STUDY ON UTILITY OF *Crassostrea madrasensis* (THE INDIAN OYSTER) SHELLS FOR WATER QUALITY IMPROVEMENT: AN ALTERNATIVE FOR WASTEWATER TREATMENT

RASHINI PUNSALA SENADEERA

Aquatic Resources Technology Degree Programme

Department of Animal Science

Faculty of Animal Science and Export Agriculture

Uva Wellassa University of Sri Lanka

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Abstract

Oyster shell is a waste byproduct in sea food industry, thus waste accumulation can be minimized by reusing shells in environmental applications. Most biogenic structures are useful as adsorbent and biofilter in wastewater treatment. This study focused on investigation of potential use of *Crassostrea madrasensis* Oyster shells for removal of contaminants in wastewater. Removal efficiency of heavy metals (Cu, Cd, and Cr) and other physicochemical parameters in wastewater were tested in different treatments. Crushed and oven dried (90^0C) oyster shells (9g-20g) for 24 hrs retention time was utilized to optimize the appropriate conditions for the treatment procedures for removal of contaminants. As results revealed, heavy metal adsorption capacity, analyzed using Atomic Absorption Spectrometer, is significantly changed with initial heavy metal concentration and adsorbent masses ($p<0.05$). Wastewater treated with 9g of shell powder recorded most efficient heavy metal removal rates for Cu (94.50-99.88%) and Cr (95.68-97.70%), while (99.16-99.64) % of highest Cd removal rate was for wastewater treated with 11g of oyster shell powder for 24 hrs contact period. The functional groups of Chitin in *C. madrasensis* shells make strong adsorption capacity, thus Oyster shells act as an effective biofilter in removal of heavy metals in wastewater. Further, average DO was increased at maximum 30.26%, while highest removal efficiency of COD was 59.84% for 5 g of shell powder after 24 hrs treatment period. Initial phosphate concentration was significantly decreased with increased oyster shell powder amount ($p<0.05$), indicating potential of application in eutrophicated water. Highest phosphate removal capacity at 1ppm (72.4%), 3ppm (85.9%) and 5ppm (56.2%) was found to be at 15 g of shell powder with 24 hrs retention period. Presence of CaO in higher quantities facilitates the removal of pollutants by surface adsorption. Final pH was found to be increased approximately at pH of 6.5-8.5 which is optimum pH range for aquatic organisms. This study specified potential in implementation of *C. madrasensis* Oyster shells for wastewater treatments as low cost, environmental friendly alternative method.

Keywords: Bio-filter, Adsorption Capacity, Physicochemical properties, Wastewater treatment, Oyster shells