

# Can We Use Jute and Mesta-Sticks for Mini Paper Plants

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About 3 million tonnes of jute and mesta sticks are grown annually in India as byproducts of jute and mesta cultivation. To these may be added a host of other agricultural residues which carry the woody portion known as stick, covered with bast fibers. The burning problem today is whether these vast resources of cellulosic raw materials obtained annually through agriculture could be at least partly used for pulp, paper, board and cellulose industries or they are to be left only to their general uses like burning as a fuel, temporary fencing and training creepers.

At present bamboo and wood and to some extent grass, straw, bagasse and similar unconventional raw materials are used by pulp and paper mills which have the necessary infra-structure and set-up for the purpose. Resources of wood and bamboo can not, however be stretched to meet the evergrowing demand for various qualities of paper in the contry. In this context new ventures, which are sure to come up in the near future will have to depend on other sources of cellulose of which

jute and mesta sticks are very important. Technological and commercial difficulties to be faced in the utilisation of jute and mesta sticks could be made minimum in small units upto 10 tonnes by adopting special manufacturing patterns and techniques. In this respect big units which are tied up to a technology for processing wood and bamboo might find it difficult and not paying to process jute and mesta sticks and similar agricultural residues.

Various problems involved in the utilisation of jute stick and similar agricultural residues for mini paper plants are to be identified and solved satisfactorily, because without these vast resources of cellulosic raw materials, expansion of pulp and paper and cellulose industries is not possible. Commercial and technological problems which would be discussed individually may be summarised as follows:

1) Is jute stick a waste and how much of it can be profitably utilised for pulp and paper industries without disturbing the village economy?

2) Jute stick, being a seasonal crop, is available only during a part of the year.

3) Jute stick having low density and high bulk faces the problem

of collection, transport, handling and storage.

4) Jute stick and similar agricultural residues like sticks of other bast fibres, having high bulk and short fibers have technological difficulties during large scale processing with the type of machinery used for wood and bamboo in big pulp and paper units which have specialised in manufacturing particular grades of paper.

Although various points regarding the utilisation of jute stick have been investigated and discussed by different authors <sup>1,2,3,4,5,6,7,8,9,10,11</sup> at different times, still feasibility of utilising this material for mini or for big paper plants have to be clearly understood. A discussion on the problems cited above will throw some light on the subject.

## No. 1 Problem

### Is jute stick a waste ?

During a recent survey to find out how jute stick is utilised to boost up the village economy, it was found that the major use of jute stick is a fuel which consumes about 70% of the total production. For thatching and for training creepers, a small portion, about 5 to 10% is used. The rest is either unused or unaccounted for. The price of jute stick varies from place to place. On an average it is about Rs. 10/-

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per quintal but in some parts of Bengal it is between Rs. 3/- to Rs. 5/- quintal. Limited uses of jute stick for pulp, paper and board industries for mini plants which could certainly improve the village economy by producing cheap quality papers and boards could be possible. In that case the question of alternative fuel like coal to replace jute stick as a fuel may come up.

#### **No. 2 Problem**

##### **Jute stick a seasonal crop**

The improvement point to be kept in view is that jute stick is available only during the latter half of the year. So the question of alternative raw materials and storage of jute stick along with other raw materials should be kept in mind. Generally rice is grown in those parts where jute cultivation is carried out. There jute stick and rice straw could make an ideal combination for mini paper plants

#### **No. 3 Problem**

##### **Procurement of jute stick is beset with many problems**

Being of low density and high bulk the procurement of jute stick faces a number of problems like that of collection, transport, handling and storage. However, the cost of collection, transport, handling and storage could be minimised to a great extent if a suitable location for the paper plant is found near the area where jute stick is grown in abundance. Mini paper plants suitably located near jute and rice growing belts where different kinds of transport are available locally could solve the

above difficulties, while big paper mills developed traditionally on wood and bamboo near urban areas could not be interested in systematically lifting jute stick available in limited quantities from remote places.

Price of jute stick near urban areas is generally higher while the price in villages where jute stick is available in abundance is much lower. This factor is another deterrent in the use of jute stick in the existing mills situated near urban areas.

#### **No. 4 problem**

##### **Jute stick has some technological difficulties in pulping.**

Technology of pulping wood and bamboo aims at producing mostly well cooked pulp which could be bleached, if necessary, to standard brightnesses for manufacturing writing, printing and special types of papers. This technology is further tied up with the maximum recovery of chemicals for which black liquor, of proper fuel value, is required. For achieving these objectives, processing of wood and bamboo is adjusted accordingly. In this type of processing technology, yield of pulp suffers while the black liquor improves in its full value. Also wetness of the pulp increases and bleachability to high brightnesses, with minimum specks is ensured. The aim to produce high-yield pulps from wood and bamboo to improve on the overall economy of paper making can only be attained to limited extents while maintaining

these objectives which are production of bleachable pulp and recovery of cooking chemicals by burning black liquor of proper full value. In order to fit jute stick in this type of processing pattern, it has to be cooked like wood and bamboo so that a grade of pulp which could be bleached, if necessary, would be available. In achieving this objective, various difficulties, like *wetness of pulp*, *presence of fines and shortness of fibres*, stand in the way of processing. Because too many operations involving action of strong cooking and bleaching chemicals, washing the pulp free from chemicals, refining, screening, thickening, and agitation increase the wetness of the pulp, further making processing difficult, so the use of jute stick and similar raw materials may be discouraged for the sake of production and overall economy. In a different technological set-up where yield of pulp after cooking is more important than the recovery of cooking chemicals, jute stick pulp processing will not follow the technology recommended for wood and bamboo. Here wetness of pulp is not stretched far so as to create processing difficulties jute mentioned. In other words, a situation in which recovery of cooking chemicals, by improving the fuel value of black liquor is not important and the whole economy is based on high yield pulp subjected to minimum processing, jute stick and similar agricultural residues could be considered as

an ideal raw material for mini paper plants aiming at manufacturing ordinary qualities of paper.

### Processing Technology

The processing of jute stick and similar agricultural wastes in mini paper plants can be worked out along with the following lines:—(1) production of high yield pulp with minimum use of chemicals, (2) production of pulp of uniform quality with reasonable strength, and (3) manufacture of ordinary grades of paper like kraft and semi bleached varieties from such grades of pulp.

In the case of jute stick the above objectives could be attained by the applications of conventional pulping methods. Unlike wood and bamboo it is a light material which can be softened easily by chemicals. The softened material could be further processed to a uniform pulp. The same technique applied in the case of bamboo has been found to produce inferior results. Bamboo being a dense material does not respond well to mild conditions of chemi-mechanical pulping unlike jute stick and similar agricultural residues. Due to the penetration effect of the softening chemicals in the case of jute stick, partial delignification resulting in a reasonable development of strength in the final product occurs while such an effect is not achieved in the case of bamboo subjected to the

same chemi-mechanical pulping process. An analysis of chemi-mechanical pulps, of comparable freenesses, from jute stick and bamboo for strength characteristics is described in the following table.

TABLE

Nature of pulp used	Breaking Length (metres)	Fold	Remarks
(1) 100% jute-stick chemi-mechanical pulp	4990	280	Creamy yellow pulp
(2) 100% Bamboo chemi-mechanical pulp	1500	2-3	yellow pulp

These results indicated that bamboo pulp was inferior in strength characteristics to jute stick pulp, both being processed by the same chemi-mechanical pulping method.

Finally it may be stated that processing techniques and manufacturing patterns utilising jute stick and similar agricultural by products will aim at producing pulps of high yields for manufacturing kraft and semi-bleached papers and thus they are bound to be different from those used in big units which are recovery-oriented and dependent on wood and bamboo as their primary raw materials.

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## MINI PAPER & BOARD PLANT