



Seasonal Changes of a Microbial Community in a Grassland Plant Diversity Gradient Four Years after Establishment

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Aboveground plant diversity is known to influence belowground diversity and ecosystem processes. Less is known on the effect of plant diversity on soil microbial communities. Therefore, we investigated the effects of vegetation cover, varying plant biodiversity and season on soil microbial parameters in a temperate grassland ecosystem. In May and October 2006 mixed soil samples were taken from the field site of The Jena Experiment (Germany). Sampled plots differed in plant species richness (0, 4, 8, 16), number of plant functional groups (0, 1, 2, 3, 4), and plant functional group composition. We measured basal respiration (BR) and microbial biomass (C_{mic}/CFE ; chloroform fumigation extraction method), phospholipid fatty acids (PLFA), and substrate induced respiration (SIR). We found distinct seasonal variations in microbial community structure; BR and amount of PLFAs were higher at the end of the vegetation period than in spring which was primarily due to increased biomass of fungi and gram negative bacteria. Furthermore, BR and amount of PLFAs were higher on vegetated plots than on bare grounds. Although the number of plant functional groups had no effect on microbial parameters, plant species richness affected the amount of PLFAs at the end of the vegetation period with higher biomass in 4- than in 8- and 16-species mixtures. Moreover, the proportion of gram negative bacteria was increased whereas the proportion of fungi was decreased in presence of legumes. The study showed distinct seasonal changes in the soil microbial community composition which is probably driven by the availability and quality of organic resources. Furthermore, our results highlight the time-lag of belowground responses to aboveground vegetation

manipulations.