



Organic compounds in hot–water-soluble fractions from water repellent soils

Irena Atanassova (1) and Stefan Doerr (2)

(1) N.Poushkarov Institute of Soil Science, Agrotechnology and Plant Protection, Sofia, Bulgaria; (i.d.atanassova@abv.bg),

(2) Department of Geography, Swansea University, Swansea, UK (s.doerr@swansea.ac.uk)

Water repellency (WR) is a soil property providing hydrophobic protection and preventing rapid microbial decomposition of organic matter entering the soil with litter or plant residues. Global warming can cause changes in WR, thus influencing water storage and plant productivity. Here we assess two different approaches for analysis of organic compounds composition in hot water extracts from accelerated solvent extraction (ASE) of water repellent soils. Extracts were lyophilized, fractionated on SiO₂ (sand) and SPE cartridge, and measured by GC/MS. Dominant compounds were aromatic acids, short chain dicarboxylic acids (C₄-C₉), sugars, short chain fatty acids (C₈-C₁₈), and esters of stearic and palmitic acids. Polar compounds (mainly sugars) were adsorbed on applying SPE clean-up procedure, while esters were highly abundant. In addition to the removal of polar compounds, hydrophobic esters and hydrocarbons (alkanes and alkenes < C₂₀) were extracted through desorption of complex colloids stabilized as micelles in dissolved organic carbon (DOC). Water repellency was completely eliminated by hot water under high pressure. The molecular composition of HWSC can play a critical role in stabilization and destabilization of soil organic matter (SOM), particle wettability and C dynamics in soils.

Key words: soil water repellency, hot water soluble carbon (HWSC), GC/MS, hydrophobic compounds