

Phytoremediation of nickel from hydroponic system by hydrophyte coontail (*Ceratophyllum demersum* L.)

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Abstract

With increasing of population, water resources' pollution has been intensified and new and inexpensive methods are needed for remediation and improvement of water quality. Nickel is a necessary element in low concentrations for survival of the ecosystems, but in high concentrations is harmful and considered as a dangerous pollutant. This element pollutes water resources through different sources such as municipal and industrial wastewaters. Phytoremediation with aquatic macrophytes is a new, effective and inexpensive method for improving water quality and wastewater. In this study, Phytoremediation of nickel (Ni) from a hydroponic system by coontail (*Ceratophyllum demersum* L.), a native hydrophyte of most rivers in Iran, was investigated. After optimum pH determination (pH=7), this plant was cultivated within 14 days in a contaminated Hoagland nutrient solution which had four different concentrations of Ni (0, 1, 2, 4, and 6 mg/L). By daily measurement of Ni concentration in cultivation solution and also initial and final concentrations of this element in the plants, the Ni-phytoextraction potential was evaluated, and biological effects of Ni on coontail were studied by calculation of biomass production index. Maximum Ni removal efficiency was 50%, which was observed in the 1 mg/L Ni treatment. Maximum transfer factor and uptake index were 338.65 and 5.05 mg, respectively, obtained in 6 mg/L Ni treatment. Minimum and maximum biomass production-index (1.27 and 3.6 g/day, respectively) was related to 6 and 0 mg/L of pollutant concentrations. The conclusion of this research was that Ni phytoremediation in hydroponic systems with coontail is conceivable and evaluation of its potential is recommended for industrial wastewaters.

Keywords: Nickel, Phytoremediation, Hydrophytes, Pollution of water resources.

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