



Degradation of forest soils near an industrial zone

Lenka Pavlů, Ondřej Drábek, and Luboš Borůvka

Czech University of Life Sciences Prague, Czech Republic (pavlu@af.czu.cz)

Forest soils near industrial zones could be endangered by acid deposition and by contamination by potentially toxic elements (PTEs). The Silesian Beskids represents a feasible example of these two types of forest soils damage. Soils of this area are strongly acid. The surface enrichment by several studied PTEs (Cd, Cu, Pb, Zn) reflects anthropogenic contamination. Moreover, acid character of soils enables presence of dangerous forms of Al. Two forms of all these PTEs were evaluated; potentially mobilized and mobile — the most danger form. Negligible amounts of Cu, Pb, and Al^{3+} are found in the mobile form. These elements represent just a potential risk for the system. The mobile forms of Cd, Zn, and Mn account for approximately 30 % of potentially mobilized forms in organic horizons. In the mineral horizon, Cd and Zn represent only about 20 % and Mn less than 10 % of potentially mobilized forms. These elements could pose a problem to ecosystem vitality. Cadmium is phytotoxic in small concentrations and its content in mobilized form approaches the critical load. For this reason, Cd could be considered as the most dangerous element in the studied area. While the distribution of mobile Cd is control by cation exchange capacity and hydrolytic acidity in the mineral horizon, stabilization of Cd in potentially mobilized form in organic horizons is enhanced by organic matter quality. A limiting nutrient could be P. Phosphorus plays an important role in the immobilization of toxic Al forms by creation of stable complexes as it was proven by a factor analysis in the H horizon. Negative aspect of this fact is decrease of bioavailability of P for plants.

With regard to decreasing emissions, it is important to focus on the stabilization of PTEs deposited into the soil in the past. It is necessary to keep a relatively high quality of organic matter (connected to high CEC), higher pH, and higher nutrient content. This state could be temporarily achieved by the chemical amelioration. However, a more sufficient and long term solution would be the planting of broadleaf trees with higher quality of the litter.

This study was supported by the grant No. QI112A201 of the Czech Ministry of Agriculture.