

abstract book



Society of Environmental Toxicology and Chemistry North America 33rd Annual Meeting

Catching the Next Wave: Advancing Science Through
Innovation and Collaboration

Long Beach Convention & Entertainment Center, Long Beach, California
11–15 November 2012



Agricultural Products Quality Management Service sets the PHRL for the purpose of assuring agricultural product safety in the production stage. Furthermore, it evaluates the safety of agricultural products in the production stage according to the PHRL, investigates the amount of pesticide residues sprayed during the pre-harvest period, predicts the amount of pesticide residues at the time of harvest by computing the biological half-life and the decay constant, and prevents the distribution of unsuitable agricultural products that may exceed the MRL.

MP248 Ecotoxicological tests to evaluate the acute toxicity and increase of biomass of earthworms acclimated in fresh and vermicomposted organic residue L.B. Pigatin, IQSC-USP / IQSC; F. Benetti, A. dos Santos, L. Mendes, M. Kanashiro, R. Rachide, M. Landgraf, M. Rezende, IQSC-USP.

The final destination of agroindustrial organic residues is an eminent environmental problem in the world. The carbon applied through organic residues can lead to inadequate soil-atmosphere dynamics and favor mechanisms that negatively influence climate change. The organic material applied to the soil may find conditions that favor its decomposition, emitting a large amount of CO₂ into the atmosphere and, along with other gases, increasing the greenhouse effect. Vermicomposting is an ecologically alternative to the final disposition of organic residues. This work evaluates the acute toxicity and increase of biomass of earthworms *Eisenia fetida* acclimated in fresh and vermicomposted organic residue (filter cake). The earthworms were used as a bioindicator in the impact evaluation of application of the fresh and vermicomposted filter cake in the soil. The tests for evaluation of the acute toxicity were based on ISO 11268-1 and ISO 11268-2. Experiments were conducted in São Carlos city, SP, Brazil. The experiment factorial design was 2x3x5, 2 different treatments applied in 3 different doses and tests were conducted in quintuplicate using a native Oxisol. The treatments were: FFC (soil+fresh filter cake) and VFC (soil+filter cake vermicompost). Equivalent doses applied in the soil were: 0.5, 1.0 and 3.0% of the soil mass (500 g), and 0% for control. Humidity was maintained at 60% and 10 adult earthworms were added in each pot. To evaluate the acute toxicity and increase of biomass the earthworms were counted and weighed with 0, 7 and 14 days. The filter cake was obtained from the sugar and ethanol industries. The wet residues were subjected to the vermicomposting for during 6 months. The results demonstrated that the initial matrices (FFC and VFC) presented no acute toxicity for the earthworms. The earthworms presented an increase of biomass during the first 7 and 14 days. However for the fresh residue the increase of biomass was greater indicating that fresh filter cake provides more labile carbon as a source of nutrients for the earthworms. After 7 and 14 days treatment FFC showed 32.07% and 44.77% of biomass gain over the control. While after 7 and 14 days treatment VFC showed 14.64% and 23.96% of biomass gain over the control, both in its maximum dosage. The results showed that the treatments did not cause a harmful effect on the earthworm.

MP249 Fate and effects of clothianidin in agricultural fields C. de Perre,

B. Hanson, W. Hanson, M. Lydy, Southern Illinois University. Neonicotinoids are systemic insecticides that have been under recent scrutiny due to their suspected toxicity to non-target species, including honey bees. The objectives of this project were to evaluate tillage use and treatment concentrations on the fate of clothianidin, a neonicotinoid insecticide, on fields with corn/soybean annual rotation. In order to better understand persistence and transport of neonicotinoids, soil, run-off sediments, infiltration water, and ground water samples were collected throughout two farming seasons. The planting event occurred in 2011 with corn seeds coated with clothianidin at two concentrations and the fate and transport of clothianidin was monitored for two years. The field was split in three parts where two underwent low-till processes (Aerway and Turbo till) and the third one underwent no vertical tillage. Clothianidin was detected in almost all soil samples, including the ones collected a year after planting, showing persistence of this compound in soil. Clothianidin concentrations in soil and water samples will be discussed in an attempt to correlate seed coating rate and tillage use to the fate and transport of this compound. In order to evaluate the effects of clothianidin at field concentrations, laboratory acute toxicity tests have been performed on several non-target species including the aquatic amphipod (*Hyalella azteca*), microcrustacean (*Daphnia magna*), midge (*Chironomus dilutus*), fathead minnow (*Pimephales promelas*), earthworm (*Eisenia fetida*), and duckweed (*Lemna minor*). The median lethal concentrations (LC50, concentrations that results in 50% organism mortality) and the median effective concentrations (EC50, concentrations that results in 50%

affected organisms) have been calculated for each species tested. Clothianidin was shown to have no significant effect on *Lemna minor* growth at concentrations up to 1000 µg/L. Acute LC50 values were in the same range for *Hyalella azteca* and *Chironomus dilutus*, 55 and 26 µg/L, respectively. The LC50 and EC50 values for each species will then be compared to soil and water concentrations of clothianidin measured in the field to assess the environmental risk of this insecticide.

MP250 Fate of a transgenic insecticidal protein, a pyrethroid insecticide, and neonicotinoid insecticides within a maize agricultural ecosystem S. Mueting,

Southern Illinois University Carbondale / Department of Zoology, Southern Illinois University Carbondale / graduate student; M. Lydy, Southern Illinois University Carbondale / Fisheries and Illinois Aquaculture Center and Department of Zoology, Southern Illinois University-Carbondale / Fisheries and Illinois Aquaculture. With the increasing prevalence of transgenic crops used in combination with other insecticides, the ultimate fate of these pesticides is critical to understanding potential effects to non-target species. Concentrations of Cry1Ab, a transgenic insecticidal Bt protein used in maize; tefluthrin, a pyrethroid insecticide; and thiamethoxam and clothianidin, neonicotinoid insecticides used as a seed coating were measured in soil, runoff water, groundwater, and soil pore water before, during, and after maize planting for two years. A 90 acre farm in Christian County, IL was divided into separate non-Bt and Bt fields with three different rates of tefluthrin applied in replicate strips in both fields. Samples were analyzed for Cry1Ab using enzyme linked immunosorbent assays; for tefluthrin, samples were analyzed using GC-ECD; and for neonicotinoids, samples were analyzed using HPLC-DAD and HPLC-UV. In 2010, 100 soil and 150 water samples were processed for all three insecticides; and in 2011, 140 soil and 125 water samples were processed. Cry1Ab proteins were found in soil at low concentrations throughout the growing season in soils collected from the Bt field. Only a few soil samples collected from the non-Bt field contained Cry1Ab. Runoff water samples from both fields frequently contained Cry1Ab and were at the highest concentrations of any water samples. Groundwater and soil pore water often did not have detectable concentrations of Cry1Ab. Tefluthrin was detected at the highest concentrations in soil samples, and was, in general, not found to be transported by water. Neonicotinoid seed coating compounds were detected in water and soil samples throughout the growing season with the highest concentrations found in soil pore water samples. Concentrations of all three pesticides were low or near the reporting limit before planting indicating that most of the chemicals and proteins have been metabolized or broken down in the environment before the next growing season. While Cry1Ab proteins were not found in environmental matrices at ecologically relevant concentrations, tefluthrin and neonicotinoids often were detected at or above documented LC50 literature values during the growing season.

MP251 Influence of the presence of vermicompost in the toxicity of glyphosate on *Eisenia foetida* earthworms F. Benetti, L. PIGATIN, L.

Mendes, M. Kanashiro, A. dos Santos, R. Nunes, M. Landgraf, M. Rezende, IQSC-USP. Earthworms are used as bioindicators for evaluation of soil contamination, because they ingest large amounts of soil, accumulating pollutants and recycling nutrients in this compartment. The objective of the study was to evaluate the influence of the presence of vermicompost (from filter cake and cattle manure) in the biomass and glyphosate toxicity to *Eisenia foetida* earthworms. The acute toxicity tests were performed according to ISO 11268-1 and 11268-2. All assays were performed with five replicates, each result is the arithmetic mean of these replicates. Fifteen pots were assembled: five control pots (500 g of soil – sandy silty fine to medium dark brown with organic matter), five pots with 500 g of soil and 10 mL of 10,000 mg kg⁻¹ of glyphosate solution (Glyphosate 480 A KB – Kelldrin®) and five pots of soil, 15 g of vermicompost and 10 mL of glyphosate solution. In each pot, the humidity was maintained at 60% and 10 adults earthworms were placed. For biomass and acute toxicity monitoring, earthworms were weight on days 0, 7 and 14. Compared to control, after seven days, in the experiments with no vermicompost, a 21% decrease on biomass and 4.2% decrease on mortality were observed. On the other hand, in the experiments with addition of vermicompost, a gain of 3.5% on biomass and a growth of 8.3% were observed. After fourteen days, compared to control, the same behavior was noticed: to experiments with no vermicompost, a loss over 8.3% of biomass and 8.2% of mortality were observed. In the experiments with addition of vermicompost, a gain of 24.8% on biomass and a growth of 6.2% were observed. It is worth to notice that the presence