Hyperaccumulation of Arsenic in Rice Plants: A Low-Cost Approach to Arsenic Degradation

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Rice is a staple food for millions around the world and the countries known for exporting it the most have the highest levels of arsenic in their groundwater. Hyperaccumulation of arsenic in rice plants is very common and not much is being implemented to solve. This research is aimed to look reducing arsenic absorption in rice plants by growing rice plants with treatments in a controlled environment. This experiment had 5 different IV levels that had different concentrations of Arsenic. The 5 levels are 0.1 mg/L, 1 mg/L, 1 mg/L with eggshells, fertilizer, and Control. Based on last year's results from 10 different rice types, two rice types were selected to conduct the experiment (ADT, PPT). Each rice type had all 5 IV levels, resulting in 10 different samples. Once they were grown with their treatments for 6-7 months, they were cut into 2 different parts, the root and stem. 20 samples were taken to the lab and digested with nitric acid. Once digested, they were ran through the ICP-MS to measure arsenic among 25 other metals. Then, a T-test was conducted between the samples to prove the values had significance and analysis was done. Analysis showed that adding eggshells significantly reduces arsenic in both rice types. Respectively a 38.41% (ADT) and a 41.92% (PPT) decrease were seen. Out of the two rice plants, PPT naturally had less arsenic absorption than ADT. Further research was done to understand the genetic differences that could have resulted in these outcomes. This research showed a new way to reduce arsenic in rice plants using eggshells. This research also addressed possible genetic variations that could have caused the resistance of arsenic in one plant over the other.

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