ELEMENT CONTENT IN EPIPHYTIC LICHENS, MOSSES AND BARK REFLECTING AMBIENT AIR CONDITIONS: CASE OF VILNIUS PRESCHOOLS

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Abstract

EDXRF was used to determine the contents of potentially harmful elements (PHE) As, Ba, Cr, Cu, Mn, Mo, Ni, Pb, V, Zn and 20 other elements in ashed at 240°C bark, moss and epiphytic lichen near 58 preschools of Vilnius. Median relative standard deviations of all paired sub-samples of lichens were <5% for Sr, Br, K, Ca, Rb, P, Mg, S, Zn, Fe, Cu, Ni, Al, 5–10% for Zr, Pb, Si, Ti, Na, 10–20% for Y, Cr, Nb, Th, V, Mo, Ga, Ba, 20–30% for W and As. WEPAL IPE program samples were used for recalibration.

Mean measurements of paired samples were compared with the modelled amounts of particulate matter (PM10) and SO_2. The contents of S, Ni, Zn, Mo, Cu, Fe, Pb, Ga, Cr, V, Na, As, W, Br, Al, Ba, Mg in lichens significantly correlated with PM10, the same elements and Si, Ti, Th, Zr, Nb, Rb, Y, Sr with SO_2 amount. In mosses, the group of elements significantly correlated with PM10 was similar, but instead of Al, Mg, As included Th, while the group of elements significantly correlated with SO_2 did not include Nb, Al, Ti, Rb, Si, As, Mg, Sr, Y, Zr. Compared to mosses, the group of elements in bark that significantly correlated with PM10 did not include Br, Th, Cl, but included Al, Si, Ti, Zr, while the group of elements significantly correlated with SO_2 did not include Th, Cl, Br, but included Al, Ti, Si, Zr.

Comparison with recent geochemical data of topsoil and earlier data of snow cover has shown that PHE contents in bark best of all reflect former pollution, while biogeochemical composition of lichens and moss the present or recent state. The results can be used for supposed PM10 composition, its changes and optimising air quality control.