This research opens the door to creating methods for using the plant purslane to clean lands that are contaminated with arsenic. This work promises to help farmers locally and internationally by providing an opportunity to reclaim land for agricultural practices.

Identifying the gene that controls arsenic transport in purslane

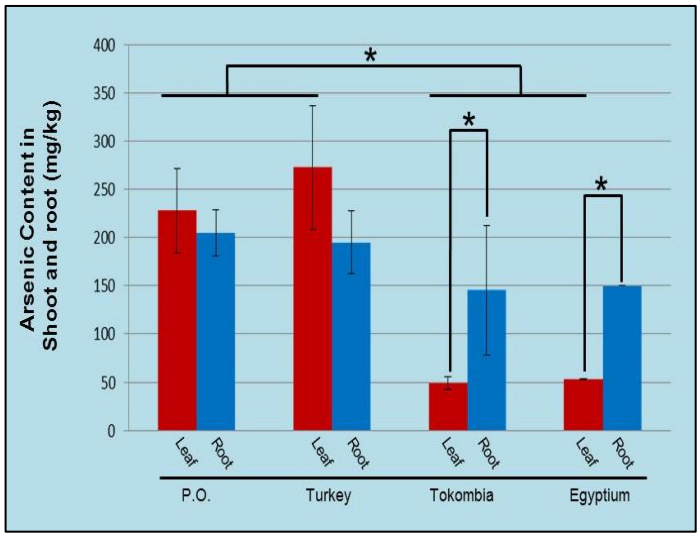
Who cares and why?

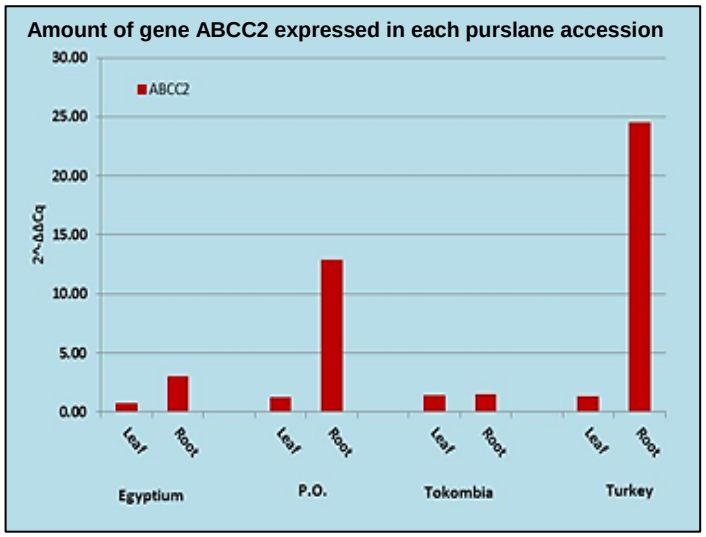
Arsenic is an extremely toxic metal that causes serious health problems to people worldwide. High levels of arsenic in soils can potentially lead to water and food contamination. Arsenic is carcinogenic, and exposure through drinking water, foods, or other sources can lead to various types of cancer, including cancer of the skin, lung, bladder and prostate. Although low concentrations of arsenic exist naturally in soil, its widespread uses as an herbicide, as an insecticide and in wood preservation have led to dangerous concentrations in many areas in the United States. The Environmental Protection Agency has reported that about 25% of wells in the U.S. contain amounts of arsenic that are higher than the levels allowed by that agency. Arsenic contamination is a local issue, too, occurring throughout Virginia, including in populated areas like Richmond. Removal of arsenic-contaminated soil from the environment will help clear the contaminant from our food supply, thus benefiting human health.

What has the project done so far?

Virginia State University researchers have identified a novel gene in purslane responsible for arsenic transport in purslane. In previous work, they identified two purslane accessions with tolerance to arsenic and two accessions that show sensitivity to arsenic. Building on that, the VSU team has found that tolerant accessions have a significantly reduced ability to transport arsenic to their shoots. Using the genomic approach, scientists have identified a multidrug-resistant gene, ABCC2, the expression of which is highly

inducible by arsenic in the roots of arsenic-sensitive purslane accessions, but not in the roots of arsenic-tolerant accessions, indicating that ABCC2 acts to control arsenic transport in plants. Understanding how arsenic is transported to shoots may lead to genetic engineering that will improve arsenic accumulation in purslane, and thus the plant's potential for use in cleaning arsenic-contaminated soil. Cost-effective removal of arsenic from contaminated soil will benefit farmers and agriculture on local and international levels by adding more clean and arable lands to agricultural production, especially in urban areas.





Impact Statements

- **Identified two arsenic-tolerant purslane genotypes**
- **Identified the gene responsible for arsenic transport in plants**
- **These findings have the potential to contribute to developing methods for cost-effective removal of arsenic from soil.**

Strategic Priority: This research addresses the priorities of Plant Genetic Resources and Plant Biological Efficiency and Abiotic Stresses Affecting Plants, as put forth by NIFA.

What research is needed?

Further research is needed to determine the effectiveness of using purslane in cleaning soils with different levels of arsenic contamination.

Want to know more?

Shuxin Ren
Virginia State University
sren@vsu.edu, (804) 524-3094

This project was supported by the USDA-NIFA Evans-Allen Program.