Development of a novel approach for risk characterization of non-target-terrestrial-plants at the plant community level (funded by and in collaboration with Bayer AG)

Ecological risk assessment of the application of plant protection products (PPPs) on agricultural fields comprises, among others, the risk on non-target terrestrial plants. NTTPs are plants growing adjacent to agricultural fields. Due to, e.g., spray drift or weather conditions during the application, NTTPs are potentially impacted by PPPs. The European Food Safety Authority (EFSA) defined specific protection goals for NTTPs on population and community level (e.g. as 'no decrease in biodiversity'). However, current guidelines are based on individual-level tests in greenhouses. The uncertainty of scaling up to plant populations and communities under field conditions is covered by considering an assessment factor.

To study the long-term impact of individual-level effects induced by PPPs on plant populations and communities, we developed an ecotoxicological submodel to integrate herbicide effects in the individual-based, spatially explicit plant community model for grasslands (IBC-grass). In this project we are

- analyzing potential effects on different plant communities under different spray drift scenarios by linking the effect to a herbicide exposure model Xplicit;
- analyzing the consequences of herbicide induced impacts on vegetative as well as reproductive plant attributes for plant populations and communities;
- validating the IBC-grass model with empirical data.

The overarching goal is to give insights about community level effects induced by herbicide drift and to develop a tool to help in ecological risk assessment of PPPs for NTTPs.

The project is funded by and in collaboration with Bayer AG.

Keywords
Spatially-explicit modeling, individual-based modeling, non-target terrestrial plants, ecotoxicology, risk assessment on community level, herbicides, specific protection goals

Researchers
Jette Reeg, Florian Jeltsch

Region
Agricultural landscapes in Europe

Duration
2013 - ongoing

Collaborators
Simon Heine, Christine Mihan, Sean McGee, Thomas Preuß

Former collaborators: Thorsten Schad, Andreas Solga, Katrin Körner

Publications

Reeg, J., Schad, T., Preuss, T.G., Solga, A., Körner, K., Mihan, C., Jeltsch, F., 2017. Modelling direct and indirect effects of herbicides on non-target grassland communities. Ecol. Modell. 348, 44–55. doi:10.1016/j.ecolmodel.2017.01.010