THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

PULPING CHARACTERISTICS OF POPULUS TRISTIS WHOLE-TREE CHIPS

FIBER & CHEMICAL PROPERTIES

Project 3364

Report Three

A Progress Report

to

MEMBERS OF THE INSTITUTE OF PAPER CHEMISTRY

and

THE UNITED STATES FOREST SERVICE

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FIBER & CHEMICAL PROPERTIES OF SIX-YEAR-OLD P. TRISTIS

INTRODUCTION

This study involved determining the fiber and pulping characteristics of whole-tree chips produced by chipping six-year-old Tristis #1 growing at a 2 x 2-foot spacing. After chipping, the material was further processed using the vacuum airlift segregator (VAS). This process resulted in three fractions:

(1) Accepts (Lift) - Fraction with higher wood and lower branch and bark composition than the original chips.

(2) Rejects (Retain) - Some wood but higher bark and branch composition.

(3) Fines - Material screened out by the belt screen.

In addition, two 50:50 mixtures were made, one of VAS accepts + VAS rejects and one of VAS accepts (pulp) + a commercial jack pine pulp that came from bolts with a ring count of 55.

PULP FIBER MEASUREMENTS

Pulp fiber measurements were made on unbeaten pulp samples. Determinations included length, width, coarseness and cell wall thickness. Table I gives the results of these measurements.

Fiber length was determined by measuring 300+ fibers 0.3 mm and up for every sample except the mixture with jack pine. For that particular sample, 600+ fibers 0.3 mm and up were measured. All fibers, including those cut, broken, and intact, were measured.

Coarseness was determined using Britt's method [Tappi 49(5) (May 1966)]. Results were expressed as mg/100 m.

One hundred fibers were measured for fiber width and cell wall thickness. After finding the widest part of the fiber, both measurements were taken. Measurements were not made, however, where swelling or other damage might have made the fiber artificially wide.

TABLE I

PULP FIBER MEASUREMENTS

Sample	Fiber Length, mm		Cell Wall Thickness, µm		Fiber Diameter, µm	Fiber Coarseness, mg/100 m
	Arith. Av.	Weighted Av.	Wall 1	Wall 2		
VAS accepts	0.647	0.715	2.74	2.77	27.51	10.6
VAS rejects	0.632	0.706	2.60	2.60	24.10	13.0
50:50 Mixture of 1 & 2	0.626	0.694	2.74	2.72	25.51	10.9
Original whole-tree chips	0.661	0.732	2.81	2.81	26.68	12.7
50:50 Mixture of VAS accepts & jack pine	0.796	1.180	3.13	3.16	31.11	14.1

CHEMICAL ANALYSIS OF CHIP SAMPLES

Total ash, calcium, silica and alcohol-benzene extractives were measured on the three original chipped fractions. Table II gives those results. Calcium, silica and alcohol-benzene extractives are duplicate determinations. Total ash is a single determination.

TABLE II

CHEMICAL ANALYSIS OF CHIP SAMPLES[a]

Sample	Total Ash, %[b]	Calcium, %[c]	Silica, %[c]	Alcohol-benzene Extractives, %[d]
VAS accepts	2.82	0.91	0.0090	2.5
VAS rejects	2.31	0.71	0.0082	3.0
VAS fines	5.19	1.8	0.28	7.0

[a]Ovendry basis
[b]Total ash - 550°C.
[c]Calcium and silica done by emission spectrographic analysis.
[d]Alcohol-benzene extractives done by TAPPI T 204 os-74.

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