

Thesis Title Effect of Gamma Radiation on Ascaris suum Eggs in
 Sludge from Wastewater Treatment System.

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ABSTRACT

This experiment was carried out on the efficacy of gamma radiation upon one cell and the infective stage of both corticated and decorticated Ascaris suum eggs in sludge from a wastewater treatment system. After irradiation at 0, 0.1, 0.2, 0.3 and 0.4 kilogray the one cell eggs were postcultured for 5 weeks and the number of eggs that could develop into infective eggs were counted, but irradiated infective eggs were postcultured only 1 week. Then a hatching technique was performed to test the hatching ability of larvae from postcultured infective eggs for 24 hours. The number of larvae hatching from postcultured infective eggs were calculated for D₁₀ value, this is the level of gamma radiation showing inhibition of 1 log or 90 percent of initial load of Ascaris eggs. The dose establishment was done by a calculation from the D₁₀ value. Confirmed tests were also carried out to show that minimum dose could completely inhibit one cell stage and the infective Ascaris eggs.

The results revealed that the number of one cell and infective stages of corticated and decorticated eggs that were destroyed would increase when gamma radiation was increased with statistical difference

($p < 0.05$). The minimum D_{10} value which reduces 90 percent of one cell decorticated eggs in 4 percent solid sludge (D_{10} value) was at 0.67 kilogray. The maximum D_{10} value that could be reduced 90 percent of infective corticated eggs in 90 percent solid sludge was at 0.83 kilogray. (average 0.75 ± 0.06 kilogray). All D_{10} value did not have statistical difference ($p > 0.05$) using ANOVA test. The fourth percent and 90 percent solid sludge used in this study could not give significantly different results on Ascaris eggs after irradiated with various doses ($p > 0.05$). When Scheffe' Method for statistical comparison was used, the infective corticated eggs in liquid and solid sludge were killed significantly higher than infective decorticated eggs ($p < 0.05$) but it is no significant difference in destroying of one cell corticated and decorticated eggs in the same condition ($p > 0.05$). After irradiated at dose 0.1 kilogray, the maximum amount of destroyed eggs were infective corticated in 90 percent solid sludge and the same dose of gamma radiation could killed minimum of the infective decorticated eggs in solid sludge.

Therefore, the utilization of wastewater treatment system is proper, effective and safe to human beings and the environment if managed by irradiated sludge with gamma radiation at 2.68 kilogray (confirm dose). This dose can kill all types of parasitic eggs. Consequently Ascaris eggs can resist many more factors than other types of parasitic eggs.