
Assessing the impact of farming practices and landscape heterogeneity on ground beetles' exposure to pesticides

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Abstract

In the nineties, John Cairns emphasized the importance of developing a field of " landscape ecotoxicology ". Indeed, landscape features influence both abiotic and biotic processes, such as pollutant transfers in the different compartments of the environment, or population dynamics of beneficial organisms. Realistic ecotoxicological scenarios therefore require a spatially explicit assessment of the exposure of mobile non-target organisms to pollutants, but so far this research field has received poor attention. The present study aims at investigating the impact of farming practices (pesticide applications) and landscape heterogeneity (proportion of semi-natural habitats and organic fields in the surrounding landscape) on ground beetles exposure to pesticides. In 2016 within the RESCAPE project, we sampled carabid beetles in hedgerows, grasslands and cereal fields in 60 different 1km² agricultural landscapes in western France (LTER site "Zone atelier Plaine et Val de Sèvres", 46°11N - 0°28W). 180 carabid beetles individuals (*Poecilus cupreus* and *Harpalus dimidiatus*) are currently being analyzed for 31 pesticide residues commonly used on the study area. We will establish quantitative links between pesticide residues concentration in animals, type of habitat, local farming practices, and landscape heterogeneity. We aim at generating spatial exposure maps to identify " at-risk " landscape contexts to pesticides transfers (i.e. landscape contexts where exposure of non-target organisms is enhanced) versus " resistant " landscapes. Such a knowledge is a prerequisite to guide scientists and land managers in identifying management tools to improve agroecosystem resistance to pesticide effects and would allow getting original insights into landscape ecotoxicology and ecology.

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