

Evaluation of the grass mixture (Faestuca Rubra, Cynodon Dactylon, Lolium Multiflorum and Pennisetum sp.) as Sb phyto-stabilizer in tailings and Sb-rich soils.

M. Aurora Armienta (1), Margarita Beltrán-Villavicencio (2), Carlos E. Ruiz-Villalobos (2), Israel Labastida (2), Nora Cenicerros (1), Olivia Cruz (1), and Alejandra Aguayo (1)

(1) Universidad Nacional Autónoma de México, Instituto de Geofísica, México, D.F., México (victoria@geofisica.unam.mx),

(2) Universidad Autónoma Metropolitana Azcapotzalco, México D.F., México

Green house experiments were carried out to evaluate the growth and Sb assimilation of a grass assemblage: Faestuca Rubra, Cynodon Dactylon, Lolium Multiflorum and Pennisetum sp, in tailings and Sb-rich soils. Tailings and soil samples were obtained at the Mexican historical mining zone of Zimapán, Central México. More than 6 tailings impoundments are located at the town outskirts and constitute a contamination source from windblown and waterborne deposit on soils, besides acid mine drainage. Four substrates were used in the experiments: 100% tailings, 20% tailings + 80% soil, 50% tailings + 50% soil, and a soil sample far from tailings as a background. Concentrations of Sb ranged from 310 mg/kg to 413 mg/kg in tailings. A pH of 7.43, 1.27% organic matter, and high concentrations of N, K and P indicated adequate conditions for plant growth. The grass assemblage was raised during 21 days as indicated by OECD (Organisation for Economic Co-operation and Development) Guideline 208 Terrestrial Plant Test: Seedling Emergence and Seedling Growth Test. The highest Sb concentrations were measured in plants grown on tailings with 139 mg/kg in the aerial part and 883 mg/kg in roots. Concentrations of Sb decreased as the proportion of tailings diminished with 22.1 mg/kg in the aerial part and 10 mg/kg in roots corresponding to the plants grown in the 20 % tailings + 80% soil. Bioaccumulation (BAC) and bioconcentration factors (BF) of plants grown on tailings (BAC= 0.42, BCF=3.93) indicated their suitability as a phyto-stabilization option. The grass mixture may be thus applied to control windblown particulate tailings taking advantage to their tolerance to high Sb levels.