OPTIMAL ALLOCATION OF THE IRRIGATION WATER AMONG SOME HERBACEOUS CROPS

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The optimal allocation of the irrigation water, or else the best water distribution among crops grown both in a farm or district, is of great interest not only when the available water is limited because it aims to maximize yield water use efficiency and profits of the agriculture activity, representing one of the strategies to increase the overall water use efficiency. So, tools able to give advices concerning this subject are crucial for the water resources management, since they are capable to address the choices of the farmers and the decisional institutions.

Its definition requests first of all the knowledge of the yield response of the interested crops, expressed in economical terms, but also the use of mathematical models of optimization, necessary to resolve complicated systems of equations with a unknowns number higher with respect to constraint relations.

A first study (Rubino et al., 2008) has been carried out on 9 herbaceous and vegetable crops: autumnal and spring sugar beet, spring and summer grain corn, dry and fresh bean, eggplant, pepper, and processing tomato.

To experimental data of yield response, expressed in economical terms, Mitscherlich equation, as modified by Giardini and Borin, has been fitted, and the obtained parameters, characterized moreover by an agronomical and physiological meaning, have been processed through a mathematical model of non linear programming (General Algebraic Modelling System, GAMS); a dual water tariff system has been considered; it has been hypothesized that all crops occupied equal soil surface (1 ha per each crop).

The objective of this study consists in deepening further the subject, simulating a real condition, that is to describe the irrigation water optimal allocation in the hypothesis that different values of soil surfaces can be assigned to the crops.

The definition of a such model will be the base to constitute a valid decision-making instrument able to give suggestions on the irrigation water management at district level and, within certain limits, on the surface values to assign to single crops.