

Wareenida Wiwanthamongkon 2013: Study on Heavy Metal Content in Waste Water, Effluent and Biogas Digester Sludge of Pig Farms and Effects of Pig Farm Waste Utilization as Fertilizer on Heavy Metal Contamination in Vegetable Production. Master of Science (Environmental Science and Technology), Major Field: Environmental Science and Technology, Division of Sciences. Thesis Advisor: Associate Professor Chongrak Kaewprasit, Ph.D. 82 pages.

Objectives of this study were 1. to evaluate content of arsenic (AS), cadmium (Cd), mercury (Hg) and lead (Pb) in waste water, effluent and sludge from biogas digester of 10 pig farms collected from 3 sites, and 2. to compare effects of using bio-fertilizer, chemical fertilizer, effluent and effluent+sludge from biogas digesters as plant nutrient source on heavy metal residue in cultivated medium, morning glory and lettuce. The vegetables were grown by 4 treatments of fertilizer application 1. bio-fertilizer, 2. bio-fertilizer+chemical fertilizer, 3 effluent+bio-fertilizer and 4. bio-fertilizer+effluent+biogas digester sludge. The study was conducted 4 replication of treatments and for 2 crops of the vegetables production by using completely randomized design (CRD). Result of the first objective showed that content of As, Cd, Hg and Pb in the effluent of biogas digester were 0.0598 ± 0.0139 , 0.0065 ± 0.0027 , 0.0004 ± 0.0001 และ $0.0472 \pm 0.0127 \text{ mg L}^{-1}$, respectively. However, all the heavy metal content are less than the PCD standard, and there were no relationship between the heavy metal content and the collection site of the samples. The content of As, Cd, Hg and Pb in sludge of biogas digester were 3.9658-17.4499, 0.7058-2.6585, 0-0.5054 and $3.7611-44.9735 \text{ mg kg}^{-1}$, respectively. However, the heavy metal content is less than the maximum limits of organic fertilizer standard.

Result of the second objective also showed that there were Cd and Pb in cultivated medium both at before and after the vegetable production. Morning glory grown by using effluent+sludge from biogas digester contains Pb $0.1398-0.1567 \text{ mg kg}^{-1}$ meanwhile lettuce grown by using chemical fertilizer contains Pb $0.0020-0.0035 \text{ mg kg}^{-1}$. There were no relationship between the heavy metal content in soil medium both at before and after vegetable cultivation and the lead content in both morning glory and lettuce is less than the maximum limits of food safety (article 2).

Student's signature

Thesis Advisor's signature