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Phosphorus removal and effect of adsorbent type in a constructed wetland system

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ABSTRACT

This research project aimed to determine the technologically feasible and applicable wastewater treatment systems which will be constructed to solve environmental problems of small communities in Turkey. Pilot-scale treatment of a small community's wastewater was performed over a period of more than 2 y in order to show applicability of these systems. The present study involves removal of phosphorus in horizontal (HFCW) and vertical (VFCW) sub-surface flow constructed wetlands operated in series. The pilot-scale wetland was constructed downstream of anaerobic reactors at the campus of TUBITAK-MRC. Anaerobically pretreated wastewater was introduced into this hybrid two-stage sub-surface flow wetland system. Wastewater was first introduced into the HFCW and then VFCW before being discharged. VFCW achieved up to 60–90% phosphorus removal whereas HFCW could remove only less than 20%. The effect of type of filling material on adsorption of phosphorus was investigated both in adsorption studies and in 1 m^2 constructed wetlands filled with different materials. The results showed that iron slag was the most efficient material for phosphorus removal in constructed wetlands compared to gravel, marble stone and zeolite.

Keywords: Horizontal sub-surface flow; Vertical sub-surface flow; Hybrid constructed wetland; Phosphorus removal; Filling material; Phosphorus adsorption

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