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THE EFFECT OF BLENDING A RATIO OF EGYPTIAN CHORISIA SPP. FIBERS WITH COTTON AND POLYESTER WASTES ON SOME PROPERTIES OF THE YARNS

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ABASTRACT:

This research may be the first to use the hollow fibers that are rarely grown trees though they are found in Egypt and in many countries of the world under many types such as chorisia , bombax, kapok and java, and some of these types exist in Egypt but the most famous are the chorisia spp. trees . the organizations did not pay attention for the fibers of these trees but they pay attention for using it in the medical field . These fibers are light, very smooth, short and free of convolutions. They are not immature fibers, so when they are spun they must be blended with other fibers. This research sheds light on blending chorisia fibers with cotton and polyester wastes to make two blends, the first of which using ratios of 70% cotton wastes and 30% polyester wastes and the second using the ratios of 40% korisia , 30% cotton wastes and 30% polyester wastes were spun using the open-end spining to produce yarn counts 6/1 13/1 17/1 Ne. Tests on yarns produced such as tensile strength, elongation, the proportion of yarn irregularity and yarn imperfections were carried out and the results in the two blends were compared. One of the most important results is low tensile values, high ratios of elongation, imperfections and yarn irregularity c.v$_m$% in the second blend which contains chorisia fibers from those in the first blend, which contains no chorisia.

Keywords: Blending , Chorisia Fibers , Cotton Wastes, Imperfection/ Km , Polyester Wastes

I. INTRODUCTION

Chorisis spp. is a tree that produce chorisia fibers that considered a hollow fibers such as kapok tree and bombax tree , their family is Bombacaceae [1--3] these fibers are natural cellulose and have smooth silky surface [4-5] Many researchers studied chemical and physical compositions of kapok[3--5] and bombax [6-7] . Hollow fibers used in many fields such as wadding [8] , blended yarns [5,9,10] and fabrics products [11- 12] . Bombax , kapok and chorisia impossible to spun separately due to short length ,low density and very smooth surface[4-5] so that they should be blended with other fibers like cotton, polyester[5-9] , polypropylene[12] and sisal[13] ….. etc .In a research the blended yarns cotton / kapok were produced using different blending ratios of 80: 20, 70: 30, 60:40and 50: 50% where they were produced with rotor spinning. One of the most

important results that by increasing the ratio of kapok both tensile strength and quality of yarns decreased [5] . After a period of time the ring [9, 14]and compact spinning were produced for the production of blended yarns .In other research the blended yarns were collected from various manufactures these yarns content 14 type of kapok blended yarns and 4 types of cotton yarns at different blending ratios that manufactured through rotor, ring and compact spinning . then measured yarn fineness/unevenness , yarn defects , yarn hairiness , and breaking tenacity , then comparing between the results of the quality of kapok blended yarn , It was found that the compact spinning produced the higher quality of the blended yarn [9] . another research made blended yarns of kapok/ cotton ratios of 70:30% , 60:40% ,40:60% , count yarns 28 tex and 28 tex 100% cotton then the yarns were treated by mercerization process with a solution of NaOH with various concentrations : 180g/L, 220g/L, 250g/L, 280g/L .[10] The research results are that the mercerization influenced the properties of blended yarns containing a ratio of Kapok[10,15] . When the alkali concentration increased from 180 g/L to 250g/L , the strength of treated blended yarns increased and elongations at breaking decreased. When alkali concentration reached to 280 g/L , the strength of blended yarns with high content of kapok fibers decreased and elongation increased [10] Mercerization treatment had little or no apparent effect on the chemical composition of the blended yarns containing kapok fibers ,but led to decreasing on crystallinity of the blended yarns , and parts of cellulose I were transformed into cellulose II [10,15] . chorisia spp. Trees were planted in different places in Egypt , they are considered medical plants and they are used in the pharmacy field [16 - 17] . Most of the researches used the bombax and kapok fibres to produce yarns and fabrics but this research will use the egyptian chorisia fibrer and bleded it with a certain ratio with the wastes of polyester and cotton to improve the chorisia properties and use less amounts of egyptian cotton especially that the chorisia have lots of seeds and their production is great . In a certain season the chorisia trees are harvested . these trees have less cost in their cultivation and in converting them to yarns .

II. EXPERIMENTAL

2.1 Materials

Egyptian chorisia spp. fibers considered a hollow fibers . It was used and blended with cotton wastes and polyester wastes to make two blends .

2.2 Preparation of blending samples

The first blend consists of 70% cotton wastes and 30% polyester wastes .The second blend 40%chorisia, 30% cotton and 30% polyester. From the previous two blends three count yarns will be produced. In the second blend chorisia fibers was blended in chute feed with cotton wastes and polyester wastes to produce card sliver then drafting them then The draft sliver will be spun

2-2-1 The specifications of samples yarns

Produced 6 single yarns samples of count 6/1, 13/1and 17/1 Ne from two blends and specifications as shown in table 1

2-2-2 The specifications of spinning machine

It has been produced yarns on the Open- End Spinning machine of two blends and machine specifications were as follows:

Machine kind Schlafhourst – German
Rotor speed 42000 rpm
Opening roller 8500 rpm
rotor Diameter 45 mm

Table 1 The specifications of the blended yarns

No	Yarns material	yarns blending ratio	yarn count Ne	yarn Twist/inch
1	Cotton wastes Polyester wastes	70% Cotton wastes 30%Polyester wastes	6/1	14
2			13/1	21
3			17/1	24
4	chorisia Cotton wastes Polyester wastes	40% chorisia 30%Cotton wastes 30%Polyester wastes	6/1	14
5			13/1	21
6			17/1	24

2-3 Testing of the yarns

Laboratory tests on the produced yarns samples were carried out at the standard conditions for textiles with an air temperature (20 ± 2° C) and relative humidity of air (65± 5%) according to the American society of testing materials (ASTM).

2-3-1 Tensile strength g/f and elongation % of yarns :

The yarns Tensile strength, elongation and tenacity were measured and the test was carried out on the 1,000 meters for each yarn by the device Uster 3

2-3-2 Yarn imperfection / km and C.Vm %

Thin , thick and Neps places values and C.Vm % were measured by Uster 4

III. RESULTS AND DISCUSSION

After the production of yarns from the two blends and testing it was noted marked differences as a result of the blending ratios of chorisia , Confirms that chorisia has an effect on the properties of the yarns .Table 2 shows the results of tests

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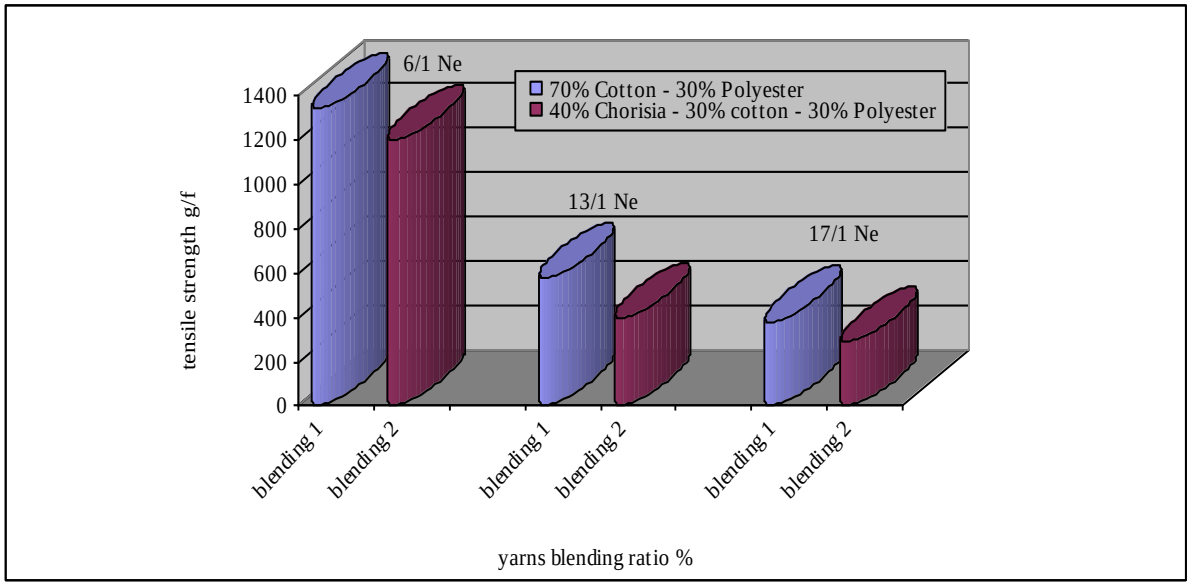
Table 2 : The results of testing the samples of the blended yarns

No	yarns blending ratio	Yarn Count Ne	Tensile strength g / f	Elongation %	Yarn imperfection/ km			C.Vm%
					-50% km Thin	+50% km Thick	+280%km Neps	
1	70% Cotton 30% Polyester	6/1	1338	13.58	0	6	6	11.8
2		13/1	578	10.8	0	25	14	13.86
3		17/1	381	9.8	1	35	22	14.51
4	40 % chorisia 30 % Cotton 30 % Polyester	6/1	1193	14.69	0	25	10	18.21
5		13/1	392	11.28	3	36	25	14.19
6		17/1	288	10.21	9	40	27.5	17.45

3.1 The Effect of blending on the Fiber Tensile Strength g/f and Yarn Elongation %

Table 2 and Fig. 1 show that the tensile strength for all yarns in the second blend scored lower values than that in the first blend at the same yarn counts. This is due to the presence of chorisia fibers by 40% of the blending ratio since they are not fully grown fibers as the hollow inside the fiber is greater than its wall consisting of deposited cellulose layers and thus the tensile strength of the fiber is low thus resulting in a lower tensile strength. In addition, the chorisia fibers are very soft and it has no convolutions and it is light and short length and all this leads fibers to slide within the yarn structure so that not all the fibers are arranged in the longitudinal direction of the yarn, which reduces its tensile strength.

Yarn elongation in the second blend, as shown in Fig. 2 scored higher values than that in the first blend at the same yarn counts. The reason is that the chorisia fibers are light, easy to bend and the fibers may be in the cross position as a result of sliding. All this leads to an increase in elongation of yarns when they are under tension.



Figurer I. The effect of blending on the tensile strength g/f of yarns

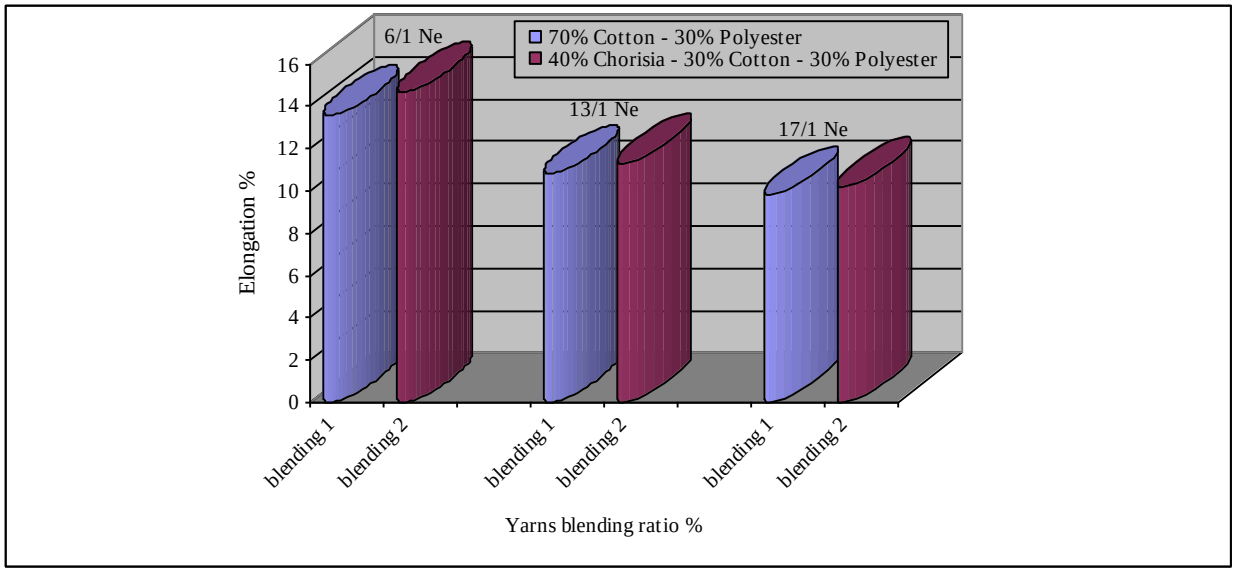


Figure 2. The effect of blending on the elongation % of yarns

3.2 The Effect of Blending on the Yarn Imperfection /km

In the second blend as shown in Fig. 3 thick places scored higher values than those scored by their corresponding in the first blend at the same yarn counts. The reason for this is the presence of chorisia fibers with a great difference in fiber thickness. The thick places also scored high values with low thickness of the yarn (greater yarn count) where the thick yarns have greater number of fibers which reduces the number of thick places in the yarn and the opposite happens for the thin yarns.

For high neps values in the second blend as shown in Fig. 3 this is due to the presence of hairiness intertwined on the surface of the yarn forming neps. In addition, the cotton and polyester wastes that basically contain neps, which increase in the presence of chorisia fibers that are easy to bend and slide. It was also noted that the ratio of neps increases with greater yarn count for the same reason previously explained.

For thin places as shown in Table 2 they scored values only at yarn count 17/1 in the first blend. They also scored values in the second blend at yarns counts 13/1 and 17/1. That is, thin places appear when the yarns thickness is low.

3.3 The Effect of Blending on the Ratio of Yarn Irregularity c.v$_m$%

In the second blend as shown in Fig. 4 c.v$_m$.% scored higher values than those scored by their corresponding in the first blend at the same yarn counts. Notably, the high ratio of c.v$_m$% in the two blends, because blending cotton and polyester wastes with chorisia fibers result in a higher c.v.% value in the second blend. The fibers always undergo a disorder, leading to the difference in the number of fibers in the yarn cross-section in addition to the difference of fibers fineness in the same material. All this led to irregularity of yarns and the appearance of imperfections. The c.v$_m$% values rises with increasing the yarn count in the two blends .

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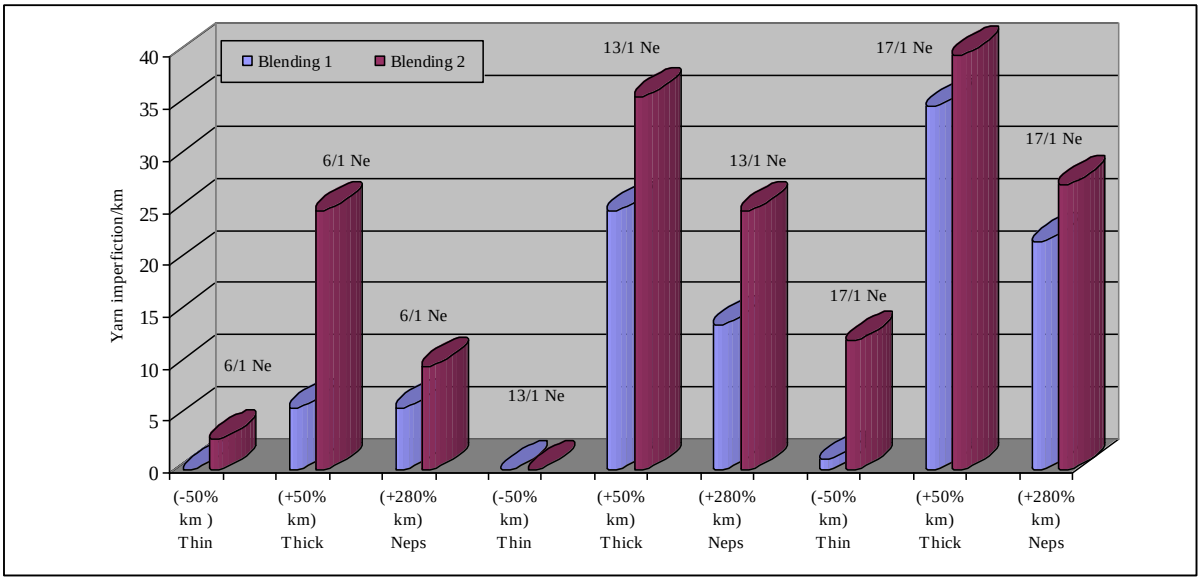

Figure 3. The effect of blending on the yarn imperfection / km

Blending 1 = 70 % cotton-30% polyester

Blending 2= 40%chorisia- 30%cotton-30%polyester

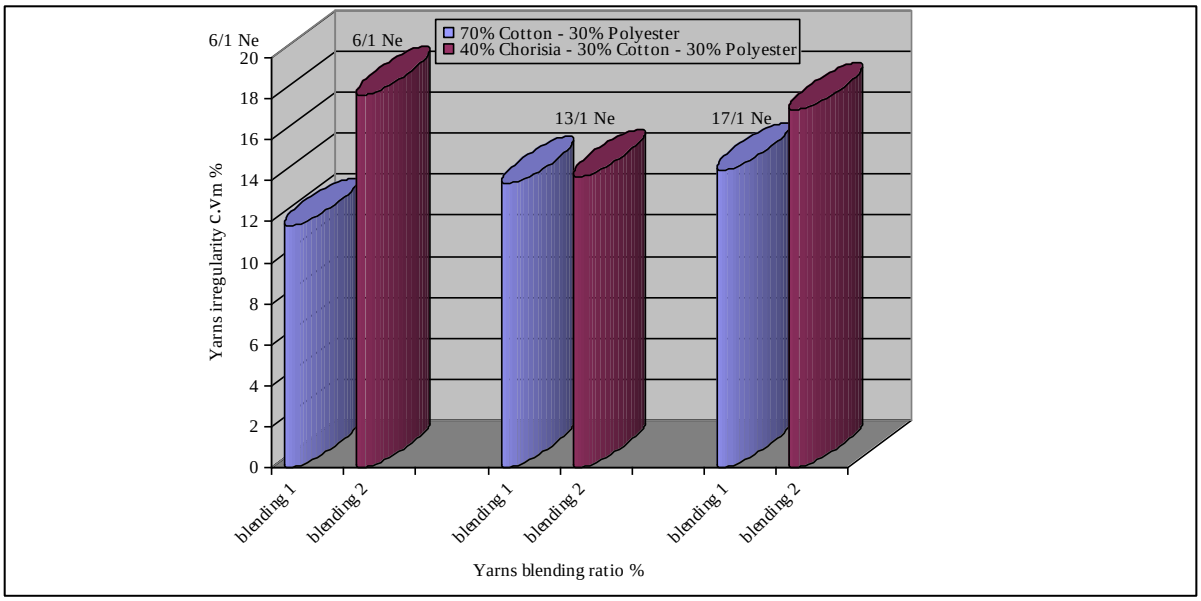

Figure 4. The effect of blending on the yarn c.Vm %

IV. CONCOLUSION

The presence of chorisia fibers in the blend leads to a lower tensile strength, yarn quality and regularity. chorisia fibers have led to improving the yarn elongation. They can be used as wefts or blend with many other wastes or raw materials.

The cotton ratio can be dispensed with and replaced by chorisia fibers, thus saving the cotton. The advantages of these fibers include: they do not need a ginning process, or passing on the opening and cleaning line or beaters, their seeds are easy to get rid of and this leads to saving energy and thus reduces costs.

This can also open new venues for researches on this material to make advantages of them larger with making amendments in the production line to suit the nature of this material .

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