

# Abstract

Decomposition of organic matter in soil is influenced by abiotic and biotic factors and their role is different depending on site, organic substrate and its decomposition phase. Soil microbial community influences soil organic decomposition process in a different way, which is manifested, for example, by changes of microbial abundance and production of extracellular enzymes. The thesis aimed in determining relationship of two main soil microbial decomposers groups - fungi and actinobacteria in decomposition processes *in situ*.

The impact of selected factors on decomposition processes were determined by experiment with litterbags, which were filled with litter of plant with different properties. *Astragalus exscapus* from the *Fabaceae* family contains high amounts of nitrogen in the tissues, *Fagus sylvatica* contains high amounts of carbon and lignin and *Carex humilis* has less carbon in the tissues than *Fagus sylvatica* falling in tissue element composition between *Astragalus exscapus* and *Fagus sylvatica*. Litterbags with three plant species were put under a litter layer at both contrasting sites. Litterbags and samples of soil were collected every two months during the years 2011-2012. Each litterbag was weighted, DNA was isolated from litter and soil samples and analyses of quantitative real time PCR with 16S/18S rRNA primers were performed. Enzymatic activities, element composition were also analysed in plant litter. Above that soil pH, humidity and temperature were assessed during the experiment.

Results of the thesis showed substrate specificity of enzyme activities and differences between sites during decomposition. Overall, higher exocellulase enzyme activities were detected in Vienna, while higher endocellulase enzyme activities were detected in Oblík. Variable oxidase activities were detected at both sites. Soil microbial decomposer communities were typical by dominance of actinobacteria over fungi at both sites. Fungi proved to be a substrate specific microorganism as opposed to actinobacteria that proved to be a local specific microorganisms. Both microbial groups correlated positively with each other and correlated negatively with dry weight of plant litter. Positive correlation between enzymatic activities and fungi were observed opposite to actinobacteria, that correlated

negatively with enzymatic activities, while correlation with greater number of enzymes of actinobacteria were observed in comparison to fungi. This experiment shows, that actinobacteria use different type of enzymes or different strategies than fungi for heterotrophic growth.