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

A. Parneyan<sup>1\*</sup>, M. Chorom<sup>1</sup>, N. Jafarzadeh Haghighi-Fard<sup>2</sup> and M. Dinarvand<sup>3</sup>

(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.

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

<sup>2.</sup> Prof., Dept. of Environ. Health, Ahvaz Jundishapur Univ. of Medical Sci., Ahvaz, Iran.

<sup>3.</sup> MSc. of Botany, Agric. and Natur. Resour. Res. Center of Ahvaz, Iran.

<sup>\*:</sup> Corresponding Author, Email: amir.parnain86@gmail.com