

Soil and Water Sciences Department Graduate Student Exit Seminar

- Speaker:** Nasiru Danmowa, Ph.D. Degree Candidate
- Advisor:** Dr. Peter Nkedi-Kizza (Chair) and Dr. Jim Jawitz (Co-Chair)
- Title:** **Fate and Transport of Nitrogen Forms, Phosphorus and Pesticides in Soils from Florida and Nigeria**
- Date:** Monday, February 27, 2017
- Time:** 3:00 pm – 4:00 pm
- Location:** McCarty Hall A, Room G186



Feeding the rapidly growing world population and the dwindling soil fertility require efficient use of fertilizers and pesticides. The interactions of these chemicals with soils is of research interest since their impact on human health depends on our understanding of their fate and transport in the environment. Therefore, experiments were carried out in the laboratory and in the field, to study the behavior of nitrogen and phosphorus fertilizers, and atrazine in soils used for sorghum cultivation. The soils were from the semiarid tropics (Sokoto, Nigeria) and the humid subtropics (Citra, Florida). Soils from both regions were sandy, low in organic matter and CEC, but had optimum pH for sorghum production. Using Mehlich-3 (M3) soil test, Nigerian soils were deficient in Boron and Phosphorus, and contained more [Ca + Mg] than [Fe + Al]. In batch sorption experiments, Atrazine and P were found to undergo sorption kinetics in all soils. The kinetics data were described by the Two Site Nonequilibrium (TSNE) model. The sorption equilibrium data were described by the Freundlich isotherm. Although Atrazine was weakly sorbed in all soils, P was strongly adsorbed. Mehlich-3 and water extracted P were used to calculate the Phosphorus Saturation Ratio (PSR) as an index of P leaching in the soils from Nigeria. For these soils PSR was calculated using [Ca + Mg] or [Ca + Mg + Fe + Al] as the major P-adsorbing cations. Atrazine extraction efficiency from soils using methanol and water (80:20) was predicted by the Solvophobic theory and was used to calculate the degradation rate coefficients. Atrazine degraded faster in Florida soils than in the Nigerian soils ($t_{1/2}$ 22 days versus 61 days). Data from saturated water flow soil column leaching experiments of Atrazine, N and P in a mixture of fertilizers (NPK) and hydrophobic organic pesticides (Imidacloprid+Imidacloprid-urea+Atrazine) demonstrated that sorption parameters in the mixture can be used to simulate Atrazine transport, but not P. The transport data for NO_3^- and NH_4^+ were described by the convective-dispersive (CD) model and Atrazine and other pesticides by the TSNE model. However, P data were only described by the TSNE model that incorporated an irreversible sink term. An experiment for the N-fertilizer trial at Citra during sorghum cultivation revealed that most of the applied N is leached out of the root-zone shortly after application. Nitrogen uptake efficiency was higher in treatments with lower N-application rates. Fertility and pesticide management strategies for both regions will be discussed.

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