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## Application of Natural Fibre (Jute) Products

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# Introduction

- Jute is one of the world's most important natural fibres second only to cotton in production. It is a bast fibre obtained from two species namely White Jute (*Corchorus capsularis*) and Tossa Jute (*Corchorus olitorius*). Every part of jute from leaves to roots is utilized in different forms such as packaging material, furnishing fabrics, vegetables, cooking fuel etc. As it is a coarse textile fibre it is mainly used as a raw material for the production of packaging material.
- Properly retted and washed jute fibre is fairly lustrous. The color of the fibre varies from creamy white to brown.
- Jute and jute products are bio-degradable, photodegradable, thermal degradable, non-toxic, hydrophilic, drappable and less extensible with high moisture and UV absorbing capacity. It has the similarity with cotton and wood simultaneously due to the presence of cellulose and lignin respectively. Based on its properties a large number of traditional and diversified jute products are now being produced.





# Jute Field



## Extraction of Jute



# Jute Fibre



# Table 1: World production of jute, kenaf & allied fibres

(in thousand tonnes)

	2006/2007	2007/2008	2008/2009	2009/2010 (Target)
<b>World</b>	<b>3051.31 (Provisional)</b>	<b>2994.52 (Provisional)</b>		
<b>Bangladesh</b>	<b>1186.00</b>	<b>1237.00</b>	<b>918</b>	<b>1080</b>
<b>India</b>	<b>1800.00</b>	<b>1782.00</b>	<b>1476</b>	<b>1692</b>
<b>China</b>	<b>86.80</b>	<b>86.80</b>		
<b>Myanmar</b>	<b>43.60</b>	<b>40.00</b>		
<b>Nepal</b>	<b>17.10</b>	<b>17.10</b>		
<b>Thailand</b>	<b>36.00</b>	<b>36.00</b>		
<b>Vietnam</b>	<b>10.50</b>	<b>10.50</b>		



# Jute

## Major Producing Countries:

Bangladesh, India, China, Nepal, Myanmar, Thailand & Vietnam which account for 95 % of total world production.



# Jute Sector

- Jute cultivation - 1.6 m ha
- Farmers - 12 m
- Industry workers - 0.5 m

About 100 million people in the world are dependent on jute for their livelihood in production, industry and trade.



# Main Strengths of Jute

- High strength and modulus
- Low extensibility
- Moisture absorbing ability
- High abrasion resistance
- Good thermal stability
- Insulation against sound
- Anti-static property
- Surface morphology



# Additional advantages

- Renewable
- Unbreakable and Durable
- UV-, termite-, acid- and alkali- resistant
- Less costly
- Biodegradable
- Eco-friendly etc.



# Traditional Jute Products

- Traditionally jute has been used to manufacture packaging materials like hessian, sacking, ropes, twines, carpet backing cloth etc.
- **Yarns/Twines/Cordages**
- A wide range of yarns/twines/cordages (3lbs-500lbs) are manufactured in different counts and diameter. These are used for the purpose of tying, knotting, and binding etc Jute yarns of various dimensions are plied together to make twines as per requirement and use.



# Traditional Jute Products Contd.

## Hessian, Sacking and Carpet Backing Cloth (CBC)

- Hessian is lighter than sacking and is used for bags, wrappers, wall-coverings, upholstery and home furnishings.
- Sacking is used as a packaging material for transportation of agricultural products.
- Carpet backing cloth (CBC) is a kind of balanced fabric, weighing between 180-407 gm/m<sup>2</sup> and is used as a base for making carpet. Normally CBC is of two types:
  - (a) Carpet backing (primary): The base fabrics on which pile yarns are tufted and anchored to make a carpet.
  - (b) Carpet backing (secondary): Fabrics bonded on the backside of the carpet forming an underlay.
- The technical advantage of jute packing materials are resistance to tearing, ease of repair, high surface frictional coefficient, better stacking, stability, free from stack heating effects, better breathability etc.



# Diversified Jute Products

- Jute is a versatile fibre. Based on its properties a wide range of diversified jute products have been produced by the application of various chemical modifications and finishing processes.
- In fact, there is no universal definition for diversified jute products. Products other than traditional ones and having higher value addition can be defined as diversified jute products.
- The market for traditional products started declining in the 80's with the advent of synthetics. To overcome the declining market new technologies have been evolved to produce high value added and price competitive products. These products for new, alternative and non-traditional use of jute are generally termed as 'Diversified Jute Products'.



# Some of the Specific Diversified Jute Products

The jute yarns / fabrics can be improved / modified / bleached / dyed / texturised / woollenised / blended / coated / polished / made rot-proof, fire-retardant, water proof, softened and smooth and absorbent of UV radiation etc. The modified finished yarns are used for the production of value added diversified jute goods according to consumer needs.



# Finer Jute Yarn

Jute yarn less than 5 counts (172.5 Tex) are generally denoted as finer yarn. Normally yarns between 1.75-5lbs (60-172.5 Tex) are called fine yarns.

These yarns have wide applications in textiles particularly in home textiles, union fabrics for garments and other diversified products. Furthermore, twistless and parafil technologies are available for manufacturing better and diversified jute products for other uses.





**Jute Yarn**



**Dyed Jute Yarn**

# Blending

- Blending has become an important area where diversifications of jute uses are getting more and more prominence.
- Jute / Cotton union / blended products
- A wide range of jute, cotton union / blended fabrics are produced in both handloom and power loom factories with bleached and dyed yarns.



# Jutton

Jutton is a novel innovation where especially chemically treated jute fibre is blended with other natural and synthetic fibres particularly cotton. A wide range of textile materials e.g. yarns; fabrics are made for the manufacturing of apparels, home textiles, decorative, furnishing fabrics after proper bleaching, dyeing and finishing. These include striped, denim, check and plain clothes. These are further tailored into furnishing fabrics such as curtain, sofa cover, cushion cover, jeans, coat, trousers, buckram, liners, shoes, sandals etc.





**Jute-cotton blended fabrics for apparels**

# Home Textiles

Table cloth, cushion covers, sofa covers, bed covers, curtain cloth, table mats, prayer mats, napkins, aprons, blankets, kitchen apron, factory apron, upholstery and tapestry etc, are made of jute or jute in combination with other textile fibres.

Jute has many advantages as a home textile, either replacing cotton or in blend with it. It is a strong, durable, colour and light-fast fibre. Its UV protection, sound and heat insulation, low thermal conduction and anti-static properties make it a wise choice in home décor. These properties indicate that jute can be used in high performance technical textiles.



# Home Textiles



**Jute Cushion Cover & Printed Jute Fabrics**

# Home Textiles



**Jute Furnishing Fabric**

## Bags and Soft Luggage for Various Purposes

Travel bags, shoulder bag, beach bags, fancy bags, ladies bags, school bags, shopping bags, netting bags, fashion bag, carry bags, coin bags, vanity bags, fruits carry bags, water bag, wine bag, bottle bag, hover-sack, money bag, garbage bag, tools bag, ornament boxes etc. are made of jute. Brief case, suite case, spectacle box/bags, pharmaceuticals box & bags, cosmetics bag /boxes are available for use in the market.





## Bags and Soft Luggage



## Jute Bags



## Jute Bag & Hat Making

# Handicrafts

Jute handicrafts are attractive products produced from jute fibre, yarn and fabric. A wide range of handicrafts with jute, bamboo, cane, cotton, silk, grasses, leaves, terracotta etc. are produced by craftsman in different forms and color in small and cottage industries. Special type of bags, sikka, toys, and dolls, bags and boxes, holders, pots, decorative, special types of cloths, scarf, dresses, batiks, bangles, different types of Jewellery, showpieces, flowers, hats, umbrella, door mat, paintings, wall hangings are produced.

## ■ Office Appliances

Seminar folder, pen holder, calendar, file cover, tissue boxes, lamp shed, and photo holder etc could be made with jute fabrics according to the choice of the users.





## Jute Handicrafts, Jute Wall Hangings & Flowers from Jute



## Use of Jute in Ornaments

# Foot Wears





## Foot Wears Made of Jute



# Jute Blankets / Quilts

By chemical modification through causticisation or woolenization jute fibre can be imparted with woolen properties. The thermal property of jute-wool is in between wool and cotton.





## Jute Blankets

# Floor Covering

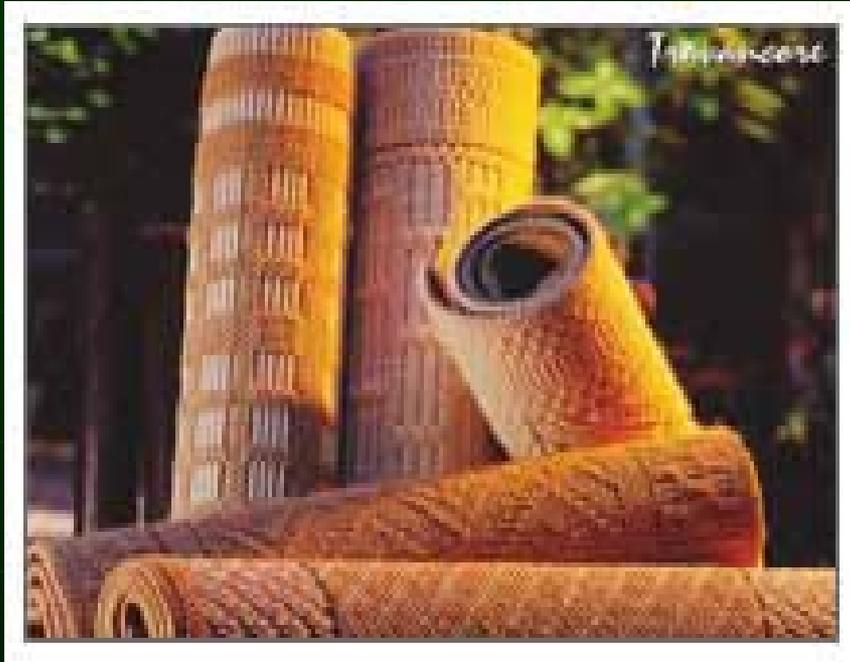
From the conventional carpet backing cloth, jute has moved up the value chain and is being used to make attractive floor coverings. Consumer preference is also shifting away from synthetics to natural floor coverings. Jute floor coverings consist of woven tufted and piled carpets, rugs, floor mats; matting, braided carpets, durries etc. made of jute alone or blended with other textile fibres.



# Floor Covering Contd.

Woven jute floor covering and matting of continuous length can be woven in solid and fancy shades, and in different weaves like, 'Boucle', 'Panama', 'Herringbone', etc. Jute floor coverings and rugs are made through both power loom and handloom. The traditional Satranji carpet is becoming very popular in home décor. Jute non-woven can be used for underlay, linoleum substrate and backing for carpet, special underlay for wood block floorings.





## Jute Floor Coverings & Jute Mats



## Jute Carpets

# Food Grade Jute Bags

Food Grade Jute Bags / Products are now being produced in Bangladesh and India for transportation of Cocoa, Coffee and Shelled Nuts as per requirements of international standards.





## Food Grade Jute Bag

# Jute Geotextiles

Geotextiles are generally used for solving geo-technical & bio-engineering problems and agro-horticultural requirements. These fabricated materials are suitable for solving various civil, hydrological and erosion problems. They have got definite functional properties like filtering, draining, separating, reinforcing, moisturizing, water holding, draping, soil stabilizing and protecting from rain-wind, erosion and facilitating germination. These materials are also used as bio-engineering appliances for protection of wetland, water bodies with plants, grass and seedlings.

Geotextiles are newly emerging technical textiles. Recently, natural fibres including jute are used as geotextiles in various form and design, both woven and non-woven, as geotechnical appliances and bioengineering materials for their high tenacity, water absorbing capacity, superior drapability, less extensibility abundant supply and above all biodegradability and eco friendly characteristics.



# Jute Geotextiles



**Road Construction, Canal bank Protection & Weed Control**

# Pulp & Paper

The demand for pulp and paper is increasing globally and is expected to grow further. A drastic reduction in the supply of wood and bamboo pulp the world over coupled with increasing concerns regarding reduced forest resources have forced many countries to search for alternatives for making paper from so called "tree free" pulp. Jute and kenaf plants are annually renewable resources, requiring only 120 to 180 days for its growth. Jute and kenaf, containing cellulose like other raw materials used for paper pulp, has been found to be an excellent raw material for making good quality pulp and paper. The technologies for making pulp and paper from whole jute as well as from jute fibre are successfully developed.





## Pulp & Paper

# Technical Textiles

- Technical textiles are used by industries of non-textile character in hi-tech and hi-performance applications like advertising, civil engineering, chemical, electrical and leather industries, medical, environmental protection, transportation etc. for their performance or functional characteristics rather than for their aesthetics.
- Technical textiles include textiles for automotive applications, medical textiles (e.g., implants), geotextiles (reinforcement of embankments), agro-textiles (textiles for crop protection), and protective clothing (e.g., heat and radiation protection for fire fighters, molten metal protection for welders, stab protection and bullet proof vests). Technical textiles play an important role worldwide than is commonly acknowledged.



# Application Areas

A study has identified 150 technical end-use products and grouped them into the following 12

- **Agrotech** : agriculture, horticulture, forestry and fishing
- **Buildtech** : building and construction
- **Clothtech** : functional components of shoes and clothing
- **Geotech** : geotextiles and civil engineering
- **Hometech** : products used in the home; components of furniture and floor coverings
- **Indutech** : filtration and other products used in industry
- **Medtech** : hygiene and medical
- **Mobiltech** : transportation construction, equipment and furnishing
- **Oekotech** : environmental protection
- **Packtech** : packaging and storage
- **Protech** : personal and property protection
- **Sporttech** : sports and leisure technical components



# Jute Composite

- The major breakthrough in the uses of jute has come when the automobile, pulp and paper, and the furniture and bedding industries started to use jute and its allied fibres with their non-woven and composite technology. In fact, jute has changed its textile fibre outlook and steadily heading towards a newer identity of a versatile natural fibre.
- Jute composites are emerging as true substitute of wood. A range of products that are presently being produced from jute composites are, Automobile parts, sheets/boards, doors, window frames, furniture, corrugated sheets and chequered boards.



# Jute Composite



**Electric extension cable covers, Household items  
& Magazine cover of cars**



## Jute Composites

# Jute Particle Boards

Particle boards made from the wooden part of the jute stem find wide applications as substitutes for wood. The availability of the technologies for the production of particle boards and its high socio-economic value are arguments in favour of the future development of this jute product. The use of jute particle boards has been found to be quite acceptable both in terms of quality and price.

Particle boards, paper boards, door and window frames, partition, chair, table, helmet and different types of composite materials are commercially available in different trade names. Particle Boards in different sizes, shapes, thickness, design, colour and fashion are available in the market for using as a raw material for furniture, home decoration such as Tables, Chairs, Garden Tables, Door Frames, Cans, and Containers etc. as a substitute of wood and plastic materials.





## Particle Board Made of Jute Sticks

# Cellulose and Cellulose Derivatives

Jute is a lingo-cellulosic natural fibre. By delignification and chemical treatment pure alpha cellulose are produced. A number of cellulose derivatives such as micro crystal cellulose, cellulose acetate, cellulose nitrate, carboxyl methyl cellulose, methyl cellulose etc. are produced from jute. These cellulose derivatives have wide uses in textile industry, cosmetic industry, soap and detergent industry, pharmaceutical industry etc.



# Nursery pots

- Jute fabrics can be used as nursery pots as jute is suitable for its biodegradable nature. The young trees can be planted directly with the container without disturbing the roots, and land restoration where jute cloth prevents erosion occurring while natural vegetation becomes established.





## Nursery Pot Made of Jute Fabric

# Jute and Ecological Aspects

- **Fabrics made of jute fibres are nearly carbon-dioxide neutral and naturally decomposable. One hectare of jute plants can consume about 15 tons of Carbon dioxide (CO<sub>2</sub>) and releases about 11 tons of Oxygen (O<sub>2</sub>). Studies also reveal that the CO<sub>2</sub> assimilation rate of jute is several times higher than that of trees.**
- **Thus, jute is an environment-friendly fibre starting from the seed to fibre, as the used fibres can be recycled. Since jute is a natural fibre it sequesters a significant amount of carbon during its agricultural stage. Thus the green house gas emission of jute was found to be negative.**



# Green Jute Leaves

- Jute leaves contain protein, mineral and salt. They also contain some carotene and antioxidant and are consumed in Bangladesh and India as a vegetable and as ingredients of soup.





**Green Jute Leaves**

# Conclusion

Global awareness about a pollution free environment is being built up and people, in general, are becoming more inclined to the use of natural fibre products which are not only environment friendly but would also serve the intended purpose.





**Thank You All**

