Thesis Title	Influence of Fertilizer and Water Management of Methane Emission from Rice Field
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Abstract

The thesis was categorized into 2 parts, the first part subject to the influence of fertilizer and water management on methane emission from rice field at Inburi district, Singburi province during wet season. The rice strained SPR 1 (*Oryza sativa* var.) was cultivated for 112 days. The methane emission from the rice fields was collected using static box technique once a week during 21-112 days of the planting period. In this study 5 applications of fertilizers were: 1) No fertilizer 2) Supplement with basal, but not topdressing fertilizers 3) Supplement with both basal and topdressing fertilizers. These topdressing fertilizer were either urea ($CO(NH_2)_2$), ammonium sulfate ($(NH_4)_2SO_4$), or ammonium phosphate ($(NH_4)_3PO_4$). The study on the influence of water management from rice field was categorized using 4 water management of regimes: 1) Flushing waters every 7 days at water level 5 cm 2) Flushing waters every 7 days at water level 2.5 cm 3) No water level above ground, and 4) Constant water level at 5 cm. The second part of this study was a laboratory investigation on anaerobic digestion of the Roi-Et soil series. Soil was incubated in an anaerobic condition for 112 days without organic carbon supplement, and with nitrogen source varied. There were 6 treatments: 1) Supplement with urea fertilizer 2) Supplement with ammonium sulfate fertilizer 3) Supplement with ammonium phosphate fertilizer 4) Supplement with mixed fertilizer (16-16-8) 5) Supplement with urea and ammonium phosphate fertilizer, and 6) No fertilizer.

The methane emission fluxes from 5 fertilizer applications were in the range of 0.074-0.109 $gCH_4/m^2/d$ (0.744-1.086 kg/ha/d). The emission fluxes of methane in decreasing order were: urea > ammonium phosphate > ammonium sulfate > basal fertilizer only > no

fertilizer. The emission fluxes were 0.109 $gCH_4/m^2/d$ (1.087 kg/ha/d), 0.092 $gCH_4/m^2/d$ (0.917 kg/ha/d), 0.088 $gCH_4/m^2/d$ (0.880 kg/ha/d), 0.084 $gCH_4/m^2/d$ (0.840 kg/ha/d), and 0.074 $gCH_4/m^2/d$ (0.744 kg/ha/d), respectively. The rice growth were in decreasing order of: urea > ammonium phosphate > ammonium sulfate > basal fertilizer only > no fertilizer. The methane emission fluxes from 4 water management regimes were in the range of 0.087-0.109 $gCH_4/m^2/d$ (0.868-1.086 kg/ha/d). The emission fluxes of methane in decreasing order were: Constant water level at 5 cm > Flushing water every 7 days at water level 5 cm > Flushing water every 7 days at water level 2.5 cm > No water level above ground. The emission fluxes were 0.109 $gCH_4/m^2/d$ (1.086 kg/ha/d), 0.099 $gCH_4/m^2/d$ (0.991 kg/ha/d), 0.093 $gCH_4/m^2/d$ (0.927 kg/ha/d) and 0.087 $gCH_4/m^2/d$ (0.868 kg/ha/d), respectively. The rice growth were in decreasing order of: Constant water level at 5 cm > Flushing water every 7 days at water level 5 cm > Flushing water every 7 days at water level 2.5 cm > No water level above ground. The rice growth, represent by height, field density, air space in rice stems, and dry weight biomass that induced higher growth due to appropriate condition applied, led to higher methane emission. It is noted that the factors of fertilizer supplement influenced higher uncertainties than the factors of water management due to its broader ranges of methane emission fluxes.

The study of anaerobic digestion of Roi-Et soil series in laboratory investigation without organic carbon supplement, and with nitrogen varied shown lower methane production than the experiments in the field due to the low of organic carbon. Fertilizer was essential for controlling methane production in paddy soil. Methane was emitted only from urea treatment and urea added ammonium phosphate treatment.

Keywords: Emission Fluxes / Rice Field / Water Management / Topdressing Fertilizer / Urea Fertilizer / Ammonium Phosphate Fertilizer / Ammonium Sulfate Fertilizer / Anaerobic Digestion