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Dynamic Emission of CH₄ from a Rice-Duck Farming Ecosystem

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ABSTRACT

Global climatic change induced by emissions of greenhouse gases from human activities is an issue of increasing international environmental concerns, and agricultural practices and managements are the important contributors for such emissions. This study investigated dynamic emission of methane (CH₄) from a paddy field in a rice-duck farming ecosystem. Three different cultivation treatments, namely the organic fertilizer + duck (OF+D), chemical fertilizer + duck (CF + D), and chemical fertilizer (Control) treatments, were employed in this study. Experimental data showed that hourly variations of CH₄ emission from the paddy field during the day were somewhat positively correlated ($R^2 = 0.7$ for the OF + D treatment and $R^2 = 0.6$ for the CF+D treatment) to the hourly changes in air temperatures in addition to the influences of the duck activities. The rate of CH₄ emission for the CF+D treatment was higher than that of the Control treatment at the tillering stage, whereas the opposite was true at the heading stage. In contrary, the rate of CH₄ emission for the OF + D treatment was always higher than that of the Control treatment regardless the tillering or heading stage. Our study revealed that the rate of CH₄ emission depended not only on air temperature but also on the rice growth stage. A 6.7% increase in CH₄ emission and in global warming potential (GWP) was observed for the CF + D treatment as compared to the Control treatment. This study suggested that although the impacts of duckling on the emission of CH₄ depended on the rice growth stage and air temperature regime, the introduction of ducks into the rice farming system in general mitigated the overall CH₄ emission and thereby the GWP.

KEYWORDS

Methane Emission, Global Warming Potential, Rice-Duck Farming

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