SECTION 7 - PHYSICAL AND CHEMICAL PROPERTIES

7.1 Soil Inclusions

Calcium carbonate is the main soil inclusion and occurred in almost every profile. Gypsum is present in some profiles, especially in the lower parts of subsoils. Occasionally, small amounts of quartz, gravel, ferruginous concretions and soft carbon occur at various depths.

Although calcium carbonate is present in all the profiles listed in Appendix III, there is considerable variation in its amount and form at different depths. Kalkee clay microscale complex is the most calcareous soil type. In the soils of this complex calcium carbonate occurs from the surface down to depths of 120 cm or more. Depths of maximum concentration varies greatly and some profiles do not have such a zone.

Hard nodules of calcium carbonate are often scattered on the surface, but the amounts of visible calcium carbonate in surface horizons are usually less than 3%.

In most profiles of the Murra Warra clay complex, Murra Warra duplex and minor soil types, calcium carbonate is not found in the top 30 or 50cm. However, hard nodules of calcium carbonate are scattered on the surface in a few places. The depth of maximum concentration in these soils ranges from 60 to 85 cm.

Gypsum occurs in some profiles, especially in the lower parts of the subsoils. It is present mainly in the Murra Warra clay complex and Murra Warra duplex soils. Generally, the amount of gypsum does not exceed 10% and is usually less than 3%.

7.2 Chemical Properties

The pH and electrical conductivity (E.C.) were determined for soil from each major morphological horizon of each soil type.* A 1:5 soil-water suspension was used for determination of E.C. and pH. The E.C. of the suspension was determined using a conductivity cell and meter and the results expressed in micro-Siemens per centimetre (us/cm). A glass electrode was used for pH determinations. Chloride was determined by t he electrometric titration method (Best, 1931) and the results expressed as per cent chloride (oven-dry basis).

7.2.1 pH

All soil types exhibited alkaline soil reaction trends. The Kalkee clay and Murra Warra clay complex soils had surface pH values greater than 8 (range 6.9 to 9.7) and subsoil pH values commonly around 9 (range 8.1 to 10). Soils of Murra Warra duplex group had surface and subsoil pH values of about 7.5 and 9, respectively.

7.2.2 Chloride and Electrical Conductivity (E.C.)

(a) Statistical analysis

The results were analysed statistically as follows:

Data from soil samples analysed for chloride (Murra Warra duplex soils) and for both chloride and E.C. (Kalkee and Murra clay soils) were grouped into successive 10 cm depth zones within the profile (0 to 120cm). The mean mid-depths, per cent chloride and E.C. values were calculated for each zone, and a simple linear regression equation fitted to each set of data. The results are shown in figures 6a and b.

(b) Results

(i) ***Chloride***: All soils exhibited a linear increase in chloride contents with depth. Kalkee clay soils had the lowest chloride contents and Murra Warra duplex soils the highest. In the duplex soil group subsoil chloride levels seldom exceeded 0.25%. Although this level could represent a high salinity hazard under irrigation conditions its effect on dryland wheat farming is not known. Salt problems have not been reported for soils in this area, but it is possible that

* Where morphologically similar horizons occur at different depths in different soil types, comparisons on a fixed depth basis, between soil types, is not possible.

the availability of subsoil moisture could be reduced and thus aggravate the effects of low rainfall on crops during growing seasons.

(ii) ***E.C.:*** In both the Kalkee and Murra Warra clay soils, E.C. increased linearly with depth, higher values occurring throughout the soil profiles of the Murra Warra clay group.

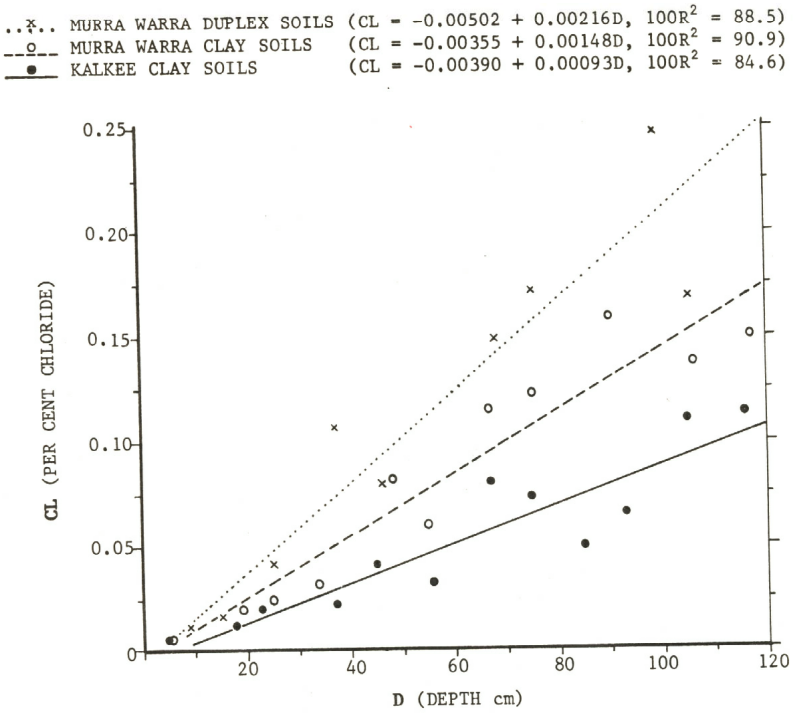

Figure 6a – Mean depth distribution of chloride for the three major soil groups

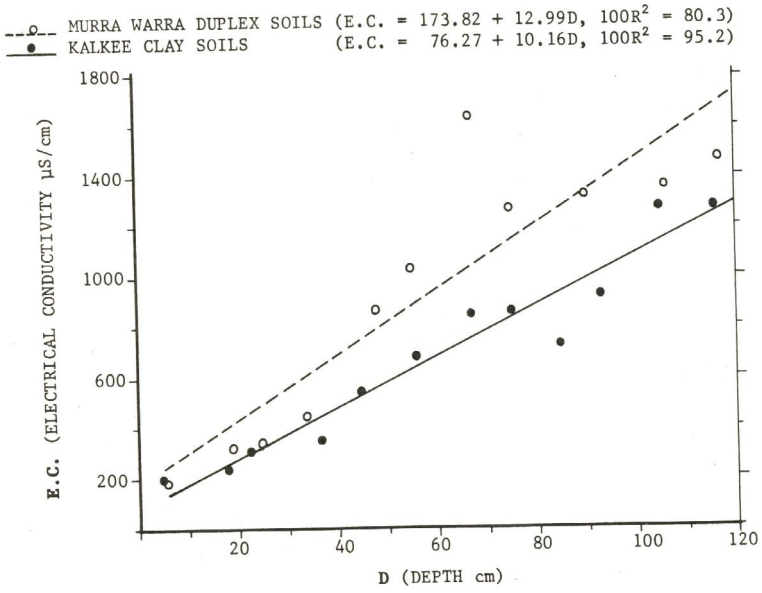

Figure 6b - Mean depth distribution of electrical conductivity for the two major clay soil groups