World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:11, No:03, 2017

Potential Benefits and Adaptation of Climate Smart Practices by Small Farmers Under Three-Crop Rice Production System in Vietnam

Authors : Azeem Tariq, Stephane De Tourdonnet, Lars Stoumann Jensen, Reiner Wassmann, Bjoern Ole Sander, Quynh Duong Vu, Trinh Van Mai, Andreas De Neergaard

Abstract : Rice growing area is increasing to meet the food demand of increasing population. Mostly, rice is growing on lowland, small landholder fields in most part of the world, which is one of the major sources of greenhouse gases (GHG) emissions from agriculture fields. The strategies such as, altering water and residues (carbon) management practices are assumed to be essential to mitigate the GHG emissions from flooded rice system. The actual implementation and potential of these measures on small farmer fields is still challenging. A field study was conducted on red river delta in Northern Vietnam to identify the potential challenges and barriers to the small rice farmers for implementation of climate smart rice practices. The objective of this study was to develop and access the feasibility of climate smart rice prototypes under actual farmer conditions. Field and scientific oriented framework was used to meet our objective. The methodological framework composed of six steps: i) identification of stakeholders and possible options, ii) assessment of barrios, drawbacks/advantages of new technologies, iii) prototype design, iv) assessment of mitigation potential of each prototype, v) scenario building and vi) scenario assessment. A farm survey was conducted to identify the existing farm practices and major constraints of small rice farmers. We proposed the two water (pre transplant+midseason drainage and early+midseason drainage) and one straw (full residue incorporation) management option keeping in views the farmers constraints and barriers for implementation. To test new typologies with existing prototypes (midseason drainage, partial residue incorporation) at farmer local conditions, a participatory field experiment was conducted for two consecutive rice seasons at farmer fields. Following the results of each season a workshop was conducted with stakeholders (farmers, village leaders, cooperatives, irrigation staff, extensionists, agricultural officers) at local and district level to get feedbacks on new tested prototypes and to develop possible scenarios for climate smart rice production practices. The farm analysis survey showed that non-availability of cheap labor and lacks of alternatives for straw management influence the small farmers to burn the residues in the fields except to use for composting or other purposes. Our field results revealed that application of early season drainage significantly mitigates (40-60%) the methane emissions from residue incorporation. Early season drainage was more efficient and easy to control under cooperate manage system than individually managed water system, and it leads to both economic (9-11% high rice yield, low cost of production, reduced nutrient loses) and environmental (mitigate methane emissions) benefits. The participatory field study allows the assessment of adaptation potential and possible benefits of climate smart practices on small farmer fields. If farmers have no other residue management option, full residue incorporation with early plus midseason drainage is adaptable and beneficial (both environmentally and economically) management option for small rice farmers.

Keywords : adaptation, climate smart agriculture, constrainsts, smallholders
Conference Title : ICGFS 2017 : International Conference on Global Food Security
Conference Location : Miami, United States
Conference Dates : March 09-10, 2017