TECHNIQUES FOR ASSESSING PHOSPHORUS LOSS FROM SOILS OF VARYING TEXTURES FOR PROTECTION OF WATER QUALITY

Amanda N. Rodriguez, *and Vimala Nair*
Soil and Water Science Department, University of Florida, Gainesville, FL, USA

Excessive phosphorus (P) fertilizer application in agricultural production has resulted in P accumulation in soils, increasing the risk of P loss to surrounding waterbodies. Techniques that estimate soil storage and sorption characteristics are necessary to minimize this loss. Langmuir isotherms measure soil sorption characteristics, such as P bonding strength (K_L), equilibrium P concentration (EPC_0), and P sorption maximum (S_{max}). Soil P storage capacity (SPSC) estimates the maximum amount of P a soil can retain before posing an environmental risk. It is based on a threshold P saturation ratio (PSR) of 0.1 and is calculated as: SPSC = (0.1 – Soil PSR) * (Fe+Al) * 31 mg kg^{-1}. Phosphorus, Fe and Al concentrations were obtained in a Mehlich 3 solution, a common extractant in soil testing laboratories. The objective of this experiment was to evaluate potential P loss using isotherm parameters and soil test data for soils of varying textures ranging from sand to clay loam. Surface soil samples with varying P-impact levels and textural properties were collected from different locations (six from eastern and central US; five from Africa, India and Spain). Isotherm parameters, water-soluble P (WSP), PSR, and SPSC were determined for all soils. Low PSR values (<0.01) were found in high P-retentive foreign soils, likely due to the presence of poorly crystallized and crystalline Fe and Al oxides and high clay content. Consequently, SPSC values could not be calculated as a threshold value of 0.1 might not be accurate for these soils. All parameters (WSP, EPC_0, S_{max} and PSR) suggest that P loss from the sandy US soils in this study would result in greater P loss compared to the more P-retentive soils when applied at the same P rate.

PRESENTER BIO: Amanda Rodriguez is a first year Master's student in the Soil and Water Science Department at the University of Florida. Her research primarily focuses on the use of Langmuir isotherms to determine soil phosphorus sorption characteristics.