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***Eichhornia crassipes* Leaves as a Waste-derived Bio-Sorbent to Remove Organics and Nutrients from Rice Mill Wastewater**

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Abstract

The increased rate of population growth resulted in the increased number of rice mill industries to fulfill the demand for rice. The rice mill wastewater contains a high load of organics and nutrients. Therefore, the direct discharge of wastewater into the environment may degrade the quality of the environment as well as causes adverse effects on human health. Among various methods to treat waste effluent, bio-sorption is a cheap and environmentally sound approach. *Eichhornia crassipes* is a noxious weed that spreads rapidly. Most of the tanks in Vavuniya are polluted by *E. crassipes* and it needs a sustainable solution. This study uses the leaves of *E. crassipes* to produce waste-derived bio-sorbent to treat rice mill wastewater. The wastewater was collected from one of the rice mills in the Vavuniya town area. The adsorption isotherm and adsorption kinetics experiments were conducted to find out the removal efficiencies of COD, nitrate, and phosphate from wastewater. The effect of the dosage of bio-sorbent (1-6 g/L) and the contact time (30-180 min) with the wastewater was studied to determine the optimum dosage and optimum contact time. The bio-sorbent showed maximum removal efficiencies of COD (54.5%), nitrates (58.1%), and phosphates (29.5%) at the optimum dosage of 4 g/L at 120 min. Based on the t-test, *E. crassipes* leaves significantly reduce COD, nitrate, and phosphate (p-value<0.05). However, COD and nitrate showed higher removal rates than phosphate. Further, long-term column studies should be conducted to apply the above technique in wastewater treatment plants in treating the rice mill wastewater in the real world. This study emphasizes that *E. crassipes* leaves have the potential to remove contaminants from wastewater as well as this would also help to minimize the spread of the weed to safeguard the environment.

Keywords: *Eichhornia crassipes*, Bio-sorption, Vavuniya tank, Water quality