

Phytoremediation Rates of Water Hyacinth in an Aquaculture Effluent Hydroponic System

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Abstract : Conventional wastewater treatment plants of activated carbon, electro dialysis, ion exchange, reverse osmosis etc. are expensive to install, operate and maintain especially in developing countries; therefore, the use of aquatic macrophytes for wastewater purification is a viable alternative. On the first day of experimentation, approximately 100g of water hyacinth was introduced into the hydroponic units in four replicates. The water quality parameters measured were total suspended solids (TSS), pH and electrical conductivity (EC). Others were concentration of ammonium–nitrogen (NH₄⁺-N), nitrite-nitrogen (NO₂⁻-N), nitrate-nitrogen (NO₃⁻-N), phosphate–phosphorus (PO₄³⁻-P), and biomass value. At phytoremediation intervals of 7, 14, 21 and 28 days, the biomass recorded were 438.2 g, 600.7 g, 688.2 g and 725.7 g. Water hyacinth was able to reduce the pollutant concentration of all the selected parameter. The percentage reduction of pH ranged from 1.9% to 14.7%, EC from 49.8% to 97.0%, TDS from 50.4% to 97.6%, TSS from 34.0% to 78.3%, NH₄⁺-N from 38.9% to 85.2%, NO₂⁻-N from 0% to 84.6%, NO₃⁻-N from 63.2% to 98.8% and PO₄³⁻-P from 10% to 88.0%. Paired sample t-test shows that at 95% confidence level, it can be concluded statistically that the inequality between the pre-treatment and post-treatment values are significant. This suggests that the use of water hyacinth is valuable in the design and operation of aquaculture effluent treatment and should therefore be adopted by environmental and wastewater managers.

Keywords : aquaculture effluent, phytoremediation, pollutant, water hyacinth

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