

PHYTOREMEDIATION OF PHOSPHATES AS A REMEDY FOR EUTROPHICATION

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Eutrophication is a globally concerned water quality impairment as a result of excessive nutrient discharge primarily by phosphorus/phosphates to waterbodies from agricultural and other anthropogenic origins. Beyond a threshold of $>0.03 \text{ mgL}^{-1}$ of phosphates, usage of such eutrophied waterbodies leads to severe health and environmental concerns to adjacent communities and ecosystems. Phytoremediation, a cost-effective plant-based approach, has been identified as sustainable and environmentally friendly remediation. The broad objective of the study was to assess the efficacy of locally available macrophytes for phosphate phytoremediation. From the preliminary study, *Eichhornia crassipes* (water hyacinth) and *Pistia stratiotes* L. (water lettuce) were selected as candidate macrophytes. The efficacy of the 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 $250 \pm 5 \text{ g}$ of two macrophytes was introduced into to a 3 L of 25 mgL^{-1} of phosphate solutions, and after 48 hours of equilibrium time resulted phosphate removal efficiencies were 71.6% and 76.8% from *P. stratiotes*, *E. crassipes*, receptively. The most effective introduction biomass was 550 g for both *P. stratiotes* and *E. crassipes* with removal efficiencies of 77.1% 80.1%, respectively. Maximum removal efficiencies of 77.7% and 83.7% were observed for *P. stratiotes* and *E. crassipes* at pH of 7. *P. stratiotes* reached to its maximum removal efficiency of 88.2% in 25 mgL^{-1} , while in *E. crassipes*, highest uptake was 46.99 mgL^{-1} at 250 mgL^{-1} , despite the highest removal efficiency of 89.5% was at 25 mgL^{-1} . *P. stratiotes* and *E. crassipes* showed a potential of fixing 35.4% and 41.6% of phosphorus from eutrophied water body after five days, indicating a higher efficacy in phytoremediation and a candidacy of being a good source of phosphorus fertilizer in future.

Keywords: *Eichhornia crassipes*, *Pistia stratiotes*, Phosphates, Phytoremediation, Removal efficiency