

## Bottom-up and top-down forces of herbivory in a tree diversity experiment

Opportunities to conduct Bachelor and Master thesis in the framework of the MyDiv experiment ([https://www.idiv.de/en/research/platforms\\_and\\_networks/mydiv.html](https://www.idiv.de/en/research/platforms_and_networks/mydiv.html); Ferlian et al. 2018).

Plant diversity has been shown to play a significant role in trophic interactions and the structure of food webs. Plant diversity can influence consumer communities via bottom-up effects (Scherber et al. 2010), i.e. through changes in resource availability, as well as through top-down effects (Haddad et al. 2009), i.e. through changes in predation pressure on plants' natural enemies. However, assessing the relative importance of both mechanisms has been elusive. We will conduct field studies on herbivory and herbivore predation assessments within the MyDiv experiment, the design of which covers a gradient in resource availability to consumers based on differences in soil nutrient uptake by different tree species. Field work will focus on standardized feeding trails and comparisons of plant palatability of target species across MyDiv treatments in the lab (see Figure below). Based on the interests of the students, this project offers a wealth of ramifications, including different approaches and methods—from molecular analyses of secondary metabolites, to nutrient content analyses of leaves, feeding trials in Petri dishes, herbivory and predation assessments in the field, and the study of invertebrate communities.

The tree diversity experiment MyDiv aims at integrating the mycorrhizal type, a crucial plant functional trait, in tree species diversity gradients. The experiment involves ten native angiosperm tree species that were planted in monocultures, 2-species, and 4-species mixtures. At each of the tree diversity levels, tree communities with only ectomycorrhiza, only arbuscular mycorrhiza or mixtures of both were established.



A caterpillar feeding of the leaf of a tree (Photo: waldwissen.net), plots of the MyDiv experiment, and a sketch of a caterpillar feeding trail in Petri dishes to assess the palatability of two food items (Henniges-Janssen et al. 2014).

*References:* Ferlian et al. 2018 Ecosphere | Haddad et al. 2009 Ecology Letters | Scherber et al. 2010 Nature

**Contact:** Dr. Olga Ferlian, Prof. Nico Eisenhauer, Prof. Rodolfo Dirzo