Journal of Textiles, Coloration and Polymer Science
https://jtcps.journals.ekb.eg/
Egyptian Society for Textile Science and Technology
الجمعية المصرية لعلوم وتكنولوجيا النسيج

Effect of Blending ratio of lint cotton grades of Egyptian cotton varieties on fiber quality properties

Abo-Baker E.M. Gadallh, Yaser Sh. Abd-El-Rhman* and Nasser Sayed Nasser
Cotton Res. Inst., Agric. Res. Center, Giza, Egypt.

Abstract

The objective of this study was to determine the effect of different mixing percentages of lint cotton grades on fiber quality properties. Three Egyptian cotton varieties (Extra Giza96, Super Giza 94 and Giza95) as well as, ten blending ratio of lint cotton grades were used. Upper half mean length, uniformity index, micronaire value, maturity ratio, fiber strength, reality strength, reflectance degree values and count spinning product decreased with increasing low grades percentage in the blending. Whereas, trash/gr, seed coat, neps/ gr increased. Lint cotton grade Good (G) gave the best fiber properties, spinning consistency index (SCI), fiber quality index (FQI), and count spinning product. Results demonstrated a negative correlation between both of trash content, short fiber content with most fiber properties. The lint cotton grade 75% good + 25% fully good faire was the optimum blending ratio. In contrast, 25% fully good faire + 75% good faire recorded the lowest fiber quality.
Keywords: Blending ratio; Lint cotton grades; Egyptian cotton.

Introduction

Cotton is the king natural fiber in the world .it also yields a high-grade vegetable oil from cotton seed for human consumption as well as multiple cellulosic by-products. Cotton has a lot of activities and economics based on exporting row cotton materials or using these in the spinning and weaving industry.

In recent times the price of raw cotton very risen especially after Covid 19 appeared due to the price of clothes increasing. In Egyptian cotton, the classer put the price of raw cotton depending basically on the grade of the sample of the cotton. In general, High cotton grade which it characterized by containing a lot of quality properties such as effective length, a high percentage of uniformity of length, maturity, strength, reduction of short fiber content, less trash content, etc., whereas low grades contain. High ratio of short fiber content, trash content, motes, a lot of immature fiber and dead fibers, coarser, low uniformity ratio, and weak in strength. High grades of lint were of low trash content, +b values, and high micronaire reading and Rd% [1].

High variation within the same variety of impurities, degree of cleaning and cleanability [2]. The same nominal grade for different varieties has different values from these measures, especially the lowest grade F.G.F. An increase in trash, dust, and fiber fragments resulted in a decrease in cleanability and degree of cleaning. Fiber material with low trash content is usually more expensive than material with higher trash content, however, blending of grades with different spinning values may affect the technological value of the blend and yarn quality product [3].

Several researchers have stated that blending Egyptian cotton with upland cotton, or even lower-grade Egyptian cotton, significantly reduced the fiber properties of the blend. [4, 5]. Cotton variety Giza 45 and lint cotton grade good to fully good (G/FG) gave the highest values of fiber length, uniformity index, and the lowest short fiber content and yellowness degree (+b) While, it gave the lowest value of short fiber content [6]. On contrast, the lint cotton grade fully good fair to good (FGF/G) for cotton variety Giza 80 recorded the lowest values of fiber length, uniformity index, fiber strength, fiber elongation and reflectance degree [7].

Fiber properties were highly significantly affected by the cotton variety. Giza 96 recorded the highest values of upper half mean length, maturity ratio. Also, Giza 94 gave the highest values of uniformity index, short fiber index, fiber strength, reflectance degree, yellowness degree, trash count, trash area and spinning consistency index. The lint

*Corresponding author: Yaser Sh. Abd-El-Rhman, E-mail: yasser.salem64@yahoo.com
Receive Date: 20 October 2024, Accept Date: 05 November 2024
DOI: 10.21608/JTCPS.2024.329905.1395
©2024 National Information and Documentation Center (NIDOC)

cotton grade Good to Fully Good recorded the best fiber quality properties for all studied varieties.

All fiber properties were highly significant affected by the lint cotton grade. the interaction between cotton varieties and lint grades was highly significant for upper half mean length, length uniformity index, short fiber index, micronaire reading, maturity ratio, bundle strength, fiber elongation, color and trash attributes, , trash count, trash area and spinning consistency index.

Upper half mean length, maturity ratio and micronaire value had negative and highly significant correlation with trash content. While, Short fiber content and trash area recorded positive and highly significant correlations with trash content and Neps / gram recorded positive and highly significant correlations with each trash contents[8].

This research aims to produce a mix of different grades from each variety under study to reduce the cost of raw material and keep the spinning value of the blending.

Material and Methods

This research was carried out at the Cotton Research Institute at the Egyptian & International Cotton Classification Center (EICCC), Cotton grade section, 2022 seasons to study the effect of ten blending ratio of lint cotton grades from Three cotton varieties (Extra Giza 96, Super Giza 94 and Giza 95) on the spinning value (Fiber quality index and spinning consistency index).

Table 1 Blending ratio of lint cotton grades

Blending code	Blending ratio grades
1	Good 100% (control)
2	50% Good + 50 % F.G.F.
3	50% Good + 50% G.F.
4	50% F.G.F + 50% G.F.
5	75% Good + 25% F.G.F .
6	75% Good + 25% G.F .
7	75 % F.G.F + 25 % G.F.
8	25 % Good + 75 % F.G. F.
9	25 % Good + 75% G.F
10	25 % F.G.F + 75 % G.F

Blending was prepared by hand blending the materials more than once. Four sub-samples from all blending and the control sample (G) grade were measured using fiber classifying system instrument (F.C.S) version 5.4 (V 5.4). The cotton fiber properties station from (F.C.S) were upper half main length (U.H.M), uniformity index (UI %), short fiber content (S.F.C), fiber strength (F.S), fiber elongation (EL), micronair value (MIC), maturity ratio (MR), non-lint (NL), trash count number in gram (TRCNT / gr), neps count in gram (NPCNT /gr), fiber quality index (FQI) and spinning consistency index (SCI). All samples were put in the Binder Humidifier equipment for three days at 65 % ± 2 RH and 21°C ± 2 °C before testing.

1- FQI = Ml/2 × F.S(HVI)× M.R

Mic

FQI(Fiber Quality Index), ,

(USDA. quality evaluation of the sample)

2- Spinning consistency index (SCI):- it was calculated with HVI properties through a regression model as reported by Anonym, (1999). Application handbook of USTER- HVI spectrum (USTER, 1999). [9]

The regression equation used is as follows: -

SCI = - 414.67 + 2.9 STR (HVI) + 49.17 (UHM/ 25.4) + 4.74 UI –9.32 MIC+ 0.65 Rd% + 0.36 (+b).

(USDA. quality evaluation of the sample)

$$\text{HVI CSP} = \frac{8327.5+1364.1\text{UHM}}{25.4+103\text{UI}+58.4\text{STR.HVI}-215.7\text{MIC}}$$

(USDA. quality evaluation of the sample)

Fiber quality index, spinning consistency index and spinning count product calculated of yarn strength which taken from (CCS) instrument.

Analysis of variation (ANOVA) was performed according to Snedecor and Cochran. [10]The correlation coefficient was carried out according to Draper and Smith. [11]

Resluts and Discussion

Results in Table (2) showed that there were significant differences among the ten mixing grades of Egyptian cotton variety super G 94 on all fiber quality properties, trash content, fiber quality index (FQI), spinning consistency index (SCI), and count spinning product. The lint grade good overpassed all blending ratios in all fiber properties .Also, it is the basic grade in the Egyptian cotton classer grade flowed by the 75% Good + 25% Fully good fair in (upper half mean length (UHML) (32.32), uniformity index (UI%) (84.88), realty strength (STR g\tex) (20.6), HVI strength g/tex (40.96), reflectance degree (Rd %,) (72.96), fiber quality index (FQI) (136.8), spinning consistency index (SCI) (130.72) and count spinning product (3650), this result is logic but this trend differ micronaire reading (MIC).

In contrast it gave the lowest values in trash /gr TRC/g (104.8), seed coat CSN/g (4.0) and neps /gr (83.6). There was significant difference between Good grade and all blending ratio. The lint grade good recorded the greatest fiber properties followed by the mix between 75% G + 25% F.G.F, it gave the nearest data from Good grade. This trend differs in seed coat /gr (CSN\g) it is followed by the blending ratio (50% G +50% F.G.F.) in all fiber properties except F.Q.I., S.C.I. and C.S.P. The lowest data

of fiber properties recorded by (25% F.G.F +75% G.F) blending ratio except (strength g/tex and realty strength).This results accordance with El- Bagoury (1999) and Nomer et al (2005) who found that blending Egyptian cotton at even lower grades significantly reduced the fiber properties of the blend. [5, 12] These results are logical where this blending ratio contains the lowest grades it is the same trend with Salem et al (2006) reported that the highest fiber length, fineness, and strength are closely related to Good grade where F.G.F. grade awarded the lowest ones. [13]

Effect of mixing lint cotton grades on fiber properties in Giza 95

Results in **Table (3)** demonstrated that cotton grades (G) had highly significant effects on all fiber properties. The highest lint cotton grade Good (G) recorded the highest values of fiber properties, Fiber quality index (FQI), Spinning consistency index (SCI), Count spinning product (CSP), and Trash content. The cotton grade Good supper passed the highest mean value of fiber length (U.H.M.L.) (28.62 mm), uniformity index (81.88 %), micronaire reading (4.20), maturity ratio (0.94), realty strength (16.86), fiber strength (34.88 g/tex), reflectance degree (61.94), Fiber quality index (FQI)(99.6), Spinning consistency index S.C.I (95.92), Count spinning product (CSP)(2881),.While it gave the lowest values of short fiber content (11.2)), trash count (61.6), seed coat (10.6), and neps/gr (37.0). In contrast, the mixing lint cotton grade 25% fully good faire + 75% Good faire gave the lowest main values of fiber length (U.H.M.L.) (25.30 mm), uniformity index (76.88 %), micronaire reading (2.08), maturity ratio (0.62), realty strength (11.98), fiber strength (27.88 g/tex), Fiber quality index (FQI)(78.6), Spinning consistency index SCI (58.08), Count and spinning product (CSP)(2067). While it gave the highest values of short fiber content (12.68), trash count (78.8), seed coat (17.4), and neps/gr (229.2). Generally, cotton grades differed from each grade to other grade. The highest grade gave the longest and the strongest fibers due to it containing a high ratio of mature fibers and low short fiber content.

Table (2) mean values of fiber properties of different cotton blending ratio, fiber quality index, spinning consistency index and (CSP) for Giza 94 variety.

Blending Ratio %	U.H.M	U.I%	S.F.C %	Mic	M.R%	Str	H.V.I str	Rd%	+b	TRC./g	CSN./g	NP/g	F.Q.I	S.C.I	CSP
1	32.32	84.88	8.54	4.08	0.95	20.6	40.96	72.96	9.4	104.8	4.0	83.6	136.8	130.72	3650
2	31.28	83.30	10.78	3.47	0.92	19.18	38.04	69.92	9.7	184.20	5.0	118.4	129.8	127.4	3572
3	30.06	82.88	10.58	2.92	0.80	17.16	35.34	69.40	9.4	185.40	4.0	143.0	123.6	126.04	3538
4	29.64	80.74	9.57	2.88	0.80	16.82	35.52	68.88	9.0	188.40	4.0	134.0	124.2	124.88	3402
5	31.44	83.84	9.45	3.61	0.95	19.34	38.50	72.64	9.3	176.20	6.8	110.2	117.0	118.94	3375
6	29.32	82.58	10.86	2.71	0.74	18.38	37.58	66.08	9.6	179.20	8.2	117.4	114.4	118.30	3259
7	31.04	83.1	10.47	2.77	0.72	19.24	38.28	69.32	9.2	180.20	5.4	136.2	112.0	109.78	3188
8	30.08	82.04	10.50	2.70	0.71	18.14	36.44	64.12	8.6	178.60	6.4	157.8	112.1	106.46	3125
9	29.24	81.38	11.00	2.80	0.71	17.58	35.78	67.64	9.3	195.60	5.6	164.4	106.4	104.28	3085
10	28.96	81.20	11.22	2.57	0.68	18.46	36.88	64.32	8.2	198.20	5.8	183.8	95.0	102.24	3039
LSD at .005	0.61	0.67	0.63	0.10	0.02	1.25	1.30	3.04	0.85	3.48	0.64	5.76	18.14	1.04	22.3

Good grade (G)(1), 50% Good + 50 % F.G.F(2),50 % Good + 50% G.F(3),50% F.G.F. + 50% G.F(4),75% G. + 25% F.G.F(5),75% G. + 25%G.F(6),75% F.G.F. +25% G.F(7),25% G. +75% F.G.F(8),25% G. +75% G.F(9) and 25% F.G.F. + 75% G.F(10)

Table (3) mean values of fiber properties of different cotton blending ratio, fiber quality index, spinning consistency index and (CSP) for Giza 95 var.

Blending Ratio %	U.H.M	U.I%	S.F.C %	Mic	M.R%	Str	H.V.I str	Rd%	+b	TRC./g	CSN./g	NP/g	F.Q.I	S.C.I	CSP
1	28.62	81.88	11.2	4.20	0.94	16.86	34.88	61.94	11.22	61.6	10.6	37.0	99.6	95.92	2881
2	27.44	78.84	12.06	3.26	0.82	14.16	31.3	58.86	11.16	64.2	14.8	101.2	85.8	74.56	2411
3	26.56	77.98	12.42	2.84	0.74	13.0	29.72	56.92	12.26	68.0	15.2	122.2	80.5	66.46	2277
4	25.84	78.02	12.58	2.37	0.69	12.74	29.34	56.28	10.76	70.4	17.4	164.8	86.4	69.18	2294
5	27.48	79.04	12.06	3.39	0.81	14.04	31.12	60.88	11.78	71.4	13.4	76.0	83.0	73.12	2392
6	27.24	78.68	12.08	3.47	0.83	13.62	30.56	60.78	11.66	73.0	14.0	103.2	80.4	73.0	2395
7	25.72	77.50	12.62	2.48	0.72	12.04	28.3	53.16	10.84	75.6	14.6	174.4	82.44	61.26	2126
8	292	78.16	12.52	2.73	0.75	13.28	30.12	58.04	10.18	76.7	16.0	183.8	83.8	69.5	2285
9	25.42	77.72	12.66	2.24	0.66	11.62	28.34	57.94	11.64	77.6	16.8	227.8	83.8	68.24	2281
10	25.30	76.88	12.68	2.08	0.62	11.98	27.88	56.60	11.38	78.8	17.4	229.2	78.6	58.08	2067
LSD at .005	0.78	1.33	0.26	0.11	0.027	1.45	1.93	4.90	0.98	5.70	1.74	5.03	1.26	1.72	41.07

Good grade (G)(1), 50% Good + 50 % F.G.F(2),50 % Good + 50% G.F(3),50% F.G.F. + 50% G.F(4),75% G. + 25% F.G.F(5),75% G. + 25%G.F(6),75% F.G.F. +25% G.F(7),25% G. +75% F.G.F(8),25% G. +75% G.F(9) and 25% F.G.F. + 75% G.F(10)

Effect of mixing lint cotton grades on fiber properties in Extra Giza 96

The results showed that lint cotton grade had a highly significant influence on the CCS fiber parameters, i.e. upper half mean length U.H.M),

length uniformity index (U.I.), short fiber content (S.F.C.), micronaire reading, maturity ratio, reality strength, bundle strength color, and trash attributes, i.e. reflectance degree (Rd%), yellowness degree (+b), trash count, trash area, spinning consistency index, Fiber quality index, and Spinning consistency index, as shown in Table (4) Good (G), gave the highest mean values of. Upper half mean length (35.2 mm), length uniformity index (85.0), micronaire reading (3.90), maturity ratio (0.87), reality strength (20.8), bundle strength (43.5g /tex), reflectance degree (Rd, 73.1%), Fiber quality index (FQI (145.2), Spinning consistency index (140.8) and Count spinning product (CSP (3809), on contrast it gave the lowest mean values of the short fiber content (8.3), yellowness degree (+b 9.3), trash count (71.0) seed coat /gr (10.4) and neps/gr (57.2). On the other hand the lowest mean values of upper half mean length (28.2), length uniformity index (79.2%), micronaire reading (2.4)), maturity ratio (0.65), reality strength (12.5) bundle strength (29.1 g/tex), reflectance degree (Rd%, 65.1), Fiber quality index (FQI (85.4), Spinning consistency index (88.6) and Count spinning product (CSP (2831) and the highest mean values of the short fiber content (11.1), yellowness degree (+b 10.5), trash count (97.8), seed coat (22.8), and neps/gr (265.2) were recorded by the lint cotton grade, i.e. (25% F.G.F + 75% G.F) . The attained results could be attributed to the high amount of immature fiber and short fiber content which usually increase with decreasing the lint cotton grade. The short fiber content of extra-long staple varieties was lower than that of long staple cotton**.** These results are in harmony with those of El-Banna (2019) who indicated that the better grades had longer fibers, more mature fiber, higher fiber bundle strength, and less short fiber content[14] .

Data in Table 5 showed that the simple correlation coefficients between almost fiber properties, trash content, neps/gr, spinning consistency index, fiber quality index, and count spinning product for Super Giza94 were significant during the 2023 season. There were positive correlation coefficients between micronaire value, fiber maturity, upper half mean length, fiber uniformity index, fiber bundle strength, and reality strength. There were significant negative correlation coefficients between (upper half mean length, fiber uniformity index, fiber bundle strength, micronaire value, fiber maturity, fiber brightness degree, (short fiber index, fiber yellowness degree, and No. of neps). Micronaire value was positive and highly significant correlated with maturity ratio (0.927**), upper half mean length (0.814**), uniformity index (0.769**), fiber bundle strength (0.550**), reality strength (0.672**), reflectance degree (0.677**), spinning consistency index (0.691**), fiber quality index (0.532**) and count spinning product (0.771**).

On the other hand, it was negative and highly significantly correlated with short fiber content (-0.674**), trash count /gr (-0.768**), seed coat (-0.285*), and neps/gr (-0.811**). while maturity ratio was positive and highly significant correlated with upper half mean length (0.760**), uniformity index (0.687**), fiber bundle strength (0.421**), reality strength (0.524**), reflectance degree (0.692**), spinning consistency index (0.800**), fiber quality index (0.540**) and count spinning product (0.845**) on other hand it was negative and highly significant correlated with short fiber content (-0.637**), trash count /gr (-0.580**), seed coat (-0.261*) and neps /gr (-0.820**). Likewise upper half mean length was positive and highly significantly correlated with uniformity index (0.847**), fiber bundle strength (0.640**), reality strength (0.717**), reflectance degree (0.640**), spinning consistency index (0.550**), fiber quality index (0.485**) and count spinning product (0.645**). On the other hand, it was negative and highly significantly correlated with short fiber content (-0.678**), trash count /gr (-0.702**), seed coat (-0.278*), and neps /gr (-0.730**).Also short fiber content was positive and highly correlated with trash count /gr (0.729**), seed coat (0.345**), and neps /gr (0.650**) in contrast it was negative and highly significantly correlated with uniformity index (-0.486**), fiber bundle strength (-0.405**), reality strength (-0.492**), reflectance degree (-0.554**), spinning consistency index (-0.558**), fiber quality index (-0.407**) and count spinning product (-0.556**).

Also, the uniformity index was positive and highly significantly correlated with fiber bundle strength (0.610**), reality strength (0.726**), reflectance degree (0.581**), spinning consistency index (0.527**), fiber quality index (0.379**) and count spinning product (0.619**). But it gave a negative significant correlation with trash count /gr (-0.710**), and neps /gr (-0.753**). Likewise, fiber bundle strength was positive and highly significantly correlated with reality strength (0.905**) and correlated with reflectance degree (0.267*). On the other hand it negatively significantly correlated with trash count /gr (-0.591**), and neps /gr (-0.470**). Reality strength is positive and significantly correlated with reflectance degree (0.337**), spinning consistency index (0.311*), fiber quality index (0.316*), and highly correlated with count spinning product (0.370**). In contrast, it is negative and highly significantly correlated with trash count /gr (-0.731**) and neps /gr (-0.653**).

Also, the fiber yellowness degree was positive and significantly correlated with the spinning consistency index (0.382**), count spinning product (0.377**), and significantly correlated with the fiber quality index (0.307*). As well as fiber reflectance degree positive and highly significant corre-

lated with spinning consistency index (0.572**), count spinning product (0.616**) and fiber quality index (0.406**) and it negative and highly significant correlated with trash count /gr (-0.484**), seed coat (-0.331*) and neps /gr (-0.655**) Also trash count /gr positive and highly significant correlated with neps/gr (0.748**) and simple correlated with seed coat (0.259*) and negative and highly significant correlated with spinning consistency index (-0.536**), count spinning product (-0.588**) and fiber quality index (-0.454**) While seed coat was highly significant correlated negative with spinning consistency index (-0.434**), count spinning product (-0.506**) and fiber quality index (-0.354**) As well as neps/gr with highly negative significant correlated with spinning consistency index (-0.801**), count spinning product (-0.780**) and fiber quality index (-0.579**) Also spinning consistency index significant correlated highly positive with fiber quality index (0.662**) and count spinning product (0.971**) finely fiber quality index was positive and highly significant correlated with count spinning product (0.668**).

Table (4) mean values of fiber properties of blending lint cotton grades, fiber quality index, spinning consistency index and (CSP) for Giza 96 variety.

Blending Ratio %	U.H.M	U.I%	S.F.C %	Mic	M.R%	Str	H.V.I str	Rd%	+b	TRC./g	CSN./g	NP/g	F.Q.I	S.C.I	CSP
1	35.2	85.0	8.3	3.9	0.87	20.8	43.5	73.1	9.3	71.0	10.4	57.2	145.2	140.8	3809
2	32.1	82.8	8.7	3.1	0.79	18.9	38.8	69.1	9.5	86.0	15.2	116.2	128.2	133.6	3418
3	31.7	83.2	9.4	3.0	0.74	18.5	37.8	69.3	8.9	83.6	19.8	139.2	121.8	122.0	3405
4	30.1	80.0	10.2	2.8	0.69	16.9	35.6	65.1	9.7	77.6	21.0	155.8	132.4	121.7	3489
5	33.9	83.9	8.4	3.8	0.85	20.4	40.1	71.0	9.5	75.4	14.6	90.4	138.7	137.5	3763
6	32.4	83.3	8.8	3.4	0.82	19.2	38.0	70.9	10.2	85.0	14.8	127.1	133.8	125.9	3473
7	31.9	83.5	10.2	2.8	0.80	17.4	35.0	67.6	10.3	82.4	20.2	185.4	120.6	117.2	3368
8	31.5	82.0	9.8	2.6	0.71	17.7	36.0	67.4	10.3	87.6	18.8	192.4	109.8	115.9	3354
9	30.0	80.8	10.8	2.5	0.65	14.8	30.3	66.7	10.1	89.2	21.4	247.2	105.0	99.6	2991
10	28.2	79.2	11.1	2.4	0.65	12.5	29.1	65.1	10.5	97.8	22.8	265.2	85.4	88.6	2831
LSD at .005	0.8	2.5	0.5	.07	0.02	2.4	3.1	5.2	.94	5.4	2.7	6.2	2.5	3.0	55.8

Good grade (G)(1), 50% Good + 50 % F.G.F(2),50 % Good + 50% G.F(3),50% F.G.F. + 50% G.F(4),75% G. + 25% F.G.F(5),75% G. + 25%G.F(6),75% F.G.F. +25% G.F(7),25% G. +75% F.G.F(8),25% G. +75% G.F(9) and 25% F.G.F. + 75% G.F(10)

Simple correlation between blending lint cotton grades and fiber properties for G 94 Cotton variety.]

Table 5 the simple correlation coefficients between fiber properties

			FIBRO TEST												
	MIC	MR	UHM mm	SFC %	UI	Strength cN/tex	Rel. Str. cN/tex	+b	Rd	TRCNT/gr	CSNCNT/gr	NPCNT/gr	SCI	FQI	CSP
MIC	1														
MR	.927**	1.00													
UHM	.814**	.760**	1.00												
SFC	-.674**	-.637**	-.678**	1.00											
UI	.769**	.687**	.847**	-.486**	1.00										
Strength	.550**	.421**	.640**	-.405**	.610**	1.00									
Rel. Str.	.672**	.524**	.717**	-.492**	.726**	.905**	1.00								
+b	.274*	.323*	0.204	-0.118	0.222	0.028	0.086	1							
Rd	.677**	.692**	.640**	-.554**	.581**	.267*	.337**	0.218	1						
TRCNT/gr	-.768**	-.580**	-.702**	.729**	-.710**	-.591**	-.731**	-0.167	-.484**	1					
CSNCNT/gr	-.285*	-.261*	-.278*	.345**	-0.067	0.094	0.051	-0.057	-.331**	.259*	1				
NPCNT/gr	-.811**	-.820**	-.730**	.650**	-.753**	-.479**	-.653**	-.424**	-.655**	.748**	0.083	1			
SCI	.691**	.800**	.550**	-.558**	.527**	0.174	.311*	.382**	.572**	-.536**	-.434**	-.801**	1		
FQI	.532**	.540**	.485**	-.407**	.379**	0.193	.316*	.307*	.406**	-.454**	-.354**	-.579**	.662**	1	
CSP	.771**	.845**	.645**	-.556**	.619**	0.244	.370**	.377**	.616**	-.588**	-.506**	-.780**	.971**	.668**	1

Simple correlation between blending lint cotton grades and fiber properties for G 94 cotton variety

Micronaire (Mic), MR% (Maturity ratio), Upper half mean length(UHML), Short fiber content (SFC), Uniformity index(UI), fiber strength (FS), realty strength (Rel. Str.), Yellowness (+b), reflectance degree(Rd), Trash /gram(TRCNT/ gr),Seed coat(CSNCNT/gr), Neps /gram(NPCNT/gr),spinning consistency index(SCI), Fiber quality index(FQI), and count spinning product (CSP).

The simple correlation between blending lint cotton grades and fiber properties for Giza 95 Cotton variety

Data in Table 6 showed that the simple correlation coefficients between almost fiber properties, trash content, neps/gr, spinning consistency index, fiber quality index, and count spinning product for Giza95 were significant during the 2023 season. There were positive correlation coefficients between micronaire value, fiber maturity, upper half mean length, fiber uniformity index, fiber bundle strength, and reality strength. There were significant negative correlation coefficients between (upper half mean length, fiber uniformity index, fiber bundle strength, micronaire value, fiber maturity, fiber brightness degree, short fiber index, fiber yellowness degree, and No. of neps). Micronaire value was positive and highly significant correlated with maturity ratio (0.967**), upper half mean length (0.883**), uniformity index (0.744**), fiber bundle strength (0.758**), reality strength (0.759**), reflectance degree (0.481**), spinning consistency index (0.747**), fiber quality index (0.731**) and count spinning product (0.725**).On the other side, it was negative and highly significantly correlated with short fiber content (-0.868**), trash count /gr (-0.773**), seed coat (-0.637*), and neps/gr (-0.527**). Also maturity ratio was positive and highly significant correlated with upper half mean length (0.885**), uniformity index (0.735**), fiber bundle strength (0.780**), reality strength (0.769**), reflectance degree (0.434**), spinning consistency index (0.819**), fiber quality index (0.794**) and count spinning product (0.802**) on contrast it was negative and highly significant correlated with short fiber content (-0.878**), trash count /gr (-0.607**), seed coat (-0.559**) and neps /gr (-0.548**). Likewise upper half mean length was positive and highly significantly correlated with uniformity index (0.673**), fiber bundle strength (0.725**), reality strength (0.708**), reflectance degree (0.500**), spinning consistency index (0.740**), fiber quality index (0.733**) and count spinning product (0.731**). On the other hand, it was negative and highly significantly correlated with short fiber content (-0.937**), trash count /gr (-0.607**), seed coat (-0.559*), and neps /gr (-0.548**) .Also short fiber content was positive and highly correlated with trash count /gr (0.587**), seed coat (0.605**), and neps /gr (0.487**) on contrast it was negative and highly correlated with uniformity index (-0.780**), fiber bundle strength (-0.818**), reality strength (-0.797**), reflectance degree (-0.503**), spinning consistency index (-0.831**), fiber quality index (-0.841**) and count spinning product (-0.815**). While uniformity index was positive and highly correlated with fiber bundle strength (0.709**), reality strength (0.773**), reflectance degree (0.323*), spinning consistency index (0.786**), fiber quality index (0.783**) and count spinning product (0.769**). In contrast, it gave a negative correlation with trash count /gr (-0.596**), seed coat (-0.632), and neps /gr (-0.477**). Likewise, fiber bundle strength was positive and highly correlated with reality strength (0.940**), reflectance degree (0.431**) spinning consistency index (0.763**), fiber quality index (0.751**), and count spinning product (0.750**).On the other hand, it negatively correlated with trash count /gr (-0.579**), seed coat (-0.582**), and neps /gr (-0.499**). Also, reality strength is positive and highly correlated with reflectance degree (0.363**), spinning consistency index (0.764**), fiber quality index (0.746*), and count spinning product (0.750**) on the other hand it is negative and highly correlated with trash count /gr (-0.552**), seed coat (-0.596**) and neps /gr (-0.497**). While the fiber reflectance degree was positive and correlated with the spinning consistency index (0.300*), the fiber quality index (0.312*) count spinning product (0.289*) and it negative and highly correlated with trash count /gr (-0.365**) and simple correlated seed coat (-0.306*). While trash count /gr was positive and highly significant correlated with neps/gr (0.460**) and seed coat (0.565*) and negative and highly significant correlated with spinning consistency index (-0.573**), fiber quality index (-0.539**) and count spinning product (-0.558**) As well as seed coat was highly correlated negative with spinning consistency index (-0.632**), fiber quality index (-0.602**) and count spinning product (-0.629**) on contrast it gave negative and highly correlated with neps/gr As well as neps/gr with highly negative correlated with spinning consistency index (-0.684**), fiber quality index (-0.611**) and count spinning product (-0.683**). Also spinning consistency index significantly correlated highly positively with and fiber quality index (0.971**) and the count spinning product (0.992 **). Finally fiber quality index was positive and highly correlated with the count spinning product (0.971**).

The simple correlation between blending lint cotton grades and fiber properties for G 96 Cotton variety.

Data in Table **7** showed that the simple correlation coefficients between almost fiber properties, trash content, neps/gr, spinning consistency index, fiber quality index, and count spinning product for Extra G96 were significant during the 2023 season. There were positive correlation coefficients between micronaire value, fiber maturity, upper half mean length, fiber uniformity index, fiber bundle strength, and reality strength. There were significant negative correlation coefficients between (upper half mean length, fiber uniformity index, fiber bundle strength, micronaire value, fiber maturity, fiber brightness

degree, short fiber index, fiber yellowness degree, and No. of neps).

Micronaire value was positive and highly significant correlated with maturity ratio (0.920**), upper half mean length (0.546**), uniformity index (0.423**), fiber bundle strength (0.649**), reality strength (0.684**), reflectance degree (0.525**), spinning consistency index (0.709**), fiber quality index (0.711**) and count spinning product (0.730**) on other hand it was negative and highly significant correlated with short fiber content (-0.688**), trash count /gr (-0.714**), seed coat (-0.826*) and neps/gr (-0.655**). While maturity ratio was positive and highly significant correlated with upper half mean length (0.612**), uniformity index (0.457**), fiber bundle strength (0.723**), reality strength (0.768**), reflectance degree (0.539**), spinning consistency index (0.734**), fiber quality index (0.700**) and count spinning product (0.769**). On the other hand, it was negative and highly significantly correlated with short fiber content (-0.816**), trash count /gr (-0.627**), seed coat (-0.823**), and neps /gr (-0.678**). Likewise upper half mean length was positive and highly significantly correlated with uniformity ratio (0.742**), fiber strength (0.629**) reality strength (0.641**), fiber reflectance (0.342**), spinning consistency index (0.762**), fiber quality index 0.704**) and count spinning product (0.742**). In contrast, it was negative and highly correlated with short fiber content (598**), trash count (-0.543**), seed coat (0.598**), and neps/gr (0.678**) While short fiber content recorded a significant negative correlation with uniformity index (-0.322*), and highly significant fiber strength (-0.790**) reality strength (-0.774**), fiber reflectance (-0.432**), spinning consistency index (-0.732**), fiber quality index -0.632**) and count spinning product (-0.766**) on other hand it recorded highly significant positive correlation with trash count (0.488**), seed coat (0.710**) and neps/gr (0.508**). Also, the uniformity index recorded a highly significant positive correlation with fiber strength (0.420**) reality strength (0.433**) spinning consistency index (0.525**), fiber quality index 0.485**) and count spinning product (0.513**). But it recorded a negative correlation with trash count (-0.298**), seed coat (0.462**), and neps/gr (0.534**). While, fiber strength was positive and significantly correlated with reality strength (0.859**) spinning consistency index (0.757*), fiber quality index 0.746*), and count spinning product (0.775**). In contrast, it negative correlation with fiber yellowness (-0.370**), trash count/gr (-0.539**), seed coat (-0.565 **) and neps/gr (-0.575**). Also, reality strength was positive and significantly correlated with the spinning consistency index (0.793**), fiber quality index 0.769**) and count spinning product (0.819**). On the other hand, there was a negative correlation with fiber yellowness (-0.338**), trash count/gr (-0.596**), seed coat (-0.641 **), and neps/gr (-0.644**). likewise, fiber yellowness recorded highly significant positive with trash count/gr (0.394**), and neps/gr (0.512**) on contrast it gave a negative correlation with spinning consistency index (-0.452**), fiber quality index (-0.525**) and count spinning product (-0.457**).while fiber brightness degree gave highly significant positive with spinning consistency index (0.369**), fiber quality index (0.335**), and count spinning product (0.340**) on the other hand it gave highly significant negative trash count/gr (-0.370**), seed coat /gr (-515**) and neps/gr (-0.419**). As well Trash count /gm was positive and highly significantly correlated with seed coat /gr (0.511**) and neps/gr (0.609**) but it recorded significant negative correlations with spinning consistency index (-0.690**), fiber quality index (-0.748**) and count spinning product (-0.668**). While seed coat per game was positive and significantly correlated with neps/gr (0.615**). In contrast, it gave a negative and highly significant correlation with the spinning consistency index (-0.690**), fiber quality index (-0.636**), and count spinning product (-0.714**). Also, neps/gr was negative and significantly correlated with the spinning consistency index (-0.772**), fiber quality index (-0.819**), and count spinning product (-0.775**). Whereas the spinning consistency index was highly positive and significantly correlated with the fiber quality index (0.952**) and count spinning product (0.986**).Finally fiber quality index was positive and highly significantly correlated with the count spinning product (0.950**).

Conclusion

The main of this research was to study the effect of different blending ratio of lint cotton grades on fiber quality properties. Egyptian cotton varieties (Extra Giza96, Super Giza 94 and Giza95 and ten blending ratio of lint cotton grades were used. the results indicated that increasing low lint cotton grades percentage in the blending led to decrease upper half mean length, uniformity index, micronaire value, maturity ratio, fiber strength, reality strength, reflectance degree values and count spinning product . Lint cotton grade Good recorded the best fiber properties, spinning consistency index (SCI), fiber quality index (FQI), and count spinning product. There was a negative correlation between Trash content, short fiber content, and most fiber properties. The lint cotton grade 75% good + 25% fully good faire was the optimum blending ratio. In contrast, 25% fully good faire + 75% good faire recorded the lowest fiber quality.

Table (6) Simple correlation between blending ratio and fiber properties for Giza 95 cotton variety.

			FIBRO TEST												
			UHM	SFC	UI	Strength	Rel. Str.	+b	Rd	TRCNT	CSNCNT	NPCNT	SCI	FQI	CSP
NO	MIC	MR	mm	%						/gr	/gr	/gr			
MIC	1														
MR	.967**	1													
UHM	.883**	.885**	1												
SFC	-.868**	-.878**	-.937**	1											
UI	.744**	.735**	.673**	-.780**	1										
Strength	.758**	.780**	.725**	-.818**	.709**	1									
Rel. Str.	.759**	.769**	.708**	-.797**	.773**	.940**	1								
+b	0.155	0.053	0.136	-0.104	0.027	-0.115	-0.12	1							
Rd	.481**	.434**	.500**	-.503**	.323*	.431**	.363**	0.048	1						
TRCNT/gr	-.773**	-.760**	-.607**	.587**	-.596**	-.579**	-.552**	0.074	-.365**	1					
CSNCNT/gr	-.637**	-.674**	-.559**	.605**	-.632**	-.582**	-.596**	-0.054	-.306*	.565**	1				
NPCNT/gr	-.527**	-.542**	-.548**	.487**	-.477**	-.499**	-.497**	-0.017	-0.198	.460**	.437**	1			
SCI	.747**	.819**	.748**	-.831**	.786**	.763**	.764**	-0.02	.300*	-.573**	-.632**	-.684**	1		
FQI	.731**	.794**	.733**	-.841**	.783**	.751**	.746**	0.067	.312*	-.539**	-.602**	-.611**	.971**	1	
CSP	.725**	.802**	.731**	-.815**	.769**	.750**	.750**	-0.039	.289*	-.558**	-.629**	-.683**	.992**	.971**	1

Micronaire (Mic), MR% (Maturity ratio), Upper half mean length(UHML), Short fiber content (SFC), Uniformity index(UI), fiber strength (FS), realty strength (Rel. Str.), Yellowness (+b), reflectance degree(Rd), Trash /gram(TRCNT/ gr),Seed coat(CSNCNT/gr), Neps /gram(NPCNT/gr), spinning consistency index(SCI), Fiber quality index(FQI), and count spinning product (CSP).

Table (7) Simple correlation between blending ratio and fiber properties for Extra Giza 96 cotton variety.

			FIBRO TEST												
	MIC	MR	UHM	SFC	UI	Strength	Rel. Str.	+b	Rd	TRCNT/gr	CSNCNT/gr	NPCNT/gr	SCI	FQI	CSP
MIC	1														
MR	.920**	1													
UHM	.546**	.612**	1												
SFC	-.688**	-.816**	-.598**	1											
UI	.423**	.457**	.742**	-.322*	1										
Strength	.649**	.723**	.629**	-.790**	.420**	1									
Rel. Str.	.684**	.768**	.641**	-.774**	.433**	.322*	1								
+b	-.283*	-.278*	-.308*	.262*	-0.23	-.370**	-.338**	1							
Rd	.525**	.539**	.342**	-.432**	0.183	0.233	.305*	-0.053	1						
TRCNT/gr	-.714**	-.627**	-.543**	.488**	-.298*	-.539**	-.596**	.394**	-.370**	1					
CSNCNT/gr	-.826**	-.823**	-.598**	.710**	-.462**	-.565**	-.641**	0.214	-.515**	.511**	1				
NPCNT/gr	-.655**	-.678**	-.678**	.508**	-.534**	-.575**	-.644**	.512**	-.419**	.609**	.615**	1	-.**		
SCI	.709**	.734**	.762**	-.732**	.525**	.757**	.793**	-.452**	.369**	-.690**	-.690**	-.772**	1		
FQI	.711**	.700**	.704**	-.632**	.485**	.746**	.769**	-.525**	.335**	-.748**	-.636**	-.819**	.952**	1	
CSP	.730**	.769**	.742**	-.766**	.513**	.775**	.819**	-.457**	.340**	-.668**	-.714**	-.775**	.986**	.950**	1

Micronaire (Mic), MR% (Maturity ratio), Upper half mean length(UHML), Short fiber content (SFC), Uniformity index(UI), fiber strength (FS), realty strength (Rel. Str.), Yellowness (+b), reflectance degree(Rd), Trash /gram(TRCNT/ gr),Seed coat(CSNCNT/gr), Neps /gram(NPCNT/gr), spinning consistency index(SCI), Fiber quality index(FQI), and count spinning product (CSP)

Acknowledgements

The author thanks Cotton Res. Inst., Agric. Res. Center, Giza, Egypt.

Funding statements

The author declares that there is no funder.

Conflict of Interest

There is no conflict of interest in the publication of this article.

References

1. Youssef, A., El-Hariry, S. and Sief, M. Grade components in relation to growing season, cotton varieties and lint grade, *Egyptian Journal of Agricultural Research (Egypt)*, **72**(4) (1994).

2. Hussein, K., Ebaido, I. and Abd-Elrahman, Y. Influence of lint grade and impurities on the egyptian cottons cleanability, *Egyptian Journal of Agricultural Sciences*, **65** 236-242 (2014).

3. Leifeld, F. Influence factor'c'of cotton in the cleaning process, (1988).

4. Majumdar, P.K. and Majumdar, A. Predicting the breaking elongation of ring spun cotton yarns using mathematical, statistical, and artificial neural network models, *Textile Research Journal*, **74**(7) 652-655 (2004).

5. Nomeir, K. and Abd EL-Hameed, N. Report of quality control of cotton spinning industry, *Textile consolidation fund*, (2005).

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

7. Beheary, M., Elsaid, I.A., El-Banna, A.A., El-Shayeb, Y. and Taha, N. The relationship between cotton variety and lint cotton grade on fiber properties, *Journal of the Advances in Agricultural Researches*, **25**(1) 2-13 (2020).

8. Gadalla, A.-B.I., Abd-Elrahman, Y.S. and Elsayed, E.R. Effect of cotton fiber fineness, maturity and trash content on nep formation in raw cotton and spun yarns, *Journal of Textiles, Coloration and Polymer Science*, **20**(2) 313-332 (2023).

9. Uster, H. Spectrum: High volume instrument for fiber testing, *Application handbook. Zellweger Uster*, (1999).

10. Ridgman, W. Statistical methods, 8th edn, by gw snedecor & wg cochran. Xx+ 503 pp. Ames: Iowa state university press (1989). $44.95 (hard covers). Isbn 0 8138 1561 6, *The Journal of Agricultural Science*, **115**(1) 153-153 (1990).

11. Draper, N. Applied regression analysis, McGraw-Hill. Inc, (1998).

12. El-Bagoury, M.I. Technological evaluation of blending different lint grade of some egyptian cotton cultivation, Faculty of agriculture (sababasha), Alexandria. Uni Egypt, (1992).

13. Salem, M.S.A., El-Maghraby, A.F., Mabrouk, K.I.K. and Alam, A.E. Fiber quality and yarn properties of some egyptian cotton as affected by grades and spinning variables, *Egyptian Journal of Applied Sciences*, **21**(6B) (2006).

14. Elbanna, M.N., Beheary, M.G., Ibrahim, I.A., Elbeltagy, M. and Abou-khalil, M.M. Relationship between classer grade, the 3-digit color and trash grade attained from the hvi, *Journal of the Advances in Agricultural Researches*, **24**(1) 2-14 (2019).

تأثير نسبة خلط رتب القطن الشعر للأصناف المصرية على صفات جودة التيلة

أبوبكر ابراهيم محمود جادالله، ياسر شكري عبدالرحمن* و ناصر سيد ناصر

معهد بحوث القطن، مركز البحوث الزراعية، الجيزة، مصر.

الملخص

الهدف من هذه الدراسة هو تحديد تأثير نسب الخلط المختلفة لرتب القطن الشعر على خواص جودة الألياف. تم استخدام ثلاثة أصناف من القطن المصري (إكسترا جيزة 96، سوبر جيزة 94، جيزة 95) بالإضافة إلى عشرة نسب خلط لرتب القطن الشعر من كل صنف (رتبة جود،50%جود + 50% فولى جود فير،50%جود+ 50%جود فير ، 50% فولى جود فير + 50% جود فير،75% جود + 25% فولى جود فير، 75%جود +25% جود فير،75% فولى جود فير+ 25% جود فير، 25% جود +75% فولى جود فير،25%جود +75% جود فير،25% فولى جود فير +75% جود فير). أدت زيادة نسبة الرتب المنخفضة في الخلطة إلى انحفاض قيم طول التيلة، انتظام الطول، الميكرونير، نسبة النضج، متانة التيلة، درجة انعكاس اللون وزيادة محتوى العينة من الشوائب بالجرام، أغلفة البذور ونسبة العقد/جرام. أعطت الرتبة جود (*G*) أفضل خواص جودة للتيلة و مدى ملائمة الغزل (*SCI*) ، معامل الجودة (*FQI*) وحاصل الغزل. أظهرت النتائج وجود ارتباط معنوى سالب بين كلا من محتوى العينة من الشوائب و محتوى الشعيرات القصيرة مع معظم خواص جودة الالياف. نسب الخلط 75٪ جود + 25٪ فولى جود فير هى نسبة الخلط المثلى. بينما، أعطت نسبة الخلط 25٪ فولى جود فير + 75٪ جود فير أقل صفات جودة للألياف.

الكلمات المفتاحية: نسب الخلط ، رتب القطن الشعر، القطن المصرى.