Additive effects of ecological continuities drive plant assembly rules

Léa Uroy*†[1,2], Cendrine Mony[1], and Aude Ernoult[1]

[1]Ecosystèmes, biodiversité, évolution (ECOBIO) – INEE, Universite de Rennes 1, CNRS : UMR6553, Observatoire des Sciences de l'Univers de Rennes – Bâtiment 14 - Université de Rennes 1 - Campus de Beaulieu - CS 74205 - 35042 Rennes Cedex - France, France

[2]Biodiversité agroécologie et aménagement du paysage (UMR BAGAP) – ESA - Ecole supérieure dAgriculture dÁngers, Agrocampus Ouest, Institut National de la Recherche Agronomique, ESA - Ecole supérieure dAgriculture dÁngers, ESA - Ecole supérieure dAgriculture dÁngers, ESA - Ecole supérieure dAgriculture dÁngers, ESA - Ecole supérieure dAgriculture dÁngers – 65 rue de Saint-Brieuc 35042 Rennes, France

Abstract

Understanding the influence of landscape connectivity on plant assemblages' structure is a central issue in landscape ecology. So far, empirical studies showed contradictory results, possibly due to (1) an inaccurate assessment of landscape connectivity prioritizing the effect of some habitat types among others, when landscape connectivity may be best estimated accounting for the different ecological continuity types independently and (2) the absence of consideration that plant dispersal vectors may be positively or negatively influenced by the different continuity types.
Here, we studied plant assemblages in agricultural landscapes comprising three main habitat types: woodlands, grasslands, and crops. Using 25 habitat patches per habitat type, we analysed the effect of connectivity on plant assemblages' similarity between pairs of patches for three dispersal modes (animal-dispersed, wind-dispersed and unassisted). Plant response was evaluated relatively to the random similarity expected based on the species pool. We measured connectivity using circuit theory, combining continuities provided independently by wooded, grassland and crop elements.

Plant assemblages' similarity in woodland and grasslands was better predicted by accounting for wooded, grassland and crop continuities together rather than by the continuities of the focal habitat alone. Assemblages' similarity was not related to connectivity in crops. In particular, connectivity provided by wooded continuities increased assemblage's similarity for both wooded and grassland assemblages. Responses were modulated though by dispersal mode. Animal dispersal in woodlands was promoted by wooded but disfavoured by crop continuities whereas in grasslands, it was promoted by crop and woodland ones. Wind-dispersal species was independent of connectivity. Dispersal of unassisted species was promoted by wooded continuities for grasslands.
Our study demonstrates that the simultaneous consideration of the different continuity types to assess connectivity improve our capacity to predict plant community assemblages. Specifically, some assembly rules related to plant dispersal were determined by the additive effects of the different ecological continuities.

*Speaker
†Corresponding author: lea.uroy@univ-rennes1.fr