

Paddy Rice Research Group Meeting

INRA Versailles and Palais de Congress de Versailles, France

1 - 2 March 2011

Meeting Report

OVERVIEW

The second meeting of the Rice Research Group of the Global Research Alliance on Agricultural Greenhouse Gases took place from 1-2 March 2011 over two locations in France (INRA's Versailles research centre and Palais de Congress de Versailles, Versailles). The meeting was part of a week of events comprising the second Senior Officials Meeting of the Alliance (other meetings are reported on separately). It was co-chaired by Japan (Dr Kazuyuki Yagi, National Institute for Agro-Environmental Sciences) as co-ordinator of the Rice Research Group and Uruguay (Dr Alvaro Roel, National Institute of Agricultural Research).

This report is a summary of the key discussions and outcomes of the meeting. PDFs of the presentations are provided separately on the website.

PARTICIPANTS

The meeting was attended by 13 participants, representing 12 Alliance member countries. For a full participant list, please refer to Appendix 1.

- Alliance Members attending : Ghana, Indonesia, Japan, Malaysia, Mexico, Pakistan, Peru, Thailand, Uruguay, USA, Viet Nam.
- Observers attending : Republic of Korea

MEETING OUTCOMES

The meeting achieved the following outcomes :

- Review of activities since the September 2010 meeting in Tsukuba, Japan.
- Review of high level analysis of updated stocktake data.
- Further elaboration of paddy rice research activities underway in Alliance member countries.
- Agreement on a draft work plan for the Group, comprising different groups of activities :

Immediate

- Publication of a manual of standardisation of measurement techniques through identification of “good practice” and gaps in current methodology.
- Development of a database of publications and experts that can be uploaded onto the Alliance web-site
- Increasing partnership efforts with key rice research organisations and research funding bodies
- Increasing participant of more countries and experts in the Rice Research Group’s activities.

Longer Term

- Development of an experimental protocol for a pilot multi-site/country experiment focused on water management mitigation options. (The protocol should include life cycle management and economic analysis as part of its design.)
- A range of issues that were either cross cutting or interfaced with the work of other Research Groups were also identified.

The Group will present an update on progress with the work plan to Ministers at their Summit in Rome in late June, and will meet again in November 2011 in Japan in conjunction with the Monsoon Asia Agro-Environmental Research Consortium symposium.

SUMMARY OF DISCUSSIONS

UPDATE FROM THE SECRETARIAT

1 The Secretariat updated participants on Alliance developments since the last meeting of the Paddy Rice Research Group (refer to separate PDF presentation). This covered new members, developments in the other Research Groups and the Governance Group (including the draft Charter’s progress), plans for the Ministerial Summit in June, ongoing outreach to key non-governmental organisations (eg CGIAR, FAO, EU Joint Programming Initiative, World Bank) and upcoming changes to the Alliance website.

2 On the website redevelopment, the Secretariat also advised that there would be a new look public website for the Alliance from April/May 2011. This would include a more user-friendly news services and the ability to subscribe to receive updates from the site. The intention is that the Research Groups actively contribute information to their pages of this public site, facilitated by the Secretariat.

3 There would also be a new look members area for the website. This would include :

- An altered password approval process, putting the onus on each country’s Senior Official to approve website access for individual country representatives;
- Community spaces for each of the Research Groups, and the ability for anyone to set up new community spaces for individual projects or activities;

- Easier format and storage facility for uploading documents; and
- The ability to subscribe to receive updates from different community forums within the members areas, i.e. when someone posts a new message or adds a document for discussion.

4 When the new site is available, the Secretariat will email instructions to Alliance members on how to access the new members area and use the functionality available.

OVERVIEW OF PADDY RICE RESEARCH GROUP

5 The meeting began by reviewing the discussion and outcomes of the first Paddy Rice Research Group meeting in September 2010 and the activities that had taken place since that time.

6 There was a brief discussion about the overall focus of the paddy rice research group's activities including the linkage between mitigation, productivity and adaptation. It was identified that there were three overarching elements that needed to be considered in a holistic manner. Those elements are :

- Productivity and related food security – it was agreed that research outcomes that resulted in lower yields (and/or lower income for farmers) were unacceptable;
- Maintaining production in a sustainable manner – mitigation is key in this regard; and
- Enhancement of business opportunities for farmers through the adoption of new technology and solutions.

7 For these three elements to be achieved, participants agreed that consistency of measurement and a decrease in uncertainty was required. It was also noted, that while trade-offs might need to be made between various aspects of the production system, the key was to have good data by which to understand those trades-offs and make the appropriate decisions.

ALLIANCE STOCKTAKE : EXPLORATION OF INDIVIDUAL COUNTRY EFFORTS

8 Each country represented gave a brief description of the mitigation research efforts that they were undertaking. Power-point presentations from Japan, Korea, Malaysia, Mexico, Pakistan, Thailand, Uruguay, USA and Viet Nam are available on the Global Research Alliance website.

Ghana

Ghana noted that a priority for paddy rice research in Ghana was increasing soil carbon sequestration and fertility. Most paddy rice production in Ghana is small scale, with only 20% of the production area being irrigated.

Indonesia

The representative from Indonesia noted that it had five areas of research focus :

- Development of monitoring, reporting and verification for greenhouse gas emissions;
- Comparing measurement methodologies for greenhouse gas emissions;
- Using ameliorants to reduce greenhouse gases from peat soils;

- Studying water and fertiliser management to reduce greenhouse emissions from flooded mineral soils; and
- Direct seeding technologies (TABELA) to reduce emissions.

Indonesia had a “dissemination programme” which focused on improving rice varieties to increase yields and/or to improve tolerance to unfavourable conditions, and on improving farming technology. On the latter there were two specific projects : integrated plant management systems, and carbon efficient farming.

The gaps that Indonesia identified were both human resources (number of researchers available and capability) and limited financial resources.

Japan

The research priorities for Japan were :

- Developing feasible mitigation options particularly in water and straw management;
- Evaluation of mitigation potential of these options at a national scale;
- Improving national inventories with using the DNDC rice model; and
- Promoting international collaboration to find possibility of applying for agricultural CDM.

These priorities have been developed on the basis of existing paddy rice mitigation research such as :

- Emission monitoring by closed chamber techniques and field experiments to test mitigation options;
- Results showing that water management is a promising line of enquiry with testing of various options occurring at different sites in Japan;
- Methane accounting by the process based DNDC rice model and the refinement of model so that it can be used for accounting purposes; and
- Automatic flux monitoring systems for methane, nitrous oxide and carbon dioxide.

Korea

The representative from Korea noted that paddy rice accounted for 11% of land use and 50% of cultivated crops. Agricultural emissions accounted for only 2.9% of greenhouse gas emissions in Korea, and of that, cropland accounted for 65% of emissions, and paddy rice production for 33%.

The primary focus of Korean paddy rice mitigation research is the development of national emission factors for methane and nitrous oxide. An important monitoring technique was the use of cavity ring-down spectroscopy (CDRS). Another important strand of research is the development of management practices for reducing greenhouse gas emissions from paddy rice focusing on water management and variety improvement. There is also international collaborative work underway on soil carbon sequestration using biochar.

Malaysia

Malaysia's two research priorities were to improve the national inventory in particular developing specific emission factors, and finding better mitigation options. Current research projects are directed at seeded rice, and the effect of straw and urea management. Malaysia has identified that further research is required to develop local emissions factors, water management (especially mid-season drainage) and alternative fertiliser application.

Mexico

Agriculture accounts for some 6 percent of Mexico's greenhouse gas emissions and of this, livestock accounts for the bulk of those emissions (85% compared to 15% for cropping). Rice production emissions are a very small proportion of cropping emissions (around 1%). That said, Mexico is the world's 15th largest emitter of greenhouse gases and therefore research into reducing paddy rice emissions assumes a greater importance than would be assumed on the numbers alone.

Mexico currently has no research projects focused on rice. Its main research programmes are focused on carbon sequestration of forests, oils and several projects on livestock mitigation research. Mexico has still to develop emissions factors for rice production and currently relies on tier 1 methodology.

Pakistan

Pakistan has a very low rice yield. It has focused its research on aerobic rice production and reported some promising results particularly in terms of crop yield. It has developed a directed seeding farming practice and has looked at alternative wetting/drying scenarios for rice production. Pakistan is also developing indigenous rice varieties in conjunction with CAAS, Chinese private companies and IRRI. Its research is focused on salt tolerance and bacteria blight resistance.

Future research work included measurement and quantification of mitigation, development of better rice varieties and development and dissemination of resource conservation technologies to farmers.

Thailand

Thailand's mitigation research is focused on reducing greenhouse gas emissions through using new crop production systems to induce two crops a year. One of its major projects is to consider the impact of global warming on rice production and has developed a model that predicts which areas of Thailand will be too hot and dry for optimal rice production in the future. On the basis of this information, Thailand put in place a rice breeding programme and in considering how production systems can be altered. The representative from Thailand noted that they needed more standard emission measurement instruments.

Uruguay

Between 2008 and 2010, Uruguay's research priorities focused on measuring methane and nitrous oxide emissions for paddy rice and assessing the effects on nitrous oxide of water management and winter cropping. In the current period (2010-2011) the focus is on calculating the carbon footprint of rice production, calculating Uruguay specific emission factors for paddy rice and investigating water use efficiency and its effect on greenhouse gas emissions. The goal is to be able to integrate carbon and water footprinting. The essential equation to focus on is kg rice /m³ water/ kg CO₂ eq. without affecting yield.

US

The representative from the US provided a copy of a paper entitled “USDA-ARS GRACEnet Project Protocols, Chapter 3 : Chamber Based Trace Gas Flux Measurements” which it believed would be of interest to the Research Group and particularly for the discussion on standardisation of measurement techniques.

The US produces 10.6% of global rice exports. Much of the rice production in the US is irrigated – the proportion of rainfed cultivated areas is falling. There is a concern about the over use of ground water in the US and therefore reducing the amount of water required for rice production is one of the areas of research focus. It was noted that this goal and the goal of reducing green house gas emissions cannot come at the expense of yield. Some research undertaken suggests that intermittent irrigation, thus reducing water usage by half, has no effect on yield. However, it is unclear whether such a decrease in water usage would have a corresponding increase in nitrous oxide. The representative of the US also noted that there is a need to conduct meta-analyses of existent data regarding GHG emissions.

There is also a research focus in the US on cultivar variation. The US representative provided details about a research project that is about to commence which has the following objectives :

- Determining, for different rice cultivars, the irrigation practices that optimise yield and conserves water. (The project will consider 80 cultivars and 4 different irrigation practices.)
- Quantifying the combination of irrigation and cultivar type that decreases methane and nitrous oxide.
- Identifying genetic markets that maximises yield, minimises water and greenhouse gas emissions for the purposes of future breeding.
- Carry out life cycle analysis of a range of management options to inform farmer decision making.

Viet Nam

Viet Nam’s research effort is mainly focused on adaptation, specifically looking at the impact of sea level rise scenarios. Viet Nam is also looking at different cropping systems and the effect of these systems on soil carbon, and how to gain more value from rice by-products such as composting rice straw, bio-char, and growing field mushrooms.

Key Conclusions

9 The key conclusions that arose from the exploration of individual country efforts were :

- An initial research step is to develop local emission factors – but collection of the data needed to develop such emission factors is difficult;
- In considering effective mitigation options, cognisance had to be had of the differing conditions in each country;
- It was also necessary to consider the trade-offs and co-benefits of various options. The essential equation is kg rice /m³ water/ kg CO₂ eq;

- An increase in efficiency in respect to the use of inputs is likely to have an effect on mitigation as long as productivity can be maintained;
- The most promising mitigation method would appear to be water management. Other promising candidates include : organic matter, fertiliser management, cultivar selection, use of amendments. In addition, carbon sequestration with bio-char was also seen as important;
- There is a need to standardise measurement techniques so that comparisons can be made between research projects and countries;
- Life-cycle analysis is important both for influencing farmer behaviour and adoption of new technologies, as well as responding to retailer demands;

ANALYSIS AND DISCUSSION OF STOCKTAKE RESULTS

10 As at 1 March 2011, 68 projects had been listed in the stocktake from 16 countries (China, Denmark, Ghana, Indonesia, Japan, Korea, Malaysia, Netherlands, Pakistan, Peru, Philippines, Russian Federation, Spain, Thailand, Uruguay and US).

11 Most of the research is being undertaken into irrigated rice production and just over 50% of the current research was focused on methane. There were two topics of research that predominated : GHG accounting/life cycle assessment and agronomy. While much smaller, the third focus for research was farming systems. In terms of outcomes, the key primary outcomes being sought included : testing of mitigation, low greenhouse gas emitting varieties, improved national inventory and investigation of mitigation options. Most of the current research can be described as “applied” or “tactical” and is primarily funded from government.

12 There was discussion as to whether the development of a single database containing publications and information on emissions research related to different soil types, cultivars and emissions factors would be a useful exercise. It was noted that there was already sufficient information published and meta-analysis of what research was available but that there was a great deal of gray literature that had not been adequately collated and disseminated. The IPCC is working on improving its database of emission factors for rice and it was suggested that contact be established with the IPCC to see if and how it was possible to work together.

13 It was noted that a lot of countries are working on water management techniques and the effect on greenhouse gas emissions. The question was asked whether it would be possible to develop a simple project looking at different water management regimes using consistent methodology that would be undertaken in a number of rice producing countries.

14 There was also a discussion about the importance of life cycle analysis in providing both emission and economic information. Such information was necessary for considering the trade-offs and co-benefits of various mitigation options and for assessing the economic incentives for action and getting farmers to change farming practices. It was agreed that life cycle assessment and economic analysis should be included in the development of the above experimental protocol.

STANDARDISATION OF MEASUREMENT TECHNIQUES

15 At the first Research Group meeting in September 2010, it was agreed that Alliance members would share information about measurement techniques and methodologies. It was also agreed that members would work towards identifying both “good practice” and gaps in the current methodologies.

16 Following the first Research Group meeting, members of the Group had been asked to fill in a survey sheet on measurement techniques. The sheet had a total of 10 specific categories and 85 questions. Responses were received from 11 countries and 1 institute.

17 Analysis showed the following :

- Measurement period – most of the measurements occurred during the rice season but the period partly depends on the target gas. The primary target was methane, while nitrous oxide and soil carbon were secondary. There was a wide variation in the time of day measurements were taken.

Question for Consideration : What time of day should methane be measured ?

- Estimation of Total Gas Emission – most sampling is undertaken at least weekly but the sampling rate increases after drainage and after nitrogen application. The Group discussed whether or not the current sampling techniques meant that spike fluxes of methane and nitrous oxide were being missed and whether or not more frequent sampling was required during events.

Question for Consideration : How accurate can we estimate total emissions by optimising sampling intervals ?

18 It was noted that the only manual setting out paddy rice measurement techniques was published by the IAEA in 1992. Other useful resources included a USDA manual for upland field crops, the US GRACE Net Protocol (as mentioned by the US representative earlier in the meeting), and the International Rice Research Institute literature survey of rice measurement techniques.

19 The resultant discussion focused on what was good measurement practice and what were the limitations. It was agreed that it would be useful in a new manual to describe different measurement options including identifying gaps and limitations, and how to correct for such deficiencies. This could become a base for developing country specific emissions factors and mitigation options. It was also identified that other Research Groups were undertaking similar exercises and that co-ordination might be possible.

CROSS CUTTING ISSUES

20 Following on from the discussions on promising mitigation options, actions that could be taken and how to progress standardisation of measurement, a range of issues that intersected with or would be of interest to the other Research Groups was identified. These included :

- Soil carbon sequestration – organic matter management, re-use of byproducts and monitoring methodologies;
- Nitrous oxide emissions and nitrogen cycling;
- Modelling of greenhouse gas emissions – source/sink of CO₂ equivalent;
- System approach of integrated rice/upland crops/livestock system for mitigation;
- Methodologies for life cycle assessment and carbon footprinting;
- Inventory development – partnership with IPCC emissions factor database; and

- Standardisation of measurement.

RELATIONSHIP WITH OTHER PARTNERS

21 In the final part of the meeting, discussion turned to how to engage with other rice research partners. Research Group members identified a number of key partners including the : International Rice Research Institute, AfricaRice, and the CGIAR Global Rice Science Partnership (GRiSP). There was also some discussion as the possibility of engaging with research funding bodies such as the Asian Development Bank and ASEAN.

APPENDIX 1: Participants List

Country	Attendees
Alliance Member Countries	
Argentina	Unable to attend
Colombia	Unable to attend
France	Unable to attend
Ghana	Akwasi Abunyewa, Savanna Agricultural Research Institute (akwasi_abunyewa@yahoo.com)
India	Unable to attend
Indonesia	Dedi Nursyamsi, Indonesian Agricultural Environment Research Institute (ddnursyamsi@yahoo.com)
Japan	Kazuyuki Yagi, NIAES (kyagi@affrc.go.jp) Minamikawa Kazunori, NIAES (minakazu@affrc.go.jp)
Malaysia	Mohd Fairuz Mat Suptian, MARDI (fairuzsr@mardi.gov.my)
Mexico	Tomas Hernandez Tejeda, INIFAP (hernandez.tomas@inifap.gob.mx)
Netherlands	Unable to attend
Pakistan	Muhammad Anwar, Pakistan Agricultural Research Council (muhammadanwar1964@gmail.com)
Peru	Orlando Palacios Agurto, Instituto Nacional de Innovacion Agraria (opalacios@inia.gob.pe)
Philippines	Unable to attend
Russia	Unable to attend
Spain	Unable to attend
Thailand	Supatra Thanaseniwat, Ministry of Agriculture
USA	Dr Lewis Ziska, USDA- Agricultural Research Service (L.ziska@ars.usda.gov)
Uruguay	Dr Alvaro Roel, INIA Uruguay (aroel@inia.org.uy)
Viet Nam	Mr Ha Phamquang, MARD/Hanoi (haphamquang@fpt.vn)
Observers	
Brazil	Unable to attend
China	Unable to attend
European Commission	Unable to attend
Korea	Hyun-Cheol Jeong, National Academy of Agricultural Science (NAAS) (taiji152@korea.kr)
Secretariat , Meredith Stockdijk, New Zealand Ministry of Agriculture and Forestry (Meredith.Stokdijk@maf.govt.nz)	