



Changes in water and solute fluxes in the vadose zone after switching crops

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Switching crop type and therefore changing irrigation and fertilization regimes leads to alternation in deep percolation and concentrations of solutes in pore water. Changes of fluxes of water, chloride and nitrate under a commercial greenhouse due to a change from tomato to green spices were observed. The site, located above the a coastal aquifer, was monitored for the last four years. A vadose-zone monitoring system (VMS) was implemented under the greenhouse and provided continuous data on both the temporal variation in water content and the chemical composition of pore water at multiple depths in the deep vadose zone (~ 20 m). Chloride and nitrate profiles, before and after the crop type switching, indicate on a clear alternation in soil water solutes concentrations. Before the switching of the crop type, the average chloride profile ranged from ~ 130 to ~ 210 , while after the switching, the average profile ranged from ~ 34 to ~ 203 mg L⁻¹, 22% reduction in chloride mass. Counter trend was observed for the nitrate concentrations, the average nitrate profile before switching ranged from ~ 11 to ~ 44 mg L⁻¹, and after switching, the average profile ranged from ~ 500 to ~ 75 mg L⁻¹, 400% increase in nitrate mass. A one dimensional unsaturated water flow and chloride transport model was calibrated to transient deep vadose zone data. A comparison between the simulation results under each of the surface boundary conditions of the vegetables and spices cultivation regime, clearly show a distinct alternation in the quantity and quality of groundwater recharge.