Geophysical Research Abstracts
Vol. 16, EGU2014-4315, 2014
EGU General Assembly 2014

Wild plants as tools for the remediation of abandoned mining sites with a high arsenic content

Salvadora Martínez-Lopez (1), MJose Martínez-Sanchez (1), Carmen Perez- Sirvent (1), Lucia B. Martínez (1), and Jaume Bech (2)

(1) University of Murcia, Faculty of Chemistry, Agricultural Chemistry, Geology and Pedology, Murcia, Spain (melita@um.es, 34 968 364148), (2) University of Barcelona. Barcelona. Spain.

The aim of this study was to assess the environmental risk posed by arsenic when new vegetation types are introduced, analyzing the transfer of arsenic in different plant species that grow spontaneously in mining areas of SE Spain (Sierra Minera of Cartagena), and the contribution of such plants to the environmental risk represented by their ingestion by animals living in the same ecosystems.
When dealing with remediation projects in zones affected by mining activities, the risk posed by the ingestion of the plants by fauna is often forgotten. To study the transfer to the trophic chain, two mammals, sheep and vole, were selected. The risk analysis was centered in the contribution of these natural plants to the ingestion calculated. For this study, 21 vegetal species naturally growing in the soils were collected from the Sierra Minera. The vegetal material studied is clearly associated with the Mediterranean Region (S.E. of Spain) and the plant species collected are endemisms and plants characteristic of the zone.
Physico-chemical properties were obtained by means of the usual procedures. To determine the arsenic content, the soil samples and plant materials were digested in a microwave system and the arsenic concentration was determined using atomic fluorescence spectrometry with an automated continuous flow hydride generation system. A semiquantitative estimation of the mineralogical composition of the samples was made by X Ray Diffraction analysis.
The soils were classified into three groups: Low (group 1) (7-35 mg/kg) medium (group 2) (35-327 mg/kg) and high (group 3) (> 327 mg/kg), according to their As content. The mineralogy and As content of the soils studied depends on the materials related with mining activity. The descriptive statistical analysis of the population of plants studied showed the As range in roots to be 0.31-150 mg/kg while leaf concentrations were lower (0.21-83.4 mg/kg).
The potential risk of As entering the food chain through of the plant species has been evaluated. The exposure pathway considered has been oral ingestion, calculating the contribution of the plant to the daily dose based on the arsenic concentration in the leaves of the plants analyzed. The Bioconcentration Factors are generally very low, the transfer Factors being somewhat higher although rarely exceed the unity. When dealing with phytoremediation of contaminated sites, the contribution of the As level in plants to the daily diet of animals should be used as an indicator for a suitable selection of the vegetal species to be used.