Geophysical Research Abstracts
Vol. 17, EGU2015-6451, 2015
EGU General Assembly 2015

Rhizosphere Environment and Labile Phosphorus Release from Organic Waste-Amended Soils.

Thanh H. Dao

USDA-ARS, Beltsville Agricultural Research Center, Beltsville, United States (thanh.dao@ars.usda.gov)

Crop residues and biofertilizers are primary sources of nutrients for organic crop production. However, soils treated with large amounts of nutrient-enriched manure have elevated phosphorus (P) levels in regions of intensive animal agriculture. Surpluses occurred in these amended soils, resulting in large pools of exchangeable inorganic P (P_i) and enzyme-labile organic P (P_o) that averaging 30.9 and 68.2 mg kg^{-1}, respectively. Organic acids produced during crop residue decomposition can promote the complexation of counter-ions and decouple and release unbound P_i from metal and alkali metal phosphates. Animal manure and cover crop residues also contain large amounts of soluble organic matter, and likely generate similar ligands. However, a high degree of heterogeneity in P spatial distribution in such amended fields, arising from variances in substrate physical forms ranging from slurries to dried solids, composition, and diverse application methods and equipment. Distinct clusters of P_i and P_o were observed, where accumulation of the latter forms was associated with high soil microbial biomass C and reduced phosphomonoesterases' activity. Accurate estimates of plant requirements and lability of soil P pools, and real-time plant and soil P sensing systems are critical considerations to optimally manage manure-derived nutrients in crop production systems. An *in situ* X-ray fluorescence-based approach to sensing canopy and soil XRFS-P was developed to improve the yield-soil P relationship for optimal nutrient recommendations in addition to allowing in-the-field verification of foliar P status.