Predictors of tree growth in a Dipterocarp-based agroforest: a critical assessment

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Abstract

Growth records from three 1 ha plots of old-growth agroforest that have been monitored for 3–7 years in Sumatra are analysed. These plots of damar agroforest show typical multi-species composition. Tree species were grouped into five sets according to species ecology and average growth rate. Variables used in the multiple linear regression to predict average annual increment were crown form index, crown position (CP) index and initial girth. Crown form (CF) index is indicative both of photosynthetic capacity and of general vigour of the tree. Crown position index is indicative of the amount of light available to a tree. Results show that crown form is the most effective predictor of growth and that initial girth, and crown position only marginally increase the percentage of variance accounted for in most cases. About 40–50% of the variance is explained by using the above mentioned variables depending on the sites. The significance of these results is discussed and some methodological improvements to the monitoring techniques currently in use are suggested. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Damar agroforest are multi-species, multi-strata agroforests made up of a mosaic of individually owned and managed plantations (see for instance (Michon et al., 1995; Michon et al., 2000)). Damar (*Shorea javanica* K. and V.), the main species is planted and tapped for its resin. It is also used as a source of timber. Other planted trees include fruit trees such as *Durio zibethinus* Murr., *Lansium domesticum* Correa, legume trees such as *Parkia speciosa* Hassk., *Archidendron pauciflorum* (Benth.) Nielsen. Many other tree species are left to grow from natural regeneration when they are thought not to compete with trees of economic value. The present trend is to actively tend a growing number of timber species. Little is formally known on the functional ecology and optimal management of such complex agroforests. Our objective here is to give a first account of long-term measurements that have been carried out in the last 8 years. Data from three permanent 1 ha plots are analysed.

The variables used to predict annual girth increment are the following: crown position (later referred to as CP), crown form (CF), a species grouping (five groups) and initial girth (size).

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