

# PHYTOREMEDIATION EFFICIENCIES OF *SPIRODELA POLYRHIZA* AND *BRASSICA OLERACEA* IN REMOVING NUTRIENTS FROM TREATED SEWAGE EFFLUENT

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## Abstract

The study investigates the capacity of phytoremediation as a post-treatment step for the nutrients rich treated sewage effluent from Saga City Sewage Treatment Plant, Saga, Japan. Phytoremediation in the context of this study is the removal of nutrients such as ammoniacal nitrogen, nitrate nitrogen and phosphorus from the nutrients rich treated sewage effluent. In this study, *Spirodela polyrhiza* and *Brassica oleracea* were used to phytoremediate the treated sewage effluent collected from Saga City Sewage Treatment Plant under laboratory scale. Plants were grown in *polypropylene* planter box supplied with 8000 ml treated sewage effluent with indoor environment and full water retention throughout the experimental studies. The removal efficiency and daily absorption of nutrients by phytoremediation plants were determined. It was found that the most optimal removal efficiency and average daily nutrient removal rate of *Spirodela polyrhiza* throughout the experiment were 92.42±1.29% or 15.4 mg/L/day of ammoniacal nitrogen achieved in day 1, 78.69±10.31% 2.68 mg/L/day of nitrate nitrogen achieved in day 4 and 93.45±3.26% or 0.51 mg/L/day of phosphorus in day 3 of experiment. On the other hand, the removal efficiency and average daily nutrient removal rate of *Brassica oleracea* throughout the experiment of a total of 8 days were 76.07±10.38% or 1.68 mg/L/day of ammoniacal nitrogen, 78.38±0.40% or 1.19 mg/L/day of nitrate nitrogen and 67.40±10.91% or 0.10 mg/L/day of phosphorus. The combination of findings demonstrate that phytoremediation of *Spirodela polyrhiza* is far more effective in removing nutrients from the nutrients rich treated sewage effluent than *Brassica oleracea*. The significants of the study includes reduce the possibility of eutrophication outbreak caused by the disposal of treated sewage effluent, advocating less dependency of global demand for non-renewable phosphorus resources in the agriculture sector and solving food demand due to increasing world population.

**Keywords:** Phytoremediation, Treated Sewage, Effluent, *Spirodela polyrhiza*, *Brassica oleracea*