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To meet the increasing demand of fibrous raw material for paper manufacture the industry has been keen in search for alternative raw materials, since its exclusive reliance on forest based materials, as bamboo and wood are not able to meet all the demands of the expanding industry.

The reasons are evident:

- a) Forest areas are shrinking by encroachment for Agricultural purposes.
- b) Regeneration rate of forest materials for paper have been found to be requiring a long ranged project involving commitments both by the industry and the forest authorities for envisaged fature date deliveries.

Thus the paper industry has its attentions to agricultural residues, preferably of annual rotation crops available, and which the industry can make use of as supplemental raw materials.

Amongst the agricultrual residues that have received some attention are:

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Agricultural Residues as Supplemental Fibrous Material for Paper

Suitability of "Sun Flower Plant Stem" which contains about 20% pith as a raw material for paper grade pulp to be used alorgwith sulphate bamboo pulp was studied. Unbleached yield is about 33% and fibre length range from 0.3 to 0.8 mm. Due to very short fibre length its use as make up pulp is limited.

Sun-flower plant stems, and
 Araca nut husk.

Though the problems involved in procurement and handling are yet in the initial stages, preliminary investigations have been done for their suitability.

Scope of Investigations:

Laboratory tests of cooking were conducted to find their suitability as make up pulp with sulphate pulps of bamboo.

1. Sun-flower Plant Stem:

Sun-flower plant is grown to the extent of about two lacs acres in Karnataka State itself. Its cultivation is increasing year by year, as the seeds produced is a source of edible oils. The stem portions of this plant is now either discarded in green state as a manurable stuff or burnt by agriculturists.

Test Procedures:

The stems were cut into 1 to $1\frac{1}{2}^{"}$ length pieces and then dried in sun.

The central portion all along the stem was seen to contain pith which material weighed almost 20% of the material. The moisture content of the dried and depithed material taken for test showed 14% moisture.

The density of the depithed material was 155 Kg/m^3 (BD).

Experiments using depithed dried Stem:

Experiment No. 1

Material cooked	200 gms.
	(BD Chips)
Active Alkali used	18%
Bath ratio	1 : 4
Temperature of	•
cooking	160°C
Cooking Time	2 Hrs.

Results

Cooking was incomplete, nearly 34.5% material remained uncooked. There was no residual alkali seen in the spent liquor.

Hence, the 2nd experiment was made.

Experiment No. 2

Material cooked	200 gms.
	(BDChips)
Active Alkali used	28.2%
Bath ratio	1:3.25
Cooking Liquor Co	n 7.52 %
Cooking Temperatu	ıre160°C
Cooking Time	2 Hrs.

Cooking was completed. The following data obtained for experiment:

K.No. of unbleached pulp :18.5 Active Alkali consumed :24.12% Unbleached Pulp yield :33 % Bleach consumption :14.2 % Bleaching loss :10.0 % Brightness of Bleached Pulp :83/84 % GE. The fibres as seen under Microscope range from 0.3 to 1.8 mm. Many fibres were in the range of 0.5 mm. to 0.7 mm.

Conclusion

- 1. Sun-flower plant stem is a highly pithy material having upto 20% pith on its weight.
- 2. The fibre length are in the medium range of short fibres which limits its make up value.
- 3. Regarding Araca Husk, detailed studies are being conducted both in laboratory and Plant scale.

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