
Bringing macroecology into agricultural science: promises and challenges

Christine Meynard*¹

¹Centre de Biologie pour la Gestion des Populations (CBGP) – Centre de Coopération Internationale en Recherche Agronomique pour le Développement : UMR55, Centre international d'études supérieures en sciences agronomiques : UMR1062, Institut national de la recherche agronomique [Montpellier] : UMR1062, Université de Montpellier : UMR1062, Institut de Recherche pour le Développement : UMR1062, Institut national d'études supérieures agronomiques de Montpellier, Centre international d'études supérieures en sciences agronomiques : UMR1062, Centre international d'études supérieures en sciences agronomiques : UMR1062, Centre international d'études supérieures en sciences agronomiques : UMR1062, Centre international d'études supérieures en sciences agronomiques : UMR1062, Centre international d'études supérieures en sciences agronomiques : UMR1062 – 755 avenue du Campus Agropolis, 34988 Montferrier sur Lez, France

Abstract

Given the multiple challenges imposed by global changes, including climate change, land use conversion, biological invasions, and habitat loss, ecology has received more societal attention in the last decades than ever before. Indeed, global change imposes a number of new challenges for global food security, including the need to adapt agricultural systems to new environmental conditions and potentially new pests and diseases. Planning for these changes requires a better understanding of the factors influencing agricultural productivity and stability, as well as the design and use of predictive tools to allow forecasting and comparisons between potential management strategies. More importantly, the goals of sustainability, along with the need to adapt and forecast, impose a need to abandon the case-by-case approaches and to come up with broader, more generalizable strategies that will allow maintaining and increasing productivity in a more biodiversity-friendly manner. Macroecology focuses on finding general patterns across ecological communities at large scales, in particular with respect to abundance, distributions and biodiversity. It is therefore particularly well suited to study and answer questions of global change as applied to agricultural landscapes. However, as in many other fields in ecology, macroecologists have focused largely on the study of natural or semi-natural systems. Here I review major macroecological fields of study that can contribute to a more predictive agricultural management strategy. The main goals of this review will be to (1) synthesize what we know about macroecological patterns that need to be tested and applied to agricultural systems; (2) identify areas where macroecological research has already been contributing to agricultural planning as well as (3) identifying gaps where we can bring more macroecology into agricultural sciences. The emphasis will be on the particular challenges and opportunities that agricultural settings can provide for such a macroecological perspective.

*Speaker