Ectomycorrhizas of beech: functional diversity for N uptake under drought and effects of a direct competitor (*Cornus sp.*)

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In temperate forests unaffected by anthropogenic activities, nitrogen availability is usually a limiting factor for plant growth. The ability of ectomycorrhizal (EM) fungi to access N from sparse and heterogeneously distributed inorganic and organic resources, to deliver N to the host and to improve plant N status, confer key roles of mycorrhizal symbiosis.

Root tips of mature beech (*Fagus sylvatica*) trees are almost 100% ectomycorrhizal, hosting 90 different fungal species (Pena et al. 2010). The factors affecting EMF colonization and community composition are still not well understood. Even if the colonization rates remained unchanged, rare EM fungal species were highly sensitive to the depletion of recent photosynthate and disappeared (Pena et al. 2010). In addition to carbon availability, EM fungal colonization and community composition may be affected by differences in dispersal, ecological niche differentiation, resource partitioning or functional differences between fungal species.

Here we tested the hypothesis that an inter-specific competitor like dogwood (*Cornus sp.*) influences EM colonization rates and that functional differences exist between EMF species with respect to inorganic N uptake from the soil.

To test these hypotheses, EM fungal colonization was measured on roots of 3-years-old beeches grown in phytotrons (www.helmholtz-muenchen.de/eus/index_en.php) in presence and absence of dogwood trees. Functional differences between EM fungal species were studied on six-months-old beech seedlings, whose roots systems were colonized by typical EMF communities, grown under two different light and water regimes and labelled with $^{15}$N to follow N uptake. $^{15}$N and N contents were determined in shoots, roots and root tips of the seedlings. Effectiveness in nitrogen uptake and transport in root tips colonized by EMF in comparison with non-mycorrhizal root tips were studied. $^{15}$N allocation to different EMF species was determined and the contributions of different EMF to N allocation were assessed.

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