

Independent project/Master degree project

Subject: Environmental Science, Soil Science

Level: D, E

Credits: 30 hp

Title: Influences of catchment characteristics and compound properties on pesticide losses through fast flow processes

A better understanding of the dominant loss pathways for pesticides on a catchment scale is important for the development of efficient mitigation practices. Field experiments show that the major pesticide losses to streams occur through surface runoff and preferential flow to tile drainage systems during the first significant discharge events after pesticide application. Such leaching events should be reflected in the dynamics of pesticide losses on the catchment scale. However, on a catchment scale, the dynamics of pesticide losses are complicated by for example multiple application dates, non-uniform precipitation within the catchment and differences in residence times for water and pesticides entering the catchment at different locations.

A method for analysing the effects of fast flow processes on pesticide losses based on hydrograph separation was suggested by Leu et al. (2010). This method overcomes some of the above mentioned complicating factors. The hydrograph (data on discharge over time) can be separated into two components: A base flow component (low pesticide concentrations) resulting from ground water recharge and a fast flow component (high pesticide concentrations) resulting from surface runoff and preferential flow to tile drainage systems. Leu et al. (2010) showed that the relative losses of two pesticides were linearly dependent on the fast flow volumes during the time period after pesticide application.

The Department of Soil and Environment in cooperation with the Centre for Chemical Pesticides (CKB) maintains a large database on pesticide monitoring data from four Swedish catchments. This database contains daily discharge data, data on pesticide usage and weekly data of pesticide concentrations in the catchment effluents for a large number of substances. These data show a large variation in pesticide losses between years.

- Can the large variation in pesticide losses between years be explained by differences in fast flow volumes during the leaching periods?
- Do the four catchments behave differently regarding losses through fast flow?
- Do different pesticides behave differently?

The objectives of this project are i) to examine the relationship between yearly fast flow volumes and the relative losses of pesticides for the four Swedish monitoring catchments using the methods suggested by Leu et al. (2010) and ii) relate the observed differences in pesticide behaviour to catchment characteristics and pesticide properties.

Contacts:

Mats Larsbo, Assistant professor, Division of Biogeophysics and Water Quality,
Department of Soil and Environment, SLU.

Email: Mats.Larsbo@slu.se, phone: 018-671238

Stina Adielsson, Division of Biogeophysics and Water Quality, Department of Soil and
Environment, SLU.

Email: Stina.Adielsson@slu.se, phone 018-672435