**TIME EVOLUTION OF SURFACE SOIL HYDRAULIC PROPERTIES.**

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Direct hit of rain drops on bare soil usually leads to progressive crusting and thus modification of surface soil structure (deterioration of hydraulic conductivity), whereas on even partially covered soil (plant residues) structure can be protected and maintained under the same conditions. Based on this main scheme, the evolution in time (4 years) of surface soil structure was studied on four maize plots, each one having the same initial surface structure but treated in a different way. At the end of 4 years the soil hydraulic properties were measured on each plot at several depths. The results clearly showed a treatment–related response in terms of surface structure, whereas the alternated top soil layer highly influenced the infiltration fluxes.

The use of a classical infiltration model allowed, by inversion, to derive the main hydraulic properties in each homogeneous soil layer (relation between soil water pressure ($h$) and volumetric water content ($\theta$) and relation between hydraulic conductivity ($K$) and volumetric water content ($\theta$)). As it was impossible to derive the properties of the crust layer of the uncovered surface with a single-layer infiltration model, an analytical double-layer model was developed. The latter model allowed to derive successfully the hydraulic properties of the very crust of the uncovered plots and to quantify their effects on infiltration and runoff.