Geophysical Research Abstracts, Vol. 8, 08400, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08400

Water and solute transport in the unsaturated zone and management of irrigation in cracking soils

G.Crescimanno, P. Garofalo

Dipartimento di Ingegneria e Tecnologie Agro-Forestali – Sezione Idraulica, Palermo, Università di Palermo, Italy

(gcrescim@unipa.it / Phone +39-091-7028109)

Management scenarios aimed at optimizing irrigation in a Sicilian vineyard characterized by a cracking clay soil irrigated with saline water were explored for seven soil profiles (Baglio 1-Baglio 7), by using the simulation model SWAP (van Dam et al., 1997), which accounts for shrinkage and cracking. Accurate prediction of water content,q, was obtained for the seven profiles by expressing the soil hydraulic properties according to the Brutsaert retention equation coupled with the hydraulic conductivity model proposed by Gardner (B-G model). A satisfactory prediction of the electrical conductivity of saturated extract, ECsat, was obtained using for the dispersivity (Ldis), a calibration value of 20 cm.

Different irrigation schedulings and alternating waters of different quality were then explored as viable management options. The results showed that bypass flow determined a favorable water distribution, and that the best irrigation strategy was to make a minimum number of irrigations, by maximizing at the same time the amount of water supplied at each irrigation. Water storage in cracks was found to promote salt-leaching; neglecting cracks and bypass flow was shown to overestimate salinization. Alternating two different irrigation waters proved to be the best strategy which could be adopted to reduce soil salinization and enhance crop transpiration. Our results also suggest that the most efficient salt-leaching can be obtained if application of leaching solution(s) is performed when the soil presents a considerable degree of cracking.