

TREATMENT OF BATHROOM WASTEWATER IN MICROBIALLY IMPROVED CONSTRUCTED WETLAND USING BULRUSH PLANT

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Constructed wetland (CW) systems have emerged as an alternative low cost and sustainable wastewater treatment systems. Combination of wetland plants and microbial inoculums have been identified as the most effective treatment in enhancing the pollution removal efficiency of CWs. Literature revealed that CW system with bulrush (*Scirpus californicus*) plants was performed poorly in removal of certain pollutants. Hence, this study focused to enhance the pollution removal efficiency of CW with bulrush plants by introducing a fungal inoculum. The CW system was located in the Faculty of Agriculture, Rajarata University of Sri Lanka. The fungal inoculum was added to the soil surface of the CW with already established bulrush plants. The grey water discharged from a student hostel complex was directed in to the wetland at the average rate of $0.75 \text{ m}^3 \text{ h}^{-1}$. The hydraulic retention time was 45 hrs. Water quality parameters of the influent and effluent were monitored in two week intervals for a period of four months by analysing biological oxygen demand (BOD_5), nitrate-nitrogen (NO_3^- -N), ammonium - nitrogen (NH_4^+ -N), phosphate - phosphorous (PO_4^{3-} -P), total dissolved solid (TDS), dissolved oxygen (DO), pH and electrical conductivity (EC). The results revealed that the system reduced the concentration of contaminants with the increasing removal efficiencies (REs) throughout the monitoring period. The average REs of BOD_5 , NO_3^- -N, NH_4^+ -N, PO_4^{3-} -P were 59.6%, 40.5%, 28.7%, 72.6% respectively. The average pH (6.84) of the effluents was ranged around the neutral, TDS (237.3 mg L^{-1}) and EC (313.2 S cm^{-1}) also ranged within the permissible level following the natural standards for waste water. Overall it can be concluded that the microbially improved CW performed effectively in removal of all measured parameters, comparatively highest in removal of PO_4^{3-} -P. However, repeated studies would be needed for a concrete conclusion.

Keywords: Constructed wetlands, Fungal inoculum, Greywater treatment, Removal efficiency