

1. P r e f a c e

One of the tasks of contemporary soil science is the characterization and the quantitative and qualitative description of soil forming processes in many branches of pedology. Through such an approach, the requirements which arise from agricultural practice, particularly in the field of irrigation, drainage and soil management should be met.

The practice of irrigation and drainage in arid and semi-arid areas, as well as the introduction of irrigation in numerous new agricultural regions make up-to-date water and salinity control imperative in order to properly utilize the existing irrigation systems and to prevent the hazard of secondary salinization, alkalization and water-logging. Only a thorough knowledge of these processes combined with appropriate prediction and control measures will make the effective utilization of soils and irrigation water possible, so that good yields can be secured over a long period without leading to the degradation of soils and/or to the deterioration of land.

Simulation models have been prepared to show the major links between the principle factors in the major soil-forming processes, and to determine the essential element in each of these. Once these processes are successfully reproduced, scientific intervention can be determined according to the needs of each soil condition, and, in conjunction with correct exploitation, can keep the soil fertile. Good results have been achieved in modelling soil processes such as soil salinization and leaching. The models elaborated contribute to the design, construction and exploitation of irrigation and drainage systems in many arid and semi-arid regions.

Within the framework of the scientific collaboration which has existed for several years between the Institute of Agrochemistry and Soil Science of the Academy of Sciences of the USSR (Puschino) and the Research Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Sciences (Budapest), new models have been elaborated for the study of some of the main aspects and processes of soil salinization and alkalization. These are published in the following chapters.

The intention of the authors is to describe and analyse the dominating processes of interaction between electrolyte solutions and soils under conditions similar to natural soil and irrigation conditions.

We are aware that our models cover only part of the complex picture of soil salinization and alkalization as a whole, but we have tried to simulate those interactions between the solid and liquid phases of the soils which play a dominating role during the formation of saline and alkali soils, and which show substantial similarity to the conditions which can be observed in irrigation and drainage practice.

August 1978.

V. A. KOVDA

I. SZABOLCS