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Assessment of algae as mercury bioindicators in acid mine drainage waters and their potential for phytoremediation

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Abstract

The use of algae as heavy metal bioindicators in aquatic environments has received much attention. In this study, the performance of a common freshwater living green alga, *Cladophora* sp. as a mercury bioindicator and its potential for phytoremediation applications was assessed by various parameters which included the influence of contact time, pH, initial mercury concentration and the presence of competing metal cations. A rapid uptake of mercury by *Cladophora* sp. was displayed. More than 99% of mercury in solution was removed within the first 5 min of contact and equilibrium was attained after 10 min. High adsorption capacities of 800 mg kg^{-1}, 530 mg kg^{-1} and 590 mg kg^{-1} at pH 3, 6.5 and 8.5 respectively were obtained at the optimum mercury concentration of 1.0 mg l^{-1}. Competitive adsorption studies showed that the selectivity of heavy metal cations by *Cladophora* sp. was in the following order: Hg^{2+} >Fe^{2+}>Cu^{2+}> Zn^{2+} > Co^{2+}. These results indicate that living *Cladophora* sp. algae are suitable for use as mercury bioindicators in AMD waters and are also suitable for the removal of mercury in AMD conditions.