

Green Algal and Cyanobacterial Heavy Metal Removers Isolated from Kandy Lake and Mid Canal

W.G.M. Lakmali¹, S.N.P. Athukorala², K.B. Jayasundera³

Algae are a group of photosynthetic eukaryotic organisms that range from microscopic (microalgae) to macroscopic (macro algae). They have ability to remove nutrients, inorganic and organic contaminations, heavy metals and some pathogens from waste water. The objectives of this study were to isolate different algal and cyanobacterial strains from Kandy Lake and Mid Canal and to screen them for metal removal ability. Water samples were randomly collected from twenty plots at 0-2 feet depth during August 2016 to May 2017 from Kandy Lake and Mid Canal, green algae and Cyanobacteria were identified using standard keys. Pure cultures were obtained by subsequent streaking on solid Bold's Basal Medium (BBM). Pure cultures of five species including unicellular, filamentous green algae and cyanobacteria (*Anacystis* sp., *Chlorella* sp. *Phormidium* sp., *Uronema* sp. and *Monoraphidium* sp.) were used to screen the ability to remove lead (Pb²⁺) with a concentration of 20 mgdm⁻³ using Atomic Absorption Spectrophotometer (AAS). Tolerance of each species to Pb²⁺ were determined by calculating the percentage live and death cells using methylene blue assay, after incubating three days of algal cells in liquid BBM with a Pb²⁺ concentration of 20 mgdm⁻³. According to results, except *Monoraphidium* sp. (71.77%), unicellular species exhibited low metal removal capacity (*Anacystis* sp. - 9.01% and *Chlorella* sp. - 9.12%). Filamentous species; *Uronema* sp. (55.53%) and *Phormidium* sp. (78.52%) have shown significantly high Pb²⁺ removal ability. Toxicity study has shown that except *Anacystis* sp., most of the algal species tolerate Pb²⁺ at 20 mgdm⁻³. Low Pb²⁺ removal ability of unicellular species may be due to the variation of metal binding sites and their capability for fixing metal ions. Some cells in the filamentous forms might have vacuoles to store the metal ions. *Phormidium* sp., which showed the highest removal ability, has also been recorded to remove Pb²⁺ at low concentrations in previous studies. This study has identified two green algal species and one cyanobacterial species with Pb²⁺ removal ability, which could be developed into potential Pb²⁺ removers at industrial levels. Further studies are underway to determine the removal ability of other heavy metals and further characterization of these candidates.

Keywords: Microalgae, Cyanobacteria, Heavy Metal Removers, Pure Cultures, Wastewater Treatment

¹ Department of Botany, Faculty of Science, University of Peradeniya, Sri Lanka; madushalakmali1992@gmail.com

² Department of Botany, Faculty of Science, University of Peradeniya, Sri Lanka

³ Department of Chemistry, Faculty of Science, University of Ruhuna, Sri Lanka