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Extracellular enzyme activity assays (EEA) as a tool to investigate priming in freshwater biofilms

K. Wagner, A. Sieczko, MM. Bengtsson, N. Burns, E. Herberg, and T. Battin
Department of Limnology, University of Vienna, 1090-Vienna, Austria

The priming effect describes a phenomenon, where an input of labile organic matter (LOM) increases the mineralization rate of recalcitrant organic matter (ROM). Until now priming has been mostly studied in soils, but not in aquatic ecosystems. In streams, microbial biofilms play a key role in carbon cycling. In this study, we investigate if priming contributes the metabolism of ROM in stream biofilms. We used bioreactors mimicking heterotrophic biofilms in the streambed, which were exposed to either glucose + NO_3 and PO4 or to algal extracts as potential primers. Extracellular enzymatic activities were measured both in the biofilms, before and after the experiment, and in the in- and outflow of the bioreactors during the experiment. We measured the activity of β-d-glucosidase, α-d-glucosidase, β-d-xylosidase, cellobiohydrolase as enzymes involved in carbon metabolism, of leucine-aminopeptidase and endopeptidase as enzymes involved in peptides decomposition, and of esterase and phosphatase. Furthermore, phenol oxidase activity was assessed as an indicator for ROM. We evaluate these enzymatic activities to illuminate possible mechanisms underlying priming in the biofilms.