Physico-chemical properties, carbon dioxide emissions and carbon stock in peat soil used for turmeric cultivation at Kuala Langat Selatan, Selangor, Malaysia

ABSTRACT

Measurement of carbon dioxide emissions in peat soil was done in a turmeric cultivation area on August 2009 and January 2010 at Kampung Tumbuk Darat, Kuala Langat Selatan, Selangor. The objective of this research was to determine the quantity of CO2 emissions from peat soil as well as the carbon stock that is stored in the peat soil. Other parameters that were investigated included soil pH, soil temperature, soil bulk density, soil organic carbon, soil fresh water content, organic matter, humic acid and fulvic acid content. A total of 30 carbon dioxide emission sampling points in rectangular grid arrangement was prepared in a survey plot of 1 hectare. The survey plot was further divided into sub-plots of size 20 m x 25 m. Soil samples were randomly taken at the depth of 0-15 cm to 50-65 cm using an auger. Sampling of CO2 emissions was done using the static alkali absorption method (Kirita Method). The organic carbon content was determined using the Walkley-Black method, while the humic and fulvic acid content was determined using the basic molecule isolation method. Other soil properties were determined using standard methods of determination. The surface temperature of peat soil was between 28oC and 30oC. The bulk density of the area was as low as 0.20 g cm-3. On the other hand, the soil fresh water content, soil organic matter, and peat soil humic acid was very high. The minimum quantity of CO2 emissions in the peat soil on August 2009 and January 2010 was 40.92±21.62 t CO2 ha-1 yr -1 (467.10±246.86 mg CO2 m-2 hr-1) and 41.51±13.41 t CO2 ha-1 yr -1 (473.86±153.12 mg CO2 m-2 hr -1), respectively. Carbon stock for the month of August 2009 and January 2010, respectively was 297.70 t ha-1 and 456.60 t ha-1. T test showed that there were significant ($p<0.05$) differences in many of the soil parameters such as the pH, water content and organic carbon. Correlation analysis showed that CO2 is influenced by the organic matter, water content and temperature.