

## Soil and Water Science Department Seminar

**Speaker:** **Amanda Hirst**  
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**Advisor:** Dr. Gurpal Toor & Dr. Craig Stanley

**Title:** **Reducing Nitrogen Loading from Onsite Wastewater Systems to Shallow Groundwater: *Design and Performance Evaluation of Two-Stage Biofiltration Systems***



**Date:** Monday, November 9th

**Time:** 3:00 pm

**Location:** McCarty Hall B, Room G086

Onsite wastewater systems (OWS), commonly known as septic systems, are an important source of nitrogen (N) in Florida's shallow groundwater. Our objective was to design and evaluate biofiltration systems to remove N before effluent dispersal in the drainfields. This was achieved by designing four two-stage systems for promoting nitrification followed by denitrification. Nitrification biofilters included expanded clay or clinoptilolite media and denitrification biofilters included elemental sulfur (S) or lignocellulosic media. Samples were collected bi-monthly from various points in the treatment train (septic tank effluent, after nitrification and denitrification biofilters) from May 2010 to June 2011. Mean concentration of total N (TN) in the septic tank effluent was  $58 \pm 19.9$  mg/L, which decreased to  $43 \pm 20.1$  mg/L after effluent passed through nitrification biofilters and to  $12 \pm 14.3$  mg/L after denitrification biofilters. Most of the N leaving the four nitrification biofilter was nitrate/nitrite ( $\text{NO}_x\text{-N}$ ;  $40 \pm 19.7$  mg/L), with small amount of total organic nitrogen (TON;  $3 \pm 0.8$  mg/L). In other words, nitrification biofilters nitrified >99% ammonium-N suggesting that OWS can use either expanded clay or clinoptilolite media. Total N concentrations leaving two lignocellulosic denitrification biofilters were up to TN  $20 \pm 15.2$  mg/L as compared with only  $2 \pm 0.8$  mg/L in two S denitrification biofilters. The four denitrification biofilters consistently removed >76%  $\text{NO}_x\text{-N}$ . Based on these results, we designed both in-tank and in-ground passive two-stage biofiltration systems using S denitrification biofilter, which is recommended for reducing N loading from OWS to shallow groundwater.

For our off-campus students, off-campus faculty, and on-campus students who cannot attend, all seminars can be viewed at: <http://mbreeze.ifas.ufl.edu/seminars>. In addition, all seminars are archived for viewing at <http://soils.ifas.ufl.edu/academics/seminars.shtml>