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Contrasting habitats but comparable microbial decomposition in the benthic and hyporheic zone

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Abstract:

Input of allochthonous leaf litter is the main carbon source for heterotrophic metabolism in low-order forested streams. A major part of this leaf litter is accumulated at benthic retention structures or buried in the hyporheic zone. As a result of hyporheic sediment characteristics, hyporheic physicochemistry differs from that of the benthic zone selecting the microbial community. The present study aimed at understanding the influence of the hydrological and physiochemical differences between the benthic and hyporheic zone on microbial leaf litter decomposition and on the structure and function of the associated microbial community. Leached leaves of *Alnus glutinosa* were exposed for 62 days in 250-μm mesh bags in the benthic zone and buried in the hyporheic zone at a depth of 2 – 3 cm. Decomposition rates were comparable for both zones. In contrast, respiration, bacterial abundance, ergosterol content, fungal spore production and richness of fungal morphotypes were lower associated with hyporheic than with benthic leaves. Microbial community structure displayed zone-dependent temporal dynamics. Thus, the microbial community carried out leaf litter decomposition independently of its structure. These results suggest that carbon processing is not necessarily impaired by environmental constraints because the community structure may compensate those constraints (i.e. functional redundancy).

Keywords: Ecosystem functioning, microbial community, bacteria, fungi, protozoa, physicochemical filter