CLAY MINERALOGY AND SPECIFIC SURFACE OF SELECTED SRI LANKAN SOILS IN RELATION TO WEATHERING SEQUENCES

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Soil mineralogy and texture are two major factors affecting soil behaviour. These modify the soil behaviour by affecting the specific surface which determines soil properties including cation exchange capacity, water retention and soil rheology. The clay minerals are formed from the weathering products of parent material, and the resulting mineralogy strongly bear the characteristics of the rock, parent material and weathering sequences.

The objective of this study was to characterize the clay mineralogy and specific surfaces of five Sri Lankan soils with relation to weathering sequences.

Surface soil samples (0–20 cm) were collected from six major agricultural soils including Reddish Brown Earths, Reddish Brown Latasolic, Red Yellow Podzolic, Red Yellow Podzolic with soft or hard Laterites, Low Humic Gley and Immature Brown Loam soils. The clay fraction was separated by sedimentation after oxidizing the organic matter using hydrogen peroxide and was subjected to mineralogical analysis by X–ray diffraction. These samples were subjected to several pre–treatments: Mg–saturation, Mg–glyceration, K–saturation and heating with K–saturation to identify different mineralogical groups. Specific surface of the clay fraction was estimated using the BET – N2 method.

The results indicate that kaolinite is the predominant mineral in all soils. The Red Yellow Podzolic and Red Yellow Podzolic with soft or hard laterite show moderate amounts of gibbsite and traces of boehmite in addition to kaolinite. Gibbsite and boehmite are Al–oxyhydroxides which are formed under very high acid leaching conditions prevailing under the wet climatic zone. Immature Brown Loams and Low Humic Gley soil which are the least weathered soils showed appreciable amounts of smectite and traces of mica in addition to kaolinite. Reddish Brown Earths and Reddish Brown Latasolic soils show low amounts of smectite and some traces of mica and vermiculite. These soils can be classified as intermediately weathered soils. The estimated specific surfaces also indicate similar trends with least weathered soils showing high values of 80 m^2g^{-1} and the highly weathered group showing lower values of 30 to 10 m^2g^{-1}. These results indicate that the clay mineralogy and specific surface of these soils can be correlated with the weathering sequences.