ABSTRACT

Genesis and Properties of Shale Derived Soils of Jamaica

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Soils of Jamaica derived form shales of Eocene and Cretaceous origin have been studied in terms of their physical, chemical and mineralogical properties. These soils are wide-spread and are second to the limestone soils in aerial extent; they are considered to be the most important soils occurring on hilly land. The soils show wide variations in texture, from sandy clay loam to loam and clay. Wide variations in depth (20 cm - 150 cm) occur but the soft, brecciated nature of the parent material allow for rapid rejuvenation and restoration of the eroded soils. The small hillside farmers' exploitation of these soils, owing to the ability of plant roots to penetrate the brecciated or otherwise soft material, often results in increased erosion and the depletion of plant nutrients.

The variation in parent material and the differences in the micro-climates favour the development of different soils. The nine soils studied were classified and placed into four Soil Orders, i.e. Alfisols, Ultisols, Inceptisols and Vertisols. The Alfisols and Ultisols (Ultic Tropudalfs and Dystropeptic Tropudults) show low

pH of 4.9 - 5.0 and high exchangeable Al saturation (57 - 81 percent). The Inceptisols (Lithic Eutropepts, Para-lithic Vertic Ustropepts and Vertic Dystropepts) show wide variations in the different micro-climates where they occur. High leaching conditions result in some soils having 5 - 48 percent Al saturation throughout the profile to the subsoils while others show up to 20 percent free $CaCO_3$ in the profile.

The Vertisols with >50 percent clay in the surface horizons exhibit characteristic features of cracking, slickensides, slumping and land-slipping. A drainage toposequence is recognised and proposed for these soils. The de-calcification of the soils occurring on ridge-tops results in a subsequent redistribution of sesquioxides and Si. High exchangeable Al and a reddish colour are marked characteristics at this level. The soils are classified as Aquentic Chromuderts; those developed on colluvial materials at lower levels are poorly drained with much mottling and are classified as Aquic Chromuderts. The soils at the mid-slope are better drained with only fine mottles and are classified as Entic Chromuderts.

X-ray diffraction and infra-red spectro-photometric studies indicate that montmorillonite is the dominant clay mineral followed by mica and kaolinite irr-espective of pH, cation status and soil colour. Analytical

data strongly suggest that the soils are derived from the under-lying parent rock. Ca and Mg are the dominant exchangeable cations for the soils with pH above 5.5 and exchangeable Al for the soils of pH <5.4. Exchangeable Na is often higher than exchangeable K while low P indicates its need in a soil fertility maintenance programme.