

Growth of *Acacia mangium* at Different Stand Ages and Soil Physicochemical Properties in Sarawak, Malaysia

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ABSTRACT

The information on soil physicochemical properties is vital for the optimum wood biomass production in forest plantation management. The objective of this study was to determine the topsoil physicochemical properties under different *Acacia mangium* stand ages and their effect on the growth parameters. Five plots were established randomly within each five different stand ages. In all sample plots, the diameter at breast height (DBH) and the total height of standing trees were measured. Soil samples were collected at a depth of 0 to 20 cm at three random points in each plot, then mixed to get a composite before determining physical and chemical properties. DBH mean and the total height of *A. mangium* increased as stand age increased. The mean annual volume increment maximised at the 8.5 years old stand with 27.9 m³ ha⁻¹ yr⁻¹. Survival rate and stem density decreased as stand age increased. Principal component analysis (PCA) results showed that the most important soil physical properties were soil organic matter, silt and sand contents, bulk density, and moisture content. For soil chemical parameters, exchangeable magnesium (Mg), cation exchange capacity (CEC), total carbon (TC), total nitrogen (TN), and carbon-to-nitrogen (C/N)

ratio were the influential soil variables. Soil pH, available phosphorus (P), and clay content were negatively correlated with the growth development of *A. mangium* trees. Observations suggest that multiple soil variables are essential for the success of the *A. mangium* plantation.

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