest short fiber index (11.38 and 11.55) and fiber yellowness degree (11.80 and 12.04) in both

seasons respectively were obtained from Giza 95 cotton variety. Giza 90 cotton variety gave the maximum fiber elongation (8.77 and 9.12 %), linear density (164.33 and 157.76 millitex), trash area (2.048 and 2.109) and trash content (332.55 and 342.53) in first and second seasons, respectively. Giza 96 cotton variety gave the longest upper half mean length (34.33 and 33.30 mm in both seasons respectively). The greatest fiber uniformity ratio (89.22 and 86.54 %), micronaire value (4.48 and 4.30) and fiber maturity (0.957 and 0.919) in both seasons respectively, were obtained from Giza 86 cotton variety. Giza 92 cotton variety gave the maximum fiber bundle strength (46.85 and 44.97 g/tex in both seasons respectively). The highest fiber brightness degree (77.91 and 76.35 % in the respective both seasons) was obtained from Giza 94 cotton variety. On the other hand, the minimum short fiber index (7.53 and 7.64 %), fiber elongation (6.63 and 6.90 %), trash area (1.003 and 1.033) and trash content (40.76 and 41.98) in both seasons, respectively were recorded from Giza 96 cotton variety. The fibers which obtained from Giza 90 cotton variety gave the lowest upper half mean length (29.54 and 28.66 mm), uniformity index (84.75 and 82.20 %), fiber bundle strength (36.00 and 34.56 g/tex), fiber maturity (0.871 and 0.836) and fiber brightness degree (64.82 and 63.53 %). Giza 92 cotton variety recorded the lowest micronaire value (3.53 and 3.39 in two seasons, respectively). Giza 94 cotton variety recorded the lowest linear density (127.35 and 122.25 millitex) and fiber yellowness degree (8.22 and 8.38) in respective both seasons. These differences in yarn quality measurements of cotton varieties may be due to the genetic differences between Giza 92 and Giza 96 cotton varieties (extra long staple) and Giza 86, Giza 94, Giza 95 and Giza 90 cotton varieties (long staple). These results in good accordance with those reported by **(Hequet and Ethridge 2000; Ureyen and Kadogla 2007; Saleem *et al*. 2010; Ibrahim 2013; Ahmed *et al*. 2014; Parsi *et al*. 2016; Abdel-Khalik *et al*. 2017; El-Gedwy *et al*. 2018; Ibrahim 2018 and Haitham 2019)** showed that cotton varieties markedly varied for fiber quality measurements.

Table 1. Mean values of fiber quality measurements as affected by Egyptian cotton varieties during 2019 and 2020 seasons.

Trait / Treatment	SFI (%)	UHML (mm)	FUI (%)	FEP (%)	FBS (g/tex)	MIC	FM	LD (millitex)	Rd (%)	+b	TA	TC
Cotton variety						**2019 season**						
Giza 92	7.68	33.48	86.11	6.94	46.85	3.53	0.917	137.37	76.17	8.75	1.106	83.43
Giza 96	7.53	34.33	85.95	6.63	44.80	3.79	0.934	134.41	74.86	8.42	1.003	40.76
Giza 86	9.36	32.23	89.22	7.43	44.27	4.48	0.957	153.92	74.00	8.61	1.192	89.79
Giza 94	8.65	33.28	86.33	7.53	42.32	4.26	0.934	127.35	77.91	8.22	1.377	108.13
Giza 95	11.38	29.82	85.56	8.55	37.69	4.23	0.939	142.72	66.06	11.80	1.477	135.21
Giza 90	10.09	29.54	84.75	8.77	36.00	3.81	0.871	164.33	64.82	11.58	2.048	332.55
L.S.D. at 5 %	**0.63**	**0.30**	**0.39**	**0.49**	**0.64**	**0.12**	**0.013**	**7.39**	**1.06**	**0.26**	**0.367**	**26.65**
Cotton variety						**2020 season**						
Giza 92	7.80	32.47	83.53	7.21	44.97	3.39	0.881	131.88	74.65	8.92	1.140	85.93
Giza 96	7.64	33.30	83.37	6.90	43.01	3.64	0.896	129.03	73.36	8.58	1.033	41.98
Giza 86	9.51	31.26	86.54	7.72	42.50	4.30	0.919	147.76	72.52	8.78	1.228	92.48
Giza 94	8.78	32.28	83.74	7.83	40.63	4.09	0.896	122.25	76.35	8.38	1.418	111.38
Giza 95	11.55	28.92	82.99	8.89	36.18	4.06	0.901	137.01	64.74	12.04	1.522	139.27
Giza 90	10.24	28.66	82.20	9.12	34.56	3.65	0.836	157.76	63.53	11.81	2.109	342.53
L.S.D. at 5 %	**0.69**	**0.46**	**0.63**	**0.33**	**0.76**	**0.21**	**0.013**	**7.38**	**1.40**	**0.30**	**0.324**	**22.14**

Where, (SFI) = short fiber index, (UHML) = upper half mean length, (FUI) = fiber uniformity index, (FEP) = fiber elongation percentage, (FBS) = fiber bundle strength, (MIC) = micronaire value, (FM) = fiber maturity, (LD) = linear density, (Rd) = fiber brightness degree, (+b) = fiber yellowness degree, (TA) = trash area and (TC) = trash content.

Effect of short fiber content

Results presented in **Table 2** revealed that the differences between the three short fiber content (5.50, 6.75 and 8.25 %) were significant on all fiber quality measurements during 2019 and 2020 seasons. Increasing short fiber content from 5.50, 6.75 to 8.25 % caused significant increments in short fiber index, fiber elongation percentage, fiber yellowness degree, trash area and trash content, while upper half mean length, uniformity index, fiber bundle strength, micronaire value, fiber maturity, linear density and fiber brightness degree were significantly decreased during 2019 and 2020 seasons. The cotton fibers containing the lowest short fiber content (5.50 %) markedly gave the maximum upper half mean length (34.13 and 33.11 mm), uniformity index (87.70 and 85.07 %), fiber bundle strength (44.86 and 43.06 g/tex), micronaire value (4.34 and 4.16), fiber maturity (0.954 and 0.916), linear density (163.19 and 156.66 millitex) and fiber brightness degree

(75.54 and 74.03 %) as well as recorded the minimum short fiber index (7.30 and 7.42 %), fiber elongation percentage (7.10 and 7.38 %), fiber yellowness degree (8.69 and 8.87), trash area (0.587 and 0.604) and trash content (50.61 and 52.13) in first and second seasons, respectively. On the other hand, the highest short fiber index (11.07 and 11.24 %), fiber elongation percentage (8.40 and 8.73%), fiber yellowness degree (10.59 and 10.80), trash area (2.336 and 2.406) and trash content (233.69 and 240.70) as well as, the lowest upper half mean length (29.04 and 28.17 mm), uniformity index (84.62 and 82.08 %), fiber bundle strength (37.77 and 36.26 g/tex), micronaire value (3.61 and 3.46), fiber maturity (0.883 and 0.848), linear density (119.59 and 114.81 millitex) and fiber brightness degree (67.58 and 66.23 %) were recorded from cotton fibers containing the highest short fiber content (8.25 %) . The cotton fibers containing the lowest short fiber content are usually accompanied with high upper half mean length, uniformity index, fiber bundle strength, micronaire value, fiber maturity, linear density and fiber brightness degree. While, with highest short fiber content are usually accompanied with high short fiber index, fiber elongation percentage, fiber yellowness degree, trash area and trash content **(Bradow and Davidonis 2000; Stuart 2002; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ibrahim 2018 and Haitham 2019)**.

Table 2. Mean values of fiber quality measurements as affected by short fiber content during 2019 and 2020 seasons.

Trait / Treatment	SFI (%)	UHML (mm)	FUI (%)	FEP (%)	FBS (g/tex)	MIC	FM	LD (millitex)	Rd (%)	+b	TA	TC
Short fiber content						**2019 season**						
5.50 %	7.30	34.13	87.70	7.10	44.86	4.34	0.954	163.19	75.54	8.69	0.587	50.61
6.75 %	8.96	33.16	86.64	7.43	43.34	4.10	0.939	147.28	73.79	9.41	1.180	110.63
8.25 %	11.07	29.04	84.62	8.40	37.77	3.61	0.883	119.59	67.58	10.59	2.336	233.69
L.S.D. at 5 %	**0.45**	**0.21**	**0.28**	**0.35**	**0.45**	**0.09**	**0.009**	**5.22**	**0.75**	**0.18**	**0.259**	**18.84**
Short fiber content						**2020 season**						
5.50 %	7.42	33.11	85.07	7.38	43.06	4.16	0.916	156.66	74.03	8.87	0.604	52.13
6.75 %	9.10	32.17	84.04	7.73	41.61	3.94	0.901	141.39	72.32	9.60	1.215	113.95
8.25 %	11.24	28.17	82.08	8.73	36.26	3.46	0.848	114.81	66.23	10.80	2.406	240.70
L.S.D. at 5 %	**0.49**	**0.32**	**0.45**	**0.23**	**0.54**	**0.15**	**0.009**	**5.22**	**0.99**	**0.21**	**0.229**	**15.65**

Where, (SFI) = short fiber index, (UHML) = upper half mean length, (FUI) = fiber uniformity index, (FEP) = fiber elongation percentage, (FBS) = fiber bundle strength, (MIC) = micronaire value, (FM) = fiber maturity, (LD) = linear density, (Rd) = fiber brightness degree, (+b) = fiber yellowness degree, (TA) = trash area and (TC) = trash content.

Interaction effect

All fiber quality measurements of Egyptian cotton were significantly affected by interaction between varieties (Giza 92, Giza 96, Giza 86, Giza 94, Giza 95 and Giza 90) and short fiber content (5.50, 6.75 and 8.25 %) during both seasons, as shown in **Table 3.** The fibers which obtained from Giza 95 cotton variety with lowest short fiber content (5.50 %) significantly recorded the greatest short fiber index (13.57 and 13.77) and fiber yellowness degree (13.44 and 13.71) in both seasons respectively. The maximum fiber elongation (9.29 and 9.66 %), trash area (3.147 and 3.241) and trash content (558.75 and 575.51) in both seasons, respectively were obtained from Giza 90 cotton variety when used the highest short fiber content (8.25 %), while, under the same cotton variety with lowest short fiber content (5.50 %) recorded the highest linear density (190.00 and 182.40 millitex in respective both seasons). Giza 96 cotton variety containing the lowest short fiber content (5.50 %) gave the longest upper half mean length (36.11and 35.03 mm in two seasons, respectively). The maximum fiber uniformity ratio (90.87 and 88.14 %), micronaire value (4.86 and 4.67) and fiber maturity (0.972 and 0.933) in respective both seasons were recorded from Giza 86 cotton variety with lowest short fiber content (5.50 %). Giza 92 cotton variety at lowest short fiber content (5.50 %) gave the strongest fiber bundle strength (48.92 and 46.96 g/tex in first and second seasons, respectively). The maximum fiber brightness degree (81.32 and 79.69 % in both seasons respectively) was obtained from Giza 94 cotton variety with lowest short fiber content (5.50 %). On the other hand, the lowest short fiber index (5.75 and 5.84 %), fiber elongation (5.99 and 6.23 %), trash area (0.260 and 0.268) and trash content (6.13 and 6.31) during 2019 and 2020 seasons, respectively were produced from Giza 96 cotton variety with lowest short fiber content (5.50 %). The fibers which obtained from Giza 90 cotton variety containing the highest short fiber content (8.25 %) gave the minimum upper half mean length (26.12 and 25.34 mm), uniformity index (83.29 and 80.79 %), fiber bundle strength (30.57 and 29.35 g/tex), fiber maturity (0.785 and 0.754) and fiber brightness degree (60.25 and 59.05 %). Giza 92 cotton variety containing the highest short fiber content (8.25 %)

recorded the minimum micronaire value (3.07 and 2.95 in both seasons, respectively). Giza 94 cotton variety when used the highest short fiber content (8.25 %) recorded the lowest linear density (108.25 and 103.92 millitex in both seasons respectively), while, the same cotton variety with the lowest short fiber content (5.50 %) recorded the lowest fiber yellowness degree (7.49 and 7.64 in both seasons respectively). These results agree with those reported by **(Bradow and Davidonis 2000; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ibrahim 2018 and Haitham 2019),** found that fiber quality measurements were significantly different by interaction between varieties and short fiber content.

Table 3. Mean values of fiber quality measurements in relation to short fiber content in some Egyptian cotton varieties during 2019 and 2020 seasons.

Trait / Treatment		SFI (%)	UHML (mm)	FUI (%)	FEP (%)	FBS (g/tex)	MIC	FM	LD (millitex)	Rd (%)	+b	TA	TC
Cotton variety	Short fiber content						2019 season						
	5.50 %	5.93	35.22	87.11	6.23	48.92	3.89	0.951	155.33	79.32	8.21	0.467	28.95
Giza 92	6.75 %	7.36	34.32	86.82	6.81	47.65	3.62	0.932	136.54	77.52	8.61	0.965	70.58
	8.25 %	9.75	30.89	84.41	7.77	43.98	3.07	0.869	120.25	71.68	9.43	1.887	150.75
	5.50 %	5.75	36.11	88.02	5.99	48.21	4.11	0.961	152.42	78.65	7.83	0.260	6.13
Giza 96	6.75 %	7.19	35.32	86.15	6.42	46.55	3.91	0.943	135.54	76.63	8.21	0.891	33.33
	8.25 %	9.65	31.56	83.67	7.48	39.64	3.35	0.897	115.26	69.29	9.21	1.857	82.81
	5.50 %	7.39	34.12	90.87	6.86	46.42	4.86	0.972	176.33	77.87	8.06	0.554	31.23
Giza 86	6.75 %	9.35	33.62	89.81	7.33	45.14	4.52	0.964	159.66	75.92	8.43	1.013	81.33
	8.25 %	11.33	28.95	86.97	8.09	41.26	4.05	0.935	125.77	68.22	9.33	2.010	156.8
	5.50 %	7.15	35.12	87.55	6.84	44.75	4.57	0.958	142.54	81.32	7.49	0.577	43.25
Giza 94	6.75 %	8.65	34.55	86.42	7.42	43.63	4.32	0.941	131.25	79.12	8.05	0.986	82.45
	8.25 %	10.15	30.17	85.02	8.33	38.59	3.89	0.902	108.25	73.29	9.11	2.567	198.7
	5.50 %	9.35	32.15	86.64	7.93	41.29	4.45	0.963	162.50	68.37	10.33	0.621	51.54
Giza 95	6.75 %	11.21	30.75	85.71	8.31	39.22	4.33	0.945	150.33	67.05	11.63	1.265	99.78
	8.25 %	13.57	26.55	84.33	9.41	32.56	3.91	0.908	115.33	62.75	13.44	2.546	254.32
	5.50 %	8.25	32.08	86.02	8.73	39.56	4.13	0.921	190.00	67.69	10.24	1.040	142.57
Giza 90	6.75 %	10.02	30.42	84.93	8.30	37.86	3.92	0.907	170.33	66.52	11.52	1.957	296.33
	8.25 %	11.99	26.12	83.29	9.29	30.57	3.37	0.785	132.67	60.25	12.99	3.147	558.75
L.S.D. at 5 %		1.09	0.52	0.68	0.85	1.10	0.21	0.023	12.80	1.84	0.44	0.64	46.15
							2020 season						
	5.50 %	6.02	34.16	84.50	6.48	46.96	3.73	0.913	149.12	77.73	8.37	0.481	29.82
Giza 92	6.75 %	7.47	33.29	84.22	7.08	45.74	3.48	0.895	131.08	75.97	8.78	0.994	72.70
	8.25 %	9.90	29.96	81.88	8.08	42.22	2.95	0.834	115.44	70.25	9.62	1.944	155.27
	5.50 %	5.84	35.03	85.38	6.23	46.28	3.95	0.923	146.32	77.08	7.99	0.268	6.31
Giza 96	6.75 %	7.30	34.26	83.57	6.68	44.69	3.75	0.905	130.12	75.10	8.37	0.918	34.33
	8.25 %	9.79	30.61	81.16	7.78	38.05	3.22	0.861	110.65	67.90	9.39	1.913	85.29
	5.50 %	7.52	33.10	88.14	7.13	44.56	4.67	0.933	169.28	76.31	8.22	0.571	32.17
Giza 86	6.75 %	9.51	32.61	87.12	7.62	43.33	4.34	0.925	153.27	74.40	8.60	1.043	83.77
	8.25 %	11.51	28.08	84.36	8.41	39.61	3.89	0.898	120.74	66.86	9.52	2.070	161.50
	5.50 %	7.26	34.07	84.92	7.11	42.96	4.39	0.920	136.84	79.69	7.64	0.594	44.55
Giza 94	6.75 %	8.78	33.51	83.83	7.72	41.88	4.15	0.903	126.00	77.54	8.21	1.016	84.92
	8.25 %	10.30	29.26	82.47	8.66	37.05	3.73	0.866	103.92	71.82	9.29	2.644	204.66
	5.50 %	9.49	31.19	84.04	8.25	39.64	4.27	0.924	156.00	67.00	10.54	0.640	53.09
Giza 95	6.75 %	11.38	29.83	83.14	8.64	37.65	4.16	0.907	144.32	65.71	11.86	1.303	102.77
	8.25 %	13.77	25.75	81.80	9.79	31.26	3.75	0.872	110.72	61.50	13.71	2.622	261.95
	5.50 %	8.37	31.12	83.44	9.08	37.98	3.96	0.884	182.40	66.34	10.44	1.071	146.85
Giza 90	6.75 %	10.17	29.51	82.38	8.63	36.35	3.76	0.871	163.52	65.19	11.75	2.016	305.22
	8.25 %	12.17	25.34	80.79	9.66	29.35	3.24	0.754	127.36	59.05	13.25	3.241	575.51
L.S.D. at 5 %		1.20	0.79	1.09	0.57	1.32	0.36	0.023	12.79	2.42	0.52	0.56	38.34

Where, (SFI) = short fiber index, (UHML) = upper half mean length, (FUI) = fiber uniformity index, (FEP) = fiber elongation percentage, (FBS) = fiber bundle strength, (MIC) = micronaire value, (FM) = fiber maturity, (LD) = linear density, (Rd) = fiber brightness degree, (+b) = fiber yellowness degree, (TA) = trash area and (TC) = trash content.

Yarn quality measurements

Effect of Egyptian cotton varieties

All yarn quality measurements were significantly affected by six tested Egyptian cotton varieties (Giza 92, Giza 96, Giza 86, Giza 94, Giza 95 and Giza 90) under study in 2019 and 2020 seasons, as shown in **Table 4.** Giza 96 cotton variety significantly produced the maximum lea count strength product at yarn count of 40's (3429.00 and 3321.21) and at yarn count of 60's (3300.42 and 3169.44) in both seasons, respectively. The highest single yarn strength at yarn count of 40's (28.93 and 29.09 cN/tex) and at yarn count of 60's (26.04 and 26.43 cN/tex) as well as yarn evenness at yarn count of 60's (16.33 and 15.87 %) were produced from Giza 92 cotton variety in both seasons, respectively. The yarn produced from Giza 90 cotton variety significantly recorded the highest yarn evenness at yarn count of 40's being 15.71 and 15.31 % in the first and second seasons, respectively. On the other hand, the lowest lea count strength product (2233.00 and 2207.42) and single yarn strength (14.10 and 12.73 cN/tex) at yarn count of 40's were obtained from Giza 90 cotton variety in both seasons, respectively. The yarn produced from Giza 86 cotton variety markedly gave the lowest yarn evenness at yarn count of 40's (11.82 and 11.78 %) and at yarn count of 60's (12.85 and 12.69 %) in both seasons, respectively. The lowest lea count strength product (2373.75 and 2298.00) and single yarn strength (14.43 and 13.96 cN/tex) at yarn count of 60's were obtained by Giza 94 cotton variety in two seasons, respectively. These differences in yarn quality measurements of cotton varieties may be due to the genetic differences between Giza 92 and Giza 96 cotton varieties (extra long staple) and Giza 86, Giza 94, Giza 95 and Giza 90 cotton varieties (long staple). These results in good accordance with those reported by **(Ethridge and Krifa 2004**; **Foulk *et al*. 2009; Kotb 2012; Yiyun *et al*. 2013; Hager and Hassan 2016; Rizk *et al*. 2016; El-Gedwy *et al*. 2018 and Abdel-Ghaffar *et al*. 2019)** showed that cotton varieties markedly varied for yarn quality.

Table 4. Mean values of yarn quality measurements as affected by Egyptian cotton varieties during 2019 and 2020 seasons.

Trait / Treatment	Lea count strength product at 40's	Single yarn strength at 40's (cN/tex)	Evenness at 40's (C.V. %)	Lea count strength product at 60's	Single yarn strength at 60's (cN/tex)	Evenness at 60's (C.V. %)
Cotton variety			**2019 season**			
Giza 92	3335.50	28.93	15.24	3219.50	26.04	16.33
Giza 96	3429.00	25.73	12.36	3300.42	22.58	13.54
Giza 86	2778.83	22.78	11.82	2497.58	21.23	12.85
Giza 94	2674.56	14.85	12.49	2373.75	14.43	13.49
Giza 95	2291.75	14.29	15.09	--	--	--
Giza 90	2233.00	14.10	15.71	--	--	--
L.S.D. at 5 %	**33.75**	**0.29**	**0.51**	**25.40**	**0.53**	**0.30**
Cotton variety			**2020 season**			
Giza 92	3266.17	29.09	15.07	3146.67	26.43	15.87
Giza 96	3321.21	24.60	12.26	3169.44	21.80	13.44
Giza 86	2777.50	22.67	11.78	2438.11	21.13	12.69
Giza 94	2621.42	15.07	12.54	2298.00	13.96	13.37
Giza 95	2270.08	14.69	15.10	--	--	--
Giza 90	2207.42	12.73	15.31	--	--	--
L.S.D. at 5 %	**27.03**	**0.43**	**0.38**	**35.00**	**0.64**	**0.32**

Effect of short fiber content

Results presented in **Table 5** revealed that the differences between the three short fiber content (5.50, 6.75 and 8.25) were significant on all yarn quality measurements of Egyptian cotton during 2019 and 2020 seasons. Cotton materials containing the lowest short fiber content (5.50 %) markedly produced the maximum lea count strength product (2925.48 and 2860.76), single yarn strength (22.81 and 22.47 cN/tex) at yarn count of 40's, lea count strength product (3118.75 and 3031.11) and single yarn strength (26.46 and 26.14 cN/tex) at yarn count of 60's, as well as gave the lowest yarn evenness at yarn count of 40's (13.00 and 12.96 %) and at yarn count of 60's (13.45 and 13.50 %) in first and second seasons, respectively. On the other hand, the highest yarn evenness at yarn count of 40's (14.61 and 14.33 %) and at yarn count of 60's (15.17 and 14.49 %) as well as the minimum lea count strength product (2633.71 and 2600.80), single yarn strength (17.06 and 16.89 cN/tex) at yarn count of 40's, lea count strength product (2885.08 and 2777.56) and single yarn strength (18.92 and 18.67 cN/tex) at yarn count of 60's in both seasons, respectively were obtained from cotton material containing the highest short fiber content (8.25 %). The cotton material containing the lowest short fiber content are usually accompanied with lea count strength product and single yarn strength, while, with highest short fiber content are usually accompanied with high yarn evenness **(Bradow and Davidonis 2000; Stuart 2002; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ibrahim 2018 and Haitham 2019)**.

Table 5. Mean values of yarn quality measurements as affected by short fiber content during 2019 and 2020 seasons.

Trait / Treatment	Lea count strength product at 40's	Single yarn strength at 40's (cN/tex)	Evenness at 40's (C.V. %)	Lea count strength product at 60's	Single yarn strength at 60's (cN/tex)	Evenness at 60's (C.V. %)
Short fiber content			**2019 season**			
5.50 %	2925.48	22.81	13.00	3118.75	26.46	13.45
6.75 %	2812.13	20.47	13.75	3013.67	24.48	14.11
8.25 %	2633.71	17.06	14.61	2885.08	18.92	15.17
L.S.D. at 5 %	**23.87**	**0.21**	**0.36**	**21.99**	**0.46**	**0.26**
Short fiber content			**2020 season**			
5.50 %	2860.76	22.47	12.96	3031.11	26.14	13.50
6.75 %	2770.33	20.07	13.74	2945.55	24.56	14.01
8.25 %	2600.80	16.89	14.33	2777.56	18.67	14.49
L.S.D. at 5 %	**19.11**	**0.30**	**0.27**	**30.31**	**0.55**	**0.27**

Interaction effect

Results in **Table 6** showed that the interaction effect among varieties (Giza 92, Giza 96, Giza 86, Giza 94, Giza 95 and Giza 90) and short fiber content (5.50, 6.75 and 8.25 %) induced significant differences on yarn quality measurements of Egyptian cotton during 2019 and 2020 seasons. The yarn produced from Giza 96 cotton variety with lowest short fiber content (5.50 %) significantly produced the highest lea count strength product at yarn count of 40's (3500.50 and 3426.80) and at yarn count of 60's (3375.25 and 3293.33) in the respective both seasons. The maximum single yarn strength at yarn count of 40's (33.33 and 33.67 cN/tex) and at yarn count of 60's (30.40 and 30.30 cN/tex) were produced from Giza 92 cotton variety with the lowest short fiber content (5.50 %), while with the highest short fiber content (8.25 %) gave the highest yarn evenness at yarn count of 60's (16.99 and 16.34 %) in both seasons, respectively. The yarn produced from Giza 90 variety containing the highest short fiber content (8.25 %) significantly recorded the maximum yarn evenness at yarn count of 40's (16.78 and 16.09 % in both seasons, respectively). On the other hand, the lowest lea count strength product (2002.75 and 2015.75) and single yarn strength (11.33 and 11.67 cN/tex) at yarn count of 40's were obtained from Giza 90 cotton variety containing the highest short fiber content (8.25 %) in both seasons, respectively. The yarn produced from Giza 86 cotton variety with the lowest short fiber content (5.50 %) significantly gave the minimum yarn evenness at yarn count of 40's (11.20 and 11.30 %) and at yarn count of 60's (12.08 and 12.19 %) during respective both seasons. The yarn produced from Giza 94 cotton variety with the highest short fiber content (8.25 %) markedly recorded the lowest lea count strength product (2225.50 and 2159.00) and single yarn strength (11.60 and 11.27 cN/tex) at yarn count of 60's in two seasons, respectively. Similar results were also reported by **(Bradow and Davidonis 2000; Ethridge and Krifa 2004**; **Ureyen and Kadogla 2007; Foulk *et al*. 2009; Kotb 2012; Ibrahim 2013; Yiyun *et al*. 2013; Ibrahim 2018 and Haitham 2019)** whose found variations in yarn quality measurements among cotton varieties and short fiber content interaction.

Correlation studies between studied measurements

Data in **Table 7** showed that the simple correlation coefficients between almost fiber and yarn quality measurements for six verities and three short fiber content of Egyptian cotton were significant from the average of all data during 2019 and 2020 seasons. There were positive correlation coefficients between short fiber index, fiber elongation percentage, fiber yellowness degree, trash area, trash content and yarn evenness. As well as there were positive related relationships among upper half mean length, uniformity index, fiber bundle strength, micronaire value, fiber maturity, linear density, fiber brightness degree, lea count strength product and single yarn strength at yarn count of 40's. On the other hand, there were significant negative correlation coefficients between (short fiber index, fiber elongation percentage, fiber yellowness degree, trash area, trash content and yarn evenness at yarn count of 40's) and (upper half mean length, uniformity index, fiber bundle strength, micronaire value, fiber maturity, linear density, fiber brightness degree, lea count strength product and single yarn strength at yarn count of 40's). Short fiber index was positive and highly significant correlated with fiber elongation percentage (0.890^{**}), fiber yellowness degree (0.827^{**}), trash area (0.840^{**}), trash content (0.696^{**}) and yarn evenness (0.516^{**}) at yarn count of 40's. On the other hand, was negative and significant correlated with upper half mean length (-0.930^{**}), uniformity index (-0.488^{**}), fiber bundle strength (-0.868^{**}), fiber maturity (-0.518^{**}), linear density (-0.419^{*}), fiber brightness degree (-0.845^{**}), lea count strength product (-0.761^{**}) and single yarn strength (-0.728^{**}) at yarn count of 40's. While, micronaire value (-0.262) was negative and insignificant correlated. Upper half mean length was positive and significant correlated with uniformity index (0.624^{**}), fiber bundle strength (0.923^{**}), micronaire value (0.425^{**}), fiber maturity (0.718^{**}), linear density (0.381^{*}), fiber brightness degree (0.914^{**}), lea count strength product (0.742^{**}) and single yarn strength

(0.676**) at yarn count of 40's. On the other hand, was negative and highly significant correlated with short fiber index (-0.930**), fiber elongation percentage (-0.920**), fiber yellowness degree (-0.869**), trash area (-0.903**), trash content (-0.827**) and yarn evenness (-0.614**) at yarn count of 40's. These results in good accordance with those reported by **Ureyen and Kadogla 2007, Yiyun *et al*. 2013 and Hager and Hassan 2016.**

Table 6. Mean values of yarn quality measurements in relation to short fiber content in some Egyptian cotton varieties during 2019 and 2020 seasons.

Treatment	Trait	Lea count strength product at 40's	Single yarn strength at 40's (cN/tex)	Evenness at 40's (C.V. %)	Lea count strength product at 60's	Single yarn strength at 60's (cN/tex)	Evenness at 60's (C.V. %)
Cotton variety	Short fiber content			2019 season			
	5.50 %	3420.75	33.33	14.77	3305.75	30.40	15.75
Giza 92	6.75 %	3375.50	30.37	15.17	3250.50	28.10	16.25
	8.25 %	3210.25	23.10	15.79	3102.25	19.63	16.99
	5.50 %	3500.50	28.00	11.40	3375.25	24.77	12.51
Giza 96	6.75 %	3415.75	25.70	12.07	3285.25	23.17	13.25
	8.25 %	3370.75	23.50	13.60	3240.75	19.80	14.87
	5.50 %	2950.25	25.47	11.20	2675.25	24.20	12.08
Giza 86	6.75 %	2785.75	22.90	11.65	2505.25	22.17	12.83
	8.25 %	2600.50	19.97	12.60	2312.25	17.33	13.65
	5.50 %	2815.62	17.47	11.53	2465.25	16.73	12.62
Giza 94	6.75 %	2697.55	15.27	12.67	2430.50	14.97	13.34
	8.25 %	2510.50	11.80	13.27	2225.50	11.60	14.52
	5.50 %	2452.25	16.23	14.20	--	--	--
Giza 95	6.75 %	2315.50	14.00	15.43	--	--	--
	8.25 %	2107.50	12.63	15.64	--	--	--
	5.50 %	2413.50	16.37	14.87	--	--	--
Giza 90	6.75 %	2282.75	14.60	15.48	--	--	--
	8.25 %	2002.75	11.33	16.78	--	--	--
L.S.D. at 5 %		58.46	0.51	0.88	43.99	0.92	0.52
				2020 season			
	5.50 %	3370.25	33.67	14.50	3240.00	30.30	15.25
Giza 92	6.75 %	3301.50	30.03	15.17	3163.33	28.47	16.01
	8.25 %	3126.75	23.57	15.53	3036.67	20.53	16.34
	5.50 %	3426.80	27.67	11.43	3293.33	24.73	13.06
Giza 96	6.75 %	3337.25	24.67	12.17	3173.33	23.07	13.22
	8.25 %	3199.57	21.47	13.17	3041.67	17.60	14.05
	5.50 %	2895.75	25.00	11.30	2560.00	23.40	12.19
Giza 86	6.75 %	2802.50	23.00	11.80	2500.00	22.13	12.79
	8.25 %	2634.25	20.00	12.23	2254.33	17.87	13.08
	5.50 %	2725.75	17.63	11.70	2395.00	16.57	12.32
Giza 94	6.75 %	2634.75	15.70	12.53	2340.00	14.03	13.43
	8.25 %	2503.75	11.87	13.40	2159.00	11.27	14.35
	5.50 %	2395.75	16.50	14.27	--	--	--
Giza 95	6.75 %	2289.75	14.80	15.50	--	--	--
	8.25 %	2124.75	12.77	15.53	--	--	--
	5.50 %	2350.25	14.33	14.54	--	--	--
Giza 90	6.75 %	2256.25	12.20	15.29	--	--	--
	8.25 %	2015.75	11.67	16.09	--	--	--
L.S.D. at 5 %		46.81	0.74	0.65	60.62	1.11	0.55

Table 7. Simple correlation coefficients between fiber and yarn quality measurements from the average of all data during 2019 and 2020 seasons.

Traits	SFI	UHML	FUI	FEP	FBS	MIC	FM	LD	Rd	+b	TA	TC	LCSP40	SYS40	YE40
SFI	1														
UHML	-0.930**	1													
FUI	-0.488**	0.624**	1												
FEP	0.890**	-0.920**	-0.577**	1											
FBS	-0.868**	0.923**	0.661**	-0.940**	1										
MIC	-0.262	0.425**	0.735**	-0.249	0.311	1									
FM	-0.518**	0.718**	0.816**	-0.620**	0.704**	0.759**	1								
LD	-0.419*	0.381*	0.518**	-0.179	0.276	0.576**	0.432**	1							
Rd	-0.845**	0.914**	0.611**	-0.894**	0.902**	0.389*	0.641**	0.126	1						
+ b	0.827**	-0.869**	-0.555**	0.871**	-0.888**	-0.308	-0.577**	-0.095	-0.934**	1					
TA	0.840**	-0.903**	-0.621**	0.791**	-0.837**	-0.582**	-0.774**	-0.572**	-0.752**	0.705**	1				
TC	0.696**	-0.827**	-0.525**	0.770**	-0.837**	-0.452**	-0.812**	-0.218	-0.761**	0.775**	0.861**	1			
LCSP40	-0.761**	0.742**	0.302	-0.883**	0.838**	-0.152	0.364*	-0.073	0.729**	-0.775**	-0.572**	-0.688**	1		
SYS40	-0.728**	0.676**	0.415*	-0.834**	0.833**	-0.054	0.395*	0.130	0.650**	-0.658**	-0.617**	-0.629**	0.907**	1	
YE40	0.516**	-0.614**	-0.576**	0.617**	-0.570**	-0.588**	-0.585**	-0.104	-0.679**	0.769**	0.544**	0.619**	-0.433**	-0.319	1

Where, (SFI) = short fiber index, (UHML) = upper half mean length, (FUI) = fiber uniformity index, (FEP) = fiber elongation percentage, (FBS) = fiber bundle strength, (MIC) = micronaire value, (FM) = fiber maturity, (LD) = linear density, (Rd) = fiber brightness degree, (+b) = fiber yellowness degree, (TA) = trash area, (TC) = trash content, (LCSP40) = lea count strength product at yarn count of 40's, (SYS40) = single yarn strength at yarn count of 40's, (YE40) = yarn evenness at yarn count of 40's, (**) = correlation is significant at the 0.01 level (2-tailed) and (*) = correlation is significant at the 0.05 level (2-tailed)

References

Abdel-Ghaffar, E. A. F.; G. Y. M. Hammam; A. A. A. El-Hosary; E. M. M. El-Gedwy and A. A. Hassan (2019). Influence of some commercial blends between the imported cotton and the upper Egyptian varieties on technological properties. Annals of Agric. Sci., Moshtohor, 57 (1): 31-38

Abdel-Khalik, F. S.; E. M. Shoker; S. A. H. Allam; E. M. M. El-Gedwy and A. A. Hassan (2017). Production of low priced, medium and coarse yarns using rotor spinning system. Egypt. J. Appl. Sci., 32 (1): 11-24.

Ahmed, H. S. A.; A. A. Hassan and O. D. M. Nour (2014). Studies on the relative contribution of fiber properties in yarn variation strength in some Egyptian cotton variety and promising. Egypt. J. Appl. Sci., 29 (12 b): 697-708.

American Society for Testing and Materials (1967). Standards on textile, (D-1578 & D-1907), In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (1984). Standards on textile, (D-1445 & D-2256), In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (1997). Standard test method for micronaire reading of cotton fibers (D1448-11) In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (1998). test method for linear density and maturity index of cotton fibers (D-3818) In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (2004). Standard atmosphere for conditioning and testing designation, (D 1776-04) In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (2012 a). Standard test method for breaking strength and elongation of cotton fibers (D1445/D1445M-2012) In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (2012 b). Standard test method for length and length distribution of manufactured staple fibers (D5103-07-2012), In Annual Book of Standards, ASTM International, West Conshohocken, PA).

American Society for Testing and Materials (2012 c). Standard test method for length and length distribution of cotton fibers (D1440-07-2012), In Annual Book of Standards, ASTM International, West Conshohocken, PA.

American Society for Testing and Materials (2012 d). Standard test method for length and length uniformity of cotton fibers (D1447-07-2012) In Annual Book of Standards, ASTM International, West Conshohocken, PA.

Bradow, J. M. and G. H. Davidonis (2000). Quantitation of fiber quality and the cotton production-processing interface: A physiologist's perspective. J. Cotton Sci., 4: 34-64.

Chinese Standards Test method (2006). Test method for length of cotton fibers, roller analyzers. GB/T 6098.1-.2006, National Standards of P.R. China.

El-Gedwy, E. M. M.; A. E. M. Gadallh and R. M. Abdel-Twab (2018). Response of some Egyptian cotton cultivars to foliar spray by some microelements. Annals of Agric. Sci., Moshtohor, 56 (4): 965-974.

Ethridge, M. D. and M. Krifa (2004). Renewed focus on short fibers. Textile Topics, (3):1-8.

Foulk, J. and D. McAlister (2002). Single cotton fiber properties of low, ideal, and high micronaire values. Text. Res. J., 72: 885-891.

Foulk, J.; W. Meredith; D, McAlister and D. Luke (2009). Fiber and yarn properties improve with new cotton cultivar. J. Cotton Sci., 13: 212–220.

Freed, R. D. (1991). MSTATC Microcomputer Statistical Program. Michigan State University, East Lansing, Michigan, USA.

Gomez, K. A. and A. A. Gomez (1984). Statistical procedures for agricultural research. 2nd, (ed). John Wiley and Sons, NY, U.S.A.

Hager, M. A and A. A. Hassan (2016). Use of correlation and regression analysis in estimating relative importance of fiber properties affecting yarn hairiness in some Egyptian cotton genotypes. Int. J. adv. Res., 4 (8):1274-1284.

Haitham, A. D. (2019). Effect of low-quality and inexpensive cotton materials on yarn properties using rotor spinning system. Int. Design J., 9 (4): 63-72.

Hequet, E. and D. Ethridge (2000). Effect of cotton fiber length distribution on yarn quality. Int. Proc. Belt wide Cotton Conf., San Antonio, TX. 4-8 Jan. Natl. Cotton Counc. Am., Memphis, 1507-1514.

Ibrahim, I. A. E. (2013). Effect of cotton variety and lint grade on some fiber and yarn properties. J. Appl. Sci. Res., 9 (6): 4015-4020.

Ibrahim, I. A. E. (2018). Effect of fiber length and short fiber percent in cotton on fiber and yarn quality. Alexandria Sci. Exch. J., 39 (4): 663-668.

Kotb, N. A. (2012). Predicting yarn quality performance based on fibers types and yarn structure. Life Sci. J., 9 (3):1009-1015.

Parsi, R. D.; M. V. Kakde; K. Pawar and R. S. P. Patil (2016). Influence of fiber length on ring spun yarn quality. Int. J. Res. Sci. Innov., 3 (8): 154-156.

Rizk, M. A. M.; A. M. Azab; E. A. Emesbah; A. A. Hassan and M. A. Sh. Yonis (2016).

Technological study on some yarn properties of extra-long staple in Egyptian cotton varieties. Al-Azhar. J. Agric. Res., 26: 570-577.

Saleem, M. F.; M. F. Bilal; M. Awais; M. Q. Shahid and S. A. Anjum (2010). Effect of nitrogen on seed cotton yield and fiber qualities of cotton (*Gossypium hirsutum* L.) cultivars. J. Animal & Plant Sci., 20 (1): 23-27.

Stuart, G (2002). The effect of short fiber and neps on Murata vortex spinning. The Aust. Cotton Gro., 23 (1): 28-35.

Thibodeaux, D.; H. Senter; J. L. Knowlton; D. McAlister and X. Cui (2008). The impact of short fiber content on the quality of cotton ring spun yarn. J. cotton Sci., 12: 368-377.

Ureyen, M. E. and H. Kadogla (2007). The prediction of cotton ring yarn properties AFIS fiber properties by using linear regression models. Fibers & Textiles Eastern Europe, 15 (4): 63-71.

Yiyun, C.; X. Cui; J. Rodgers; D. Thibodeaux; V. Martin; M. Watson and S. Pang (2013). A comparative study of the effects of cotton fiber length parameters on modeling yarn properties. Textile Res. J., 83 (9): 961-970.

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جودة التيلة والخيط وعلاقتهما بمحتوي الشعيرات القصيرة لبعض أصناف القطن المصري

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أجرى هذا البحث في معمل قسم بحوث تكنولوجيا القطن . معهد بحوث القطن . مركز البحوث الزراعية . الجيزة . مصر خلال عامي 2019 و2020م بهدف دراسة تأثير ستة أصناف من القطن المصري (جيزة 92، جيزة 96، جيزة 86، جيزة 94، جيزة 95 و جيزة 90) مع ثلاث رتب من القطن الشعر من كل صنف وهي فولي جود، جود وفولي جود فير لتمثيل ثلاث نسب من الشعيرات القصيرة وهي 5.50، 6.75 و 8.25 % على الترتيب على الصفات التكنولوجية للتيلة والخيط تحت نظام الغزل الحلقي.

أشارت النتائج أن الإختلافات بين أصناف القطن تحت الدراسة كانت معنوية في كل الصفات التكنولوجية للتيلة والخيط المدروسة. إستخدام الأقطان فائقة الطول (جيزة 92 وجيزة 96) سجلا معنوياً أعلى القيم لصفات طول أطول الشعيرات (مم)، متانة الشعيرات (جم/تكس)، متانة الشلة والخيط المفرد عند نمرة خيط 40 و60 نمرة إنجليزي ومعامل إختلاف الخيط (%) عند نمرة خيط 40 نمرة إنجليزي وأيضا أعطى أقل القيم لصفات دليل الشعيرات القصيرة (%)، % للإستطالة الشعيرات، قيمة الميكرونير، مساحة الشوائب وعدد الشوائب خلال عامي الدراسة. أعلى القيم لصفات الإنتظامية في الطول (%)، قيمة الميكرونير ونضج الشعيرات وأقل قيم صفة معامل إختلاف الخيط (%) عند نمرة خيط 40 و60 نمرة إنجليزي خلال عامي الدراسة تم الحصول عليها من جيزة 86. جيزة 94 حقق أعلى القيم لصفة درجة الإنعكاس وأقل القيم لصفات النعومة الذاتية، درجة الإصفرار ومتانة الشلة والخيط المفرد عند نمرة خيط 60 نمرة إنجليزي خلال عامي الدراسة. أعلى القيم لصفتي دليل الشعيرات القصيرة (%) ودرجة الإصفرار خلال عامي الدراسة تم الحصول عليهما من جيزة 95. جيزة 90 أعطى أعلى القيم لصفات % للإستطالة الشعيرات، النعومة الذاتية، مساحة الشوائب، عدد الشوائب ومعامل إختلاف الخيط المفرد (%) عند نمرة خيط 40 نمرة إنجليزي وأيضا سجل أقل القيم لصفات طول أطول الشعيرات (مم)، الإنتظامية في الطول (%)، متانة الشعيرات (جم/تكس)، نضج الشعيرات، درجة الإنعكاس، متانة الشلة والخيط المفرد عند نمرة خيط 40 نمرة إنجليزي خلال عامي الدراسة.

أوضحت النتائج أن زيادة محتوي الشعيرات القصيرة من 5.50 و 6.75 إلى 8.25 % أحدثت زيادة معنوية في قيم صفات دليل الشعيرات القصيرة، % للإستطالة الشعيرات، درجة الإصفرار، مساحة الشوائب، عدد الشوائب ومعامل إختلاف الخيط عند نمرة خيط 40 و60 نمرة إنجليزي على العكس من ذلك قيم صفات طول أطول الشعيرات، الإنتظامية في الطول، متانة الشعيرات، قيمة الميكرونير، نضج الشعيرات، النعومة الذاتية، درجة الإنعكاس، متانة الشلة والخيط المفرد عند نمرة خيط 40 و60 نمرة إنجليزي قلت معنوياً بزيادة محتوي الشعيرات القصيرة خلال عامي الدراسة.

جيزة 92 عند أقل محتوي للشعيرات القصيرة (5.50 %) سجل أعلى القيم لصفات متانة الشعيرات، متانة الخيط المفرد عند نمرة خيط 40 و 60 نمرة إنجليزي بينما عند أعلى محتوي للشعيرات القصيرة (8.25 %) سجل أقل قراءة للميكرونير وأعلى قيم لصفة معامل إختلاف الخيط عند نمرة خيط 60 نمرة إنجليزي خلال عامي الدراسة. جيزة 96 مع أقل محتوي للشعيرات القصيرة أعطى أعلى القيم لصفات طول أطول الشعيرات ومتانة الشلة عند نمرة خيط 40 و60 نمرة إنجليزي وأقل القيم لصفات دليل الشعيرات القصيرة، % للإستطالة الشعيرات، مساحة الشوائب وعدد الشوائب خلال عامي الدراسة. أعلى القيم لصفات % الإنتظامية في الطول، قيمة الميكرونير ونضج الشعيرات وأقل القيم لصفة معامل إختلاف الخيط خلال عامي الدراسة تم الحصول عليهم من جيزة 86 مع أقل محتوي للشعيرات القصيرة. أعلى القيم لصفة درجة الإنعكاس وأقل القيم لصفة درجة الإصفرار تم الحصول عليهم من جيزة 94 مع أقل محتوي للشعيرات القصيرة بينما عند أعلى محتوي للشعيرات القصيرة حقق أقل القيم لصفات النعومة الذاتية ومتانة الشلة والخيط المفرد عند نمرة خيط 60 نمرة إنجليزي خلال عامي الدراسة. جيزة 95 مع إستخدام أعلى محتوي للشعيرات القصيرة سجل أعلى القيم لصفات دليل الشعيرات القصيرة ودرجة الإصفرار خلال عامي الدراسة. أعلى القيم لصفات % للإستطالة الشعيرات، مساحة الشوائب، عدد الشوائب ومعامل إختلاف الخيط عند نمرة خيط 40 نمرة إنجليزي وأقل القيم لصفات طول أطول الشعيرات، الإنتظامية في الطول، متانة الشعيرات، نضج الشعيرات، درجة الإنعكاس، متانة الشلة والخيط المفرد عند نمرة خيط 40 نمرة إنجليزي تم الحصول عليهم من جيزة 90 مع أعلى محتوي للشعيرات القصيرة بينما عند أقل محتوي للشعيرات القصيرة سجل أقل قيم لصفة النعومة الذاتية خلال عامي الدراسة.

يوجد إرتباط معنوي سالب بين (دليل الشعيرات القصيرة، % للإستطالة الشعيرات، درجة الإصفرار،مساحة الشوائب، عدد الشوائب ومعامل إختلاف الخيط) و (طول أطول الشعيرات، الإنتظامية في الطول، متانة الشعيرات، قيمة الميكرونير، نضج الشعيرات، النعومة الذاتية، درجة الإنعكاس، متانة الشلة والخيط المفرد عند نمرة خيط 40 نمرة إنجليزي).