Estimation of tree age in the humid tropics by vessel measurement: a preliminary study

ABSTRACT

We estimated the age of plantation-grown trees lacking distinct and consistent annual rings to examine whether an anatomical method for determining the vessel traits of wood is effective in the tropical rain forest climate. Stem disks from 1 Dipterocarpaceae and 2 Meliaceae species for which the planting year was known were collected, and radial strips were sawn out from 2 different radii on each disk. We measured mean vessel lumen area (MVLA) and vessel frequency (VF) and found that radial changes in the 2 variables showed cyclic variation in all samples. The cycle number of both MVLA and VF mostly matched the tree age when they were analyzed with proper radial resolution. The number and shape of the cyclic variations were different between the 2 radii; this inconsistency could partly be ascribed to asynchronous cambium activity. The result implies that (1) the selection of sample species is important and (2) more than 1 radius should be analyzed to increase the accuracy of estimation. Thus, we concluded that vessel traits are important growth-ring indicators in the humid tropics, but a single application of this method of ring analysis may not be sufficiently accurate in age estimation. Further research on the factors affecting vessel formation will make the method more effective.

Keyword: Dipterocarpaceae; Growth ring; Meliaceae; Tree-age estimation; Tropical rain forest; Vessel traits