

# Production of mechanical pulp type printing papers-problems & prospects

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## ABSTRACT

A combination of basic wood raw material properties and appropriate technology is the only way to successful production of Chemi-mechanical or other high yield pulps for use in Newsprint and uncoated magazine papers. A deeper understanding of the various parameters affecting chemi-mechanical pulp quality is necessary including impregnation, refining, formation of fines and their nature, surface of the separated fibres etc. Agricultural residues/wastes as an alternative source of production of high yield pulps for use in newsprint/uncoated magazine papers also have to be studied in great depth for possible utilization in 30-50 T/day units.

The country's requirement of newsprint and uncoated magazine papers containing a substantial amount of ground wood type pulp are met mainly by imports. The deficit in supply and demand is large and measures are being considered to augment indigenous production of newsprint and uncoated magazine papers. Both the technical and economic factors, are responsible for present shortages of mechanical pulp type printing papers however in the present paper only technical factors have been discussed to bring in some points for corrective action.

The furnish of newsprint and uncoated magazine papers consist mainly of mechanical pulp types. Mechanical pulp types are mostly produced from coniferous fibrous raw materials. Unfortunately this country does not have coniferous fibrous raw materials available with ease and in greater quantities, as such the production of newsprint and magazine papers have suffered. The fact that coniferous fibrous raw materials are still considered ideal for production of mechanical pulp type printing papers have even necessitated some countries to go in for large scale plantation of tropical pines.

Technology of production of mechanical pulp types from coniferous fibrous raw materials has made remarkable progress during the last few years. Processes like stone ground wood, pressurised ground wood, refiner mechanical, thermomechanical, chemithermomechanical, Bi-sulphite chemimechanical etc with many variations are followed to produce pulps with balanced physical and optical properties. Encouraging results are also reported on some temperate hardwoods. The choice of the fibrous raw material for production of ultra high yield pulps for use in Newsprint/Magazine paper is achieving great importance for

reasons of developing simple concepts of treatment in view of the concern for energy, environment and ecology.

The situation as it stands today and excluding possibility of utilization of coniferous fibrous raw materials for high yield pulping, the choice falls on mixed tropical hardwoods, plantation hardwoods and agricultural residues/wastes. So far research in this country had shown that mixed tropical hardwoods with their wide variability in colour, density, heartwood content etc are not suitable for production of bleached mechanical pulp types, for use in significant quantities as a furnish for newsprint and magazine paper. By suitability, it is implied techno-economic suitability. Even with the plantation hardwood of which Eucalyptus hybrid is the dominating variety, the choice of the process for producing ultra high yield pulps is very limited. As the formation of heartwood and polyphenols takes place very rapidly, the brightness of the wood and of the resultant

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pulp suffers adversely necessitating elaborate bleaching. Probably due importance of basic wood raw material properties for ultra high yield pulp production has not received adequate attention with those concerned with raising of plantations and also with those planning for their utilization in production of mechanical pulp type printing papers. To a certain extent inadequate research facilities in this area have also contributed to our ignorance and the thrust of research and development activities that was really necessary could not be met. However, in the last 3-4 years, situation has changed and it is now left to us if processes of ultra high yield pulping could be developed in a way that these could be commercially exploited. The approach is likely to be two fold.

1. Raising of trees suitable for production of mechanical pulp types.
2. Process and technological developments to overcome the shortcomings in the raw material for production of superior quality ultra high yield pulps.

Probably a balance has to be struck between the two as either cannot reach an ideal situation. The evidence of emphasis on raw material quality can be obtained from PICOP (Paper Industries Corporation of the Philippines) where *Albizzia falcata* is the preferred species for production of ultra high yield pulp. *Gmelina arborea* has also shown some promise. Poplar is another promising material. Malaysia is raising plantation of tropical pines in a big way and if the plans succeed it can become an exporter of newsprint for the region in due course. At the same time there is an example, worth emulating of successful utilization of young-growth *Eucalypt* Sp. for production of ground-wood pulp by the Australian Newsprint Mills Ltd., the G I B (Groundwood from impregnated billets) process was the answer to the problem with added advantages of higher brightness of pulp as the regrowth wood was much lighter in colour than the mature wood used otherwise in normal groundwood pulp production.

*E. hybrid* the main plantation wood in the country cannot be considered from all counts, ideal for production of bleached ultra high yield pulps. To a certain extent a better understanding of this wood has enabled to adopt right conditions of treatment in the production of chemimechanical pulps for use in newsprint and magazine papers. Studies on effect of density/age, Variation in anatomical composition, heartwood and extractives formations, fibre dimensions etc are useful in determining quality of chemimechanical pulps. Studies reported elsewhere have shown that there is wide

variation in the anatomical composition of the *Eucalypts* as will be seen from below :

#### Wood anatomical data (% by Volume)

	Basic density		
	Fibres :	Paren- chyma:	Vessels : lb/ft <sup>3</sup>
<i>E. regnans</i> (Young)	81	12	7
<i>E. regnans</i> (Over mature)	59	18	23
<i>E. camaldulensis</i>	48	25	27

Studies made in this country on *E. hybrid* as to "In tree Variation of wood quality", effect of age on heartwood content, changes in colour of Sap wood and heartwood with age etc have been useful in guiding their effect on chemimechanical pulps quality. In brief it may be said that the while approach to studying chemimechanical or other high yield pulping process has to be more deeper starting from fibrous raw material. It appears that even if this approach is taken up immediately, there is not much of plantation hardwood available for use in newsprint/magazine papers by following well established ultra high yield pulping technologies. The situation is really serious and also in view of the continuing deforestation, affecting ecology, any substantial increase in mechanical pulp types for use in newsprint/magazine papers from hardwoods is not a distinct possibility. May be emphasis has to be shifted to agricultural residues/wastes and it needs to be found out if appropriate technology which will be economically and environmentally acceptable can be developed for their utilization in production of newsprint/magazine papers. The author feels that plants of size of 30-50T/day may be techno-economically feasible which, of course, needs to be studied in detail. For such units the long fibred content will have to be provided from either a mother pulp mill or initially would be based on imported semibleached soft-wood pulp.

Agricultural residues/wastes have already some use and it would not be proper for the industry to make their price/uneconomical by laying heavy dependence on them. In addition heavy dependence also necessitates more organized collection, transport and storage arrangements which sometimes may not be possible if advantage of diffused location of the units has to be obtained. It is also possible that of the many agricultural residues/wastes available not all may show the promise for use in manufacture of newsprint/maga-

zine papers. Incidentally limited work carried out here has shown that jute stick is a promising raw material. A distinction has to be drawn between a cellulosic raw material which is ideal for a specific purpose and the other which has to be made suitable by technical refinements. Jute stick bleached chemimechanical pulp has a good combination of capacity, strength properties, smoothness and printability a plus point for use in production of light weight newsprint/magazine papers. The problem with certain other agricultural residues/wastes notably bagasse are too well known for producing a satisfactory quality of newsprint and it is believed that these have now been overcome due to further technological developments.

Jute sticks have been pulped as reported in the literature by some high yield pulping process, however, their economic suitability is not really known. It is important that after initial process development work, the concept of technology transfer, of which, process is just one part is taken up in right earnest, otherwise most of the developments in the field of pulp and paper in this country will not reach to commercial fruition. Assistance from Indigenous manufacturer's of equipment for various high yield pulping systems is also overdue as this will provide a push for adoption of improved approaches for sizable production of newsprint/magazine papers, so very necessary for the literacy of the masses.