Promising Poplars for paper pulp

Poplars, *Populus deltoides* Marsh., are fast growing trees, suitable for making variety of papers. It has been found that 3-4 years old trees become ready for pulp making. The farmers grow poplars in single row in the field plantation as well as block plantation. Introduction of Poplar in agro-forestry has benefited the farmers economically. Due to high demand of raw material by paper industry, plantations of fast growing species of *Casuarina*, *Populus*, *Leucaena* and *Eucalyptus* are gaining increasing attention.

Hardwoods of poplar have been used in mechanical pulping for a number of years but technology for getting high brightness paper suitable for tissue grades and writing and printing paper have not been developed yet. Researchers at Orient Paper Mills, Shahdol, Madhya Pradesh have done comparative pulping studies of poplar stem and root for exploring possibilities of utilizing whole plant as raw material. The results have revealed that poplar stem gives higher bleached pulp yield and better strength properties than poplar root bleached pulp. However, both are quite suitable for pulp and paper-making [Naithani et al, IPPTA J, 2004, 16 (2), 57-60; Khare et al, ibid, 2004, 16(2) 75-79].

During experiment steamed chips were dewatered and impregnated with chemicals in two stages followed by dewatering after each stage of chemical treatment in indigenously designed and fabricated impressafiner. The chemical treated dewatered chips were finally refined. It was observed that high pulp yield (about 80%) having adequate strength properties with brightness (>75%) can be obtained from poplar by using APMP process.

Poplar does not re-grow from stump after cutting hence its root is dug out and used for various purposes. Researchers at Orient Paper Mills, Shahdol, Madhya Pradesh have done comparative pulping studies of poplar stem and root for exploring possibilities of utilizing whole plant as raw material. The results have revealed that poplar stem gives higher bleached pulp yield and better strength properties than poplar root bleached pulp. However, both are quite suitable for pulp and paper-making [Naithani et al, IPPTA J, 2004, 16 (2), 57-60; Khare et al, ibid, 2004, 16(2) 75-79].

Bio-deinking of waste papers

Recycling of waste paper into high-grade writing paper is the new trend in paper industry. The major problem in recycling of waste paper is the removal of contaminants, mainly the inks. Microbial enzymes have shown promising results when used in combination with flotation deinking during recycling of waste paper. Vyas and others of NCL, Pune, have described fabrication of a cost effective, laboratory scale flotation device that can be used for deinking of various grades of waste paper. The unit consists of aeration device, sparger, baffles for high air to stock ratios and high shear mixing. The sparger is designed in such a way, that, it gives micro turbulent airflow necessary for removal of smaller ink particles. The deinking experiments using alkaline active cellulases from an alkalo tolerant *Fusarium* sp. have been reported. The enzyme preparation showed different cellulolytic and xylanolytic activities. Successful application of cellulases in enzymatic deinking of mixed office waste paper has been described [Vyas et al, Indian J Chem Technol, 2003, 10(6), 593-597].
Pulp and Paper from Indian non-woody fibrous raw materials

Indian Pulp and Paper industries are facing many problems in which availability of better quality of wood fibres is one of them. Attempts are made to investigate the unique chemical and morphological characteristics of some potentially available non-woody fibrous plants that lie in close vicinity of softwood and bamboo in same properties that can be used to develop certain specific quality papers. Dutt and others at Department of Paper Technology, Indian Institute of Technology, Roorkee, Saharanpur Campus, Saharanpur evaluated the morphological and other paper making characteristics of some abundantly available non-woody plants like *Ipomoea carnea Jacq.* (Hindi – Besharam), *Cannabis sativa Linn.* (Hemp, Hindi – Bhang) and *Sesbania aculeata Pers.* (Hindi – Dhaincha). *I. carnea* native to South America resembles *Pinus kesiya* and *Picea abies Karst.* in lumen and fibre diameter. Although the fibres are short, yet it gives stronger paper due to high collapsing index. *C. sativa* (popularly known as True hemp) long bast fibre strands or ribbons are extensively used for manufacturing of quality papers. *S. aculeata* produces high quality bast fibres resembling jute. A mix of *S. aculeata* bast fibres can be utilized to develop tissue paper of low humidity, Alkali Resistant & Soap Resistant (ARSR) paper, razor blade wrapper, currency papers, etc. due their unique property of durability in water [Dutt et al, *J Sci Ind Res*, 2004, 63(1), 48-57].

Preserving bagasse biotechnologically

Bagasse, a by-product of sugarcane industry, has potential to serve as a source of cellulosic fibre for paper-making. For its consumption throughout the year, bagasse needs to be preserved for at least 6-8 months. The use of chemicals for preservation of bagasse has been found unsafe in practice, hazardous for health and polluter of eco-system. An attempt has been made by researchers at Prathista R&D Centre, Secunderabad to preserve bagasse through biotechnological approaches. For this purpose, bagasse was exposed to three plant-derived (Neem, Calotropis and Tobacco leaves dried and pulverized) anti-microbial powders, individually and cumulatively, with and without organic acid producing bacteria. The exposed bagasse was preserved for 6 months, under ambient conditions mimicking the storage in paper mills. Subsequently, it was subjected to physical, chemical and microbiological examination to evaluate the effect of each preservative. It was observed that neem leaf powder exposure in conjunction with acid producing bacteria afforded maximum preservative effect on bagasse, as it retained necessary characteristics desired for good quality pulp making. By using natural anti-microbial agents the strategy provides desired safety for environment, by virtue of their no harmful effect during application and biodegradable nature in the long run [Yadav et al, *Indian J Chem Technol*, 2003, 10(6), 587-592].