

ENVIRONMENTAL FATE AND BEHAVIOR



Get accurate, defensible data on the behavior of agrochemicals in the environment to support rapid development and registration of your products. Battelle brings extensive regulatory experience and analytical expertise to help you fully understand your risks and accelerate global registration (EU, EPA, and JMAFF).

We can conduct single studies or manage your entire programme, including dossier preparation and submission. We have the equipment and expertise to conduct both standard, GLP-compliant studies for regulatory purposes and complex custom studies to meet your unique needs.

AEROBIC AND ANAEROBIC TRANSFORMATION IN SOIL AND IN AQUATIC SEDIMENT SYSTEMS

Save time and money with pre-development early screening for registerability and full GLP studies. Battelle's custom-made glassware offers flow-through and static designs. Test systems are incubated in our temperature-controlled light-free rooms.

AEROBIC MINERALIZATION IN SURFACE WATER (OECD 309)

Understand the persistence of chemicals at low dilution in large water bodies, particularly the rate at which they become mineralized (fully degraded to CO₂).

ADSORPTION/DESORPTION

We offer both standard design studies (HPLC method according to OECD121 or full batch equilibrium study according to OECD106) and higher-tier (aged desorption) studies designed to refine groundwater risk assessments.

LEACHING AND AGED LEACHING

Get a more realistic insight to the leaching potential of your products. Our studies can follow the formation and movement of metabolites or show restricted leaching under simulated use conditions.

SOIL DISSIPATION

Get accurate, detailed information on products that degrade slowly in soil under laboratory conditions. Both small-scale studies with radiotracers and large programs with non-labeled end use products are conducted outdoors under typical use conditions. Studies are designed to respond to most recent EFSA requirements to derive normalized half-lives (DT50)

LYSIMETER

Assess the long-term leaching potential of your products. Lysimeters can be conducted with a choice of soils under realistic climatic conditions.

HYDROLYSIS

Meet specified international regulatory guidelines with accurate, reliable hydrolysis studies. We conduct standard design studies according to OECD 111 or national requirements (e.g. natural water hydrolysis).

PHOTOLYSIS (AQUEOUS AND SOIL)

Conduct photolysis studies using Hereaus Suntest artificial sunlight sources and a choice of custom-designed static or flow-through systems. Studies are conducted according to OECD 316 and SETAC 1995.

Improving Environmental Fate Models for Agrochemicals

CHALLENGE

Before making a pesticide or other agrochemical available on the marketplace, agrochemical companies need to fully understand the potential fate of the chemical in the environment. In the case of pesticides, the potential for the chemical to leech into groundwater is of particular concern. Currently, computer simulations utilizing data about soil characteristics and weather conditions at various locations are used to predict pesticide concentrations under different conditions. Lab data, including information about the rate of degradation and sorption properties, is used to build the computer models. However, inaccurate assumptions in the model will lead to incorrect conclusions about the environmental fate of the pesticide, potentially unnecessarily jeopardizing registration, or resulting in unsafe application recommendations.

SOLUTION

The standard models assume that sorption is due only to binding to the organic matter in the soil. In lower horizons of soil, the organic matter is approximately zero, and thus no sorption is assumed. In reality this may not be entirely correct when other mechanisms of sorption are taken into consideration.

Battelle looked at one of the standard scenarios used to assess pesticide leaching, the “Borstel” model. This is considered to be one of the more critical scenarios, as it is a very sandy soil and represents a greater risk for leaching into groundwater. To provide data to refine the simulation, Battelle collected “Borstel” soil as a core down to 1m. The core was segmented and each horizon analyzed to confirm its similarity to the soil characterization data used in the computer simulation. Each soil horizon was then used in an adsorption/desorption study to determine the actual sorption of the chemical. The measured sorption in the deeper soil horizons was found to be greater than predicted by assuming organic matter binding as the sole mechanism, leading to a more favorable leaching risk assessment.

OUTCOME

Using the new lab data, we were able to refine the assumptions used in the computer model to provide a more realistic risk assessment of potential leaching. The refined modelling can be used to make better decisions about application recommendations, and provide critical data necessary to maintain product registration or move into new market areas.

Every day, the people of Battelle apply science and technology to solving what matters most. At major technology centers and national laboratories around the world, Battelle conducts research and development, designs and manufactures products, and delivers critical services for government and commercial customers. Headquartered in Columbus, Ohio since its founding in 1929, Battelle serves the national security, health and life sciences, and energy and environmental industries. For more information, visit www.battelle.org.

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