Appendix II – Analytical Methods

All estimations were carried out on the air-dried fine earth, i.e., material passing a 2 mm round hole sieve. For calcium carbonate, nitrogen and organic carbon analyses, the fine earth was further reduced to pass through a 0.5 mm sieve. All results except pH and gravel are reported on an oven-dry basis. Gravel is reported as a percentage of the field sample.

The methods used are given below and except where indicate otherwise are essentially as described by Piper (1950).

Particle Size Distributin – For the majority of the soils the procedure adopted followed that of the International "A" pipette method. In some cases, the Bouyoucos hydrometer was used to determine silt and clay, the soils being agitated in a motor dispersion unit with sodium hexa-meta-phosphate and caustic soda, followed by overnight end-over-end shaking.

Soluble Salts – A 1 : 5 salt-water suspension was shaken for one hour and the electrical conductivity (EC) determined. This was converted to per cent total soluble salts (TS) using the relationship:

$$TS = EC \times 340$$

where EC is expressed as mho/cm and the factor 340 was derived from a number of gravimetric determiantions of total soluble salts.

Values for soluble salts are not given for soils containing more than traces of gypsum.

pH – After determination of electrical conductivity (soluble salts), the same suspension was used to determine pH by the glass electrode.

Chlorides – These were deterined by the electrometric titration method of Best.

Calcium Carbonate – Carbon dioxide was determined by the vacuum method of Hutchinson and MacLennan and expressed as calcium carbonate.

Phosphorus – This was extracted by boiling 30 g of soil with 150 ml of hydrochloric acid (SG 1.115) for 2 hours.

Nitrogen – The Kjeldahl method was used.

Organic Carbon – The wet combustion method of Walkley and Black was used. Results have been mutliplied by an empirical recovery factory of 1.25.

Exchangeable Cations – The soil was first leached with 60% ethanol to remove soluble salts. In the case of the earlier determinations, it was then leached with N ammonium chloride and the exchangeable cations were determined gravimetrically in the leachate by the methods of Piper (1950). For later determinations (Sample No. 7151-62, 81-84, 89), N ammonium acetate adjusted to pH 7.0 was used as the leaching reagent if no carbonates were present, and N ammonium chloride in 60% ethanol adjusted with ammonia to pH 8.5 (Tucker 1954) if carbonates were present.

In the leachate, calcium and magnesium were determined by EDTA tiltration, and sodium and potassium using an EEL flame photometer. The individual cations have been expressed as milligram equivalents per 100 g of soil and as percentages of the sum of the metal ions.