Biodiversity Ecosystem Functioning: from above to below ground using protists as a model

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Biodiversity and ecosystem functioning (BEF) are often positively linked as evident in plants, with higher species richness of plants providing more biomass and suppressing pests. However, it remains elusive if such a positive BEF relation exists for soil communities. Lack of knowledge on soil BEF (sBEF) stems from the immense diversity of soil life, particularly that of bacteria and fungi that underlie most soil functions. Among soil biodiversity are also microbial predators such as nematodes or protists, which play an important role in shaping microbial communities, controlling pests, and catalyzing nutrient cycling in soils via predation.

I aim to uncover the importance of BEF in soils (sBEF), and whether this relation is the same as in aboveground ecosystems. Using microbial predators assemblages as models consisting of more than 30 protist and nematode species, I test whether an increasing soil biodiversity affects plant performance. I also evaluate the importance of an increased diversity of microbial predators under different nitrogen fertilizer concentrations and drought. Preliminary results from a first experiment indicate that under drought, an increasing number of protists appears to negatively affect plant growth, while the combination of both predators (protists and nematodes) increased it. Additionally, in a second experiment we showed that by adding nitrogen inputs into the soil plant growth was enhanced, but when nematodes and protists are also added, plant growth was maximized already at low nitrogen input. This result could open a new door of research to determine whether an increasing microbial predator diversity could help to reduce nitrogen inputs while keeping a high level of plant production.

Experiment met Cannabis sativa als modelplant: nematoden en protisten in de bodem beïnvloeden het effect van stikstofbemesting op de plantengroei.