

Ruj Kasetsuwan 2009: Zinc and Cadmium Content in Paddy Fields and Rice Grains: Implication for Human Health in Khao Yoi District, Phetchaburi Province. Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Ms. Savaporn Supaphol, Ph.D. 109 pages.

In order to investigate zinc and cadmium contents in rice growing area and to study relationship among of soil-plant-human in zinc content, the experiment was carried out in one selected area with field survey. Soils and rice samples were collected from the area in Khao Yoi District, Phetchaburi Province. Human hairs were obtained from people living in this area. The result indicated that extractable zinc and cadmium concentrations were considered as medium to very low at the range of 0.33 - 1.70 mg kg⁻¹ and 0.005 - 0.071 mg kg⁻¹ for extractable zinc and cadmium, respectively. Extractable zinc and cadmium in the soils were non significantly correlated with zinc and cadmium in the rice grain. Zinc concentration in Supanburi 1 and Chainat 1 brown rice are not adequate for human. Cadmium concentration in brown rice on these varieties are found in a small amount which is safely for human consumption. The zinc contents in the human hair ranged 60.19 - 193.11 mg kg⁻¹ which were less than normal range effecting on the risk of zinc deficiency. The above mentioned data showed the nutrition status presenting the relationship between soil, plant and human. It was suggested that the biofortification was suitable for selecting rice cultivar which contributed higher Zn in grains. Therefore, five rice cultivars consisting of Chainat 1, Pathumthani 1, RD 23, Suphanburi 1 and Suphanburi 3, were selected to investigate appropriate Zn level by cultivating in hydroponics culture experiment for 28 days at Kasetsart University Greenhouse. The experimental design was on 5×12 factorial in completely randomized design (CRD) with two replicates. The result showed that the appropriate zinc levels applied as ZnSO₄ for Chainat 1, Pathumthani 1, RD 23, Suphanburi 1 and Suphanburi 3 were 75, 75, 100, 100 and 50 μmol L⁻¹, respectively. Subsequently, selecting the suitable rate of Zn concentration to reduce Cd uptake in each rice cultivars, the rice cultivation in hydroponics culture experiment was conducted at 45 days. The experimental design was on 5×5 factorial in completely randomized design (CRD) with 3 replicates. The five rice cultivars were cultivated in nutrient solution at Zn 10 μmol L⁻¹, Zn 10 μmol L⁻¹ + Cd 20 μmol L⁻¹, Zn 25 μmol L⁻¹ + Cd 20 μmol L⁻¹, Zn 50 μmol L⁻¹ + Cd 20 μmol L⁻¹, Zn 75 μmol L⁻¹ + Cd 20 μmol L⁻¹. The result showed that only Suphanburi 3 cultivar had the lowest Cd uptake when ZnSO₄ was applied at 75 μmol L⁻¹

Student's signature

Thesis Advisor's signature