

# Pulping of Tropical Pines for Wrapping, Writing and Printing Papers

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## INTRODUCTION

The genus *Pinus* has great potentialities as a raw material for pulp and paper. The "Southern Pines" form an important source of fibrous raw material for the U.S. pulp and paper industry.

The indigenous *Pinus* species of India are :—

1. *Pinus roxburghii* (Chir) (Earlier called *Pinus longifolia*)
2. *Pinus gerardiana* (Chilgosa)
3. *Pinus kesiya* (Khasi pine)
- and 4. *Pinus wallichiana* (Kail)

Recently under the scheme of short rotation forestry (S.R.F.), attempts have been made to grow on man made forest basis also :—

*Pinus brutia* (Earlier called *Pinus halepensis*)  
*Pinus caribaea*  
*Pinus oocarpa*  
*Pinus patula*  
*Pinus elliottii*  
*Pinus khasya*  
*Pinus taeda*  
*Pinus pseudostrobus*  
*Pinus insularis*  
*Pinus merkusi*  
*Pinus radiata*  
*Pinus greggii*  
*Pinus tropicalis*  
*Pinus occidentalis*  
*Pinus douglasiana*  
*Pinus montezumae*

The work on *Pinus roxburghii*<sup>1,2,3,4,5</sup> *Pinus patula*<sup>6</sup> *Pinus Wallichiana*<sup>7</sup> *Pinus kesiya*<sup>8</sup> and *Pinus halepensis*<sup>9</sup>, have already been reported.

The present paper gives the results of work on

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*Pinus insularis*, *Pinus taeda*, *Pinus pseudostrobus* and *Pinus caribaea*.

## Raw Material

The Silviculturist, Orissa sent one sample each of *Pinus insularis* from Joshipur and from Jaypur.

The Forest Range Officer, Kodaikanal (Tamil Nadu) sent a sample of *Pinus taeda* and sample of *Pinus pseudostrobus*.

The State Forest Research Institute, Jabalpur (M.P.) sent a sample each of *Pinus caribaea* top portion and bottom portion.

## PRODUCTION OF UNBLEACHED PULP

For the production of unbleached pulp from various pine species, the pine logs were debarked and chipped. 200 o.d. chips were digested by sulphate process in a stationary stainless steel autoclave.

## COOKING PARAMETERS :

(a) Total chemicals (as Na <sub>2</sub> O)	18%
(b) Sulphidity	25%
(c) Max. cooking temperature	162°C
(d) Total cooking period, hours (This includes 1-½ hr., to raise the temp. from room temperature to Maximum temperature)	4
(e) Bath ratio	1:4.5

The pulps were washed and yield of the unbleached pulp was determined. The Kappa number of the pulps was also determined. The pulps were beaten in a Lampen mill to about 250 ml. (C.S.F.) freeness, and sheets of about 60 g.s.m. were made.

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The sheets were dried and were conditioned at 65% RH and 25°C temperature and then tested for strength properties. The results are recorded in Table-I.

### PRODUCTION OF BLEACHED PULP

The pulps were also bleached by multi-stage bleaching process. The conditions of bleaching are given below :—

#### First Stage (Chlorination)

(a) Chlorine applied on o.d. pulp, %	8
(b) Consistency, %	3
(c) Temperature, °C	30
(d) Time, minutes	45

#### Second Stage (alkali extraction)

(a) Caustic soda applied on o.d. pulp, %	2
(b) Consistency, %	5
(c) Temperature, °C	70
(d) Time, minutes	60

#### Third Stage (Hypochlorite treatment)

(a) Calcium hypochlorite applied as available chlorine, %	2
(b) Consistency, %	5
(c) Temperature, °C	30
(d) Time, minutes	180

These pulps were washed after every stage.

TABLE I YIELD, KAPPA NUMBER AND STRENGTH PROPERTIES OF DIFFERENT SPECIES OF PINES

Sl. No.	Species	Unbleached pulp yield %	Kappa No.	Breaking length (m)	Burst factor	Tear factor
1.	<i>Pinus insularis</i>					
	(i) Joshipur	51.7	23.0	7270	57.3	91.3
	(ii) Jaypur	50.1	22.8	6840	49.2	78.5
2.	<i>Pinus taeda</i>	52.0	27.6	6530	50.8	76.0
	<i>Pinus pseudostrobus</i>	51.3	26.5	6830	54.0	84.1
3.	<i>Pinus caribaea</i>					
	(i) top	46.4	24.3	5000	43.4	69.0
	(ii) bottom	50.1	27.1	5750	53.3	81.3

TABLE—II BLEACHED PULP YIELD AND STRENGTH PROPERTIES OF STANDARD SHEETS

Sl. No	Species	Bleached Pulp yield %	Breaking length (m)	Burst factor	Tear factor
1.	<i>Pinus insularis</i>				
	(i) Joshipur	48.6	5400	46.6	73.3
	(ii) Jaypur	46.7	5750	90.0	66.6
2.	<i>Pinus taeda</i>	47.3	5040	40.2	66.7
3.	<i>Pinus pseudostrobus</i>	46.0	5120	48.3	69.0
4.	<i>Pinus caribaea</i>				
	(i) top	42.1	4130	40.0	55.0
	(ii) bottom	44.6	4240	46.0	66.6

Bleached yield was determined. The pulps were beaten in a Lampen mill to about 250 ml. (C.S.F) freeness. The sheets were tested for the strength properties. Results are recorded in Table-II.

### DISCUSSIONS AND CONCLUSIONS

It could be seen from the Table-I that unbleached pulp in good yield and with satisfactory strength properties could be obtained from all the pine species tested. The pulps produced could be bleached to satisfactory brightness using C.E.H. sequence. There is no significant difference in top and bottom or in two localities.

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