
Interest of a trait-based approach to understand plant-arthropod interactions in agroecosystems and implications to improve conservation biological control

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Abstract

The role of biodiversity in ecosystem services delivery is increasingly addressed via trait-based functional approaches. To advance predictive agroecology and take advantage of the many ecosystem services that depend on multitrophic interactions, there is a need to improve our understanding of the connection between plant and animal communities.

We focus on the use of a trait-based approach to better understand plant-arthropod interactions in agroecosystems. Taking conservation biological control as a case study, we find that there is a lack of understanding regarding the relationship between a gradient of diversity and complexity within arthropod communities, on the one hand, and the level of herbivore regulation, on the other.

We propose the concept of "interaction traits" to better understand how arthropod communities respond to plant communities and to refer to functional traits involved in trophic and non-trophic interactions between plants and arthropods. The interaction traits of interest here include plant features associated with the provision of trophic resources such as attractiveness, accessibility, quality, and temporal availability, or with the modification of non-trophic habitat functions such as shelter and microclimate.

Progress in our understanding of scaling up from individual to community traits is needed. The extent to which arthropod communities are affected by the attributes and distribution of plant community traits remains largely unexplored. We therefore need to identify metrics describing the functional structure of plant and arthropod communities, and quantitatively relate these metrics to ecosystem functions.

Keywords: entomophagous arthropods, flower strip, functional diversity, functional trait, interaction trait, multitrophic community, natural enemy

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