

Thesis Title	Influence of Rice Varieties and Soil Series to Methane Emission from Rice Field
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Candidate	Miss Ormnisa Jittasatra
Supervisors	Assoc.Prof.Dr. Sirintornthep Towprayoon Miss Sasidhorn Buddhawong
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### Abstract

Rice field is one of the major greenhouse gas (methane) particularly in the agricultural country. This thesis studies the methane emission from rice fields influenced by two factors; rice varieties and soil series. The comparison between these two factors is also discussed.

Firstly, rice varieties of major popular plantation area in Thailand namely Suphanburi1, Suphanburi90, Chainat1, RD15 and Suphanburi60 were cultivated in Ratchaburi series at Inburi district, Singburi province with the same rice ecosystem and fertilizer supplement. Later three different plantation locations with different soil series namely Ratchaburi series at Inburi district, Singburi province, Bangken series at Sainoi district, Nonthaburi province and Saraburi series at Thamaka district, Kanchanaburi province were use to culture Chainat1 variety in the same ecosystem and fertilizer supplement. Experimental design was randomized complete blocks and 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.

Methane emission of rice field cultivated with rice varieties shown the range of emission from 28.21-34.89 g/m<sup>2</sup>/crop (2.69-3.32 kg/ha/d). The sequence from highest to lowest

emission were Suphanburi90 > RD15 > Suphanburi60 > Suphanburi1 > Chainat1 with the integrated methane emission of 34.89 (3.32), 33.09 (3.15), 32.57 (3.10), 29.35 (2.79) and 28.21 (2.69)  $\text{g/m}^2/\text{crop}$  ( $\text{kg/ha/d}$ ), respectively. The field without rice cultivation emitted methane 49.97  $\text{g/m}^2/\text{crop}$  ( $4.76 \text{ kg/ha/d}$ ) in the same ecosystem. The experiment shown that the ratio of methane emission to rice yield, when using Chainat1, expressed the lowest ratio of 0.061 kg methane/kg product.

The physical characteristics of rice plant such as height, number of leaves and air space in rice stem shown linear relationship to methane emission with significantly different between varieties. The amount of methane production in the same ecosystem and plantation condition is hypothesized to be the same, the difference of the methane emission is, therefore, influence by the physical characteristics of each varieties.

Methane emission of rice field cultivated with the same rice varieties, Chainat1, in three different soil series shown the range of emission from 9.36-28.21  $\text{g/m}^2/\text{crop}$  (0.89-2.69  $\text{kg/ha/d}$ ). The sequence from highest to lowest emission were Ratchaburi series > Bangken series > Saraburi series with the integrated methane emission of 28.21 (2.69), 11.86 (1.13) and 9.36 (0.89)  $\text{g/m}^2/\text{crop}$  ( $\text{kg/ha/d}$ ), respectively. The experiment shown that the ratio of methane emission to rice yield, cultivated in Saraburi series, expressed the lowest ratio of 0.022 kg methane/kg product.

The chemical characteristics of soil series such as organic carbon, nitrogen, phosphorus and potassium shown linear relationship to methane emission flux rate. The amount of methane emission with the same rice varieties is hypothesized to be the same, therefore, the difference of the methane production is influenced by the chemical characteristics of each soils series.

It is noted that the factor of soil series influenced higher uncertainties than the factor of rice varieties due to its broader range of methane emission flux rate.

**Keywords :** Methane emission / Methane flux rate / rice varieties / soil series / rice field