Local and landscape scale effects on seed-eating carabids and levels of weed seed predation in arable fields

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Abstract

Recent studies suggest that weed seed predation by carabid beetles may partly substitute for herbicide use in agriculture. As the abundance of seed-eating carabids has been linked to the amount of regulation of the weed seed bank, management options that increase the in-field abundance of carabids would enhance this regulation service. However, our understanding of how management at different spatial scales might enhance weed seed predation is still limited due to the diversity of habitat requirements of seed-eating carabids and the diversity of spatial scales at which they respond. Here, we present results from two large-scale surveys conducted in the UK and in France that investigated the role of grassland on the weed seed regulation service. We assessed the effect of the cover area of grassland in the landscapes surrounding fields at different spatial scales, on both in-field seed-eating carabid abundance and levels of weed seed predation. Our results indicate that the cover of grassland habitats has, overall, a positive effect on the in-field abundance of the most common seed-eating carabid species, at species-specific scales, which can enhance weed seed predation levels. Our results also show that these landscape-scale effects may be conditional, being dependent on the local in-field management practices. These findings suggest that local management practices and properties of the wider landscape can promote weed seed predation in arable fields and that these different spatial scales should be considered in combination, rather than separately.

Keywords: agroecology, biological regulation, granivory, spatial scale

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