

EFFECTS OF ACACIA MANGIUM ON MORPHOLOGICAL AND PHYSICOCHEMICAL PROPERTIES OF SOIL

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2015. Effects of *Acacia mangium* on morphological and physicochemical properties of soil. This study was conducted in an industrial *Acacia mangium* plantation in Sarawak, Malaysia, to investigate the effects of planting and harvesting *A. mangium* on soil morphological and physicochemical properties. In *A. mangium* sites, the disruptive effect of planting practices extended to morphological properties in subsoil layers. The A horizon redeveloped during early stages after planting which could be ascribed to plentiful supply of organic matter through rapid decomposition of vegetation residues produced upon land preparation. However, soil C- and N-related properties appeared to decrease with stand age, while the levels of exchangeable bases and available P remained low even after 10 years. In post-harvest sites, distinct soil horizons were not observed due to severe disturbance. The levels of total C, N and exchangeable bases at depth of 0–5 cm for sites assessed 3 years after harvesting were higher than those of sites assessed 1 year after harvesting. This might be ascribed to relatively gradual release of organic matter and nutrients from harvest residues into soil due to low level of decomposition as well as low nutrient uptake of poor vegetation regrowth.

Keywords: Exchangeable bases, planting, harvesting, Malaysia, soil organic matter, Typic Dystrudepts

INTRODUCTION

Acacia species planted on degraded forest and grassland for the purpose of reforestation or rehabilitation have been known to restore soil conditions (Yamashita et al. 2008, Inagaki & Titin 2009, Yang et al. 2009). Many of such studies were conducted in subtropical monsoon, semi-arid or arid climates. In contrast, several studies conducted under tropical humid climate have reported a decrease or no change in soil C, N and other nutrients over time after planting with *Acacia* (Norisada et al. 2005, Nykvist & Sim 2009, Vijayanathan et al. 2011).

In Sarawak, Malaysia, a large area of land (i.e. 480,000 ha) was designated as Planted Forest Zone (PFZ), within which 125,000 ha

were planted with *Acacia mangium* in 2011. The PFZ was established mostly on non-degraded secondary forests caused by shifting cultivation or logging activities. Due to its industrial purpose, a short-term rotation system was adopted in the PFZ. The climate is characterised by high annual precipitation of 3800 mm. Although detailed soil information is required to attain sustainable management of industrial forest plantations using fast-growing tree species in short-rotation systems (Mackensen et al. 2003), soil condition after planting has yet to be investigated in the PFZ. The purpose of this study was to assess effects of planting and harvesting *A. mangium* on morphological and physicochemical properties of soil in the PFZ.

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