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# BIOAVAILABILITY OF METALS OCCURRING IN POLLUTED SOIL AND ITS ACCUMULATION IN PLANT FOOD

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Bioavailability of metals occurring in soil is the basic source of its accumulation in plant food. The impact of soil pollution (due to urban and mining areas) on the food chain presents a challenge for many investigations. Bioavailability of metals in a potentially polluted soil and their possible transfer and bioaccumulation in several vegetable species and herbs was examined. Three extraction methods were implemented for determination of bioavailable metals in the soil. Microwave digestion was applied for total digestion of the plant tissues, while on the soil samples open wet digestion with a mixture of acids was applied. Atomic emission spectrometry with inductively coupled plasma was used for determination of total elements contents. Significant enrichments in agricultural soil for As, Pb and Zn (in urban area), Cd, Cu and Ni (in a copper mine area), compared with the respective values from European standards were detected. On the basis of three different extraction methods, higher availability was assumed for both lithogenic and anthropogenic elements. Translocation factors higher than 1 were obtained for As, Cd, Cu, Ni, Pb and Zn. Higher root to shoot translocation of these metals indicated that plants species have vital characteristics to be used for phytoextraction of these metals. The obtained data also suggested that *S. oleracea* and *R. acetosa* were singled out to have a phytostabilization potential for Cd, Cu, Ni and Pb, while U. dioica only for Cu. *Rumex acetosa* has a potential for phytoextraction of Cd in urban and copper polluted areas.

**Key words:** metals, bioavailability, soil pollution, plant food, R. Macedonia

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# LONGTIME GEOCHEMICAL EVOLUTION OF Cd-Pb-Zn DISTRIBUTION IN DEPOSITED ATTIC DUST

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Attic dusts were examined as historical archives of anthropogenic emissions, with the aim of elucidating the pathways of pollution associated with a hydrothermal exploitation of Cu, Pb and Zn minerals in the eastern part of the Republic of Macedonia, the Bregalnica river basin region. Samples were collected from 84 settlements. Atomic emission spectrometry and mass spectrometry with inductively coupled plasma were applied as analytical techniques for determination of the Cd, Pb and Zn content in attic dust and soil samples. The anthropogenic affects on the air pollution was marked with dominance of these elements contents. Enriched contents of Cd, Pb and Zn were also determined in areas with dominant occurrence of the very old Rifeous shales. These elements distribution also presents a very unique association that despite the heterogenisity relays on natural phenomena of tracking the deposition in areas of Proterozoic gneisses; related to the distribution of fine particles associated with carbonate-silicate volcanic rocks. Intensive poly-metallic dust depositions were determined only in the surroundings of the localities where the hydrothermal extractions are implemented. Long-time deposition can be considered as pollution indexes for these hot spots. This mainly affect the Cd, Pb and Zn deposition that riches to 25, 3900, and 3200 mg/kg, respectively.

**Key words:** attic dust, lithogenic distribution, anthropogenic geochemical marker; air pollution