A trait-based approach to unravel the effects of habitat connectivity and habitat amount on weeds

Léa Uroy, Cendrine Mony, Aude Ernoult, Audrey Alignier

Abstract ID code: T0385

A trait-based approach to unravel the effects of habitat connectivity and habitat amount on weeds

Uroy Léa[1,2], Mony Cendrine[1], Ernoult Aude[1] and Alignier Audrey[2].

[1]University of Rennes, UMR CNRS 6553 Ecobio, 35000, Rennes, France.

[2]INRA of Rennes, UMR INRA 0980 Bagap, 35000, Rennes, France.

The recent essay of Fahrig (2019) has revived the debate about the relative influence of two major components of landscape structure, *i.e.* habitat connectivity and habitat amount, on biodiversity. In plants, these two components may act as a filter on dispersal and establishment trait values (*response trait*). These trait values should, in turn, shape plant diversity and abundance (*effect trait*).

In agricultural landscapes, weeds play a dual role. They support important ecosystem functions (*e.g.* pollination, limitation of soil erosion) but also represent a major problem for farmers through the competition with the crop. Unraveling the effects of habitat connectivity and habitat amount on weed traits should then help to understand the mechanisms behind their maintenance and growth in fields.

Here, we investigated the relative effects of habitat connectivity and habitat amount on i) five dispersal and establishment trait values and on ii) weed richness, diversity and cover, as proxies of their colonization ability. We sampled 27 cereal fields in the LSTER-ZA Armorique. We assessed habitat connectivity and habitat amount provided by wooded, grassland and cropland elements at three spatial scales: 250m, 500m and 750m.

Habitat connectivity provided by cropland elements decreased aggregated values of seed germination rate. Habitat amount provided by wooded, grassland and cropland elements impacted aggregated values of plant height vegetative, seed mass, seed germination rate and seed number per plant. Changes in trait values of seed germination rate and seed mass, in turn, drove weed cover and diversity. Our results demonstrated hence that landscape structure shapes the colonization ability and establishment of weeds through its filtering effect on functional traits. This study emphasizes that using the response-effect trait framework provides a better understanding of weed assembly rules and a key to combine the maintenance of weeds without jeopardizing crop production.

Key words: Agricultural landscapes; response-effect trait framework; dispersal traits; establishment traits; weed cover and diversity