



Experimental Approaches for Investigating the Relationship between Soil Microbial Activity and Soil Surface Sealing

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The development of soil surface seals due to the impact of raindrops has considerable negative effects for agriculture (e.g. erosion) and environment (e.g. increased flood risk due to higher surface runoff). There is few knowledge on the role of soil biological activity for the breakdown of the surface crusts and the protection of the soil surface against sealing. Therefore more fundamental information on the interaction between soil biology and soil surface state is required to support the development of soil structure-preserving agricultural management practices.

The investigation of relationships between soil biology and soil surface sealing is a complex task and an interdisciplinary challenge for the soil sciences. In this presentation we give an insight to the field experimental approaches chosen for this purpose by the Dept. of Hydrology and Water Resources Management of Kiel University.

Three sites in Schleswig-Holstein (northern Germany) were selected for the investigation. The sites are characterised by different intensity of agricultural land use, i.e. conventional farming and organic farming. Soil surface conditions are monitored by digital image analysis. The activity of the soil enzymes acid phosphatase and beta-glucosidase as well as substrate-induced respiration are investigated as indicators of the biological state of the top 3 cm of the soil. Information on weather conditions, soil water content and matric potential contributes to the knowledge about the system and helps for interpreting the results. We present an overview on the experimental setup and show results of the first year of investigation which focused on separating the effect of local weather conditions and soil management practices on the enzyme activity as well as the potential of the imaging method for documentation of soil surface state.