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Varietal Effects of Five Contrasting Rice Varieties on Diurnal Methane Emissions at Different Development Stages

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Abstract

Currently, concentrations of atmospheric methane (CH₄) are rising faster than at any time in the last two decades. In order to combat climate change, it is essential to quantify and mitigate methane emissions. Rice production is one of the main anthropogenic sources of methane. While CH₄ emissions from paddy fields are subject to diurnal variations, these are often neglected in similar field studies, leading to an over- or underestimation of total daily or seasonal methane fluxes. In collaboration with the International Rice Research Institute (IRRI), a field experiment was conducted during the dry season 2019/20 in the An Giang province of the Vietnam Mekong Delta (VMD) to evaluate diurnal variations of CH₄ fluxes at tillering, panicle initiation, and flowering stage for five contrasting rice varieties. CH₄ samples were collected at 0, 15 and 30 min after chamber closure with a 60-ml syringe using the manual closed chamber method and stored in a 30 ml evacuated glass vial. Analyses were performed with an SRI 8610C gas chromatograph (GC) at the IRRI laboratory in Los Banos, Philippines. Preliminary results show a distinct diurnal pattern that differed strongly among varieties, with maximum emissions in the early afternoon (12:00 to 15:00), followed by a decline to a minimum around midnight. Data obtained in this study will be used to correct regional emission factors to reflect the effects of diurnal variations and improve the accuracy of CH₄ extrapolations. Varietal differences in methane emissions in combination with appropriate water management would allow mitigating methane emissions in rice production systems.

Keywords: Diurnal variation, greenhouse gas mitigation, manual closed chamber, *Oryza sativa*, plant growth stages