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581-9 The Effect of Organic Acids from Rice (*Oryza sativa* L.) on Cadmium and Zinc Bioavailability in Thai Paddy Soils.

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George R. Brown Convention Center, Exhibit Hall E

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Bioavailability of metals is controlled by many factors such as the chemical properties of metals, rhizosphere soil properties, and plant species. There is increasing evidence that the root exudates increase the solubility of heavy metals in the rhizosphere. However, the root secretion derived heavy metal speciation and translocation is highly plant species and cultivar dependent process. The secretion of low-molecular-weight organic acids (LMWOA) from roots can operate by multiple mechanisms in response to various environmental stresses (David L. Jones, 1998). Cadmium (Cd) and zinc (Zn) naturally occur together. While Zn is a required micronutrient, Cd is harmful to human health. Although Cd has no biological role in rice, rice can take up Cd from soil, resulting in Cd entering the human food chain. This study aims to find the predominant organic acids secreted in the root exudates of two Thai rice cultivars in response to Cd and Zn, and further elucidate the effect of those organic acids on Cd and Zn mobility/bioavailability in Thai alkaline and acid paddy soils which are heavily contaminated with Cd and Zn. Two Thai rice cultivars grown *in vitro* were subjected to six different levels of Cd and Zn for fifteen days. Root exudates were collected and analyzed for organic acids by high performance liquid chromatography. Stirred-flow kinetic experiments were used to elucidate the effect of oxalic acid, citric acid, and malic acid to the release of Cd and Zn in Thai alkaline and acid paddy soils. The results show that oxalic acid is the major LMWOA secreted stably from rice roots in both cultivars under all treatment conditions. However, citric acid and malic acids are found to be responding to Cd treatment. Understanding the relationship of rhizosphere-chemistry and Cd and Zn mobility/bioavailability is crucial for developing a best sustainable strategy for remediation in contaminated paddy soils.

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