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1. Accession	Agency Identification No.	5. Work Unit/Project No.	6. Status
0224251	2. NIFA 3. LA.B	**LAB94074**	**Annual Report**

7. Title

Mobility and Reactivity of Applied Agricultural Chemicals in Louisiana Soils

12. Investigator Name(s) (Last Name and Initials)

Selim, H. M.

20. Termination Date 09/30/2015

40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011

Outputs:

This project generated results in the form of two book chapters, five journal articles and two proceedings. The use of a simple averaged affinity coefficinet to represent metribuzin retention over an entire growing season is valid. This information is a prerequisite in predicting the role of the sugarcane residue on the mobility and leaching losses of atrazine in soils grown to sugarcane in Louisiana and elsewhere.

Outcomes/Impacts:

Batch methods were used to quantify adsorption and desorption of metribuzin by the sugarcane mulch residue over a wide range of input concentrations and reaction times. Desorption was carried out after 1 and 21 d adsorption which was followed by methanol extraction. Metribuzin retention by the residue exhibited linear adsorption where the partitioning coefficient (Kd) increased over time. Adsorption-desorption exhibited strong hysteresis indicative of time-dependent retention. The extent of hysteresis and nonextracatble or residual amounts increased as the time for adsorption increased. A multireaction model (MRTM) provided a good description of the time-dependent adsorption and desorption behavior for all input concentrations. Based on measured Kd values, metribuzin retention by the residue did not change significantly with the age of the decaying residue. Metribuzin breakthrough results from soil column (miscible displacement experiments) indicated high mobility of metribuzin in residue-amended Sharkey and Commerce soil columns. Metribuzin BTCs exhibited gradual release during leaching as well as significant responses to flow interruption and were well described using the MRTM model. A major finding from this work is that metribuzin retention by the sugarcane residue with time of decay was not observed.

Publications:

Elbana, T. A. and H M. Selim. 2011. Copper Mobility in Acidic and Alkaline Soils: Miscible Displacement Experiments. Soil Science Society of America J. 75:2101-2110.

Jeong, C. J. and H. M. Selim. 2011. Adsorption-Desorption Kinetics of Imidacloprid in Soils: Influence of Phosphate. Soil Science 176:582-588.

Delaune, R. D. and H. M. Selim. 2011. Environmental Applications of Nanoscale and Microscale Reactive Metal Particles. Book Review. J. Environ. Quality 43:1683.

Selim, H. M. and B. J Naquin. 2011. Retention of Metribuzin by Sugarcane Residue: Adsorption-Desorption and Miscible Displacement Experiments. Soil Science 176:508-517.

Bengtson, R.L. and H.M. Selim. 2011. Impact of sugarcane residue management strategies on water quality and crop yield. ASABE Paper No. 11-10530. St. Joseph, MI. ASABE.

Selim, H. M. 2011. Layered Soils, Water and Solute Transport in Verlag. Encyclopedia of Agrophysics, Springer; pp 414-421.

Selim, H. M.,K. Zhao, Eric Ferguson, Tamer A. Elbana. 2011. Miscible Displacement of Zn in Soil Transport Columns: Influence of Phosphate. Proceedings of the 11th ICOBTE, Florence, Italy, July 4-7, 2011, pp. 1-2.

Selim, H . M. 2011. Nonlinear Behavior of Heavy Metals in Soils: Mobility and Bioavailability. In Dynamics and Bioavaikability of heavy metals in the rootzone. Selim, H. M. Ed. CRC Press, Boca Raton, FL, P. 1-36.

Zhang, H. and H M. Selim. 2011. Second-order modeling of arsenite transport in soils. J. Contaminant Hydrology 126:121-129.

Participants:

M. Selim (PI), LSU AgCenter.

Target Audiences:

Professional soil scientists and herbicide companies.

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date