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A Study on Blending of regenerated Bamboo with Silk

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Abstract: Fiber blending has been a common practice in the textile industry for a long time, stimulated to a great degree by the availability of an ever increasing number of manmade fibers. Fiber blending can achieve quality products that cannot be realized using one fiber type alone, and it can also reduce the cost by substituting a less expensive fiber for a more costly one. The demands from fabrics have changed with the developments in technology and the rising living standards. Now the requirement is not only style, durability and comfort, but also hygienic related property of clothing which includes psychological sensorial, thermo-physiological comfort and body protection from sun ray(as ultra violet) and smell of fungal growth. It is evident that fibre type, yarn properties, fabric structure, finishing treatment and clothing conditions are the main factors affecting clothing comfort and hygienic property. Hence, the study was proposed with the following objectives: - To blend regenerated bamboo fibre with Mulberry silk, and To study the physical properties of the blended yarn.

Keywords: Blending, manmade fibres , regenerated, drawing .

INTRODUCTION:

Natural fibers have unique properties compared to synthetic fibers. The manufacturing processes, the characteristics, and the blending traits are considered in producing high performance athletic wear. Comfort properties, such as air transfer, moisture transfer, and wick ability, are essential when it comes to athletic wear. Through examining the uniqueness of natural fibers, the advantages and benefits of using a higher percentage of natural fibers when manufacturing comfortable and functional high performance athletic wear can be obtained.

The development in the field of fibres began with the natural fibres, The natural fibres were utilized in the past for the textile purposes as they offer the advantages of being comfortable as far as cotton is concerned, the warm fibre to protect from

cold for wool and the lustrous fibres for the status of the mankind as far as silk is concerned. Other natural fibres like jute were utilized for the packaging purposes. Some no conventional fibres were hailed as important fibres as far as rural economy is concerned. The lack of required properties for natural fibres and also the need for utilization of other cellulosic sources necessitated the need for regeneration of fibres after dissolution in required form.

Currently, regenerated bamboo fibres are used in apparels including undergarments, sports textiles, t-shirts and socks. They are also suitable for hygienic products and sanitary materials such as sanitary napkins, absorbing pads, masks, and bandages and surgical gowns. The use of Bamboo fibre is also manufactured by a mechanical process. In the mechanical process, the woody parts of the bamboo plant are crushed and then natural enzymes are used to break the bamboo walls into a soft mass so that the natural fibers can be mechanically combed out and spun into yarn. Since this process is more labour intensive and costly, this type of manufacturing process of bamboo fibre for clothing is rarely used.

Consumer markets are changing fast, with rapid growth in disposable incomes, the development of modern urban lifestyles and the emergence of the kind of trend conscious consumers that India has seen in the past. There is an increasing shift from price consideration to design and quality as there is a greater focus on looking and feeling good. At the same time the new consumer is not beguiled by retailed products, which are high on price but commensurately low on value or functionality. Diversification in the product can be brought about at various stages viz., yarn, fabric, design, fashion and style. Blended fabrics can be created with variegated novelty effect that caters to the fashion world today. Hence, the study was proposed with the following objectives: - To blend regenerated bamboo fibre with Mulberry silk, and To study the physical properties of the blended yarn.

Materials and methods

Bamboo fibre is regenerated cellulosic fibre produced from bamboo. The type of bamboo used for apparels is Moso bamboo (*Phyllostachys pubscents).* Mulberry silk is comes from the silkworm,(*Bombyxmori L,*) which solely

feeds on the leaves of mulberry plant. Form of availability of raw material of bamboo and silk are differ, and also the basic fiber properties vary, hence they need to undergo different processes till they are suitable for good blending. The silk is always available in cocoon form. These cocoons contain sericin gum which is to be removed for further smooth processing. So the first process is degumming further followed by other processes. Both the fibres were blend in carding and drawing stage and Yarns of three different blends along with 100% bamboo and 100% silk yarn were produced after proper blending. The blend proportion of prepared yarns samples were 20:80, 50:50 and 80:20 of bamboo/silk. The yarns produced were then wound to form cones. The physical properties of the blended yarns are examined and tested for their strength, elongation, wicking height, twist and density.

Table 1: Physical properties of selected fibres

The physical properties of the selected fibres were determined and the results were presented in Table 1

Table 1: Physical properties of the selected fibres

Fibre	Length (mm)	Average single fibre strength(gms/tex)	Elongation (%)	Density ($g/cm^{2)}$	Moisture Content (%)	Wicking height (cm)
Bamboo	70	15.87	11.30	1.65	12.14	6.08
Mulberry	68	17.20	15.33	2.25	11.01	5.01

The results are the arithmetic mean of five determination of each sample

From the table (1), it was seen that among the fibres the staple length of the regenerated bamboo was found to be highest (70mm), followed by mulberry (68mm). The average strength, elongation and density were highest in mulberry silk i.e. (17.20 gm/tex) , (15.33%) and (2.25 g/cm2) respectively. But the moisture content value and wicking height of the bamboo fibre is higher than the mulberry silk. The measured value of density of mulberry fibres suggests that mulberry silk has relatively higher degree of order and therefore a more compact structure. (Gupta, *et al.*, 2000).

Table 2. Physical properties of yarns :

The physical properties of yarns such as twist (tpi), average tenacity (g/den), elongation (%), wicking height (cm) and density (g/cm^2) were observed and presented in the table (2.)

Table 2. Physical properties of controlled and blended yarns

Yarns	Average twist (tpi)	Direction	Average tenacity (g/den)	Elongation (%)	Wickinghight (cm)	Density (g/cm^2)
Bamboo 100%	12.85	z twist	17.80	13.40	2.72	1.35
Mulberry 100%	14.55	z twist	22.20	11.30	3.50	1.78
BM 20:80	15.45	z twist	25.00	19.38	3.25	2.85
BM 50:50	14.40	z twist	23.76	25.64	3.28	2.35
BM 80:20	13.64	z twist	24.37	20.72	4.78	2.18
Variable	**S.Ed(±)**	**CD**	**CV%**			
Twist (tpi)	0.19	0.51	2.17			
Tenacity (g/den)	0.24	0.64	1.44			
Elongation (%)	0.20	0.53	1.50			
Wicking height (cm)	0.16	0.47	5.65			
Density (g/cm2)	0.12	0.34	2.36			

From the above table 2.it was found that the maximum twist observed in blended yarn BM 20:80 (15.45tpi) followed by controlled mulberry (14.55tpi) and minimum was in bamboo controlled (12.85tpi). So also the average tenacity was found in BM 20:80 (25.00g/den) followed by the other yarn and lowest was observed in bamboo(17.80g/den). The highest elongation was found in BM 50:50 (25.64%), followed by other blended

proportion whereas the lowest was found in mulberry control yarn (11.30%).The density of yarns were maximum in BM 20:80 (2.85g/cm^2) and minimum in bamboo control yarn (1.35g/cm^2). Similarly the highest wicking height was observed in Bamboo mulberry 80:20 (4.78cm) and the lowest was in bamboo eri 20:80 (2.72cm).

It was evident that blends of bamboo and mulberry20:80 fibre produce the strongest yarn. This was supported by Doraiswamy, *et al*.(1994) who stated that fibre properties had significant effects on yarn strength.

Since the elongation as well as strength is the primary properties of fibre, the elongation is very much necessary for spinning quality, which enhances the cohesiveness of the fibre during spinning process (Doorthy, 1980).

The difference in twist, tensile strength and elongation of the yarn might be due to the method of extraction of fibres employed and process involved in blending of yarn. (corbman, 1985).

CONCLUSION:

The regenerated bamboo and mulberry silk, both fibre can be used to blend with different proportions. Considering all the physical tests, all the blend proportion shows better result, which is required for clothing materials. From the aforesaid, it can be inferred that all the three proportions can be used for producing the blended yarn. Blending of bamboo with silk fibres offers excellent scope for producing a variety of materials for different uses.

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