

Thesis Title	Emission rate and influential factor of methane from rice paddy field
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Candidate	Mr. Piyabutr Wanichpongpan
Supervisors	Assistant Professor. Dr. Sirintornthep Towprayoon Mrs. Soydoa Vinitnantharat
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- Abstract

The Thesis categories into 2 part, the first part involved with the preliminary survey of the methane emission from rice paddy field at Nakornpatom province during dry and wet season and the second part is to investigate the influence of the 3 factors; fertilizer, pesticide and water level effected on the emission of methane. Nakornpatom province located in the middle part of Thailand where the major part of rice cultivation was planted. The soil characteristic at Nakornpatom was classified as Clay Tropaqualfs with moderate content of organic substances. The cultivated rice strain is "SPR 90" which required 120 days of cultivation. The strain is developed for high yield and self resistance. The methane emission from the rice paddy field was collected by using static box technique every two weeks during the planting period. The collected methane was analyzed by gas chromatography and estimated as the methane flux rate from the paddy field.

It is observed that during dry and wet season of cultivation, the maximum peak of methane flux rate reached 28.77 and 31.74 $\text{mg}/\text{m}^2/\text{h}$ respectively, at maturing period (70 days). The average methane flux rate was 9.57 and 10.17 $\text{mg}/\text{m}^2/\text{h}$ at dry and wet season respectively. The integrated methane emission was 25.08 and 43.44 $\text{g}/\text{m}^2/\text{crop}$ at dry and wet season, respectively. To estimate the total methane emission of Thailand, the rice planting area of 7,184

and 88,834 square kilometers for dry and wet season were used as the area factor and the total emission was calculated to be 3.25 TgCH₄/year, by using the methane flux rate of 0.23 and 0.29 g/m²/d for dry and wet season, respectively.

The studies of three influential factors were done at KMITT using the concrete box of 0.8 x 0.8 x 0.4 m³ (W x L x H) as the experimental plot. The organic fertilizer and chemical fertilizer were applied to the rice cultivated plot at different ratio of 10:0, 8:4, 4:8, 0:10 and 0:0 (organic fertilizer : chemical fertilizer) with the integrated methane emission of 38.14, 34.92, 29.29, 25.67 and 18.07 g/m²/crop, respectively. It is noted that the addition of fertilizer to the plantation increased the CH₄ emission and the rice production. The organic fertilizer caused more emission rate of CH₄ with lower production than chemical fertilizer.

Four kinds of pesticide namely ; Thiobencarb, Methylparathion, Endosulfan 5% G and Butachlor were applied to the rice plot during the cultivation. It is observed that the 3 former pesticides, with the integrated methane emission of 13.77, 13.10 and 12.02 g/m²/crop, respectively, showed higher methane flux rate than the control plot (15.72 g/m²/crop). While the CH₄ emission of the later pesticide, Butachlor, (15.92 g/m²/crop) was similar to the amount obtained from the control.

The water level during the plantation was the last influential factor studied in this experiment. The water level of 20,10,5 and 0 cm were controlled in the plot through the experiments and the integrated methane emission were 20.53,17.42,15.72 and 12.11 g/m²/crop, respectively. The higher water level, the more increment of methane flux rate was observed. It is noted that the water level was also shown the relation to the paddy growth which believed to be the main route of CH₄ emission.

Keywords : Rice paddy field / Methane emission / Methane flux rate /
Organic fertilizer / Chemical fertilizer / Pesticide /
Water level