

Above-belowground interactions in the context of biological invasions

We are offering a **Bachelor's and Master's thesis projects** that will focus on the effect of **invasive earthworms on above- and belowground plant responses and biotic interactions**.

Understanding the mechanisms by which an introduced species modifies native communities and ecosystems is a key question in ecology. When exotic earthworms invaded earthworm-free regions like in North-America, they induce habitat modifications, such as changes in spatial distribution of organic matter and nutrients in the soil, from uniform to patchy. In response to soil nutrient heterogeneity induced by invasive earthworms, some plant species with high plasticity of the root system might be able to selectively place their resource uptake organs in nutrient-rich patches created by earthworms (Cameron et al. 2014). These capacities influence their resource acquisition and, consequently, their establishment success and competitive abilities in different environments (Funk & Vitousek 2007, Drenovsky et al. 2008). However, **how earthworms can affect plant traits and resource acquisition capacities** has rarely been studied, and the **underlying mechanisms of invasive earthworm impacts on plant community structure** via their effects on species-specific plant resource allocation are largely unknown (Wurst 2010).

The student will study **how invasive earthworms affect plant species traits and biotic interactions**. In spring 2021, we will set-up up different plant communities in microcosms, using plant species of three functional groups. Each plant community will be crossed with different earthworm/herbivore treatments. After 3-4 months of experiment, we will evaluate plant responses to their neighbors, earthworms, and to herbivory via the measurement of **above- and belowground functional trait responses** as well as **plant hormonal and metabolomics responses**.



This project is a great opportunity to work on exciting ecological questions at the **German Centre for Integrative Biodiversity Research (iDiv)**. The student will learn how to plan, set up, maintain, and harvest microcosm experiments. Moreover, the student will develop skills in **lab techniques relevant to plant and soil ecology, or molecular and chemical ecology**, depending on the student's interests. We are looking for dedicated students with good organizational skills and a **strong interest in plant ecology/biology, chemical ecology and in the interaction between plants and their biotic environment**. The ability and willingness to work in a team are necessary. Skills in the statistical software R or the motivation to acquire them are also required.

How to get in touch?

Please contact **Dr. Lise Thouvenot** (lise.thouvenot@idiv.de) and **Prof. Dr. Nico Eisenhauer** (nico.eisenhauer@idiv.de) if you have any questions and are interested to discuss the project. This project will be realized in collaboration with Prof. Dr. Nicole van Dam, Prof. Dr. Jan Willem van Groenigen, and Dr. Henriette Uthe.

References: Cameron, et al. 2014. *PLoS one* ; Drenovsky, et al. 2008. *American Journal of Botany*; Funk and Vitousek. 2007. *Nature*; Wurst 2010. *Applied Soil Ecology*.