

Scope of using Jute Stick an Agriculture residue in Pulp and Paper Industries

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In view to ever-growing demand for pulp, paper and cellulose products with increase in population, growth of literacy, improvement of standard of living and constant depletion of shrinking forest wealth, the existing pulp and paper and cellulose industries have to look for unconventional raw materials other than wood and bamboo even for maintaining the present rate of production. For the same reason any new venture in these lines has also to depend on unconventional raw materials as most of wood and bamboo would be consumed by existing big paper units which have the necessary infrastructure for the purpose. In this context, jute stick, an important by product of the jute crop is now by and large being wasted, can play an important role for the development of pulp and paper industries. Other agricultural by-products which are of great importance and can be profitably utilised are rice straw, wheat straw and various similar agricultural by-products.

In terms of quantity, about 3 million tones of jute stick is available as a by-product. To these may be added a host of agricultural residues like cotton stick, dhancha-fibre stick, roselle stick and sticks of other bast fibres for profitable utilisation. The great challenge for this decade is whether these vast resources of cellulosic raw materials obtained annually, could be wholly or at least partly utilised for pulp, paper, board and cellulose industries or they are to be left only for the domestic purposes as fuel, temporary fencing etc. In this jute plants which are kept for seeds and from which bast fibre is not extracted, should also be included. Industrial utilisation of jute stick should start with a knowledge of its chemical composition. Jute stick is a good source of celluloses as indicated in Table 1 below; the chemical composition of jute stick and jute and mesta fibre are compared for a proper understanding of their respective utilities.

TABLE-1

	Jute stick	Jute fibre	Mesta fibre
Alpha Cellulose	40.8	60.5	60
Lignin	23.5	13.3	10.1
Hemicellulose	34	22	23

Jute stick pulp is comparable to hard wood pulp in fibre length while bamboo pulp is similar to soft wood pulp. The use of jute stick pulp in pulp and paper industries is very much influenced by its fibre characteristics. The main physical properties of jute stick are its high tensile strength, brittleness and high porosity. This last factor has also to be taken into consideration.

The basic process of pulping of jute stick is based on fundamental practices of Paper making. This process has been further developed at the Jute Technological Research Laboratories to meet the various technological shortcomings of jute stick during its processing. The description of the process is as follows:—

Jute stick in the form of broken bits or as a whole are digested with alkali, ranging from 6-10% on the raw materials used. Cooked pulp is then discharged in pits with false bottom and water is spread on the pulp to remove black liquor.

The pulp is then passed through a refiner to the potcher where it is further washed to remove excess black liquor. The pulp is then screened, dewatered and again refined and stored. Refined pulp is then mixed with requisite quantity of alum, rosin and other ingredients when necessary, in a mixing potcher, again refined and finally sent to stock chest which is the last storage place from which pulp will finally be delivered to the paper-making screen.

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The flow sheet diagram for the layout of the proposed plant would be as follows:—

Boiler-Digester-Refiner-Broker-cum-washer-Screen-Concentrator-Refiner-Prepared stuff-Screen-Paper-Machine Finished product.

Suitable deviation may however, be made according to necessity. In our institute kraft paper of acceptable quality was processed from different agricultural by products admixture with jute sticks or jute sticks alone. Results of strength characteristics of such kraft papers along with figures for market samples and those of ISI standard kraft paper are shown in the Table II.

TABLE—II

Sl. No	Nature of sample from	Substance in gm/m ²	Breaking length in metre	Double Fold
1.	100% jute stick	55-65	4780	57
2.	Jute stick + Rice straw pulps (50% + 50%)	60	5380	120
3.	Kraft paper from market	—	3000 to 4000	above 10
4.	ISI standard for kraft paper	—	3500	40

Jute stick and similar agricultural residues like sticks of other bast fibres, having high bulk and short fibres have various technological difficulties like wetness of pulp, presence of fines and shortness of fibres, during large scale processing pattern, used for wood and bamboo, in a big pulp and paper mill. Because, too many operations involving action of strong cooking and bleaching chemicals, washing the pulp free from chemicals, refining, screenig, thickening, and agitation increase the wetness of the pulp to a great extent, so the use of jute stick and similar raw materials may be discouraged for the sake of production and overall economy.

But in a different technological set up where whole economy may be based on high yield pulp subjected

to minimum processing rather than improving the fuel value of black liquor, jute stick and similar agricultural residues could be considered as ideal raw materials for mini-paper plants, aiming at manufacturing ordinary qualities of paper. So the processing technology of agricultural residues for the mini paper plants should be worked with three objectives mentioned below : (1) production of high yield pulp with minimum use of chemicals (2) production of pulp with good strength (3) Manufacture of ordinary grades of paper like kraft and semi-bleached papers

Various problems related to the utilisation of jute stick and similar agricultural residues for mini paper plant are to be determined and solved properly, otherwise vast resources of agro-raw materials will be of no use in driving out paper famine in near future.

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