

EFFECTIVENESS OF *Monochoria vaginalis* TO TREAT DAIRY WASTEWATER IN ALUM SLUDGE-BASED CONSTRUCTED WETLAND SYSTEM

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Wastewater is one of the major environmental problems worldwide. Industrial wastewater such as dairy wastewater contains a high level of organic and inorganic matter, oil and grease, and phosphate. The constructed wetland (CW) concept has been used as a treatment method for various types of wastewater. In this study, an alum sludge-based CW system consisting of two steps as a sedimentation tank and the CW was created to treat dairy wastewater. An alum sludge layer was applied as a substrate layer to the CW to increase the effectiveness of removing phosphorus from the dairy wastewater. The *Monochoria vaginalis* plant was selected as a macrophyte for this CW system. Twenty-five litres of dairy wastewater flowed through the following: a) CW system, b) CW without the alum sludge layer, and c) CW without the *Monochoria vaginalis*. The samples were collected before and after sending through the system, and the following parameters: pH, conductivity, turbidity, nitrate, phosphate as P, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Solids (TS) and oil and grease were measured. Results showed that average removal efficiencies of the complete CW system were 30% for pH, 15% for conductivity, 75% for turbidity, 73% for nitrate, 65% for phosphate, 95 – 99% for oil and grease, 25% for TS, 15 – 20% for TDS and 60% for TSS. Further, the results showed that the alum sludge substrate layer could significantly reduce the amount of phosphorus in the wastewater. In this CW system, physical, chemical and biological processes have been involved in wastewater treatment. Therefore, the CW system developed in this study can be identified as an effective, eco-friendly and cost-effective small-scale constructed wetland unit.

Keywords: Alum sludge, Constructed wetland, Dairy wastewater, *Monochoria vaginalis*