Characterizing soil properties of lowland and hill dipterocarp forests at peninsular Malaysia

Abstract

A study was conducted to characterize soil properties of a rehabilitated-degraded forestland and an adjacent natural forest in two major forest types, representing the lowland and hill-dipterocarp forests at Bidor and Kinta Forest Reserves, respectively. Twelve soil profiles were dug at both sites. At Bidor site, the soil profiles were under rehabilitated secondaiy forests (B1 and B2), an abandoned Acacia mangium plantation (B3 and B4) and natural forests (B5 and B6) of lowland dipterocarp. However, at Kinta site, the soil profiles were located in differing topography: rehabilitated secondaiy forests at 450 m (K1 and K2), rehabilitated secondaiy forests at 550 m (K3 and K4) and natural forests at 650 m (K5 and K6) above sea level. The effect of rehabilitating the forests could be seen by the accumulation of organic matter in the uppermost layer, which was assumed to be at an intermediate stage of mineralization. The soil morphology in natural forests of Bidor site exhibited a thicker and darker upper horizon than that of the rehabilitated sites, whereas, those at Kinta site had pronounced soil color in the upper horizon, though to come from decomposition of organic matter. The soils were very acid (pH <5.5), having low activity clay resulting in low (<16 cmol c kg -1) Cation Exchange Capacity (CEC), available P (Av. P), total nitrogen and exchangeable bases, but high in exchangeable Al. High exchangeable A1 was the main cause of soil acidity. The main source of negative charge was the organic matter which affected the CEC, Points Zero Salt Effect (PZSE) and op values. The soils were considered as strongly weathered, devoid of 2:1 type clay minerals. Kaolinite and gibbsite dominated the clay fraction of the soils at both sites. It is recommended that soil characteristics be taken into consideration prior and during the rehabilitation of degraded forestland in tropical rainforests.