

Innovative Jute Retting Technology



**Jute Diversified Product
Decorative Handicraft**



NATURAL RESOURCE MANAGEMENT CENTRE

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Jute is mainly cultivated West Bengal, Assam, Bihar, Meghalaya, Orissa, Tripura and Uttar Pradesh in about 8.5 lakh ha. The national jute production is of the order of 95 lakh bales (1 bale = 180 Kg). Among various states, West Bengal has the distinction of having highest area, production and productivity. It is cultivated in 12 districts of West



Jute Stalks

Bengal and the important districts include Howrah, Hooghly and Nadia. The State produces about 82.16 lakh bales of jute from about 6.0 lakh ha area. Jute is a key element for manufacturing different types of packaging material, bags and various value added di-

versified products. In the background of environment awareness it is finding an important space as compared to HDPE and other synthetic packaging material.



Jute Ribboner

Jute Retting

Normally, Jute fibres are extracted by a process called retting that involves recovery of fibres from its stalks. This is accomplished by allowing the harvested stalks to undergo a decomposition process in water. At the appropriate temperature natural micro organisms present in water act on jute tissues and gradually soften them so that the residues/debris are washed away leaving the fibre intact.

Although the process is basically a simple one, timing is important in obtaining good quality fibre. If the stem is under-retted, it will not be soft enough to remove the bark. Over-retting is equally harmful since the bacteria will not only break down the plant tissues but will also attack the fibre bundles thus weakening the fibre.

The process of retting can be divided into two distinct phases i.e. physical phase and biochemical phase. The physical phase begins when the harvested plants are put in water. The tissues absorb water and swell, releasing soluble components into the water. In the biochemical phase, the released substances (carbohydrates, nitrogenous compounds and salts of different kinds) facilitate growth and multiplication of the microbes in the retting water, prior to their entry into the reeds. These organisms develop and multiply by utilizing free sugars, pectins, hemicelluloses, proteins of the plants as nutrients.

When retting is complete, bundles are taken out of water and fibre is extracted manually one by one i.e. single plant extraction or by beat-break-jerk method i.e. multiple plant extraction. The efficiency of retting depends on a number of factors such as age of the plant, water quality, pH and temperature. Mature plants above 110 days accumulate more of lignin and are hence difficult for decomposition. Non polluted and slow moving water having a pH between 6.0 – 8.0 is convenient for retting. The optimum temperature for jute retting is around 34–36°C at which the process is completed in the minimum

time due to the accelerated activity of the retting micro flora. Microbial action in retting water is maximum at a depth of 15 cm from the surface of water and retting is quicker and better at this depth. Some microbial action is evidenced even up to depth of 35 cm, but below this particularly no effect has been observed. It is reported that retting is accelerated in the presence of several activators. Natural activators like dhaincha (*Sesbania aculeata*) and sun hemp (*Crotalaria juncea*) which are generally introduced into the jute stem bundles before they are put in water for retting. These leguminous plants being rich in nitrogen content help the growth and activity of retting microbes by supplying additional nutrients to them.

Traditional Retting Method

Owing to shortage of water, farmers are compelled to let their harvest decompose in local ditches, way side water bodies, canals and ponds which are meant for community use. Generally, the harvested jute out of traditional retting are of low quality as there is virtually no control over the water quality and temperature. This apart, it results in polluting the stagnant water which subsequently becomes breeding ground of mosquitoes and thus pollutes the local environment. Traditional retting also involves manual labour inside these polluted water causing irritation to skin and health hazards. Some times labourers decline to process owing to these reasons and they may charge a higher wage. Further, on account of poor quality jute out of traditional retting it fetches a lesser price and limits its use for making jute diversified products (JDPs).

Depending on the sufficiency of the above factors a conventional retting process takes about 16-20 days. Thus, the conventional retting process is not only dependent on many natural factors but also is a potential reason of pollution, depending on water availability and likely to result in inferior quality jute.

Present Project

In this background, a technology for quality jute production while avoiding the dependence on the quantity of water and duration of retting has been developed by National Institute for Research on Jute and Allied Fibre Technology (NIRJAFT) under the aegis of ICAR. An attempt was made by NABARD to popularize the technology through funding support under "RIF-Innovative Component" to Manosri Tarun Bani Mandir, an NGO located in Howrah. In the first phase, a demonstration project was implemented in the last year in Udaynarayanpur block of Howrah district. It covered 100 farmers of 20 villages. Subsequently a similar programme was sanctioned and is being implemented in Khanakul and Jangipara block of Hooghly district, Amta II block of Howrah district and in Nadia district.

Innovative Technology of NIRJAFT

The technology of NIRJAFT is outlined as under,

- Jute to be harvested between 100-110 days of sowing. Over matured stalks pose problem of ribboning and are difficult for complete retting resulting in poor yield and inferior quality.
- Harvested stalks should preferably be ribboned quickly (loss of moisture pose problems during ribboning) with help of the ribboning machine.
- Ribboning machine has since been improvised by NIRJAFT by way of providing 04

additional side/vertical rollers along with two collapsible brackets on either side of the main roller. This has helped in firm placement of the stalks and their easy movement inside the main roller during ribboning. Accordingly, the cost of the machine now stands at Rs.1200/- per machine, i.e. an increment by Rs.200/- per machine.

- Harvested ribbons are then bundled and kept ready for retting inside the tank.
- The tank preparation involves checking pH of water (from natural bodies and not from tap) which should be near neutral.
- The ideal tank dimension should be around 10' x 4.5' to 5.0' x 2.5', i.e. the length



Ribboner being used by farmers

of the tank should be in accordance with the stalk length. A tank of this dimension is sufficient to accommodate the harvest from one bigha land. Suitable numbers of retting tanks could be constructed depending on the scale of cultivation.

- The chemical (a non-microbial gum dissolving research product of NIRJAFT) is first dissolved well with a little water. The amount to be used is 7 gm / lit. A pack of 1.75 kg is priced at

Rs.60/- and is easily available from them.

- The dissolved chemical is then applied to the water inside the tank and mixed well. The ribbons are then placed firmly in the tank avoiding twisting and turning (i.e. straight placement).
- The ribbons inside the chemical treated water in the tank are then manually (by feet) pressed for 04-05 minutes till the water becomes little slimy.
- The tank is then covered with polythene sheet from all the sides.
- Fibres are extracted at the end of 07-10 days with washing.



Jute ribbons being soaked in tanks

Normally 100 kg plant yields 40 kg of ribbons (60 kg of stalks is reduced at the field level itself requiring less energy for carriage). Traditionally, 20 litres of water is required for retting of 1 kg of plant. However, under the new technology, water requirement is @ 1 lit / plant. (or @ 2.5 litre for every kg of ribbon). Moreover, the ribbons could be well retted within 07-10 days of time as compared to the traditional process requiring 03 weeks. Moreover, the quality and quantity of fibre is much superior under new technology as compared to the traditional method. The jute produced under traditional method is normally of TD₅ / TD₆ grade. However, the same under new technology could easily be of TD₃ grade if done properly. Thus the probability of fetching a better price on account of quality is much higher than the traditional method. The quantitative improvement however, is marginal at 1.0 to 1.5%. Apart from economy of water, it yields better stalks (apart from its use as fuel, in betel vine *Baroj*, in making particle boards etc.) and is environment friendly.



*Conventional retting
(Unhygienic/poor quality)*



Covered tank



Improved Jute



Good quality yarn under new technology

Advantages of improved retting over the traditional process

- Water Requirement : Reduced from 20 l/kg of plant to 1.0 l/kg of plant
- Retting period : Reduced from 16-21 days to 07 days
- Yield advantage by 1%
- Quality : From TD6/TD7 to TD-3/TD4
- Environment friendly
- Scope for having JDP (Jute Diversified Product)
- Better quality stalks as by product

Opportunity for Financing

The major items of investment include ribboner and retting tank. That apart the cost of consumables could also be considered. Therefore, the following amount could be tentatively considered for 1 bigha of jute holding (nearly 1/3rd of an acre).

Item	Nos / qty	Rate (Rs.)	Amt (Rs.)
Ribboner	4	1200	4,800
Retting tank (4mX3mX1m)	1		18,000
Sub total			22,800
Other expenses :			
Chemical	37 Kg	52.0	1,924
Labour	11	72	792
Sub total			2,716
		Total	25516

Thus a total financial requirement would be of the order of Rs.25516/- per bigha. Apart from better yield and quality that will fetch a higher return, the farmer can also earn additional income from hiring charges. Further the retting tank can also be used for diversified purposes such as compost pit, rain water harvesting etc.

Grading of Jute by the method of touching and looking

Grading of jute is an important factor, because the sale price of the jute depends on it. So, it is very necessary for our farmers to grade the crop themselves. Grading of jute depends upon the following six factors :

- | | | |
|-------------|-----------|----------------|
| a) Strength | b) Stake | c) Deformities |
| d) Fineness | e) colour | f) Density |

BIS has decided grades/marks for each and every factor. The sum of the marks is known as Grading of jute. Generally, jute has been categorized into 08 grades/category, for Tosha Jute it is from TD₁ and TD₈ and for White Jute it is from W₁ to W₈.

There are some guidelines by which one can easily categorize the jute.

- | | |
|--------------------|--|
| Strength | <ul style="list-style-type: none">● Take some 10-15 ribbons from the bundle.● Pull them vertically and the force you use is the strength of your crop.● Repeat this procedure 05 times.● By this you can understand the category of the strength.● Accordingly give marks from the following table. |
| Stake | <ul style="list-style-type: none">● Length of stake decides categorization of jute.● First, vertically keep the bundle of jute on a table.● Then measure stake length.● According to the length calculate percentage of stake to stalk.● By doubling this percentage we will get the percentage of the stake according to the weight.● Accordingly give marks from the following table. |
| Deformities | <ul style="list-style-type: none">● Spread the jute on a table● Mark their deformities.● Accordingly give marks from the following table. |
| Fineness | <ul style="list-style-type: none">● Take some jute in your hand to examine the fineness of its fiber.● Check its fineness.● Accordingly give marks from the following table. |
| Colour | <ul style="list-style-type: none">● Spread the jute on a sufficient lighted area.● Carefully watch its colour.● Categorize them according to the table● Accordingly give marks from the following table. |
| Density | <ul style="list-style-type: none">● Take some jute in you hand to examine its density.● If it is heavy then it is 'Heavy Bodied' Jute.● If it is not so heavy then it is 'Medium Bodied' Jute. |
| Grading | <ul style="list-style-type: none">● Sum up the marks secured from six factors.● By the help of the table categorize them.● If there is any extra mark after categorization then work out its percentage.● If the percentage is more than 50% from one category to the other then the crop will get the price of the higher category.● If the percentage is less than 50% from one category to the other then the price of the crop will be decided between the buyer and the seller. |

Different categories of Tosha Jute & Marks thereof

Category	Strength	Colour	Density	Fineness	Quantity of Stake	Deformities	Total Marks
Td1	Excellent (30)	Excellent (10)	Heavy (5)	Very Fine (10)	5 Percent (20)	Without any Deformity (25)	100
Td2	Very Good (23)	Very Good (7)	Heavy (5)	Fine (7)	8 Percent (18)	Without any Deformity (25)	85
Td3	Good (23)	Good (7)	Medium Heavy (3)	Good Separate Fibers (5)	10 Percent (15)	Only Minor Deformity (22)	70
Td4	Satisfactory (23)	Satisfactory (7)	Medium Heavy (5)	Separate Fibers (7)	15 Percent (10)	Minor Deformity (18)	55
Td5	Almost O.K. (16)	Almost O.K. (3)	-	Separate Fibers (2)	20 Percent (5)	Without Major Deformity (14)	40
Td6	Almost O.K. (16)	-	-	-	25 Percent (4)	Without Several Deformity (5)	25
Td7	Weak (5)	-	-	-	35 Percent (3)	50% With Major Deformity (2)	10

Td8 is the lowest category with some commercial value.

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