



Soil phosphorus – new insights into a critical cycle across many soil functions

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The fate of phosphorus (P-) compounds in the soil – plant – water – system is linked with most soil functions such as productivity for agricultural crops, reactor for nutrient cycling, filter and buffer for water, and biodiversity. The P-compounds, mostly phosphates in a multitude of chemical bonds, may have contradicting influences on soil functions. For instance, P-concentrations may be suboptimal for crop yields but at the same time exceeding the soil filter/buffer capacity for water resources. Modern agriculture has increased this misbalance. Therefore, a better soil P management that balances all soil functions requires a deeper understanding of the P-cycling in the environment. The collaborative project “InnoSoilPhos” in the frame of the BonaRes-program of the German Federal Ministry of Education and Research (BMBF) aims at disclosing the chemical composition, biogeochemical transformations and microbiological fundamentals of P-cycling and P-transport processes across all relevant scales from atomic to catchment and landscapes. The contribution will give an overview on the project and some examples for the latest findings on P-reactions at mineral surfaces (experimental and theoretical), microorganism diversity involved in soil P-transformations, crop yield responses to P-fertilizer regimes (including new P-recycling products) and, finally, hot spots and hot moments of P-release from soils into adjoining freshwater systems. These findings allow some preliminary demands and frame conditions for an improved soil P management to better balance the soil functions and save the global mineable P resources.