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Effect of Cotton Fiber and (Chorisia spp.) Blended Yarns on Mechanical and Physical Properties of Yarn and Fabrics with Different yarn Count

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ABSTRACT

The paper providesthe effect of some properties on chorisia spp. / cotton (G86) blended yarn in the ratio of (50%:50%). In this regard one type of yarns was produced in the ring frame withfour different counts were produced (30s -28s - 25s - 22s). The blending was carried out in the draw frame.Chorisia fiber is considered as an unfit for textile fabrics. The weavability of chorisia fiber can be improved by blending with other fibers, such as cotton fiber.Chorisia fiber is a natural and environmental-friendly cellulosic fiber with a lightweight of volume units, hollow structure, and no residue of pesticides and chemicals. Chorisia fiber is also a heat and sound insulation material as well as a good filling and floating material. It is currently the only natural cellulosic fiber that has not been developed and applied in the field of dress adornments, due to its high resiliency, low cohesion,and low spinnability, but it has high dye-uptake, dyeing performance of chorisia fiber has not been systematically researched.Results have proved the improvement of dyeing for the product blended yarn before and after dyeing compared to Egyptian cotton G86. The color strength K/S of dyed blended yarn is slightly higher than the control yarn samples, and conversely R% (Reflection). This indicates higher dye absorption in chorisia / cotton yarn. The K/S of yarns increases with increases in the yarn count till it reached 30s.A greater relative decrease in air permeability was observed with increasing chorisia fiber content. The cotton/chorisia blended fabrics exhibited lower air permeability values as compared to cotton fabrics.The thermal conductivity values of these fabrics were compared and it was found that, as the yarn gets finer the thermal conductivity decrease. The heat retention of chorisia was better than that of other fibers due to the static immobile air held in the large lumen region of chorisia. Chorisia has good heat insulator.

Keywords: Blending, Chorisia Fibers, Kapok Fibers, Cotton Fibers, Yarn Properties, Scouring and Dyeing.

I. INTRODUCTION

Fiber blending is commonly defined as the process of forming a fiber mixture by combining different fiber components, either of the same fiber type or of different fiber types, together to produce a homogenous fiber assembly, the main purpose is typically to produce a fiber assembly of homogenous fiber mixture that exhibits predetermined values of fiber characteristics that cannot be found in only one type of fibers.

Chorisia fiber is known as the soft gold in plants for its finest and lightest quality, highest hollowness, and most warm nature. Due to their wide lumen filled with air, their smooth surface, and low strength, Chorisia fibers are considered unfit for textile fabrics in the early years **[Fengel and Wenzkowski 1986]**. With the development of technology, the spinning of 100 % Chorisiafibers beyond lap formation stage is not possible, but Chorisiayarn property and weavability could be improved through sizing or blended spinning **[Yang and Jin 2008]**. To resolve the problem of pure Chorisia yarn such as low strength, much hairiness, poor wear resistance, and difficult to weave, sizing experiment of 27.8 tex pure Chorisia yarns was carried out in order to improve yarn performance and meet the requirements of weaving. According to the characteristics of Chorisia yarns, a mixed size composed of acid-modified starch and poly(vinyl alcohol) (PVA) was selected to size Chorisia yarns. The results show that low solid content helps size penetration and facilitates yarn strength and elongation improvement **[Yang 2010]**. Furthermore, the spinning of Chorisia fiber blended with cotton fiber is largely successful. With an increase in Chorisia content in the blend, the yarn regularity and tenacity decrease, while the yarn extensibility increases. It is considered that Chorisia fiber can be blended with cotton for spinning yarn, but the content of Chorisia fiber should not be more than 50 %, or the blended yarn property and weaving processing will be effected **[Dauda and Kolawole 2003 ; Yang et al. 2013]**. Also, the total cost of production of the yarns decreases significantly as the Chorisia content increases in the blend.

Chorisia is a silky fibre obtained from the fruit or pods of Chorisia tree.Chorisia, like cotton, grows in a seed pod. The Chorisia tree, sometimes called thesilk cotton tree, is native to the tropics. The dried fiber can be easily separatedfrom the seeds. The fibers are contained in the outer shell. When the fruit orpod ripens, the fibers which are in small clumps loosely surrounding the seedsbecome entirely free from the shell. Individual Chorisiafibers are from 1 to 1.5cm in length **[Li 1984]**.Under a microscope, Chorisia fiber appears as a long narrow cellwith frequent folds with a thin wall and hollow structure. The walls forma smooth, closed tube with a large cavity called lumen. Each Chorisiafiber iscoated with a waxy substance called cutine. It is the cutine and lumen whichgives Chorisiafiber, its buoyancy. Chemically, Chorisiafiber consists of cellulose,although it contains polysaccharides called pentosan and an inert plastic-likematerial called lignin. Chorisiafibers are smooth and do not contain scales. Itweighs only one-eighth as much as cotton, is as warm as wool and smooth assilk **[Sunmonu&Abdullahi 1981]**.

The Chorisia fiber is white and silky. The fiber has exceptionalresiliency and buoyancy, but it is too brittle to be spun readily into yarns. As aresult, the uses of Chorisia have been limited to stuffing and insulationmaterials. Because of its buoyancy and resistance to wetting, chorisia has beenused as a filling for life preservers. Having a hollow and air filled structure;Chorisia can remain in water for hours without an appreciable absorption ofwater, while holding up considerable weight. The degree of polymerization ofChorisiafiber is 3300, moisture regain is 10% and specific heat of fibers is0.324 cal/g c **[Meiwu et al 2010]**.

Chorisiaspp. fibers have very good acoustic damping property due to its natural hollow structure. The sound absorption is directly affected with bulkiness of the fabric, thickness and arrangement of fibers but less dependent on fiber length [9].

Heat is transferred by means of conduction convection and radiation. Of these, conductivity is the most important mechanism of heat transfer. The heat insulating performance of wadding is usually represented by the combination of conductivity and heat convection. The conductivity coefficient (W/m°C) of immobile or trapped air can be regarded as a major contributor to the thermal property. The properties and the structural configuration of the fibrous materials play a very important role in thermal behavior. The heat retention of chorisia was better than that of other fibers due to the static immobile air held in the large lumen region of chorisia. The chorisia 's conductivity dregs between 0.03 and 0.04 W/m.ºK for density which varies between 5 and 40 kg/m3. Taking also into account year average diffusivity of 17.1x10G7 m2/s, chorisia has good heat insulator. [10].

Chorisia fiber because of its short length of low intensity of cohesive property difference and lacking of elasticity so that it is difficult to solely spinning these deficiencies limits the textile clothing in the aspect of application and development. Using chorisia fiber and other fiber, product with super high heat preservation, strong and fast moisture conductivity can be achieved.[11]

Dyeing of chorisia comprises the following steps: pre-treating chorisia textile so as to remove some waxy substances, impurities and the like on the surface of the chorisia fiber and achieve certain whiteness; and then adding a complexion rare earth mordant into a dye bath of the pretreated chorisia textile, and mordant dyeing the chorisia textile. Rare earth elements ions and the dye of fiber and other compounds of the hydroxyl group azo group or sulfonic acid group and so on to form the compound of the rare earth are used for printing and dyeing because of the rare earth element the fiber and the impurity on the complex containing the element crack impurity form the complex compound after washing. They are then dispersed into the solution to improve the capillary effect [12]

This research sheds light on blending chorisia spp. with cotton fibers, the objective of this research is producing a blended yarn mixing ratio (50% chorisiaspp.:50% Cotton fiber G86) with different yarn count Ne. (30s -28s - 25s - 22s) to producedfabrics from these yarnsand study the response of the yarnsandfabrics to chemical treatments, dyeing and measuring its mechanical and physical properties.

II. MATERIALS ANDMETHODS

2.1. Materials

Egyptian cotton fiber G86 and chorisia spp.were blended to make yarn of ratio (50%:50%) with different yarn count Ne. (30s -28s - 25s - 22s).

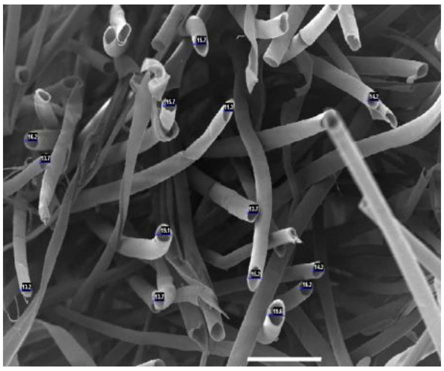


Fig. 1.SEMImage ofChorisiaSpp.Fiber

Fig. 2.Chorisia Spp.Fiber

2.2. Methods

The chemical properties of the fibers and blended samples was measured and carried out in Chemistry Research section of cotton and textile fibers at Cotton Research Institute, the process of spinning of the samples mixed on the ring spinning machine, they were carried out in “Elshorbagy Factory” at Embaba.

2.2.1The specifications of spinning machine were showed in Table (1)

Blow Room	Trutzschler - German
Carding m/c	Trutzschler - DK 760
Card speed	80 m/s
Drawing Frame	Riter RSB D 30
Roving Frame	FL 14
Countof Roving	No. 1
Ring spinning frame	Toyoda – Japans - RY 1984
Spindle speed, rpm	11500
Winding m/c	Morata 7. II

Table (1): Carded yarns - (Ring Spinning) processing outline for the blending yarn under study

2.2.2.The specifications of weaving machine were showed in Table (2)

A process of weaving the 4 fabrics replica of the samples pad 1 \ 1 was carried out in factory at Bejamm - Shubra Al Khaimah with Shuttle loom.

Picks (1/cm)	20
Reed (1/cm)	20
Reed - Width	17 cm
Dents	10
Denting	2 ends / dent
The Count Warp	30/2 cotton / polyester
The Count Weft	(30s -28s - 25s - 22s)
TwistMultiplier	(4.7 – 6.4 – 5.4 – 5.3)

Table (2):Fabrics Specification

2.3.Chemicals

2.3.1.Finishing blended yarn:

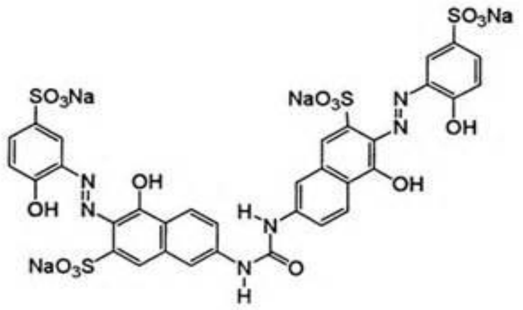
A process of finishing and dyeing was carried out in Chemistry Research section of cotton and textile fibers at Cotton Research Institute. The chorisia / cotton blend yarn and fabrics were scoured and dyed according to standard methods as described below:

2.3.1.1.Step A: - Pretreatment "Scouring (Boiling Off)":

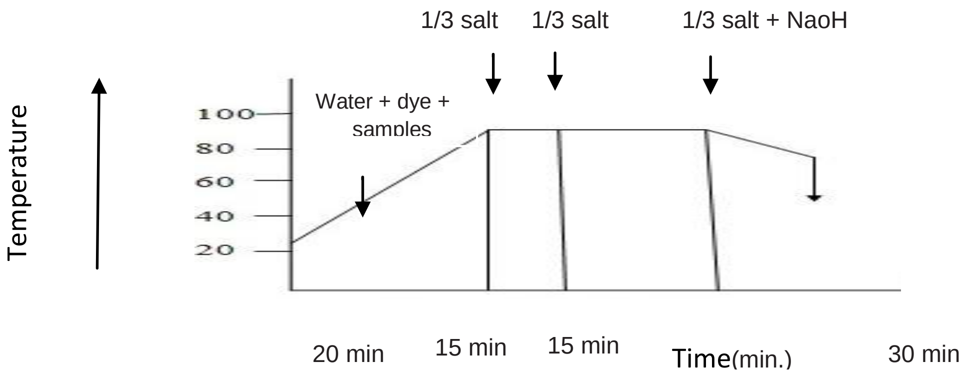
An alkaline pre-treatment in water solution containing sodium hydroxide 4.0 % (o.w.f) and wetting agent – Triton X- using liquor ratio 1:50 at boiling for 90 minutes. Then rinsing with hot and cold water then air dried at room temperature.The purpose of this process is to get rid of foreign substances, whether natural or added, and boiling it in a solution of caustic soda to turn it into simple materials can easily be removed with water.

2.3.1.2. Step B: - Dyeing:

The dye used in this investigation was the reactive dye (first REA. Orange ME2RL).The dye bath prepared containing the required amount of dye solution 3% dye. The temperature raise to 30°C and the samples add, the dyeing continue at this temperature for 10 min., preparing the required amount of salt solution 50g/L NaCL and divided into three equal portions. The temperature raise to 80°C through 20 min. and the three equal portions of salt solution add at equal intervals through this period. Preparing the required amount of alkali 1gm/L NaOH then the first portion of sodium hydroxide add and the dyeing continue for 10 min. followed by adding the second portion of sodium hydroxide, finally the dyeing continued for 30 min.



(Fig.3) Structural formula of the reactive dye (first REA. Orange ME2RL)



(Fig.4) The curve of dyeing procedure

2. 3.1.3- Step C: - Washing off:

The dyed samples were rinsed with cold and hot water followed by soaping in a bath contained 2g/L nonionic detergent at 60°C for 30 min to ensure good washing fastness.

2.4. Evaluation test:

2.4.1.Yarn properties:

Yarn properties were measured for each of the raw and treatment 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).

Tensile strength (g/f) and elongation (%) were measured by the Statimat ME Automatic tensile tester (according to A.S.T.M.D: 2256 -91) with a testing speed of 5000 mm/min with attest length of 50 cm was used for the testing of tensile properties. Average of 120 tests for breaking load and elongation value were taken for the calculation for tenacity and breaking extension of the samples.

Color Measurements (Spectrophotometer), Color Strength (K/S) and Reflections (R %) were measured using the double beam spectrophotometer (Perkin-Elmer Company – USA, of model Lambda 35) the measurement was done in accordance to ASTM E313-96 using CIE color system coordinates.

K/S = (1-R) 2 / 2R

Where:-

R: Decimal fraction of the reflectance of dyed samples.

K: Absorption coefficient.

S: scattering coefficient

2.4.2- Fabrics mechanical and physical properties:

Tensile Strength - It is the property of a fabric defined as the ability to resist stress and is expressed as tensile strength (pounds per square inch) or as tenacity (grams per denier). The tensile strength (g/tex) and elongation (%) were measured according to ASTM D5034-09 using Shimadzu Autograph S-500 Testing Machine- Japan at Textile metrology Department – National Institute for Standard (NIS – Egypt).

Thermal conductivity- Fabric’s thermal conductivity is one of the important factors that influence the effectiveness of body comfort (Booth, 1983). This property was determined using SASMIRA thermal conductivity apparatus following ASTM D-1518-64.

Air permeability -was determined by Prolific Air Permeability tester (FX3300 SDL) as per the standard procedure ASTM D737-10.1520/D0737-04R08E02 and the results were expressed in terms of (125 pa, m3/m2/s).

III. RESULTS AND DISCUSSION

3.1. Mechanical and Physical properties of Chorisia Spp. / Cotton blended yarn

After the production of blended yarns and testing it was noted marked differences as a result of the variation of yarn count Ne., this has an effect on the properties of the yarns Table (3) shows the results of tests:

No.	Blended Yarn	Tensile Strength (g / f)	Elongation %	R%	K/S
1	**22 s**	28	4.12	14.27	2.0
2	**25 s**	25	4.33	14.8	2.23
3	**28 s**	21	5.21	15.82	2.44
4	**30 s**	16	5.52	17.77	2.57

Table (3) Show the result of testing of blended yarn ratio (50%:50%) with different count Ne.

3.2. Effect of yarn count Ne. on theblended yarn tensile strength (g/f) and elongation (%):

The tensile properties of any spun yarn depend upon the properties of its constituent fibers, the arrangements of these fibers within the yarn (that is, on the yarn structure) and the mass distribution of yarn along its length. The structure is primarily decided by the yarn formation mechanism and the process parameters. It is therefore, important to establish which fiber and yarn parameters influence yarn tensile properties and if possible, to derive the functional relationship between them, from table (3) and figure (5) were extracted that the count Ne. was thin, the tensile strength less, or increased in yarn count reduced yarn tenacity. As expected increased upper quartile length increased tenacity. Obviously, fiber strength is the most important factor for yarn tenacity. The blending of a relatively weak fiber (i.e., chorisia) with a strong fiber (i.e., cotton) leads, as expected, to some losses in yarn strength. The properties of the blended yarns cannot merely be explained in terms of the proportions of the different constituent fibers in the blends. In fact, the overall properties of the blended yarns are related to the blend ratios, the corresponding properties of each component and the interactions of the components themselves. [14]

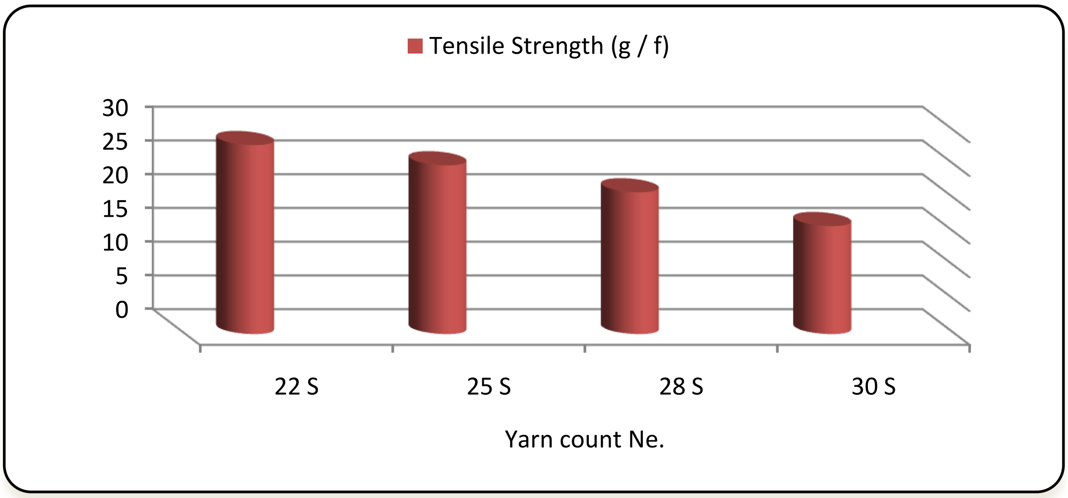


Fig. (5) Effect of yarn count Ne. on the blendedyarntensile strength (g/f)

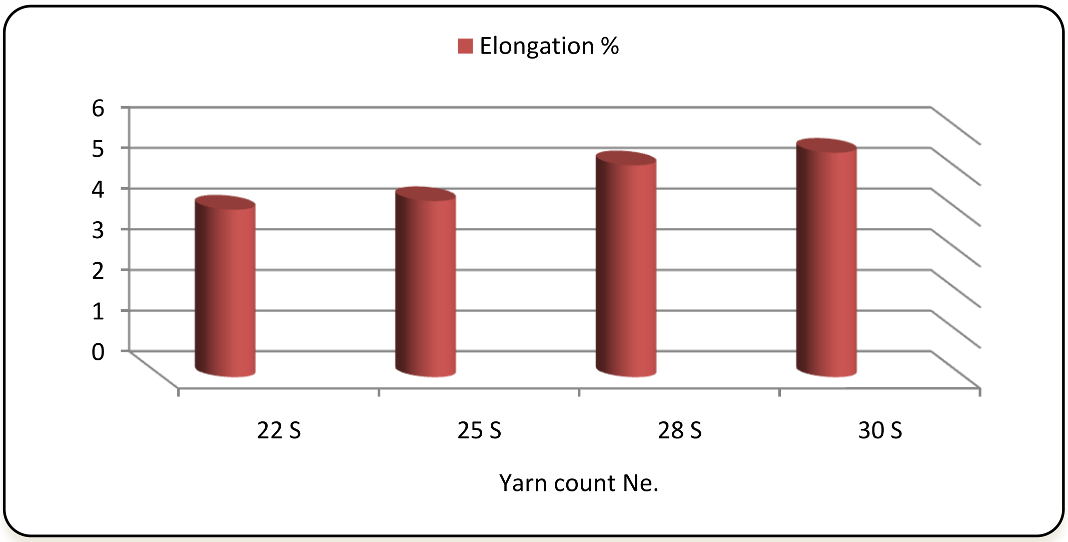


Fig. (6) Effect of yarn count Ne. on the blendedyarn elongation (%)

Table (3) and figure (6) show the breaking elongation that is the mostly influenced by yarn count. Upper quartile length and fineness are the most important fiber properties for the yarn breaking elongation. Other important parameters are yarn twist, roving count and roving unevenness. All parameters have positive effect except roving unevenness and fiber diameter. Several researchers concluded that yarn elongation is chiefly influenced by fiber elongation and fiber strength. We cannot measure fiber elongation and strength on an AFIS instrument. The number of fibers in the yarn cross-section affects the mechanical properties of the yarn. When the blended yarn is subjected to a force, the fibers of both components will be elongated as the force increases, until the fibers with smaller elongation break and so transfer the entire load to other fibers. If there are enough fibers with higher elongation in the yarn cross-section, the blended yarn will not break. Fiber slippage plays a particularly important role when component fibers in a blended yarn have different values of fiber breaking elongation. [14]

3.3.Chemical properties of chorisiaspp. / cotton blended yarn

Chorisia fiber contains high contents of cellulose and lignin, and these components show high affinity to dyes in aqueous solution. However, chorisia fiber has not been investigated for its adsorption characteristics for dyes to the same extent as other agro-products, due to the fact that the waxy layer on the surface of chorisiafiber makes it water repellent. Therefore, chorisia fiber has to be pretreated to make it hydrophilic before it is used to remove dyes from aqueous solution. When treated with sodium chlorite, chorisia fiber transforms from hydrophobic to hydrophilic, and simultaneously, the lignin can be removed from chorisia fiber, leading the amorphous region present in chorisia fiber to expand **[Wang et al., 2012a]**.

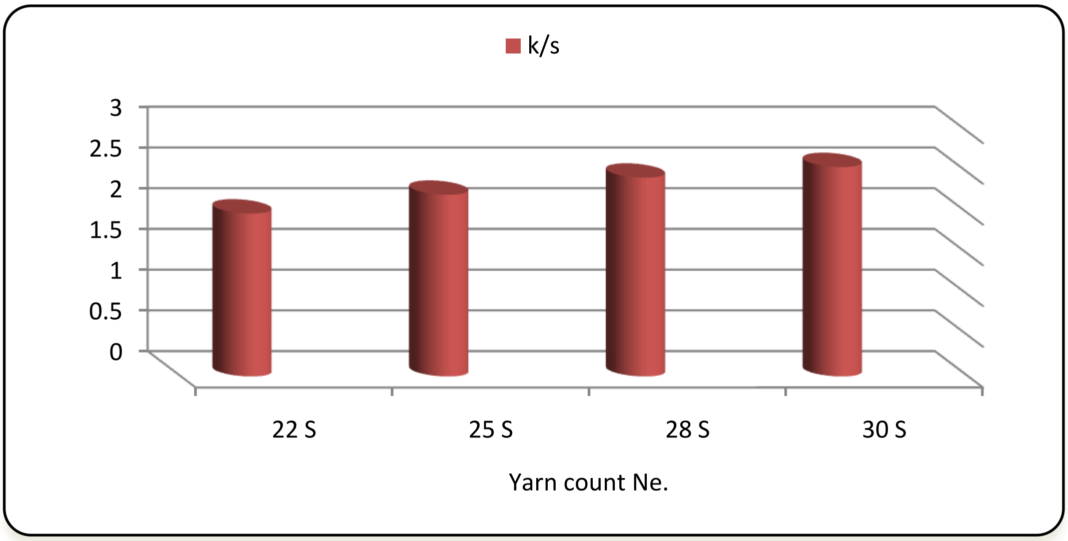


Fig. (7)Effect of dyeing processes on blended yarnColor Strength (K/S)

It is clear from table (3) and figures (7) that the color strength K/S of dyed blended yarnincreases with increases in the yarn count and twist factor valuesand conversely R% (Reflection). The differences might be due to the more even yarn structure and less hairiness of the yarn. The yarn surface regularity should be independently considered for dyed yarns because of the fact that the surface characteristics have an effect on the reflectance values after dyeing. It can be observed that the color efficiency values of 30 Ne. are generally higher than 22 Ne. These results might be due to the maturity % of the cotton fiber and chorisia fiber which indicates that there is more precipitated cellulose (crystalline or amorphous) in chorisia thus producing more free hydroxyl groups which can react with the reactive dye to give a higher K/S. The increase in color properties can be explained generally because of the destruction of crystalline regions during swelling and changes in microstructure and morphology.

3.4. Mechanical and physical properties of Chorisia Spp. / Cotton blended fabrics before and after dye:

After the production of blended fabrics and testing it was noted marked differences as a result of the variation of yarn count Ne., this has an effect on the properties of the fabrics Table (4) shows the results of tests:

No.	Fabrics Symbols	Tensile Strength (N)		Elongation %		Air Permeability (m3/m2/s)		Thermal Conductivity(W/cm.deg C)	
		Raw	Dye	Raw	Dye	Raw		Raw	
						Cotton	Blended	Cotton	Blended
1	**22 s**	123	130	11.1	10.8	119	72	45.86	58.94
2	**25 s**	118	129	10.4	14.5	127	78	41.77	56.51

3	**28 s**	120	143	14	18	138	82	36.75	55.17
4	**30 s**	102	123	12.9	18.5	144	94	33.59	54.04

Table (4) Show the result of testing of fabrics with different count Ne.

3.4.1 Effect of yarn count Ne. on the fabrics tensile strength (g/f) and fabrics elongation (%)before and after dye:

As can be seen in table (4) and figure (8), the pre-treatment and the dye processes brought about a considerable improvement in the tensile strength of blended fabrics. The rate of increase varied between 4.1% and 19.5%, depending on the yarn count, after the dyeing process; however, their fabric tensile strength was still higher than the tensile strength of raw fabrics. The physical and chemical properties of fibers such as dye absorption; strength etc. are close related to the structure of non-crystalline sections. Due to the temperature of the heat-setting applied, the rate of crystalline sections, the average distance between crystalline centers and the number of bonds between macromolecules in fibers increased, as a consequence of which the degree of orientation in fibers increased, causing an improvement in the fabric tenacity.[16]Also, results showed that the breaking load increased with reactive dyeing because of the effect of chemical bonds between the dye and the fibers. Moreover, reactive dye can also be bonded with more than one fiber consequently increasing the tensile strength.

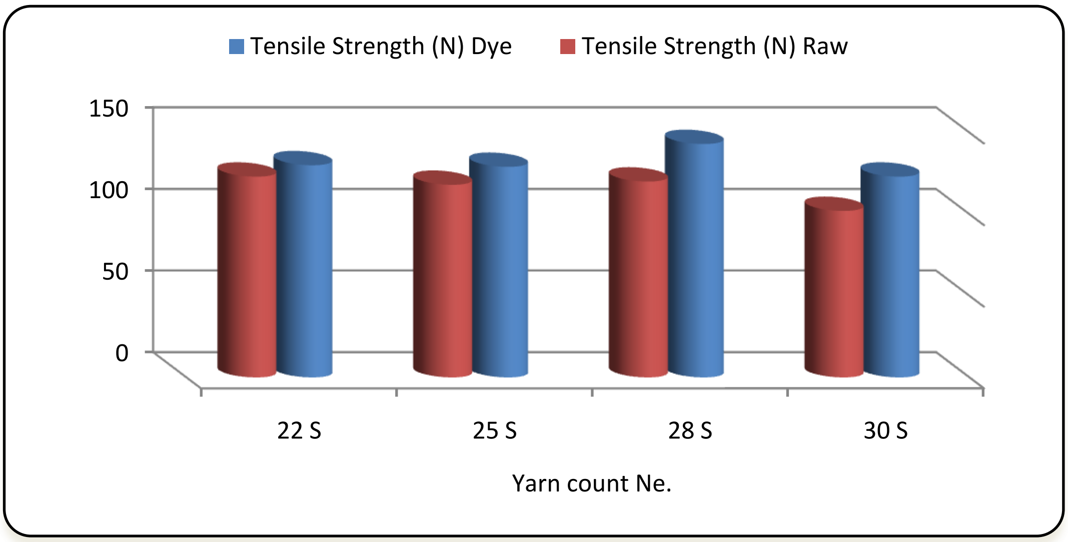


Fig. (8)Effect of yarn count Ne. on the fabrics tensile strength (g/f) before and after dye

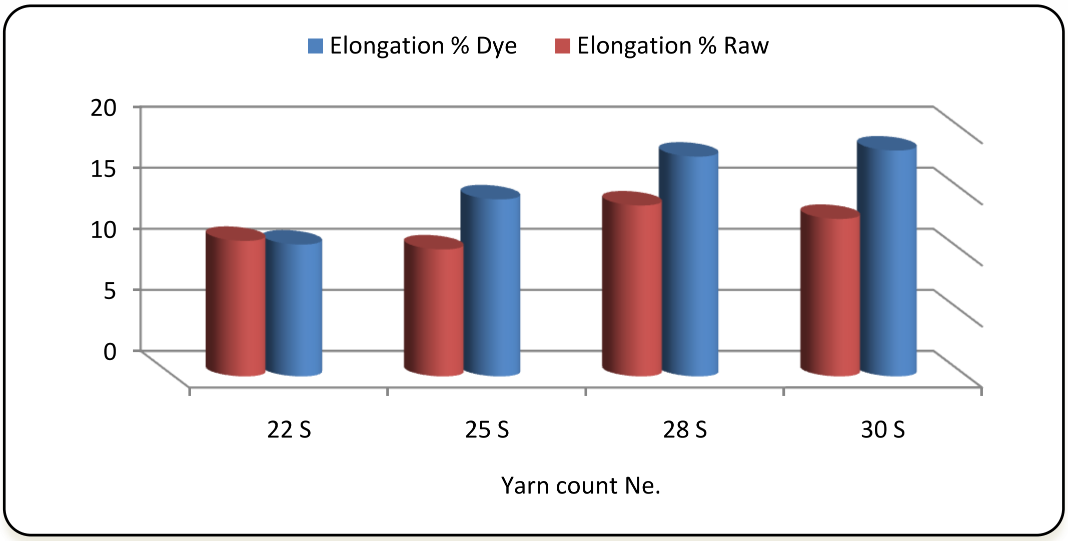


Fig. (9)Effect of yarn count Ne. on the fabrics elongation (%)before and after dye

The pre-treatment and the dye processes increased the values of fabrics elongation within the range of 5% and 15%, depending on the yarn count and cellulose macromoleculles,as can be seen in table (4) and figure (9), which form regenerated cellulose fibers, are short, the attraction between these macromollecules was not very strong. Therefore, when a force parallel to the fiber axis was applied to the regenerated cellulose fibers, bonds between the macromollecules weakened, causing the fibers to break. Breakages of wet regenerated fibers took place more easily because of the swelling and sliding effects of water [16]. Consequently, the elongation values of the wet regenerated cellulose fibers were noticeably higher than those of dry ones. Generally, the tenacity values decreased, but elongation values (%) increased, while these fibers were wet. The increase observed after the application of the pre-treatment and the dye processes in the elongation (%) values of the yarn fell a little after the dyeing process. However, the elongation values (%) obtained after the dyeing process are still higher than those of the raw yarns. The pre-treatment and the dye processes improved both the tenacity and elongation (%) of these yarns.

3.4.2. Effect of yarn count Ne. on the fabricsair permeability

Air permeability is closely related to thermal property and is frequently a major factor in body comfort. Fabrics with good air permeability encourage body heat loss. Air resistance of the fabric is the time in seconds for specific volume of air to pass through specific volume of fabric. Lower the value of air resistance, higher will be theair permeability of fabric. Air resistance of fabrics has been measured in (m3/m2/s).Air permeability is an important factor in the performance of textile materials and it can also be used to provide an indication of the breathability. The amount of air space compared to the amount of material in known area is the one that influences the fabric characteristics and its end use **[Booth, 1983]**.

Table (4) and figure (10)represent the data regarding the air permeability of the tested samples. A greater relative decrease in air permeability was observed with increasing chorisia fiber content. The cotton/chorisia blended fabrics exhibited lower air permeability values as compared to cotton fabrics. It also pointed out that chorisia having a hollow and air filled structure. The properties and the structural configuration of the fibrous materials play a very important role in air permeability behavior. The heat retention of chorisia was better than that of other fibers due to the static immobile air held in the large lumen region of chorisia.[10].

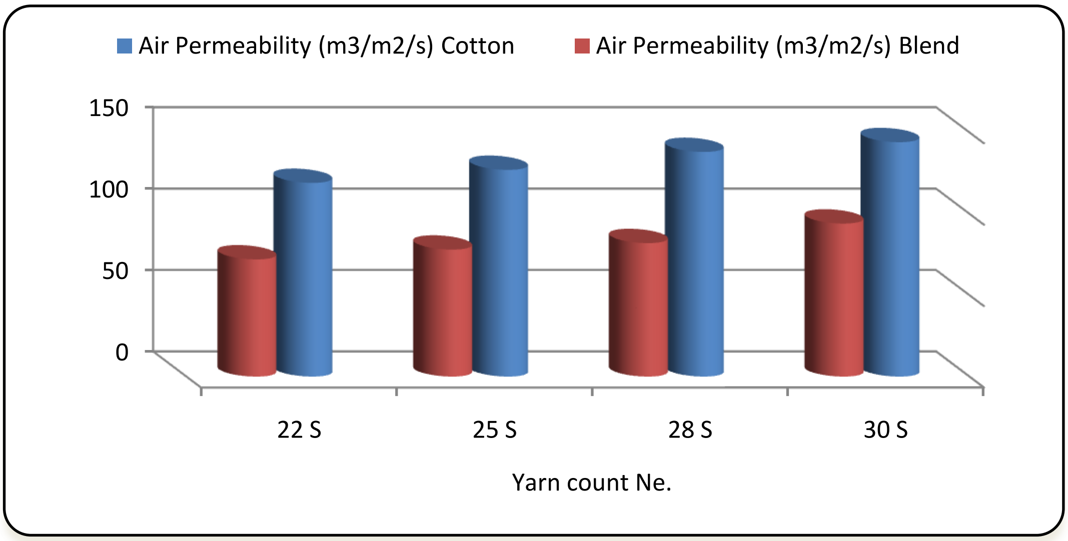


Fig. (10) Effect of yarn count Ne. on the fabrics air permeability

From the results presented in Table (4) and Fig. (10), it can be stated that the highest air permeability value was obtained for 100 % cotton fabrics and yarn count Ne. (30s). The results showed that fabric thickness had a significant effect on the air permeability values of the chorisia blended fabrics, since air permeability tended to decrease as thickness increased, irrespective of fiber type. On the other hand, chorisia fiber also gives lower air permeability values because of a hollow and air filled structure. The results show that for a fabric of given composition, the air permeability decreases the yarn count Ne. increases (thick yarns), that the air permeability of cotton/chorisia blended fabrics lower than those of the cotton fabrics made of the same yarn count Ne.

3.4.3. Effect of yarn count Ne. on the fabricsthermal conductivity

Thermal conductivity is one of the factors affecting thermal comfort. It is the abilityof a fabric to transfer heat from body to environment and vice versa depending uponwhether temperature of body is more or less than that of environment. It is evident from Table (4)and Fig. (11) thatpure cotton fabrics showed lower thermal conductivity as compared toblendedcotton /chorisia fabrics. This can be explained by high weight per unit area and thickness of blendedcotton /chorisia fabrics; and therefore more still air in these fabrics.Still air inside the fabric geometry has the least thermal conductivity rate as compared to conductivity of fibers. So air conveys a low quantityof energy via conduction and therefore, thermal conductivity of fabric decreases **[Badr 2013]**.The heat retention of chorisia was better than that of other fibers due to the static immobile air held in the large lumen region of chorisia. Chorisia has good heat insulator. [10]

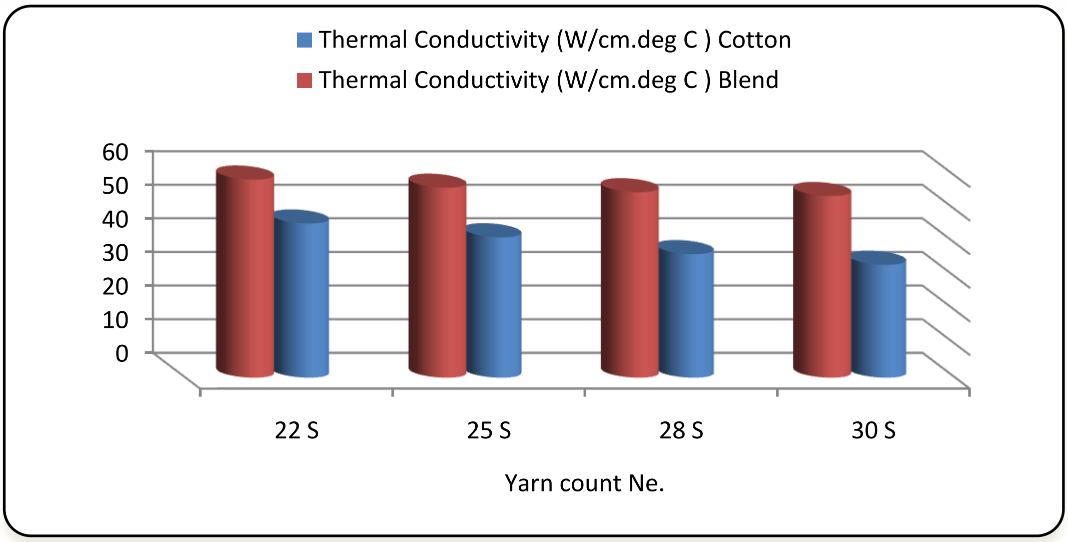


Fig. (11)Effect of yarn count Ne. on the fabrics thermal conductivity

The thermal conductivity values of these fabrics were comparedand it was found that, as the yarn gets finer the thermal conductivity decrease.When finer yarn is used in fabric, yarn diameter and, therefore,fabric thickness decrease. If the amount of decreasein thickness is more than the amount of decrease in thermalconductivity.

That thermal resistance increases as the face yarn linear density increases for all the fabrics, irrespective of the fiber types. Increase in thermal resistance could be attributed to the increase in thickness, as the face yarn (cotton) becomes coarser. Increase in fabric thickness influences fabric porosity due to corresponding increase in fabric volume, thereby increasing the amount of air in fabric. Since the volume of air enclosed is much higher than the volume of fibers, the insulation is dependent more on thickness of material.[18]

IV. CONCLUSION

In recent years, cellulosic fibers such as kapok and chorisia fiber have received increasing attention as an eco-friendly material for its intrinsic advantages. Despite the increasing attention to chorisia fiber, the difficulty in spinning of chorisia fiber still limits its fabrication possibilities for broader applications. This can be partially solved by combining chorisia fiber with other polymer matrices to achieve different kinds of composite materials. To improve the physical and chemical interactions at the interface and achieve composite materials with better performance, chorisia fiber should be pretreated by chemical or physical means to enhance the intrinsic properties or alter the surface characteristics. Due to the limited number of studies reported, there are various aspects of chorisia fiber research and development that remain open for further work. With the focus on this green cellulosic fiber, more studies should be carried out to expand the application fields for chorisia fiber by taking advantage of its combination of high hollowness and hydrophobic–oleophilic characteristics. We believe that the development of novel technologies or methods in the future will promote the further utilization of this plant fiber and its composite materials, and this may open up promising new possibilities in the field of chorisia fiber for high-added-value applications.

Considering the environmental pollution as a major drawback of manmade material the need for natural material to replace the existing synthetically manufactured materials is at a high preference and one such fiber is chorisia fiber which has been let down by user due to its failure as apparel product and some relative chemical behavior.

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