Environmental implication of geogenic soil contamination by chromium and nickel of Eastern Slovakian Flysh Belt

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On sedimentary lithosequences of Eastern Slovakian Flysh Belt (Paleogene) soils were characterized by high content of iron, magnesium, chromium, nickel, cobalt and vanadium and low calcium level. Such soils were usually developed on serpentinic rocks. The presence of "serpentine soils" pointed to the fact that sedimentary Flysh deposits from soils weathered and derived from ultrabasic (serpentinic) rocks. Contents of chromium and nickel were also high in fluvial sediments of Eastern Slovakian rivers and at the bottom land of river Váh. It was a consequence of material derived from Flysch rocks being transported away by rivers to the plants. The main objective of the research was to study the presence of geogenic soil contamination in the soil-plant system of Eastern Slovakia Flysch Belt (Paleogene).

We randomly collected representative soil samples from the studied sites. All chemical analyses from soils were performed by HS ICP-AAS. We sampled needles from the Scots pine (*Pinus sylvestris L.*) and dandelion (*Taraxacum officinale*) from the same sites. The needle age classes (C, C + 1) and dandelions were oven-dried at 40 °C and milled. Their chemical content was analyzed by ETAAS and HS ICP-AAS.

Chromium concentrations in soils were from 107 to 441 $mg.kg^{-1}$ and nickel concentrations were from 34 to 164 $mg.kg^{-1}$. On geogenic contaminated soils, Scots pine contained from 0.78 to 2.2 mg.kg-1 of chromium and from 0.7 to 29.1 $mg.kg^{-1}$ of nickel. In the case of dandelion, concentrations of chromium were from 1.3 to 4.6 $mg.kg^{-1}$ and for nickel from 2.8 to 14.8 $mg.kg^{-1}$. Limits for the soil were considerably exceeded. Obtained results highlighted why soils of Flysh Belt and adjacent lowlands of Eastern Slovakia, Poland and Hungary were geogenically enriched with chromium and nickel. Consequently plants enriched with chromium and nickel in the study sites were contradictory to the former statement about anthropogenic origin [1,2] Results confirmed some of the findings about bioaccumulation in plants and their possible movement in soil-plant system.

References

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