Dissecting soil multi-trophic community assembly across a forest-grassland edge.

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Résumé

Human-induced landscape fragmentation profoundly impacts the dynamics of biodiversity, and increases the spatial proportion of habitats that are potentially influenced by neighboring ones. While much research has been devoted to the effects of habitat edges on taxonomic groups separately, edge effects on multi-trophic community structure remain largely unknown.
We here present the result of an empirical study focusing on the interface between a grazed grassland and a beech forest in the Massif Central, France. We specifically address the following questions : 1) What are the spatial variations of invertebrate community structure across the edge? 2) Are these spatial variations similar across trophic levels? 3) Do these community-level changes affect the structure of trophic interactions? and 4) What are the relative contributions of space and environments to these patterns?

We extensively sampled soil meso and macrofauna at 50 points of an irregular sampling grid, covering both sides of the edge. We assembled a metaweb of potential trophic interactions between all taxa sampled in our study area, and used it to reconstruct local foodweb characteristics at each sampled plot. At each plot, we also measured a set of 13 environmental properties, including soil chemistry, vegetation cover and litter quantity.
We evidence a very large turn-over of community composition across the edge that translates into changes in trophic interaction structure, but with a much lower magnitude. Edge effects on foodweb structure still propagate at distances up to 25m in habitat interiors. A second major finding of our study is the very strong small-scale (< 3m) variability of community composition and associated foodweb structure that is only modestly explained by the environmental covariates measured. These results have key implications for predicting alterations of community assembly and ecosystem functioning in human-modified landscapes, by demonstrating the emergence of novel patterns of foodweb structure across habitat edges.

Mots-Clés: Multitrophic community, edge effect, foodweb structure, spatial turnover

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