

Pesticide impact: Comparing lab, field-scale results

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Assessing the environmental risk of pesticide use is an important, complex task that requires knowledge of the equilibrium sorption parameter. This helps researchers assess the risk of pesticides leaching into groundwater. For cost-effective assessments, this is usually determined through batch experiments that find the amount of pesticide in test soils as a function of concentration at a constant temperature. These experimental conditions differ considerably from real-world conditions. Thus, the validity of the data collected using this method is widely debated.

Recently, scientists from Germany and New Zealand evaluated parameters from different experiments that used the same pesticides and soils. Using this data, scientists analyzed the relationships between flow velocities of [soil](#) water, the residence time of the pesticides in the soil and the sorption parameters. Results from the study were published in the May-June 2011 issue of the [Journal of Environmental Quality](#).

Scientists found that the range of sorption constants increased with increasing water velocity. Only for water velocity values lower than 35 mm/day, the range of sorption constants was between zero and one. Typically, these values have been obtained in field-scale experiments run under unsaturated flow conditions using undisturbed soil columns. The scientists showed that replacing equilibrium constants obtained from standard measurement protocols for pesticide registration purposes would lead to misinterpretation of the data. Experiment operation times greater than one day, with a typical duration of several days to weeks, yield the most realistic results.

According to the authors, it is also important to consider sorption and desorption kinetics. The movement of pesticides into a soil matrix was found to depend strongly on the amount of accessible sorption sites, which is determined by

soil water content and [soil structure](#). An understanding of this movement will require experimental protocols that take soil structure and soil moisture content into account when researching the impact of [pesticides](#).

More information:

www.agronomy.org/publications/...q/abstracts/40/3/879

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