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Distribution and biodegradability of sludge accumulated in a full-scale horizontal subsurface-flow constructed wetland

Esther Llorens, Jaume Puigagut, Joan García*

Environmental Engineering Division, Department of Hydraulics, Maritime and Environmental Engineering, Technical University of Catalonia, c/ Jordi Girona 1-3, Mòdul D-1, E- 08034 Barcelona, Catalonia, Spain
Tel. +34 (93) 4016464; Fax +34 (93) 401 73 57; email: e.llorens@upc.edu, jaume.puigagut@upc.edu, joan.garcia@upc.edu

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ABSTRACT

Sludge accumulated in the inlet and outlet zones of a full-scale horizontal subsurface-flow constructed wetland was analysed in order to assess its distribution pattern and biodegradability characteristics. The amount of sludge was very variable (4.6–20.2 g TSS·kg gravel^{-1}) depending on sample location and it was mainly composed by mineral fractions (ca. 90% of the total solids content). Sludge accumulated at the inlet zone was more easily biodegraded by both aerobic and anaerobic pathways than that accumulated at the outlet zone. Specific methanogenic activities of the sludge at the inlet and outlet zones expressed as BOD equivalents were 7.8 mg BOD·g VSS^{-1}·d^{-1}, and 1.7 mg BOD·g VSS^{-1}·d^{-1}, respectively. Specific aerobic biodegradability of the sludge at the inlet and outlet zones were 23 mg BOD·g VSS^{-1}·d^{-1}, and 3.8 mg BOD·g VSS^{-1}·d^{-1}, respectively. Only around a 5% of the organic matter of the tested sludges could be degraded through aerobic pathways, and therefore it was rather refractory. Results of this study indicate that density and packing properties of the sludge are so important as the amount of sludge in relation to clogging processes.

Keywords: Wastewater; Small communities; Reed beds; Hydraulic conductivity; Methane

* Corresponding author.

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