Correlation of heavy metal contamination in surface soils with infestation of viscum album in poplar trees in Goslar using a micro-ecosystem study

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Heavy metal contamination in the Harz Mountains (central Germany) is a well known phenomenon. Mining and mineral processing work in the past centuries in the Harz Mountains has caused acid mine drainage releasing heavy metals into the rivers which are ultimately deposited in the flood plains in the Northern Harz area. The deciduous trees in the region of Goslar have been found to be infected by mistletoes (Viscum Album), a hemiparasite. The goal of a larger research project carried out at FAL is to find a spatial correlation between ground contamination and mistletoe growth on deciduous trees. As part of this project, the work presented here aims to study the variability of heavy metal contamination in soils in Goslar in specific locations, and also to find a possible correlation between soil contamination and mistletoe growth at these sites. Soil sampling was carried out in the summer months of July and August 2005 at three different locations in Goslar with high, medium and low metal contamination of soils. One representative tree was chosen in each location for soil sampling. Soil samples were taken around each tree at radii 1.5m, 3m and 7 m radii on one half and 1.5m, 5m and 10m in the other half. Eight samples were taken in each concentric ring. A soil corer was used for obtaining a vertical soil profile of 90 cm at all sampling points which was divided into three parts of 0-30 cm, 30-60 cm and 60-90 cm. These were analyzed for Pb, Cd, Cu, Zn, Ni, Fe and other relevant heavy metals using ICP-OES. There is an obvious variation in the concentration of heavy metals in the three locations with metals like Pb, Cd and Cu showing values of almost an order magnitude higher in high contamination area compared to low metal contamination area. In all three locations, the concentrations of metals in context decrease with depth. Also, Pb shows the highest and Cd and Ni show the lowest concentrations of all heavy metals

measured in all areas. The results of this micro-ecosystem study will support the results from the large-scale study at FAL and also elucidate the trace metal variability within the nutrient catchment area of a single tree.