Geophysical Research Abstracts
Vol. 12, EGU2010-3262, 2010
EGU General Assembly 2010

LAND CONTAMINATION AND SOIL-PLANT INTERACTIONS IN THE IMPERINA VALLEY MINE (Belluno, Venetian Region, Italy)

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In Italy, ore exploitation, particularly that of mixed sulphides, has been abandoned since the final thirty years of the last century, and a quantity of mine dumps has been discharged in wide areas of the land, provoking evident environmental damages to landscape, soil and vegetation, with potential risk for human health.
The present study concerns the distribution and mobility of heavy metals (Ni, Cr, Cu, Pb, Zn, Fe and Mn) in the soils of a mine site and their transfer to wild flora. Soils and wild plants were sampled from mixed sulphides mine dumps in Imperina valley (Belluno, Italy), and the concentrations of heavy metals were determined.
Chemical analyses carried out on 10 soil profiles (mostly entisols) of the mineralised area revealed metal concentrations generally above the international target levels (Cu up to 3160 mg kg-1 , Pb up to 23600 mg kg-1, Zn up to 1588 mg kg-1, Fe up to 52,30 %). The concentrations of Ni, Cr and Mn, instead, are below the reference limits. Moreover, a highly significant correlation was observed between the concentrations of metals in soils (Fe, Pb, Zn and Cu).
Metal concentration in selected wild plants of the mineralized area is moderately high, in particolar Cu, Pb, Zn in the roots of Plantago major, Pb and Zn in the leaves of Taraxacum officinale, Zn and Pb in Salix spp. The translocation coefficient (BAC) from soil to plant (hypogean portion), and within the plant (epigean portion) vary from 0,37 in Plantago major to 2,97 in Silene dioica, two known accumulator plants. Salix spp present high translocation coefficients from soil to plant, and from roots to leaves. In particular, essential metals present a translocation coefficient $\geq$1 (with the order Mn>Zn>Cu>Fe), while toxic metals have coefficients <1 (Pb<Hg), thus suggesting a sinergic/antagonist effect among metals and plant, in relation to their nutritional function.
The combined results of metal concentration in soils and plants, BAC and translocation coefficients show that the plants considered seem to be rather highly tolerant towards environmental pollution, since their metabolic equilibrium is not altered by increased metal uptake. This suggests that the selected plants could be useful in phytoremediation of metal contaminated sites.
The phytoremediation ability of Salix species (S. eleagnos, S. purpurea and S. caprea) for heavy metals and in particular zinc was estimated. Plantago major has very high metal concentrations in the roots and could be recommended for phytostabilization.