

Necessity of Joint Consideration of Persistence and Mobility for Determining the Leaching Potential of Chemicals

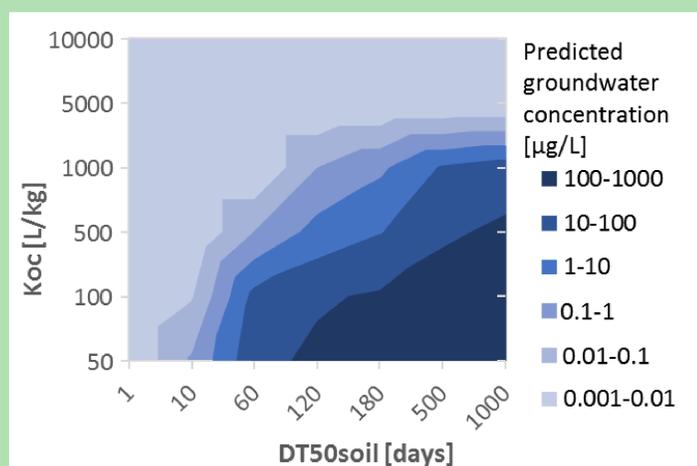
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BACKGROUND

In the current hazard-based UBA proposal on PMT/vPvM* (UBA, 2019), P/vP and M/vM are assessed separately. Chemicals which fulfil the UBA definition of both M/vM and P/vP are considered for PMT/vPvM. This results in many false positives, substances that are classified PMT/vPvM although they do not reach sources of drinking water. On the other hand, it is not excluded that some substances are classified false negative and excluded from further assessments although they might reach groundwater in exceptional cases under certain conditions such as high rainfall and highly draining soils susceptible for leaching.

CRITICAL POINTS OF PMT MOBILITY CRITERIA

- Limitations on validity of organic carbon-water partition coefficient (K_{oc}) concept as used as an indicator of M in the PMT concept:
 - For soils with low organic carbon (OC) content
 - For very polar or ionised substances
 - Disregarding non-linear (Freundlich type) sorption
 - No consideration of long-term sorption increase (aged sorption)
 - Competitive sorption can lead to displacement of a sorbed species by another.
- Need of combined consideration of degradation and sorption in soil



Example of predicted groundwater concentration of a plant protection product after annual application of 1 kg a.i./ha (FOCUS model)

ALTERNATIVE APPROACHES

- Leaching indices combining the main chemical characteristics such as degradation and sorption.
- Ranking approach as used by the Common Implementation Strategy Working Group to setup the Groundwater Watch List.
- Risk assessment approach based on modelling of the leaching potential using models that consider the essential processes, exposure characteristics, and take into account relevant pedo-climatic scenarios.

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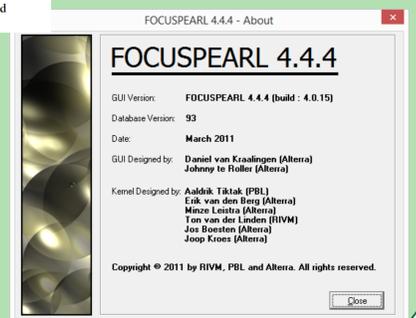
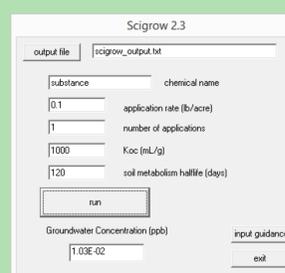
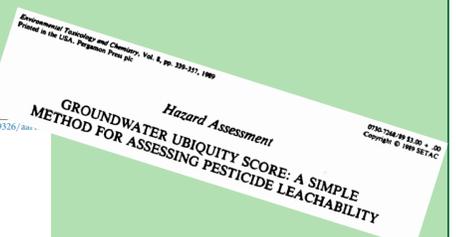
<https://doi.org/10.1088/1748-9326/aac...>

Environmental Research Letters

LETTER

Developing a groundwater watch list for substances of emerging concern: a European perspective

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CONCLUSIONS

A joint consideration of persistence and mobility is necessary to make a scientifically sound prediction whether a chemical can reach drinking water sources or not. The simple criterion of a threshold K_{oc} -value is not sufficient and does not consider the complex sorption behaviour chemicals can undergo. As alternative approaches to the simplistic mobility criterion other approaches such as leaching indices, screening models and more sophisticated process-oriented numerical models with appropriate scenarios should be considered in a tiered assessment.

* PMT = Persistent, Mobile and Toxic; vP/vM = very Persistent and very Mobile

References

Umweltbundesamt (UBA). 2019. Protecting the sources of our drinking water - The criteria for identifying Persistent, Mobile, and Toxic (PMT) substances and very Persistent, and very Mobile (vPvM) substances under EU REACH Regulation (EC) No 1907/2006.

ECETOC Technical Report 'Persistent chemicals and water resources protection' Chapter 3. For Publication 2020.