



## A Review - Studies on Jute Properties, Characteristics and Application in Textile Industry

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DOI: <https://doi.org/10.55248/gengpi.2022.3.10.30>

### ABSTRACT:

Jute plant fibres made up of cellulose and lignin. Jute is an appealing and versatile fibre with a pleasing appearance. Because of its biodegradability, the Golden Fiber has grown in popularity all over the world. It is a natural vegetable fibre that blends with soil and does not produce toxic fumes or residue when burned. Jute fibre is now widely used in both industry and the production of various value-added materials for domestic use. The main issue in the jute industry today is producing high-quality fibre. This fibre is increasingly being used in the production of diverse and value-added products such as upholstery, furnishing, decorative, and secondary apparel. In this paper deals with jute fibre and fabric properties, characteristics and different applications.

### 1. INTRODUCTION:

Jute is an Indian fibre whose name is derived from oriya/bengali for "braid hair." Jute originated in the Indian subcontinent (1). Jute is one of the most popular fibres in the luxury industry. It takes nearly 3 months for the jute plant to reach a height of 12 - 15 feet. Jute fibres, yarns, and composites are used to make a variety of products, and as a result, demand for these materials is increasing significantly(2). Jute fibre is a bastfibre derived from the bark of the jute plant that contains three major categories of chemical compounds: cellulose (5863%), hemicellulose (2024%), and lignin (1215%), as well as some other minor constituents such as fats, pectin, and aqueous extract. Jute fibre is made up of small cellulose units that are surrounded and cemented together by lignin and hemicelluloses(3). Each cell of a single jute fibre has a central hole or lumen and is roughly polygonal in shape. The lumen accounts for approximately 10% of the cross-sectional area of the cell (1). Aside from technical advantages such as high tensile strength, initial modulus, moisture regain, good sound and heat insulation property, dimensional stability, and dye acceptability, jute fibre is agro-renewable, biodegradable, and easily available at a low cost. It also has some drawbacks, such as relative coarseness, brittleness, harshness in feel, a wide variation in fibre length and fineness, a branching nature, poor washability, and a tendency to yellow when exposed to sunlight. Jute's low extensibility can be advantageous and disadvantageous at times (4). The jute technical fibre has the structure of a number of parallel short ultimate cells embedded in a non cellulose matrix, similar to multiple fibre reinforced composite. The modified Weibull distribution can predict the breaking strength of jute fibre at 2 mm, 3 mm, and 25 mm gauge lengths more accurately than the two- and three-parameter Weibull distributions(5). Chemical modification at the fibre and fabric levels without sacrificing flexibility appears to be a better alternative to the processes used so far to improve the resistance of jute geotextiles to degradation. The water affinity of jute treated with chemicals appears to make the fabrics less hydrophilic, with the fibre level treatment outperforming the fabric level treatment. The characterization of the degradation products of geotextiles made from treated jute fibres and treated jute geotextiles revealed no toxicity or chemical hazard(6).

Hybridization with jute fibres can significantly improve the tensile and flexural properties (strength and stiffness) of wool fibre reinforced epoxy composites. The strength of laminates increases as the volume fraction of jute fibres increases(7). Surface modification of jute would not only reduce moisture absorption, but would also increase wettability of fibres with matrix polymer and interfacial bond strength, both of which are important factors in achieving better mechanical properties in composites. Moisture absorption is high in jute due to the presence of hydroxy and other polar groups in various constituents, resulting in poor wettability and weak interfacial bonding between fibres and more hydrophobic matrices (8). Jute fibre is now widely used in both industry and the production of various value-added materials for domestic use. The main issue in the jute industry today is producing high-quality fibre. proper cultivation practises in good quality soil, controlled retting process, and genetic make-up of jute cultivars are important factors controlling the production of quality fibre. The quality and quantity of crops produced are intimately connected to soil quality (9).

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## 2. METHODOLOGY:

### 2.1 Selection of Material :

Jute is a significant but coarser natural fibre that is primarily used for packaging as well as a variety of textile and non-textile applications, including technical textiles. Jute is also used as a home textile in furnishing and decorative upholstery products. Jute is a ligno-cellulosic, multicellular bast fibre that is primarily grown in India, Bangladesh, and the subcontinent. Jute fibre is agro-renewable, biodegradable, and inexpensive, in addition to having technical advantages such as high tensile strength, initial modulus, moisture regain, good sound and heat insulation properties, dimensional stability, and dye acceptability.(4)

### 2.2 Types of Jute Fabric :

1. White Jute,
2. Mesta Jute,
3. Tossa Jute,
4. Jute Cuttings.

#### 2.2.1 White jute

White jute isn't as popular as it once was, but historical records indicate that it was the primary textile used to clothe the common people of India's Bengal region. White jute, as the name implies, is lighter in colour than other strains of this fibre, but it is also less durable than its cousins.

#### 2.2.2 Mesta Jute

Mesta jute is a cross between white jute and tossa jute. While this type of jute was not historically popular, political complications during India's turbulent independence period led to the prominence of its production.

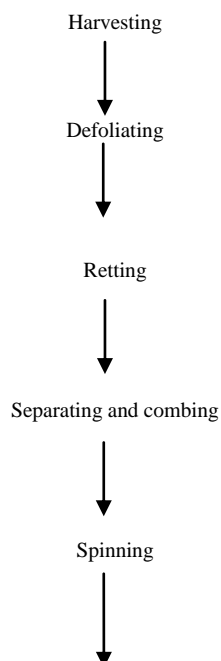
#### 2.2.3 Tossa Jute

Tossa jute is the most common type of jute in use today. It is a hardy crop that yields more fibre than white jute. Tossa jute is more brown than off-white in colour, and its fibres are as long and strong as any other type of jute.

#### 2.2.4 Jute Cuttings

Jute cuttings are a byproduct of the jute manufacturing process. They are the roughest and least desirable parts of the jute plant, but they can still be used to make primitive textiles.(11)

### 2.2 Processing Of Jute :



## Finishing

**3. PROPERTIES OF JUTE :**

<b>Origin</b>	India , Bangladesh
<b>Breathability</b>	High
<b>Moisture-Wicking Abilities</b>	High
<b>Heat Retention Abilities</b>	Medium
<b>Stretchability</b>	Low
<b>Washing Temperatures</b>	Cool, warm, or hot
<b>Prone To Pilling/Bubbling</b>	Low

- 100% biodegradable and recyclable, making it eco-friendly.
- natural fiber with a golden and silky lustre
- Following cotton, it is the second most important and widely cultivated vegetable fibre.
- The material has a high tensile strength but a low extensibility.
- This contributes to the creation of high-quality industrial yarn and fabric for packaging.
- Natural fibres with a wide range of applications, including packaging, textiles, non-textiles, and agriculture.
- Jute stem contains a high volume of cellulose that can be obtained in 4-6 months, and thus it can help save the forest.(10)
- It contributes to the production of high-quality industrial yarn, fabric, net, and sacks. It is one of the most versatile natural fibres, having been used in raw materials for packaging, textiles, non-textile, construction, and agricultural sectors. When blended as a ternary blend, bulking of yarn results in decreased breaking tenacity and increased breaking extensibility.(13)

**4. DIFFERENT VARIETIES OF JUTE APPLICATIONS :**

- i. A luxurious range of Jute home decor products are available to suit various lifestyles. Cushion covers, table mats, and table covers add a touch of elegance to the lifestyle. Exquisite Jute floor coverings add ethnicity to home interiors.
- ii. Be it light, soft, and practical portfolio bags for executives, Jute cotton blend bedspreads, easy to clean decorative wall hangings, soft non-scratching mats/baskets, or sturdy and comfortable hammocks, they all come in jute - so celebrate this autumn season in an eco-friendly-class of its own.(10)
- iii. Jute was primarily used to weave coarse packaging materials, farmer market bags, grocery bags, shopping bags, floor mats, ropes, and twines in India.
- iv. Since ageing, jute fabric has been used as bags or sacks for packing because it is a strong and durable fabric.
- v. Jute fabric is a popular choice for fashionable clothing, home furnishings, and fashion accessories. Jute fabric is most commonly used in the production of carpets, linoleum, cordage, and twines. It is occasionally used as webbing to cover the inner springs of automobile seats.
- vi. Sometimes used as a fashion accessory for clothing, tapestries, soft luggage, and so on.(12)
- vii. Jute is also used to make ghillie suits, which are used as camouflage and look like grass or brush.
- viii. Jute byproducts are diverse and can be used in cosmetics, medicine, paints, and other products.(13)

**CONCLUSION:**

This paper describes the detailed information of jute fibre and fabric properties, characteristics, and applications. Jute fabrics are one of the most effective and biodegradable natural fibres, with a wide range of applications and cost-effectiveness.

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