

INTISARI

N₂O merupakan gas rumah kaca antropogenik di atmosfer yang sangat penting setelah CO₂ dan CH₄. Emisi N₂O dari lahan sawah dianggap sebagai salah satu sumber penting N₂O di atmosfer. Pengelolaan air, seperti *midseason drainage* (pengeringan tengah musim), dan aplikasi *green manure* (pupuk hijau) merupakan faktor penting yang mempengaruhi emisi N₂O dari lahan sawah. Oleh karena itu, penelitian ini dilakukan untuk mengetahui pengaruh perpanjangan *midseason drainage* dan aplikasi *green manure* terhadap emisi N₂O dari lahan sawah, kemudian dampaknya terhadap potensi pemanasan global (*global warming potential*). Fluks N₂O diukur dengan metode *closed chamber*. Gas diambil dengan spet kemudian disimpan di botol vakum pada menit ke 0, 30, dan 60 pada *fallow season* (musim bera), dan pada menit 4, 14, dan 24 pada *growing season* (musim pertumbuhan padi), setelah *chamber* dibanamkan. Konsentrasi gas N₂O dianalisis dengan gas chromatograph. Fluks N₂O diukur setiap dua minggu sekali. Sampel tanah diambil pada kedalaman 0-10 cm dari permukaan tanah pada saat pengukuran gas dilakukan, kemudian diukur pH tanah, Eh tanah, NO₃⁻, dan NH₄⁺. Fluks N₂O berkorelasi nyata/signifikan dengan pH dan Eh tanah. Fluks N₂O berkorelasi secara negatif dengan pH tanah dan berkorelasi positif dengan Eh tanah. Dampak perpanjangan *midseason drainage* terhadap emisi N₂O tahunan terbatas karena besarnya sumbangan N₂O selama *fallow season* daripada *growing season*. Meskipun demikian, perpanjangan masa *midseason drainage* berpotensi meningkatkan emisi N₂O. Pembenanam tanaman legum sebagai *green manure* cenderung meningkatkan emisi N₂O. Dibandingkan dengan perlakuan tanpa *green manure*, aplikasi *green manure* meningkatkan emisi N₂O tahunan. Kombinasi dari perpanjangan *midseason drainage* dan aplikasi *green manure* cenderung meningkatkan emisi N₂O dari lahan sawah sehingga memicu meningkatnya potensi pemanasan global.

Kata kunci: fluk N₂O, emisi N₂O, sawah, pengeringan sawah, pupuk hijau

ABSTRACT

N₂O is the third most important anthropogenic greenhouse gas in the atmosphere after CO₂ and CH₄. N₂O emission from paddy field has been regarded as one of the important source of atmospheric N₂O. Water management, such as midseason drainage, and green manure application are an important factors affecting N₂O emission from paddy field. Thus this experiment was conducted to find out effect of prolonged midseason drainage and green manure application on N₂O emission from paddy field, then its impact on global warming potential. Fluxes of N₂O gas was measured by the closed chamber method. Gas samples were collected by syringe then kept into vacuum-sealed vials with butyl rubber stoppers at 0, 30, and 60 minutes in the fallow season and 4, 14, and 24 minutes in growing season from the time the chambers were deployed. Concentrations of N₂O were analyzed by a gas chromatograph (GC) equipped with an electron capture detector. N₂O gas fluxes were measured every two weeks. Soil samples were collected from the 0-10-cm depth at the time of each gas sampling measurement. Then soil pH, soil Eh, NO₃⁻, and NH₄⁺ were analyzed from those soil samples. Compare to other soil properties, N₂O flux has a significantly correlation with soil pH and soil Eh. N₂O fluxes was negatively correlation with soil pH and positively significant correlation with soil Eh. Effect of prolonged midseason drainage period on annual N₂O emission was limited due to the higher contribution of N₂O emission in fallow season than growing season to the annual N₂O emission. However, prolonged midseason drainage potentially increase N₂O emission. Incorporation of legume crop as green manure to the soil tended to increase N₂O emission in this study. Compared to the treatment without green manure, application of green manure increased the annual N₂O emission. Combination of prolonged midseason drainage and green manure application tended to increase N₂O emission from paddy field thus induced the increasing of global warming potential.

Keywords: N₂O flux, N₂O emission, paddy field, midseason drainage, green manure