Metabolism recovery of a stromatolitic biofilm after drought in a Mediterranean stream

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With 3 figures and 2 tables in the text

Abstract: Organisms dwelling in Mediterranean streams need to be adapted to dry periods. La Solana stream dried out completely during summer 1994. The recovery of the biofilm was studied in a laboratory experiment by immersing it in stream water. La Solana has a thick stromatolitic biofilm composed of the cyanobacteria Rivularia sp. and Schizothrix spp. Ectoenzymatic microbial activities (β-glucosidase, β-xylosidase and phosphatase), H^{14}CO_3 incorporation and respiration (Electron Transport System-ETS-activity) were measured immediately after rewetting and then every hour for 5 h. Both ETS and photosynthetic activities were low at the beginning of the rewetting but increased significantly after two hours. Recovery of enzymatic activities in the biofilm was immediate, since values measured at 0h were similar to those obtained in the stream before drought. Enzymatic activities increased markedly after three hours to higher values than those reported before drought. All activities stabilized to initial values at the end of the experiment. We suggest that the rapid recovery of the biofilm metabolism could be supported by the stromatolitic structure of La Solana biofilm acting as a reserve of organic matter, as well as the rapid rehydration provided by the cyanobacteria sheaths. This implies that the biofilm can exploit short rainfall periods in dry summers.

Introduction

Most rivers subject to the Mediterranean climate are defined by their irregular pattern of water discharge (SABATER et al. 1995). Low-order streams are usually affected by drought (especially in summer), which may even convert them to discontinuous streams. Drought can affect most of the organisms dwelling in the system (WILLIAMS & HYNES 1976) even though algae and cyanobacteria recover rapidly. Recovery of biofilm metabolism after drought...