

**Soil and Water Sciences Department
Graduate Student Exit Seminar**

- Speaker:** Harmanpreet Sidhu
Ph.D. Degree Candidate
- Advisor:** Dr. George O'Connor
- Title:** Risks from Biosolids-borne Ciprofloxacin and Azithromycin
- Date:** Monday, April 2nd
- Time:** 3:00 pm – 4:00 pm
- Location:** McCarty Hall A, Room G186

Ciprofloxacin (CIP) and azithromycin (AZ) are commonly prescribed antibiotics for various infections in humans and are, consequently, frequently detected in biosolids. Ecological and human health risks from biosolids-borne CIP and AZ are not well understood, but necessary for formulating policy on safe use and management of biosolids. A project funded by Water Environment & Reuse Foundation (WE&RF) was designed to identify and fill various data gaps in the fate of biosolids borne CIP and AZ and to facilitate a scientifically sound ecological and human health risk assessment. Data from a batch equilibration retention/release study formulated our central hypothesis that the limited bioaccessibility of strongly sorbed biosolids-borne CIP and AZ minimizes human and environmental health risks. Bioavailability of biosolids-borne CIP and AZ was assessed in subsequent organism response (plant, earthworm, and microbial systems) studies and (where applicable) correlated with chemical bioaccessibilities. The organism response data revealed limited bioavailability (plant BAF values 0.01 (CIP) and 0.1 (AZ), deputed earthworm BAF values ~4 (CIP) and ~ 7 (AZ), minimal impacts on overall microbiota) of the biosolids-borne antibiotics under environmentally relevant scenarios. The data generated herein, and environmentally relevant data collected from pertinent literature, were utilized in a scientifically sound ecological and human health risk assessment. Human and ecological exposure hazards were identified, and potential adverse effects associated with CIP and AZ in land-applied biosolids were assessed using the World Health Organization developed integrated risk assessment (IRA) framework. The tiered IRA, consistent with our hypothesis, estimated negligible risks from biosolids-borne CIP and AZ under real-world based biosolids management practices. Even unrealistically high exposures from land application of biosolids pose minimal human and ecological health risks. Preliminary pollutant limits, calculated based on the most sensitive organisms, suggest that long term real-world based land application of biosolids is without appreciable human and ecological health risks. Chemical load tracking is only required for some biosolids that contain greater than 12 mg CIP/kg and 2.2 mg AZ/kg. The IRA needs refining by including more data, especially on biosolids-borne antibiotic resistance, before it is appropriate to suggest modifications to current land-application regulations.

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: [Harmanpreet Sidhu](#). In addition, all seminars are archived for viewing on our [SWSD Seminar Page](#).