

Ferruginous Soils of Humid Tropical Andaman and Nicobar Islands: their Pedology, Mineralogy and Edaphology

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Abstract: *The acid soils of Andaman and Nicobar (A&N) Island's ecosystems typically represent tropical soils of the Indian subcontinent. Although a useful database on the physical, chemical and mineralogical properties of humid tropical (HT) soils of the main lands of the country are available, no such initiatives had been taken for A&N Island. We aimed to study mineralogy, pedogenic processes and their implications to some edaphological properties of the soils for which two benchmark soils of the island were identified. Despite soil weathering in acidic pedo-chemical environment of HT climate for a prolonged period of time, soils had high base saturation and belong to smectitic mineralogy class. Pedogenically, formation of argillic horizon was not a contemporary event. The primary contributor to soil formation was vegetation, which not only turned soils acidic but enriched them with high amount of organic carbon (OC). The addition of alkali metal cations through litter fall made soils base rich and prevented weathering to reach an advanced stage. Hydroxides of Al and Fe produced by breaking crystalline clay minerals in acidic pedo-chemical environment were trapped in the interlayers of 2: 1 clay minerals and thus, both smectite and vermiculite were transformed to hydroxy-interlayered smectite (HIS) and hydroxy-interlayered vermiculite (HIV). Soil properties modified by the profuse vegetation discerned that SOC enrichment, vegetation, acidity and hydroxy-interlayered clay minerals played greater roles than the crystalline clay minerals. Formation of HIS, HIV and kaolin prevented occurrence of Al ions in soil solution, which in turn saved plants from hazards of Al toxicity. The soils support forest and agricultural crops and deliver astute ecosystem. Therefore, attributing chemical degradation for the occurrence of acid soils under HT climate might demand rethinking. The outcome of the present study is expected to expand our understanding of pedogenic processes, and open up opportunity to re-examine the role of forestry and its influence in enriching soils with OC alongside addition of alkali metal cations through litter falls in developing high base saturated soils. High base saturation is expected to prevent soils from becoming low in fertility and productivity as happened in the extremely weathered soils.*

Keywords: Alfisols; hydroxy-interlayered smectite (HIS) and vermiculite (HIV), kaolin; organic carbon; weathering.