CONCENTRATION OF METALS IN MOSS SAMPLES FROM FIVE DIFFERENT ENVIRONMENTS IN SERBIA: COMPARISON AND ANALYSIS

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Mosses are widely recognized as effective bioindicators of atmospheric metal pollution due to their ability to accumulate heavy metals from the surrounding environment. This study investigates metal concentrations in moss samples collected from five different locations across Serbia, representing diverse environmental settings, from urban and industrial to rural and mountainous areas.

This study presents the results of metal concentration analysis in moss samples collected from five distinct environments in Serbia: 1 (Bor city, industrial area with a copper smelter complex), 2 (recreational complex Ada Ciganlija on the Sava River, near busy roads), 3 (area influenced by the Obrenovac Thermal Power Plant), 4 (urban area near the Šabac city), and 5 (Kopaonik mountain, background site). The collected samples were analyzed using neutron activation analysis at Regata facility of the IBR-2 reactor. The concentrations of 33 elements (Na, Mg, Al, Cl, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Zn, As, Br, Rb, Sr, Sb, Cs, Ba, La, Ce, Sm, Tb, Yb, Hf, Ta, W, Au, Th, U) were measured in ppm.

The results demonstrate significant variability in metal accumulation depending on the sampling site and local environmental conditions. The highest levels of Al (7580 ppm), Fe (4680 ppm), and Mn (106 ppm) were found in moss from site 2, likely due to combined effects of road traffic and proximity to the Sava River. Site 1, as an industrial zone with a copper smelter, showed elevated concentrations of Cu-related and heavy metals, including As (6.17 ppm) and Ni (3 ppm), reflecting industrial emissions. Site 3, under the influence of the thermal power plant, exhibited increased levels of Cr (56 ppm) and Ni (37.1 ppm), indicating possible combustion related pollution. The urban site (sample 4) had moderate metal levels, with notable Zn (136 ppm) and Br (5.19 ppm), possibly associated with urban activities and traffic. In contrast, the mountainous site of Kopaonik (sample 5) showed the lowest overall metal concentrations, serving as a background reference for atmospheric deposition in Serbia.

These results demonstrate that mosses are effective biomonitors for assessing spatial patterns of atmospheric metal deposition and can distinguish between industrial, urban, traffic-related, and natural background influences. The findings are discussed in the context of biomonitoring potential of mosses for assessing atmospheric metal deposition in Serbia and compared with similar studies in neighboring regions.