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“Development on the margin”

Mitigation of Methane Emissions from Rice Paddies: Alternate-wetting-and-drying in Farmers' Fields (Central Luzon, Philippines)

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Abstract

Alternate wetting and drying (AWD) is a water saving strategy in irrigated rice production. The basic idea is to switch from continuously flooded rice fields to fields that alternately encompass flooded and non-flooded phases which can save up to 20 % of irrigation water. This can be applied without yield losses as long as the water level does not go lower than 15 cm below soil surface. In our study, we have assessed AWD as a means to mitigate methane emissions. While the principal potential of water saving as mitigation strategy has previously been shown on experimental farms, we intended to demonstrate the actual emission savings under farmers' practices.

The greenhouse gas (GHG) methane is produced anaerobically by methanogenic bacteria. Hence flooded rice fields are a large source of methane emissions (in fact, the second largest anthropogenic source after ruminant livestock). Periodic aeration of the soil inhibits methane producing bacteria, so that AWD can reduce methane emissions by up to 50 %.

AWD is adopted in many rice producing areas already, but it is unclear to what extent the recommended irrigation protocols are followed by individual farmers. For an assessment and upscaling of actual emission savings, however, it is indispensable to do measurements in farmers' fields. In our study we analyse methane emissions on selected rice farms in Nueva Ecija (Central Luzon, Philippines) comprising farms that adopted AWD as well as those with continuously flooded fields. Our key findings are 1) reduction of CH₄ emissions under AWD as practised in farmers' fields is marginal and 2) there are only minor differences in N₂O emissions between AWD and continuously flooded fields.

Keywords: Greenhouse gases, irrigation, methane, rice, water management, water saving