

Horizontal and vertical emissions of carbon dioxide and methane from a tropical peat soil cultivated with pineapple (*Ananas comosus* L) Merr.)

ABSTRACT

Peat soils have been developed for large scale plantations such as oil palm due to their positive contribution to Malaysia's economic growth in agriculture sector. However, these developments contribute to the emissions of greenhouse gases (GHGs) mainly carbon (CO₂) and methane (CH₄). To date, there were limited information of GHGs emissions from pineapple cultivation and also inadequate data on horizontally and vertically soil GHGs emissions in peat soil profile. Thus, this study was carried out to determine carbon CO₂ and CH₄ emissions horizontally and vertically from a drained tropical peat soils from a drained tropical peat soils cultivated with pineapple (*Ananas comosus* (L.) Merr. Horizontal and vertical movements of CO₂ and CH₄ were measured from a drained tropical peatland with *Ananas comosus* (L.) Merr. Tropical peat soils cultivated with *Ananas comosus* (L.) Merr. contributed to 79.7 % of CO₂, and 0.2 % of CH₄ based on the yearly basis regardless of the differences in diurnal transportation; horizontal and vertical emission. Soil CO₂ and CH₄ were emitted the most through horizontal transportation with 70.84 % CO₂, and 0.19 % CH₄ compared to 8.85 % CO₂, and 0.02 % CH₄ in vertical transportation. The emission of CO₂ was influenced by depth of water table and temperature. It is generally believed that lowering of peats water table leads to emission of higher CO₂ emission because this process leads to exposure of peat soils to oxidation. Seasonal variation in CH₄ flux was higher in the wet seasons due to rainfall; this might have increased the water table of the peat soil. The results suggest that CO₂ and CH₄ emissions occur both horizontally and vertically regardless of season. Therefore in order not to underestimate CO₂ and CH₄ emissions from peat soil, it is important to measure the emissions of this greenhouse gas which has been implicated in environmental pollution horizontally and vertically.

Keyword: Carbon dioxide; Horizontal; Methane; Peatlands; Vertical