

Achara Chumvong 2008: Water Management in Paddy Field for Reduction of Environmental Impacts on Methane and Water Quality. Doctor of Engineering, (Irrigation Engineering), Major Field: Irrigation Engineering, Department of Irrigation Engineering. Thesis Advisor: Associate Professor Bancha Kwanyuen, Ph.D.
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Under traditional practice of paddy fields in Thailand, farmers irrigate more water than crop water requirement for weed control and water supply assurance. This practice wastes a lot of water through percolation and drainage and also effects on water quality. Moreover, continuous flooding induces methane gas emission into atmosphere which leads to global warming. Therefore, this research was focused on water management in paddy fields to find suitable water management to reduce environmental impacts by applying the shallow water depth (10 to 5 cm.), the alternate wetting and drying (5 to -5 cm.) and the traditional irrigation (30 to 20 cm.). Samples were regularly collected from paddy fields during the dry and rainy seasons of 2006 in the MaeKlong river basin, Thailand. The results showed that higher and longer flooding period of paddy field increased methane emission and reduced water quality. The traditional irrigation induced the highest impacts on methane emission and water quality, while the shallow water depth and the combination of shallow water depth with drying period showed less impacts, respectively. Moreover the combination of wet and dry periods gave the lowest methane emission in paddy field and nitrate and phosphate concentrations in drainage canal. In comparison with traditional irrigation, the proposed methods indicated that methane emission, nitrate and phosphate concentrations were reduced between 20–81%, 51-61% and 97-98%, respectively. In addition, the quantity of water supply decreased between 40–63% without any significant yield reductions. However, the impacts of irrigation methods on soil quality was inconclusive due to a short period of study. In conclusion, the proper water management is an effective way to reduce water use and enhance sustainable environmental condition of atmosphere and water resources. Furthermore, proper water management may also improve quality of life and better condition of ecosystem.

Student's signature

Thesis Advisor's signature