

## **Occurrence and anatomical features of growth rings in tropical rainforest trees in Peninsular Malaysia: a preliminary study**

### **ABSTRACT**

The occurrence and anatomical features of growth rings were investigated in tropical tree species in Peninsular Malaysia. The species studied included five species from two plantations, in a tropical monsoon and tropical rainforest climate, and 26 species from a natural forest in a tropical rainforest climate. Most of the trees were diffuse-porous species, with the exception of *Peronema canescens*, which was ring-porous. The growth rings were observed macroscopically and microscopically and were classified as having fiber zones, radially flattened fibers, marginal parenchyma, thick-walled fibers, or variations in vessel size and density. Whereas *P. canescens* from two plantations and *Intsia palembanica* from the natural forest showed well-defined growth rings, possibly formed annually following environmental stresses, 17 species showed indefinable growth rings and 10 species had no growth rings. Many of the samples presented intermittent growth rings, ambiguous growth rings, discontinuous growth rings, or resin canals and/or traumatic canals that made them difficult to classify. Bands of axial parenchyma were observed macroscopically in *Sindora wallichii* and *Azadirachta excelsa*, but microscopic analysis revealed that these bands were formed by concentric traumatic canals. Parenchyma bands with resin ducts or traumatic canals were likely not to be formed periodically. We concluded that some tree species that grow in a tropical rainforest climate do form growth rings and may be used in tree-ring analysis studies.

**Keyword:** Tropical tree; Growth ring; Tropical rainforest; Peninsular Malaysia