



This research aimed at developing an environmental-friendly, cost-effective mitigation strategy that reduces arsenic uptake and arsenic content of rice grains in arsenic-elevated soil through the best water management practices.

Reducing Arsenic Content in Rice Grains

Who cares and why?

Rice is one of major foods in the world and one of the most important crops in the United States. Averaged American is estimated to consume about 25 pounds of rice grains per year, and the United States is ranked the #3 of rice-exporting countries in the world. A recent survey indicated that rice grains produced from the South Central U.S. contained elevated arsenic (As) concentrations due to historical application of As-containing pesticides. Elevated As content in rice grain has been reported as a primary source of As intake by children and identified as a health threat to general public, especially to rice consumers, which potentially threatens public health, food safety, and rice-based regional economy in the United States.

In an effort to improve the quality and safety of US-produced rice grains and safeguard human health and rice consumers from soil As contamination, there is an urgent need to develop the mitigation strategies that would minimize the As accumulation in rice grains. This research will substantially enhance our understanding of the As chemical and uptake behavior in the rice-soil ecosystem and provide American rice growers with the best management practices to reduce As accumulation of rice grains in As-elevated soils and produce high quality, marketable rice grains, which could protect American rice consumers from the potential health risk of As-elevated rice products and promote rice-based regional economy.

What has the project done so far?

A research team consisting of scientists from academia and governmental agency has conducted experiments through an integrated approach of laboratory, greenhouse, and field studies to investigate the As bioavailability in the soil and the reduction of As uptake and grain As content by rice through soil amendments, rice cultivar selection, and water management practices. Results indicated that As content in rice grains and rice yield were rice cultivar-dependent and influenced by soil-As level and water management practices. Arsenic-resistant cultivars would yield more and contain less As in grain than the susceptible ones. The As accumulation in rice grain could be significantly reduced by wet-dry water management and nano-iron material amendment in rice field.



Impact Statement

This research improved rice grain quality and safety of US-produced rice products through cultivar selection, soil amendment, and water management.

- Developed the best management strategy to reduce arsenic uptake by rice plants and the grain As content.
- Produced safe, high quality, marketable rice grains or rice products.
- Safeguarded American rice consumers from the As-related health risk.
- Promoted rice-based regional economy in the south-central region.
- Advanced our understanding of the arsenic chemical and uptake behavior in the rice-soil ecosystem.

What research is needed?

As soil constituents are important to control arsenic phytoavailability or solubility that affect As uptake by rice plants, investigations of the As behaviors and its interactions with key soil minerals under various water management conditions are needed. Soil geochemical processes induced by water treatments and their relationship with As solubility and uptake by rice plants are being studied, and the impacts of As accumulation on rice grain nutritional quality and influences of nano-materials and soil amendments on the As solubility and uptake examined.



Want to know more?

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Additional link can be found at <http://www.umes.edu/ard/Default.aspx?id=46285>