GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Paddy Rice Research Group Meeting

Latin America Room, CIAT, Cali, Colombia

5 – 8 May 2014

Meeting Report

OVERVIEW

The meeting of the First America's sub-Group of the Paddy Rice Research Group of the Global Research Alliance on Agricultural Greenhouse Gases ("the Alliance") and the related regional workshop "Towards a common protocol for generating and processing greenhouse gas data in rice systems" was held at the International Centre for Tropical Agriculture (CIAT) 5-8 May 2014. The Alliance meeting was chaired by Uruguay (Mr Gonzalo Zorrilla, INIA) and Japan (Dr Kazuyuki Yagi, NIAES) as co-Chairs of the Paddy Rice Research Group.

This report is a summary of the key discussions and outcomes of the meeting. PDF's of the presentations are provided separately on the member's area of the Global Research Alliance website.

PARTICIPANTS

The meeting was attended by 17 participants, representing 9 Alliance member countries and partner organisations

- **Alliance Members attending:** Bolivia, Brazil, Chile, Colombia, Ecuador, Japan, Paraguay, Peru, Uruguay.
- **Partner Organisations attending:** CIAT, IRRI, CCAFS.

MEETING OUTCOMES

The meeting achieved the following outcomes:

- Overview from the Alliance Secretariat on the Global Research Alliance on Agricultural Greenhouse Gases and aims of the Council and other Research Groups.

- Developed a list of researchers and national contacts of the Paddy Rice Research Group in the Americas and identified countries that should be invited to join.
- Developed a common understanding on the principles for measuring GHG emissions in rice systems.
- Reviewed the draft standard protocol on necessary equipment and important considerations for data collection and processing.
- Developed an action plan for each country
- Developed a timeline to draft a concept note and proposal for a multi-site/country experiment.
- Identified the next steps for the Group and date for the next meeting

SUMMARY OF DICUSSIONS

1. Note that this report has been structured to group together the technical presentations and discussions related to the workshop and does not follow the agenda chronologically.

2. The first meeting of the America sub-Group of the Paddy Rice Research Group was opened by Dr Joseph Tohme, Agrobiodiversity Research Director at CIAT. Dr Tohme welcomed all participants to CIAT, Colombia. The topic of measuring and mitigating greenhouse gases from rice systems is a new area for CIAT which is developing research collaborations with Colombia, Uruguay and other countries in the region.

3. The outcomes of the week's meeting and workshop will help us to develop protocols that allow for comparison of greenhouse gas (GHG) emissions from rice in tropical and temperate regions, from the farmer scale to the national level, and between Asia and America. The goal of the Alliance is to bring together research from across the world and the most important aim of the meeting is the exchange of knowledge and ideas among participants.

SECRETARIAT OVERVIEW

4. The Secretariat presented general information on the Global Research Alliance for meeting participants who are new to the Alliance. The Alliance now has 41 member countries, including six new members from Latin America. New members in the Alliance are expected to support the Alliance in the way that best aligns with their country's research priorities and interests. It is expected that countries would provide funding for participants to attend Council and Research Group meetings at the very least, and find ways to participate with projects in the Research Groups. Participation can start small and is not always about providing new funding to activities.

5. The Secretariat also noted that it is the responsibility of Research Group participants to communicate opportunities and outcomes resulting from Research Group meetings to Council representatives. Official reporting from Group meetings, such as the publicly available meeting summary that the Secretariat produces, should be sent to Council representatives and Ministers so that actions can be followed up at the government level.

Research Group reporting at the next Council Meeting

- The 2014 Council meeting will take place in The Hague, the Netherlands 16-19 June 2014.
- Uruguay will hand the role of Council Chair over to the Netherlands.
- Research Groups will be presenting individually to the Council with a chance to highlight achievements and issues facing each Group.

- Research Group reports will also consider outcomes of the actions agreed to at the 2013 Council meeting:
    - Research Groups to provide a list of partnerships/collaborations underway.
    - Identify/develop mitigation projects or activities that have synergies with adaptation.
    - Include synergies between mitigation and adaptation in reporting to the Council.
    - Create specific networks to promote synergies between mitigation and adaptation.

OVERVIEW OF THE PADDY RICE RESEARCH GROUP

6. Dr Kazuyuki Yagi, co-Chair of the Paddy Rice Research Group then provided an update on the aims and activities of the Group and outcomes from the last meeting of the Asia sub-Group in Bogor, Indonesia, October 2013.

7. The Group is the smallest in the Alliance, but with several countries in Latin America producing significant amounts of rice it is hoped that dividing into regional sub-Groups will increase Group numbers and active participation. The Asia and America sub-Groups will share the same workplan, and work toward the same goals, holding separate regional meetings.

8. The Groups vision is to understand and reduce emissions from paddy rice systems. While methane emissions are the difference between rice and other crops the group needs to consider trade-offs with nitrous oxide emissions and the effect on soil carbon. The Group will provide research knowledge and mitigation options to policy makers, farmers and land managers and help to improve national inventories.

9. Collaboration with partner organisations is an important way of ensuring the Alliance makes the best use of resources available and transfers knowledge to farmers and policy makers. The Paddy Rice Research Group already has activities under way with multiple partners, networks (MARCO, PROCISUR, FLUXNET) and rice experts from non-Member countries. A new collaboration with the Climate and Clean Air Coalition (CCAC) has recently been approved and the Group will be involved along with the Climate Change, Agriculture and Food Security (CCAFS) programme, CIAT and the International Rice Research Institute (IRRI).

10. The workplan of the Paddy Rice Research Group was provided, the Asia sub-Group and the America sub-Group will both contribute to activities on the same workplan. The Group was asked to consider the workplan and identify opportunities for Latin American countries to contribute to current activities and add new activities.

America sub-Group representation

11. Major producers of irrigated rice in Latin America also include Cuba, the Dominican Republic, Venezuela, Suriname and Guyana who are not members of the Alliance. These Countries should be invited to join the Alliance, or have scientists invited to attend meetings as technical experts.

12. Not all Latin American Countries in the Alliance participate in the Paddy Rice Research Group, including countries which are represented at this meeting. All countries should be invited to join the Group and nominate a contact person.

COUNTRY REPORTS

13. Each member presented to the Group regarding rice production systems within their country and research underway, particularly the measurement of greenhouse gas emissions.

Bolivia - René Guzmán

14. Most of Bolivia's rice production occurs in the south east of the country, in the Santa Cruz region. Manual planting, and labour intensive systems are common in most of the country with only the San Juan region so far adopting mechanised Japanese systems for planting and irrigation.

15. Most paddy rice crops in Bolivia are rainfed (94%), although irregular rainfall patterns are causing problems for farmers so there is a focus on improving irrigation. Other problems include wild rice weeds growing alongside the crop and rice blast fungus.

16. Research in rice production systems has drawn on the experiences of other countries in the region; Uruguay and Argentina in particular have introduced new methods for irrigating rice crops. There has been no research to measure GHG emissions from Bolivian paddy rice in rainfed or irrigated conditions.

Brazil - Walkyria Scivittaro

17. Brazil has a commitment to reduce total greenhouse gas emissions by 36-38.9% compared to projected emissions for 2020. Significant reductions in greenhouse gas emissions from the forestry sector have already been achieved. Goals for low carbon agriculture are managed through the ABC plan which includes, capacity building, funding for research and monitoring activities.

18. Brazil has 2.75 million hectares of rice, farmed in lowland (56%) and upland (44%) production systems with most rice in the south of the country under irrigation. These irrigated fields contribute 18% of methane emissions and have been the systems most researched in Brazil.

19. Research in to mitigation strategies:

- Comparison of conventional tillage methods with minimum tillage, shows a reduction of 33% of total emissions from the minimum tillage treatment.
- Water management using intermittent flooding instead of continuous flooding practices can reduce the irrigation period and water level required and reduces emissions by 43% on average.
- Testing of nitrogen fertilisers on different rice varieties, including the timing of application/s and the doses required.
- Research into lowland cropping systems, which rotate rice with livestock (pasture) and other crops.

Chile - Sara Hube

20. In Chile most rice is pre-germinated and broadcast onto the field. Direct seeding in dry soil accounts for only 8-10% of rice production in Chile. Greenhouse gas emissions from rice account for only a small percentage of total emissions from the agriculture sector.

21. The fist experiment in Chile to measure greenhouse gas emissions from rice took place in the Maule Region, in the centre of the country and an area that produces 60% of Chile's rice crop. Static chambers were placed in fields under continuous flooding conditions where different amounts of nitrogen had been applied. The experiment showed higher methane emissions from the treatments where higher amounts of nitrogen had been applied.

22. In future experiments it is hoped that the chambers can be improved, including greater certainty regarding the chamber seal and the materials used to control temperatures inside the chamber. The next experiments will include new treatments and consider how to get a better representation of rice plants within the chamber area. As rice fields are planted through broadcast seeding methods the plants are not spread uniformly across the field.

Colombia - Patricia Guzman y Néstor Hernández

23. The majority of rice crops grown in Colombia is for national consumption rather than export. Systems are mostly mechanised and split between rainfed and irrigated systems. Climate variability and rainfall is the factor limiting rice production with most rice grown in central and eastern Colombia.

24. Colombia's National Federation of Rice Farmers (FEDEARROZ) have 22 research sites across Colombia and manage research programmes including breeding, agronomy and economics as well as leading technology transfer and farmer training programmes. Research is underway to analyse systems for adaptation to climate change through the identification of high and low productivity factors with low environmental impact.

25. Colombia has a low carbon development policy identifying mitigation strategies and priorities for each sector. For rice this has meant a survey of rice systems and management practices as well as learning the results of local research activities. Modelling of rice crops and yields has been completed to estimate greenhouse gas emissions and there are plans to measure greenhouse gas emissions as a component of an efficient crop management project in collaboration with CCAFS.

Ecuador - Roberto Celi

26. In Ecuador the highest areas of rice production are in the provinces of Guayas, Los Rios and Manabi and most of the area is on rainfed systems. Research is underway to improve production and develop new rice varieties with resistance to pests and diseases. Ecuador has no research on greenhouse gas emissions from rice as yet.

Paraguay - Aldo Noguera

27. Most rice production in Paraguay is in the south of the country, using irrigated systems. Agriculture is the largest contributor of methane emissions (70%) and within this sector, rice contributes the least to methane emissions, following enteric methane and manure management. However, emissions from rice production have increased by up to six times over the last 10 years due to an impressive increase in area planted and production. Rice production is expected to continue increasing as both land and water are readily available.

28. In Paraguay rice research focuses on increasing production, with no research on greenhouse gas emissions. Paraguay collaborates on rice production research activities with Brazil and others within the region.

Peru - Orlando Palacios

29. Peru is one of the largest producers of rice in Latin America, with a significant increase in production seen over the past 60 years. The highest producing crops are irrigated fields on the coast and tropical high lands with most rice grown in the north of the country using transplanted systems. Peru's national greenhouse gas inventory shows that agriculture is responsible for almost 20% of emissions.

30. Improving management practices has increased productivity 4.5 to 7.9 tonnes/ha. Research is underway to develop new varieties including those crops that use less water by producing less vegetative growth. No research on greenhouse gas emissions has been conducted up to now, but a new government program (PLANCC) on climate change is supposed to bring resources to start.

Uruguay - Pilar Irizarri y Gonzalo Zorrilla

31. Most of the rice produced in Uruguay is exported (90%), with crops producing an average yield of 8 tonnes/ha. Rice crops are irrigated and grown in rotation with pasture for beef cattle. Rice is directly seeded onto dry soil, with fertiliser and will be watered a two or three times before the field is flooded.

32. Research underway in Uruguay includes comparisons in the greenhouse showing that the timing of flooding and nitrogen fertiliser application both have an effect on nitrous oxide emissions from rice. Field research has been completed to compare yields between two different irrigation managements in high producing rice systems. Traditionally paddy fields in Uruguay are drill seeded in dry soil and flooded 30 days after emergence and irrigation is cut 20 days before harvest. It was supposed this management would reduce levels of methane emissions but initial data did not confirm this, giving numbers similar to the ones reported in other countries with continuous flooding. The experiment took place over three seasons and compared the conventional method with an alternate wetting and drying (AWD) method flooding the field completely only after panicle initiation. Under the AWD method there was a noticeable reduction in methane emissions but there was also a reduction in crop yield.

33. Future research will focus on designing strategies to reduce emissions without reducing yield, research that covers the whole system of rice production (in rotation with other crops) and intensification methods. There is also soil microbiology research planned to better understand the microorganisms involved.

WORKSHOP PRESENTATIONS AND DISCUSSIONS "PROTOCOL FOR GENERATING GHG DATA FROM RICE SYSTEMS"

Experiences of measuring GHG emissions from rice systems - NIAES

34. **Dr Kazuyuki Yagi** provided an overview of research in Japan and an introduction to the MIRSA 2 project underway in Indonesia, Thailand, Vietnam and the Philippines.

35. In Japan rice cultivation makes up half of the total available cropland area, using 7% of total land area and contributing to 18% of total agricultural greenhouse gas emissions from Japan. Rice paddy fields in Japan are irrigated with a single transplanted crop and mechanised harvest.

36. The research priorities for Japan include measuring greenhouse gas emissions from rice paddy systems and identifying mitigation options at the farm scale and then evaluating the mitigations achieved at the national scale through modelling programs. Ongoing and future research projects in Japan:

- Mitigation options, particularly by rice straw and water management.
- Modelling, DNDC-Rice
- Life Cycle Analysis and implementing carbon trading schemes
- GHG emissions under future CO_2 levels and changes in temperature.
- International collaborations
  - MIRSA
  - With other countries across Asia.

MIRSA 2

37. Dr Yagi provided an update on the "Greenhouse Gas Mitigation in Irrigated Rice Paddies in Southeast Asia" (MIRSA) project to identify water management options across sites in Indonesia, Vietnam, the Philippines and Thailand. The one year pilot project (MIRSA 1) was conducted by IRRI during 2013 with funding provided by the Japanese Ministry of Agriculture Forestry and Fisheries. The five year project (MIRSA 2) began in October 2013 with a kick-off meeting at Hue University of Agriculture and Forestry, Vietnam. MIRSA 2 is coordinated by NIAES, Japan and includes participants from IRRI as well as involving researchers and field measurements from all four participating member countries.

38. The project aims to improve water management options based on alternate wetting and drying (AWD) practices, with a 30% reduction of combined emissions from N_2O and CH_4. Each

participating country will compare continuous flooding water management alongside a safe AWD protocol (the field is reflooded when the water level drops to 15cm below ground level) and a site specific AWD protocol. The experiment will also measure any changes in soil carbon that may occur over the five year period. Results so far are showing that both AWD options at each site are reducing methane emissions.

39. IRRI is also looking for additional benefits which may encourage farmers to follow AWD practices. Farmers note that AWD methods mean the fields are drier at harvest time, therefore in a better condition for mechanised harvesting of the crop. There has also been a noticeable reduction in the levels of bacteria and diseases when fields are drained intermittently.

Experiences of measuring GHG emissions from rice systems - IRRI

40. **Dr Ole Sander** from IRRI provided and overview of his experiences measuring greenhouse gas emissions from rice systems in South-East Asia including identifying the best time of day for measurements and his work for the SAMPLES project led by CCAFS.

41. An activity of the Paddy Rice Research Group has been to identify the best time of day to sample greenhouse gas emissions from chambers and achieve a representative value. In Japan, NIAES researchers found that diurnal measurements of emissions peaked at midday and the time that most consistently provided average values was 10am. However, when IRRI researchers repeated this experiment in a tropical climate in the Philippines an obvious diurnal variation was not always detectable, and manual sampling showed that the representative time would be between 9-11am.

42. The Standard Assessment of Mitigation Potential and Livelihoods in Smallholder Systems (SAMPLES) project is developing low cost protocols for greenhouse gas emissions measurement, defining minimum data requirements and guidelines for analysis of trade-offs. The programme is trialling AWD methods to reduce emissions from paddy rice systems. The results showed that nitrous oxide emissions increased using AWD protocols, where the fertiliser was applied just before drainage. However, there is still the potential to reduce methane emissions using this method as nitrous oxide remains a minor contribution to overall emissions even with the increase shown in this experiment.

43. Other experiments are underway comparing farms with differing levels of water access (canal access, pumped but continuous access, farmer payment for diesel to pumps and council regulated access) all showed reduced methane emissions when following the AWD protocol and no significant reduction in yield was seen.

44. IRRI collaborates with countries to develop country/ region specific emission factors. A recent collaboration with Vietnam has established labs to analyse greenhouse gas emissions, shown a reduction in emissions using AWD methods and has not identified any differences in emission levels between hybrid rice varieties and inbreed varieties.

CCAFS work in rice systems and future plans to strengthen capacity

45. **Dr. Ana María Loboguerrero**, CCAFS regional programme leader for Latin America provided the Group with an overview of CCAFS rice research and work in the Latin America region. Most of the research in rice has been completed in South and South East Asian systems and focused on adaptation to climate change for the most vulnerable areas, such as river deltas facing an increase in salinity. Other research includes breeding programmes for rice-sorghum cropping systems and modelling then testing climate smart agriculture options in rice production systems.

46. Within Latin America CCAFS work programmes are assessing crop yields under different predictions of climate change and comparing cropping systems. CCAFS is also involved in the CCAC methane mitigation projects with the Paddy Rice Research group. CCAFS is building labs and lab

capability in the region with local partners to measure greenhouse gas emissions and better understand climate smart management practice for specific sites and systems. CCAFS partners with national organizations such as FEDEARROZ in Colombia to support activities that can quantify the impacts of a changing climate in the rice sector.

Calculations of GHG Fluxes

47. **Dr Ole Sander** presented to the Group a template he has developed that will take recorded field and lab data and automatically complete calculations to show greenhouse gas fluxes, e.g. recording the water level and chamber dimensions will mean that the total gas volume is calculated. The template records the measurements from the gas analysis in the lab and can calculate methane and nitrous oxide emissions from the chamber.

48. A metasheet included with the template automatically populates values from the experiment as a whole and can record average emission values from all replicates at each site. The template will be circulated to the Group and is available for participants to make use of if they wish to.

The role of science to drive climate change mitigation in developing countries

49. **Todd Rosenstock** from the World AgroForestry Centre in Nairobi, Kenya challenged the Group to rethink how we use science to influence change at the government and intergovernmental level.

50. We need to think about our audience/stakeholders when we send out information, typical avenues for research such as papers and info briefs may not come to the attention of international bodies, donors or farmers. We should identify stakeholders' needs before collecting data and presenting research results and ensure that information is delivered in a format they can use to take action and make change.

51. Scientists should also need to think about building human and institutional capacity so that the research completed now will continue to contribute a shape national goals and priorities.

52. Measurements are only an estimate based in a point in time; they are always going to be wrong and are not able to show the whole picture. Therefore, it is important that we develop standardised protocols so that results can be compared. However, we also need to think about developing methods that meet the needs of the locations we are working in.

53. In Africa the World AgroForestry Centre work with countries that have limited lab and human capacity and are covering a range of diverse source emissions. They have developed a gas pooling method that helps to capture spatial heterogeneity in the field and reduces lab time and costs. The same syringe is used to collect equal amounts of gas at each replicate site, with each point in time using one syringe. When individual chamber measurements were compared with the pooled method samples the results showed a very close correlation (1-8% difference).

54. Looking beyond field measurements, agricultural greenhouse gas measurements need to focus more on collecting accurate activity data. In some cases the activities such as livestock numbers, fertiliser use, crops grown are relatively unknown and take little effort to collect in comparison to setting up expensive GHG field experiments.

Standardised Protocol on field measurements and data processing

55. The standardised protocol takes other protocols made available and combines to identify minimum standards. The framework is based on the items identified by the Asia sub-Group of the Paddy Rice Research group over the previous two meetings. However, the America sub-Group should contribute additional items or note changes if the protocol does not meet sampling requirements in Latin American rice systems. The standardised guidelines will be circulated to the

56. Group for further comments once finalised later this year. An outline of the sampling protocol is listed below:

- **Chamber,** should enclose 4 hills or an average density of plants if direct seeded.
- **Chamber Base,** the part of the chamber that remains in the field needs to be as low to the ground as possible so as not to influence growth of plants within 20cm (10cm below soil and 10cm above) is recommended.
- **Water regime,** the base must allow for drainage of water out of the chamber so that the water level remains the same as the surrounding field.
- **Chamber material,** transparent chambers can be fine in cooler climates, however in very hot conditions the chamber should be white or reflective to prevent heat stress to the plant.
- **Temperature,** should always be measured when taking samples.
- **Sampling Frequency**, once a week usually suits scientists best and during late stage of growth the emissions remain level so once every two weeks. Could also sample more frequently after an event (rainfall and fertiliser application).
- **Time of day,** should capture the average GHG flux, mid-morning between 8-11 generally. A diurnal measurement should be completed twice a season (once at the beginning before the canopy is closed, and once late in season to record the effect in soil temperature) start before sunrise and measure every 2-3 hours for 24 hours.
- **Chamber closure**, a recommended length of time is 30 minutes, and the chamber should not remain closed for longer than 45 minutes.
- **Number of measurements**, at least three, four measurements will ensure that the line can be drawn.

57. The Group discussed the protocol around storage of gas samples; some countries had experience storing samples in the syringe. When collecting samples in a syringe the syringes should be checked for leakage using a standard gas before they are used for sampling. Gas samples should be transferred to glass vials or analysed a short time after collection.

WORK PLAN ACTIVITIES

Inventory on potential partners in Latin America

58. The Group has now completed the list for regional Member countries contacts, updating the Paddy Rice Research Group participants and the Alliance Council representatives. The Group should also identify partner organisations that can be involved in the sub-Group, other than those represented at this meeting. Suggestions from the Group included IRI – The International Research Institute for climate change in Colombia, and researchers from the US including a group in California.

Databases for publications and experts

59. The database activity is now focused on experimental sites and associated metadata rather than compiling a list of experts/researchers. This database activity is led by Japan (Dr Shigeto Sudo, NIAES) who will prepare and develop the spreadsheet for circulation to members. The template will be circulated to participants of the America sub-Group for comments and any further changes to the template beyond what was agreed by the Asia sub-Group at previous meetings.

60. Those countries that have already completed research measuring greenhouse gas emissions (Argentina, Brazil, Chile and Uruguay) will be asked to complete the template with their experimental site information if they wish to contribute to the project.

61. Currently the publications template only includes published papers, and corresponding author details. There may need to be a future discussion to identify ways of linking to papers in different language and how the database can support internal reports and conference proceedings.

Develop a concept note for multi-site/country experiments on rice systems

62. The America sub-Group agreed to develop a concept note for a joint multi-country project which would focus on specific aspects on rice production systems in Latin America; such as different environments, irrigation methods, production systems and synergies between adaptation and mitigation.

63. The Group agreed that a project on water management and AWD such as the Asia sub-Group is doing would only be appropriate for the irrigated rice regions in Latin America, not for rainfed systems. A project which looks at a combination of crop management practices that can improve yields and reduce water use would be beneficial, and would have good links with adaptation practices. In Brazil experiments are measuring and monitoring results across whole systems beyond a single season of the rice crop and considering other crops in rotation with rice. A multi-country project could be based on measuring emissions from a typical system (rice-pasture/ rice-crops) in each country over two full years.

64. Developing the common protocol from this workshop will mean that results from different systems, countries and climates are properly comparable. The project would include a capability building element for those researchers that do not have experience in measuring greenhouse gas emissions and should have lab facilities provided by countries or partners institutes (CCAFS, CIAT etc) for those countries that do not have the required lab equipment.

65. The list of project ideas will be circulated to the Group, and CCAFS will be asked to support the activity. The next round of funding through FONTAGRO closes on May 21; there is no enough time to attempt to develop the proposal in time for this funding round.

Joint publications

66. A future activity for the Group could be a report providing an outline of the current state of paddy rice research and greenhouse gas measurements from across the region, supported by information from CIAT and IRRI. Once the database data is complete the Group can discuss if they are happy to share research information more widely.

FUTURE ACTIVITIES

67. Future activities for the Group following this meeting were provided by each of the Country representatives attending. The activities were considered in line with the six work areas of the Research Groups and area considered the PRRG six monthly report (February 2014) to Council.

Bolivia

- Not yet an official member of the Rice group, the contact person should be identified.
- Interested in finding the funds and support to evaluate emissions from paddy rice.
- Need to identify a lab with the facilities to analyse samples (may be a university or even a lab outside the country).
- Interested to participate in future collaborations of the Group.

Brazil

- Rice Research in Brazil is aligned with the overall greenhouse gas emissions strategy.
- Open to collaborate on any of the topics mentioned, especially where work is already ongoing in Brazil.

- Activity data for rice needs to be improved in areas of rice production across the country – except for the south which produces the greatest amount of rice and has been the most researched.
- Need to improve communication of research information among scientists – large country
- National inventories, organised through the Ministry of Science and technology, need better activity data. The Ministry is working to improve monitoring.

Chile

- Would like to improve chamber methodology based on workshop protocol.
- Government has offered new funding this year to develop national emission factors for agriculture inventories.
- Both the Ministry of Agriculture and the Ministry of Environment are involved in developing the national emission factors and well aligned with Chile's priorities.

Colombia

- Rice is one of 11 sectors identified in the low carbon strategy for Colombia.
- Protocols are being studied to develop national emission factors.
- Working closely with the national rice farmer federation (FEDEARROZ), including a review of UNFCCC reporting data.
- Adaptation is the focus of the national research strategy rather than mitigating emissions.
- Colombia does undertake water footprinting and are likely to develop carbon footprinting activities in the future.
- Colombia has national research funds that projects may apply to, and an ongoing funding call on mitigation research as a cooperation action with Germany.
- The Council meeting information will be sent to the new delegate for Colombia,
- Interested in research that helps farmers to improve practices, reducing emissions but also improving income.

Ecuador

- Ecuador has a stocktake of activities already completed.
- Identify the position of paddy rice within the national agriculture inventory and what is already known about greenhouse gas emissions from rice.
- Reporting on the outcomes of this meeting to the Council representative and identify the future activities with the Group.

Paraguay

- appoint Alliance contacts – as a new member
- identify opportunities for Paraguayan researchers within the Group
- The national research institute (IPTA), does not have an agricultural greenhouse gases research programme, although plan to develop this in the future.
- Activities with Paraguay's private sector will be an important contribution to the Alliance.
- Outcomes from this meeting will be provided to the Council representative and a request for support of these activities.

Peru

- Peru's national plan on climate change has a focus on inventories until 2015 (first phase).
- 2016-2021 will include research on greenhouse gases with resource to develop capacity.
- Report back to Council representative on meeting outcomes and discuss future funding.

- INIA-Peru has new funding from IDB and World Bank, will explore the potential of including rice as a topics and possible collaborations with CIAT and others in the region.

Uruguay

- Has good activity data (small country) but has not developed specific emission factors.
- Country priority is adaptation not mitigation, which means there are less funding opportunities.
- Uruguay place great importance on developing collaborations, particularly in the region.
- Rice sector in Uruguay is to be marketed as having a low impact on the environment, and needs the research completed to back up these claims.

CIAT

- To become a technical hub for the Group, including capacity building activities, experimental expertise and collaborations
- Distribution of new information in rice research

IRRI

- Will send a link to the info note on AWD developed by IRRI and send out the other documents mentioned in this meeting - calculation template and field data template.
- There is free ALU software available to calculate national inventories made available by Colorado State University (http://www.nrel.colostate.edu/projects/ALUsoftware/index.html). The programme is easy to use and offers a complete picture of the agriculture sector.

68. The co-Chairs note that consideration before developing national/regional emission factors is to better understand the activity data that underpins these inventories. Activity data should be a future topic of discussion for the Group.

Next meeting

69. The Group agreed to meet next alongside the 12th International Rice Conference for Latin America and the Caribbean in Porto Alegre, Brazil during February 2015. The program could include visits to GHG research facilities at IRGA near Porto Alegre and EMBRAPA Pelotas, two-hour drive from this city. The co-Chairs will see if it is possible to arrange a session on paddy rice greenhouse gas emissions during the conference.

Meeting Close

70. The co-Chairs then brought the meeting to a close, thanking all participants for their attendance at the workshop and participation in the discussions of the Group. Special thanks were made to CIAT, CCAFS, PROCISUR and the government of Colombia for support of the workshop. The co-Chair noted that the Alliance is based on voluntary actions and Members should contribute only what they are able. The initial activity of standardising measurement protocols should provide a good basis for all countries to contribute to the Group and see how the Alliance can support and promote the work of Members.

APPENDIX 1: Participants List

Country	Attendees
Alliance Member Countries	
Bolivia	Jorge Rene Guzman Arnez, INIAF (reneciat@hotmail.com; santacruz@iniaf.gob.bo)
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