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Effect of available P and phenolics on mineral N release in acidified spruce forest: connection with lignin-degrading enzymes and bacterial and fungal communities

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Annotation

We conducted over four months a shortterm laboratory incubation experiment to find the best prediction parameters (i.e. initial chemical characteristics) to explain differences in microbial respiration rates and mineral N (DIN) release in different litter in an acidified spruce forest. In addition, we wanted to find the link between the activity of key extracellular ligninolytic enzymes, phenoloxidases (PhOx) and peroxidases (PerOx), microbial respiration and composition of fungal and bacterial communities. Samples of spruce needles (*Picea abies*) and litter of four dominant understorey vegetation; lady fern (*Athyrium alpestre*), blueberry (*Vaccinium myrtillus*), reedgrass (*Calamagrostis villosa*) and hair grass (*Avenella flexuosa*), were collected in 2005, 2006 and 2007 from six sites located in watersheds of two glacial lakes (Plešné Lake and Čertovo Lake) in the Bohemian Forest, Czech Republic. Litter samples were incubated at 0 and 10 °C in laboratory controlled conditions for 90 days. Activities of PhOx and PerOx, and C mineralization rate were measured regularly each 14 days. Litter quality characteristics and endophytic microbial community structure, based on 16SrDNA-DGGE fingerprint of bacteria and ITS-DGGE of fungi, were determined at the beginning and end of litter incubation. Our results showed a close correlation of phenolics/P_{OX} with DIN release ($r > 0.74$, $p < 0.001$). Using multivariate analyses, P_{OX} seems to play an important role in the change of litter fungal and bacterial community composition. At 0 °C the fungal and bacterial communities of reedgrass and blueberry litter changed in relation to P_{OX} and PerOx activity, while at 10 °C the fungal communities after the incubation were additionally affected by the phenolics/N_{TOT} and phenolics/P_{TOT} ratios.

<u>Stanovisko spoluautorů</u>

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V Českých Budějovicích dne 29.7. 2010 Daniel Vaněk

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