EGU21-2937
https://doi.org/10.5194/egusphere-egu21-2937
EGU General Assembly 2021

Are ectomycorrhizal fungi actually adapting to 5 years of extreme summer drought in Middle European forests?

Fabian Weikl and Karin Pritsch
Institute of Biochemical Plant Pathology, Helmholtz Zentrum München - German Research Center for Environmental Health, Munich, Germany

Middle Europe's forests face an increasing risk of recurring summer droughts. To explore the impact of such conditions, trees in a mature spruce-beech forest were exposed to five successive years of extreme summer drought during the Kranzberg Roof Experiment located in Bavaria (Grams et al. 2021, DOI: 10.1002/ecs2.3399).

Those trees (*Picea abies* and *Fagus sylvatica*) heavily depend on their ectomycorrhizal fungal symbiosis partners (ECMf) belowground. Thus, we set out to identify modes of compositional and functional adaptation in these communities.

We monitored ECMf communities via metabarcoding and analysed the functionality of morphotyped ectomycorrhizae via testing their enzyme activities.

To our surprise, most effects were quantitative throughout the whole period. Total enzyme activities strongly declined alongside the numbers of vital root tips of drought treated trees, while enzyme activities per surviving root tip remained remarkably similar to controls. Likewise, ECMf communities only experienced minor shifts that only slightly increased during the years, although different capacities for drought tolerance in ECMf have previously been hypothesised.

Summed up: Along with most tree individuals, their fungal partners showed a strong ability to resist the applied extreme drought scenario, at the cost of severely diminished capacities at the ecosystems level.

Speculatively, individual root tips could be seen as surviving insulae whose fungal communities only experienced indirect and moderated drought effects. Therefore, the ECM system may rather show an inherent resistance to drought, with observable qualitative adaptation requiring a still longer time-frame.