PHYTO-MICROBIAL TREATMENT OF BATHROOM WASTEWATER IN CONSTRUCTED WETLAND

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Constructed wetlands (CWs) are treatment systems combined with wetland vegetation, soils and their associated microbial communities. Phyto-microbial combinations in wetlands are capable of treating the wastewater by adsorbing and absorbing various pollutants with plant microbiome. Therefore, this study aimed to evaluate the phyto-microbial efficiency of CW on greywater treatment process. The experiment was conducted for free water surface flow CW located at the Faculty of Agriculture, Rajarata University of Sri Lanka using *Thunhiriya (Actinoscirpus grossus)* as the wetland plant. A fungal inoculum was prepared using roots of *Thunhiriya* plant and added to the soil surface of the CW. The greywater discharged from a student hostel complex was directed into the wetland at the rate of $0.75 \, m^3h^{-1}$. The hydraulic retention time was 45 h. Water quality parameters of the influent and effluent were monitored in two weeks intervals for a period of two months by analysing nitrate-nitrogen (NO_3^--N), ammonium-nitrogen (NH_4^+-N), phosphate-phosphorous ($PO_4^{-3}-P$), total dissolved solids, dissolved oxygen, 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 NO_3^--N, NH_4^+-N, $PO_4^{-3}-P$ were 39.6%, 26.1%, 29.4%, respectively. The average pH (6.97) of the effluents was ranged around the neutral, total dissolved solids ($248 \, mgL^{-1}$), electrical conductivity ($342.8 \, \mu S \, cm^{-1}$) and dissolved oxygen ($1.25 \, mgL^{-1}$) ranged around the permissible level following the natural standards for wastewater. Overall, it can be concluded that the phyto-microbial combination of CW was successful in removing of all measured parameters and the most efficient in removal of NO_3^--N. However, repeated studies would be needed for concrete conclusion.

Keywords: Constructed wetlands, Greywater treatment, Phyto-microbial treatment Removal Efficiency