

Biodegradation of dissolved free simple carbohydrates in surface, hyporheic and riparian waters of a large river

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With 3 figures and 3 tables

Abstract: We present experimental evidence of the potential biodegradability of five dissolved free monosaccharides and disaccharides in three different subsystems of the Garonne River: the surface water, the hyporheic zone and the riparian groundwater. A first experiment of incubation of these sugars, alone and in combination, was conducted in surface water. Glucose, fructose and cellobiose were rapidly degraded after 8 hours, whereas fucose and rhamnose were not. Second, a mixed-sugar incubation was conducted in surface, hyporheic and ground waters. Sugar biodegradation in surface water was similar to results from the first experiment. However, none of the sugars were degraded within 10 hours in hyporheic and ground waters; degradation took at least 24 hours in these subsystems. Our incubation experiments demonstrate that bacterial communities in surface, hyporheic and riparian waters, which show respectively 2.98 , 1.60 and $0.95 \cdot 10^6$ cells/ml, consume added mono- and disaccharides rapidly and with different rates, depending on the type of carbohydrates and the bacterial community.

Key words: carbohydrates, dissolved free saccharides, dissolved organic matter, biodegradation, bioavailability, river ecosystems, HPLC-PAD.

Introduction

Organic matter in river systems represents an important heterotrophic substrate (VANNOTE et al. 1980) and more particularly, dissolved organic matter (DOM) provides direct energy to the microbial loop (BOTT et al. 1984, MEYER

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