Nisanath Churthong 2009: Iron Content in Paddy Fields and Correlation of Phytic Acid with Iron in 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: Mrs.Savaporn Supaphol, Ph.D. 132 pages.

Iron deficiency is a major nutritional constraint for people in developing countries throughout the world. Rice is the most important staple food for Asia where people usually receive 50% of dietary Fe from rice. In Thailand, it has been found that rice has the lowest Fe concentration comparing to other cereals. Subsequently, anemia disease increasing in people is diagnosed. This study aimed to investigate influence of regional geography on the concentration of Fe in rice plants and human population. An initial field survey was carried out in Khao Yoi District, Phetchaburi Province. Soil samples, rice samples and human hairs of populations living in the Khao Yoi area were collected. The survey indicated that 71% of sampling populations from Khao Yoi area tended to be Fe deficiency. Rice cultivars of Chainat 1 and Suphanburi 1 were the most planted in this area. Both cultivars were low in Fe contents and Fe mole to phytic acid ratio as 1:1.8 and 1:2.4 of polished rice of Chainat 1 and Suphanburi 1, respectively. From the data mentioned above, they showed the nutrition status which presented the relationship between soil, plant and human. It was suggested that the biofortification was suitable for selecting rice cultivar which contributed higher Fe in rice grains.

Therefore, five rice cultivars consisting of Chainat 1, Pathumthani 1, RD 23, Suphanburi 1 and Suphanburi 3, were selected to investigate appropriate Fe level by cultivating in hydroponics culture experiment for 28 days at Kasetsart University Greenhouse. The experimental design was on 5x4 in completely randomized design (CRD) with three replicates. The result showed that the appropriate Fe level of Chainat 1 and Pathumthani 1 was Fe-EDTA supply at 100 μmol L^{-1} whereas Fe- EDTA supply in the range of more than 50 μmol L^{-1} to less than 100 μmol L^{-1} was appropriate Fe level for RD 23, Suphanburi 1 and Suphanburi 3. Subsequently, selecting the suitable rate of Fe concentration and rice cultivars, the rice cultivation in hydroponics culture experiment was conducted at 45 days. The experimental design was on 5x5 factorials in completely randomized design (CRD) with three replicates. The Chainat 1, Pathumthani 1, RD 23, Suphanburi 1 and Suphanburi 3 cultivars were cultivated in the Fe-EDTA solution at 5 different levels (50, 75, 100, 125 and 150 μmol L^{-1}). The result showed that the Chainat 1 cultivar had the greatest Fe content compared to other rice cultivars when Fe-EDTA was applied at 100 μmol L^{-1}. Furthermore, the Fe content in Chainat 1 was significantly increased by increasing Fe application rate compared to other rice cultivars.

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