

2015 Asia Sub-Group Meeting of the Paddy Rice Research Group 18 September 2015 Institute of Soil Science, Chinese Academy of Sciences, Nanjing, China



# Recent IRRI Initiatives for mitigating GHG emissions from rice cultivation

#### A. T. Padre

Rice and Climate Change Research

IRRI



RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security



#### **Climate-Smart Crop Management**

Low Carbon development – explores and assesses management techniques with reduced carbon footprint e.g. AWD

#### Decision – support tools

Measurement, reporting and verification to come up with globally comparable evaluation tools

- Greenhouse gas mitigation in irrigated rice systems in Asia Part 2 (MIRSA-2) – funded by MAFF Japan
- Mitigation options to reduce methane emissions in paddy rice CCAC – Climate and Clean Air Coalition
- □ CIRCLE Manager decision-support tool
- **CCAFS Flagship #3: Low Emissions Agriculture**
- Assessing incentives for scaling-up mitigation at different stakeholder levels: "No regret mitigation strategies in rice production"
- Standard Assessment of Mitigation Potential and Livelihoods in Smallholder Systems (SAMPLES)
- The Climate Food and Farming Research Network (CLIFF) - capacity building



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## Greenhouse gas Mitigation in Irrigated Rice Systems in Asia Part 2 (MIRSA 2)

IRRI

Objective: To develop improved water management based on AWD that can always reduce soil-derived CO2-eq emission (CH4 + N2O) during rice growing season from irrigated rice paddies in Asian countries by 30% compared to the conventional practice.



#### Greenhouse gas Mitigation in Irrigated Rice Systems in Asia Part 2 (MIRSA 2)

#### Approach:

IRRI

 Field demonstration in Vietnam, Philippines, Thailand, and Indonesia.



Guidelines for Measuring CH<sub>4</sub> and N<sub>2</sub>O Emissions from Rice Paddies by a Manually Operated Closed Chamber Method



NIAES

Version 1 August, 2015 National Institute for Agro-Environmental Sciences, Japan Minamikawa, K., Tokida, T., Sudo, S., Padre, A., Yagi, K. (2015) Guidelines for measuring  $CH_4$  and  $N_2O$  emissions from rice paddies by a manually operated closed chamber method. National Institute for Agro-Environmental Sciences, Tsukuba, Japan. Download at http://www.niaes.affrc.go.jp/index\_e.html

These guidelines were commissioned by the Secretariat of the Agriculture, Forestry and Fisheries Research Council of the Ministry of Agriculture, Forestry and Fisheries of Japan through the MIRSA-2 project to support the goals and objectives of the Paddy Rice Research Group of the Global Research Alliance on Agricultural Greenhouse Gases (PRRG-GRA).

2. Development of guidelines on implementing MRV targeted at a mitigation option by water management for GHG emission from irrigated rice paddies



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## Mitigation options to reduce methane emissions in paddy rice



Hosted by United Nations Environment Program (UNEP)

Implementing Partners: IRRI in Asia and CIAT in Latin America with support from CCAFS)

First-Mover Countries (Partner Countries for Implementation):











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#### IRRI Decision support tool: Climate-Informed Rice Crop and Low Emissions manager





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#### **Climate-Smart Crop Management**

#### **CCAFS Flagship #3: Low Emissions Agriculture**

#### **Research Areas**

Quantifying agricultural emissions Setting low emissions priorities Scaling up low emissions practices



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# Assessing incentives for scaling-up mitigation at different stakeholder levels: "No regret mitigation strategies in rice production"

The project seeks to overcome a lack of motivation among smallholder farmers to practice AWD. The water-saving features simply do not provide enough incentive to motivate adoption.

#### **Objective:**

The project aims to develop an innovative approach based on highlighting co-benefits of mitigation options, integrating alternate wetting and drying (AWD) into a farming strategy, as opposed to approaches focusing on emissions reductions only.

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## Activities No regret mitigation strategies in rice production

An inventory of AWD and other mitigation technology projects implemented in satellite sites is being done to obtain supplemental data confirming the co-benefits of mitigation.

Field experiments will be implemented to enable data collection on additional incentives of water-saving technologies to proceed from mere anecdotal evidence to science-based facts. The co-benefits of AWD will be quantitatively evaluated (specifically on reduced lodging, less fungal disease, better soil condition for mechanization).





Photo from MIRSA-2 field experiment in Hue, Vientam





## Activity No regret mitigation strategies in rice production

Comprehensive data analysis will be done on crop performance vis-a-vis mitigation potential

The project will also assess agronomic advantages in crop performance through participatory field testing in Climate-Smart Villages (CSVs). Here, both women and men farmers will be given the same opportunity to be involved in field testing and evaluation of the technologies.

Economic input/output ratios of different mitigation options will be analyzed.



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#### **The SAMPLES Program**

## Standard Assessment of Mitigation Potential and Livelihoods in Smallholder Systems

















### SAMPLES

Purpose: Provide methods and data to quantify agricultural emissions and mitigation in developing countries

- Established 2012
- 6 CG centers + regional and global partners (e.g. Global Research Alliance)
- Active in 4 regions (in CCAFS focal countries)

#### The Problem:

- Few data tropical developing countries
  - Baseline emissions
  - Potential for emissions reductions and enhanced carbon storage

Agricultural activity \* emission factor = emissions





#### **Goals of SAMPLES**

- Provide data for emission factors
  - Develop methods to lower cost of measurements
- Provide guidelines to for measurement to ensure robust, comparable data
- Validate models and proxies to estimate mitigation without measurement

#### Why we need location-specific data

Over-prediction of emissions using default emission factors

- Dashed line is a 1:2 line; data points above this line represent an overestimation by a factor of 2 or more.
- Solid line is a 1:1 line; data points above this line represent an over-estimation of GHG emissions by the calculator.

Shameless plug: Tuesday poster

ssion 2-4:30



## **Activities**





Rice – Philippines Trees and Livestock - Kenya

## **Identifying mitigation options:** Substantial GHG reductions with alternate wetting and drying in rice (Sander et al.)



#### http://samples.ccafs.cgiar.org/



#### **ABOUT THE SAMPLES DATABASE**

#### What you can do with the database

- Download site-specific emission factors and associated agroecological data for use in greenhouse gas accounting or inventories
- Find links and contact information to access full datasets for use in biogeochemical modeling
- Share data from your own research

#### Sharing your data

- We encourage anyone conducting greenhouse gas measurements from agricultural systems to upload their data to the database. Generally, only published data are accepted.
- To add your data to the database, please use the Microsoft Excel® data entry workbook. Before entering data, please read the instructions on the yellow "background" tab.

#### SAMPLES data input template\_v4

- Completed data entry workbooks should be sent to Meryl Richards at meryl.richards@uvm.edu
- The database team will then work with you to resolve any questions or issues related to data content or formatting before uploading your data.
  By providing data, you agree to have this data made freely available to database users.

#### **ABOUT THE SAMPLES DATABASE**

#### Terms for using the SAMPLES database

- Information in this database is freely available to the public for use in research or other purposes. Data from CCAFS research are made available according to the <u>CCAFS Data Ownership and Sharing Agreement</u>.
- Please acknowledge data providers in any products or publications that have used data from this database, using the journal citation associated with the data. If no citation is provided, please contact the data provider (see the Contact information column).
- CCAFS, CGIAR scientists and collaborators have made all efforts to ensure the accuracy of emission factors and associated data in this database. However complete accuracy cannot be guaranteed, and anyone using the SAMPLES database agrees to hold all parties involved in the production and distribution of these data harmless for damages resulting from their use or interpretation.





SAMPLES STANDARD ASSESSMENT OF AGRICULTURAL MITIGATION POTENTIAL AND LIVELIHOODS



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| EMISSIONS DATA -           | MEASUREMENT METHODS -          | TOOLS | ABOUT SAMPLES - | PUBLICATIONS & MEDIA | CONTACT | ٩ |
|----------------------------|--------------------------------|-------|-----------------|----------------------|---------|---|
|                            |                                |       |                 |                      |         |   |
| EMISSIONS                  | DATA                           |       |                 |                      |         |   |
| Emission factors for a     | agricultural sinks and sources |       |                 |                      |         |   |
| Click on the picture to go | o to the link                  |       |                 |                      |         |   |

#### Beta version, June 2015



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| Country                    |       |
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| 1996 IPCC sink/source cate | gory  |
| Select a value             |       |
| 2006 IPCC sink/source cate | egory |
| Select a value             | *     |
|                            |       |
| Source                     |       |





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Flagships

Low Emissions Agriculture

**CLIFF** is an international research network that helps to build the capacity of young researchers working on climate change mitigation in smallholder farming. It achieves this by linking researchers with doctoral students who wish to participate in the **SAMPLES** project.





Flagships

Low Emissions Agriculture

#### Partners

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) launched CLIFF in 2011 in collaboration with the Department of Agriculture and Ecology, University of Copenhagen and the Department of Agroecology at Aarhus University.

#### 2015 CLIFF Recipients



CLIFF 2015 GRANT RECIPIENTS WITH COLLABORATING SCIENTISTS AND AARHUS AND CCAFS PARTNERS. (PHOTO: T KANDEL, AARHUS)

| Name             | University | Host       | Host        |
|------------------|------------|------------|-------------|
|                  | of         | center     | country     |
|                  | Enrollment |            |             |
| Theodora Achieng | Kenya      | ILRI/CIFOR | Kenya       |
| Carolina Alvarez | Argentina  | CATIE      | Costa Rica  |
|                  | gornine    | ••••       |             |
| Geeta Bhatrai    | Thailand   | IRRI       | Philippines |
| Bastakoti        |            |            |             |
| Aadhu Choudhary  | India      | CIMMYT     | India       |
| Sandra Durango   | Colombia   | CIAT       | Colombia    |
|                  |            |            |             |
| Alice Onyango    | Kenya      | ILRI/CIFOR | Kenya       |
| Pardeep Sagwal   | India      | CIMMYT     | India       |
|                  |            |            |             |
| an Yuechen       | China      | CIMMYT     | UK          |
|                  |            |            |             |

IRRI

#### Rice and climate change research

#### IRRI.ORG Home Framework overview Projects CCAC component Blog Resources Contact us

#### https://sites.google.com/a/irri.org/rice-and-climate-change-research/

#### AWD saves water and reduces methane emission.

#### Welcome to IRRI's Climate Change Research!

IRRI's Climate Change Research assesses the interactive nature of rice production and climate change <u>since the early</u> <u>1990s</u>. Research conducted by <u>IRRI's Climate Change group</u> group covers various aspects of adaptation and mitigation in rice production systems. Moreover, our work on Climate Change largely capitalizes on research findings stemming from IRRI projects conceived in another thematic context—for instance plant breeding—to improve resilience in unfavorable environments or decision making for higher resource use efficiency.

Our activities cut across different disciplines under a <u>'two-portfolio framework</u>' combining two Consortium Research Programs (CRPs) of the CGIAR, namely <u>Climate Change, Agriculture and Food Security (CCAFS</u>) and <u>Global Rice Science</u> <u>Partnership (GRiSP</u>). <u>Adaptation</u> research aims to develop rice plants and crop management systems that can better cope with higher temperatures and aggravating climate extremes. <u>Mitigation</u> research focuses on reducing the carbon footprint of irrigated rice such as water saving technologies. Impacts and Policies are addressed across different scales, from local to international (e.g. ASEAN).

#### What's new?

- <u>Climate project partners map inroad to</u> adoption of water-saving technology
- Philippines: Climate conference centers on
   "smart agriculture"
- <u>Philippines: Conservation agriculture in</u> <u>South Asia highlighted at climate-smart</u> <u>agriculture workshop</u>

#### **Events**

No upcoming events. Please stand by for updates.

#### **Quick Links**

Climate and Clean Air Coalitions (CCAC): Methane Mitigation in Ric Paddies



#### **New Publications**

Wetting and Drying: Reducing Greenhouse Gas Emissions and Saving Water from Rice Production



Infonote April 2014 - Alternate Wetting and Drying in Irrigated Rice





Thank you very much

for your attention...

