# Abstract

Decomposition of litter is a key process in the soil nutrient cycle. It is a very complex process that is influenced by a number of factors. This dissertation studies these key factors influencing the rate of organic matter mineralization using modern analytical methods. The results of the dissertation are presented in four publications in international journals with IF and one manuscript ready for publication.

The first publication shows a strong positive correlation between microbial diversity and organic matter decomposition per gram of carbon. In contrast, microbial respiration per gram soil was negatively correlated with bacterial diversity and positively correlated with fungal biomass. Thus, the relationship between microbial diversity and decomposition rate is context dependent. The second study (in manuscript form) shows that microbial respiration correlates with C/N of fallout only at the beginning of the experiment, but not at the end. However, respiration during litter decomposition at the beginning and end of the experiment is strongly negatively correlated with the C/N ratio of green leaves. This suggests that the stoichiometric C/N ratio may influence decomposition indirectly through correlation with other unknown parameters such as leaf morphology. The third study examined the structure of fungal and bacterial communities in different fractions of soil organic matter in chronosequences of successional plots across Europe. Macroaggregates had less connected microbial networks and low rates of microbial respiration compared to other aggregate sizes. This suggests that a key point in the organization of microbial communities is the embedding of organic particles in the mineral matrix of macroaggregates. The results highlight the importance of soil aggregates for microbial community organization and soil carbon stabilization. The fourth paper assesses the influence of low soil pH and the characteristics of the reclaimed soil on the regeneration of the microbial community, soil fauna and vegetation in a former sulphur mine. The last publication evaluates the impact of peatland rewetting on microbial community composition along a longitudinal European gradient.