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VARIATION IN SPECIFIC GRAVITY OF FIVE-YEAR-OLD *ACACIA MANGIUM* FROM THE BATU ARANG PLANTATION, SELANGOR, MALAYSIA

Ani Sulaiman & Lim Seng Choon

Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia

Acacia mangium, when established in plantations, grows as fast or faster than other plantation species such as *Gmelina arborea* and *Eucalyptus deglupta* (Anonymous 1983). The trees can reach 30 *m* in height, with trunk diameter of 40 *cm* at breast height (1.3 *m*) in 14 years. In Peninsular Malaysia, *Acacia mangium* has been planted since 1982 as part of the Compensatory Forest Plantation Project.

Four 5-y-old *Acacia mangium* trees were obtained from the Batu Arang plantation in Selangor, during a thinning operation carried out by the Forestry Department, Peninsular Malaysia. From each tree, discs of about 5 *cm* in thickness were obtained at about 10, 30, 50, 70 and 90% heights of the clear bole, measured from the base.

From each disc, two strips of about 2.5 *cm* wide were cut across the diameter and arbitrarily marked to indicate the four different radii of each disc irrespective of its north or south directions. From each radius, three block samples of 2.5 × 2.5 × 2.5 *cm* were taken radially from the pith outwards to represent the position near the centre (C), intermediate (I), and at the outer (0) regions of the disc. These samples were used for the specific gravity determination calculated from the green volume of samples and their oven-dried weight.

All trees obtained for sampling showed some variation in their form, ranging from straight to leaning to first branching. There was a distinct colour difference between the lighter straw- coloured sapwood and grey brown, brown to dark brown heartwood. The grain was mostly straight to slightly interlocked. Texture was moderately coarse and even.

The total height of the trees varied from 21.8 to 24.4 *m* with a mean height of 23.1 *m*. The maximum length of clear bole was recorded at 9.3 *m* for trees 3 and 4 and the minimum length at 4.3 *m* for tree 1. The diameter of the trees at breast height varied from 21.5 to 26.3 *cm* with a mean diameter of 23.0 *cm*.

In the present study, the specific gravity in the radial direction increased from the centre of the disc (0.29) to the outer region near the bark (0.50) for all trees studied (Figure 1). The trend is quite similar to the observation made by Wu and Wang (1988) in their study on wood properties of *Acacia mangium*.

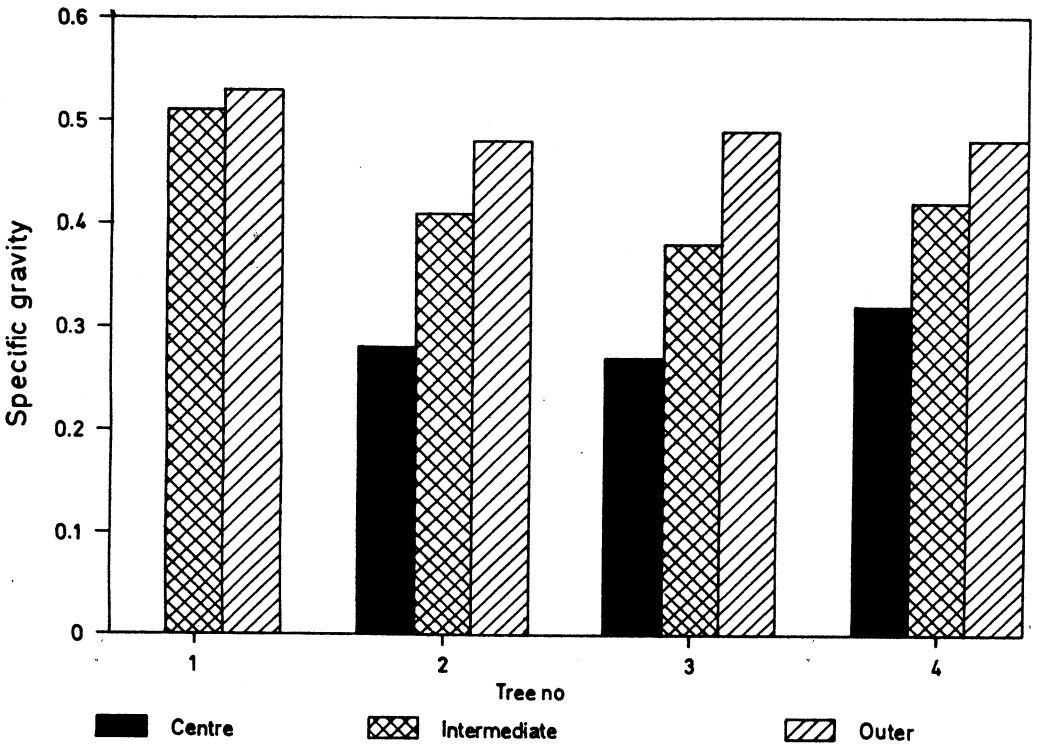

Figure 1. Specific gravity in radial direction

In the longitudinal direction, two trees (3 and 4) showed a similar pattern where there was an increase in specific gravity from the 10% to 70% heights before decreasing at the 90% height level (Figure 2). Tree 1 showed an initial increase in specific gravity from the 10% to 30% heights before decreasing toward the top of the stem. Tree 2 showed a decrease from 10% to 30% heights before increasing to the 90% height level. From the 70% height onwards, three trees (1,3 and 4) showed a decrease in specific gravity while one tree (Tree 2) showed a rapid increase.

Tree 1 appeared to have the highest specific gravity throughout compared to the other trees. Tree 2 did not seem to follow the general trend as observed in the other trees. Wu and Wang (1988) reported large variations in the wood properties along the longitudinal direction, with the specific gravity at maximum at the stump and decreasing from the base to the top of the tree.

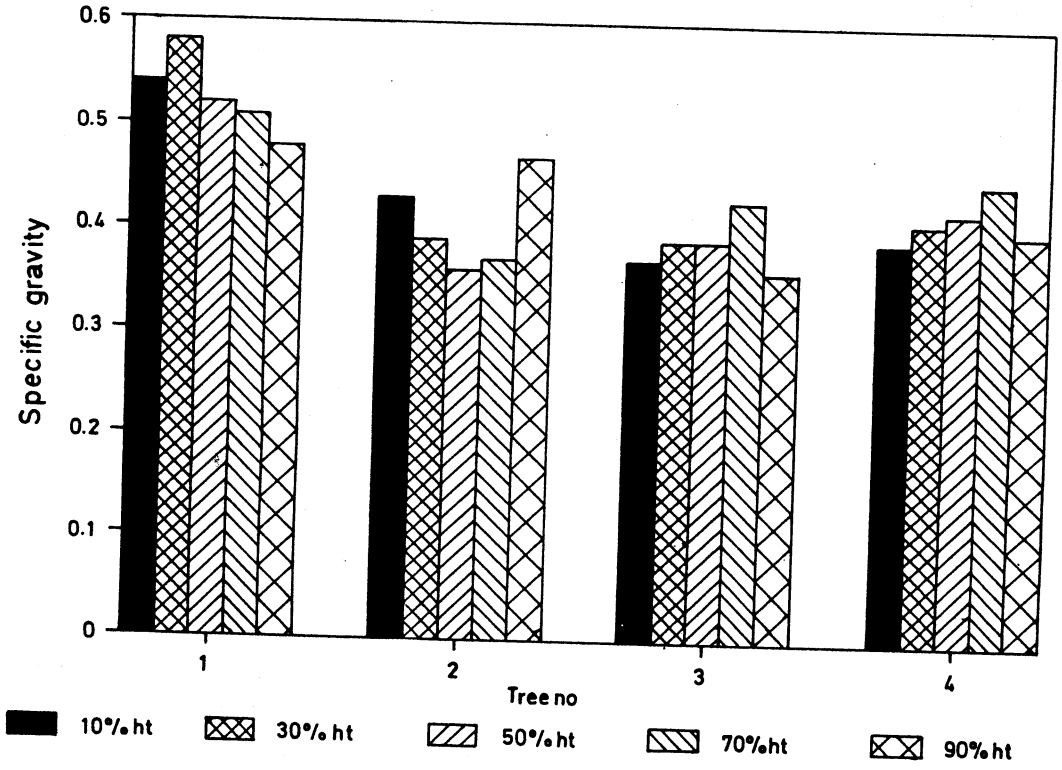

Figure 2. Specific gravity in longitudinal direction

The 5-y-old *Acacia mangium* examined appeared to be of poor form and quality. Most of the discs obtained contained a certain degree of discoloration at the centre and at times, a hollow core.

Generally, specific gravity was much lower in the area near the pith and slightly higher in the area near the bark. Low specific gravity may be associated with the wood formed during the juvenile stage of growth. Low specific gravity is likely to affect the general utilisation of the timber concerned, especially the fibre yield and pulp and paper production, as well as uses where strength is essential. Where the juvenile wood is to

be used as sawn timber, various undesirable characteristics might be encountered such as excessive longitudinal shrinkage of wood, problems in the machining and woodworking and defects associated with the seasoning of wood. All these properties would result in the juvenile wood being unsuitable for solid wood production.

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A NOTE ON THE ROOTING OF *SHOREA ACUMINATA* AND *SHOREA PARVIFOLIA* LEAFY STEM CUTTINGS

Nor Aini Ab. Shukor & Ling Tiing Tchin

Faculty of Forestry, Universiti Pertanian Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Shorea acuminata (meranti rambai daun) and *Shorea parvifolia* (meranti sarang punai) are two of the common commercial red meranti species. However, both species are considered difficult to root by leafy stem cuttings (Eric 1979, Alias 1984) compared to other dipterocarps. This experiment investigated the rooting ability of leafy stem cuttings of young seedlings of *S. acuminata* and *S. parvifolia* with respect to positions, IBA concentrations and rooting media.

Three half-leaf stem cuttings (two-node cutting) of both species were taken from 18-*mth*-old potted seedlings : terminal (second node from apex), middle (fourth node) and basal (sixth node). A nested experimental design was employed involving a total of 480 cuttings. They were then subjected to a hormonal treatment of six levels: 0 μ *g* IBA (indole butyric acid) (control), 75 μ *g* IBA, 100 μ *g* IBA, 125 μ *g* IBA, 150 μ *g* IBA and 100 μ *g* IBA + 100 μ *g* NAA (napthalene acetic acid) with 40 cuttings per species. The hormone was dissolved in methanol and applied to the basal ends of cuttings using the droplet method (instrument : pipette).

The cuttings were then inserted into two rooting media : coconut fibre and paddy husk. The rooting media were kept moist by an automatic mist sprinkler with a spraying duration of two minutes every half hourly. The propagation bed was maintained at 25 °C with 12 *h* photoperiods at an irradiance of 27 Wm^{-2} and a relative humidity of 60%. Survival (number of lived cuttings) and rooting percentage of cuttings were assessed 14 weeks after insertion. The number and maximum length of roots per rooted cutting were also recorded.

Over 80% and 65% of the cuttings of both species (*S. parvifolia* and *S. acuminata*) survived and rooted respectively. This is contrary to past studies by Eric (1979) and Alias (1984) in which both percentages were below 20%. The juvenility of these seedlings, which limited physiological barriers to rooting (Hartmann & Kester 1983, Marmae 1983, Ng 1988, Liew 1992), could have caused this difference.

Results also indicated that terminal cuttings of both species in both media had the highest survival rate (*S. acuminata*: coconut fibre 95.8%, paddy husk 95.8%; *S. parvifolia*: coconut fibre 93.8%, paddy husk 91.7%) followed by middle and basal cuttings. In rooting percentage, distinct inconsistencies were observed between terminal (*S. acuminata:*