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DRUŠTVA
SRBIJE

Tematski broj

OD LEKA DO ZDRAVSTVENIH ISHODA

5/2010

MONITORING OF HEAVY METAL POLLUTION USING PLANT ASSAY

Darinka Gjorgieva[1], Tatjana Kadifkova-Panovska[2], Katerina Baceva[3], Trajce Stafilov[3]

[1]Faculty of Medical Sciences, Goce Delcev University, [2]Faculty of Pharmacy, Ss. Cyril and Methodius University, [3]Institute of Chemistry, Faculty of Natural Science

Introduction and aim:

Monitoring the pollution status of the environment using plants is one of the main topics of environmental biogeochemistry. The interest in phyto-indicators arises from the fact that plants quickly react to chemical changes in the environment and are affected by a wide array of substances that contaminate air, water and soil.

Different plant organs (leaves, flowers, stems or roots) from four plant species: *Urtica dioica L. (Urticaceae), Robinia pseudoacacia L. (Fabaceae), Taraxacum officinale (Asteraceae)* and *Matricaria recutita (Asteraceae)*, were evaluated as possible bioindicators for heavy metal pollution in R. Macedonia.

Methodology:

Concentrations of Pb, Cu, Cd, Mn, Ni and Zn were determined in plant parts collected from areas with different degrees of metal pollution by ICP-AES.

Results and discussion:

All these elements were found to be at high levels in samples collected from an industrial area. Maximum Pb concentration was 174.52 ± 1.04 mg kg^{-1} and maximum Cd concentration was 7.97 ± 0.15 mg kg^{-1} in *R. pseudoacacia* flowers sampled from Veles area, where lead and zinc metallurgical activities are present. Nickel concentrations were in the range from 1.90 ± 0.04 to 5.74 ± 0.03 mg kg^{-1}. For *U. dioica* leaves and *R. pseudoacacia* flowers sampled near to lead-smelting plant the concentrations of 465.0 ± 0.55 mg kg^{-1} and 403.56 ± 0.34 mg kg^{-1} Zn were detected, respectively. Maximum concentration for Cu (15.88 ± 0.19) was determined in *M. recutita*. Results for investigated metals were found significantly lower in all control samples.

Conclusion:

Summarizing the results, it can be concluded that *T. officinale, U. dioica* and *R. pseudoacacia* may be considered as bioaccumulator species for Pb, Cu, Cd, and Zn and can be used as bioindicators for pollution with these metals, while *M. recutita* is a metal avoider. The investigated elements are very important essential and toxic metals and their presence in the environment is important to be followed. The analysis of heavy metal concentration in plants is necessary also in the case of plants used for phytotherapeutical purposes.