

ABSTRACT

Jute fiber 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. It is widely being used as a natural choice for plant mulching and rural road pavement construction. And due to biodegradable and environment friendly characteristics, jute fabrics have considerable demand in home and abroad.

In the tropical countries like that of ours cotton clothing is extensively used, general demand to replace cotton with jute is due to obvious reasons of meeting shortage of cloths. At the same time, price of the 100% cotton fabric is higher than the jute- cotton union fabric. That's why union fabric may be the replacement of 100% cotton fabric. The major sources of supply of jute lie within the commonwealth chiefly in India and Bangladesh. Hence attempts have been made to produce fabrics of jute in combination with cotton for better fall.

The textile fabrics used in this study are jute cotton mixture fabrics with cotton yarns in the warp and jute cotton mixture yarns of different ratio in the weft were used in the study. The specifications about the jute cotton mixture fabrics used in this study were as follows:

- a) Jute cotton mixture fabric (30/70): warp count – 30^s Ne, weft count - 8^s Ne, ends per inch – 44, picks per inch – 44, GSM – 570
- b) Jute cotton mixture fabric (40/60): warp count – 30^s Ne, weft count - 4^s Ne, ends per inch – 48, picks per inch – 42, GSM – 623
- c) Jute cotton mixture fabric (50/50): warp count – 30^s Ne, weft count - 6^s Ne, ends per inch – 48, picks per inch – 42, GSM – 643
- d) Jute cotton mixture fabric (70/30): warp count – 30^s Ne, weft count - 8^s Ne, ends per inch – 38, picks per inch – 38, GSM – 710

These fabrics were pretreated for main treatments such as enzymatic treatment, dyeing and silicone polyurethane finishing. The pretreated fabrics were subjected to enzymatic treatment with cellulase enzyme and dyeing using reactive dyes and after which the fabric were treated with silicone and polyurethane to impart softening finish. These jute cotton mixture fabrics undergo various physical tests and characterization techniques before and after finishing.

The physical properties such as tensile strength, tearing strength, pilling, wickability, water absorbency, water vapour permeability, air permeability, thermal conductivity, flexural rigidity, bending modulus, colour strength (K/S) and colour fastness (wash, rub and perspiration) were tested and the fabrics were done characterization analysis through microscopic study (SEM) and spectroscopic analysis (FTIR).

The jute cotton mixture fabrics finished with chitosan and titanium dioxide were tested for antimicrobial activity and antifungal activity against bacterial strains according to AATCC 100 – 2004 and AATCC 30 – 2004. The TiO₂ and chitosan treated fabrics showed good bacterial reduction but there was no antifungal activity. Titanium dioxide treated jute cotton fabrics were evaluated for flammability under ASTM D 6413.

Jute cotton mixture fabrics showed high tensile strength and tearing strength. After finishing the flexural rigidity and bending modulus were less leading to good drapeability. The wickability, water absorbency and water vapour permeability parameters for evaluating the comfort characteristics of the fabrics are good after softening treatment. The surface modification of the jute cotton mixture fabrics after finishing led to good air permeability of the fabrics. Also thermal conductivity improved due to improvement water absorbency which in has gave good colour strength the chroma value and brightness values also significantly changed according to the variations in jute proportion.

The jute cotton mixture fabrics were objectively analysed for improvement in hand value with the KES for PHV and THV. The total hand value of the fabrics after the application of finish has increased subsequently for all the jute cotton mixture fabrics.

Hence from the overall results it could be concluded that the enzymatic and softening finished jute cotton mixture fabrics could be more suitable for apparel purposes with excellent comfort.