Soluble Salts

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10-1 INTRODUCTION

The term soluble salts, as applied to soils, refers to major dissolved inorganic solutes. Soil salinity is described and characterized in terms of the concentrations (or, occasionally, the content) of soluble salts. The management and need for reclamation of saline soils are evaluated from measurements of such concentrations.

Ideally, it would be desirable to know the individual solute concentrations in the soil water over the entire range of field water contents and to obtain this information immediately in the field, without need for collection of soil samples or laboratory analyses. No practical methods are available at present to permit such determinations, although determinations of total salinity can be made in situ using electrical signals from various types of sensors (Rhoades, 1978, 1984). Such determinations are valuable for survey, monitoring, and irrigation and drainage needs, even though they give a measure of only total soluble salt concentration. Such methods are, in many cases, supplanting the need for more conventional analytical procedures.

Soluble salts in soils can be determined or estimated from measurements made (i) on aqueous extracts of soil samples, (ii) on samples of soil water itself obtained from the soil, (iii) in soil using buried porous salinity sensors that imbibe and equilibrate with soil water, and (iv) in soil (or soil pastes) using four-electrode probes or electromagnetic (EM) systems. The appropriate method of measuring soil salinity must be selected for the specific condition and purpose. If only a measure of total soluble electrolyte level is needed, salinity sensors, EM, or four-probe devices are recommended. To monitor soil water salinity as the soil dries between irrigations, the salinity sensor is recommended. When determination of a particular solute is needed, then either collection and extraction of soil samples or collection of water samples is required. Collection of water samples is more convenient for monitoring needs but is limited to relatively wet soil conditions. Soil sample extracts give relative comparisons only, since the soils are adjusted to unnaturally high water contents during extraction. A combination of the