POTENTIALLY TOXIC ELEMENT CONTAMINATION IN EARTH MATERIAL AND WILD FLORA AT THE ROŞIA MONTANĂ ANCIENT MINING AREA (ROMANIA)

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Potentially Toxic Element (PTE) pollution from mining activities is a significant environmental problem, as mine dumps are source of heavy metal dispersion in the nearby ecosystems. In this work PTE contamination in the mining area of Roşia Montană (Romania) was investigated by bio-geochemical analyses that have affected both the Hop waste-rock dump and the valley of Roşia River.

The Roşia Montană hydrothermal ore deposit is hosted in andesites and dacites of Neogene age piercing the prevolcanic sedimentary basement as breccia pipes. They host polymetallic sulphides and Au-Ag-Te mineralizations that present in epithermal veins, mineralizing phreatomagmatic breccias and stockworks (WALLIER *et al*., 2006).

On the Hop waste dump (2.5 ha) 10 plant samples, belonging to Salix *spp*., *Popolus tremula* and *Betula pendula* species, were collected with the corresponding rizosphera. Moreover, other 12 mixed soil and plant samples, belonging to *Alnus glutinosa*, were collected, starting from the adit of the SF. Cruci din Orlea gallery up to the confluence between Roşia and Abrud Rivers. Earth material and soil samples were collected from 15 to 40 cm depth and the fraction < 2 mm was separated for pH and EC analyses. Cu, Zn and As concentrations were determined by ICP-AES on both soil and plant tissues. Bioaccumulation Factor (BF) and Translocation Factor (TF) were calculated for plants data set.

Results show that the plant species growing on the Hop waste-rock dump can tolerate acid substrates, with pH values ranging from 3 to 5. In earth materials, average element concentrations reach 28 ppm for Cu, 41 ppm for Zn and 470 for As. Cu and Zn contents in plant tissue is always higher than those in soils while As content is always lower. BF values are almost always greater than 1 for Cu and Zn and << 1 for As. TF calculation shows a preferential allocation of metals in leaves. In soils along the river, average element concentrations are one order of magnitude higher than those of non-contaminated soils (KABATA-PENDIAS & PENDIAS, 2001), reaching 150 ppm for Cu, 232 ppm for Zn and 57 ppm for As. The species *Alnus glutinosa* shows a special property: PTE average contents in leaves are always lower than in soils, reaching 17 ppm for Cu, 59 ppm for Zn and 2.6 ppm for As. BF values are < 1 and TF calculation shows a preferential allocation of Cu in roots.

These results appear interesting for phytoremediation purpose, also for the surrounding areas still not vegetated. On the other hand, they highlight that ecotoxic elements are actually moving from substrates to living beings, resulting in a potential geochemical hazard.

References

KABATA-PENDIAS, A. & PENDIAS, H. (2001): Trace elements in soils and plants. CRC, Boca Raton.

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