Annals of Agric. Sci., Moshtohor **ISSN 1110-0419**
Vol. 58(4) (2020), 895 – 904 **http://aasj.bu.edu.eg/index.php**

Study on Fiber and Yarn Quality of Some Varieties and Egyptian Cotton Promising Crosses

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Abstract

This investigation was carried out during 2020 season on the laboratory at Cotton Technology Research Division, Cotton Research Institute, Agricultural Research Center, Giza, Egypt, to investigate the effect of two Egyptian cotton varieties (Giza 80 and Giza 94), and two promising cotton hybrids, i.*e.* hybrid cotton No. 1 [(G83xG80)xG89]Austrian and hybrid cotton No. 2 [(G89xK)xG86]xG94 on fiber and yarn technological properties under using the new technique of the ring spinning system at yarn count of 40's with 4.0 twist multiplier. The obvious results of this investigation can be summarized as follows: The differences between the studied Egyptian cotton genotypes in all fiber and yarn technological properties were significant, except micronaire value and fiber maturity were not significantly affected by cotton varieties under study during 2020 season. The promising hybrid 2 significantly recorded the highest upper half mean length (mm), fiber mean length (mm), fiber uniformity index (%), fiber bundle strength (g/tex) and lea count strength product vice versa, it gave lowest short fiber index (%), yarn evenness and No. of neps/100 m. Giza 94 cotton variety recorded maximum fiber stiffness (g/tex) and fiber brightness degree (Rd %), however it gave lowest fiber elongation percentage and fiber yellowness degree (+b). Maximum short fiber index (%), fiber yellowness degree (+b), yarn evenness and No. of neps/100 m as well as, the minimum upper half mean length (mm), fiber mean length (mm), fiber uniformity index (%), fiber bundle strength (g/tex), fiber stiffness (g/tex), fiber toughness (g/tex), fiber brightness degree (%) and lea count strength product which obtained from Giza 80 cotton variety. The fiber which obtained from promising hybrid 1 recorded greatest fiber elongation percentage and fiber toughness (g/tex).

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

Introduction

Utilization of Egyptian cotton in producing fine fibers and yarns with high quality properties to be exported would provide great economic advantages allowing Egypt to dominate world market since there would be no strong competition in this respect from countries producing yarns. The improvement of cotton relies mainly upon the Cotton Research Institute, who, through a long process of breeding, maintenance, evaluation of fiber and yarn quality properties test arrives at new genotypes of superior quality to replace the old ageing ones. Consequently, strenuous efforts have been always directed towards improving its quality to maintain the worldwide reputation it has gained.

Differences among the cotton genotypes have been reported by many researchers they found that significant differences between the cotton genotypes in upper half mean length (mm), fiber mean length (mm), fiber uniformity index (%) and short fiber index (%) **[Foulk *et al*. 2009; Ibrahim and El-Banna 2018 and Abdel-Ghaffar *et al*. 2019]**, fiber bundle strength (g/tex), fiber elongation percentage, fiber stiffness (g/tex) and fiber toughness (g/tex) **[Saleem *et al*. 2010; Hager and Hassan 2016 and Abdel-Khalik *et al*. 2017]**, micronaire value and fiber maturity **[Ibrahim 2013 and El-Gedwy *et al*. 2018]**, fiber brightness degree (%) and fiber yellowness degree **[Beheary *et al*. 2018 and Ibrahim 2018]** and lea count strength product, yarn evenness (cv %) and No. of neps/100 m **[Kotb 2012; Yiyun *et al*. 2013; Ahmed *et al*. 2014; Rizk *et al*. 2016 and Haitham 2019]**.

The objective of this research was to evaluate the Egyptian cotton verities (Giza 80 and Giza 94) and new hybrids namely: [(G.83*G80) G89) Austrian] and [(G 98*R101) G86) G94] for some fiber and yarn properties.

Materials and Methods

This study was carried out at Cotton Research Institute, Agricultural Research Center, Giza, Egypt, during 2020 season to investigate the performance of two Egyptian cotton varieties and two promising cotton hybrids as long staple (over 1 ¼ - 1 3/8 inch) on fiber and yarn technological properties, as well as correlation coefficients among traits under using the new technique of the ring spinning system at yarn count of 40's with 4.0 twist multiplier. The experimental design was laid out using completely randomized design in three replications. The materials of Egyptian cotton varieties were obtained from Cotton Research Institute, Agricultural Research Center, Egypt. All fiber and yarn technological properties 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.

Cotton genotypes:

1. Giza 80 cotton variety.
2. Giza 94 cotton variety.
3. Hybrid 1: [(G83xG80)xG89]Austrian under registration in name of Giza 98.
4. Hybrid 2: [(G89xK)xG86]xG94 and registration was done in name of Giza 97.

Studied properties

a) Fiber technological properties

1) Upper half mean length (mm).
2) Fiber mean length (mm).
3) Fiber uniformity index (%).
4) Short fiber index (%).
5) Fiber bundle strength (g/tex).
6) Fiber elongation percentage.
7) Fiber stiffness (g/tex) was calculated according to the equation: Fiber stiffness = fiber strength/fiber elongation x 100
8) Fiber toughness (g/tex) was calculated according to the equation: Fiber toughness = (fiber strength x fiber elongation)/2
9) Micronaire value.
10) Fiber maturity.
11) Fiber brightness degree (%).
12) Fiber yellowness degree.

The Cotton Classifying System Version-5.2 instrument (CCS-V5.2) used for determination of Upper half mean length, fiber mean length, fiber uniformity index, short fiber index, fiber bundle strength, Fiber elongation percentage, Fiber brightness degree and Fiber yellowness degree according to **(ASTM, 2012 a, b, c and d).** Micronaire value and fiber maturity were determined using the Wira micronaire according to **(ASTM, 1997 and 1998).**

b) Yarn technological properties

1) Lea count strength product Where, Lea product = Corrected breaking load in pounds x nominal count
2) Yarn evenness (cv %).
3) Number of neps/100 m

Lea count strength product were measured by using the Good-Brand Lea Tester and Statimat ME **(ASTM, 1967),** while yarn evenness was measured by Uster tester III **(ASTM, 1984).** Measurements of No. of neps/100 m by Neps and Trash Digital Analyzer (NT-DA-FM30) according to **(ASTM, 2012 d).**

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

a) Fiber technological properties

1- Upper half mean length (mm)

Data presented in **Table 1** show significant differences between Egyptian cotton varieties (Giza 80 and Giza 94) and promising cotton hybrids (1 and 2) during 2020 season in upper half mean length (mm), but the differences between Giza 80 and hybrid 1 did found non-significant. The longest upper half mean length (33.87 mm) was obtained from hybrid 2. On the other hand, the shortest upper half mean length (31.33 mm) was recorded from Giza 80 variety. Generally, the four tested cotton genotypes could be arranged as descending order according to upper half mean length as follow: hybrid 2, Giza 94, hybrid 1 and Giza 80. The fibers which obtained from hybrid 2 significantly increased upper half mean length by 3.26, 6.28 and 8.11 % as compared to upper half mean length of Giza 94, hybrid 1 and Giza 80, respectively. These differences may be due to the genetic differences between Egyptian cotton genotypes under study. Similar trend of result were obtained by **Foulk *et al*. 2009; Ibrahim and El-Banna 2018 and Abdel-Ghaffar *et al*. 2019.**

2- Fiber mean length (mm)

Results in **Table 1** indicated a significant difference among the four tested of Egyptian cotton genotypes in fiber mean length (mm) in 2020 season, but, the differences in fiber mean length between Giza 94 and hybrid 1 did not reach the level of significance. The fibers which obtained from promising hybrid 2 significantly recorded the longest fiber mean length and recording 29.38 mm. On the other hand, the shortest fiber mean length was obtained from Giza 80, which recorded 26.70 mm. The four tested cotton genotypes could be arranged as descending order with regard to fiber mean length as follows, hybrid 2, Giza 94, hybrid 1 and Giza 80. The promising hybrid 2 significantly increased fiber mean length by 4.78, 6.88 and 10.04 % as compared to fiber mean length of Giza 94, Hybrid 1 and Giza 80, respectively. These differences in fiber mean length of cotton may be due to the genetic differences between cotton genotypes under study. Also, the promising hybrid 2 gave the longest fiber mean length is attributed to longest upper half mean length.

These results in good accordance with those reported by **Foulk *et al*. 2009; Ibrahim and El-Banna 2018 and Abdel-Ghaffar *et al*. 2019,** whose found marked differences in fiber mean length among cotton genotypes.

3- Fiber Uniformity index (%)

Results presented in **Table 1** showed a significant difference in fiber uniformity index (%) between the four studied Egyptian cotton genotypes during 2020 season, but the differences between hybrid 1 and 2 as well as among Giza 80 and Giza 94 cotton varieties did found non-significant. The promising hybrid 2 significantly gave the highest fiber uniformity index (86.77 %), followed by hybrid 1 which recorded 86.30 %, then Giza 94 which recorded 85.50 %. On the other hand, lowest fiber uniformity index which obtained from Giza 80 and recorded 85.23 %. The fibers which produced from hybrid 2 significantly increased fiber uniformity index by 0.54, 1.49 and 1.81 % as compared to fiber uniformity index of hybrid 1, Giza 94 and Giza 80, respectively. The differences among cotton genotypes were mainly due to the differences in the genetic constituents. Also, the simple differences among upper half mean length and fiber mean length in hybrid 2. These results are reported by **Foulk *et al*. 2009; Ibrahim and El-Banna 2018 and Abdel-Ghaffar *et al*. 2019,** indicated great variations in fiber uniformity index of cotton genotypes.

4- Short fiber index (%)

There were significant differences in short fiber index among Egyptian cotton genotypes in 2020 season, but the differences in short fiber index (%) between Giza 94 and hybrid 2 were not significant as shown in **Table 1.** The fibers which obtained from the promising hybrid 2 surpassed the other three cotton genotypes and significantly gave the minimum short fiber index by 5.80 %. On the other hand, Giza 80 cotton variety significantly recorded maximum short fiber index (8.80 %). The four tested cotton genotypes could be arranged as descending order with regard to short fiber index as follows, Giza 80, Giza 94, hybrid 1 and hybrid 2. Hybrid 2 significantly decreased short fiber index by 2.85, 18.31 and 34.09 % as compared to short fiber index of Giza 94, hybrid 1 and Giza 80. In this connection, it could be noticed that those differences may be due to genetic differences between cotton varieties under study. Many investigators found similar results such as **Foulk *et al*. 2009; Ibrahim and El-Banna 2018 and Abdel-Ghaffar *et al*. 201p,** indicated great variations in short fiber index of cotton genotypes.

Table 1. Mean values of upper half mean length, fiber mean length, fiber uniformity index and short fiber index as affected by Egyptian cotton genotypes during 2020 season.

Cotton genotype	Upper half mean length (mm)	Fiber mean length (mm)	Fiber uniformity index (%)	Short fiber index (%)
Giza 80	31.33	26.70	85.23	8.80
Giza 94	32.80	28.04	85.50	5.97
Hybrid 1	31.87	27.49	86.30	7.10
Hybrid 2	33.87	29.38	86.77	5.80
L.S.D. at 5 %	**0.67**	**0.72**	**0.59**	**0.26**

5- Fiber bundle strength (g/tex)

Results in **Table 2** showed that Egyptian cotton genotypes had a significant effect on fiber bundle strength in 2020 season. But, the differences in fiber bundle strength (g/tex) between Giza 94 and hybrid 2 were not significant. Maximum fiber bundle strength (46.70 g/tex) were produced from hybrid 2, showing the superiority of this hybrid in fiber bundle strength. Whereas, the minimum fiber bundle strength (36.17 g/tex) were obtained from Giza 80 cotton variety. The promising hybrid 2 significantly increased fiber bundle strength by 1.24, 9.80 and 29.11 % as compared to cotton varieties of Giza 94, hybrid 1 and Giza 80. These differences in fiber bundle strength may be due to the genetic differences between the four genotypes. It could be concluded that hybrid 2 surpassed the other three cotton genotypes to increase fiber bundle strength may be due to more likely attributed to the increases in upper half mean length, fiber mean length and fiber uniformity index. These results are good agreement with those reported by **Saleem *et al*. 2010; Hager and Hassan 2016 and Abdel-Khalik *et al*. 2017,** whose indicated marked differences in fiber bundle strength among cotton genotypes.

6- Fiber elongation percentage

Results indicated significant differences between the four tested of cotton in fiber elongation percentage, but, the differences in fiber elongation percentage between Giza 94 and hybrid 2 as well as among Giza 80 and hybrid 1 were not significant during 2020 season, as shown in **Table 2.** The promising hybrid 1 significantly gave maximum fiber elongation percentage recording 8.47 %. On the other hand, the minimum fiber elongation percentage was 7.23 % which obtained from Giza 94 cotton variety. The fibers which obtained from hybrid 1 significantly increased fiber elongation percentage by 3.67, 15.55 and 17.15 %, as compared to fiber elongation percentage of Giza 80, hybrid 2 and Giza 94, respectively. It could be concluded that marked variations were found among cotton genotypes in regard to fiber elongation percentage due to great differences in their genetic constitution. Also, cotton genotypes of hybrid 1 and Giza 80 gave the highest fiber elongation percentage is attributed to shortest upper half mean length and fiber mean length. These results are in harmony with those reported by **Saleem *et al*. 2010; Hager and Hassan 2016 and Abdel-Khalik *et al*. 2017,** whose concluded that the differences in fiber elongation percentage of cotton genotypes.

7- Fiber stiffness (g/tex)

Results in **Table 2** indicated that fiber stiffness (g/tex) were significantly affected by Egyptian cotton varieties (Giza 80 and Giza 94) and promising cotton hybrids (1 and 2), but the differences in fiber stiffness between hybrid 2 and Giza 94 were not significant during 2020 season. The greatest fiber stiffness (6.38 g/tex) which obtained from Giza 94 cotton variety. Whereas, the fibers which obtained from Giza 80 cotton variety significantly gave lowest fiber stiffness (4.43 g/tex). The fibers which obtained from cotton variety of Giza 94 significantly increased fiber stiffness by 0.16, 27.09 and 44.02 %, as compared to fiber stiffness of hybrid 2, Hybrid 1 and Giza 80 cotton genotypes, respectively. It could be concluded that marked variations were found among cotton genotypes in fiber stiffness may be due to great differences in their genetic constitution between cotton genotypes. As well as, Giza 94 and hybrid 2 surpassed the other two cotton genotypes to increase fiber stiffness may be due to more likely attributed to the increase in fiber bundle strength. Similar results were also reported by **Saleem *et al*. 2010; Hager and Hassan 2016 and Abdel-Khalik *et al*. 2017,** whose found greatest variations in fiber stiffness among cotton genotypes.

8- Fiber toughness (g/tex)

The differences among the four cotton genotypes under study in fiber toughness (g/tex) were significant affected, but the differences in fiber toughness between Giza 94 and hybrid 2 were not significant during 2020 season, as shown in **Table 2.** The fibers which produced from hybrid 1 significantly surpassed the other three cotton genotypes in fiber toughness, this hybrid followed by cotton genotypes of hybrid 2, Giza 94 and Giza 80, as descending order. The promising hybrid 1 significantly gave the greatest fiber toughness which was 180.07 g/tex. On the other hand, Giza 80 significantly produced lowest fiber toughness which was 147.69 g/tex. The promising hybrid 1 significantly increased fiber toughness by 5.16, 7.94 and 21.92 %, as compared to fiber toughness of hybrid 2, Giza 94 and Giza 80, respectively. These differences in fiber toughness may be due to the variations in the genetic constitution of cotton genotypes. Also, hybrid 1 gave the greatest fiber toughness is attributed to greatest in fiber bundle strength. These results in agreement with those reported by **Saleem *et al*. 2010; Hager and Hassan 2016 and Abdel-Khalik *et al*. 2017,** whose found marked differences in fiber toughness among cotton genotypes.

Table 2. Mean values of fiber bundle strength, fiber elongation percentage, fiber stiffness and fiber toughness as affected by Egyptian cotton genotypes during 2020 season.

Cotton genotype	Fiber bundle strength (g/tex)	Fiber elongation percentage	Fiber stiffness (g/tex)	Fiber toughness (g/tex)
Giza 80	36.17	8.17	4.43	147.69
Giza 94	46.13	7.23	6.38	166.82
Hybrid 1	42.53	8.47	5.02	180.07
Hybrid 2	46.70	7.33	6.37	171.23
L.S.D. at 5 %	**0.82**	**0.34**	**0.31**	**7.59**

9- Micronaire value

Results presented in **Table 3** show that micronaire value were not significantly affected by four Egyptian cotton genotypes under study during 2020 season. The fibers which produced from hybrid 2 recorded the highest micronaire value (4.47). On the other hand, lowest micronaire value (4.23) was produced from Giza 94 cotton variety.

10- Fiber maturity:

Mean values of fiber maturity were not significantly affected by Egyptian cotton genotypes (Giza 80 and Giza 94) and promising cotton hybrids (1 and 2) during 2020 season, as presented in **Table 3.** The fibers which obtained from hybrid 2 gave maximum fiber maturity (0.95).

11- Fiber brightness degree (Rd %)

Results indicated significant differences among the four tested genotypes of Egyptian cotton in fiber brightness degree (%), but no significant differences were detected among Giza 80 and hybrid 1 on this trait during 2020 season, as shown in **Table 3.** The fibers which produced from Giza 94 cotton variety significantly surpassed the other three genotypes in fiber brightness degree, recording 79.47 %, followed by hybrid 2 with 72.30 %, hybrid 1 with 65.60 % and Giza 80 recording 65.07 %, as descending order. Giza 94 cotton variety increased fiber brightness degree by 9.92, 21.14 and 22.13 %, over fiber brightness degree of hybrid 2, hybrid 1 and Giza 80, respectively. These differences in fiber brightness degree may be due to the genetic differences between cotton genotypes. Similar results were also reported by **Beheary *et al.* 2018 and Ibrahim 2018,** whose found great differences in fiber brightness degree of cotton genotypes.

12- Fiber yellowness degree (+b)

The differences among the four tested Egyptian genotypes in fiber yellowness degree were significant during 2020 season, as shown in **Table 3.** Cotton variety of Giza 80 significantly surpassed the other three cotton genotypes in fiber yellowness degree, this variety followed by cotton genotypes of hybrid 1, hybrid 2 and Giza 94, as descending order. Cotton variety of Giza 80 significantly gave the greatest fiber yellowness degree which was 12.43. On the other hand, cotton variety of Giza 94 produced lowest fiber yellowness degree which was 7.70. The fibers which obtained from Giza 80 significantly increased fiber yellowness degree by 10.29, 47.45 and 61.43 %, as compared to fiber yellowness degree of hybrid 1, hybrid 2 and Giza 94 cotton genotypes, respectively. These differences in fiber yellowness degree may be due to the variations in the genetic constitution of the tested Egyptian cotton genotypes. Also, Giza 80 gave the greatest fiber yellowness degree is attributed to lowest in fiber brightness degree. These results in agreement with those reported by **Beheary *et al.* 2018 and Ibrahim 2018,** whose found marked differences in mean values of fiber yellowness degree among cotton genotypes.

Table 3. Mean values of micronaire value, fiber maturity, fiber brightness degree and fiber yellowness degree as affected by Egyptian cotton genotypes during 2020 season.

Cotton genotype	Micronaire value	Fiber maturity	Fiber brightness degree (%)	Fiber yellowness degree
Giza 80	4.37	0.93	65.07	12.43
Giza 94	4.23	0.93	79.47	7.70
Hybrid 1	4.27	0.94	65.60	11.27
Hybrid 2	4.47	0.95	72.30	8.43
L.S.D. at 5 %	**N.S.**	**N.S.**	**3.31**	**0.69**

b) Yarn technological properties

1- Lea count strength product

Data presented in **Table 4** indicate that lea count strength product were significantly influenced by changing Egyptian cotton genotypes during 2020 season. The yarns obtained from hybrid 2 significantly surpassed the other three cotton genotypes in lea count strength product, recording 2441.67, followed by Giza 94 with 2253.33, hybrid 1 by 2053.33 Giza 80 recording 1930.00, in a descending order. The yarns which made from hybrid 2 significantly increased lea count strength product by 8.36, 18.91 and 26.51 % as compared to cotton genotypes of Giza 94, hybrid 1 and Giza 80. It could be concluded that hybrid 2 surpassed the other three cotton genotypes to increase lea count strength product may be due to more likely attributed to the increases in upper half mean length, fiber mean length, fiber uniformity index and fiber bundle strength and decreases in short fiber content. These results were in harmony with **Kotb 2012; Yiyun *et al.* 2013; Ahmed *et al.* 2014; Rizk *et al.* 2016 and Haitham 2019.**

2- Yarn evenness (%)

Data presented in **Table 3** indicate that the yarn evenness in the produced yarns were significantly influenced by Egyptian cotton varieties (Giza 80 and Giza 94) and promising cotton hybrids (1 and 2) during 2020 season. Egyptian cotton genotypes could be ranked in ascending order according to their yarn evenness as follows: hybrid 2 (10.50 %), Giza 94 (11.57 %), hybrid 1 (13.33 %) and Giza 80 (15.10 %). The yarns which obtained from the promising hybrid 2 significantly decreased yarn evenness by 9.25, 21.23 and 30.46 % as compared to yarn evenness of Giza 94, hybrid 1 and Giza 80. It could be concluded that hybrid 2 surpassed the other three cotton genotypes to decrease yarn evenness may be due to more likely attributed to the increase in fiber uniformity index and decrease in short fiber content. These results agree with those reported by **Kotb 2012; Yiyun *et al.* 2013; Ahmed *et al.* 2014; Rizk *et al.* 2016 and Haitham 2019.**

3- Number of neps/100 m

Data presented in **Table 4** indicate that No. of neps/100 m were significantly influenced by changing Egyptian cotton genotypes, but no significant differences were detected among Giza 94 and hybrid 1 on this trait during 2020 season. Egyptian cotton genotypes could be ranked in descending order according to their No. of neps/100 m as follows: Giza 80, Giza 94, hybrid 1 and hybrid 2 by 115.33, 86.00, 85.33 and 66.67 neps, respectively. The yarns which obtained from hybrid 2 significantly decreased No. of neps/100 m by 21.87, 22.48 and 42.19 % as compared to No. of neps/100 m in Giza 94, hybrid 1 and Giza 80 cotton genotypes. It could be concluded that hybrid 2 surpassed the other three cotton genotypes to decrease No. of neps/100 m may be due to more likely attributed to the increase in fiber uniformity index and decrease in short fiber content and yarn evenness. These results were in agreement with those obtained by **Kotb 2012; Yiyun *et al.* 2013; Ahmed *et al.* 2014; Rizk *et al.* 2016 and Haitham 2019.**

Table 4. Mean values of lea count strength product, Yarn evenness and No. of neps/100 m as affected by Egyptian cotton genotypes during 2020 season.

Cotton genotype	Lea count strength product	Yarn evenness (CV %)	No. of neps/100 m
Giza 80	1930.00	15.10	115.33
Giza 94	2253.33	11.57	85.33
Hybrid 1	2053.33	13.33	86.00
Hybrid 2	2441.67	10.50	66.67
L.S.D. at 5 %	**97.61**	**0.88**	**8.63**

c) Correlation studies between studied measurements

Data in **Table 5** showed that the simple correlation coefficients between almost fiber and yarn technological properties for four Egyptian cotton genotypes were significant during 2020 season. There were positive correlation coefficients between upper half mean length, fiber mean length, fiber uniformity index, fiber bundle strength, fiber stiffness, fiber toughness, micronaire value, fiber maturity, fiber brightness degree and lea count strength product at yarn count. As well as there were positive related relationships among short fiber index, fiber elongation percentage, fiber yellowness degree, yarn evenness and No. of neps vice versa, there were significant negative correlation coefficients between (upper half mean length, fiber mean length, fiber uniformity index, fiber bundle strength, fiber stiffness, fiber toughness, micronaire value, fiber maturity, fiber brightness degree and lea count strength product at yarn count) and (short fiber index, fiber elongation percentage, fiber yellowness degree, yarn evenness and No. of neps). Upper half mean length was positive and significant correlated with fiber mean length (0.988**), fiber uniformity index (0.673*), fiber bundle strength (0.844**), fiber stiffness (0.898**), fiber brightness degree (0.610*) and lea count strength product (0.936**) vice versa, was negative and highly significant correlated with short fiber index (-0.860**), fiber elongation percentage (-0.800**), fiber yellowness degree (-0.788**), yarn evenness (-0.895**) and No. of neps (-0.867**). Fiber mean length was positive and significant correlated with fiber uniformity index (0.779**), fiber bundle strength (0.833**), fiber stiffness (0.851**), fiber maturity (0.590*) and lea count strength product (0.922**) vice versa, was negative and highly significant correlated with short fiber index (-0.845**), fiber elongation percentage (-0.715**), fiber yellowness degree (-0.724**), yarn evenness (-0.872**) and No. of neps (-0.904**). Fiber uniformity index was positive and significant correlated with fiber bundle strength (0.578*), fiber toughness (0.618*), fiber maturity (0.689*) and lea count strength product (0.615*) vice versa, was negative and highly significant correlated with No. of neps (-0.815**). Short fiber index was positive and highly significant correlated with fiber elongation percentage (0.712**), fiber yellowness degree (0.918**), yarn evenness (0.937**) and No. of neps (0.897**) vice versa, was negative and significant correlated with fiber bundle strength (-0.990**), fiber stiffness (-0.945**), fiber toughness (-0.647*), fiber brightness degree (-0.757**) and lea count strength product (-0.889**). Fiber bundle strength was positive and significant correlated with fiber stiffness (0.941**), fiber toughness (0.685*), fiber brightness degree (0.734**) and lea count strength product (0.883**) vice versa, was negative and significant correlated with fiber elongation percentage (-0.687*), fiber yellowness degree (-0.909**), yarn evenness (-0.943**) and No. of neps (-0.912**). Fiber stiffness was positive and highly significant correlated with fiber brightness degree (0.850**) and lea count strength product (0.923**) vice versa, was negative and highly significant correlated with fiber yellowness degree (-0.965**), yarn evenness (-0.934**) and No. of neps (-0.815**). Fiber toughness was negative and highly significant correlated with No. of neps (-0.714**). Fiber maturity was negative and significant correlated with No. of neps (-0.597*). Fiber brightness degree was positive and significant correlated with lea count strength product (0.643*) vice versa, was negative and significant correlated with fiber yellowness degree (-0.889**) and yarn evenness (-0.688*). Fiber yellowness degree was positive and highly significant correlated with yarn evenness (0.899**) and No. of neps (0.724**) vice versa, was negative and highly significant correlated with lea count strength product (-0.874**). Lea count strength product was negative and highly significant correlated with yarn evenness (-0.957**) and No. of neps (-0.874**). Yarn evenness was positive and highly significant correlated with No. of neps (0.894**). These results in good accordance with those reported by **Yiyun *et al*. 2013; Hager and Hassan 2016 and Beheary *et al*. 2018.**

Table 5. Simple correlation coefficients between fiber and yarn technological properties during 2020 season.

Trait	UHML	FML	FUI	SFI	FBS	FEP	FS	FT	MIC	FM	RD	+b	LCSP	YE	NN
UHML	1														
FML	0.988^{**}	1													
FUI	0.673^{*}	0.779^{**}	1												
SFI	-0.860^{**}	-0.845^{**}	-0.568	1											
FBS	0.844^{**}	0.833^{**}	0.578^{*}	-0.990^{**}	1										
FEP	-0.800^{**}	-0.715^{**}	-0.176	0.712^{**}	-0.687^{*}	1									
FS	0.898^{**}	0.851^{**}	0.441	-0.945^{**}	0.941^{**}	-0.891^{**}	1								
FT	0.353	0.425	0.618^{*}	-0.647^{*}	0.685^{*}	0.059	0.398	1							
MIC	0.262	0.292	0.309	-0.004	-0.027	-0.206	0.064	-0.235	1						
FM	0.524	0.590^{*}	0.689^{*}	-0.449	0.403	-0.075	0.277	0.478	0.490	1					
RD	0.610^{*}	0.521	0.028	-0.757^{**}	0.734^{**}	-0.845^{**}	0.850^{**}	0.161	-0.192	-0.038	1				
+b	-0.788^{**}	-0.724^{**}	-0.278	0.918^{**}	-0.909^{**}	0.871^{**}	-0.965^{**}	-0.378	1	-0.206	-0.885^{**}	1			
LCSP	0.936^{**}	0.922^{**}	0.615^{*}	-0.889^{**}	0.883^{**}	-0.812^{**}	0.923^{**}	0.400	0.387	0.477	0.643^{*}	-0.874^{**}	1		
YE	-0.895^{**}	-0.872^{**}	-0.545	0.937^{**}	-0.943^{**}	0.751^{**}	-0.934^{**}	-0.541	-0.205	-0.466	-0.688^{*}	0.899^{**}	-0.957^{**}	1	
NN	-0.867^{**}	-0.904^{**}	-0.815^{**}	0.897^{**}	-0.912^{**}	0.540	-0.815^{**}	-0.714^{**}	-0.172	-0.597^{*}	-0.483	0.726^{**}	-0.874^{**}	0.894^{**}	1

Where, (UHML) = upper half mean length, (FML)= fiber mean length, (FUI) = fiber uniformity index, (SFI) = short fiber index, (FBS) = fiber bundle strength, (FEP) = fiber elongation percentage, (FS)= fiber stiffness, (FT)= fiber toughness,(MIC) = micronaire value, (FM) = fiber maturity, (Rd) = fiber brightness degree, (+b) = fiber yellowness degree, (LCSP40) = lea count strength product at yarn count, (YE40) = yarn evenness, (NN)= Number of neps, (**) = correlation is significant at the 0.01 level (2-tailed) and (*) = correlation is significant at the 0.05 level (2-tailed).

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دراسة على جودة التيلة والغزل لبعض أصناف وهجن القطن المصري المبشرة

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أجرى هذا البحث في معمل قسم بحوث تكنولوجيا القطن . معهد بحوث القطن . مركز البحوث الزراعية . الجيزة . مصر خلال عام 2020م بهدف دراسة تأثير صنفان من القطن المصري (جيزة 80 و جيزة 94) وهجينان من الهجن المبشرة [(جـ83 × جـ80) × جـ89] أسترالي هجين القطن رقم 1 و [(جـ89 × كاراشنكى) × جـ86] × جـ 94 هجين القطن رقم 2 على الصفات التكنولوجية للتيلة والخيط تحت نظام الغزل الحلقي عند نمرة خيط 40 نمرة إنجليزي ومعامل برم 4. ويمكن تلخيص أهم النتائج فيما يلي:-

أوضحت النتائج أن الإختلافات بين التراكيب الوراثية للقطن المصري تحت الدراسة كانت معنوية في جميع الصفات التكنولوجية للتيلة والخيط المدروسة ما عدا قيمة الميكرونير ونضج الشعيرات لم تتأثر معنوياً بالتركيب الوراثية تحت الدراسة خلال عام 2020. هجن القطن المبشر رقم 2 سجل معنوياً أعلى القيم لصفات طول أطول الشعيرات (مم)، متوسط طول الشعيرات (مم)، الإنتظامية في الطول (%)، متانة الشعيرات (جم/تكس) ومتانة الشلة على العكس من ذلك أعطى أقل القيم لصفات دليل الشعيرات القصيرة (%)، معامل إختلاف الخيط (%) وعدد العقد/100متر خلال عام الدراسة. خامات القطن الناتجة من جيزة 94 حقق أعلى القيم لصفتي معامل صلابة الألياف (جم/تكس) ودرجة الإنعكاس للشعيرات وأقل القيم لصفتي % للإستطالة الشعيرات ودرجة الإصفرار للشعيرات خلال عام الدراسة. أعلى القيم لصفات دليل الشعيرات القصيرة (%)، درجة الإصفرار للشعيرات، معامل إختلاف الخيط (%) وعدد العقد/100متر وأقل القيم لصفات طول أطول الشعيرات (مم)، متوسط طول الشعيرات (مم)، الإنتظامية في الطول (%)، متانة الشعيرات (جم/تكس)، معامل صلابة الألياف (جم/تكس)، قدرة الليفة على إمتصاص الجهد (جم/تكس)، درجة الإنعكاس للشعيرات ومتانة الشلة خلال عام الدراسة تم الحصول عليها من خامات القطن صنف جيزة 80. شعيرات القطن الناتجة من هجين القطن المبشر رقم 1 حقق أعلى القيم لصفتي % للإستطالة الشعيرات وقدرة الليفة على إمتصاص الجهد (جم/تكس) خلال عام الدراسة.