NOTE

A NOTE ON THE PROXIMATE CHEMICAL COMPOSITION AND FIBRE MORPHOLOGY OF *BAMBUSA VULGARIS*

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Information on the basic properties of Malaysian bamboos, particularly for pulp and papermaking, is very limited. Since many bamboo species remain unutilised, research is needed to determine their properties so that appropriate technologies could be developed to exploit them. Two of such properties which affect the suitability of the species as a pulping material are the proximate chemical composition and fibre morphology, which were investigated in a study on *Bambusa vulgaris*, the most common Malaysian village bamboo.

Fifty mature culms of *B. vulgaris* were obtained from Gombak, Selangor. Samples taken from the top, middle and basal portions were thoroughly mixed and used in the study. Determination of fibre morphology was conducted using the methods of Wilson (1954) and Anonymous (1955), while the proximate chemical analysis was based on TAPPI methods (Anonymous 1978) and that of Wise *et al.* (1946).

The results of the proximate chemical analysis are given in Table 1. *B. vulgaris* appears to be similar to wood in only the holocellulose, alpha-cellulose and lignin contents. In fact these contents are more than the average for Malaysian hardwoods (Khoo & Peh 1982). The high ash content is expected, since bamboos are known for their very siliceous nature. The large values of the alkali solubles and water (hot and cold) solubles reflect the high contents of hemicelluloses, and sugars and starch present in the bamboo respectively. The large amount of sugars and starch support the fact that bamboos in general have poor natural duability (Liese 1980). The high starch content in *B. vulgaris* has been reported (Sulthoni 1988).

Table 1. Proximate chemical composition of *B. vulgaris*

Component	%
Cold water solubles	8.5
Hot water solubles	10.4
1% NaOH solubles	26.4
Alcohol-benzene solubles	8.5
Holocellulose	77.4
Alpha-cellulose	55.4
Lignin	22.7
Ash	2.7

The basic density and fibre dimensions of *B. vulgaris* are shown in Table 2. Compared to other bamboos, which have densities ranging from 500 to 800 $kg\ m^{-3}$ (Kumar &

Dobriyal 1988), *B. vulgaris* appears to be relatively light. The fibres are generally slender with narrow lumens. Thus, although the fibre wall is not thick, the relatively narrow lumen gives rise to a high Runkel ratio. As characteristic of bamboos, *B. vulgaris* has long fibres, and the fibre length measured in this study is longer than that of any of the bamboos reported from the Philippines, even that of the same species (Ooi 1991). It is interesting to note that Abd. Latif and Mohd Tamizi (1992) found the fibre length of the same bamboo from another locality (Forest Research Institute Malaysia) and of age one to three years to be much longer (3.11 to 3.85 *mm*), and that the effect of age and height on fibre length was insignificant.

Table 2. Density and fibre dimensions of *B. vulgaris*

Property	Value
Basic density	0.58 $g\ cm^{-3}$
Fibre length	2.82 *mm*
Fibre width	13.0 *um*
Fibre wall thickness	5.7 *um*
Lumen width	2.7 *um*
Runkle ratio	5.3
Flexibily ratio	0.19
Slenderness ratio	218.5

Based on the proximate chemical composition and fibre morphology determined, *B. vulgaris* has good potential as a pulping material. This will have to be supported by an actual pulping investigation which will be the subject of another paper to be reported later.

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ERRATA

(1) In JTFS 5(3), page 358, Table 4 should be:

Table 4. Wood basic density of three *Pinus patula* provenances at Lushoto, Tanzania

Provenance	Basic density *kg m⁻³*		
	Range	Mean	sd
Rhodesia (A)	318-415	389	26
Kigogo (B)	387-445	415	26
Old Moshi (C)	367-449	423	31

(2) In JTFS 6(2), page 200, the correct figure is:

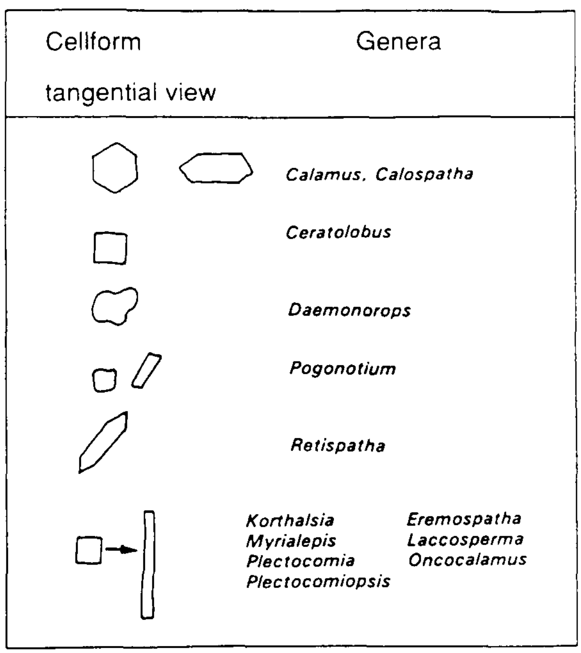

Figure 3. Surface view of epidermal cells

BOOK REVIEWS

CALDER, I.R., HALL, R.L. & ADLARD, P.G. 1992. (Editors). **Growth and Water Use of Forest Plantations.** Proceedings of the International Symposium, held at Bangalore, India, February 4 - 7, 1991. John Wiley & Son. ISBN 0-471-93561-1, 381 pp. Hardcover. £40.00

The book describes research activities which were carried out mainly under the ODA programme 'Effects of fast-growing trees on site, India' in the state of Karnataka, India. Special attention is paid to the use of fast-growing *Eucalyptus* species in industrial plantations and agroforestry systems and the problems arising from the water requirements. The proceedings present the articles in two parts, the first containing articles on 'Social, economic and scientific background' of forest plantations and on 'forest growth'. Growth aspects are discussed from various angles, *e.g.* related to site and site changes, to spacing, intercropping, organic productivity, nutrient cycling and hydrology. The second part deals with the water use problems proper, *e.g.*, methods of transpiration measurements using deuterium tracing, heat pulse observations of transpiration, physiological studies and their use in estimating forest transpiration, soil moisture regimes, interception losses. The problems of growth related to water use are discussed in a special subchapter. Here, the implications of water use by *Eucalyptus* grown in monocultures and in agroforestry systems are addressed, especially the growth under water-limited conditions. In several contributions recommendations for the optimisation of water use are given. The proceedings are a valuable source of applied methods in forest hydrology and physiology. Scientific reasoning is sound and it comes as no surprise that the detrimental 'water-mining' effects of *Eucalyptus* species assumed to be generally valid are shown to be conditional. Nevertheless, it is indispensable to gain a clear idea of the specific soil water conditions before embarking on plantations with fast-growing tree species with high water requirements. The book should be widely read by planners and scientists who are involved in such plantations.

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ROBINSON, D.M. & McKEAN, S.J. (Compilers). 1992. **Shifting Cultivation and Alternatives: An Annotated Bibliography, 1972-1989.** C.A.B. International, Wallingford, Oxon, in association with CIAT (Centro Internatioanl de Agricultura Tropical), Cali, Colombia. ISBN 0-85198-680-3, 281pp. £25.00 (US$47.50 Americas only)

The human society at large is increasingly concerned with "green"issues and factors contributing to deforestation, the depletion of the ozone layer and the resulting global warming. Shifting cultivation has been highlighted by many as an important contributor to deforestation.

This excellent publication, which brings together and classifies abstracts of relevant works on the subject, provides further insights and understanding of the dynamics of various aspects of shifting cultivation in the 1970s and 1980s. In the past when land was relatively plenty and population small, slashing and burning followed by fallow was an important means to rejuvenate soil fertility and control weeds and diseases. Adequate fallow period ensured sustainable use of land and resources. However, as population increases and more forest land is opened up for logging and agricultural purposes, population pressure, land hunger and poverty lead to the clearing of more land for shifting cultivation, especially after logging. Subsequently, as well indicated in this publication, there is a general decrease in the fallow period. The adverse impacts are immense (such as rapid soil deterioration and high land erosion rate) and hence shifting cultivation is branded one of the main culprits of deforestation and global warming.

Blaming the shifting cultivators does not solve the problem. Rather, solutions need to the found in either increasing rural productivity or involving the rural people in alternative employment. Hence, an important contribution of this publication lies in its attempt to examine the alternatives to shifting cultivation: improved and alternative fallows; various intensified farming systems; methods of erosion control; alternative input strategies; and rehabilitation of degraded land. The information is useful in understanding the ways rural people adjust to the charging environment without adverse effects on their traditional way of life.

The publication also makes a good attempt in examining the social and policy aspects of shifting cultivation. While recognizing the role of government in developing the rural areas, the "bottom-up" views and the socio-economic and technical conditions and needs of the local people should not be neglected. Both the government and the rural residents have to see "eye to eye" and talk "heart to heart" before any alternative solutions on minimizing land degradation can be derived and the integration or rural agriculture into the main stream of natural development is successfully achieved.

The publication is particularly useful to foresters and decision-makers interested in forest management and rural development. The general public will have a clearer view on shifting cultivation and the related "green" issues.

The well presented materials, except for abstracts 0184 and 0185 which are identical, consist of an overview and three parts, namely shifting cultivation (Part I), alternatives to shifting cultivation (Part II) and social and policy aspects of intensification in countries having shifting cultivation (Part III). While Part II commands the bulk of the bibliography with seven sections, Part I has three and Part III stands by itself. Each section (and Part III) introduces the reader to the main contents and works that need to be done; this is a useful and attractive feature of the bibliograply.

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