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Using some fiber Properties to Predict Strength and Regularity of Combed Yarns for Some Egyptian Cotton Varieties

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Abstract

The present investigations was carried out to determine prediction equation and the relative contribution of five fiber properties to estimate yarn strength, neps and evenness on count 80,100 and 120 for Extra-long (extra fine) and Extra-long stable of Egyptian cotton varieties under combed ring spinning systems.

The full model regression and stepwise multiple linear regression model were used to satisfy the target of work. The results of the supposed models of regression differed according to the Extra-long (extra fine) and extra-long of Egyptian cotton varieties and also the applying yarn counts.

Generally, under combed ring spinning system, Upper half mean Length was the most effective fiber properties to predict yarn properties for the Extra-long Extra fine, Extra-long stable on counts 80 100 and 120 while, fiber strength and micronaire were the most important fiber traits contributing to yarn properties using the Extra-long (extra fine) stable on count 120 in Egyptian cotton varieties. The Fiber diameter was the greatest influence on the studied yarn properties for the Extra-long staple on count 120while, Fiber Diameter ranked the first in fiber properties that used to predict the yarn strength on count8os for the Extra-long stable in Egyptian cotton varieties.

All the supposed models of regression were significant and reflected large part of the variation of studied yarn properties expressed as high values of R^2 and near values of the corresponding adjusted R^2 indicating the validity and goodness of fit for these models.

Keywords: yarn counts, yarn strength, yarn neps, yarn evenness, combed ring spinning system and fiber properties.

Introduction

The combing process is normally used to produce smoother, finer, stronger and more uniform yarns. Therefore, combing is commonly confined to high grade, long staple natural fibers. In recent years, combing has been utilized for upgrading the quality of medium staple fibers. In addition, a yarn made of combed cotton needs less twist than a carded yarn. However, these quality improvements are obtained at the cost of additional expenditure on machines, floor-space and personnel, together with a loss of raw material. Yarn production coast is increased by something under 1/Kg of yarn (depending on the intensity of combing).

To improve the yarn quality, the comber must perform the following operations:

➢Elimination of precisely pre-determined quantity of short fibers

➢Elimination of the remaining impurities;

➢Elimination of a large proportion (not all) of the neps in the fiber material

➢ Formation of a sliver having maximum possible evenness

➢ producing of more straight and parallel fibers.

Fiber physical and yarn strength properties play an exceptionally important role as principle determinants of textile product quality. Yarn nep count and evenness are the most important features that influence the appearance of yarns and consequently the quality of the end product, especially in fine yarns which are needed in manufacturing fine and luxurious end products. Information concerning the relative contribution of fiber properties to yarn strength, yarn nep count, and evenness in different types of spinning system for various categories of cotton (Extra-long stable and long stable), is one of the important targets for each of cotton breeder to explore yarn quality of his large number of new selections also for the spinner in order to choose cottons that are best suited to the manufacture of specific end product.

Many authors used the full model regression as an important statistical procedure to estimate the relative contribution of the fiber properties, as independent variables, in the total variation of yarn properties as dependent variable. Also, the step wise multiple linear regressions were used to construct a regression equation that includes fiber properties accounting for the most variation of yarn properties.

Marth *et al.* (1952) reported that micronaire value was an excellent index of the number of neps expected in card web. **Fiori *et al.* (1954)** concluded put that fiber strength does not significantly affect the evenness of silver. **Grosberg (1956)** obtained a relationship between yarn unevenness coefficient of variation and the means of fiber length and diameter. **Leitgeb and Wakeham (1956)** pointed that neps increased with increasing fiber fineness. **Phillip**

(1957) found that fiber fineness and maturity were related tonippiness. **Balasubramanian and Lyengar (1961)** reported that fiber length variation coefficient contributed more toyarn irregularity.**Louis *et al.* (1961)** concluded from their study on pima cottons that nep count is influenced by fiber elongation. **Louis *et al.* (1968)** stated that 5o% span length was better than 2.5% span length to explain effect of fiber length on yarn strength. **Rusca (197o)** stated that neps rapidly decreased with increase in micronaire reading while yarn irregularity slightly decreased with either extra-long fine or extra-coarsemicronaire reading. **Amin (1971)** found that fiber strength and elongation were more effective than micronaire value with regard to their contribution to yarn strength. **Garawain (1971)** showed that yarn added unevenness was not highly related to micronaire reading. **Sallouma *et al.* (1973) and AboulFadl (1976)** found a strong association between micronaire value and the number of neps in yarn.

El-Ghawas *et al.* (1978) found that, within a variety, micronaire value and 5o% Span length were negatively correlated with yarn evenness. The net effect of 50% Span length on yarn evenness was more pronounced than that of micronaire value. They also added that, on the basis of the relative net effect on pertinent fiber properties on yarn nippiness, micronaire value ranked first, followed by fiber length. **Ahmed *et al.* (1984)** Stated that, micronaire value exerted the greatest influence, wet hear directly or indirectly, upon yarn nippiness, followed by fiber length which appeared amoderate effect. **Mansour (1984)** found that the three fiber properties span length (2.5%), fiber strength and micronaire value)were the most influential on evenness in spite of their rank which differed from one variety to.

Another and within the some variety from count to count. Working on the Egyptian Extra-long staple variety Giza 45, **Seif (1984)** found that fiber strength and micronaire values their interaction arose as the prominent factors contributing to yarn strength different counts and twist. **Hegab*et al.* (1985)** found that fiber strength, fiber length their interaction were the contributors to yarn strength in variety of Giza 70. **Abdel-Fattah (1988)** found that 2.5% span length was the most contributors to yarn strength. **Fares *et al.* (2010)** indicated that fiber strength and short fiber content were the most important contributing cotton fiber properties in carded ring skein strength under four counts of spinning.

Ahmed and Hassan (2016) Found that the Micronaire reading was the most important causative factor inducing neps in cotton yarns. In fact, Micronaire reading exerted influence both directly and indirectlyup on neps count. Fiber length showed amoderate effect, while fiber stiffness revealed the lowest effect on yarn neps count compared with the other two factors.

Hassan and Ibrahim (2018). Indicated that fiber length, fiber strength and micronaire value had the greatest influenceon yarn strength, evenness C.v.% and number of neps for the extra-long and long staple cotton varieties. All calculated models of regression were significant and reflected large part of the variation of studied yarn properties expressed as high values of R2.

The present investigation was carried out to the present investigations were carried out to determine prediction equation and determine the relative importance of fiber properties to explain the variation of yarn strength, yarn nep count and evenness on counts 80s, 100s and 120s using combed ring spinning systems for Extra-long extra fine, Extra-long staple in Egyptian cotton varieties.

Materials and methods

The present study was carried out on twostaplesof Egyptian cotton varieties, that are, Extra-long(extra fine) staple (Giza 45, Giza 87 and Giza 93) and Extra-long staple (Giza 88, Giza 92, and Giza 70) during 2o16 season at laboratories of Cotton Technology Division of the Cotton Research Institute. Cotton samples were obtained from the commercial cotton samples of 2o16 crop that belong to Cotton Maintaince Research Section. Cotton samples were spun into Combed Ring Spinning systems at one count (80,100 and120noil 18%) with 4.3 twist factor **Lab labor**

Three yarn quality properties were used as dependent variables in the current study that are, **Y1**strength, **Y2**neps count and **Y3**evenness (c.v%)was measured on the Good Brand Lea Tester to determine the lea strength in pounds **A.S.T.M. (1967), D1578**. Nep count and yarn evenness (c.v. %) were measured by **Uster tester 3** according to the standard methods testing of textile material **A.S.T.M. (1986), D- 1425- 60 T**).

Data were recorded for five fiber properties as independent variables vise:

X1 Upper half mean Length (mm)
X2Fiber strength (g/tex)
X3 Micronaire
X4Short fiber content
X5Fiber Diameter

Fiber properties were tested according to the following methods:

H.V.I Instrument System was used according to **A.S.T.M (D-4603-86-1776-98)** to determine Upper Half Mean Length (UHM) by (mm.), fiber Strength by(g/tex), Micronaire, and Short fiber content was used according to the **A.S.T.M.(D-1440-65).**

Statistical analysis

The full model regression and step wise multiple linear regression were used to evaluate the relative contribution of the aforementioned fiber properties (**X1, X2,….X5**)as explanatory variables on each of three qualityyarn characters **Y1** strength, **Y2**neps count and **Y3**evenness (c.v%) as dependent variables.

Full model regression was applied as outlined by **Draper and Smith (1981)** to predict the quality yarn properties using fiber properties and also to estimate the relative importance of the fiber properties expressed as coefficient of determination (R^2value) in the total variation of yarn characters.

Stepwise multiple linear regression analysis was used to determine what of the fiber properties that accounted for the majority of the total variation of yarn quality properties as described by **Draper and Smith (1981).**

Results and discussion

Data in **Table 1** indicate that the correlation among fiber properties and yarn, strength, neps and evenness (c.v%) within each yarn counts (80,100 and 120) over theExtra-long (extra Fine) and Extra-long stapleusing combed ring spinning system.

Thepositive highly significant correlation was found between yarn strength on count 8os and each of Upper half mean length (mm), fiber strength (g/tex),micronaire and short fiber content for Extra-long (extra fine staple (0.91, 0.50, 0.71and 0.38 respectively). In addition positive highly significant correlation was detected between yarn strength on count100 and upper half mean length (mm),micronaire, short fiber content and fiber diameter for extra-long (extra fine) staple (0.72, 0.42, 0.45 and o.36 respectively).Moreover, positive highly significant correlation was detected between yarn strength on count 120 and upper half mean length (mm), fiber strength (g/tex) micronaire , short fiber content and fiber diameter for extra-long extra fine staple (0.98,0.8o,0.53,0.48 and 0.62 respectively). These results in general are agreement with thoseobtained by **Sallouma *et al.* (1973),Nawar *etal.* (1990), Raoof (1995) and Abdel-Salam(1999).**

on the other hand , negative highly significant correlation was found between neps on count 8o's and each of upper half mean length (m.m) , fiber strength (g/tex), short fiber content and fiber diameter for extra-long extra fine staple (-0.84,-0.62,-0.73and -0.92respectivly). Highly negative correlation was found among neps on count 1oo's and each of upper half mean length (m.m), fiber strength (g/tex), short fiber content and fiber diameter for extra-longextra fine staple (-0.67,-0.76,-0.57 and -0.87) respectively. Moreover negative highly significant correlation was found between neps on count 12o's and each of upper half mean length (m.m), fiber strength (g/tex), short fiber content and fiber diameter for extra-long –extra fine staple (0.61,-0.77,-0.52 and -0.83) . In addition positive highly significant correlation was detected between evenness (c.v%) on counts 80 ,100 and each of upper half mean length (m.m) , short fiber content and fiber diameter for Extra-long –extra fine staple .

Table 1. Correlation coefficient between fiber and yarn properties within each of three yarncounts(80, 100 and 120) in two staples of Egyptian cotton.

counts	Yarn properties	Fiber properties				
		(X_1)	(X_2)	(X_3)	(X_4)	(X_5)
		Extra-long (Extra fine) staple				
80	(Y_1)Strength	0.91**	0.50**	0.71**	0.38**	0.34
	(Y_2)Neps	-0.84**	-0.62**	-0.05	-0.73**	-0.92**
	(Y_3)Evenness (c.v%)	0.73**	0.26	-0.08	0.92**	0.85**
100	(Y_1)Strength	0.72**	0.30	0.42**	0.45**	0.36**
	(Y_2)Neps	-0.67**	-0.76**	0.06	-0.57**	-0.87**
	(Y_3)Evenness (c.v%)	0.47**	0.33	-0.44**	0.83**	0.96**
120	(Y_1)Strength	0.98**	0.80**	0.53**	0.48**	0.62**
	(Y_2)Neps	-0.61**	-0.77**	0.08	-0.52**	-0.83**
	(Y_3)Evenness (c.v%)	-0.49**	-0.76**	0.09**	-0.36*	-0.72**
		Extra-long staple				
80	(Y_1)Strength	0.30**	0.59**	0.39**	-0.58**	-0.65**
	(Y_2)Neps	-0.37**	-0.90**	-0.40**	0.29**	0.95**
	(Y_3)Evenness (c.v%)	-0.68**	-0.62**	-0.69**	0.26**	0.69**
100	(Y_1)Strength	0.93**	0.40**	0.94**	-0.01	-0.51**
	(Y_2)Neps	-0.20**	-0.84**	-0.26**	0.49**	0.91**
	(Y_3)Evenness (c.v%)	-0.77**	-60**	-0.82**	0.17	-0.71**
120	(Y_1)Strength	0.05	0.88**	-0.01	0.17	-0.84**
	(Y_2)Neps	-0.50**	-0.91**	-0.48**	0.12	0.91**
	(Y_3)Evenness (c.v%)	-0.58**	-0.80**	-0.57**	0.23**	0.87**

X1= (U.H.M), Upper half mean Length (m.m), X2= (F. stre.), Fiber strength (g/tex), X3(Mic.), Micronaire, X 4= (S.F.C), Short fiber content and X5= (F.d), Fiber diameter

Positive highly significant correlation was measured between yarn strength on count 8o's 100 andupper half mean length (m.m) fiber strength (g/tex) andmicronaire for extra-long staple. while, negative highly significant correlation was found between yarn strength on counts 8o"s and short fiber content, fiber diameter for extra-long staple. Highly significant negative correlation was found among neps on counts 8o's,1oo's and 12o's and each of upper half mean length (m.m) fiber strength and micronaire for extra-long staplewhile, positive highly significant correlation was detected between neps on counts 8o's,1oo's and 12o's and each of short fiber content , fiber diameter for extra-long staple. Highly significant negative correlation was found among evenness (c.v%) on counts 80 100 and 120 and each of upper half mean length (m.m), fiber strength (g/tex) and micronaire for extra-long staple –while positive highly significant correlation was detected between evenness (c.v%)on counts 8o's 12o's and each of short fiber content fiber diameter for extra-long staple, and Significant and highly significant at 0.05 and 0.01 probability Respectively **Sagbaş and Erol (2004).Strumiłłoet al., (2007).**

The results of multiple linear regression analysis between each oneof threeyarn properties on counts 80,100 and 120 as dependent variable and five fiber properties as explanatory variables under combed ring spinning system of Extra-longExtra Fin stable Egyptian cotton varieties are presented in **table 2**.The results revealed that the supposed multiple regression models were significantly explained the most variability of the theeyarn properties on counts 8os, 1oos, and 12o,s of Extra-long Extra Fin stable Egyptian cotton varieties. Statistically, goodness of fit was satisfied for the nine supposed models where the coefficients of determination (R^2%) ranged from 70.7 to 98.6 indicating that the most yarn properties variation was attributed to the tested fiber properties. The residuals content (1-R^2 %) may by returned to some errors during measuring the fiber and yarn properties, some fiber properties were not into account under the current investigation and / orun known variation (randomerror).one the other hand, the values of adjusted R^2werevery close to their corresponding R^2values giving evidence on the goodness of fit for the supposed models. Similar trend of results was obtained by **Krifa and Ethridge(2003), Krifa and Ethridge(2006), Fares *et al.*(2010) and Hager et al., (2011).**

Table 2. Regression Coefficient to predict fiber and yarn properties within each of three yarncounts(80, 100 and 120) in two staples of Egyptian cotton under combed ring spinning system.

counts	Yarn properties	constant	Regression Coefficients					Goodness of Fit	
			Fiber properties						
			(X_1)	(X_2)	(X_3)	(X_4)	(X_5)	R^2%	R^2
80	**(Y_1)Strength**	**2483**	**55.6**	**-4.45**	**-3.7**	**5.45**	**-11.3**	**98.6**	**98.3**
	(Y_2)Neps	**2220**	**-38.2**	**3.08**	**12.7**	**13.2**	**-23.1**	**96.2**	**95.5**
	(Y_3)Evenness (c.v%)	**7.97**	**0.366**	**-0.0462**	**-0.308**	**0.0818**	**-0.033**	**96.9**	**96.3**
100	**(Y_1)Strength**	**-6067**	**505**	**-18.7**	**-513**	**22.7**	**-152**	**70.7**	**64.6**
	(Y_2)Neps	**2382**	**53**	**-23.2**	**-65.1**	**24.3**	**-71.6**	**96.0**	**95.1**
	(Y_3)Evenness (c.v%)	**15.6**	**-0.0248**	**-0.0366**	**-0.0069**	**-0.0060**	**0.0789**	**94.8**	**93.7**
120	**(Y_1)Strength**	**1440**	**47.0**	**5.20**	**-1.5**	**1.16**	**-0.85**	**96.8**	**96.1**
	(Y_2)Neps	**3106**	**99.2**	**-45.0**	**-87**	**35.1**	**-104**	**94.7**	**93.7**
	(Y_3)Evenness (c.v%)	**29.7**	**0.917**	**-0.273**	**-0.868**	**0.323**	**-0.727**	**91.6**	**89.9**

X1= (U.H.M), Upper half mean Length (m.m), X2= (F. stre.), Fiber strength (g/tex), X3(Mic.), Micronaire, X 4= (S.F.C), Short fiber content and X5= (F.d), Fiber diameter

When theyarn properties **Y1** strength, **Y2**neps count and **Y3**evenness (c.v%)on counts 80, 100 and 120 individually regressed on the tested fiber properties under combed ring spinning system for Extra-long stable Egyptian cotton varieties the results were as in **table (3).** All postulated regression models were significant and properties on counts 8os, 1oos and 12os expressed as high values of R^2 ranged from 82.2 to 98% the previous results proved the validity of the supposed models of regression, in addition, the clear closeness between R^2values and their corresponding adjusted R^2values gave another evidence. Accordingly, the present regression equations would be accurately applied to predict the theeyarn properties on counts 80,100 and 120 using fiber traits. The current results are in harmony with **El-Hariry*et al.* (1990), Sawires *et al.* (1990) and Fares *et al.* (2010).**

Table 4 shoed the best equation amount, coefficient of determination (R2) and rank of contribution of the studied fiber properties toyarn strength, neps and evenness (c.v%) within each yarn counts (80, 100 and 120) over the Extra-long – Extra fine stable Egyptian cotton varieties. Concerning the Extra-long – Extra fine stable Egyptian cotton varieties, the step wise multiple linear regression indicated that the accepted limiting properties of cotton fiber that were significantly accounted for the most variation of yarn strength (Y1) on count 8oswereUpper half mean length(m.m) (x_1), fiber diameter (x_5) and micronaire (x_3) while fiber diameter (x_5), Upper half mean length(m.m) (x_1) and short fiber content (x_4) were most important properties using the neps (y_2) on count 8os as a dependent variable. For evenness (y_3)on count 8os, only the threefiber properties of Upper half mean length (m.m) (x_1),fiber strength (g/tex) (x_2) and micronaire (x_3) were accepted using the stepwisemodel. the three proposed models were responsible for 98,95.o8 and 94.5 % of the total variation(expressed as R^2 %) of yarn strength (y_1),neps (y_2) and evenness (y_3) on count 8os respectively. According to the previous results, it could be concluded that Upper half mean length (m.m) (x_1), fiber strength (g/tex) (x_2) and micronaire (x_3) were the most effective fiber properties overall the twoyarn properties yarn strength (y_1), neps (y_2) on count 1oos of Extra-long – Extra fine stable Egyptian cotton varieties (R^2 =7o, 94.65 % respectively). The best equation of three variables effectingyarn evenness (y_3) were fiber diameter (x_5), short fiber content (x_4) and Upper half mean length (m.m) (x_1) (R^2=94.6). The best equation of four variables effectingyarn strength (y_1)on count 12os were Upper half mean length (m.m) (x_1), fiber strength (g/tex) (x_2) , short fiber content (x_4) and Micronaire (x_3) (R^2=91.5) .the best equation of four variables effecting evenness (y_3)on count 12os were fiber strength (g/tex)(x_2), Micronaire (x_3), fiber diameter (x_5) and Upper half mean length (m.m) (x_1) (R^2 = 88 %). The current results are portly in accordance with those reported by **Amin (1971) and sawires *et al.* (1990).** Remarkable results were obtained from the previous result, it is that, the fiber properties which significantly contributing toyarn properties differed according to the Extra-long – Extra fine stable of the used Egyptian cotton varieties **Sawires *et al.* (1990).**

Table 3. Regression Coefficient to predict fiber and yarn properties within each of three yarncounts(80, 100 and 120) in two staples of Egyptian cotton

counts	Yarn properties	Regression Coefficients						Goodness of Fit	
		constant	Fiber properties						
			(X1)	(X2)	(X3)	(X4)	(X5)	R²%	R²
80	**(Y_1)Strength**	**639**	**-9.70**	**47.60**	**72.70**	**-31.9**	**20.3**	**82.2**	**81.4**
	(Y_2)Neps	**50.0**	**-0.084**	**-1.73**	**-1.96**	**0.862**	**1.08**	**95.7**	**95.5**
	(Y_3)Evenness (c.v%)	**73.2**	**-0.698**	**-0.634**	**-0.104**	**0.364**	**-0.236**	**88.2**	**87.7**
100	**(Y_1)Strength**	**147**	**54.70**	**19.10**	**69.50**	**-14.8**	**2.77**	**98.0**	**97.9**
	(Y_2)Neps	**15.3**	**0.96**	**-1.30**	**-2.62**	**1.08**	**0.769**	**95.7**	**95.5**
	(Y_3)Evenness (c.v%)	**26.3**	**0.055**	**-0.285**	**-1.31**	**0.146**	**0.009**	**95.4**	**95.3**
120	**(Y_1)Strength**	**8543**	**6.30**	**29.20**	**-206**	**87.90**	**-163**	**90.6**	**90.2**
	(Y_2)Neps	**293**	**-2.69**	**-3.49**	**1.26**	**0.836**	**-0384**	**96.7**	**96.6**
	(Y_3)Evenness (c.v%)	**54.2**	**-0.967**	**-0.410**	**0.736**	**0.305**	**0.153**	**93.9**	**93.6**

X1= (U.H.M), Upper half mean Length (m.m), X2= (F. stre.), Fiber strength (g/tex), X3(Mic.), Micronaire, X 4= (S.F.C), Short fiber content and X5= (F.d), Fiber diameter

Table 4. The best equation amount coefficient of determination (R^2) and rank of Contribution of the studied fiber properties to yarn properties within each yarn counts (80, 100and 120) in two staples of Egyptian cotton.

counts	Yarn Properties	Best Equation	R² %	Rank of contribution				
				first	second	third	fourth	fifth
80	(Y_1)Strength	2237+65.5 (x_1)-11.07(x_5)-5.77(x_2)-17.2(x_3)	98.0	X1	X3	X2	X4	X5
	(Y_2)Neps	1883-21.4 (x_5)-25 (x_1)+4.5(x_4)	95.08	X5	X1	X4	X2	X3
	(Y3)Evenness (c.v%)	5.369+0.445 (x_1)-0.07(x_2)-0.388 (x_3)	94.5	X4	X5	X1	X2	X3
100	(Y_1)Strength	-7091+546(x_1)-24(x_2)-151(x_5)-569 (x_3)	70.0	X1	X4	X3	X5	X2
	(Y_2)Neps	1281-70.8 (x_5)-29.1(x_2) +97.3(x_1)-125 (x_3)	94.65	X5	X2	X1	X4	X3
	(Y_3)Evenness (c.v%)	16.2+0.0594 (x_5)+0.0225(x_4)-0.0274 (x_1)	94.6	X5	X4	X1	X3	X2
120	(Y_1)Strength	955.7+66.7(x_1)+2.19(x_2)-9.40 (x_4)-30.6 (x_3)	96.5	X1	X2	X5	X3	X4
	(Y_2)Neps	977-129.4-47.3(x_2)+211(x_1)-294	91.5	X5	X2	X1	X4	X3
	(Y3)Evenness (c.v%)	15.12-0.351(x_2)-1.66 (x_3)-0.717(x_5) +1.51(x_1)	88.3	X2	X5	X1	X4	X3

X1= (U.H.M), Upper half mean Length (m.m), X2= (F. stre.), Fiber strength (g/tex), X3(Mic.), Micronaire, X 4= (S.F.C), Short fiber content and X5= (F.d), Fiber diameter

Table 5 showed the prediction the best equation amount, coefficient of determination (R^2) and rank of contribution of the studied fiber properties toyarn strength, neps and evenness (c.v %)

within each yarn counts (80,100 and 120) over the Extra-long stable Egyptian cotton varieties. Concerning the Extra-long stable Egyptian cotton varieties, the step wise multiple linear regression indicated that the accepted limiting properties of cotton fiber that were significantly accounted for the most variation of yarn strength(y_1),neps (y_2) on count 8os were fiber diameter (x_5),short fiber content (x_4),Micronaire (x_3)and fiber strength (g/tex)(x_2)while fiber strength (g/tex) (x_2),short fiber content (x_4) and Upper half mean length (m.m)(x_1) were important properties usingevenness (y_3)on count 8os as a dependent variable. The threemodels on count 80 accounted for 82, 95.7 and 87.1% expressed as R^2 of the total variation of yarn strength (y_1), neps (y_2)andevenness(y_3) respectively. The technique of stepwise regression accepted Micronaire (x_3), fiber strength (g/tex) (x_2), short fiber content (x_4) and Upper half mean length (m.m)(x_1)as the fiber properties that they had greatest influenceon yarn strength (y_1)count 1oos.the trails of fiber diameter (x_5),short fiber content (x_4)and fiber strength (g/tex)(x_2)contributing to the neps (y_2) on count 1oos variation. It may be reported that both Micronaire (x_3), short fiber content (x_4) and fiber strength (g/tex)(x_2) were the important fiber properties to predict yarn evenness (y_3) on count 1oos using Extra-long stable Egyptian cotton varieties. The values of 97.9, 94.15 and 95.4 (expressed as R^2 %) were the ability of the three proposed models to predict the variation of the three tested yarn properties on count 1oos (y_1, y_2 and y_3) respectively. the best equation of three variables effectingyarn strength (y_1) on count 120 were short fiber content (x_4), Micronaire (x_3) and fiber diameter (x_5). According to previous results, it could be concluded that fiber diameter (x_5), Upper half mean length (m.m) (x_1), short fiber content (x_4) and fiber strength (g/tex) (x_2) were the most effective fiber properties overall the twoyarn properties neps y_2, evenness $y_3$on count 12os for the Extra-long stable Egyptian cotton varieties. The values of 90.5,96.6 and 93.3%expressed (as R^2%) were the ability of the thee proposed models to predict thevariation of three tested yarn properties on count 120 (y_1,y_2 and y_3) respectively. Similar trends of results wereobtained by **Sief (1984), Hegab*et al.* (1985), El-Hariry*et al.* (199o), Sawires *et al.* (199o) and Fares *et al.* (2o1o).**

Table 5 . The best equation amount coefficient of determination(R^2) and rank of Contribution of the studied fiber properties to yarn properties within each yarn counts (80, 100and 120) in two staples of Egyptian cotton.

counts	Yarn properties	Best Equation	R^2%	Rank of contribution first	second	third	fourth	fifth
80	(Y_1)Strength	412.7+19.9(x_5)-33 (x_4)+55.3 (x_3)+46.0 (x_2)	82.0	X5	X2	X4	X3	X1
	(Y_2)Neps	48.04+1.074(x_5)+0.853(x_4)-1.74 (x_2)- 2.12 (x_3)	95.7	X5	X2	X3	X1	X4
	(Y3)Evenness (c.v%)	49.04-0.355 (x_2).+0.371(x_4) -0.688 (x_1)	87.1	X5	X3	X1	X2	X4
100	(Y_1)Strength	416.5+67.4(x_3)+15.78(x_2)14.3(x_4)+55.1(x_1)	97.9	X3	X1	X5	X2	X4
	(Y_2)Neps	-8.189+1.258(x_5)+1.058(x_4)+0.73(x_2)	94.15	X5	X2	X4	X3	X1
	(Y3)Evenness (c.v%)	28.723-1.221 (x_3) +0.154(x_4)-0.294 (x_2)	95.4	X3	X1	X5	X2	X4
120	(Y_1)Strength	11134+92.9 (x_4)-206(x_3)186.1(x_5)	90.5	X2	X5	X1	X4	X3
	(Y_2)Neps	283.28-0.457(x_5)-2.05(x_1)3.59(x_2)+0.780(x_4)	96.6	X5	X2	X1	X3	X4
	(Y3)Evenness (c.v%)	48.339+0.111(x_5)-0.59(x_1) +0.272 (x_4)-0.470(x_2)	93.3	X5	X2	X1	X3	X4

X1= (U.H.M), Upper half mean Length (m.m), X2= (F. stre.), Fiber strength (g/tex), X3(Mic.), Micronaire, X 4= (S.F.C), Short fiber content and X5= (F.d), Fiber diameter

Finally, the current investigation stated the following conclusions or remarks:-

1- The results of the supposed regression models differed according to the category of the used cotton variety and also the kind of the applying spinning system.

2- The current results helps the spinner to predict the spinning performance using the available fiber properties as well as choosing cotton that are best suited to the manufacture of the end products.

3- Statistically, goodness of fit was satisfied for all regression models under the present investigation.

4- The residuals content ($1-R^2$) may be attributed to three reasons being the committed errors during measuring fiber and yarn properties, some considerable fiber properties were not into account and/ or unknown variation (random error).

5- The stepwise regression procedure determined the minimum number of fiber characters that are accounted for the most variation of various yarn properties which save the time and effort.

6- The stepwise regression procedure determined the minimum number of fiber characters that are accounted for themost variation of various yarn properties which save the time and effort

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إستخدام بعض صفات التيله للتنبؤ بمتانة وإنتظامية الخيوط الممشطة لبعض أصناف القطن المصرى

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يهدف هذا البحث لدراسة مدى مساهمة صفات التيلة في صفات الخيوط الممشطة (متانة الشلة، العقد، انتظامية الخيط)عند نمره 80 ،100، 120 لاصناف القطن المصري (فائق الطول فائق النعومة و فائق الطول) تحت نظام الغزل الحلقي . وقد اشتملت الأصناف فائقة الطول والنعومة علي صنف (جيزة 45، جيزة 87 و جيزة 93) بينما كانت الأصناف فائقة الطول هي (جيزة 92، جيزة 88، جيزة 70) حيث تم استخدام عينات من المحصول التجاري لعام 2016

وقد تم استخدام كل من :

1- الارتباط البسيط R^2

2- تحليل الانحدار المتعدد

3- تحليل الانحدار المتعدد المرحلي لتحقيق هذا الهدف

وقد أوضحت النتائج أن صفات التيلة الأكثر إسهاماً في صفات الخيط الممشط تختلف من نمرة لآخرى ومن فئة إلي أخري كما اختلفت ايضا درجة الارتباطR^2من نمرة لآخرى ومن فئة إلي أخري

- وبوجه عام أشاvت النتائج الى ان طول اطول الشعيرات كانت هي الأكثر تأثيراً في صفات الخيوط الممشطة (متانة الشلة، العقد، انتظامية الخيط)عند نمر نمره 80 ،100، 120 انجليزى وذلك لأصناف القطن فائق الطول والنعومة والاصناف فائقة الطول بينما كانت صفات متانة التيلة، والميكرونير هي الأهم في توقع صفات الخيط الممشطة على نمرة 120 انجليزى لأصناف القطن فائقة الطول الناعمة.
- قطر الشعره هي أكثر صفات التيلة إسهاماً في صفات الخيوط الممشطة على نمرة 120 انجليزى لأصناف القطن فائقة الطول في حين ايضا أن قطر الشعره هو اول مساهم فى متانة الغزل على نمره 80 انجليزى لأصناف القطن فائقة الطول .
- من ناحية أخرى فإن جميع نماذج الانحدار المقترحة كانت معنوية وأعطت قيم مرتفعة من معامل التحديد (R^2) كما كانت قيم التحديد المعدل ($Adj.R^2$) قريبة من قيم معامل التحديد مما يشير إلى جودة التوفيق لهذه النماذج.