

## Summary

This doctoral dissertation focuses on selected interactions, which take place in the rhizosphere of ericoid mycorrhizal (ErM) plants. These include (i) interactions between ErM fungi and dark septate endophytic (DSE) fungi; (ii) interactions among ericaceous plants and ErM and EcM fungi, and fungi with yet unresolved mycorrhizal status; (iii) interactions among ErM and DSE fungi and soil testate amoebae. Main findings achieved in the frame of the doctoral dissertation are:

- Ericoid mycorrhiza and DSE-association simultaneously occur in roots of all screened European *Rhododendron* species across the continent. However, their proportions differ depending mainly on latitude. DSE-colonization is negatively correlated with ErM colonization in roots of all screened rhododendrons. DSE fungi form intracellular structures, which morphologically resemble ericoid mycorrhiza.
- Colonization with selected DSE strains has neutral to negative influence on the growth of ericaceous plants in vitro, whereas the effect of the typical ErM fungus *Rhizoscyphus ericae* is neutral to positive. Effects of both types of fungi on the growth of host plants are correlated with the level of ErM and DSE colonization. ErM fungi can alter the negative effect of DSE fungi when present in the same root system in vitro.
- ErM fungus *Oidiodendron maius* increases the growth and nutrient uptake by ericaceous plants, which can be strain-specifically altered by the presence of a DSE fungus. The effect of DSE-association is variable and strain specific, ranging from positive to neutral to negative. Positive effect of the DSE fungus does not need to be connected with its colonization potential.
- *Meliniomyces variabilis*, a fungus with affinities to the *Rhizoscyphus ericae* – aggregate, forms intracellular structures resembling ErM in ericaceous roots. In addition, *M. variabilis* intracellularly colonizes ectomycorrhizal host plants (*Picea abies*, *Pinus sylvestris*) without causing a negative effect on their growth. *M. variabilis* can also colonize sporocarps of an EcM fungus *Hydnotrya tulasnei*, which illustrates its variable life-style.
- EcM fungi can indirectly affect ericaceous plants, often growing under the canopy formed by EcM plants, even without forming mycorrhizal association. For example, *Cenococcum geophilum* can support the growth and formation of roots and hence also overall growth of ericaceous plants, likely by producing phytohormones (IAA) in their rhizosphere.
- Roots of ericaceous plants can be intracellularly colonized by fungi, which are to date not regarded as their mycorrhizal associates. *Geomyces pannorum*, a soil-borne saprotrophic fungus, forms structures resembling ErM in roots of its ericaceous hosts, but apparently depresses their growth in vitro.
- Shells of probably withered soil testate amoebae are regularly associated with mycorrhizal roots of ericaceous plants. ErM and DSE fungi can colonize the shells and use them as a sole source of nutrients for their growth. Within the shells, the typical DSE fungus *P. fortinii* forms microsclerotia, which are a diagnostic character for DSE-association, formed in roots of most of higher plants.