Modelling the processes of dissolution and precipitation of salts in soils as related to management of irrigation and drainage

Modélisation des processus de dissolution et de précipitation des sels dans les sols selon la conduite des irrigations et du drainage

Modelización de los procesos de disolución y precipitación de sales en el suelo en relación al manejo del riego y del drenaje

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The development and reclamation of salt-affected soils (saline and sodic) are closely related to the irrigation and drainage management, as they affect the balances of water and salts in the soil. The salt balance is in many cases strongly affected by the possibilities of precipitation and dissolution of salts of limited solubility, mainly Ca sulfate and Ca and Mg carbonates. Therefore, the adequate quantitative evaluation of those processes is very important, both for the prediction and control of the salinization and sodification levels of soils and drainage waters, as well for the assessment of possibilities and methods to reclaim salt-affected soils.

Some “precise” theoretical models (Suárez et al.), developed to predict the changes, both in time and depth, of concentration and composition of salts in soil solution and of exchangeable cations have limitations to be applied, because they are based on very variable biological and physicochemical processes, which are very difficult to evaluate or to preview in most of the cases. Other models based on empirical correlations (FAO 1976, 1986; Rose, 19884) have demonstrated to be only applicable to very specific conditions. In this paper there are presented some results of the application of a simple, theoretically sound model (“SALSODIMAR”), based on an independent balance of the most common ions and salts present in irrigation waters and soils. The experience accumulated in the application and validation of succesive approximations of the model “SALSODIMAR” (Pla, 1968, 1988, 1996; Pla and Dappo, 1977), to predict the precipitation and dissolution of salts in the soil, and their effects on the salinization and sodification processes, and on the requirements of irrigation and drainage management, has proved that this model could be used in practice for guiding the irrigation and drainage practices, to take advantage of the processes of precipitation and dissolution of salts in the prevention and reclamtion of salt-affected soils.

Pla, I. 1968. Evaluation of the quality of irrigation waters with high bicarbonate content in relation to the drainage conditions. Trans. 9th Cong. ISSS. I:357-370. Adelaide


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