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A Study on Functional Properties of Regenerated Bamboo and Muga Silk Blended Woven Fabric

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ABSTRACT

The purpose of blending is to produce yarn with such qualities that cannot be obtained by using one type of fibre alone. Blending different fibres is a widely practised means of enhancing the performance and the aesthetics qualities of a fabric. Blending is also practised for reasons of economic production, shortage of natural fibre, better performance in spinning, to improve the yarn strength, yarn evenness, imperfection level etc. In the present study an attempt was made to develop fabrics using regenerated bamboo with silk blended yarn of three different ratios *viz.,* 20:80, 50:50 and 80:20 on a fly shuttle handloom. Further, the newly designed blended fabrics were evaluated for functional properties. It was found that the woven blended Bamboo-Muga Silk fabrics can successfully use as apparel as well as value added products. Overall the results indicated that Blended yarns from natural and man-made fibres have the particular advantage of successfully combining the good properties of both fibre components, such as comfort of wear with easy care properties. These advantages also permit an increased variety of products to be made, and yield a stronger marketing advantage.

Keywords: Functional properties, Regenerated Bamboo, Muga silk, Blending, Plain Weave

INTRODUCTION

Natural fibres and their blends with classic fibres bear valuable properties, so at present there are various products made of these fibres. It determine that absorbing and discharging moisture, non-irritating, antibacterial, anti-allergic, protection against the suns harmful Ultra violates rays and other valuable properties are better, than classic yarns. Blended regenerated bamboo and silk fabric is a sustainable and luxurious textile that combines the eco-friendly properties of bamboo with the natural elegance of silk. This innovative fabric blend is gaining popularity in the fashion and textile industries due to its unique combination of functionality, comfort, and environmental benefits. Bamboo, a renewable resource grown widely throughout Asia, serves as medium for manufacturing numerous utility and decorative articles, besides that it possesses some unique medicinal properties *i.e.* absorbency, anti-bacterial property, etc. that are retained in the manufacture of bamboo fibres, yarns and textiles. Bamboo fabric is light and strong, with excellent wicking properties that helps in retaining body hygiene of the wearer. Fibres, yarns and textiles derived from bamboo are 100% biodegradable. The end use of bamboo fibre includes intimate apparels, non-woven fabrics, sanitary materials, decorating and bathroom series. Bamboo fibre products are cool, breathable, luxurious and considered one of the newer environment friendly products to offer eco-safe benefits to consumers (Sharma and Goel,2010; Jayapriya and Bagyalakshmi, 2018).

Gayatri and Bala (2006) opined that there are two ways to process bamboo to make the plant into a fabric: mechanically or chemically. The mechanical way is by crushing the woody parts of the bamboo plant and then use natural enzymes to break the bamboo walls into a mushy mass so that the natural fibres can be mechanically combed out and spun into yarn. Regenerated bamboo fibres are produced in a wet spun process in which natural

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Table 1 : Constructional details of regenerated bamboo and muga silk blended fabrics

Sr. No.	Sample	Weave	Types of loom	Yarn count	Composition Warp %	Weft %	Reed count	Loom pick	Cloth width in inch
1.	Bamboo 100%	Plain	Fly Shuttle	1/60 s	Same in both way		4 8	52	36”
2.	Muga Silk 100%	Plain		1/60 s	Same in both way		4 8	52	36”
3.	Bamboo muga 20:80	Plain		1/60 s	Same in both way		4 8	52	36”
4.	Bamboo muga 50:50	Plain		1/60 s	Same in both way		4 8	52	36”
5.	Bamboo muga 80:20	Plain		1/60 s	Same in both way		4 8	52	36”

Note:
BT=Bamboo (control) Plain weave
MUT= Muga silk (control) plain weave
BMU 20:80= Bamboo x muga silk (20:80 ratio)
BMU 50:50= Bamboo x muga silk (50:50 ratio)
BMU 80:20= Bamboo x muga silk (80:20 ratio)

cellulose (in this case originating from mechanically crushed bamboo leaves and stems) is used as raw material in a hydrolysis alkalisation process. The raw material is obtained from the *Phylostachys heterocycla pubescens* bamboo plant, commonly known as Moso bamboo (Fu, 2001).

Objectives of the study:

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 plain weave using blended yarn.

METHODOLOGY

Bamboo fibre is regenerated cellulosic fibre produced from bamboo. The type of bamboo used for apparels is Moso bamboo (*Phyllostac hyspubscents*). Muga silk is comes from the silkworm, (*Antheraea assamensis*) which solely feeds on the leaves of So and Sualu 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 blend proportion of prepared yarns samples were 20:80, 50:50 and 80:20 of bamboo/silk. The controlled and blended fabrics were weaved in hand fly shuttle loom.

RESULTS AND DISCUSSION

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

Assessment of Functional property of blended fabrics:

The test fabrics were tested for their functional property *i.e.* tensile strength, according to the IS and BS method.

The tensile strength of plain weave controlled and blended fabrics were evaluated and the result of the tensile strength of plain weave blended fabric, from Table 2 illustrated that among the test samples highest tensile strength (64.36kg f) was shown by BMUP 20:80 in warp direction, and the least was exhibited by bamboo plain weave in weft (42.65 kg f). The highest tensile strength was found in the blended samples, which may be due to the highest strength of the silk fibres. The Summary of fabric strength in plain weave in warp and weft directions (kgf) blended fabrics was evaluated and data were listed in Table 2. The statistical analysis of variance and comparison of individual means for tensile strength of test fabrics were analysed and results indicates that the difference in tensile strength due to different types of fabrics were highly significant. Similarly all their

Table 2 : Functional properties of Blended Fabrics (Warp and Weft Direction)

Test Fabrics	Tensile Strength (kg/f) Warp	Tensile Strength (kg/f) Weft
	Plain Weave	Plain Weave
Bamboo	51.12	42.65
Muga	57.45	48.63
BMU 20:80	64.36	59.03
BMU 50:50	63.32	48.71
BMU 80:20	52.65	56.46

interactions also recorded highly significant effect. The increase in bamboo content decreases the strength of the blended fabrics may be due to the less tensile strength of the bamboo fibre. The tensile strength of the fabrics depends on the fibre type and arrangement, as well as the fabric structures (Wang *et al.*, 2010).

In regards to the interaction between the test fabrics and the warp and weft of plain weaves the highest values for fabrics tensile strength in warp direction was obtained by blended fabric Bamboo muga in warp direction 20:80 (64.36kgf) and lowest was found in sample bamboo control (51.12 kgf) while in weft direction Bamboo Muga 20:80 shows maximum value (59.03) and least was in control bamboo fabric.

The results are in line with findings of Gogoi *et al.,* 2017; Devi, 2011).

Conclusion:

The results showed that tensile strength, %elongation and tear strength of woven fabrics using the blended yarn were increased with an increase in silk content. This is an advantage of silk in the aspect of rendering the strength to the blended yarns and fabrics. In summary, blended regenerated bamboo and silk fabric represents a modern approach to textile innovation, merging traditional luxury with sustainable practices to meet the growing demand for environmentally responsible and high-performance materials.

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