



“Gheorghe Asachi” Technical University of Iasi, Romania



TREATMENT OF RURAL DOMESTIC WASTEWATER WITH ARTIFICIAL CONSTRUCTED WETLANDS USING *Ipomoea carnea* AND *Ricinus castor* PLANTS

Sagar Mukundrao Gawande*, Dilip Dhondu Sarode

Department of General Engineering, Institute of Chemical Technology, Mumbai, Matunga, Mumbai, 400019, India

Abstract

Pollutants that represent a significant hazard for human health can include dyes, heavy metals, and other toxic organic and inorganic compounds. The application of manmade treatment wetlands to intercept and partially refurbish wastewaters before they leave the farms as surface runoff or groundwater penetration, or before they are reused in the farm for irrigation or other operations, is one approach that is increasingly being considered. Wastewater quality can be controlled by being treated using various treatment technologies, among which, Phytoremediation has gained a major interest due to its efficiency and low costs. Phytoremediation involves the use of plants as well as related soil bacteria to lower the concentrations or harmful effects of pollutants in the environment. This present study examined the use of phytoremediation as a plant-based environmental treatment in environmental remediation, specifically in the treatment of rural residential wastewater with artificially produced wetlands including *Ipomoea carnea* and *Ricinus castor* plants. The methods involved in Phytoremediation, its advantages and disadvantages, the materials used, steps involved in the process etc. are discussed in the paper. The influence of some factors on treatment efficiency, such as pH values, temperature, the levels of wastewater characteristics (BOD, COD, TSS, $\text{NH}_3\text{-N}$, PO_4^{3-} etc.) are analyzed for the inlet and outlet wastewater. These factors were monitored weekly, during the first week of April 2022 to the second week of August 2022 and the results were processed. Biology and dimension aspects are studied using field emission scanning electron microscopy (FESEM). The experimental setup and site work are all depicted in visual form. FESEM analysis is used to examine the form and size characteristics of particles found in the plants *Ipomoea Carnea* and *Ricinus castor*. The suggested model can balance pH upto (7.2), BOD (56), COD (103), TSS (43.3), and the NH_3^- levels, according to the data. As a result, the suggested model can turn dirty water (acid or base) into a neutral solution.

Key words: domestic waste, *Ipomoea*, phytoremediation, *Ricinus castor*, wastewater treatment

Received: September, 2022; Revised final: June, 2023; Accepted: September, 2023; Published in final edited form: September, 2023

* Author to whom all correspondence should be addressed: e-mail: civ16sm.gawande@pg.ictmumbai.edu.in