FIBER QUALITY INDEX OF EGYPTIAN COTTON USING HVI DATA

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ABSTRACT

The fiber properties of five Egyptian cotton varieties with four lint grades were tested using the **HVI** Spectrum II system and spun at 60'S with 3.6 twist multiplier to study the relationship between fiber traits and ring yarn quality parameters for the two seasons 2002 and 2003.

Multiple regression analysis and relative contribution percentage of the studied fiber properties to yarn quality parameters was computed. Regression equations for predicting five yarn quality parameters were obtained.

The attained results reveal that all studied HVI fiber properties and yarn characters were significantly affected by cotton variety, except length uniformity index in both seasons. The highest mean values of fiber length, bundle strength, lea product and single yarn strength were recorded by Giza 88 cotton variety.

The highest mean values of the studied fiber properties were attained by the highest cotton grade and gradually decreased as the lint cotton grade decreased in both seasons. The lea product and single yarn strength were gradually decreased whereas, the yarn evenness CV% and imperfections were proportionally increased as the lint cotton grade decreased. The cotton variety and grade interaction was significant for most of studied fiber and yarn properties in both seasons.

Five fiber quality indices were formulated based on the relative contribution of each fiber character to the corresponding yarn quality. The fiber quality index based on yarn work of rupture /evenness C.V. % was selected, for the Egyptian cotton, as the best one including the important yarn traits. Fiber length was the first in order contributing this yarn quality parameter, followed by fiber strength, micronaire value and maturity index.

The fiber quality index (FQI) did not completely corresponded with the lint grade in some varieties but it was in agreement with the seed cotton price per Kentar within each cotton variety.

INTRODUCTION

The market value of cotton is largely determined by a subjective evaluation of a limited number of quality parameters such as: grade, length, and fineness.

The world wide spread of High Volume Instrument (HVI) testing systems has stimulated efforts to obtain the maximum benefits from these systems. HVI measurements are in accordance with the standard test methods of the American Society for Testing and Materials (ASTM). It was found that combinations of HVI measured fiber properties can account for 80 to 95% of known variation in yarn strength and 75 to 85% in fabric strength.

Developments in spinning and testing technology necessitate the evaluation of a more effective method for determining the actual value of the cotton based on the value of its inherent characteristics that contribute to the quality of the yarn and textile products made from it.

The market value of the fibers should reflect the technological value of cotton and establishing such value is extremely useful for both cotton users and producers.

Fiber quality index (FQI), was determined from the following equation proposed by Lord (1961) and later used by Foster et al (1983): F.Q.I= Stelometer strength X 2.5 % Span length / Standard fineness.

There is a major problem with regression analysis on cotton fiber and yarn properties, is their lack of generality (5). The fiber length ranked first in order of importance to yarn tenacity followed by the fiber strength in second order and the micronaire reading ranked third for the open-end spun-yarn tenacity (18).

Length uniformity index, which is available on all (HVI) systems. can be used instead of the array short fiber content as an indicator of cotton quality (9).

El-Mogahzy *et al.* **(1990)**, proposed an equation for calculating the fiber quality index (FQI) as follows:

FQI = FL* LU* FS / FF. Where : FL= Fiber Length , LU= Length Uniformity, FS= Fiber Strength, FF= Fiber Fineness

Using a fiber quality index to combine the effects of the fiber properties leads to proportions of cotton components and optimum costs that differ from those obtained when fiber properties are treated individually (7).

There is a straight relationship between staple length and yarn tenacity (15). Fiber strength is transferred directly into yarn strength. Fiber strength is considered to be the most important fiber property in determining the strength of rotor-spun yarns and ranks second to fiber length in ring-spun yarns (16).

A Trash Code (= 0.1 X Trash Count X Trash Area) highly significant and negatively correlated with the classer's grade, and a simple equation for calculating the Instrumental Grade (IG= 10 RD% / Trash Count X Trash Area) were proposed by, **Hossam El-Din *et al.* (2002).**

Both fiber quality index (FQI) and staple ratio (SR) were found to have significant positive relation to yarn strength. (12).

The present investigation was conducted to demonstrate the relative contribution of the HVI fiber properties to the different yarn quality parameters. Besides illustrating a statistical approach. for determining the Fiber Quality Index (FQI) based on the inherent characteristics of the Egyptian cotton varieties tested by the High Volume Instrument (HVI) Spectrum II system.

MATERIALS AND METHODS

Five cotton varieties were used in this investigation, representing the two length groups of the Egyptian cotton. The extra long staple varieties were Giza 70 and Giza 88, while the long staple varieties were Giza 85, Giza 86, and Giza 89, for the two seasons of 2002 and 2003. Four lint grades, namely: Good to Fully Good (G/FG), Good +1/4 (G+1/4), Good (G), and Good -1/4 (G-1/4) for each cotton variety were involved.

Cotton samples were obtained from: ALCOTAN Cotton Trading Co., Al-Kahira Cotton Co., Eastern Cotton Co.. Alexandria Commercial Co., and Port-Said Cotton Export Co. Each grade was represented by four replicates, 1/2 kg from each sample.

The fiber properties were tested using the High Volume Instrument (H.V.I) Spectrum II system under the standard conditions at the Fiber Testing Labs of Cotton Arbitration and Testing General Organization (CATGO), Smouha. Studied samples were spun at 60'S with 3.6 twist multiplier at the Cotton Technology Research Laboratories, Cotton Research Institute, Agriculture Research Center, Giza. Yarn properties were tested under standard conditions in the same place.

The experimental work was carried out in a completely randomized design with four replicates for each season, the attained data were analyzed as a factorial experiment according to **Steel and Torrie (1961)**. Multiple regression analysis of the yarn quality parameter and the HVI fiber properties was computed. The relative contribution percentage of the *i*th fiber property (C_i) was determined using the following equation:

$C_i\% = 100 \ (B_i^* \ / \ ? B_i^*) \ R^2$. Where : B_i^* is the partial regression coefficient of the *i*th variable ($i = 1, 2 ...k$) and R^2 is the coefficient of determination.

RESULTS AND DISCUSSION

The attained results will be presented and discussed in six main categories as follows:

1. Varietal effect:

1.1. Varietal effect on HVI fiber properties

The highest mean values of the fiber U.H.M. length and strength were obtained in Giza 88, and the lowest mean values of the same traits were recorded by Giza 85 in both studied seasons.

The highest mean values of the reflectance degree (Rd %) were obtained for Giza 89 in the first season, and Giza 86 in the second season. On the contrary, Giza 88 possessed the lowest mean values in the two studied seasons. The highest mean values of yellowness degree (+b) were recorded by Giza 88, while the lowest mean values of the same character were obtained for Giza 89 in the two seasons (Table 1).

These results were in agreement with those of **Nomeir *et al* (1990), Shabayek (1993) and Beheary (2001)**.

1.2. Varietal effect on yarn properties:

The highest mean values for lea product, and single yarn strength were gained by Giza 88, whereas the lowest mean values of the same character were recorded by Giza 85 in both studied seasons. Giz85 gave the highest mean values of the yarn evenness CV%, whereas the lowest mean values of the same trait were gained by Giza 70 in the two seasons.

Concerning number of thin and thick places, the highest mean values were recorded by Giza 89, and the lowest mean values were gained by Giza 88 in the two seasons (Table 2).

These results were in agreement with those obtained by **Ahmed *et al.* (1989), El-Hariry *et al.* (1990), Nomeir et al (1990) and Beheary (2001).**

2. Grade effect:

2.1. Grade effect on HVI fiber properties:

Data shown in Table (1) reveal that the highest mean values of the studied fiber properties were attained by the highest cotton grade and gradually decreased as the lint cotton grade decreased in both seasons.

These results were in harmony with those obtained by **Kamal and Ragab (1995)** who demonstrated that within a variety, cotton samples having longer fibers, with higher uniformity ratio and lower short fiber index would be of better lint grade and better yarn appearance grade.

2.2. Grade effect on yarn properties:

The Lea product and single yarn strength were gradually decreased whereas, the yarn evenness CV% and imperfections were proportionally increased as the lint cotton grade decreased in the two seasons (Table 2). **Nomeir *et al* (1990), Beheary (2001) and Kamal *et al* (2002)** came to a similar conclusion.

3. Variety and grade interaction effect:

3.1. Variety and grade interaction effect on HVI fiber properties:

Data presented in Table (1) indicated that the variety and grade interaction was significant for all studied fiber properties except, elongation (%) in the first season.

The highest mean for micronaire values were reached by the highest lint grade (G/FG) of the cotton variety Giza 86 in the two seasons. Meanwhile, the lowest ones were gained from the lowest grade (G-1/4) of the cotton variety Giza 88 in both seasons, as shown in Table (1).

As for maturity index, the highest mean value was gained from the lint grades (G/FG) of the cotton variety Giza 88 and (G+1/4) of the cotton variety Giza 70 in the first season, and lint grade (G/FG) of the cotton variety Giza 86 in the second season.

The highest mean values of the fiber U.H.M. length were attained by the highest lint grade (G/FG) of the cotton variety Giza 88 in the two seasons. Meanwhile, the lowest mean values of the same character were recorded by the highest grade (G/FG) in the case of Giza 85 cotton variety in both seasons , as shown in Table (1).

The highest mean values of the fiber bundle strength, were recorded by the lint grade (G+1/4) of the cotton variety Giza 88 in the first season and the highest grade (G/FG) of the same cotton variety in the second season. Data presented in Table (1) indicated that the highest mean values of the color brightness (Rd) were recorded by the highest lint grade of the cotton variety Giza 86 and Giza 89 in the first season, and the cotton variety Giza 89 in the second season. However, the lowest mean values of the same trait were obtained from the cotton grade (Good) of the cotton variety Giza 88 in both seasons.

Concerning the yellowness degree (+b), the highest mean values were attained by the lowest cotton grade (G-1/4) of the cotton variety Giza 88 in the two seasons. Meanwhile the lowest mean values of the same character were recorded for the lowest grade (G-1/4) of the cotton variety Giza 85 in the first season and the same grade of the cotton variety Giza 89 in the second season, as demonstrated in Table (1). Similar results were attained by **Beheary (2001) and Hossam El-Din *et al* (2002).**

3.2. Variety and grade interaction effect on yarn properties:

The cotton variety and grade interaction was highly significant for all studied yarn characters in the two studied seasons and significant for the yarn elongation % in the first season only.

The highest mean values of the Lea product (skein strength X yarn count) and single yarn strength were recorded by the highest grade (G/FG) of the cotton variety Giza 88 in the two seasons. On the other hand, the lowest mean values of the same trait were attained from the lowest grade (G-1/4) of the cotton variety Giza 85 in both seasons, as shown in Table (2).

As for fiber elongation %, the highest mean value was recorded by the highest lint grade (G/FG) of the cotton variety Giza 86 and the lowest mean value was attained from the lowest grade (G-1/4) of the cotton variety Giza 70 in the first season (Table 2).

The highest mean values of the yarn evenness CV% were obtained from the lowest grade (G-1/4) of the cotton variety Giza 85 in both studied seasons. On the other hand, the lowest mean values of the same trait were gained by the highest cotton grade (G/FG) of the cotton variety Giza 88 in the two seasons (Table 2).

The highest mean values for the yarn imperfections (thin places, thick places and neps/120Yds. of the yarn) were reached by the lowest lint grade (G-1/4) of the cotton variety Giza 89 in the first season. As for the second season the highest mean values of the number of thin and thick places were possessed by the lowest lint grade (G-1/4) of the cotton variety Giza 88 and Giza 89, respectively. The highest mean value of the number of neps was recorded by the lowest cotton grade (G-1/4) of the cotton varieties Giza 86 and Giza 85, as illustrated in aforementioned Table.

These results go in line with those of **Kamal and Ragab (1995) and Beheary (2001).**

4. Predicting yarn quality parameters using HVI data:

Five yarn quality parameters: Lea product, single yarn strength, yarn evenness CV%, yarn work of rupture (W.R.) and W.R. /CV% besides, HVI fiber properties for the two studied seasons, regardless seasonal differences, were computed using the following multiple regression equation:

$$Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + B_5 X_5 + B_6 X_6 + B_7 X_7 + B_8 X_8,$$

Where: Y is the yarn quality parameter, B_0, B_1, B_2, B_3,… B_8, are the regression coefficients or the estimates of the regression equation, X_1, X_2, X_3… X_8 is Micronaire Value, Maturity Index, Fiber U.H.M. Length (mm.), Length Uniformity Ratio (%), Fiber Bundle Strength (g/tex), Fiber Elongation (%), Fiber brightness or Reflectance Degree (Rd %), Chroma or Degree of Yellowness

(+b), respectively. Summary of statistics of the two studied seasons of HVI data is shown in Table (3). Insignificant traits were eliminated and a regression equation for each yarn quality parameter was presented in Table (4). Each equation could be used for calculating, or predicting, the desired corresponding yarn quality parameter using the available HVI fiber properties. This will double the benefits of the High Volume Instrument (HVI).

5. Contribution percentage of HVI fiber properties to yarn quality:

The relative contribution percentage of each fiber character to the aforementioned yarn quality parameters was presented in Table (5). It could be concluded that:

1- The fiber U.H.M length recorded the highest relative contribution percentage to the **Lea product** followed by fiber elongation (%), reflectance degree (Rd %), length uniformity index and maturity index, respectively.

2- The fiber U.H.M. length, also, possessed the highest relative contribution percentage to the **Yarn strength**, followed by fiber elongation (%), and maturity index.

3- As for **Yarn evenness CV%**, the fiber (U.H.M.) length ranked first in order, while the maturity index came in the second order followed by the micronaire value in the third order.

4- Concerning the **Yarn work of rupture** (W.R.), fiber U.H.M. length, also reached the highest relative contribution percentage, followed by the fiber elongation (%), micronaire value and maturity index.

5- Meanwhile, the yarn work of rupture divided by yarn evenness CV% **(W.R. /CV %)**, The obtained data indicated that fiber U.H.M length gained the highest relative contribution percentage to this parameter, followed by fiber strength, micronaire value and maturity index as illustrated in Figure (1).

These results agree with findings of **El Mogahzy *et al* (1990), Ahmed (2002) and Wali (2003).**

6. Fiber Quality Index (FQI) of the Egyptian cotton:

A fiber quality index corresponding to each studied yarn parameter was calculated by the aforementioned method and shown

Table (1): Mean values of the studied HVI fiber properties as affected by the variety and grade interaction for the two seasons (2002 and 2003).

Variety / Grade	Micronaire Value		Maturity Index		(U.H.M.) Length (mm)		Strength (g.tex)		Colour			
									Rd.%		+b	
Season	02	03	02	03	02	03	02	03	02	03	02	03
Giza 70 G/FG	4.30	4.25	0.94	0.94	34.92	34.89	44.88	46.35	72.9	75.5	8.8	8.9
G+1/4	4.35	4.19	0.95	0.94	35.20	34.48	46.18	44.58	74.2	74.0	9.1	9.1
GOOD	3.93	4.05	0.92	0.91	33.25	34.61	42.68	40.93	71.3	70.8	9.4	8.9
G-1/4	3.69	3.90	0.91	0.90	33.75	33.95	44.80	38.98	67.7	66.6	10.0	9.9
Giza 88 G/FG	4.19	4.09	0.95	0.94	36.54	36.27	46.20	47.38	67.3	67.9	12.0	11.6
G+1/4	3.99	3.94	0.94	0.93	35.63	34.99	48.38	46.05	67.6	67.7	11.5	11.6
GOOD	3.45	3.43	0.89	0.89	35.35	34.39	41.43	41.45	65.7	65.2	12.5	12.5
G-1/4	3.35	3.30	0.89	0.88	35.22	34.85	42.90	41.68	66.8	65.8	12.6	12.6
Giza 86 G/FG	4.51	4.57	0.96	0.95	34.06	33.85	46.68	44.40	78.4	78.4	9.1	8.8
G+1/4	4.19	4.40	0.93	0.94	33.0	33.33	44.33	43.13	75.4	76.7	8.4	8.5
GOOD	4.18	4.36	0.93	0.93	32.81	31.85	43.93	43.1	74.1	76.7	8.6	8.0
G-1/4	3.64	3.64	0.90	0.90	31.70	31.38	40.28	40.65	72.5	72.1	9.2	9.2
Giza 89 G/FG	4.18	4.00	0.92	0.91	31.33	31.70	41.00	40.85	78.4	78.6	8.0	7.8
G+1/4	4.27	4.24	0.93	0.93	32.20	33.14	42.30	42.38	75.9	75.1	7.3	7.6
GOOD	4.20	4.31	0.92	0.93	32.57	33.02	41.20	41.78	76.1	74.9	7.6	7.5
G-1/4	4.14	3.82	0.92	0.90	32.90	32.06	41.80	39.08	73.6	71.8	7.0	6.3
Giza 85 G/FG	4.16	4.14	0.92	0.91	29.87	29.51	40.38	38.70	78.0	77.2	8.9	8.4
G+1/4	3.94	3.94	0.92	0.91	30.14	30.23	39.98	40.75	75.9	76.0	8.4	8.4
GOOD	3.55	3.60	0.90	0.89	29.99	29.60	39.50	38.93	70.2	71.2	8.6	8.0
G-1/4	3.75	3.73	0.90	0.91	30.57	30.32	39.30	40.33	71.6	70.1	6.8	6.9
L.S.D. 0.05	0.21	0.30	0.01	0.02	1.06	1.23	3.36	3.45	1.49	2.02	0.46	0.57
0.01	0.30	0.43	0.02	0.03	1.49	1.72	4.71	4.84	2.09	2.83	0.64	0.80

Table (2): Mean values of studied yarn properties as affected by the variety and grade interaction for the two seasons (2002 and 2003).

Variety /Grade		Lea Product		Single Yarn: Strength (g/tex)		Elongation (%)	Evenness CV%		Thin Places/ 120 yds		Thick Places/ 120 yds		Neps/ 120 yds	
Season		02	03	02	03	02	02	03	02	03	02	03	02	03
Giza 70	G/FG	3015	3023	21.44	21.45	4.57	16.23	15.44	59	49	57	59	65	72
	G+1/4	2980	2965	21.14	21.23	5.52	17.42	16.43	68	71	75	79	82	96
	GOOD	2958	2952	20.41	20.92	5.50	17.76	17.70	80	120	91	91	89	113
	G-1/4	2948	2940	19.74	19.60	4.49	17.68	17.69	88	121	100	104	117	110
Giza 88	G/FG	3143	3152	22.63	23.14	5.57	16.16	15.44	25	30	45	26	41	28
	G+1/4	3025	3023	22.23	22.61	5.56	16.49	16.58	41	48	64	39	52	55
	GOOD	2980	2978	21.58	22.45	5.53	16.68	17.24	86	121	67	81	75	107
	G-1/4	2953	2950	20.74	21.80	5.55	18.37	18.23	126	145	105	95	117	123
Giza 86	G/FG	2512	2550	19.12	19.66	6.63	17.28	17.35	51	51	34	32	41	34
	G+1/4	2455	2482	17.95	18.72	6.58	17.88	17.55	59	53	94	54	58	61
	GOOD	2398	2450	17.76	18.11	6.52	18.37	18.52	68	85	109	107	101	96
	G-1/4	2352	2378	17.25	17.71	6.49	18.41	18.70	110	120	119	100	119	128
Giza 89	G/FG	2292	2312	17.94	18.11	5.95	18.35	18.32	88	54	43	65	46	38
	G+1/4	2245	2253	17.36	17.56	5.83	18.54	18.61	96	89	84	45	106	55
	GOOD	2157	2190	16.58	16.69	5.70	19.08	19.49	139	108	88	118	115	76
	G-1/4	2102	2150	16.02	16.18	5.69	18.87	19.59	136	136	171	153	127	111
Giza 85	G/FG	1950	1968	15.52	15.88	5.83	18.88	18.53	59	59	81	76	70	69
	G+1/4	1898	1923	14.60	14.63	5.71	19.12	18.58	74	69	84	70	72	88
	GOOD	1850	1878	14.16	14.25	5.71	19.65	19.45	90	105	98	95	117	109
	G-1/4	1807	1832	13.83	13.92	5.66	20.18	20.25	97	113	106	98	131	128
L.S.D.	0.05	12.96	12.37	0.10	0.13	0.48	0.30	0.26	13.52	17.14	12.67	10.77	12.22	13.88
	0.01	18.18	17.34	0.15	0.19	0.68	0.43	0.37	18.96	24.04	17.76	15.10	17.13	19.46

Table (3): Summary of statistics of the HVI fiber properties.

Fiber property	Minimum value	Mean value	Maximum value
Micronaire (Mic)	3.13	4.00	4.67
Maturity Index (MI)	0.85	0.91	0.97
Fiber length (FL)	28.98 (1.14")	33.00 (1.29")	38.02 (1.49")
Length uniformity (LU)	80.00	85.87	90.80
Fiber strength (St)	34.30	42.48	51.40
Fiber elongation (EL)	3.70	6.08	8.60
Reflectance (Rd)	62.7	72.6	79.7
Yellowness (+b)	6.10	9.09	13.20

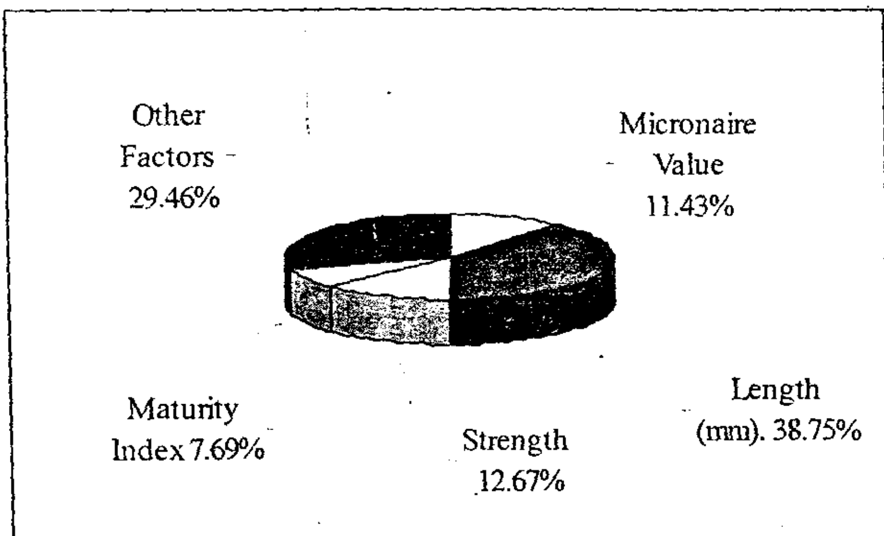
Table (4): Multiple regression equations for the studied yarn quality parameters on HVI fiber properties.

Yarn quality parameter	**Regression equation**	**R^2**
Lea Product	= 1251.62 + 178.07 MI +149.07 FL – 24.22 LU – 106.99 EL – 15.07 Rd	0.82
Single Yarn Strength	= – 7.78 – 6.16 MI + 1.06 FL – 0.53 EL	0.79
Yarn Evenness CV%	= 39.06 – 0.15 Mic – 7.67 MI – 0.40 FL	0.62
Yarn Work of Rupture	= – 43.32 +1.37 Mic +19.32 MI+ 2.47 FL+ 0.41EL	0.64
Yarn W.R./ CV%	= – 3.49 + 0.34 Mic – 3.71 MI + 0.20 FL + 0.04 St	0.70

Table (5): Relative contribution percentage of HVI fiber properties to various yarn quality parameters of ring spun yarns.

Yarn quality parameters / Fiber properties	Lea Product	Single Yarn Strength	Yarn Evenness CV%	Work of Rupture (W.R.)	W.R./ CV%
Micronaire (Mic).	n.s	n.s	3.26	4.49	11.43
Maturity index (MI).	0.66	4	10.02	3.97	7.69
Fiber length (FL).	51.09	63.81	48.54	46.81	38.75
Length uniformity (LU).	6.64	n.s	n.s	n.s	n.s
Fiber strength (ST).	n.s	n.s	n.s	n.s	12.67
Fiber elongation (EL).	13.69	11.85	n.s	9.09	n.s
Reflectance (Rd).	10.41	n.s	n.s	n.s	n.s

Figure (1): Relative contribution of fiber properties to yarn work of rupture (W.R.)/ yarn evenness CV %.



in Table (6). These indices could be used for determining the desired fiber quality index according to the spinner point of view.

Practically, the fifth yarn quality factor (W.R. /CV %) is considered the best factor including the more important yarn quality properties from the spinning point of view. Though, the fiber quality index conjugated from this factor was calculated for the (average of two seasons) studied HVI fiber properties, statistically analyzed and presented in Table (7).

So, the following formula of the Fiber Quality Index (FQI) could be used as reliable measure for determining the actual technological value, based on the inherent characters of the Egyptian cotton.

FQI = 11.43 Mic. + 38.75 FL + 12.67 St /7.69 MI

Where: Mic. = Micronaire value. FL = Fiber length (mm).
St = Fiber Strength (g/tex. MI = Maturity index.

For simplicity, the fiber length in (mm) was converted to the fiber length in inches.

6.1. Effect of cotton variety and grade on fiber quality index:

It was worthy to mention that the mean values of the fiber quality index (W.R. /CV %) were significantly influenced by cotton variety, grade and their interaction.

6.2. Effect of variety and grade interaction on fiber quality index:

The highest mean value of the FQI was reached by the grade (G+1/4) of the cotton variety Giza 88, while the lowest one was obtained from the grade (Good) of the cotton variety Giza 85 Table (7).

This could be explained on the basis of that the cotton grade is mainly affected by the trash content but the fiber quality index (FQI) is determined using the inherent characteristics of the cotton fiber. Though, the FQI could be used as a reliable numerical measure for determining the actual value and price of the Egyptian cotton.

More research work is still needed in this connection to confirm these proposals.

Table (6): Fiber quality indices corresponding to the studied yarn quality parameters.

Yarn quality parameter	Fiber Quality Index (FQI)
1-Lea Product	= (0.66 MI + 51.09 FL) / (6.64 LU + 13.69 EL + 10.41 Rd)
2-Single Yarn Strength	= 4 MI + 63.81 FL / 11.85 EL
3-Yarn Evenness CV%	= 1 / (3.26 Mic + 48.54 FL)
4-Yarn Work of Rupture	= 4.49 Mic + 3.97 MI + 46.81 FL / 9.09 EL
5-Yarn W.R./ CV%	= 11.43 Mic + 38.75 FL + 12.67 St / 7.69 MI

Table (7): Mean values of Fiber Quality Index (**FQI**) as affected by the variety and grade interaction.

Variety	Grade	Fiber Quality Index (FQI)
Giza 70	G/FG	94.02
	G+1/4	93.49
	GOOD	88.58
	G-1/4	89.23
Giza 88	G/FG	95.05
	G+1/4	96.38
	GOOD	90.14
	G-1/4	91.42
Giza 86	G/FG	92.09
	G+1/4	90.34
	GOOD	90.82
	G-1/4	86.91
Giza 89	G/FG	87.59
	G+1/4	88.66
	GOOD	88.01
	G-1/4	86.67
Giza 85	G/FG	84.71
	G+1/4	85.93
	GOOD	84.20
	G-1/4	85.69
L.S.D.	0.05	3.68

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الملخص العربي

معامل جودة الألياف للقطن المصرى باستخدام بيانات جهاز الـHVI.

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أختبرت خواص الألياف لخمسة أصناف مع أربعة رتب من القطن المصرى بجهاز ال HVI Spectrum II system وتم غزلها حلقيا على نمرة ٦٠ انجليزى مع أس برم ٣,٥ لدراسة العلاقة بين خواص الألياف ومؤشرات جودة الخيط لأقطان الموسين ٢٠٠٢ و٢٠٠٣. تم تحليل الارتداد المتعدد ونسبة اسهام خواص الألياف فى مؤشرات جودة الخيط باستخدام الكومبيوتر.

أوضحت النتائج المتحصل عليها أن جميع خواص الألياف والخيط التى درست قد تأثرت معنويا بصنف القطن ، ماعدا معامل انتظام الألياف فى الموسمين. وقد أعطى صنف القطن جيزة ٨٨ أعلى القيم المتوسطة لطول الألياف ، متانة الخصلة، متانة الشلة والخيط المفرد.

أعلى القيم المتوسطة لخواص الألياف سجلتها أعلى الرتب التى درست (ج/فح) ثم انخفضت هذه القيم بانخفاض الرتبة. وقد انخفضت متانة الشلة والخيط المفرد بينما ارتفع كلا من معامل اختلاف انتظامية الخيط وعيوب الخيط بانخفاض رتبة القطن. كان التفاعل بين الصنف والرتبة معنويا بالنسبة لمعظم خواص الألياف و الخيط التى درست.

تم الوصول الى خمس معاملات لجودة الألياف تعتمد على نسبة اسهام كل خاصية من خواص الألياف فى مؤشر جودة الخيط المقابل، مؤشر جودة الألياف الذى يعتمد على (الشغل الازم لقطع الخيط /معامل اختلاف انتظامية الخيط) كان الأفضل لاحتوائه على صفات الخيط الهامة، وتم اختياره كمعامل جودة للألياف فى القطن المصرى. احتل طول الألياف المركز الأول اسهاما فى هذا المؤشر، يليه متانة الألياف، قراءة الميكرونير ومعامل نضج الألياف. كما وجد أن معامل جودة الألياف لم يكن متمشيا تماما مع رتبة القطن فى بعض الأصناف داخل كل صنف.