AJHS
Asian Journal of Home Science
Volume 11 | Issue 1 | June, 2016 | 58-61
DOI: 10.15740/HAS/AJHS/11.1/58-61
e ISSN-0976-8351 ■ Visit us: *www.researchjournal.co.in*
Research Paper

Properties of different bast fibres in two retting methods

■ SAPNA PATHAK AND SHAHNAJ JAHAN

Received: 05.08.2015; **Revised:** 03.04.2016; **Accepted:** 17.04.2016

See end of the paper for authors' affiliations

SAPNA PATHAK
Department of Clothing and Textiles, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. NAGAR (UTTARAKHAND) INDIA
Email : sapnavibhav@gmail.com

■ **ABSTRACT :** India is primarily agricultural country. The various plants grow widely due to favorable agro climatic conditions. These plants are considered as waste and are not frequently used in the field of textiles due lack of familiarity. Proper utilization of these indigenous plant resources can provide a good opportunity of employment and income generation to the rural peoples. The stems of five different plants *i.e.* semal (*Bombax ceiba*), tesu (*Butea monosperma*), lasora (*Cordial dichotoma*), lantana (*Camellia sinensis*) and phalsa (*Grewia subequinails*) were kept in the stagnant water for water retting and treated with sodium hydroxide in chemical retting. Water retting is biological fermentation process which produces biodegradable wastes. This enhances the soil nutrients without harming the environment. Chemical retting deteriorated the fibre quality as well as more polluted water were produced which deteriorated the ecosystem.

■ **KEY WORDS:** Agro-climatic, Textiles, Employment, Nutrients, Ecosystem

■ **HOW TO CITE THIS PAPER :** Pathak, Sapna and Jahan, Shahnaj (2016). Properties of different bast fibres in two retting methods. *Asian J. Home Sci.,* **11** (1) : 58-61, **DOI: 10.15740/HAS/AJHS/11.1/58-61.**

Development of any region is dependent on effective utilization of available resources and creation of employment opportunities plays central role in overall socio-economic development of nation. India is primarily agricultural country. The various plants grow widely due to favorable agro climatic conditions. These plants are considered as waste and are not frequently used in the field of textiles due lack of familiarity. Proper utilization of these indigenous plant resources can provide a good opportunity of employment and income generation to the rural peoples.

■ RESEARCH METHODS

Based on the collected review ten different plant species *i.e.* semal (*Bombax ceiba*), tesu (*Butea monosperma*), lasora (*Cordial dichotoma*), lantana (*Camellia sinensis*), gular (*Ficus racemosa*), phalsa (*Grewia subequinails),* gurhal (*Hibiscus vitifolius*), kadam (*Mitragyna parvifolia*), kaner (*Narium* spp.) and amaltas (*Cassia fistula*) were collected for extraction of fibres from the bast/sheath portions of the plants. These plants were abundantly available in Uttarakhand state. Two retting method were used for extraction of fibres. Physical properties of fibres were studied after water retting and chemical retting.

Yield :

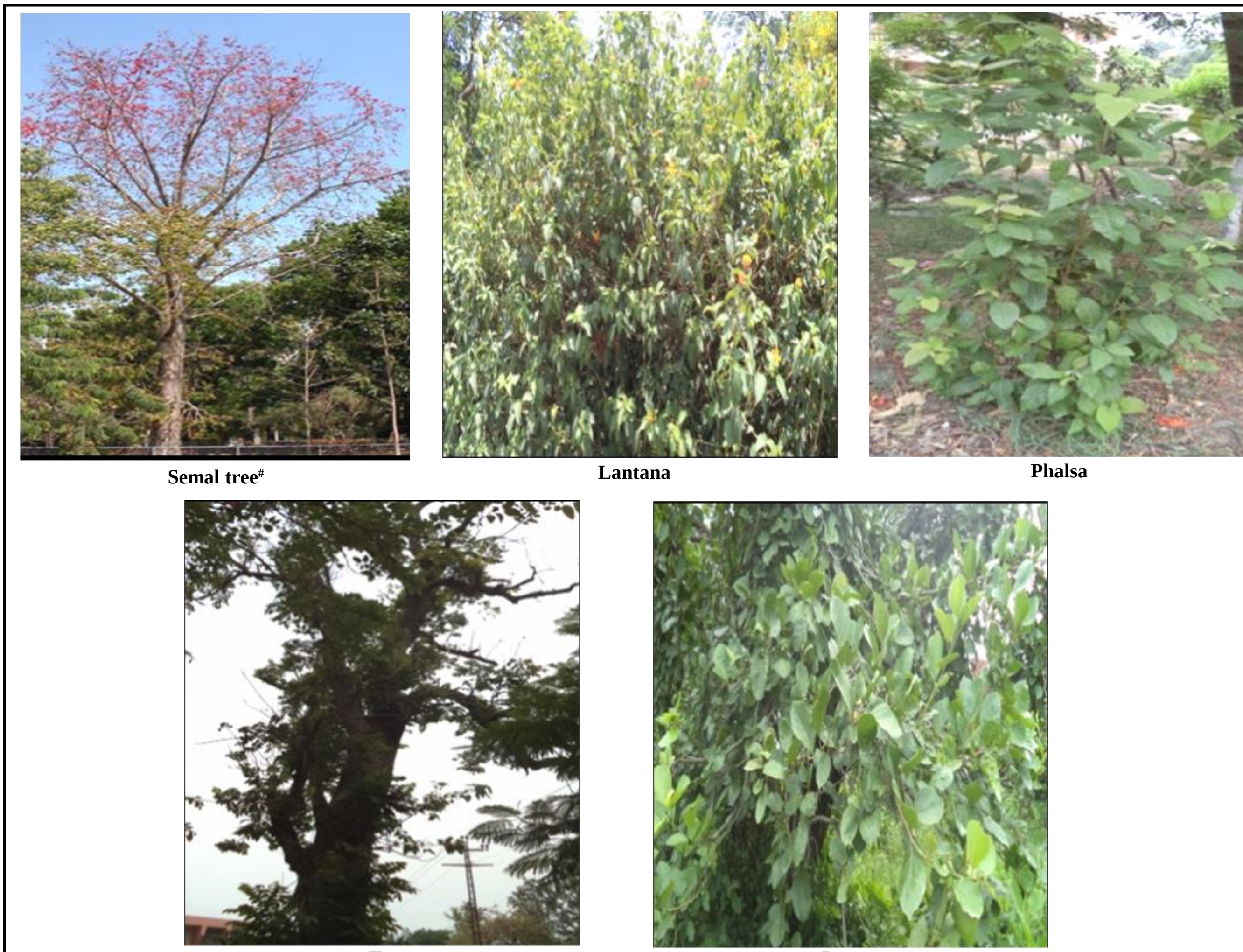
The yield percentage of the fibre was calculated as follow:

$$\text{Yield (\%)} = \frac{\text{Weight of the fibre}}{\text{Weight of the plant material}} \times 100$$

■ RESEARCH FINDINGS AND DISCUSSION

Out of 10 plants only five plants *i.e.* semal (*Bombax ceiba*), tesu (*Butea monosperma*), lasora (*Cordial dichotoma*), lantana (*Camellia sinensis*) and phalsa (*Grewia subequinails*) provided fibres and rest gave pulpy matter (Fig. 1). Bast fibres are cemented to the adjacent cells inside the stem with pectin. Retting is a universal process for removing pectineous or non cellulosic material attached to fibre for separation of individual fibres. Water retting yields good quality fibres whereas chemical retting will affect the strength or colour of the fibres as reported by (Tahir *et al.*, 2011). Among five fibre giving plants semal, tesu, lasora, phalsa are deciduous plants. When the fruits were vanished, these plant stems were cut for retting because after five month again flowers appeared. Therefore fastest retting method were selected because retting of stems were completed between two flowering season.

The stems of five different plants *i.e.* semal (*Bombax ceiba*), tesu (*Butea monosperma*), lasora (*Cordial dichotoma*), lantana (*Camellia sinensis*) and phalsa (*Grewia subequinails*) were kept in the stagnant water for water retting and treated with sodium hydroxide in chemical retting. In water retting method, microorganisms disintegrated cuticle and decomposed non-cellulosic material (*i.e.* lignin, pectin and gummy substances) present in between the stem and fibres of plant. Therefore, fibres could be separated completely from the stem. In the chemical retting method sodium hydroxide dissolved noncellulosic materials and separated fibres from the fibre bundle. The separation of fibres may be due to the penetration of alkali into the



Semal tree# Lantana Phalsa

Tesu Lasora

Fig. 1 : Plant providing fibres

Table 1 : Fibre properties and fibre yield of different plants

Sr. No.	Name of the plants	Water retted fibres properties				Chemical retted fibres properties				Fibre yield (%)
		Elongation (%)	Tenacity (g/denier)	Fineness (denier)	Length of the fibres (cm)	Elongation (%)	Tenacity (g/denier)	Fineness (denier)	Length of the fibres (cm)	
1.	Semal#	3.62	4.16	37.24	8.79	3.96	3.89	32.86	6.68	6.77
2.	Tesu	3.35	3.01	39.63	6.87	3.52	2.78	35.62	6.25	5.07
3.	Lasora	3.46	2.96	27.09	6.21	2.30	2.41	27.01	6.13	5.81
4.	Phalsa	3.21	2.69	35.89	6.25	3.07	2.69	29.98	5.64	3.33
5.	Lantana	3.06	2.27	39.83	6.95	3.22	1.93	38.71	3.87	3.24
F value		50.87**	79.66**	41.86**	7.79**	19.48**	10.24**	90.55**	58.97**	35.22**
C.D. (P=0.05)		0.38	0.27	4.17	0.61	0.34	0.31	3.39	0.55	0.98

\# Selected sample ** indicates significance of value at P=0.01

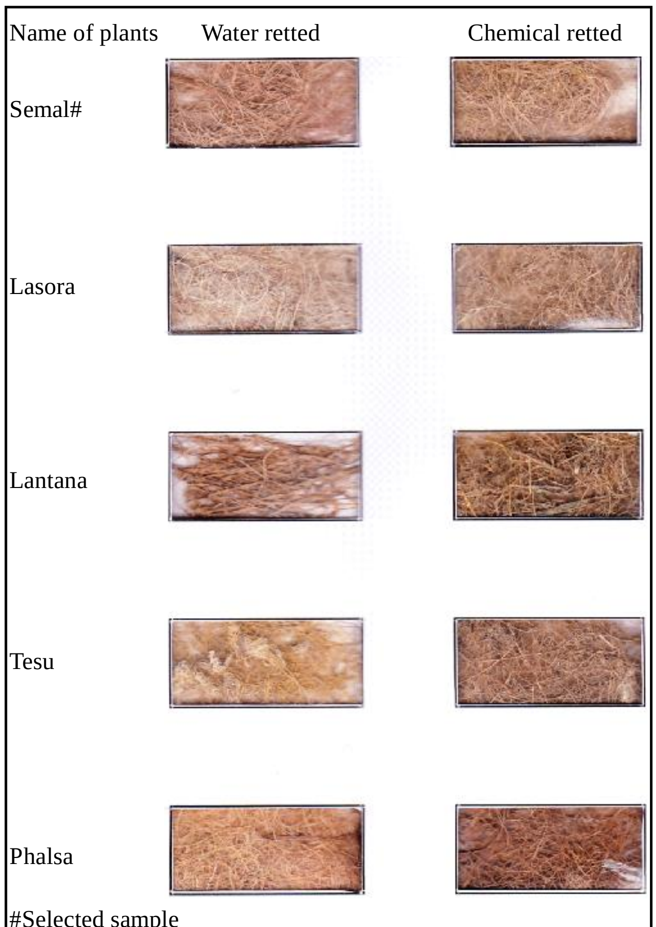
accessible region of the fibres which causes changes in the fibre structure and removal of binding material thus, the fibres were separated easily. In case of acid retting, oxygen bridges of the cellulose were broken because of instability in acid which may produced brittle fibres therefore acid retting method was rejected for extraction of fibres in chemical retting method.

The fibres obtained from the stems of different plants were tested for their physical properties *i.e.* elongation, tenacity, length of the fibres and fineness to select one fibre yielding plant and retting method for fibre extraction. The fibre samples are shown in sample sheet-1and results are shown in Table 1.

It is evident from Table 1 that the semal fibres exhibited better physical properties as compared to other plant fibres in case of both the extraction methods. The semal fibres exhibited highest value of elongation for water retting (3.62 %) and chemical retting (3.96 %) as compared to the fibres obtained from stems of other plants. The lowest value of elongation was found in water retted lantana fibres and chemical retted lasora fibres *i.e.* 3.06 and 2.30 per cent, respectively. Significant difference was found between the elongation of different fibres at one per cent level of significance, which were extracted with water retting and chemical retting methods.

In case of tenacity it was observed from Table 1 that the semal fibres obtained from both the retting methods *i.e.* water retting and chemical retting showed maximum value for tenacity *i.e.* 4.16 and 3.89 g/d, respectively. It was found that the lowest tenacity was exhibited by lantana fibres in water retting (2.27 g/d) and chemical retting (1.93 g/d). The significant difference was found between the tenacity of different fibres at one per cent level of significance, in both the extraction method.

It was found that fibres obtained by water retting were coarser than the chemical retted fibres in case of all the five bast fibres. The fineness of the fibres depends upon the removal of lignocellulosic material from the fibre surface. Chemicals efficiently removed non cellulosic components from the fibres by reacting with the fibrous materials and might have produced finer



Sample Sheet 1 : Water retted and chemical fibres of different plant stems

fibres. Pardeshi and Paul (2003) also supported the present study, they reported that treatment with sodium hydroxide enhances digestibility of the lignocellulosic materials.

One way ANOVA was applied to compare the mean value of the fineness of different fibres. Significant difference was found in the fineness of the different extracted bast fibres at one per cent level of significance.

In case of length, semal fibres had maximum length (8.79cm) and lasora fibres had minimum (6.21 cm) length when retted with water retting whereas in chemical retting lantana fibre showed minimum length (3.86 cm). Fatima and Balasubramanian (2006) stated that the increase in length of the fibres could be correlated with the plant height and increase in internodal length. According to Dhanalaxhmi *et al.* (2013) faster microbial growth has hence aided in loosening the pectins that holds the fibres to the core and bark of the stalks, resulting into longer fibres. Significant difference was observed between the fibres length of the various plant.CD value represents the critical difference between the mean lengths of various plant.

The difference in the fibres properties of different plant might be due to the difference in the pattern of formation of cellulose unit in all the plant. The above study supported by Shenai (1991), he explained that the cellulose is basic unit of all natural plants, but the amount of cellulose formed and the location of cellulose in the plant vary from one species to another. Dyson and Perkin (1974) also stated that the formation of cellulose may be the result of variations in growth rate, caused by dietary, metabolic, nutrient supply, weather, or other factor influencing the rate of cell development in natural fibres, thus, the growth of natural fibre are responsible for their properties

Natural fibres have growth irregularities and are not uniform in size or development (Hollen and Saddler, 1973) therefore, fibre yield of different plants species were considered as important parameter for the selection of fibre yielding plant. Table 1 depicts that the maximum fibre yield was found in case of semal stems (6.77 %) followed by lasora (5.81 %), tesu (5.07 %), phalsa (3.33 %) and lantana (3.24 %). The yield of the fibres depends upon the maturity of plant and the time of harvesting. According to Lewin (2007), proper stage of harvesting gives higher yield as well as better quality of fibres. Dhanalaxhmi *et al*. (2013) stated that the fibres are well developed in the physiological mature stage that can be efficiently extracted resulting in to higher fibre yield. The mean values of the fibre yields of different plants stem were significantly different at one per cent level of significance.

Conclusion :

It can be concluded that the water retted semal fibres exhibited overall better physical properties *i.e.* fibre length, elongation, tenacity except fineness as compared to fibres obtained from other plant. Water retting is biological fermentation process which produces biodegradable wastes. This enhances the soil nutrients without harming the environment. Therefore, water retting method was selected for the extraction of fibres.

Authors' affiliations:
SHAHNAJ JAHAN, Department of Clothing and Textiles, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. NAGAR (UTTARAKHAND) INDIA

■ REFERENCES

Dhanalaxmi, R.K., Vastrad, J.V. and Babalad, H.D. (2013). Influence of harvesting stage and urea treatment on physical parameters of mesta fibres. *Karnataka J. Agric. Sci.,* **26**(3): 412-414.

Dyson, E. and Perkin, W. (1974). Textile progress : A yarn Production and Properties. *The Textile Institute, Manchester,* **6**(1): 92.

Fathima, M. and Balasubramanian, A. (2006). Effect of plant growth regulations on the quality of bast fibres in *Abelnoschus esculentus* (Linn.) Moench. *Acta Bot. Croat.,* **65** (1) : 101-112.

Hollen, N. and Saddler, J. (1973). Textiles. 3rd Edn. London. The MacMillan Company. 261 p.

Lewin, M. (2007). *Handbook of Fibre Chemistry*.3rd Edn. London.CRC Press, 515 p.

Pardeshi, P.D. and Paul, R. (2003). Coir and Sisal Fibres : Resources Untapped. New Cloth Market. pp. 25-31.

Shenai, V.A. (1991). *Technology of Textile Processing : Textile Fibres*. I Vol. Bombay. Sevak Publications. 495 p.

Tahir, Mohd. P., Ahmer, B.A., Saifulazry, S.O.A. and Ahmed, Z. (2011). Retting process of some bast plant fibres and its effect on fibre quality : a Review. *Bioresources,* **6**(4): 5260-5281.