An Eco-friendly Approach for Removal of Toxic Pentavalent Arsenic from Oryza sativa (Rice)

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Rice is a staple food for majority of world's population, particularly in Asia and Africa. However, as rice is being grown, arsenic is absorbed into the grain of rice. The consumption of many types of rice can lead to harmful diseases such as cancer and cardiovascular disease. The purpose of my research was to develop a safe and effective method for arsenic removal from rice. I tested the effects of washing rice with water and utilizing the method of adsorption, with FeSO4. For the method of arsenic detection, dried and grinded rice samples were microwave digested (using 67% nitric acid) for 600 seconds at 175°C using a 3 stage heating program. The arsenic level was precisely measured using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) instrument at the Research Analytical Laboratory in the University of Minnesota. The results with a water to rice ratio of 6:1 showed 28.20% arsenic removal and the ratio of 8:1 showed a 43.10% reduction in arsenic, suggesting that washing the rice with more water removes a greater amount of arsenic. A continuous flow water filtration system was then developed to improve the arsenic removal efficiency. This system yielded a 62.09% arsenic removal, showing to be 2.2X more effective. As water is scarce in many developing nations, my continuous water filtration system provides an efficient method for arsenic removal without burdening the natural resources. It's safe, easy to use and improves the quality of life by removing toxic arsenic from rice prior to human consumption.

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