Horizontal and vertical emissions of methane from a drained tropical peat soil cultivated with Pineapple (Ananas comosus (L.) Merr.)

ABSTRACT

Drained tropical peat soils especially for agricultural purposes could lead to methane (CH4) emission into the atmosphere. Methane emission from peat soils to the atmosphere depends on rates of methane production, consumption and ability of the soil and plants to transport the gas to soil's surface and also within soil particles. The objective of this study was to determine CH4 fluxes horizontally and vertically from the floor and wall of the pit of a tropical peat soils cultivated with Ananas comosus (L.) Merr. and to determine the relationship between CH4 transportation and CH4 emission from a drained tropical peat soils. Gas samplings were conducted in the dry and wet seasons. The horizontal emission of CH4 in the dry and wet seasons were 2.96 t CH4 ha-1yr-1 and 4.27 t CH4 ha-1yr-1, respectively. The vertical emission of CH4 in the dry and wet seasons were 0.38 t CH4 ha-1yr-1 and 0.50 t CH4 ha-1yr-1, respectively. The total amount of the horizontal and vertical CH4 emissions in the dry and wet seasons were 3.34 t CH4 ha-1yr-1 and 4.47 t CH4 ha-1yr-1, respectively. Horizontal emission of CH4 was higher in the wet season due to increase in water table which resulted in increase of CH4 emission. Therefore, it can be concluded that horizontal emission of CH4 is higher than vertical emission suggesting that there is a need for direct CH4 measurement from cultivated peat soils to ensure that CH4 emission is neither underestimated nor overestimated.

Keyword: Emissions; Horizontally; Methane fluxes; Tropical peatlands; Vertically