Association of soil nutrients with organic matter and clay in different land use patterns of Sri Lanka

Gamini Seneviratne[1*], R Ratnayake[1] and S A Kulasooriya[2]
[1*] *Institute of Fundamental Studies, Hantana Rd., Kandy*
[2] *Department of Botany, University of Peradeniya, Peradeniya*

Understanding of the behavior pattern of soil nutrients in different land uses requires the knowledge of organic matter content and clay content in soil. To evaluate the leaching risk of soil nutrients from the soil the determination of clay content and organic matter content is critical. Attention has been drawn to the role of organic matter and clay in the mechanism of soil nutrient adsorption. Although much has been known about clay, organic matter and their sorptive-desorptive properties, relatively little information exists about their behavior in different land uses. This study attempted to determine the associations of soil nutrients with organic matter and clay of different land use patterns in the main agroecological zones of Sri Lanka, that reveals the roles of organic matter and clay in the nutrient availabilities of those soils. Samples were collected from two different sites (1) dominant natural forest type (Hakgala forest, Gilimale forest, Knuckles forest and Rawanaella forest) (2) adjacent, major cultivated system (Tea plantation, Rubber plantation, mixed crop plantation, and Potato cultivation). Exchangeable forms of macro and microelements, available N (NO_3^-, NH_4^+) and P (PO_4), soil organic matter, clay and pH were determined. Different relationships were found between soil nutrient concentrations in the forest and the cultivated land. Soil nutrients of forests were always correlated with the clay content of the soil, whereas soil nutrients of the cultivated lands were correlated with the organic matter content of soil. These differences in the relationships between soil organic matter or clay and soil nutrients are attributed to land use change from the forest to a cultivated land (natural ecosystem to an managed ecosystem). In the forests, limiting soil nutrients were correlated with the clay content. In cultivated lands, the soil nutrients were related to the soil organic matter content, irrespective of their limitations. This concludes that the nutrient availability in a natural ecosystem is a function of nutrient retention by clay whereas that of managed ecosystems is a function of nutrient mineralization by soil organic matter.

*gaminis@ifs.ac.lk Tel: 081 2232002