SUMMARY

VECKY DWI KUSWANDORA. CO₂ Gas Emission and Carbon Balance on Corn, Peanut, and Cassava Fields in Ranca Bungur District, Bogor.
Supervised by SUWARDI and HERMANU WIDJA JA

Climate change is one of global issues that became a warm topic of discussion over the world. Three greenhouse gases (GHG) that most contribute to the increase in GHG emissions are CO₂, CH₄, and N₂O. Besides industrial areas, CO₂ gas emission from agricultural land is allegedly high. However, researches on CO₂ emissions from tropical agricultural land are very limited especially on mineral soil. Some of the researches were conducted on the peat land. Therefore, it is very important to collect information of CO₂ emission in tropical mineral soil.

This study aims to measure the amount of CO₂ emissions on different land uses as well as to understand the controlling factors of CO₂ emission at mineral soil and to measure carbon balance.

This research was conducted on corn, peanut, and cassava fields at Bogor, West Java, from November 2010 to June 2011. CO₂ flux was measured by closed chamber method, two replications on row, one replication inter row in corn and cassava fields, three replications in peanut field (there were not row). The environment variables such as air temperature, soil temperature at 5 cm depth, relative humidity, and water content were also measured. These measurements were carried out every week from planting until harvesting. Cumulative CO₂ emission was calculated by multiplying the mean CO₂ fluxes and the duration between the adjacent sampling times. In order to compare each site, we assumed that these fields were continued to be planted same crop for one year for calculation. When harvested, all parts of plant samples were taken and analyzed its carbon content using a CHNS elemental analyzer.

All crops were planted on November 2010. Growing period was 77, 75, and 218 days in corn, peanut, and cassava field respectively. CO₂ emission from corn field was 14.95 ton C ha⁻¹ yr⁻¹, followed by 10.64 ton C ha⁻¹ yr⁻¹ in cassava field, and 10.07 ton C ha⁻¹ yr⁻¹ in peanut field. In corn field and cassava field, CO₂ flux on row was higher than inter row. Soil temperature and water content was positively correlated with CO₂ flux on row, but did not correlated with CO₂ flux inter row. These results suggest that plant activity may influence CO₂ emission. High soil temperature and water content could increase CO₂ emitted from the soil. Net Primary Production (NPP) in each site was 21.98 ton C ha⁻¹ yr⁻¹ in corn field, 10.86 ton C ha⁻¹ yr⁻¹ in peanut field, and 12.19 ton C ha⁻¹ yr⁻¹ in cassava field. There is a positive correlation between CO₂ emission and NPP.

Key words: Agricultural land, closed chamber method, CO₂ gas emission, tropical mineral soil.