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**SOIL GREENHOUSE GAS EMISSIONS IN TROPICAL PEAT SWAMP FORESTS
AND OIL PALM PLANTATIONS IN CENTRAL KALIMANTAN, INDONESIA**

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Conversion of tropical peat swamp forests to oil palm plantations disrupts the carbon (C) and nitrogen (N) cycles, and contributes substantially to greenhouse gas emissions into the atmosphere. Despite the importance of tropical peat swamp forests and the impacts of their conversion on global C and N cycles, only a small number of published studies directly compare GHG emissions in undisturbed forest and oil palm plantation ecosystems. To fill this knowledge gap, we conducted a series of monthly soil CO₂, CH₄ and N₂O emissions measurements using the dynamic (CO₂) and static (CH₄ and N₂O) chamber methods in three forest plots and three oil palm plantations over 1.5 year. Soil respiration was in addition partitioned into root-based and peat-based respiration by trenching. Annual soil respiration rates amounted to 14.9 ± 0.4 and 12.1 ± 0.2 Mg C ha⁻¹ yr⁻¹ in the forests and oil palm plantations, respectively, and peat respiration represented 57% of total emissions in the forest and 72-89% in the plantations depending on their age. Annual CH₄ emission rates were 52.4 ± 7.4 and 0.4 ± 1.2 kg C ha⁻¹ yr⁻¹ and annual N₂O emissions rates 0.5 ± 0.1 and 5.5 ± 0.6 kg N ha⁻¹ yr⁻¹ in the forests and oil palm plantations, respectively. The temporal variation of the fluxes did not show any significant pattern between dry and wet months. The water table depth, water-filled pore space and peat temperature were the main factors controlling CO₂, CH₄ and N₂O emissions, respectively. Our results indicate that peat swamp forest conversion to oil palm plantation promoted peat soil organic matter decomposition, decreased substantially CH₄ emissions and exacerbated N₂O emissions, mainly as a result of nitrogen fertilization in the plantations.

Keywords: -