UF/IFAS
Soil and Water Sciences Department

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Soil and Water Sciences Dept. Invited Speaker Seminar

Speaker: **Dr. Elisa D'Angelo**
Associate Professor
Dept. of Plant & Soil Sciences
University of Kentucky

Title: **Explorations in Biogeochemical Research by an UF SWS Alumna**

Date: Thursday, April 27th

Time: 9:30 am – 10:30 am

Location: 3177 McCarty Hall A

Antibiotics are commonly prescribed at therapeutic levels to treat bacterial infections in people and animals, and are also fed at sub-therapeutic levels to stave off infections in livestock. Up to 90% of ingested antibiotics are excreted by people and animals, so many types of antibiotics are found at elevated concentrations in treated sewage sludge (biosolids) at municipal wastewater treatment plants and livestock manure. Because biosolids/manures are often applied to soils to improve soil fertility, the potential exists for these materials to have unintended consequences, such as promoting antimicrobial resistance and adversely affecting the growth/reproduction/activity of terrestrial and aquatic organisms. Hazard risks are largely dictated by the fraction of total antibiotic in the solid phase that can be released to the solution phase (labile antibiotic), its diffusion coefficient, and sorption/desorption exchange rates in biosolids/manure particles. In this study, these processes were evaluated for ciprofloxacin (CIP) in a Class A Exceptional Quality Biosolids using a novel type of diffusion gradient in thin films (DGT) sampler that continuously removed CIP from solution, which induced desorption and diffusion in biosolids. Mass accumulation of antibiotic in the sampler over time was fit by a diffusion transport and exchange model available in the software tool 2D-DIFS to derive the distribution coefficient of labile CIP (K_{dl}) and sorption/desorption rate constants in the biosolids. The K_{dl} was 13 mL g^{-1}, which equated to 16% of total CIP in the labile pool. Although the proportion of labile CIP was considerable, release rates to solution were constrained by slow desorption kinetics (desorption rate constant=4×10^{-6} s^{-1}) and diffusion rate (effective diffusion coefficient=6×10^{-9} cm^2 s^{-1}). Studies are underway to investigate how changes in temperature, water content, pH and other physical and chemical characteristics can influence release kinetics and availability/mobility of other antibiotics and biosolids/manures- and -amended soils.

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

For additional details about Dr. D'Angelo's visit, please contact Dr. George O'Connor (gao@ufl.edu).