Magnetic susceptibility and soil contamination by potential toxic elements in the Zemianske Kostoľany area (Slovakia)

Ondrej Ďurža, Katarína Peťková, Veronika Veselská
Comenius University Bratislava, Faculty of Natural Sciences, Department of Geochemistry[1]

A b s t r a c t : The soil survey combined with magnetometry measurements in the environmentally stressed area along Nitra river from Zemianske Kostoľany to Partizánske offered valuable information about contamination of agricultural soils. Significant arsenic contamination was detected in alluvial soil of the Nitra river (extreme As values downwards the old coal-ash pond up to 939 mg.kg-1). The content of As gradually decreased as for 46 mg.kg-1 in dependence on the distance from old coal-ash pond. Similarly the content of Fe was changed (from 4,39 to 1,87 %).

The same trend was observed for the changes in magnetic susceptibility values. The highest values of magnetic susceptibility were found in alluvial soil of Nitra river (8,53 x 10-3 SI u.) below the old coal-ash pond and the lowest ones, but still over the background limit (0,40 až 0,65 x 10-3 SI u.), were found in alluvial soil of Nitra river up the town Partizánske (0,93 x 10-3 SI u.).

Higher values of magnetic susceptibility above background and content of studied elements too show, that alluvial soil of Nitra river is contaminated by potential toxic elements (especially As) from the old coal-ash pond along whole studied profile Zemianske Kostoľany –Partizánske.

The obtained results indicate that the measurements of magnetic susceptibility in the alluvium of the Nitra river can be a very prospective method for soil survey for the identification and mapping of soils highly contaminated by potential toxic elements.

[1] Ondrej Ďurža, Katarína Peťková, Veronika Veselská, Mlynská dolina, 842 15 Bratislava, Slovakia, durza@fns.uniba.sk, petkova@fns.uniba.sk, veselska@fns.uniba.sk

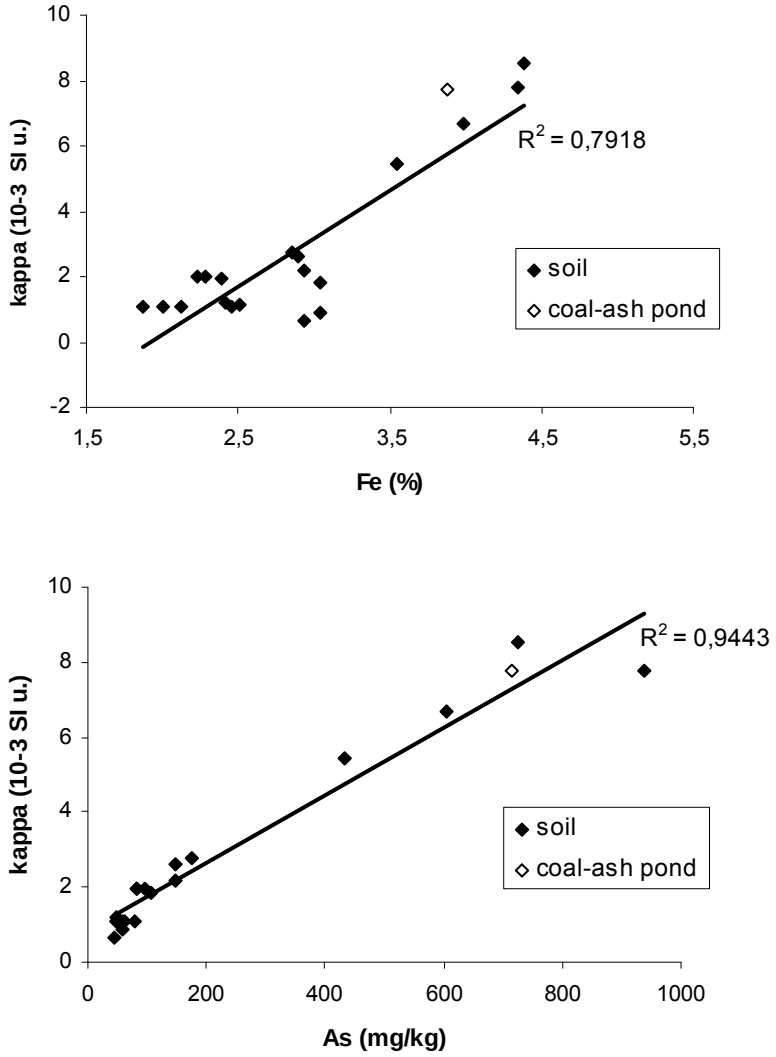

Fig. 1. Plot of magnetic susceptibility values and Fe content and As content in soil.

Key words: soil magnetic susceptibily, potential toxic elements (As, Fe), Zemianske Kostoľany, Slovakia