



Experimental and numerical study of chlortoluron transport affected by preferential flow

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Chlorotoluron transport was studied in five different soil types and under varying climate conditions. The herbicide Syncuran was applied on a four square meter plot using an application rate of 2.5 kg/ha of active ingredient. Soil samples were taken after 6, 14, 22 and 36 days to study chlorotoluron distributions in the soil profile. The herbicide almost did not move in Albic Luvisol and Haplic Luvisol. The solute transport in the other three soil profiles was influenced by preferential flow that probably occurs due to the higher content of coarse sand and gravel in Haplic Stagnosol and Haplic Cambisol. In the case of the Greyic Phaeozem, the reason may be the volume changes and influence of living organisms. The solute transport parameters, like the adsorption isotherm and the degradation rate, were determined in the laboratory using standard procedures. The field adsorption properties were also studied by coupling chlorotoluron concentration in soil water extracted from the part of the soil samples and chlorotoluron concentration adsorbed on the solid. The amounts of adsorbed solute described by field adsorption isotherms are always lower than the amounts of adsorbed solute described by laboratory adsorption isotherms. The reason may be the slow solute penetration into the soil aggregates and smaller active adsorption surface of aggregated soil particles. Some of the special features in HYDRUS-1D (Simunek et al. 2003) were used for estimation of water and solute transport irregularities and closer approximation of observed values.