Biosorption of copper ions using rhizoplane bacterial isolates isolated from *Eichhornia crassipes* ((Mart.) solms) with kinetic studies

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**ABSTRACT**

Biosorption of Cu ions from the aqueous solution was studied with *Pseudomonas putida* and *Bacillus cereus*, isolated from rhizoplane region of water hyacinth (*Eichhornia crassipes*) using pure culture technique. The effect of contact time (0, 4, 8, 12, 16, 20, and 24 h), pH (3, 5, 7, and 9), temperature (25, 37, and 45˚C), and initial concentrations of Cu ions (50–1500 mg l\(^{-1}\)) on biosorption was investigated in batch systems. Better amount of biosorption of Cu ions (500 mg l\(^{-1}\)) from the tested biosorbents was found to be 84.8% by *P. putida* and 83.8% by *B. cereus* at pH 7. The biosorbed Cu ions by *P. putida* and *B. cereus* were 420 and 415 mg l\(^{-1}\), respectively, at 500 mg l\(^{-1}\) of Cu ion concentration. The results of pseudo-second-order kinetics were considered as the most appropriate model which predicted the biosorption capacity of both the bacterial isolates with comparison to the experimental results. Langmuir and Freundlich isotherms were used to evaluate the experimental data and their constants were derived. From the data analysis, Freundlich isotherm was fitted well followed by Langmuir isotherm model.

**Keywords:** Copper ions; Rhizoplane microbes; *Eichhornia crassipes*; Langmuir and Freundlich isotherm models; Pseudo-first and second-order kinetics