The soil solution in the root zone is concentrated by the extraction of water by plant roots, and by evaporation of water directly from the soil. If the quantity of water applied to the land is equal to, or less than, the amount required by the crop, or if there is a net upward movement of water from ground water, there will be a net accumulation of salts in the soil. Lands in West Pakistan have become salinized by both of these processes.

The fundamental requirement for achieving salinity control is that there be established a net downward movement of water (and hence salt) through and beyond the crop root zone. If the soil will permit the downward movement of water through the root zone, and if the required drainage can be obtained, the problem of salinity control reduces to one of applying the proper amount of irrigation water. The higher the salt content, the more water is required. An extra amount, over and above crop needs, must be passed through the root zone in order to maintain a satisfactory level of salinity in the soil.

Equations have been developed for estimating the increase in amount of water required for salinity control, based upon the salt content of the irrigation water and the salt tolerance of the crop. An estimate also can be made of the minimum accretion to the ground water that can be anticipated where these conditions of salinity control are maintained. These equations are given in Appendix A. 2.

The basic equation for the required depth of irrigation water, D_i, is

$$D_i / D_c = 1 / [1 - (C_i / C_d)],$$

where C_i = salt concentration in irrigation water, C_d = allowable salt concentration in soil water at the bottom of the root zone, and D_c = consumptive use of water by evapotranspiration. For wheat, C_d = 7,500 parts per million (ppm).

The percentage increase in water supply that is needed for salinity control, as related to salt content of the irrigation water and the salt tolerance of the crop, is shown in Table 2. 2.

The depth of irrigation water required, D_i, is calculated as follows: