

**INTEGRATED WASTEWATER TREATMENT USING
WATER HYACINTH (*Eichhornia crassipes*), GIANT
SALVINIA (*Salvinia molesta*) AND BLUE SWIMMING
CRAB (*Portunuspelagicus*) SHELL WASTE**

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by

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Abstract

Industrial waste water emitting from industries cause significant problems in both aspects of environment and human health. Phytoremediation and biosorption are effective and low cost methods for a country like Sri Lanka to treat industrial waste water. The study was carried out to check whether there is a feasibility to utilize combination of *Portunus pelagicus* shell waste with *Eichhornia crassipes* and *Salvinia molesta* which are invasive species to Sri Lanka. The best effective dosage of shell powder and amount of plants were investigate to increase dissolve oxygen (DO), remove chemical oxygen demand (COD), neutralize pH and remove total solids (TS), total dissolve solids (TDS), phosphate and heavy metals (Cr, Cd and Cu) and evaluate whether there is an effect of initial heavy metal concentration (0.5 mg/L, 1 mg/L and 1.5 mg/L) and initial phosphate concentration (1mg/L, 2 mg/L and 3 mg/L) on removal efficiency of heavy metal and phosphate respectively. The results show that there is a significant effect on combination of *Portunus pelagicus* shell waste combine with *Eichhornia crassipes* and *Salvinia molesta* on treating waste water ($p < 0.05$). 4 g of crab shell powder with 200 g of water hyacinth recorded highest DO (4.1 ± 0.16) and highest removal rate of COD (95%), TS (72%), TDS (61%) and Phosphate (65-55% for 1-3 ppm of PO_4^{3-} levels) while maximum removal rate of Cr (92-78%), Cu (86-70%) and Cd (96-86%) shows by the same treatment. The initial concentration also significantly effect on the removal efficiency of phosphate and heavy metals ($p < 0.05$). The removal efficiency of heavy metals noted to be $Cd > Cr > Cu$ after 4 days of contacting time. The metal adsorption capacity depends on adsorbent dosage, pH level, metal ion charge, initial heavy metal concentration, and ionic radius of metal. The results of this study suggested that the combination of *Portunus pelagicus* shell waste with *Eichhornia crassipes* and *Salvinia molesta* is a good combination for treat industrial waste water while controlling freshwater invasive alien species (IAS) load and value addition to crab shell residues.