ASPHODELLUS FISTULOSUS TOLERANCE TO ARSENIC WITH RELATION TO THE SPECIATION IN SOILS DISTURBED BY MINING ACTIVITIES

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Mining generates large quantities of waste, such is the case of the mining district of Cerro de San Pedro, San Luis Potosi, Mexico. The waste generates acid mine drainage; therefore, releasing potentially toxic elements (PTE) such as arsenic. By cause of this a methodology has been implemented that facilitates the discernment of the interaction of the PTE on the soil as well in the biota. Total concentrations of As in rhizospheric soils of Asphodellus fistulosus are in intervals from 216 to 1017 mg /kg, which exceed the allowable limit both in agricultural use soils and industrial use soils established in Mexican legislation as well as guidelines in the UK, France and Argentina having as maximum allowable limits of As 22 and 260 mg/kg, 20 and 500 mg/kg, 37 and 120 mg/kg, 20 and 50 mg/kg, respectively. In this study, As was quantified in roots and leaves of As. fistulosus getting higher bioaccumulation in roots. The quantification was performed by acid digestion in a closed system. Has been determinated the arsenic chemical speciation for the purpose to understand the behavior of metals, as well as mobility and bioavailability in the environment, the speciation was determined by evaluating the geochemical fractions presents in the rhizospheric soils, the main fractions considered were anionic exchangeable, bound to carbonates, bound to iron and manganese oxides, and differed from the fraction not available as the residual fraction and bound with sulfides. Bioaccumulation of As in As. fistulosus was correlated with bioaccessibility and geochemical speciation in rhizospheric soils. The phytoavailability in rhiszospheric soil was performed by extraction with a solution of low molecular weight organic acids (C2C4), and correlated the results with the pH, redox potential and carbonates content in soils. This methodology has been integrated to provide an alternative diagnostic evaluation and environmental impact in plant species that have shown tolerance to acid mine drainage and sites with high concentrations of arsenic.

Keywords: phytoavailability, arsenic, rhiszospheric soil