

Tharini Phaosiha 2012: Assessing Carbon Budget and Soil Carbon Sequestration in Paddy Rice Fields under Chemical and Organic Agricultures with Water Management. Master of Science (Environmental Technology and Management), Major Field: Environmental Technology and Management, Department of Environmental Science. Thesis Advisor: Associate Professor Patthra Pengthumkeerati, Ph.D. 72 pages.

This study aims to assess carbon (C) budget in paddy rice fields under chemical and organic agricultures with water management (mid-season drainage) in Chachoengsao. Field experiment was conducted to measure rice growth, rice yield and biomass, soil carbon dioxide (CO<sub>2</sub>) emission and soil organic carbon. Results showed that plant height and rice yield were higher in organic rice plots (OP) than chemical rice plots (CP) and water management (WM) had a negative effect on rice growth. In addition, OP had a rapid rice growth than CP. OP had a greater soil CO<sub>2</sub> efflux than CP, but the WM effect was not observed. Total soil CO<sub>2</sub> emission throughout the growing season was not different between the two cultivation patterns. Soil organic carbon (SOC) in OP was higher than CP by 25%, indicating that adding organic fertilizer in the 9-year OP was a promise way to sequester soil C. However, WM did not have a clear effect on SOC in this one-year study. Assessing C budget in rice field showed that rice cultivation could sequester C in field and in soil for all the studied cultivation patterns, and OP could sequester C higher than CP (>1.2 times). WM considerably decreased C sequestration in CP (< 23%). Hence, this finding suggested that, regardless of water management, paddy rice fields under organic agriculture effectively enhanced C sequestration in field and in soil, comparing to chemical rice cultivation. Water management had a decreased effect on C sequestration, especially for chemical cultivation, but further investigation should be conducted for a better understanding

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