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Effects of Enrichment Planting on the Soil Physicochemical Properties at Reforestation Sites Planted with *Shorea macrophylla* de Vriese in Sampadi Forest Reserve, Sarawak, Malaysia

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Abstract

A preliminary assessment on the soils in reforestation sites at Sampadi Forest Reserve, Sarawak was conducted to clarify and compare the effects of enrichment planting on the soil physicochemical properties within the reforested areas and adjacent secondary forest. Reforestation areas which were planted with *Shorea macrophylla* de Vriese by line planting technique were selected in this study. Study sites were established at reforestation areas at different age stands; (year 1996; SM96, 1997; SM97, 1998; SM98 and 1999; SM99) and at adjacent secondary forest (SF). Undisturbed and composite soil samples were collected at the depth of 0-10 cm (surface soils) and 30-40 cm (subsurface soils) from several random points. Our findings indicated that the soils at both reforestation sites and secondary forest were strongly acidic in nature with pH (H₂O) of less than (pH < 5.5) with low nutrient status. Soil total carbon in secondary forest was significantly higher than that of the reforestation sites which indicate large pool of fresh organic matter and its accumulation at surface soil derived from the above vegetation. Notwithstanding, there were significant differences observed in soil available phosphorus between the sites at both surface and subsurface soils. In terms of the soil physical properties, the soils observed were relatively of sandy clay loam to sandy clay in texture and did not varied widely with low fertility level among the studied sites. Based on the current progress of this study, enrichment planting after 15 years might slightly help to restore the productivity of certain soil physicochemical properties at the reforestation sites.

Keywords Reforestation . Sarawak . *Shorea macrophylla* . Soil physicochemical properties . Tropical rainforests

Introduction

Mixed Dipterocarp forest of Sarawak, Malaysia is known as by one of the most developed structures and greatest species diversity of plant and animal life in the world (Whitmore 1984). However, forest areas in Sarawak has deteriorated at unprecedented rates due to various land use related activities such as conversion of forest lands to agriculture lands, forest fragmentation, and degradation by disturbances resulting from the expansion of human anthropogenic activities in agriculture and illegal timber logging (Curran et al. 2004; Hansen 2005; Laurance 2007). Whitmore (1998) and Kobayashi et al. (2001) reported that tropical rainforests of the world are being cleared at the average rate of 16.9 million hectares annually mainly due to the expansion of agriculture and shifting cultivation, while another 5.6 million hectares were logged. According to Juo and Franzluebber (2003), most soils in the tropical regions are infertile, and once the natural forest has been cleared, nutrients can be rapidly lost consequently leading to longer forest recovery time.