Effect of Non-Cellulosic Polysaccharide on Paper Making Qualities of *Eucalyptus Grandis* Neutral Sulphite Semi-Chemical Pulp

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Eucalyptus grandis pulp was prepared by neutral sulphite semi-chemical process and pentosan content of this pulp was varied either by extracting with alkali or by adding non-cellulosic polysaccharide externally. The strength properties of paper made from pulps of varying pentosan content were determined.

Introduction

Eucalyptus grandis (Hill) Maiden occurs in natural stands in Australia. This is essentially a species of sub-tropical climate with good rainfall and high humidity without extremes of temperature. In India plantations of *Eucalyptus grandis* have been sucessfully raised in high elevations in Kerala State. Due to increasing demand of paper and limited resources of bamboo in India, the paper technologists have diverted their attention towards the use of hardwoods for paper making. Many species of Eucalyptus are among the promising hardwoods for paper making in India. It has been evident for a number of decades that non-cellulosic polysaccharide have a decisive effect on the quality of the pulps produced by any of the pulping methods. Hence, it is economical to retain the non-cellulosic polysaccharides in the pulp both from point of view of increasing yields and strength properties.

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Experimental and discussion

Preparation of pulp :—1 Kg. of chips (moisture content 12%) in batches of 200 g. each were digested in a three litre stationarv stainless steel autoclave. The conditions were as follows :

Sodium carbonate	=25 g.
Sodium sulphite	=8 g.
Bath ratio (Material : liquor)	=1 : 4
Temperature	=162°C.
Total time (including 1.5 hrs. to raise the temperature to 162°C)	=4 hours

The yield of pulp was 78.4 per cent on the basis of oven-dry weight of chips.

Bleaching of the pulp : The above pulp was bleached in batch of 100 g. each (oven-dry basis) by sodium chlorite as described by Wise[1] in the preparation of holocellulose (yield, 63.19% based on original weight of the chips).

Determination of pentosan content in the pulp : Pentosan content of the pulps was determined by the Tappi method, T_1 223m–58,

Extraction of bleached pulp : The bleached pulp was extracted with sodium hydroxide of concentration varying from 2 per cent to 17.5 per cent on the basis of oven-dry weight of the pulp. The extraction was carried out at room temperature (22°C) for one hour at 3 per cent consistency.

Addition of non-cellulosic polysaccharide to bleached pulp : Non-cellulosic polysaccharide was added to the bleached pulp before beating the pulp in Lampen mill. The amount of non-cellulosic polysaccharide was varied from 1 per cent to 2 per cent on the basis of oven-dry weight of the pulp.

Preparation of standard sheets : The pulps were beaten to 250 ml. Canadian standard freeness at 20°C. The time of beating was also determined in minutes.

28 g. of the pulp was taken into the beater. About 600 ml. of

water was added to it. After various time intervals the freeness was determined at 3 per cent consistency. In all cases beating was stopped when the desired freeness was achieved. Standard sheets of about 60 grams per square meter were prepared on the sheet making machine. The sheets were pressed at 50 p. s. i. for 5 minutes and then air dried in drying rings.

Testing of hand-sheets : The hand sheets were cut according to the Tappi standard method, T-220 m-53. The strength properties of the standard sheets made from the various pulps and their pentosan contents are recorded in Table-I.

The results recorded in Table-I, indicate that beating time is reduced by increasing pentosan content in the pulp, whereas it is increased by decreasing pentosan content. The breaking length and bursting strength rise up with the increasing amount of pentosan in pulp. They decrease wtth the decreasing amount of pentosans.

Tearing strength is maximum when the pentosan content is 10.3% but above 10.3% pentosan content, it goes on decreasing. Folding endurance remains constant when non-cellulosic polysaccharides are added to it.

In general, it can be said that strength properties of the *Eucalyptus grandis* neutral sulphite semi-chemical pulps including beating time are dependent on the pentosan content of the Pulp.

Table-I

Pentosan contents and strength properties of standard sheets made from various pulps

Sample	Pentosan content* %	Beating time (minutes)	Burst factor	Tear factor	Breaking length (meters)	Folding endurance (double folds)
1. Basic pulp extracted with 17.5% NaOH	0.6	150	28.0	53.6	4519.6	24
2. Basic Pulp extracted with 16% NaOH	1.2	140	28.8	65.2	4768.7	38
3. Basic Pulp extracted with 6% NaOH	1.98	80	28.0	68.6	6465.0	42
4. Basic pulp extracted with 2% NaOH	10.3	35	68.8	113.4	9585.0	above 500
5. Bleached basic pulp	18.3	30	79.8	78.9	11015.0	above 500
6. Basic pulp +1% xylan	18.5	25	88.4	85.6	12520.0	above 500
7. Basic pulp +1.5% xylan	—	25	95.6	90.5	13437.0	above 500
8. Basic pulp +2% xylan	—	25	93.9	88.2	13942.0	above 500

*Percentage based on oven-dry weight basis of hand sheet of paper.

Reference

1. Wise, L. E. Murphy M. and D'addieco, A. A. *Paper Trade J., 112*, No. 2, 35 (1946).