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## Comparative Study on the Physical Properties of Mattress Cover Produced by the Rotor Spun Blended Yarn and 100% Cotton Yarn

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**Abstract:** The properties of mattress cover which was produced by the rotor spun jute-cotton (80:20 and 70:30) blended yarn were studied and compared with the properties of mattress cover produced by 100% cotton yarn. It was observed that the average warp wise strength and abrasion resistance of 80:20 blended fabric were comparable and very closer to that of the 100% cotton fabric. On the other hand average warp wise strength and bursting strength of 80:20 blended fabrics were very nearer to the 100% cotton fabric.

**Key words:** Physical properties, rotor spun, blended yarn, abrasion resistance, busting strength, warp wise strength

### INTRODUCTION

Jute is a long staple bast fiber which was short stapled as per required length to blend with cotton fiber. Both jute and cotton are cellulose fiber. But in case of cotton the percentage of cellulose was higher than the percentage of cellulose of jute. The basic differences between jute and cotton is that jute is a ligno cellulosic fiber i.e. it contains lignin and cotton is a pectin cellulose fiber i.e., cotton contain pectin. Due to presence of lignin, jute is hard and harsh. The jute fiber was softened enough with chemical treatment to blend with cotton. Blending was done to minimise the cost, for maximum utilization of low cost materials and to increasing the processing performance etc. To produce fabric with jute-cotton blended yarn is another achievement of the research success. The properties of the blended fabric depend on various factors. The compactness of the fabric generally depends on the number of ends and picks per unit length and width of the fabric (Vanghaluwe, 1995). The cover factor of the fabric is related to the compactness of the fabric. On the other hand construction and structure of the fabric is directly related to the compactness of the fabric (Hall, 1920). From the literature review, it was seen that many works have been performed for the improvement of the particular property of the fabric (Winks, 1966; Chu *et al.*, 1960). But limited work has been done on the various properties of the fabric (Anonymous, 1974). The breaking load of the fabric is one of the important property of the fabric. It is related to the fabric strength. Breaking load is a load on

which the specimen break. It varies on the strength of test specimen.

On the other hand, the rubbing fastness/properties is important for the fabric. It was related to the abrasion of the fabric. Assessment of abrasion damage is determined in terms of appearance against an unabraded specimen, loss in weight, loss in strength and change of lusture (Booth, 1979). The strength and abrasion resistance of grey fabric is higher than that of the strength of the bleached fabric (Rahman, 1979). The strength at which the specimen of a fabric burst out is called the bursting strength. This strength varies on the construction of the fabric and knitted fabrics are particularly tricky to test in strip form (Booth, 1979).

The present study was planned to find out weather the blended mattress fabric is compare able to the 100% cotton mattress fabric. So that the diversified uses of jute product can be increased to the best level, the ultimate goal for the diversification of jute.

### MATERIALS AND METHODS

The yarns used in this test were jute-cotton blended yarn. The jute was collected from the open market of Narayngang and cotton was collected from the Cotton Board in March 2004. The jute was stapled with the cutting machine of Jute and Textile Product Development Centre (JTPDC). Then the stapled jute was softened by the chemical treatment at JTPDC. After drying, the chemically treated jute was opened in the opening machine in JTPDC. The opened jute was softened enough

Table 1: Properties of mattress cover produced from (80:20 and 70:30 jute:cotton) blended yarn and 100% cotton yarn

Observations	Blended fabric		100% cotton fabric
	70:30:Jute:Cotton	80:20:Jute:Cotton	
Warp count	16 <sup>ø</sup>	16 <sup>ø</sup>	20 <sup>ø</sup>
Weft count	10 <sup>ø</sup>	10 <sup>ø</sup>	10 <sup>ø</sup>
Weight sq <sup>-1</sup> yd (before wash)	210 g	215 g	200 g
End inch <sup>-1</sup>	42	42	42
Pick inch <sup>-1</sup>	21	22	22
Weight sq <sup>-1</sup> yd (after wash)	148 g	139.3 g	137.5 g
Average warp wise strength	35 kg f	36.2 kg f	36.9 kg f
Average weft wise strength	23 kg f	24.19 kg f	26.15 kg f
Abrasion resistance	Very good	Very good	Excellent
Bursting strength	142.8 lb sq <sup>-1</sup> inch	145.2 lb sq <sup>-1</sup> inch	145.6 lb sq <sup>-1</sup> inch

to blend with cotton. The softened chemically modified jute was blended with the cotton at the ratio of jute:cotton/70:30 and jute:cotton/80:20, respectively. The blending was performed in the blow room section. After layer wise stacking of jute and cotton, it was passed through the blending chamber for uniform blending. Then the blending fibers were passed through the blow room lines for getting the blended lap. The lap was passed through carding and drawing frame to get the uniform and required sliver. The draw frame sliver was used in open end spinning frame (Rotor) to get the required yarn. Then the normal power loom was used to produce the mattress cover fabric. The mattress cover fabric of 100% cotton was collected from the market. Then the properties of these three types of fabric were studied in this experiment. The good brand tensile strength tester was used to test the average warp wise and weft wise strength. The abrasion resistance and bursting strength were tested by the abrasion resistance tester and bursting strength testing tester, respectively. All the tests were performed in standard condition of temperature and humidity. The test results are shown in the Table 1.

**RESULTS AND DISCUSSION**

Ten tests of different types, i.e., warp count, weft count, wt. sq<sup>-1</sup> yd, end inch<sup>-1</sup>, pick inch<sup>-1</sup>, wt. sq<sup>-1</sup> yd after wash, warp wise strength, weft wise strength, abrasion resistance and bursting strength were performed for three different types of fabrics. From the test results it was observed that the wt. sq yd<sup>-1</sup> of all types of fabrics had decreased after washing. It was also seen that the ends inch<sup>-1</sup> and pick inch<sup>-1</sup> for both the fabrics were almost the same. The average weft wise strength for 100% cotton fabric was little bit higher than that of 80:20 (jute:cotton) blended fabric. The abrasion resistance of 100% cotton fabric was better than that of 80:20/jute:cotton blended fabric. All the properties of 70:30/jute:cotton blended fabrics were closer to the properties of 80:20/jute:cotton blended fabric. The properties were also comparable to the properties of

100% cotton fabric. But considering the price, the utility of 80:20/jute:cotton blended fabric will increase than the 70:30/jute:cotton blended fabrics.

The produced fabric was mainly used for mattress cover. The mattress fabric was generally used for a single time. The fabric was not required to wash. On this ground, fabric contraction i.e., ends and picks inch<sup>-1</sup>, fabric strength, abrasion resistance and bursting strength were the most important properties of this fabric. Among the above properties, the abrasion resistance and bursting strength were important issue on the basis of end use for the mattress cover. Woven fabric which were used in mattress cover had to have sufficient strength to withstand the busting load (Vanghaluwe, 1995; Hall, 1920; Murphy, 1955). From the tested results, it was observed that the constructions of 80:20 (jute:cotton) blended fabric was very near to the 100% cotton fabric. The busting strength and warp wise strength of 80:20 (jute:cotton) blended fabric was comparable to that of the 100% cotton fabric.

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