

SIG2-1

Linking fungal wood decay functions to forest dynamics

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Purpose: The decay process of deadwood is crucial for biodiversity in forest ecosystems. Wood decay types, traditionally categorized into white, brown, and soft rots, are the consequences of fungal decay activities and strongly affect biotic communities inhabiting deadwood, including tree seedlings. Given that fungal community is affected by climatic conditions, it is important to evaluate the occurrence patterns of the decay types along a geographical range to understand forest dynamics in wide spatial scale.

Methods and Results: Field surveys in 30 sites in Japan and 15 sites in Europe revealed a clear latitudinal gradient in decay type distribution, which is significantly associated with climate condition (temperature, precipitation, and their seasonality). Fungal community variations in deadwood detected by DNA metabarcoding are also explained by those climate conditions. Incubation experiments using fungal strains obtained from pine deadwood showed that hyphal growth rates of brown rot fungi were significantly higher than that of white rot fungi in warm conditions (25-35°C) whereas no difference was detected in cooler conditions, suggesting that activity of brown rot fungi is more prominent in the warmer lower-latitude areas than in the cooler higher-latitude areas in pine log decomposition in Japan. I also examined the effects of wood decay type on seedlings growing on pine and spruce logs and found that responses to brown rotted wood was considerably different among tree species.

Conclusions: These results suggested that wood decay function of fungal communities could affect seedling regeneration and forest dynamics, reflecting biogeography of wood decay fungi.