
Exploring the link between response to habitat fragmentation and pollination efficiency in wild bee communities: a trait-based approach

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Abstract

Habitat fragmentation is considered as an important driver of wild bee diversity in agricultural landscapes. However, the impact of habitat fragmentation on bee functional community structure and its implication on the ability of wild bee communities in delivering pollination services have been little explored. In this study, we aimed at studying the influence of habitat fragmentation on farmland wild bees by explicitly testing the response-and-effect framework. More specifically, we aimed at exploring if the changes in the distribution of bee response traits along habitat fragmentation gradients altered the distribution of bee effect traits, i. e. traits contributing to pollination delivery. In 78 cereal crop fields differing in surrounding habitat fragmentation (permanent grassland, woodland edges and hedgerows), we found that bee body size was a response trait to habitat fragmentation and that variation in this response trait was correlated to changes in effect traits, such as body parts of pollen transport, beginning of foraging period and proboscis length. Therefore, the distribution of bee effect traits changed along the gradients of habitat fragmentation and these changes were either due to a correlation between response and effect traits at the species level, or to the fact that some effect traits were also response traits to habitat fragmentation. Our results suggest that a better knowledge on bee species traits and on the effects of environmental on the functional community structure of bees can help to better predict and understand the effect of habitat fragmentation on pollination function.

Keywords: Wild bees, ecological traits, habitat fragmentation, pollination

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