

Appendix IV - Analytical Methods

Soil Analysis :

Electrical conductivity (E.C.20°C). A 1 : 5 soil-water suspension was shaken for 1 hour, and the conductivity determined with a “Philips PR9500” conductivity bridge and dip cell.

Soil reaction (pH). A “Radiometer Model 22” pH meter equipped with a glass electrode was used to determine the pH of the above suspension.

Chloride ion (Cl). The electrometric titration method of R. J. Best was used, as described by Piper (1942).

Particle size analysis. The plummet balance method of Hutton (1956) was used, with removal of organic matter when necessary, and carbonates where indicated in Appendix II. The sand was separated from the finer fractions by hand decantation (Piper 1942). The “International” size fractions were separated, i.e. coarse sand 2 mm – 0.2 mm, fine sand 0.2 mm – 0.02 mm, silt 0.02 mm – 0.002 mm, clay < 0.002 mm.

Exchange capacity and exchangeable sodium percentage. Samples were treated by the method of Hutton and Bond (unpublished data). Exchangeable sodium was removed in a normal ammonium chloride leaching solution (pH = 7.0) and was subsequently determined by flame photometry. Cation exchange capacity was determined by leaching the ammonium-ion-saturated soil with normal sodium sulphate solution and determining the ammonium and chloride ion concentrations in the leachate by the Nessler method and electrometric titration respectively. The excess of ammonium ion was taken to be a measure of the cation exchange capacity.

Water Analysis :

Electrical conductivity 20°C. Measurement was by conductivity bridge and dip cell, as for the soil suspension.

Chloride ion (Cl). Suitably diluted samples were titrated with silver nitrate, with electrometric indication of the end point (Piper 1942).

Bicarbonate ion (HCO₃⁻). An aliquot of the sample was titrated with standardised sulphuric acid to pH 4.8 as indicated by a glass electrode pH meter.

Sulphate ion (SO₄⁻). The method of Bond (1955) was adopted in which the sample is treated with an excess of barium chloride and back-titrated with EDTA solution.

Potassium ion (K⁺). Determined by means of a “Lange” flame photometer.

Sodium ion (Na⁺). Determined by flame photometry on a suitably diluted sample.

Calcium ion (Ca⁺⁺). A suitably buffered aliquot was titrated with EDTA solution, using Murexide as indicator and on “Eel Titrator” to detect the end-point.

Magnesium ion (Mg⁺⁺). The calcium plus magnesium present was determined by titration of a suitably buffered aliquot with EDTA solution, using Erio T as indicator, and detecting the end-point visually. The magnesium ion content was obtained by difference.