

Anatomical characteristics of wood from three native fast-growing species in a secondary forest in South Kalimantan, Indonesia

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1. Introduction

Some tree species for raw material of pulp and paper have already switched their function into a timber which has high economic value. As the results, shortage in supply of pulp raw material became serious issue for the pulp and paper industry in Indonesia. It is, therefore, necessary to find alternative fast-growing species which are suitable for raw material of pulp and paper. Terap (*Artocarpus elasticus* Reinw. Ex Blume), medang (*Neolitsea latifolia* (Blume) S. Moore), and balik angin (*Alphitonia excelsa* (Fenzl) Rissek ex Benth) are native fast-growing tree species in South Kalimantan, Indonesia. These species are naturally grown and abundant at the secondary forests in South Kalimantan. However, the information on the anatomical characteristics of the three species is still very limited. Much more information on anatomical characteristics is required to utilize these tree species. The objective of this study is to clarify the possibility for effective utilization of the wood from native fast-growing tree species grown at the secondary forests in South Kalimantan, Indonesia.

2. Experiments

In this study, those of five individuals of each species were randomly selected from a secondary forest. The mean height and stem diameter of terap, medang, and balik angin were 20.7 m and 19.4 cm, 20.8 m and 19 cm, and 18.8 m and 18.8 cm, respectively. Discs of 10 cm in thickness were collected from 1 m above the ground, and those of 5 cm in thickness were collected from 3.0, 5.0, 7.0, 9.0, and 11.0 m above the ground. Small blocks were prepared from the disks at each height position for measuring basic density (BD) and anatomical characteristics (fiber and vessel element length) which are closely related to pulp and paper quality.

3. Results and discussion

The mean BD of whole trees in terap, medang, and balik angin was 0.34, 0.55, and 0.39 g/cm³, respectively (Table 1). The wood density of *Acacia mangium*, common pulpwood in Indonesia, is in the range of 0.34 to 0.66 g/cm³ (Nugroho *et al.* 2012). BD values in the present study were similar to those of *A. mangium*. The mean values of fiber and vessel element length in terap, medang, and balik angin were 1.52 and 0.44, 1.16 and 0.54, and 1.04 and 0.49 mm, respectively (Table 1). The mean values of fiber length of 7-year old *A. hybrid*, *A. mangium*, and *A. Auriculiformis* growing in Indonesia were 1.07, 0.98, and 0.88 mm, respectively (Yahya *et al.* 2010). The mean wood fiber length in 4-year and 8-years old of *A. mangium* from Peninsular Malaysia was 0.93 and 1.02 mm, respectively (Sahri *et al.* 1993). The mean values of fiber length in medang and balik angin were similar to those of some *Acacia* species in the previous reports, while that of terap was longer. A raw material with long fiber is desirable for pulp production. Thus, terap, medang, and balik angin are considered to be suitable raw materials for pulp production. In addition, based on the results of ANOVA, it was found that wood quality in BD and cell length of terap and medang can be improved by tree breeding programs.

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Table 1. Basic density and cell length of three species.

Properties	Terap (n = 5)		Medang (n=5)		Balik angin (n = 5)	
	Mean	SD	Mean	SD	Mean	SD
BD (g/cm ³)	0.34*	0.03	0.55**	0.05	0.39 ^{ns}	0.01
FL (mm)	1.52**	0.11	1.16**	0.08	1.04 ^{ns}	0.02
VEL (mm)	0.44**	0.03	0.54**	0.05	0.49 ^{ns}	0.01

Note: n, number of trees; SD, standard deviation; BD, basic density; FL, fiber length; VEL, vessel element length; *, significant at the 5% level among five trees; **, significant at the 1% level among five trees; ns, no significance among five trees