Geophysical Research Abstracts
Vol. 12, EGU2010-14707-1, 2010
EGU General Assembly 2010


# How cultivation alleviates soil water repellency

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Prolonged droughts are still more frequent and last longer in Central Europe. Under high temperature and low water content, the wettability of organic substances, which cover soil particles, decreases and the infiltration process can be retarded or even entirely prevented. This phenomenon (usually called the soil water repellency - SWR) is very common in sandy soils, especially under natural-state vegetation (forests, grasslands). The objective of this study was to examine to what extent the SWR can be alleviated by sandy soil cultivation. Two study sites in Pannonian basin were selected; Sekule in south-western Slovakia and Őrbottyán in northern Hungary. Both have sandy soils with similar textural composition and elementary structure. They differ only by land use. The first is an untreated meadow while the other has been cultivated for decades and contains small after-fertilization residual amount of carbonates. As the reference material, pure aeolian sand with no organic matter from the Sekule study site was taken, since no SWR has been detected there. Infiltration tests under small positive pressure and comparative infiltration tests with water and ethanol under small negative pressure were performed on the three materials, after several prolonged dry seasons. The results show that, water infiltration is considerably retarded in both sandy soils, which contain organic matter (meadow and arable) when compared to the reference material. In arable soil the effect was partially alleviated by cultivation. One evident reason is the presence of residual after-fertilization carbonates in this soil. Carbonates on the one side enlarged the hydrophilic/hydrophobic surface ratio and on the other increased pH, which causes enhanced dissociation of carboxylic groups and by this way also overall hydrophilicity of soil organic matter. This assumption was proved by laboratory experiments with the meadow soil from Sekule, when after calcite addition into the soil the persistence of water repellency (WDPT) has decreased significantly. We assume that liming can be responsible for SWR alleviation.