

A simple model predicts pesticide concentrations in the environment more reliably

May 20 2016

For the evaluation of pesticides, a simple model yields more reliable results than the method currently used in the EU. Now, researchers show that a significantly less complex box model for the risk assessment of pesticides can offer greater environmental safety than the FOCUS modelling approach presently employed by the EU within the regulatory risk assessment.

Plant protection products can be approved in Europe only when the predicted concentrations in [surface waters](#) are below the ecologically critical threshold value. Since the end of the 1990s, the EU has employed so-called FOCUS models for the calculation of the expected discharge of pesticides from agricultural use to surface waters. These are required by law for the approval process, but the knowledge of the Landau environmental researchers indicates that these models are not suitable. Ralf Schulz, one of the authors of the study, explains: "Still more important, though, our study shows that the application of a much simpler model yields far more reliable results and furthermore appears to exhibit better predictive quality when it is adapted to the particular field situation."

In their study the researchers compared 466 concentrations of insecticides measured in European surface waters with the concentrations predicted by the models and determined the number of concentrations which the respective model underestimated. In addition

to the FOCUS modelling approach, the study also examined a simpler box model, "which ultimately gave the better results", as Ralf Schulz stated.

The difference between the two models lies in the nature of the two modelling approaches. The FOCUS approach derives from different mechanistic models, based upon different detailed processes. In other words, the model attempts to exactly describe the whereabouts of a pesticide following its application. On the other hand, the box model examined in the present study provides a very general description of the distribution between the different environmental compartments. It calculates the tendencies of a chemical, in this case a pesticide, to migrate from one compartment to another, for example from the soil to the atmosphere, on the basis of only a few substance properties.

The new study compares this simple box model, requiring only a few input values, and the relatively complex, non-transparent FOCUS model in respect of two essential modelling properties: first, the level of protection which the model describes in a environmental [risk assessment](#) and second, the predictive quality, in other words how well the predicted and actual pesticide contamination of surface waters compare.

"That FOCUS is still used is probably because the relevant players either see no reason to act or are not aware of a suitable alternative. However, underestimating the actual concentration in the environment can lead to a miscalculation of the environmental risk", fears Schulz. With this study, the authors would like to give cause for thought and concrete courses of action for a revision of the pesticide risk assessment procedure employed until now in the EU.

More information: Anja Knäbel et al. Aquatic Exposure Predictions of Insecticide Field Concentrations Using a Multimedia Mass-Balance Model, *Environmental Science & Technology* (2016). [DOI:](#)

[10.1021/acs.est.5b05721](https://doi.org/10.1021/acs.est.5b05721)

Provided by Universität Koblenz-Landau

Citation: A simple model predicts pesticide concentrations in the environment more reliably (2016, May 20) retrieved 16 August 2024 from <https://phys.org/news/2016-05-simple-pesticide-environment-reliably.html>

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