Effects of chromate and sulfate on arsenic uptake and translocation by arsenic hyperaccumulator *Pteris vittata* L.

Letuzia M. Oliveira[1], Lena Q Ma[1*], Luiz R. G.G.[2]

[1] Department of Soil and Water Science, University of Florida, Gainesville, FL 32611

[2]Soil Science Department, Federal University of Lavras, Lavras, Brazil

* Corresponding author: lqma@ufl.edu

Abstract

We investigated the effects of chromate and sulfate on the uptake and translocation of arsenate by the arsenic hyperaccumulator *Pteris vittata* L. in single and binary systems. *P. vittata* was grown in the presence of arsenate and chromate or sulfate for two weeks in hydroponic before being harvested. The concentrations of the three oxyanions ranged from 0.05, 0.25 to 1.25 mM. *P. vittata* accumulated 4,598 and 1,159 mg kg^{-1} As in the fronds and roots in the presence of 0.05 mM As; however, addition of 0.05 mM chromate significantly reduced As uptake and translocation, with their concentrations being 330 and 1,394 mg kg^{-1}. *P. vittata* accumulated 234 and 12,631 mg kg^{-1} Cr in the fronds and roots in the presence of 0.05 mM Cr; however, addition of 0.05 mM As significantly reduced Cr uptake and translocation, with their concentrations being 46 and 8,073 mg kg^{-1} Cr. *P. vittata* effectively took up Cr but was ineffective in Cr translocation. Unlike chromate and arsenate, addition of sulfate increased the uptake and translocation of both chromate and arsenate. The current experiment demonstrated that chromate and arsenate inhibited each other whereas sulfate enhanced uptake and translocation of both chromate and arsenate by *P. vittata*.

Keywords: *P. vittata*, hyperaccumulator, arsenic, chromium, sulfur