

## **Suitability of non-wood fibres for the paper industry**

*G. Capretti* – Experimental Station for Cellulose and Paper, Milan, Italy

The pulp and paper industry in the industrialized countries is characterised by the dominance of wood fibres. Current estimates of world paper production attribute a mere 10% to all non-wood fibres. The utilization of non-wood fibres for the paper industry continues to grow only in countries where on one hand wood resources are limited, while annual plants are available in relevant quantity. The pulp and paper industry in India is characterised by the dominance of small units below 10,000 tonnes per annum (TPA) capacity. While mills of large capacities mainly use wood and bamboo as raw materials, small mills depend on agricultural residues and waste paper. The contribution of forest (wood and bamboo), agricultural residues and recycled fibre sources is 38%, 36% and 26% respectively. Considering that forest sources accounted for 95% of production in 1970, the progress in the utilization of non wood sources is, no doubt, impressive. In China the main raw material for paper and paperboard is non-wood pulp: rice-straw pulp constitutes 40%, bamboo pulp 1.5%, reeds pulp 4.2% and bagasse pulp 2.4%. Wood pulp contributes 12.8%. (1)

Several attempts were made in Europe to obtain pulps suitable for papermaking from annual plants, including, besides sulfate and soda/antraquinone pulping, thermomechanical and chemithermomechanical high yield pulping (TMP and CTMP), biomechanical, steam explosion and organosolv pulping. Studies were also made to understand the influence of species and cooking method upon the paper properties.

Kenaf, sorghum, corn, fiber flax and hemp were the annual plants most recently investigated in our Institute for the exploitation in papermaking.

At present, kenaf is being used on a limited scale as a substitute for wood in the production of pulp and paper in Thailand and the Peoples Republic of China, where in 1998, a newsprint mill with an annual production capacity of 70,000-80,000 tons from 100% whole-stalk kenaf fibre was installed. Results of our research showed that the whole-stalk kenaf as a source of fibres to Italian paper industry yielded pulps containing too short fibres and very fine material compared to pulps obtained from wood. The research suggested that Kenaf winter harvest were preferred to improve yield and pulp drainability, autumn harvest to obtain paper with better strength properties. (2).

Flax and hemp confirmed good results as reinforcing pulps for thin applications such as bank notes, cigarette paper, and bibles. Papermaking properties of grain sorghum and corn stalks were seriously affected by large quantities of very fine material that made difficult the sheet formation, because of their scarce drainability.(3).

Evaluation of indicative costs suggests that in Italy non-wood pulps would not be competitive with softwood and hardwood market pulps.

### References

(1) FAO Pulp and Paper Capacity Surveys

(2) R. Benati, G. Capretti, M. Maiocchi, 2001, "Effects of Autumn-Winter Harvest Period on the Paper Properties of kenaf", *Riv. Agron.* 35: 142-148.

(3) G. Capretti, R. Maiocchi, S. Orlandini, S. Lopopolo, B. Focher, 1999, "Valutazione dell'impiego di colture da fibra quali materie prime per il settore industriale cartario" - XXXIII Convegno Annuale Società Italiana di Agronomia "Le colture non alimentari", Legnaro (PD) 20-23 Settembre 1999, pp 275-276.