

Appendix 2 - Methods of Soil Analysis

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All results are expressed in terms of oven-dry soil passing a 2 mm round-hole sieve, with the exception of gravel, which is reported as a percent-age of the air-dry field sample.

Particle-size analysis - plummet balance method of Hutton (1956), with sand separation by hand decantation. The I.S.S.S. size fractions were separated: i.e. coarse sand 2 - 0.2 mm; fine sand 0.2 - 0.02 mm; silt 0.02 - 0.002 mm and clay < 0.002 mm.

Electrolytic conductivity (EC 25°C) - a 1:5 soil water suspension was shaken for 1 hour and, after temperature equilibration, conductivity was measured with a dip cell and direct-reading meter. Results are reported as microsiemens per centimetre μScm^{-1}).

Soil reaction (pH) - by glass electrode and digital pH meter on the above suspension.

Chloride (Cl) - by solid state selective-ion electrode and millivolt-meter on the same suspension, calibrated with potassium chloride standards.

Organic carbon (Org. C) - wet-combustion technique of Walkley and Black, described by Piper (1942). No recovery factor was applied but the factor 1.3 C:N was used to calculate carbon:nitrogen ratios.

Total nitrogen (N) - Metson (1956). Semimicro Kjeldahl method using a Markham still.

Free iron oxide (Fe_2O_3) - Haldane (1956). Finely-ground soil was extracted with powdered zinc in ammonium chloride/oxalic acid buffer. Ferrous ion in the treated extract was titrated with potassium dichromate.

Hydrochloric acid extract for phosphorus and potassium (P,K) - 4 g soil was refluxed for 4 hours with 20 ml constant boiling point hydrochloric acid, with subsequent filtration and dilution of the filtrate to 200 ml. Phosphorus was determined by a colormetric method using molybdenum blue (Hutton, private communication) and potassium by atomic absorption.

Available phosphorus (Pay. ppm) - Colwell (1963). 1g soil was shaken with 100 ml 0.5 M sodium bicarbonate at pH 8.5 for 16 hours. Phosphorus was determined in the clarified extract by a colormetric method (molybdenum blue).

Exchangeable cations - by extraction method of Tucker (1974), also described in Loveday (1974). Synopsis: Soluble ion removal by 10% ethanediol in ethanol. Cation displacement by ammonium chloride in ethanol/water (2:1) at pH 8.5 Cation determinations by atomic absorption. Cation exchange capacity by measurement of ammonium ion displaced from the treated soil by a potassium nitrate/calcium nitrate solution.