

## **Selected soil morphological, mineralogical and sesquioxide properties of rehabilitated and secondary forests**

### **Abstract**

Problem statement: The tropical rain forests in Southeast Asia have been characterized by several researchers. However empirical data on soil characteristics under degraded forest land in tropical rain forest and rehabilitated program are limited. A study was conducted to evaluate the soil morphology, mineralogical and sesquioxide properties of a rehabilitated degraded forest land (19 years after it was planted with various indigenous species) in comparison with an adjacent secondary forest. Approach: Soil samples were air-dried and pass through a 2 mm sieve. Soil morphology was determined based on field observation. The non-crystalline (amorphous) of Al, Fe and Si oxides and hydroxides ( $Al_o$ ,  $Fe_o$  and  $Si_o$ ) were extracted with ammonium oxalate while the dithionate-citratebicarbonate (DCB) method was used for extracting (crystalline) the Al, Fe and Si oxides and hydroxides ( $Al_d$ ,  $Fe_d$  and  $Si_d$ ). The concentrations of extracted Al, Fe and Si were determined by atomic absorption spectroscopy. Mineralogical compositions were identified by X-ray diffraction method. Results: The A-horizon of secondary forest was darker and thicker than that of the rehabilitated forest. Root mat at the secondary forest was well-developed compared to the rehabilitated forest. The clay minerals were dominated with kaolinite and illite to a lesser extent of goethite and hematite accompanied with low values of activity ratio of Al and Fe oxides and hydroxides, indicating that the soils were highly weathered. Conclusion/Recommendations: The difference between rehabilitated and secondary forests was root abundance where secondary forest had most. Good root penetration in the secondary forest indicates that the soil texture there was not heavy. Soils in the rehabilitated and secondary forests were strongly weathered (high presence of kaolin minerals), but the low presence of sesquioxides suggests that they are yet to reached the ultimately weathered phase. The soil properties in terms of morphology, sesquioxides and clay minerals should be taken into account for better management of forest rehabilitation program in tropical regions. © 2010 Science Publications.