Abstract

The decomposition of organic substrates represents an important part of the global carbon cycle and affects its global change through CO_2 release. In temperate forests, deadwood represents a large carbon stock, its amount and decomposition is crucial for ecosystem biodiversity and functioning. The fungi are omnipresent powerful decayers in all terrestrial ecosystems. Their ability to decompose all deadwood compounds, mainly lignocellulose, is highly important. Without fungi, the wood decompositions and the release of withheld nutrients back to nutrient cycles couldn´t be performed. While many studies were concerned with the estimation of decomposition rates of deadwood, still deeper knowledge about microbial decomposition processes and the diversity of saproxylic species and their interaction is needed. The fungi are still underrepresented in dead wood studies. This study had two main objectives. First was to describe the fungal community on downed deadwood of *Fagus sylvatica* and *Abies alba* in natural forest of Salajka in the Czech Republic, to reflect the substrate changes during the different decay stages, and to link the enzyme activities to fungal community composition and their described ecophysiologies. Second aim was to describe the fungal communities on standing and downed dead logs of *Fagus sylvatica*, *Picea abies* and *Abies alba*, in natural forest of Žofín in the Czech Republic, to identify if there existe different pattern of decay, and which of the studied factors among tree species, time of decay and wood chemistry is the most important for fungal community composition. When examined the downed deadwood in Salajka, the fungal community was the most influenced by the tree species and its chemical composition, older the logs were, the more homogenous the community become. The difference between standing and downed logs weren´t confirmed statistically, nevertheless the results suggested a possible difference in fungal decay. More samples of standing logs would be necessary to confirm or disprove these suggestions. Although, this study already demonstrated the necessity to deepen the focus on various type of deadwood in forest ecosystems to implement their nutrient fluxes into ecological predictive models. The accurate prediction of ecosystem development, facing global climate change, is the next major challenge for environmental microbiology.

Keywords: deadwood dynamics, wood-decaying fungi, decomposition, microbial community, next-generation-sequencing