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The Effect of Arsenic Concentration of Water on Rice Samples

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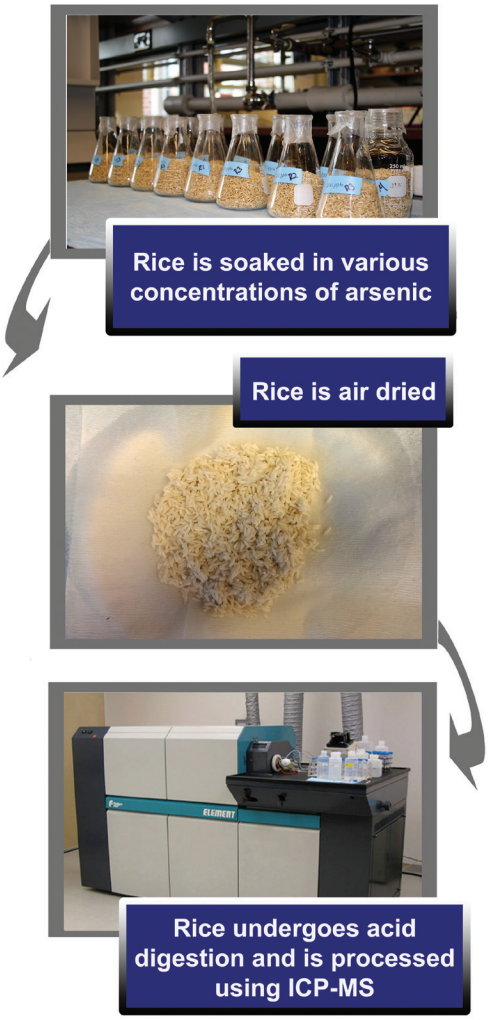
Arsenic is a toxic metalloid that is present in the environment from both natural and anthropogenic sources. Arsenic in drinking water is currently a large problem in countries such as Bangladesh, China, India, Nepal, Argentina, and Mexico. In addition, arsenic is also reported to be found in some food sources, including rice. In many of the countries facing arsenic contamination in drinking water, rice is a staple food, resulting in potential exposures from multiple sources. Based on this information, the hypothesis of this study was to test if rice soaked in water laced with arsenic would contain higher levels of arsenic than rice soaked in water without arsenic. Three objectives were completed to test this hypothesis: (1) establish an analytical protocol to measure the arsenic concentration in rice; (2) determine the concentration of arsenic in rice; and (3) determine if rice soaked in arsenic-laced water would possess higher levels of arsenic than rice soaked in water without arsenic. First, a protocol using inductively coupled plasma mass spectrometry (ICP-MS) was created and optimized to analyze arsenic concentrations in rice samples. Second, the concentration of arsenic in jasmine rice was determined using this protocol and was 3538 ng/g. Lastly, long grain rice samples were soaked in water containing either 0, 10, 100, or 200 ppb arsenic for 30 minutes, allowed to dry, and then the arsenic concentration was determined using the ICP-MS protocol. Arsenic concentrations ranged from 1969-2455 ng/g and were not significantly different among treatments ($n = 4$, $p = 0.2692$). Arsenic concentrations of the treatment water (0, 10, 100, and 200 ppb) were also analyzed and were slightly higher than the target concentrations (0, 37, 246, and 393 ppb, respectively). Overall, after experimentation, the hypothesis was disproven with the rice samples soaked in arsenic-laced water not containing significantly higher levels of arsenic than the rice samples soaked in water without arsenic.

Research advisor Jennifer Freeman writes: "Kendal's research is an interdisciplinary project with Dr. Suranjan Panigrahi (Purdue Polytechnic Institute). As arsenic exposure can result in a multitude of adverse health outcomes including cancer, Kendal's work has great significance in further understanding sources and concentrations of arsenic contamination in our food for risk assessment and regulation."



Rice was soaked in water containing arsenic, air dried, and then prepared and analyzed for changes in arsenic concentration using ICP-MS.

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