New Organisms in Agriculture – Assessing Impacts on Biodiversity and Ecosystem Functions

Biosafety Research Group, Research Division Agroecology and Environment (AOU)

Focus

Sustainable, environmentally friendly agriculture relies on a diverse agricultural landscape and its ecosystem functions, such as control of pests, pollination, and decomposition. Arthropods contributing to those functions are therefore valued. Organisms that are deliberately released to protect or enhance yields or product quality or that become accidentally introduced from other world regions potentially threaten native species and their functions. To maintain a functioning agroecosystem, we need to know the environmental impacts of such new organisms in Swiss agriculture and beyond.

In the Biosafety Research Group at Agroscope, we develop concepts for environmental risk assessment and conduct experimental research to assess exposure of arthropods to new stressors. We study potential hazards in the laboratory, glasshouse, and field. We generate knowledge that helps to select suitable test species and we develop methods and designs for impact assessment studies. Finally, we synthesize existing knowledge in a transparent and comprehensive way (systematic reviews) and we fill knowledge gaps by studying ecological interactions of plants and insects.

By publishing our findings, participation in national and international events, and engagement in expert panels, we provide expertise for science, regulation and policy.
Background

The biosafety research group was founded in 2000. Since then, we built up expertise in particular in the environmental risk assessment of genetically modified plants and biological control agents. Members of the group have published more than 200 papers on those topics and provide expertise to national (BLW, BAFU) and international (EPPO, EFSA, CBD) organizations. The experience with conceptional and experimental work gathered over time is well applicable to new organisms and technologies that challenge agriculture currently and in the future because of biotechnological advances, globalisation and climate change.

Teaching

University of Bern (CH); ETH Zürich (CH); ISARA Lyon (France)

Key International Collaborations

USDA-ARS (USA) & Cornell University (USA); Chinese Academy of Agricultural Sciences (China); CABI (CH, China); Julius Kühn Institute (Germany); University of Innsbruck (Austria)

Selected Publications

- Collatz et al. (2020) Benefits and Risks. In Mason (Ed.) Biological Control- a global endeavor. CSIRO Publishing
- Haller et al. (2019) Responses of two ladybird beetle species (Coleoptera: Coccinellidae) to dietary RNAi. Pest Manag Sci 75, 2652-2662
- Svobodová et al. (2017) Stacked Bt maize and arthropod predators – Exposure to insecticidal Cry proteins and potential hazards. Proc Royal Soc B 284, 20170440
- Knoll et al. (2017) Seasonal and regional presence of hymenopteran parasitoids of Drosophila in Switzerland and their ability to parasitize the invasive Drosophila suzukii. Sci Rep 7, 40697
- Devos et al. (2015) Optimising environmental risk assessments. Accounting for ecosystem services helps to translate broad policy protection goals into specific operational ones for environmental risk assessments. EMBO Rep 16, 1060-1063
- Romeis et al. (2014) Potential use of an arthropod database to support the non-target risk assessment and monitoring of transgenic plants. Transgenic Res 23, 995-1013
- Bacon et al. (2014) Quarantine arthropod invasions in Europe: the role of climate, hosts and propagule pressure. Diversity Distrib 20, 84-94
- Romeis et al. (2013) Deriving criteria to select arthropod species for laboratory tests to assess the ecological risks from cultivating arthropod-resistant genetically engineered crops. Chemosphere 90, 901-909
- Romeis et al. (2011) Recommendations for the design of laboratory studies on non-target arthropods for risk assessment of genetically engineered plants. Transgenic Res 20, 1-22
- Aebi et al. (2011) Detecting arthropod intraguild predation in the field. BioControl 56, 429-440
- Bigler et al. (Eds) (2006) Environmental Impact of invertebrates for Biological Control of Arthropods. CABI Publishing

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