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Blending of Regenerated Bamboo fibre with Silk to produce value added product

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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 survival of textile industry depends primarily on the diversification of end products to meet the national as well as international demands. Diversification in the product can be brought about at various stages viz., yarn, fabric, design, fashion and style. So, the study was conducted to blend mulberry silk and regenerated bamboofibre to produce value added products with the -To blend Bamboo fibre with silk, to construct fabric of twill weave using blended yarn and to produce value added products from the woven fabrics. The bamboo and silk fibre was blend in carding and drawing stage and yarn were produced in three different ratios 20:80, 50:50 and 80:20.These yarns were further weaved in twill weave and the functional properties of the fabrics produced were evaluated .It was found that the woven blended bamboo mulberry fabrics can successfully use for producing value added products.*

Keywords:*Blending, Carding, Drawing, Regenerated bamboo, Mulberry Silk.*

I. Introduction

Clothing is one among the most important three basic needs in every human life. It protects our body from various climates and gives us a good appearance. Clothing is an integral part of human life and has a number of functions: adornment, status, modesty and protection. Consumers are becoming increasingly very much conscious to environmental friendly consumer goods and much concerned about the green activities. This tendency for eco-friendly come into contact with the skin for a prolonged period of the time says Dharani et al. (2010). 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. (Das, et al., 2009).

The survival of textile industry depends primarily on the diversification of end products to meet the national as well as international demands. 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 silk,
- To construct fabric of twill weave using blended yarn and produce value added products from the woven fabrics.

II. Materials and methods

Bamboo fibre is regenerated cellulosic fibre produced from bamboo. The type of bamboo used for apparels is Moso bamboo (*Phyllostachyspubscents*). 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 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 controlled and blended fabrics were weaved in hand fly shuttle loom. From the different blended yarn, fabrics were constructed using twill weave. Blended yarns of different ratios were used for making fabrics in both warp and weft. The nomenclature of the fabric sample was done according to the blend proportions.

Table 1.Constructional details of regenerated bamboo and mulberry silk blended fabrics

Sl. No	Sample	Weave	Types of loom	Yarn count	Composition Warp weft % %	Reed count	Loom pick	Cloth width
1	Bamboo100%	Twill	Handloom Fly Shuttle Loom	1/60s	Same in both way	48	52	36"
2	Mulberry100 %	Twill		1/60s	Same in both way	48	52	36"
3	Bamboo Mulberry 20:80	Twill		1/60s	Same in both way	48	54	36"
4	Bamboo Mulberry 50:50	Twill		1/60s	Same in both way	48	56	36"
5	Bamboo mulberry 80:20	Twill		1/60s	Same in both way	48	54	36"

Note:
BT=Bamboo (control) twill weave
MT= Mulberry (control) twill weave
BMT 20:80= Bamboo x mulberry silk (20:80 ratio)
BMT 50:50= Bamboo x mulberry silk (50:50 ratio)
BMT 80:20= Bamboo x mulberry silk (80:20 ratio)

III. Result and discussion:

The findings of the study are presented in the following head.

3.1 Assessment of Functional properties of blended fabrics:

The test fabrics were tested for their functional properties such as tensile strength, elongation, wicking height, absorbency etc. according to the IS and BS methods.

Table 2. Tensile strength of twill weaves blended fabric (kg f)

Fabrics	Tensile strength (kg f)	
	Warp way	Weft way
BT	50.48	59.03
MT	52.78	63.47
BMT 20:80	60.46	79.24
BMT 50:50	63.36	74.34
BMT 80:20	60.09	72.11
S.Ed(±)	0.20	0.19
CD	0.52	0.51

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

Table 3. Elongation of twill weaves blended fabric (%)

Fabrics	Elongation (%)	
	Warp way	Weft way
BT	25.98	26.07
MT	27.72	28.14
BMT 20:80	28.71	26.27
BMT 50:50	31.33	29.34
BMT 80:20	32.00	28.15
S.Ed(±)	0.78	0.76
CD 0.05%	1.69	1.49

Table 4. Drape coefficient of Twill weave blended fabric (%)

Fabric	Drape Coefficient %
BT	44.11
MT	45.35
BMT 20:80	42.23
BMT 50:50	41.77
BMT 80:20	39.45
S.Ed(±)	0.107
CD	0.287

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

Table 5. Wicking height of woven blended fabric (cm)

Fabrics	Wicking height (cm)	
	Warp way (cm)	Weft way (cm)
BT	6.08	6.23
MT	5.18	5.36
BMT 20:80	6.87	6.92
BMT 50:50	6.33	6.55
BMT 80:20	6.88	6.98

Table 6.Water absorbency of Twill weaves blended fabric (%)

Fabrics	Absorbency (%)
BT	59.28
MT	50.76
BMT 20:80	59.96
BMT 50:50	61.21
BMT 80:20	66.26
S.Ed.(±)	0.198
CD	0.381

It is evident from the Table2, that in the warp way sample BMT 50:50 exhibited the highest tensile strength (63.36 kg f) followed by BMT 20:80 (60.46 kg f) while lowest tensile strength was found in sample BT (50.48kg f). In case of weft direction, tensile strength of sample BMT 20:80 shows highest (79.24kg f) followed by BMT 50:50. While control sample bamboo twill was found lowest (59.03kgf). The tensile strength of woven fabrics in weft direction was higher than the warp direction.Result shows that test fabric exhibits the increasing trend in both the warp and weft direction which may be due to the internal structure of the silk fibre as silk possesses highest tenacity among all the natural fibres. This was also supported by Devi (2009).Statistical analysis shows that there is a great significant difference in warp and weft way at 1% level of significance.It was seen from the table 3, that in the warp direction BMT 80:20 showed maximum elongation (32%), followed by BMT 50:50 and 20:80 as (31.33%) and (28.71%) respectively. In weft way it was observed that BMT 50:50 (29.34%) has maximum elongation. Statistically, it was found that there was a significant difference in the elongation of twill weave fabric in both warp and weft direction at 5% level of significance.In a woven fabric, the warp threads generally have higher crimp because the filling yarns are shot straight through the shed and the warp yarns go over and under the filling yarns by the up and down motion of the harness. Hence, the warp threads stretch relatively more compared to their weft.The drape coefficient of twill weave controlled and blended fabric samples were more or less same. However it was highest for mulberry twill weave fabric (45.35%) and lowest for blended fabric BMT 80:20 (39.45%), table 4.From the result it was inferred that lower drape coefficient percentage for bamboo mulberry blended fabrics depicts the good draping behaviour. This may be due to less stiffness of blended yarns.Table 5, depict that the maximum wicking height was seen in bamboo mulberry 80:20 blended samples in warp direction (6.88cm) followed by blended sample BMT 20:80 (6.87cm). while in weft direction again bamboo mulberry blended 80:20 test sample was registered as highest value in wicking height (6.98cm) followed by BMT 20:80 (6.92cm).More the wicking behaviour, more will be the skin comfort, dyeability, dimensional stability and lesser will be the static build-up of the fabric. (Phukan, et al., 1997).In case of the rate of water absorbency in woven test fabrics, the sample BMT 80:20 exhibits maximum absorbency (66.26%) among all the test samples and the lowest value was found in mulberry control test fabrics (50.76%). It was observed from the table that absorbency increases with the increase in bamboo content of the fabric. This may be due to cross section of the bamboo fibre, as it is filled with various micro gapes and micro holes (Sekerden, 2011). Further it may be also due to hydrophilic nature of the both bamboo and silk fibres.

After evaluation of functional properties and based on fabric texture some of the products were prepared. Value added diversified products were designed and constructed by following the drafting methods. Different products like girls kurta, neckties, cushion covers etc. were made from the blended fabrics.

IV. Conclusion:

Both regenerated bamboo and mulberry silk 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. Apart from these blend proportions, different blend proportions can be tried with silk &otherfibers for different end uses.

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