Low Cost Algal Removal Method for *Dri Aru* Water Treatment Plant

***Mathuranthagi, S., Rajeevan, N. and Ketheesan, B.**
Department of Civil Engineering, University of Jaffna, Sri Lanka
*Corresponding email: mathushiva15@gmail.com

Removal of algae plays an important role in the water treatment industry to maintain a system with higher efficiency and to prevent the release of algal toxins. A water treatment plant in Kilinochchi was taken as case study as the plant had serious algal overgrowth issues within the system as well as in the intake (*Dri Aru* tank). The aim of the research is to find the root causes for excessive algal growth in the *Dri Aru* tank and to propose a cost effective treatment method for algal removal in the plant. Water samples were collected from 10 locations at tributaries of *Dri Aru* tank and the concentration of Nitrate and Phosphate was measured using colorimeter to compare the locations of higher nutrient supply. For the treatment method, adsorption of coconut shell based Granular Activated Carbon (GAC) was selected (size range: 0.6 mm - 2.3 mm) to perform Batch scale and Column scale experiments. The results showed, the *Dri Aru* tank has a source of Phosphate supplement with concentrations above 0.5 ppm (Standard limit: 0.05 ppm) at Kilinochchi town rear side and supply channel from Iranamadu to *Dri Aru* tank. Based on adsorption batch studies the optimum dose and contact time were 20 g/L and one minute respectively. Based on the R^2 values of Langimuir, Freudlich, Temkin and Dubinin – Radushkevich isotherms, Temkin isotherm was selected as the best fitting model. The adsorption capacity of selected GAC was 0.17 g/L and 0.16 g/L for chlorophyll and cells respectively. The GAC fixed bed column (15 cm diameter and 70 cm height) running at the flow rate of 17 mL/min for 120 hours, resulted to the maximum removal efficiency of 92 % and 95 % for chlorophyll and cells respectively at 52 hours and the minimum removal efficiency was 58 % at 120 hours. Thus, the coconut shell based GAC can be used as an adsorbent to remove algae in water treatment plants to improve the efficiency of the system. However, the GAC fixed bed column was inefficient in removing the algae types such as *Gomphoshaeria, Osilatoria* and *Microcystis* after 120 hours of operation.

Keywords: Adsorption, Algae, Granular activated carbon, Isotherm, Water treatment