

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

A. Parneyan^{1*}, M. Chorom¹, N. Jafarzadeh Haghghi-Fard² and M. Dinarvand³

(Received : February 29-2011 ; Accepted : June 20-2011)

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.

1. Former MSc. Student and Assoc. Prof., Respectively, of Soil Sci., Shahid Chamran Univ., Ahvaz, Iran.

2. Prof., Dept. of Environ. Health, Ahvaz Jundishapur Univ. of Medical Sci., Ahvaz, Iran.

3. MSc. of Botany, Agric. and Natur. Resour. Res. Center of Ahvaz, Iran.

*: Corresponding Author, Email: amir.parnain86@gmail.com