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RESEARCH ARTICLE

EVALUATION OF HEAVY METALS CONCENTRATION IN SOME AQUATIC PLANTS AS BIOMARKERS FOR WATER POLLUTION

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ABSTRACT

This study emphasizes the predictive ability of aquatic plant as bio monitoring agents of water exposure to pollutants (especially heavy metals) in some rivers passes through Jallawla, Hemrin and Al- Wajeehia cities in Diyala province, Iraq. Chemical profiling of five heavy metals (Fe, Ni, Co, Cd, Pb) was under taken in tissues of two aquatic plants (*Ceratophyllum demersum and Myriophyllam spicatum*). The sample was collected during November and December 2013. Concentrations of these elements was determine using atomic absorption spectrophotometer. The result showed that the concentration of Fe , Ni , and Co were 7.597 ppm , 0.773 ppm and 0.428 ppm, respectively while the study was not recorded any concentration for Cd and Pb in all studied area.

INTRODUCTION

Water pollution is one of the most serious environmental problems in the worldwide due to their toxicity on organism (Duruibe *et al.*, 2007). The present of heavy metals in fresh water with various concentration reflect their anthropogenic and environmental sources such as geological erosion of rocks, increased urbanization, expansion of industrial activities, exploration and exploitation of natural resources, extantion of irrigation, using of chemical fertilizers and agricultural pesticides, factory waste and sewage (Fernandez – Leborance and Olalla-Herrero, 2000) The aquatic plants were used as biomarkers to environmental pollution for their diversity, their widespread in fresh water and for their resistance against the changes in environment conditions (Salman *et al.*, 2010). Aquatic plants was used in water quality studies to moniter heavy metals and other pollutions present in sediment and water. They accumulate pollutants at a higher level by absorption these pollutants from surrounding area (Ahmet, 2005). Phytoremedation is a new tool for removing pollutions from environments and its defined as the used of green plants to remove pollutants from environment or render them harmless or isolation danger materials from environment (Mitch, 2002, Glick, 2003, Pulford *et al.*, 2003) this tools consider as potentials remediation solution and its cheaper than any other tools were used for this problem some plants can be considered a solar – driven pump which can extract and concentrate particular elements from environment especially that without biological function such as Cd, Cr, Pb, and Hg (Baker and Brooks,1989). *Ceratophyllum demersum* belongs to genus *Ceratophyllum* Ceratophyllaceae family it is aquatic herb perennial plant while *Myriophyllam spicatum* are herbs belong to *Myriophyllam* genus, Haloragaceae family. Thes two plants were known as hyper accumulator species for some metals (Al_hamim and Almiahi, 1991). The objective of this study was to evaluate the pollution of studied area with Fe, Ni, Co, Cd and Pb Compared with local and internationalIevels.

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MATERIALS AND METHODS

Ceratophyllim demersum was collect from Jallwlla and Hemrin while *Myriophyllam spicatum* was collected from Hemrin and AL-wajeehia in Diyala province during winter months (November and December). The samples were transferred to laboratory in clean labeled plastic bags and washed by tap water then with distilled water (Lytle*etal* 1995). The samples were dried in 70 C° and then grinded. Half gram of dried samples was taken and placed in beaker. Digest processes were done by using Nitric acid, Sulfuric acid and Prechlorate acid (1:1:2, respectirely) for 2-4 hours. The samples were rinsed and the volume was completed to 50 ml with distilled water (APHA 1998). Concentration of heavy metals was determined by atomic absorption spectrophotometer in Education college for Pure Science, Diyala University.

Table 1. Concentrations heavy metals plant Ceratophyllumdemersum

Studied area	Mon.	Fe	Ni	Co	Pb	Cd
Jallawlla	Nov.	7.597 ∓ 0.001	0.468 ∓ 0.001	0.428 ∓ 0.001	No.d.	No.d.
	Dec.	5.419 ∓ 0.017	0.396 ∓ 0.001	0.233 ∓ 0.0009	No.d.	No.d.
Hemrin	Nov.	6.855 ∓ 0.015	0.594 ∓ 0.0007	0.168 ∓ 0.0008	No.d.	No.d.
	Dec.	4.935 ∓ 0.019	0.773 ∓ 0.001	0.211 ∓ 0.0007	No.d.	No.d.

Table 2. Concentrations heavy metals plant Myriophyllamspicatum

Studied area	Mon.	Fe	Ni	Co	Pb	Cd
Hemrin	Nov.	No.d.	No.d.	7.339 ∓ 0.016	0.378 ∓ 0.001	0.011 ∓ 0.0009
	Dec.	No.d.	No.d.	5.484 ∓ 0.011	0.414 ∓ 0.0007	0.157 ∓ 0.0011
Al-Wajeehia	Nov.	No.d.	No.d.	7.387 ∓ 0.052	0.432 ∓ 0.0007	0.114 ∓ 0.0001
	Nod.	Nod.	No.d.	4.548 ∓ 0.006	0.414 ∓ 0.001	0.168 ∓ 0.001

RESULT AND DISCUSSION

This study was done to determine the concentration of some heavy metals in two species of aquatic plant (*Ceratophyllum demersum, Myriophylam spicatum*) which considered as good candidates for pollutant removal or even as bio indicators for heavy metals in aquatic ecosystem (Nariain *et al*., 2011). Aquatic plants reflect the situation of pollution more then sediment or water (Memon *et al*., 2001).

Table 1 obtained the Fe concentration in *Ceratophyllum demersum* were differed due to location and period of samples collection. The highest level of Fe was in Jallawla in November (7.597 ∓ 0.0169 ppm) while the lowest was in Hemrin in December (4.935∓ 0.0191ppm). The result revealed that the higher concentration of Ni. (0.773 ∓ 0.0014 ppm) was in hemrin during December while the lowest was in Jallawla in December (0.396 ∓ 0.0014ppm). Table 1 also obtained that the concentration of Co was high in Jallawla during November (0.428 ∓ 0.0014 ppm) while it was low in hemrin during November (0.168∓ 0.008 ppm). The results are not record Cd or Pb *Ceratophyllum demersum* tissues.

Table 2 showed that Fe concentration in *Myriophyllam spicatum* was high (7.387 ∓ 0.052 ppm) in Al-wajeehia during November while it lower in hemrin during December (4.548 ∓ 0.0066 ppm). For Ni, the highest concentration was in Al-wajeehia during November (0.432 ∓ 0.0007 ppm) and it was lower in hemrin during December (0.414 ∓ 0.0007 ppm). The highest concentration of Co was record in Al-wajeehia during December (0.168 ∓ 0.0014 ppm) and the lowest concentration was in hemrin during November (0.011 ∓ 0.0009 ppm). For Pb and Cd was not recorded on *Myriophllam spicatum* tissues. When compared the present results with international limits for these elements (cd, pb and Ni) showed that the present results were lower than the international allowed limits which were 0.12, 0.89, 5.51 ppm, respectively (Kabata-pendias A-2001) The present study was recorded the lowest concentration in plant tissues in comparison with study that was done by (Salman *et al.*, 2010) (Kabata- Pendias and Pendias 1992), (nirmalkumar *et al.*, 2008). This may be due to lack of exposure to industrial pollutants and lack of factories near studied rivers in this study or may be result from the lack of chemical fertilizer and herbicide using in these area. The athors would like to thankes (Nagam Yaseen and Asmaa Hawed)

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