

PHYTOREMEDIATION OF PHOSPHATES A SOLUTION FOR EUTROPHICATION

M.A.L.A. Dayarathne¹, M.C.M. Iqbal² and W.C.P. Egodawatta¹

¹*Department of Plant Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka.*

²*National Institute of Fundamental Studies, Hantana, Sri Lanka.*

Eutrophication, a globally concerned water quality impairment as a result of excessive nutrient discharge basically by phosphorus/phosphates to water bodies from agricultural and other anthropogenic origins. Beyond a threshold of $>0.03\text{mgL}^{-1}$ of phosphates, usage of such eutrophied water bodies leads to severe health and environment concerns to adjacent communities and ecosystems. Phytoremediation, a cost effective plant based approach, has been identified as a sustainable and environmentally friendly remediation solution. The broad objective of the study was to assess the efficacy of locally available macrophytes for phosphate phytoremediation. From the preliminary study, Water hyacinth (*Eichhornia crassipes*) and Water lettuce (*Pistia stratiotes* L.) were selected as candidate macrophytes. The efficacy of two selected macrophytes was tested in ambient atmospheric conditions, in a greenhouse using floating sieves. Phytoremediation efficacy in different contact times, introductory weights, pH values and initial phosphate concentrations were assessed. The phosphate sequestration ability of *E. crassipes* and *P. stratiotes* were estimated. A fresh weight of 250 ± 5 g of two macrophytes was introduced into to a 3L of 25 mgL^{-1} of phosphate solutions, and after 48 hours of equilibrium time yielded phosphate removal efficiencies were 71.56% and 76.28% from *P. stratiotes*, *E. crassipes*, respectively. The most effective introduction biomass was 550g for both *P. stratiotes* and *E. crassipes* with removal efficiencies of 77.15% 80.13%, respectively. A maximum removal efficiency of 77.70% and 83.70% were observed for *P. stratiotes* and *E. crassipes* at pH of 7. *P. stratiotes* had reached to its maximum removal efficiency of 88.23% in 25 mgL^{-1} , while in *E. crassipes*, highest uptake was 46.99 mgL^{-1} at a 250mgL^{-1} , despite the highest removal efficiency of 89.49% was at 25mgL^{-1} . *P. stratiotes* and *E. crassipes* showed a potential of fixing 35.37% and 41.63% phosphorus an eutrophied water body after 5 days, indicating a greater efficacy in phytoremediation and a candidacy of being a good source of Phosphorus fertilizer in future.

Key words: *Eichhornia crassipes*, *Pistia stratiotes* L., Phosphates, Phytoremediation, Removal efficiency