SALTIRSOIL: A COMPUTER-BASED APPROACH TO ADVISE BETTER MANAGEMENT PRACTICES IN IRRIGATION UNDER RISK OF SALINIZATION

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Abstract

A new simulation model, SALTIRSOIL (SALTs in IRRigation SOILs), is presented in this work. This model is an agricultural computer-based tool to advise farmers and policy makers in irrigation and crop management practices aimed at keeping productivity of soils under risk of salinization. SALTIRSOIL was programmed in a modular way using Visual Basic 6.0 and it is composed of two main programming modules. One to estimate the soil water balance in the rooting depth, and the other to assess the chemical equilibrium of soil salts in the soil solution including calcite and gypsum precipitation-dissolution equilibria. The soil water balance is estimated in a monthly basis considering irrigation, precipitation, evapotranspiration and drainage to be the main terms. Soil data required to run SALTIRSOIL includes texture, organic matter and bulk density and more reliable results can be obtained if these data are imputed for several layers of soil in the rooting depth. At this point, one of the most remarkable points in SALTIRSOIL approach, in agreement with nowadays trends in agricultural modelling, is that irrigation practices such as irrigation technique can be simulated. This simulation is done using parameters such as number of irrigation days per month, water application rates and wetted soil surface percentage among others. Also, an effort to simulate the role that preferential flow plays in the way water leaches soil has been made through the calculation of the leaching efficiency, which depends on soil physical properties. The way plants extract water from the soil profile has also been considered and the crop coefficient approach scheme proposed by the FAO has been implemented in SALTIRSOIL. In the early stages of testing, SALTIRSOIL has given interesting results. The different impact of irrigation technique in the soil salinization has been taken into account. Several tests indicate that drip irrigation techniques are more adequate than others in order to prevent salinization, despite the fact that salt accumulation is more heterogeneous.