

Application of Zerovalent Iron to Immobilize Cd in the Rice Paddy Soil Contaminated with Heavy Metals

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ABSTRACT

Cadmium in rice grains grown in the paddy soils contaminated with heavy metals from the closed metal mines in Korea generally exceeds the safety guideline of KFDA (Korea Food and Drug Administration), $0.2 \text{ mg Cd kg}^{-1}$ in rice grain. Objective of this research was to apply chemical agents such as zerovalent iron (ZVI), lime, humus, and compost to stabilize Cd in the contaminated rice paddy soil. Treatment of such chemical agents reduced the adsorbed Cd fractions from 29% to 54% and the exchangeable Cd fractions from 39% to 99% as compared to those in the untreated soil (control). Efficiency of the chemical agents to inhibit Cd accumulation in rice grains was followed the orders of ZVI > lime > compost > humus. The zerovalent iron treatment did not influence the rice yield and inhibited the Cd accumulation in rice grains about 69% as compared to that in the control. Overall results indicated zerovalent iron was the most effective ameliorant to stabilize the phytoavailable Cd fractions in the contaminated rice paddy soil.

Key words: Immobilization, Cadmium, Zerovalent iron, Lime, Bioavailability, Rice (*Oriza sativa* L.)