EGU2020-8695
https://doi.org/10.5194/egusphere-egu2020-8695
EGU General Assembly 2020

Drought stress memory in filamentous soil fungi

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Drought is a common stressor for soil organisms. One adaptive mechanism is “stress priming”, the ability to cope with a severe stress (“triggering”) by retaining a memory from a previous mild stress event (“priming”). While plants have been extensively investigated for drought memory, only scare information is available for filamentous soil fungi and its implications for soil microbial communities. We investigated the potential for drought-induced stress priming on single species as well its effect on microbial communities in forest A-horizons. Batch experiments with 4 treatments were conducted: exposure to priming and/or triggering as well as non-stressed controls. A priming stress was caused by desiccation to pF 4. The samples were then rewetted and after a recovery time of up to 14 days triggered (pF 6). After triggering, microbial biomass and activity as well as microbial communities by rDNA sequencing were analysed.

Some filamentous fungi show the potential for drought-induced stress priming leading to increased survival rates and activity under severe stress events. Yet, the effect seems to be species specific with potentially high impact on composition and activity of microbial communities considering the expected increase of drought events. Especially receptive to stress priming seem to be species within the fungal classes Mortierellomycetes, Pezizomycetes, and Tremellomycetes. Shifts in the microbial community compositions could be observed in some cases in response to stress priming. In general, the nature of the response depends on the original composition of the microbial community and the occurrence of a subsequent triggering event. For example, species investing high amounts of resources into the primed state only prevail if a triggering occurs (especially noteworthy was *Byssonectria fusispora*).