Effects of alternative viticultural practices on soil fauna communities using a multi-taxon within a multi-scale approach

Clara Zimmermann*[1], Ninon Delcourt[2], Alan Vergnes[3], and Jérome Cortet[1]

[1]Centre d'Ecologie Fonctionnelle et Evolutive – Université Paul-Valéry Montpellier 3, Université de Montpellier, CNRS, EPHE, IRD – France

[2]Centre d'Ecologie Fonctionnelle et Evolutive – Université Paul-Valéry Montpellier 3, Université de Montpellier, CNRS, EPHE, IRD – France

[3]Centre d'Ecologie Fonctionnelle et Evolutive – Université Paul-Valéry Monptellier 3, Université de Montpellier, CNRS, EPHE, IRD – France

Résumé

Viticulture is one of the oldest forms of agriculture. 46% of the world's vineyards are located in Europe, notably in Italy, Spain and France, most of them using practices that aim to maintain high productivity. In Europe, conventional agriculture has been the dominant model since the end of the Second World War. This model is based on land reparcelling, mechanisation, increased use of chemical fertilisers and pesticides. However those practices showed negative environmental impacts specifically on soils, both at the local and landscape scales. Soils are complex systems, sheltering high levels of biodiversity involved in many vital functions for ecosystems and services for human societies. In order to preserve soil biodiversity, interest in researching alternative practices to conventional agriculture has been increasing over the last few decades.
The alternative practices likely to affect soil fauna in viticultural areas are partly known, and their effects have only been studied at local scales, despite the importance of processes at the landscape scale, such as dispersal, in the structuring of soil communities. The aim of this study is to analyze the effects of alternative viticultural practices located along a gradient of landscape heterogeneity on three major soil fauna communities (carabid beetles, spiders and springtails) that present various dispersal capabilities and trophic levels. Carabid beetles and spiders are essential predators in the regulation of crop pests. Collembola are organisms that decompose organic matter, providing the soil with nutrients. By studying these three complementary taxa, it is possible to generalize the results, and if there is a convergent response between the different taxa, this approach can highlight the impairment of major ecological processes.

For this study, 4 soil management practices were considered : i) permanent grassing, ii) massive input of organic matter, iii) no grassing or input of organic matter, iv) input of organic matter and grassing on a total of 40 mediterranean vineyards fields in the south of France. Soil communities were analyzed for their taxonomic and functional (traits) responses to soil management practices and landscape heterogeneity.
We will present the main results obtained until now, focusing on the responses at various scales. We hope that our study improves our understanding of the ecological processes at both local and landscape scales governing soil biodiversity in vineyards.

*Intervenant

Mots-Clés: alternative practice, vineyard, soil biodiversity, landscape ecology, community ecology