Design of Controlled Drainage and Subirrigation Facilities for Water Table Management

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I. INTRODUCTION

Agricultural drainage and related water management systems are installed primarily to eliminate water related factors that limit crop production or to reduce those factors to an acceptable level. Another major objective is to improve the quality of drainage discharge waters by controlling drainage flows to reduce agrochemical losses from farmland. System design should permit control of the water table depth in the soil profile over the range needed for the cultural practices to be followed and the crops to be grown. An integrated design for a water table control system includes determination of site suitability, drain depth and spacing, drain conduit diameter, a drain layout and installation plan, an adequate water supply, a method or structures for operating the system, and an operation plan. An acceptable application of water table control depends on the cost of the required water management system in relation to the economic and environmental benefits expected. Such benefits vary from year-to-year with both weather and economic conditions and are difficult to quantify because of the complex interrelationships of crop production and environmental processes.

As more is learned about plant growth and yield, machinery-soil interactions (e.g., trafficability), and agrochemical losses in drainage flows, it will be possible to simulate the entire crop production processes, including crop selection, rotations, fertilization, etc. This will permit optimizing the water management system design based on profit potential and environmental benefits or