Rainwater deficit affects litter mass loss and microbial decomposer communities in a Mediterranean forest

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Abstract

Decreasing rainfall is an expected consequence of climate change in the Mediterranean basin, which may severely affect nutrient cycling in terrestrial ecosystems. Here we studied whether plant diversity and reduced precipitation affects litter decomposition and microbial decomposer community in a typical Mediterranean forest, equipped to exclude about 30% rain at the experimental site Oak Observatory of the *Observatoire de Haute Provence* (O3HP), France. Litterbags containing single- or multi-species leaf litter mixtures of *Quercus pubescens*, *Acer monspessulanum*, *Cotinus coggygria* or *Pinus halepensis* were collected after eight and twenty months of decomposition, following maximum periods of cumulated rain exclusion. We used a metabarcoding approach based on the v3-v4 region of the16S rRNA gene and on the ITS1 intergenic region to characterize bacterial and fungal community compositions, respectively. As expected, litter decomposition was reduced in the rain exclusion treatment. The effects of litter mixture composition and of rain exclusion were significant for both bacterial and fungal communities. But bacterial communities were more diverse and subject to a higher turnover between sampling dates than fungal communities. Most remarkably, in bacterial communities, rain exclusion affected the dominance of *Actinobacteria* to the profit of *Proteobacteria*, *Acidobacteria* and *Bacteroidetes*. While, fungal communities mainly dominated by *Ascomycota* during early stage of litter decomposition, showed reduced domination of *Schizoparmaceae* to the profit of *Gnomoniacea*. Our study provides evidences that combined climate and forest biodiversity changes, induced by human activities at a global scale, affect the functioning of forest ecosystems at a local scale.

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