Functional and community implications of the evolution of plant traits in meta-ecosystems

Nicolas Loeuille*[1]

[1]Institute of ecology and environmental sciences - Paris (iEES Paris) – Institut de Recherche pour le Développement : UMR242, Sorbonne Universite : UMR113, Université Paris-Est Créteil Val-de-Marne - Paris 12 : UMR7618, Centre National de la Recherche Scientifique : UMR7618, Université de Paris : UMR113, Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement : UMR1392, Institut de Recherche pour le Développement, Sorbonne Universite, Université Paris-Est Créteil Val-de-Marne - Paris 12, Centre National de la Recherche Scientifique, Université de Paris, Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement – France

Résumé

As sessile organisms, plants are particularly vulnerable to enemy accumulation and rapid nutrient depletion. This context affects the eco-evolutionary dynamics of critical traits, such as the evolution of defenses, or of particular strategies that allow better access or control of nutrient quantities. Interestingly, because defenses vary in their energetic costs, these two types of traits may co-evolve and affect not only the functioning and structure of local communities, but also nutrient dynamics within and among ecosystems. This presentation aims to explore implications of the evolutionary dynamics of these traits. Firstly, I will show how the interaction of spatial connectivity and recycling processes can alter the selection of defense traits in space, resulting in more complex network modules at intermediate dispersal and productivity. I will then turn to plant traits that affect the access to nutrient and the control of their transformation. As these traits are often assumed to incur direct costs (such as root development or specific molecules), their evolution in a well-mixed system may be constrained by the tragedy of the commons. However, the spatial context facilitates their emergence. I will then discuss the implications of these traits' emergence for the coexistence and functioning of plant communities in space.

Mots-Clés: eco, evolutionary dynamics, niche construction, ecological networks, spatial ecology

*Intervenant