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UF/IFAS
Soil and Water Sciences Department

2181 McCarty Hall A
PO Box 110290
Gainesville, FL 32611-0290
352-294-3151
352-392-3399 Fax

Soil and Water Sciences Department
Graduate Student Exit Seminar

Speaker: **Steve Jennewein**
Ph.D. Degree Candidate

Advisor: Dr. Samira Daroub & Dr. Jehangir Bhadha

Title: **Determining Management Effects on Soil Gas Flux, Microbial Biomass, and Crop Yield to Identify Sustainable Practices in the Everglades Agricultural Area**

Date: Monday, May 15, 2017

Time: 3:00 pm – 4:00 pm

Location: McCarty Hall A, Room G186

Sustainable agricultural production in the Everglades Agricultural Area (EAA) is confounded by decreasing soil depth and high annual rainfall. This study was conducted to determine the effects of tillage, water-table, and N fertilizer on sugarcane yield, soil nutrient cycling, microbial biomass, and greenhouse gas (GHG; CO_2, N_2O, and CH_4) emission. A lysimeter study examining water-table, soil depth, and fertilizer along with a field trial examining tillage regime were carried out to determine management practices for agricultural sustainability and reduced oxidation rates of organic soil. The lysimeter trial utilized soil depths of 13 cm and 25 cm, water tables of constant and periodically flooded, and N fertilizer rates of 0 kg ha^{-1} yr^{-1} and 168 kg ha^{-1} yr^{-1}. The field trial utilized tillage regimes of increasing invasiveness from no-tillage, minimal-tillage, reduced-tillage, to conventional-tillage. In the lysimeter study, periodic flooding, deeper soil, and application 168 kg ha^{-1} yr^{-1} significantly improved sugarcane yield. Application of N fertilizer led to higher CO_2 emission, N_2O emission, and aerenchyma development. Periodic flooding increased soil sequestration of N_2O, microbial biomass, and plant uptake of Mn, Si, and B. High rates of N_2O emission in the 13 cm soil depth following N application denote the need for additional applications to increase efficiency. In the field trial, no-tillage and minimal-tillage regimes decreased CO_2 emission and increased soil sequestration of N_2O. Growing crops in the EAA subjected to periodic flooding and without extensive soil cultivation can assist in sustainable production. Yield increases associated with additional N indicate that there may be a need to develop rate recommendations for shallow Histosols. Soil depth was a major factor impacting sugarcane yield, morphology, nutrient uptake, along with soil CO_2 emission,N_2O emission, and microbial biomass. Reducing tillage and periodic flooding of organic soils may not only be beneficial to sugarcane yields, but also reduce oxidation of organic soils to aid in agricultural sustainability.

For our off-campus students, off-campus faculty, and on-campus students who cannot attend, this seminar can be viewed via live or watched at a later date via this link: Steve Jennewein. In addition, all seminars are archived for viewing on our SWSD Seminar Page.