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Soil and Water Science Department Seminar

Speaker: **Dr. Wendy Mussoline**
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Title: **Multifaceted Approach for Bioenergy Recovery from Industrial Sweetpotatoes**

Date: Monday, February 22nd

Time: 3:00 pm

Location: McCarty Hall A, Room G186

The sweetpotato (*Ipomoea batatas L.*) is a starch crop known for its high productivity on low-quality, arable lands and minimal demands for fertilization and irrigation. An industrial sweetpotato variety (CX-1) with biofuel potential is currently being considered as an alternative crop for citrus lost to greening. The CX-1 was selected for ethanol production because of its large roots with high dry matter (DM) and elevated starch content. During a two-year agronomic field trial conducted at the Energy Research and Education Park in Gainesville, Florida, the CX-1 was grown alongside two common table varieties, namely Hernandez and Beauregard. Average root yields (dry tonne/acre) over the two years were highest for the CX-1 (3.3) compared to Hernandez (1.8) and Beauregard (2.4) varieties. Starch content (% DM) was also highest for the CX-1 (69) compared to Hernandez (57) and Beauregard (57), which would theoretically yield 350 gETOH/kg dry root for the CX-1. No significant starch losses were observed in the CX-1 root after six months of storage at room temperature suggesting that this crop could be utilized year-round as a feedstock for ethanol production.

In addition to the roots, value-added agronomic co-products including the aerial vines and root culls contribute a substantial fraction of the overall crop yield. Average vine yields (dry tonne/acre) over the two-year period were highest for the CX-1 (2.9) compared to Hernandez (2.2) and Beauregard (1.3), amounting to nearly 50% of the entire biomass produced by the CX-1 crop. The cull rate averaged 39% of the total CX-1 root yield over the two years. Along with the agronomic co-products, the distillery waste (aka stillage) produced during the fermentation of the roots is also a readily available feedstock for methane recovery via anaerobic digestion. The methane yields for each of the three organic feedstocks, namely the aerial vines, culls, and stillage were determined using anaerobic batch assays under mesophilic conditions. An overall energetic mass balance incorporating the potential methane recovery from the co-products and their respective agronomic yields demonstrates that sufficient energy could be recovered from the co-products to meet the energy demands required for the conversion of CX-1 sweetpotato roots into ethanol. The energy recovery from the co-products not only reduces the need for fossil fuels and associated greenhouse gas emissions, but also promotes the CX-1 sweetpotato as a potential new feedstock for advanced biofuels in Florida.

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