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Soil and Water Science Department Seminar

Speaker: **Biswanath Dari**
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Advisor: Dr. Vimala Nair and Dr. Rao Mylavarapu

Title: **Approaches for Predicting Soil Phosphorus Loss and Its Potential Remediation through Biochar Application**

Date: Monday, April 20, 2015

Time: 3:15 pm

Location: McCarty Hall A Room G186

Phosphorus (P) transported from agricultural fields via surface and subsurface flow results in eutrophication of aquatic systems. Equilibrium models used for predicting P loss from a site often use the Langmuir strength of P bonding, K_L, the Freundlich adsorption coefficient, K_F, or the linear adsorption coefficient, K_D obtained from traditional isotherms, as model input parameters. The purpose of this study was to develop a protocol that would allow the estimation of isotherm parameters from easily obtainable data without developing time- and resource-consuming isotherms. Another objective of the study was to evaluate the role of biochar in reducing P loss from soil. Soil samples obtained by horizon from six Ultisol and six Spodosol sites were used for estimating "K" values from P, Fe and Al in a soil test solution. Two types of commercially available biochar – from hardwood and poultry litter feedstock – were added at three rates to two soils with different P retention capacities. The P saturation ratio (PSR) and the soil P storage capacity (SPSC) were the two approaches used in the study for fulfilling the objectives. The PSR, SPSC, K_L or K_F or K_D or S_{max} were determined for all soils and regression equations among various isotherm parameters and PSR and SPSC evaluated and validated using soils data from other sites. The relationship between predicted and determined parameters was significant suggesting that soil test data can be used to provide isotherm parameters. For the biochar study, after certain limits of P addition, corresponding to the threshold PSR, P began to be released from the soils irrespective of the nature of the biochar. The S_{max} of the soil, however, increased with increasing biochar addition. A significant implication for biochar-amended sandy coastal plain soils is that P retention is controlled by soil components rather than biochar at low and environmentally relevant P solution concentrations. However, biochar enhances P adsorption at higher concentrations such as could occur with heavily P amended soils.

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