Fluorescent arsenic-resistant bacteria enhanced arsenic solubilization in the rhizosphere and promoted growth of arsenic hyperaccumulator *Pteris vittata* L.

Piyasa Ghosh[1], Bala Rathinasabapathi[2] and Lena Q. Ma[1*]

[1]Soil and Water Science Department, University of Florida, Gainesville, FL32611, United States

[2]Horticultural Sciences Department, University of Florida, Gainesville, FL32611, United States

The metalloid arsenic (As) is a well-known lethal poison. Its pollution in the environment is a wide spread public health problem affecting millions of people in the world. Phytoremediation is an innovative technique, which employs plants to remediate polluted soils and to improve soil structure. It is also effective in removing metals of low concentrations from surface soils, sediments and water, although longer treatment times may be required. Arsenic hyperaccumulator *Pteris vittata* L (Chinese Brake fern) is capable of accumulating up to 2.3% As in its biomass, making it a good candidate for phytoextraction. *P. vittata* is capable of extracting As from both soluble and insoluble forms. Arsenate (AsV) and arsenite (AsIII) are two common inorganic forms of As in soils. AsV dominates in aerobic soils as $HAsO_4^{2-}$ and $H_2AsO_4^-$, which are often bound to Fe/Al minerals, making it insoluble. Seven As-resistant fluorescent bacteria were isolated from rhizosphere soils, which produce natural-iron chelating compounds called siderophores. This work focuses on studying the role of fluorescent bacteria in As solubilizaton from Fe and Al minerals, which often present in the rhizosphere of *P. vittata*. Arsenic uptake by *P. vittata* increased many folds due to the solubilization of minerals by the bacteria. The biomass of the hyperaccumulator also increased significantly under the influence of rhizosphere bacteria. Thus production of siderophores by As-resistant bacteria may be effective strategy utilized by rhizosphere microorganisms to mobilize As in the rhizosphere of *P. vittata* to hyperaccumulate As.