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Performance Evaluation of Constructed Wetland Units for Domestic Greywater Treatment

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Abstract

Constructed wetlands (CW) are an eco-friendly system which is mimic the functions of natural wetland. CW is now standing as a potential simple, low cost alternative system for the treatment of wastewater even up to domestic level. Therefore, this study was designed to assess the feasibility of pilot scale CW units on greywater treatment at domestic level. The sub surface flow constructed wetland units were designed using small plastic containers with the size of 55 cm length, 25 cm width, and 28 cm height and planted with selected plants such as Vetiver (*Vetiveria zizanioides*), Water spinach (*Ipomoea aquatic* L.), Lasia (*Lasia spinosa* L.) and soil without any amendments was served as a control. The experiment was conducted in a Completely Randomized Design (CRD) with three replicates in greenhouse conditions during two months period by using synthesized wastewater at the flow rate of 0.729l/h. The Hydraulic Retention Time of the system was 41 hours. The quality of the influent and each effluent were monitored at two weeks interval by analyzing water quality parameters such as Biological Oxygen Demand (BOD₅), Total Dissolve Solids (TDS), pH, Electrical Conductivity (EC), PO₄⁻³-P, NO₃⁻-N and NH₄⁺-N. According to the results, Removal efficiency of contaminants increased throughout the monitoring period. Vetiver showed significantly (p<0.05) higher RE for BOD₅, PO₄⁻³-P, NO₃⁻-N, NH₄⁺-N by 46%, 71%, 83% and 89% respectively. However Water spinach and Lasia showed significantly (p<0.05) higher RE for NO₃⁻-N and PO₄⁻³-P by 77% and 68% respectively. Hence, it can be concluded that the pilot scale CW units are feasible technology for greywater treatment at domestic level with the combination of Vetiver, Water spinach and Lasia.

Keywords: Constructed wetlands, Greywater treatment, Removal efficiencies, Wetland plants