D-40: Soil solution chemistry and clay mineralogy of some wet zone soils

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Clay fractions of the A horizon at 24 locations in the Hatton-Avissawella area (wet zone) were studied to determine their mineralogical composition and equilibrium correlation to their soil solutions.

Clay fractions from the A horizon soil samples were separated using the pipette fractionation method. 100 mg clay were analysed by differential thermal analysis and X-ray diffraction analysis techniques to identify and confirm clay mineralogy. Saturated soil solutions of soil samples (400 g) were extracted by centrifugation and immediately analysed for pH and Eh. The concentration of cations (Na, K, Ca and Mg) in soil solution was detected by atomic absorption spectrophotometry. Aqueous silica (H_4SiO_4) was determined using spectrophotometry (ammonium molybdate method).

The pH values of extracted soil solutions were approximately 3.5, and hence belonged to an acidic environment. This condition was favourable for the formation of clay minerals like kaolinite and gibbsite. Activity diagrams based on thermodynamic principles, also indicated that kaolinite and gibbsite were the most stable clay minerals to exist in the present physico-chemical environment of the area studied.