

Abstract

The decomposition of plant biomass is associated with changes of the associated fungal community which is crucial in the process of degradation due to their production of extracellular enzymes. Moreover, fungal communities as well as enzymatic activity are specific for soil microhabitats.

This thesis focused on the importance of fungi associated with the roots of Norway spruce (*Picea abies*) trees. Forest with dominating Norway spruce, located in the School Forest Enterprise Křtiny area in Moravia, was selected for the experiment. The aim of this thesis was to compare the community composition of fungi in the roots, rhizosphere and bulk soil and to describe the gradual development of this community after the death of the roots. The next aim was to isolate, describe and characterize those fungi that decomposed roots 5 and 9 months after tree harvest. Identification of fungal isolates was based on DNA sequencing. Degradation capabilities were determined as the activity of enzymes involved in the degradation of lignocellulose. Composition of fungal communities was described by sequencing of environmental DNA on the Illumina platform. Before the flow of assimilates from the live trees stopped, communities of ectomycorrhizal fungi dominated with 60 % of all sequences. Increased abundance of saprotrophic fungi was observed during the first year without the flow of assimilates. The saprotrophs were especially from subdivision Mortierellomycotina (from 5 % to 10 %) and Mucoromycotina (from 2 % to 8 %). Some saprotrophs showed preference for specific compartments of soil. The genera *Mycena* and *Phialocephala* preferred roots. *Mortierella* and *Umbelopsis* preferred rhizosphere and bulk soil and showed only a minimal presence in the roots. *Hypocrea atroviridis* was typical for the soil environment. I have cultivated it from *Picea abies* roots. These abundant fungi exhibited high activity of enzymes. Highest activity was observed for the enzymes β -glucosidase, chitinase and phosphatase.

Decomposition of roots took place as early as one month after tree removal and after a year as much as 32 % of the root mass was decomposed. At the early stage of decomposition both saprotrophic and ectomycorrhizal fungi may contribute to root decomposition.