

# JUTE (*Corchorus spp.*)



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## IMPORTANCE

- Jute is the most important fibre crop of the world, next only to cotton – in terms of production, trade and consumption.
- Jute is cheapest vegetable fibre and second most important vegetable fibre after cotton.
- Jute is a natural fibre with golden colour and silky shine in nature – known as **Golden Fibre**.
- Jute is made up of **Bast fibres** consisting highly **lignified and glued bundles of phloem cells**.
- Jute industry employs 1.36 lakh people in more than 76 jute mills and it is regularly cultivated by more than 4 lakh families in India.
- Jute is the traditional packing material.
- Some non-conventional uses are :-
  - As upholstery and home décor: Carpets, Mats, Curtains, Wall/Floor covering etc.
  - As jute cloth: Hessian cloth, Soft sweaters, Imitation silk, technical textiles etc.
  - As support system: Rope, Twine etc.
  - Agricultural uses: Container for nursery, Geotextiles for land restoration, Shade nets etc.
  - Culinary applications: Leaves of jute are used as vegetable

## ORIGIN and HISTORY

**Jute has two cultivable species**

1. ***Corchorus capsularis*** – originated from **Indo-Burma region**.
2. ***Corchorus olitorius*** – Originated from **Africa**

Wild species of Jute include

*Corchorus oestuans*,  
*Corchorus tridens*,  
*Corchorus trilocularis*,  
*Corchorus urticifolices*,  
*Corchorus japonicum*.

## ***Corchorus capsularis***

Common names – White Jute, Tita Jute, Bitter Jute

Originated from Indo Burma region

Colour of the Fibre is White

It is herbaceous annual with slender and straight stem and grows to a height of 1.5 to 4m with tapering stem

Leaves are glabrous, ovate & oblong

Stem is green to red in colour, may/may not branched

Pods are round in shape

Leaves and flowers are smaller but seeds are larger in size (1g = 300 Nos.)

Fibre Quality is poor

## ***Corchorus olitorius***

Common names – Tossa Jute, Mitha Jute

Originated from African region

Colour of the fibre is Yellowish or Reddish brown

It has cylindrical stem and grows up to a height of 5m

Leaves are glabrous, coarsely toothed

Stem is green and are usually branched

Pods are elongated

Leaves and flowers are larger but seeds are smaller in size (1g = 500 Nos.)

Fibre quality is Finer, Softer, Stronger and more lustrous than *C. capsularis*

## ***Corchorus capsularis***

Tolerates water logging, can be grown on both uplands and lowlands occupying more area of cultivation

Seed rate 10 to 11 Kg/ha

Spacing 30 X 5 cm

Seed yield is more but fibre yield is less

Longer duration 180 – 200 days

Grown in loamy soils

Sowing time is February to March

Fertilizer requirement is high

It withstands water logging

## ***Corchorus olitorius***

Cannot tolerate water logging grown only on uplands hence occupying low area of cultivation

Seed rate – 6 to 7 Kg/ha

Spacing – 20 X 5 cm

Seed yield is less but fibre yield is more.

Shorter duration – 120 to 150 days

Grown in sandy loams

Sowing time is April to May

Fertilizer requirement is low

It withstands drought





চিত্র পাট *Corchorus capsularis*



চিত্র পাট *Corchorus olitorius*

## Differences between *Corchorus capsularis* and *Corchorus olitorius*

Characteristics	<i>Corchorus capsularis</i> (White Jute)	<i>Corchorus olitorius</i> (Tossa Jute)
1. Plant height	Shorter than <i>C. olitorius</i> plant	Taller than <i>C. capsularis</i> plant
2. Leaf color	Leaves are dark green	Leaves are light green
3. Test of leaf	Leaf is bitter in taste	Sweet/bitter less in taste
4. Seed color	Seeds are dark color	Seeds are bluish green in color
5. Fiber color	Fibre is white in color	Fibre is golden in color
6. Fruit size	Fruits are round	Fruits are elongated
7. Culture area	Both upland and lowland culture	Mostly upland culture.
8. Pictures		

## DISTRIBUTION

- Jute is extensively grown in India, Bangladesh, China, Pakistan, Myanmar, Nepal.
- In India, it is extensively cultivated in eastern regions like West Bengal, Bihar, Orissa, Assam, Tripura, Meghalaya, Uttar Pradesh.
- India is the largest producer and consumer of raw jute.
- Bangladesh is largest exporter of Raw Jute.
- India stands 1st in area and production of Raw Jute.
- In India West Bengal stands 1st in area, Production and Productivity 50% of total raw jute production in India is alone from West Bengal (5.92 lakh ha and 13.5 q/ha).
- 1st Jute mill was started production in Bengal in 1856.
- Jute is an important crop providing livelihood to 2,50,000 mill workers and 4 million farmer families. Jute plays an important role in improving Indian economy by adding Rs. 6089 millions annually by export.

## PROPERTIES OF JUTE

- ❖ It has high tensile strength, low extensibility and ensures better breath ability of Fabrics
- ❖ Jute Fibre is 100% biodegradable, recyclable and this environmentally friendly
- ❖ Jute has good insulating and antielastic properties
- ❖ Jute has low thermal conductivity and moderate moisture gain
- ❖ Jute has properties like more heat and fire resistance
- ❖ These fibres are grouped under bast fibres and they are lignified
- ❖ A bitter glucoside called “**Corchorin**” present in white Jute



## USES OF JUTE

- ❖ Jute fibre is used in manufacturing rugs, carpets, coarse fibres, twines and coarse blankets
- ❖ Broken fibres of Jute is called ' Tow ' which is used in making low grade paper
- ❖ Jute waste is used as fuel in making activated charcoal
- ❖ In market Jute and Mesta fibres are together known as " Raw Jute "
- ❖ Leaves of Jute have medicinal Properties

## TYPES OF JUTE

Based on general utility purposes, Jute is of 4 types

- A. Hessian or Burlap:** Made of good quality Jute Yarn, It has wide range of applications as in cloth form or in the form of bags
- B. Sacking:** Also known as “heavy goods” It is made from lower grades of fibre and used for bags of all types
- C. Canvas:** Finest Jute product, closely woven of the best grades of fibre widely used in India for protection from weather
- D. Jute Yarn and Twine:** Most of the single strand Jute Yarn produced and consumed by the mills themselves in fabric and twine manufacture.

## CULTIVATION OF JUTE

### Varieities:

Varieities of *Corchorus capsularis* – JRC 212, JRC 321, JRC 7447

Varieities of *Corchorus olitorious*– JRO 524, JRO 878, JRO 835

### Jute based cropping systems: (Kharif)-(Rabi)-(Summer)

#### *Under rainfed conditions*

1. Jute – Wheat
- 2 crops per year
2. Jute – Mustard

#### *Under irrigated conditions*

1. Jute – Rice – Wheat
2. Jute – Rice – Potato (followed in West Bengal)
3. Jute – Rice – Cauliflower / Cabbage
4. Jute – Potato – Rice

## Soil:

- Alluvial sandy loams and clay loamy soils are the best suited for Jute cultivation.
- Capsularis Jute can grow even in standing water especially towards the latter part of growth
- Olitorius Jute cannot thrive in standing water and is more drought resistant and hence grown in light soils.
- New grey alluvial soils of good depth, receiving salts from annual floods is best suited for Jute cultivation

## Climate:

- Jute is a rainfed crop
- Grows well in warm and humid climate with temperature in the range of  $24^{\circ}\text{C} - 37^{\circ}\text{C}$  with **65-90% relative humidity**.
- Jute is mainly grown in *Kharif* or monsoon season as vegetative growth is more in *kharif* that results in higher yields of fibre.
- **Alternate sunshine hours and rainy days** are congenial for better growth.
- Temperatures less than  $20^{\circ}\text{C}$  and more than  $40^{\circ}\text{C}$  are harmful because it restricts the plant growth especially the plant height.
- Annual rainfall is 80 to 100cm.
- **Low plant population is not preferred** because of branching and reduces quality of fibre.
- Early sowing of *Corchorus olitorius* is not preferred because it comes to early flowering, quality is reduced.
- Constant rain or water logging is harmful.

## Tillage:

- Deep ploughing is necessary because root system is extensively developed.
- Seed bed should have fine tilth since seeds are very small.

Cultivated species of jute	Seed rate (Kg/ha)		Spacing (cm)	No. of Plants Per Sq.mt
	Line Sowing	Broad Casting		
<i>Corchorus olitorius</i>	5	7	25x5	80
<i>Corchorus capsularis</i>	7	10	30x5	67

## Time and methods of sowing:

- In midlands and high lands sowing starts with summer showers in March and April and continues till early June in Western part of Jute belt.
- Method of sowing is generally broadcasting or line sowing.

## Manures and Fertilizers :

- 5 tons of well decomposed farm yard manure should applied in last ploughing.
- Nitrogen should be applied in 2 splits – 1st split as **basal** and 2nd split at **4-6 weeks after** sowing.
- Application of Phosphorous reduces the lodging and improves fibre quality.
- Potassium application prevents disease incidence.

<b>Cultivated species of jute</b>	<b>Nitrogen</b>	<b>Phosphorus</b>	<b>Potassium</b>
<i>Corchorus olitorius</i>	40 Kg /ha	40 Kg /ha	60 Kg /ha
<i>Corchorus capsularis</i>	60 Kg/ha	40 Kg /ha	60 Kg/ha

## Weed Management

- Critical period of crop weed competition is upto 60 days after sowing.
- Hand weeding is done twice at 20-25 DAS and 35-40 DAS.
- Basal application of herbicide – Fluchloralin @ 1.5 Kg/ha at 3 DAS followed by irrigation.

## Irrigation:

- Water requirement is 500 mm.
- 1st irrigation is given after sowing.
- Life saving irrigation is given on 4 DAS.
- Afterwards, irrigation is given once in 15 days.
- Critical stages of irrigation are Germination and Knee high stage.

## Crop Rotation:

- In crop rotation system, one legume crop must be included so as to improve soil health.
- In light sowing soils green manure crop is grown prior to sowing of Jute.



## Harvesting:

- Duration of *Corchorus olitorius* – 120 to 150 days  
*Corchorus capsularis* – 180 to 200 days
- Early harvesting gives lower fibre yield but fibre is of finer quality, whereas, late harvesting gives higher fibre yield but the fibre is coarse in texture
- Ideal stage of harvest in Jute is 50% of tender pod formation.
- Late harvesting leads to poor quality fibre due to lignifications of bast fibres
- Harvesting is done by cutting the plants close to ground with sickles.
- Harvested plants left standing in the field for 2-3 days for shedding of leaves.
- Afterwards plants are ready for retting.
- Green plant weight yield is 45 to 50 t/ha.
- Fibre yield is 20-25 q/ha.

## PROCESS OF FIBRE EXTRACTION

1. Bundle stalks - After 2-4 days of harvesting, plants are shaken for complete leaf shedding then they are tied into bundles of 25 cm diameter.
2. Retting
3. Stripping
4. Washing
5. Storage / Transport
6. Kutcha packing
7. Boiling
8. Sundry Squeezing excess water

## Retting

- Retting is a process by which the fibres in the bark get loosened and separated from the woody stalk.
- During retting, gums, pectins and other mucilaginous substances are removed from the plants by combined action of water and microbiological action.
- It is a **microbial process** affected by various aerobic and anaerobic microflora.
- Retting is of 2 types – Dry retting and Wet retting
- When water is not available for retting immediately after harvest, plants are allowed to dry, whenever monsoon occurs, dried plants are retted. This process is called Dry retting.
- Harvested plants are immediately retted directly in water without drying and this process is called Wet retting.
- Wet retting is preferable than dry retting because of good quality of fibre.

- After 2-4days of harvesting, plants are shaken for complete leaf shedding then they are tied into bundles of 25cm diameter.
- Then bundles are steeped in standing water vertically, bundles are submerged in water in a horizontal position laid side by side and tied together to form a sort of platform called “Jak”.
- Jaks are covered with plants like water hyacinth or any other material which do not release tannins as well as iron.
- Float is then kept with weight to make the float completely immersed in water.
- Wood logs and concrete slabs may be used for this purpose
- Freshly cut mango logs or banana stems should not be used weighing material of Jak because tannins coming out from stems reacts with iron of retting water and gives black color to fibre called “Shyamala”.
- This colour can be removed or reduced by adding 2% tamarind solution.
- For ideal retting, JAKS should be kept submerged of at least 20cm deep .
- Most of the defects in fibre quality are due to improper or incomplete or faulty retting.

- Incomplete submergence results in under retting produces a fibre called “crappy fibre” which is of extremely of low value where as over retting results into “dazed fibre” which is very weak fibre.
- So gently flowing fairly deep clean and soft water are congenial for ideal retting.
- Optimum temperature of water should be around 34°C .
- Retting period is 8-30 days.
- In case of stagnating water, addition of Ammonium sulphate will hasten up retting process.
- For finding out exact end point of retting, JAKS must be examined every 10-12 days.
- Fibre should be slip from the wood easily when the plants are pressed between thumb and finger.
- Soon after the end point, JAKS or platforms should be taken out of the water and fibre should be extracted.

## Stripping

- Process of removal of fibres from the stalk after completion of retting is called Stripping.
- Fibre may be extracted in two ways – Single Reed method and Break – Break – Jerk Method
- Fibre is extracted by hands either from individual plants or from bundle of 10-12 plants.

## Washing

- After extraction, fibre is washed thoroughly in the running water

## Fibre is Squeezed for Excess Water

## Sun Drying

- After squeezing the fibre for excess water, fibre is dried on bamboo frames in the mild Sun.

## Boiling and Packing

- Extracted fibre is weighed in amounts of bales
- 1 Bale of Jute = 180 Kg
- Jute fibres are pressed based on different grades
- Jute fibre is graded into
  1. Tops – Very Strong Fibre, Good Luster and Colour
  2. Middles – Strong Fibre, Average Luster and Colour
  3. Bottom – Sound Fibre, Medium Strength
  4. B – Bottom – Sound Fibre, Medium Strength, not suitable for high grades
  5. C – Bottom – Medium Strength Fibre, Any Colour
  6. X – Bottom – Weak Jute

## Factors hastening up Retting Process:

1. Warm water
2. Retting in already used water
3. Harvesting time
4. Climate Conditions like high temperatures
5. Deep water (Too deep water will delay retting )
6. Addition of Chemicals



## Quality Parameters

### 1. Length of Fibre:

If the length of the entire fibre is more, more is the quality

### 2. Strength of Fibre:

Fibre should offer less resistance while using for packing material and other low grade yarn.

### 3. Colour of the Fibre:

Bright Colour is superior.

### 4. Luster of the Fibre:

Bright fibre of smooth surface will have superior luster.

### 5. Stiffness and Hardness:

Properly retted fibre will be soft and fine.

### 6. Fitness of Fibre:

Coarse fibre always fetches low price than fine fibre.

### 7. Percentage of Cuttings of Stem or Percentage of Cutting of Fibre:

Less the number of cuttings, More the Superiority of fibre.

### 8. Proportion of faulty materials:

Roots, Specks, Knots, Runners should be avoided for good Quality.

## Factors influencing Quality of Fibre

1. Retting Water – Gentle flowing, clean and soft water give good quality
2. Materials used as weights on JAKS
3. Seed rate should be more
4. Stage of harvesting
5. Method of Retting – Complete submergence of jak is preferred
6. Variety of Jute – *C. Olitorius* gives good quality fibre than *C. capsularis*
7. Method of fibre extraction – Single Reed Method is preferred
8. Period of Retting – under retted or over retted fibres are of inferior quality
9. Fibres should be stripped off immediately after Retting Process.

## **Different Institutes working on Jute:**

1. J A R I - Jute Agricultural Research Institute – West Bengal
2. C R I J A F - Central Research Institute for Jute and Allied Fibres, Barrackpur, West Bengal
3. J T R L - Jute Technological Research Laboratories – Kolkata, West Bengal
4. I J M A - Indian Jute Mills Association
5. J M D C - Jute Manufacturers Development Council
6. I J I R A - Indian Jute Industries Research Association
7. I J S G - International Jute Study Group
8. N C J D - National Centre for Jute Diversification











**Harvested jute crops are kept in the field for defoliation**



**Retting**



**Jute Extraction**



**Raw Jute Drying**



**Jute Processing Industry**



**Products of Jute**



Thank you...

