Tropentag, September 17-19, 2014, Prague, Czech Republic

"Bridging the gap between increasing knowledge and decreasing resources"

Mitigation of Methane Emissions from Paddy Fields by Alternate Water Management

Syed Faiz-Ul Islam[1], Andreas de Neergaard[1], Jan Willem van Groenigen[2]

[1] *University of Copenhagen, Dept. of Plant and Environmental Sciences, Denmark*
[2] *Wageningen University and Research Center (WUR), Dept. of Soil Quality, The Netherlands*

Abstract

Rice paddies are a major source of anthropogenic methane (CH_4); they are responsible for about 15–20 % of the annual global efflux. It is produced in anoxic environments, including the submerged soils of wetlands and paddy fields, by methanogenic archaea during the anaerobic degradation of organic matter. Therefore water management is one of the most important tools for methane mitigation in rice production systems. The effect of mid-season drainage and intermittent irrigation on CH_4 emission is well established. However, the effect of length and timing of drainage on CH_4 emissions is still poorly understood. We studied this effect in an experiment with six different water management systems (continuous flooding, alternate wetting and drying, varied midseason drainage and varied early stage drainage with mid-season drainage). The experiment was conducted in climate chamber resembling tropical conditions and all the five drainage systems except for continuous flooding, irrigation water from the paddy was drained out at the different stages of the crop cycle. Gas sampling was carried out using static chambers and the concentration of CH_4 and N_2O was simultaneously measured using a gas chromatograph. Among all the six different water management systems applied, highest efflux of the methane was recorded from continuously flooded plot which was significantly higher than all other treatments and mid-season drainage with early stage drainage was found to be highly effective in mitigating methane efflux. It was also found that the redox potential of the soil of the drainage system was inversely proportional to the methane efflux from all the treatments. The detailed results will be presented during the conference. These results will provide important insides regarding water management for attenuation of CH_4 emission from rice fields.

Keywords: Methane emission, rice, water management

Contact Address: Syed Faiz-Ul Islam, University of Copenhagen, Dept. of Plant and Environmental Sciences, Thorvaldsensvej 40, 1871 Frederiksberg C, Denmark, e-mail: faiz@plen.ku.dk