

EFFECT OF SIZE MATERIAL ON JUTE-COTTON UNION FABRIC

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Abstract: A study was performed on the jute-cotton union fabric to show the effect of sizing on the properties of union fabric. Here, the cotton yarn was used in the warp direction and jute yarn was used in the weft direction. The size material was used only for warp yarn that is for cotton yarn. From the experimental results, it was seen that the strength of the sized union fabric was better than the unsized union fabric although the other properties were similar to each other. Comparing the properties of union fabric with 100% cotton fabric, union fabric (jute-cotton) may be the replacement of 100% same category of cotton fabric.

Key words: Jute, union fabric, cotton fabric, warp yarn, weft yarn, sized, properties.

1 Introduction

Jute is a lignocellulosic bast fibre. It is a coarse fibre of harsh character. The present of cellulose percentage is lower than that of cotton. On the other hand, hemicellulose is an important chemical component which is present in jute. Due to present of hemicellulose and lignin, jute is more stiff and yellowish colour than cotton. Jute is the cheapest commercial fibre [1]. Jute is mainly used in manufacturing packing and coarse fabric such as hessian, sacking, carpet, carpet backing cloth etc. But in course of time it has therefore become necessary to find out alternative uses of jute for relating the economic viability of Jute Industry and thereby supporting million of people who live on it. Jute fibre conventionally is not used for producing textile products as it has some shortcoming in regard to feel, stiffness, drape, coarseness wash ability and abrasion. The stiffness or hardness of fabric has great impact on its bending length or drape coefficient [2].

During weaving, size materials plays and important role for the warp yarn. The protruding fibres of the warp yarn are

diminished due to sizing [3]. Sized yarn is stronger than the unsized yarn and with stand the friction of yarns during weaving [4].

Various types of size materials are used in the warp yarn. Among them tamarind seed powder and any type of starch are mainly used for jute and cotton. These are available and cost effective.

For union fabric generally cotton yarn is used in warp direction and jute yarn is used in weft direction. Union fabrics are cheaper than 100% cotton fabric due to use of jute in it. Jute-cotton union fabric has the prospect of wider uses and likely to come popular industrial product. The bending length of a fabric is a length at which fabric will bend under its own weight to a definite extent [5]. It is a measure of stiffness that determines draping quality. Size material has also a strong influence on bending length. Higher the stiffness of the fabric higher the bending length [5]. On the other hand, assessment of abrasion damage is determined in terms of appearance against a unabrabbbed specimen, which causes loss in weight, loss in strength and change in lusture [6].

Through development studies, this work has been taken to find out the effect of size material on the properties of union fabric.

2 Materials and Methods

The union fabric used in this experiment is made from jute and cotton. The cotton and jute yarns are used in the warp and weft direction respectively. The cotton yarn of 10^scount is collected from the local market and sized with the starch material. Due to sizing, the hairiness of the yarn is not removed but diminish a lot for successful weaving. Sized yarn can also with stand the friction of warp yarns during weaving. Jute yarn of 6 lbs/spy is collected from the spinning department of Bangladesh Jute

Research Institute (BJRI). It is used in weft direction without using size material. For weft yarn, size material is not used due to less or without friction. The weft yarn is used in spool form and it is also made in spinning department of BJRI. Before weaving, the warp beam was prepared by the beaming machine. Starch was used in the warp yarns as size material during beaming. A normal power loom was used to produce union fabric. The union fabric was produced from the Yarn and Fabric Production Department of Pilot Plant and Processing Division of BJRI. Lastly, the physical properties of the fabric through various treatments were tested in the Testing Department of Bangladesh Jute Research Institute (BJRI). The bending length is a measure of stiffness associated with handle. The bending length is determined by the "Shirley Stiffness Tester" which shows a close relationship between this value and the personal judgment of stiffness [7]. The strength of the fabric was determined by the "Tensile Strength Tester" of Good Brand Co. Ltd. The abrasion resistance of the fabric was determined by the "Abrasion Tester". The hairiness of sized and unsized yarn was tested by the "Zooglee Hairiness Tester."

3 Results and Discussions

All the tests were performed in the standard testing atmosphere i.e $65 \pm 2^\circ$ r,h and $20 \pm 2^\circ$ C. The results are shown in the Table 1 and 2. From the Table 1, it is seen that count of the weft yarn of jute was 6 lb/spy and count of warp yarn of cotton was 10^s . Quality ratio of the jute yarn was good (91.66%). Count strength product (C.P.S) of the cotton yarn was also acceptable (1670).

Table 2 shows that warp count of the grey fabric were same both in the union fabric (jute-cotton) and 100% cotton fabric. Pick/inch of the union fabric and 100% cotton fabric was 21 and 25 respectively. It

was observed that wt/sq.m of the union fabric was higher than the 100% cotton fabric. Wt./sq.m were gradually decreased with the different treatment process of both types of fabrics. This is due to loss of sizing material from the fabrics. Warp wise tensile strength of the union fabrics was higher than the weft wise. But weft wise tensile strength of 100% cotton fabric was higher than the weft wise strength of union fabrics. Warp and weft wise strength were gradually decreased by the different treatment process. At first bending length of the union fabric & 100% cotton fabric was 3.6 and 3.1 respectively. After subsequent treatment bending length of the union fabrics were higher than the 100% cotton fabrics. Abrasion resistance of the union fabric and 100% cotton fabric was excellent at all the time. From the above result, it was observed that the property of jute cotton union fabric is increased by using sizing materials.

5 Conclusion

Jute is a bio-degradable and environment friendly natural fibre. It is free from health hazard. Due to these good properties, jute fabrics have considerable demand in house and abroad. At the same time, price of the 100% cotton fabric higher than the jute-cotton union fabric. That's why union fabric may be the replacement of 100% cotton fabric.

Tensile strength of the union fabric was higher and hairiness of the union fabric was decreased by using sizing material. Sized union fabric was durable and smooth like 100% cotton fabric. Union fabric was cost effective than the 100% cotton fabric. That is why the demand of sized union fabric is increasing day by day instead of 100% cotton fabric. Hence the use of jute is also increasing through diversified jute products.

Table 1 Physical properties of warp and weft yarn of union fabric

Sl. No.	Parameter	Jute yarn (weft)	Cotton yarn (warp)
1.	Count	6 lbs/spy	10^s
2.	Strength	5.5 lbs (Single yarn)	167 lbs (Lea strength)
3.	T.P.I	5	16
4.	Haireness	-	280/m for sized yarn, 350/m for unsized yarn
5.	Quality ratio	91.66	-
6.	C.S.P	-	1670

Table 2 Comparative properties of sized union fabric and 100% cotton fabric at different treatments

Sl. No.	Treatments	Observations	Union fabric (jute-cotton)	100% cotton fabric
1.	Grey fabric	Warp count	10 ^s	10 ^s
		Weft count	6 lb/spy	10 ^s
		End/inch	34	40
		Pick/inch	21	25
		Wt/sq.m (gm)	386.6	338.2
		Warp wise strength (kg)	138.2	139.4
		Weft wise strength(kg)	129.6	131.3
		Bending length (cm)	3.6	3.1
2.	Desized fabric (Simple soap wash)	Abrasion resistance	very excellent	very excellent
		wt./sq.m(gm)	341.2	318.3
		Warp wise strength(kg)	121.6	122.2
		Weft wise strength(kg)	120.2	129.2
		Bending length (cm)	3.1	2.9
3.	Enzyme Wash	Abrasion resistance	excellent	excellent
		wt./sq.m (gm)	338.0	317.2
		Warp wise strength (kg)	120.1	121.2
		Weft wise strength (kg)	118.0	127.6
		Bending length (cm)	3.0	2.8
4.	Bleach and enzyme wash (15% H ₂ O ₂)	Abrasion resistance	excellent	excellent
		wt./sq.m(gm)	332.6	315.5
		Warp wise strength (kg)	118.2	121.0
		Weft wise strength (kg)	114.3	125.1
		Bending length (cm)	2.8	2.7
5.	Bleach, enzyme, wash and softening (10 gm/l basosoft)	Abrasion resistance	excellent	excellent
		wt./sq.m(gm)	320.5	310.4
		Warp wise strength (kg)	111.6	115.2
		Weft wise strength (kg)	108.2	122.5
		Bending length (cm)	2.6	2.4

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