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Differential protein expression in *Polystichum acrostichoides* due to metal exposure

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Abstract

Plants are considered the most cost effective and environmentally sound way to clean up the soils and water contaminated with toxic metals. We focused our studies on the fern species *Polystichum acrostichoides*. One major aim of this project was to determine whether *P. acrostichoides* was capable of hyperaccumulating arsenic and two other toxic metals, lead (Pb) and cadmium (Cd). Another aim was to learn important biochemical changes that occur when the plant is subjected to stress by the toxic metals. Six-eight week old plants were purchased from a local green house and were grown hydroponically for seven days, then ground in liquid nitrogen and stored at -80C upon harvesting. Proteomic analysis and metal uptake measurements were performed using two different concentrations (150 & 300 µM) of metal ions. The determination of metal uptake was performed using HNO3 digestion (USEPA method 3050B) followed by Inductively Coupled Plasma spectroscopy (ICP). The proteomic analysis was performed using polyethelene-glycol fractionation (PEG) followed by one (SDS-PAGE) and two dimensional gel electrophoresis (2-DE) technique. A total of 17 protein spots were up regulated and 3 proteins were down regulated upon various metal exposures, and are arranged to be subjected to liquid chromatography-tandem mass spectrometry for further identification.