Geophysical Research Abstracts,
Vol. 11, EGU2009-8342, 2009
EGU General Assembly 2009

Root growth and uptake dynamics under different drip-irrigation strategies

A. Furman (1) and S. Assouline (2)

(1) Civil & Environmental Engineering, Technion - Israel Institute of Technology, Haifa, Israel(afurman@technion.ac.il), (2) Soil, Water & Environmental Sciences, Agricultural Research Organization - Volcani Center, Bet Dagan, Israel (vwshmuel@agri.gov.il)

Root uptake of water and nutrients is a dominant and crucial component in the design of efficient irrigation and fertigation practices for applications ranging from conventional irrigation to highly-advanced high frequency irrigation practices, as well towards other unique uses of land and water resources. Nevertheless, root water and nutrient uptake is often ignored or oversimplified when simulating soil water flow and solute transport. This is primarily so because of the a-priori unknown dynamic processes of root uptake, especially when coupled with spatially heterogeneous soil water and nutrient distributions.

In this research we investigate the spatial and temporal patterns of root water uptake, and the way these patterns are influenced by environmental conditions. We consider the soil-root system as continuum. Our greenhouse setup includes sweet bell pepper grown in sand under three different irrigation schemes, differing in the rate at which water is applied (high rate, small rate, and pulses). For each scheme we have two cylindrical growing chambers equipped with 96 ERT electrodes (one with and one without a plant), similar chambers with TDR probes, continuous weighting of chambers and of drainage, and 12 equal dimensions sacks for bi-weekly mapping of root presence.

The experimental set-up enables the quantification of the dynamics of the root system, the total water uptake, the water regime within the growing medium, and the spatial and temporal distribution of the uptake function within the root zone by means of the ERT data.