

Grease Proof Papers From Sulphite Jute Stick Pulp

SINHA D.*, BHARGAVA K. S.**

SUMMARY

India paper Pulp Company is the pioneer to utilise successfully jutestick by sulphite process in large scale for the manufacture of writing and printing and special quality papers. Dr. D. C. Tapadar and his co-workers in IPP carried out a number of investigation works on Jutestick. The work carried out at cellulose and paper branch, F. R. I., Dehradun; shows jutesticks are suitable for the manufacture of Grease proof paper by N.S.S.C¹ and Kraft² process. The troubles, which are faced in using jute sticks have been elaborated by one of our co-authors in their paper³. The utilisation of jutestick for making grease proof paper by sulphite process can be found more profitable than to manufacture writing and printing papers. The utilisation of jutesticks by sulphite process for manufacturing grease proof paper has been highlighted in this paper.

INTRODUCTION

Greaseproof paper is a special grade paper impervious to oil and grease. It is generally manufactured from N.S.S.C. softwood pulp containing high percentage of hemicellulose. The characteristics of grease proof paper from high hemicellulose content pulp is obtained by having maximum fibrillation of pulp with minimum cutting of the fibres. The hydration of fibres by prolong beating gives rise to a gelatinous pulp. Strong surface tension forces and larger areas of contact between the fibres which develop during the beating process give an even surfaced sheet on drying. The paper can also be made grease and oil resistant either by adding polymer as beater additive or by surface coating with co-polymers. R. R. Laboratory Jorhat⁴ has developed a polymer compound which can be used as beater additive to produce grease proof paper from bamboo Pulp.

RAW MATERIAL

In West Bengal the seeds of jutesticks are cultivated with the first advent of rain (March/April) and it is ready for harvesting by the end of July/Aug. The fibres are extracted by retting in stationary water pond for about 120 days and jutesticks, those are left over, are used for fuel and also thatching. Approximate 15 lacs ton of jutestick are available annually in West Bengal, which is equivalent to 6.3 lakhs tons of pulp. The proximate analysis, of different raw materials as given in Table I shows that jute stick has got the

advantage over the other agricultural residues available in our country for making grease proof pulp because of its low ash and high hemicellulose contents.

PULPING

The jutesticks can be successfully cut in a chopper to a size of 1.0 to 2.5 cms and is cooked by Sulphite process. Sulphite pulping is suitable both for producing pulp containing high percentage of hemicellulose for making grease proof paper and also for making pulp of high alpha cellulose content for making Rayon etc.

The extent hemicellulose removal during cooking process is controlled by three main factors, namely, cooking time, temperature and pH. The cooking time is also governed by the concentration of bi-sulphite in the cooking liquor. The prolonged cooking time results in more dissolution of hemicelluloses. The Pulp containing high percentage of hemicellulose is to be prepared at low temperature. The dissolution of hemicellulose is faster at low pH due to acid hydrolysis of the hemicellulose. Prolonged Sulphite cooking at higher temperature and acidity (low pH) give pulp of high alpha content. In Europe and North America the greaseproof pulp is generally prepared by Neutral Sulphite process keeping the pH at the final stage of cooking to 6-6 in order to avoid hydrolytic dissolution of hemicelluloses.

As shown in the Table II, the cooking of jutesticks for Grease proof paper was modified from usual pulping process adopted in IPP for mixed cooking of Bamboo and Hardwood and

*Incharge Laboratory-cum-Quality Control.

**Production Superintendent, India Paper Pulp Co. Ltd., Hazinagar, W.B.

TABLE—I
PROXIMATE ANALYSIS OF DIFFERENT RAW MATERIALS

Sl. No.	Particulars	Bamboo	Softwood	Hardwood	Rice Straw	Bagasse	Jute Stick
1.	Ash %	2.2-3.5	0.2-0.5	0.3-0.5	8-14	2-5	0.6-1.2
2.	Silica %	1.0-1.8	0.2-.05	0.2-.05	7-12.5	0.4-0.5	0.5-0.8
3.	Solubilities in						
	a) Hot Water %	5-9	3-5	5-6	10-15	5-1	1-1.5
	b) 1% NaOH %	15-20	10-20	10-20	40-48	27-36	25-30
	c) Alcohol-Benzene %	1-3	2-4	2-4	3.8-6	1.2	1.2-1.8
4.	Pentosane content %	18-21	8.15	18.25	24-30	27-30	18
5.	Lignin %	15-30	23-33	16-25	10-22	16-22	18-21
6.	Alpha cellulose %	49	55-60	45-50	26-28	30-35	41
7.	Hemicellulose %	19-21	10-15	20-25	24	28	25
8.	Hole cellulose %	70-80	72-80	75-88	60-74	72	76
9.	Fibre length m.m.	1.4-3.8	3.0-3.5	0.7-1.8	1.1	1.2	0.8
	Diameter micron	9-20	25-50	10-40	16	18	30

TABLE—II
COOKING CONDITIONS FOR SULPHITE PULPING

Sl. No.	Particulars	Normal cooks			Modified cook
		Bamboo	Bamboo and Hardwood	Jutestick	Jutestick
1.	% chemicals				
	a) Sulphur	8.5	10.0	7.0	8.0
	b) Magnesia	6.5	8.0	6.0	6.8
2.	Bath Ratio	1 : 3.8	1 : 3.8	1:7	1:7
3.	Maximum tem °C	160	160	160	150
4.	Period of cooking at max. temperature.	6	8	4	3
5.	Total cooking time	14	16	11	9
6.	% yield of unbleached pulp	40-45	40-43	45-47	47-51
7.	K. No.	22-24	18-22	13-17	24-26
8.	Initial freeness °SR	14	16	24	24

TABLE—III. PHYSICAL STRENGTH CHARACTERISTICS OF GREASE PROOF PAPER MADE FROM JUTESTICK SULPHITE PULP AND SULPHITE JUTESTICK AND BAMBOO PULP FOR WRITING AND PRINTING PAPER

Details	Jute stick pulp for Grease proof paper		Grease proof paper (Purchased)	For writing and printing	
				Jutestick pulp	Bamboo pulp
Initial Freeness	24° SR			24° SR	14° SR
Degree of Beating	60°	80°		45° SR	45° SR
Beating time min.	65	125		40	60
Drainage time second	72	215		32	16
G.S.M.	60.5	60.4	62.0	59.0	60.8
Burst factor	63.6	64.9	43.5	48.5	40.0
Breaking length in meters	7250	7300	6340	6240	5030
Fold	990	425	638	250	150
Oil penetration in Billister test	1800+	1800+	1800+	—	—
	satis- factory	satis- factory	satisfactory	Nil	Nil

Bamboo alone and jutestick for the manufacture of writing and printing paper and other special grade of paper. The main purpose to use low temperature and high percentage of Magensia and Sulphur for cooking jutestick for Grease proof paper was to retain higher percentage of hemicelluloses. Unbleached washed pulp after screening was beaten to 60° and 80° SR and tested for its grease proofness and physical strength properties. The results are given in Table III, from which it can be seen that it met the requirements for greaseproof paper.

CONCLUSION

Jutesticks cooked by acid sulphite process at lower temperature keeping the pH high give excellent pulp of satisfactory yield for the production of greaseproof paper. The pulp beaten in Lava beater will give rise to high degree of hydration to get excellent oil and grease resistant properties. The Jutestick pulp having low degree of initial freeness would require lower power consumption in beating as compared to NSSC soft wood pulp. Unbleach sulphite pulp is much brighter than unbleached sulphate pulp and this

may be considered as additional advantage of cooking jutestick by sulphite process. In West Bengal, where jutesticks are used as fuel in villages, there is a good scope of utilising the same for the manufacture of Grease proof paper with some modifications in the conventional equipments used for making writing and printing paper.

REFERENCES

1. Guha S.R.D., Mukherjee V.N., Jutesticks pulp for grease proof paper. India Pulp and paper Vol. XVIII, No. 1, July, 1963.
2. Guha S.R.D., Mathur G.M., Sharma Y.K. and Gulati A.S., pilot plant production of Grease proof papers from Jutesticks, Indian pulp and paper, Vol. XXI, No. 6, December, 1966.
3. Banerjee B.C. and Bhargava K.S., Use of Jutestick at I.P.P. under publications.
4. Mahanta D. and Ghosh S.R., prospects of speciality papers and Boards Manufacture in India, IPPTA, Vol. XIV No. 1. Jan., Feb., March, 1977.