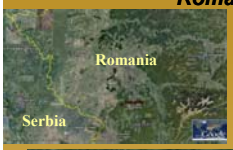
HEAVY METALS DISTRIBUTION IN SOIL DEVELOPED ON THE MINING AREA FROM SW ROMANIA AND THEIR TRANSFER TO SPONTANEOUS FLORA

Stela URUIOC[1], Smaranda MÂŞU[2], Mariana ALBULESCU[1], Vesna KRSTIĆ[3]

West University of Timisoara, Chemistry-Biology and Geography Faculty, Pestalozzi Street no. 16, 300115, Timisoara, Romania,
[1]Biology and Chemistry Department: uruioc.stela@yahoo.com; malbulescu@yahoo.com
[2] National Research and Development Institute for Industrial Ecology – ECOIND, Victoria Square no.2, et 2, PO Box 254, Timişoara, Romania, andatee@yahoo.com [3]Mining and Metallurgy Institute Bor, Zeleni bulevar 33, 19210 Bor, Serbia
vesna.krstic@irmbor.co.rs



MATERIALS AND METODS

Plants and the associated soil samples were collected in vicinity of Danila Lake (DL), in vicinity of Moravita river (MR) and from the refuse dump of Ursoanea mine (UMS) from Ocna de Fier. The six species of native plants (*Dactylis glomerata* L., *Dryopteris* filix-mas (L.) Schott., *Crepis sp., Equisetum arvense* L., *Tussilago farfara* L. *Cynodon dactylon* L..) were collected, as well as the soil below the plants (top 0-20 cm soil layer). Soil sample preparation was done in accordance with ISO 11464/98, whereas the determination of Cd, Mn and total Cr followed the ISO 11047/99 method. The plants sampling was done in accordance with the methodology described in STAS 9597/1-74. Plant and soil extracts analysis was done using a Varian Spectra AAS (atomic absorption spectrophotometer). Concentration of metals in soil was correlated with their concentration in plant. The parameter called the Bioconcentration Factor (BCF) was calculated: BCF=metal concentration ratio of plant (leaves + steam) to soil. This parameter is very important to estimate a plant's potential for phytoremediation purpose [1].

RESULTS

The concentration of metal in the soils and plants of the mining area is significantly different from the concentrations of the same elements in the soils and plants of the control ones. Analysis of plants has shown that the species collected in the vicinity of Waste Mining Dump are contaminated with Cd, Mn and total Cr. This contamination illustrates the high amounts of these metals in the soil where they should be present as chemical forms that are mobile enough to be bio-available at the soil/root interface [2].

Tabel 1. Cadmium concentrations in topsoil and plant samples (mg kg^{-1}of D.M.*) from the Ocna de Fier site

Site	Sampling points	Sampling plant	Species	Leaves + steam	Sampling soil	Topsoil
Danila Lake (DL)	1 DL (control)	P1	*Dactylis glomerata* L.	0.20	S1	0.6
Moravita River (MR)	2 MR	P2	*Dryopteris* filix-mas (L.) Schott.	0.27	S2	0.2
Ursoanea Mare Stream (UMS) where is situate Waste Mining Dump	3 UMS	P3	*Crepis sp.*	0.88	S3	5.0
		P4	*Equisetum arvense* L	0.62	S4	7.0
		P5	*Tussilago farfara* L.	1.25	S5	1.10
	4 UMS	P6	*Cynodon dactylon* (L.) Pers	0.73	S6	24.1
		P7	*Equisetum arvense* L.	0.34	S7	24.6
		P8	*Tussilago farfara* L.	6.69	S8	25.5
	5 UMS	P9	*Equisetum arvense* L.	1.34	S9	16.1
		P10	*Tussilago farfara* L.	1.23	S10	15.9

Dried Material

Table 2. Factor (BCF) calculated for to estimate a plant's potential for phytoremediation

Site	Sampling points	Sampling plant	Species	Bioconcentration factor (BCF)		
				Cd	Total Cr	Mn
Danila Lake (DL)	1 DL (control)	P1	*Dactylis glomerata* L.	0.33	0.76	0.34
Moravita River (MR)	2 MR	P2	*Dryopteris* filix-mas (L.) Schott.	1.35	1.02	0.36
Ursoanea Mare Stream (UMS) where is situate Waste Mining Dump	3 UMS	P3	*Crepis sp.*	0.17	0.79	0.11
		P4	*Equisetum arvense* L	0.08		0.18
		P5	*Tussilago farfara* L.	1.13	1.50	0.56
	4 UMS	P6	*Cynodon dactylon* (L.) Pers	0.03	0.58	0.13
		P7	*Equisetum arvense* L.	0.01	0.62	0.04
		P8	*Tussilago farfara* L.	0.26	0.22	0.16
	5 UMS	P9	*Equisetum arvense* L.	0.08	0.28	0.31
		P10	*Tussilago farfara* L.	0.07	0.06	0.20

CONCLUSIONS

The geochemical investigation has shown that the soil, in slopes of Ursoanea Mare Stream is contaminated by Cd, total Cr and Mn, due to the location of mining wastes in this area. Analysis of plants has shown that the species collected in the vicinity of Waste Mining Dump are contaminated with Cd, total Cr and Mn. Among the ten plant samples of six plant species, no plant species were identified as metal hyperaccumulators. However, two plants had BCF greater than one. *Tussilago farfara* L. (P5) and ***Dryopteris* filix-mas (L.) Schott.** (P2) were most efficient in taking up Cd and total Cr. The phytoremediation potential of these plant species, needs to be investigated.

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Acknowledgements
The authors would like to thank the students Carmen Secuianu and Dana Elena Mititelu for their contributions in the field. This paper was prepared within Romania-Republic of Serbia IPA Cross-border Cooperation Programme, within project MIS-ETC Code 464 and Subsidy contract from IPA No 8518.