

Soil and Water Science Department Seminar

- Speaker:** **Jianru Shi**
M.Sc. Thesis Degree Candidate
- Advisor:** Dr. George O'Connor and Dr. Ann Wilkie
- Title:** **Land Application as a Reuse Method of Cellulosic Ethanol Residuals**
- Date:** Monday, May 18, 2015
- Time:** 3:15 pm
- Location:** McCarty Hall A Room G186



Biofuel (bioethanol) systems are rapidly developing as alternatives to traditional fossil fuels and are projected to generate large amounts of waste residuals. To determine the feasibility of land application as a reuse method of these residues, a representative cellulosic ethanol residual (CER) produced at the Stan Mayfield Biorefinery Pilot Plant (Perry, FL) was investigated. A literature review provided background information about the production of cellulosic ethanol residuals, and indicated that cellulosic ethanol residuals can have characteristics that both promote or inhibit its land application. A characterization study showed that the Perry CER has moderate nutrient levels and minimal toxic metals hazard, which promotes its land application. However, the high water soluble P content (72% of total P) of CER raised environmental concerns about water quality degradation. The agronomic value of CER was evaluated in a 120-day soil incubation study. All CER $\text{NH}_4\text{-N}$ (~50% total N) was nitrified to $\text{NO}_3\text{-N}$ within 40 days, whereas the CER-associated organic N contributed to a stable organic N pool in amended soil. A field-based study investigated potential P leaching problems associated with land application of CER for growing elephant grass (*Pennisetum purpureum*). By-depth soil samples taken from CER amended plots and control plots were analyzed for soil P storage capacity (SPSC) and water extractable P (WEP), but showed no treatment effects after two years of CER land application. Drainage waters collected by lysimeters indicated minimal P contamination in drainage from both CER amended and control plots. Collectively, the data suggest that land application is a feasible reuse method of CER. However, decisions about how best to reuse other cellulosic ethanol residual materials should carefully consider residual characteristics (especially pretreatment methods used) and the balance between nutrient supply and crop demand.

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