Genetic Variability on Arsenic Accumulation and Its Impact on Yield in Rice (*Oryza Sativa* L.) under Elevated Arsenic in Soils

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Arsenic (As) is a human chronic carcinogenic, that occurs in soil due to natural weathering of rocks and anthropogenic activities. As (V) is taken up into rice plants through phosphate transporters owing to their chemical analogy, while As (III) uptake and translocation into grains are through the silicon transport pathway due to their similarity in molecular size. A glasshouse experiment using genetically diverse rice cultivars was carried out to investigate the accumulation of As on grains and the effect on the rice yield. In this experiment, different rice varieties were grown on natural rice soils and the same soil that spiked with As (10 mg/kg). Sodium arsenate ($Na_2HAsO_4.7H_2O$) was used for As spiking. Total As content in unpolished grains were quantified by inductively coupled plasma mass spectrometer (ICP-MS). In rice grains obtained from control pots, the As content varied from 10.6 to 44.2 µg/kg compared to the rice grown on As treated soils in which As content varied from 99.1 to 271 µg/kg. The arsenic content in rice ranked in the order of *Kalu heenati* > Bg 300 > *Beheth heenati* > *Madathawalu* > Bg 357 > *Pachchaperumal* > *Suwadel* > At 362 > *Pokkali* > *Kahawanu* that were grown on As-spiked soils, indicating the influence of genetic diversity on the accumulation. The As level in soil and varieties and also their interaction had a significant impact ($p < 0.01$) on the As accumulation in grains. The highest yield was reported in *Pokkali* under both controls and As treated soils, while *Suwadel* showed the lowest grain yield under the elevated As level followed by *Kahawanu*. The lowest yield loss was observed in *Beheth heenati* among others under As stress and followed by *Kahawanu*, *Madathawalu* and P*okkali*. The finding of this study suggested that the native cultivar, *Pokkali* is a better candidate that maintaining a lower grain As level with a higher yield under As stress in soil hence can be used to develop future rice cultivars to grown on As-contaminated soils.

Keywords: Arsenic accumulation, Genetic diversity, Rice, Yield penalties