Variability of Arsenic Species throughout Rice Plants

H. MARTIN[1]*, W.MAHER[2], E.DUNCAN[3], M.ELLWOOD[1], F. KRIKOWA[2]

[1] RSES, Australian National University, Canberra, Australia (*correspondence: Hayden.Martin@anu.edu.au)
[2] IAE, University of Canberra, Canberra, Australia
[3] Future Industries Institute, University of South Australia, Adelaide, Australia

Rice is inherently efficient at accumulating arsenic due to often being grown under anaerobic conditions, that favours the uptake and mobilisation of inorganic arsenic. This makes rice an ideal wetland plant to investigate arsenic uptake, transport and metabolism. Arsenic in the grain can pose a significant risk to human health. Inorganic arsenic (As(i)) is a class one, non-threshold carcinogenic, while organic arsenic (DMA and MMA) species are relatively nontoxic to humans. This results in organic arsenic species being overlooked when evaluating risks for human health and agricultural practices. This study investigated the distribution of arsenic species throughout the plant and health implication.

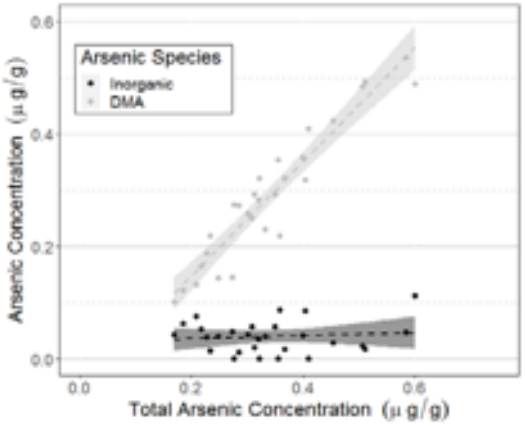

Figure1: Arsenic concentration in polished rice

While total arsenic concentrations within the grain increases, As(i) plateaus at 0.2μg g^{-1} whereas DMA continues to accumulate in a linear fashion to become the predominant species. In contrast, rice straw, As(i) increased as total arsenic concentrations increased.

Knowing the arsenic species present and their concentration is vital for assessing the risk to humans through consumption of grain and livestock that consume rice byproducts, such as straw.