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KALLAYA SUNTORNVONGSAGUL: INFLUENCE OF METALS ON SOIL MICROBAIL ACTIVITIES AND RISK OF SALMONELLA AS A RESULT OF SEWAGE SLUDGE UTILIZATION IN AGRICULTURE. THESIS ADVISOR : ASSO. PROF. ORAWAN SIRIRATPIRIYA, D.Sc., THESIS CO-ADVISOR: ASSO. PROF. PRAKITSIN SIHANONTH, Ph.D., 171 pp. ISBN 974-584-866-2

The sewage sludge can be used in agriculture within acceptable risk of salmonella and heavy metals by appropriated management. This study had 2 parts. Firstly, the number of days to dry the sludge in the sunlight until the number of salmonellas dropped to less than the infection dose (10^5) was assessed. The influent and the effluent of Huay Kwang treatment plant were also tested for the amount of salmonella. Secondly, the sludge was applied into siltyclay and siltyloam at 20, 40, 60, and 80 tonnes/ha in order to test the influence of heavy metals on soil microbial activities for 16 weeks, using CO_2 concentration as an index of the activities. The experimental design was 2x4 factorial incompletely randomized with 3 replications.

The results showed that the amount of salmonella in the influent, the effluent, and the sludge of Huay Kwang treatment plant were 9 cells/100 ml, 6 cells/100 ml, and 84 cells/g of sludge respectively. After the sludge has been exposed to the sunlight for 7 days moisture content decreased to 2%, and salmonella were not detected. The sludge application at 20 and 40 tonnes/ha,(The rate of sludge application at 20 tonnes/ha is equaled to organical fertilizer used rate in vegetable crop) resulted in nonsignificant difference ($P \leq 0.05$) in all parameters measured when compared with the control soils. Increased the sludge application rate up to 80 tonnes/ha into two soil types did not change C:N ratio significantly, but decreased the pH value and increased the CO_2 concentrations, and Zn concentration significantly. For both soil types, the CO_2 concentration, and pH value of the sludge-amended soil and the heavy metal-amended soil seem to be highly correlated. During the first 4 weeks, the CO_2 concentration, the pH value were fluctuated after the sludge was applied into both soil types, after that they appeared to be consistent until the end of the experiment.

Hence, application of sewage sludge into siltyclay and siltyloam at the rate of 20 and 40 tonnes/ha does not affect to microbial activities,and exposure to the sunlight for 7 days tended to make the sludge safe from the risk of salmonella.