

Decay Types and Fungal Communities of Norway Spruce Dead Wood in Europe

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Fungi are the major decomposers of dead wood in forest ecosystems. Differences in fungal community structure affect the lignin decomposition of dead wood through differences in ligninolytic enzyme profiles of the fungal species in the community. Such differences in decomposition patterns are expected to affect carbon stocks in forests. Therefore, it is important to understand the driving factors and functions of wood-inhabiting fungi (WIF) communities in dead wood, and how they may respond to environmental changes. In this study, we investigated the relationship between fungal community composition and environmental variables in dead wood of Norway spruce (*Picea abies*) across the latitudinal gradient in Europe.

We sampled 374 dead Norway spruce logs from forests in six sites in five European countries along the latitudinal gradient. DNA metabarcoding was used to examine the fungal community structure of each log, and the functions of the fungal species that compose the community were estimated by the FUNGuild database. In this study, we also quantitatively evaluated the decay type of dead woods by using the Dilute Alkali Solubility (DAS) method, which is a method for quantifying and evaluating the chemical changes associated with the decomposition and alteration of lignocellulose in dead woods. The value of DAS (%) tends to be higher in the brown rot decay type, in which lignin remains with little modification.

DNA metabarcoding identified 1408 OTUs, of which 18 OTUs were brown rot fungi. The structure of the fungal community varies across a climatic gradient, DAS (%), an index of brown rot, was significantly correlated with mean annual temperature. The frequency of occurrence of brown rot fungi was positively correlated with DAS and annual mean temperature. These results suggested that the frequency of brown rot may increase with temperature as some species of brown rot fungi, which are sensitive to the site environment, become more dominant in a warmer temperature.



Photo. Norway spruce forest

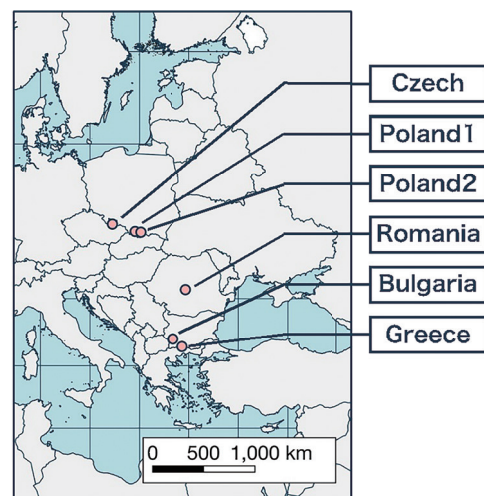


Figure. Study sites in Europe (6 sites)