



Enhanced phosphorus removal in a waste stabilization pond system with blast furnace slag filters

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ABSTRACT

In this work a tertiary horizontal-flow blast furnace slag (BFS) filter was tested for phosphorus removal under laboratory and field conditions. Laboratory experiments were conducted in a bench-scale BFS filter for phosphorus adsorption capacity at equilibrium conditions using P-spiked water. On-site, the performance of a pilot-scale BFS filter was monitored for phosphorus removal from the final effluent of a pilot-scale WSP system located in Esholt (Bradford, UK), which comprises a primary facultative pond and a secondary aerated rock filter (ARF) in series. Adsorption capacity (q) results showed that BFS has high affinity for inorganic P species and it can remove up to 30 g P/kg BFS; however, q values are strongly dependent on the initial P concentration. The pilot-scale BFS filter tested on-site performed better for longer (<2 mg P/L) than the laboratory-scale filter, even though despite the latter received the same hydraulic and P loadings (1.8 m³/m³ d and 18 g P/m³ d, respectively). Both the laboratory and field results showed that BFS filters are an appropriate low-cost technology to upgrading small wastewater treatment systems for phosphorus removal.

Keywords: Blast furnace slag filter; Domestic wastewater treatment; Phosphorus removal; Waste stabilization ponds

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