

MEASUREMENT OF SOIL CO₂ AND CH₄ FLUXES IN RUBBER, COCONUT, DURIAN PLANTATIONS, AND TERTIARY FOREST USING AUTOMATED CHAMBERS

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**TECHNOLOGY AND MANAGEMENT OF PLANTATION PRODUCTION
VOCATIONAL SCHOOL
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ABSTRAK

LISTYAWATI INDRA PUTRI. Pengukuran Fluks CO₂ dan CH₄ Tanah di Perkebunan Karet, Kelapa, Durian, dan Hutan Tersier Menggunakan *Chamber* Otomatis. Dibimbing oleh AIDIL AZHAR.

Perubahan penggunaan lahan memengaruhi fluks gas rumah kaca (GRK) dari tanah, khususnya CO₂ dan CH₄, yang berperan dalam dinamika iklim. Penelitian ini membandingkan fluks CO₂ dan CH₄ pada empat tipe lahan: perkebunan karet, kelapa, durian, dan hutan tersier di Thailand Selatan. Pengukuran mingguan dilakukan selama musim hujan menggunakan sistem otomatis LI-7810 *Trace Gas Analyzer* dan LI-8200-01 *Smart Chamber*, dilengkapi sensor suhu dan kelembapan tanah. Hasil menunjukkan bahwa tanah pada karet dan kelapa berpotensi menjadi penyerap metana, sedangkan durian menghasilkan emisi CH₄ tertinggi, terutama setelah hujan. Pola fluks bervariasi tergantung jarak collar dari batang pohon, yang diduga dipengaruhi oleh sistem perakaran. Analisis korelasi menunjukkan hubungan signifikan antara fluks GRK dengan suhu dan kelembapan tanah. Temuan ini menekankan pentingnya mempertimbangkan faktor biologis dan lingkungan dalam memahami emisi GRK serta potensi mitigasinya melalui pengelolaan lahan berkelanjutan.

Kata kunci: CO₂, CH₄, fluks gas rumah kaca, perkebunan karet, tanah, Thailand Selatan

ABSTRACT

LISTYAWATI INDRA PUTRI. Measurement of Soil CO₂ and CH₄ Fluxes in Rubber, Coconut, Durian Plantations, and Tertiary Forest Using Automated Chambers. Supervised by AIDIL AZHAR.

Land-use change influences greenhouse gas (GHG) fluxes from soil, particularly CO₂ and CH₄, which play a role in climate dynamics. This study compares CO₂ and CH₄ fluxes across four land-use types: rubber, coconut, durian plantations, and tertiary forest in Southern Thailand. Weekly measurements were conducted during the rainy season using the automated LI-7810 Trace Gas Analyzer and LI-8200-01 Smart Chamber system, equipped with soil temperature and moisture sensors. The results show that soils in rubber and coconut plantations have the potential to act as methane sinks, while durian plantations exhibited the highest CH₄ emissions, especially after rainfall events. Flux patterns varied depending on the distance of the collar from the tree trunk, likely due to the influence of root system characteristics. Correlation analysis revealed significant relationships between GHG fluxes and soil temperature and moisture. These findings highlight the importance of considering biological and environmental factors in understanding GHG emissions and their mitigation potential through sustainable land management.

Keywords: CO₂, CH₄, greenhouse gas flux, rubber plantation, soil, Southern Thailand



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LISTYAWATI INDRA PUTRI

Undergraduate Thesis
As one of the requirements for obtaining a
Applied Bachelor degree on
Technology and Management of Plantation Production Study Program

**TECHNOLOGY AND MANAGEMENT OF PLANTATION PRODUCTION
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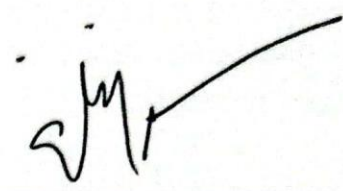
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FOREWARD

All praise and gratitude are due to Allah SWT for His blessings and grace, through which she was able to complete this undergraduate thesis entitled “Measurement of Soil CO₂ and CH₄ Fluxes in Rubber, Coconut, Durian Plantations, and Tertiary Forest Using Automated Chambers”, as a requirement to obtain a Bachelor's degree at IPB University.

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Bogor, August 2025

Listyawati Indra Putri



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