

Comparison of the Effectiveness of Hydrilla, Water Hyacinth and Water Lettuce in Treating Domestic Wastewater

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The effectiveness of three aquatic macrophytes to improve the quality of domestic wastewater was evaluated. Growth of the Water lettuce (*Pistia stratiotes*), Water hyacinth (*Eichhornia crassipes*) and Hydrilla (*Hydrilla verticillata*) were inhibited in undiluted domestic wastewater. Therefore, diluted domestic wastewater series was introduced as 30%, 20% and 10% and all three macrophytes grew successfully in the diluted series. Chemical Oxidation Demand, Biological Oxidation Demand, Dissolved Oxygen, NO_3^- as N, PO_4^{3-} as P, pH, Oil and grease, alkalinity and acidity were analyzed as water quality parameters at the beginning and 3rd day, 6th day and 9th day after introducing macrophytes. All three aquatic macrophytes improved the quality up to the permissible levels of wastewater discharging during 9-day period. According to the performance of all three macrophytes, water lettuce is the most effective macrophyte for treating domestic wastewater within the shortest time period (3-day hydraulic retention time). Controls of the each dilution to which macrophytes were not introduced, the quality did not reach to the wastewater discharging permissible levels at any quality analyzed point within the 9-day period. A model was introduced to households for treating their own domestic wastewater using the findings of this study. In the model, domestic wastewater flows through a pipeline and another pipeline is connected with water to dilute the wastewater. To achieve the 30% dilution, 35 L of water should be supplied to 50 L volume domestic wastewater treating tank (0.41 m diameter, 0.37 m working depth) which contains inlet and outlet pipelines designed with baffle walls to keep 3-day hydraulic retention time. Introducing about 100 g fresh weight of Water lettuce at the beginning is sufficient to function this model. Treated water is flowing through the outlet after 3-day period and the water can be discharged to a surface water body or to the land surface.

Keywords: Domestic wastewater treatment, Hydrilla, Water hyacinth, Water lettuce