

Use of Vetiver Grass Constructed Wetland for Treatment of Leachate

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Abstract

Performance of Constructed Wetland planted with vetiver grasses for the treatment of leachate was investigated in controlled experiments involving horizontal subsurface flow constructed wetland (HSSFCW). The HSSFCW experimental unit had two cells, one planted with vetiver grasses and another bare. Both units were packed with limestone gravel as substrate and were operated with equal hydraulic loading and hydraulic retention time. Collected samples of influents and effluents were analysed for COD, Cr, Pb, Fe and pH. The results showed that vetiver grasses tolerated leachate with high loading of COD up to 14,000 mg L(-1). The planted cell outperformed the unplanted cell in terms of COD, Cr, Pb and Fe removal. The systems showed optimum points for COD and Pb removal as a function of feed concentrations. The optimum COD removal values of 210 mgm(-2) day(-1) at feed COD concentration of 11,200 mg COD L(-1) and 89 mgm(-2) day(-1) at feed concentration of 7,200 mg COD L(-1) were obtained for planted and unplanted cells respectively. Similarly Pb removal values of 0.0132 mgm(-2) day(-1) at 1.0 mg Pb L(-1) and 0.0052 mgm(-2) day(-1) at 1.04 mgPb L(-1) were obtained for planted and unplanted units respectively. Removal of Fe as a function of feed Fe concentration showed a parabolic behaviour but Cr removal showed linear behaviour with feed Cr concentrations in both units. The system showed very good removal efficiencies with Cr and Fe but poor efficiencies were recorded for Pb.