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# Influence of biofilms on the hydrophobicity of urban soils

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Hydrophobicity of bacterial surfaces has often been investigated up to now. But studies on the influence of bacteria or surface- attached bacteria (biofilms) on soil hydrophobicity are rare. Hydrophobicity is an important phenomenon in soil systems and is influenced by physical, chemical and biological factors. It has a great impact on agriculture and soil protection. Understanding the development of water repellent soils and in consequence the possibility of affecting soil hydrophobicity is an important scientific goal. It should help to influence the wettability of arid soils or reduce wettability of bogs.

In this study, we investigated the influence of hydrophilic and hydrophobic bacteria on soil wettability. Three different soil bacteria, Variovorax paradoxus, Bacillus sphaericus and an α- Proteobacterium, were investigated in different states (vegetative cells and spores in the case of Bacillus sphaericus). The bacteria, isolated from urban soils in the Berlin Tiergarten Park and from a sewage field (in Berlin-Buch), were grown in batch cultures to form biofilms on four different materials with hydrophobic and hydrophilic surfaces. Surface hydrophobicity was determined by water contact angle measurement applying the Wilhelmy-Plate technique and sessile drop method. Cell surface hydrophobicity of bacterial suspensions was measured using the zeta potential and hexadecane-two-phase-system (Rosenberg, 1990). Measurements of cell surface hydrophobicity yielded different contact angles for the bacterial isolates and allowed to classify them as hydrophilic, hydrophobic and amphiphilic. The influence of bacterial extracellular polymeric substances (EPS) on soil hydrophobicity was an-

alyzed in bioreactors with bacterial isolates and soil samples from the Tiergarten Park in Berlin. These soil samples were investigated concerning changes of wettability by contact angle measurement. Bioreactor experiments revealed microorganisms influencing soil hydrophobicity. Variovorax paradoxus and the α-Proteobacterium changed the viscosity of the soil samples.

Reference: Rosenberg, M. and R. J. Doyle.1990. Microbial cell surface hydrophobicity. ASM press. chapter 1, page 10-12