Unraveling the Mechanisms of Arsenic-Induced Stress in Rice (Oryza sativa L.) and Assessment of Potential Alleviation by Silicon Addition

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Arsenic uptake in rice plants is a major global threat to food consumption. Addition of silicon has been found to mitigate the detrimental effects of arsenic exposure in rice plants (Oryza sativa L.). Through investigation of the relationship between silicon and arsenic absorption by rice plants at the physical, cellular, and molecular level, the interactions were observed and analyzed to arrive at the conclusion. The four treatments were Low silicon with No arsenic, Low silicon with High arsenic, High silicon with No arsenic, and High silicon with High arsenic. Rice plant growth and vigor at a physical level were determined based on plant height, mass, and leaf count. These values are analyzed using ANOVA tests to determine the relative effects of silicon and arsenic. The cellular effects were analyzed using qRT-PCR to determine the expression of genes correlated with oxidative stress. The molecular effects were analyzed using ICP-MS to determine arsenic concentrations in plant tissue. Results varied based on the methods utilized to analyze effects and suggest promising information in the field of plant toxicity.

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