GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Croplands Research Group Meeting

Embrapa Headquarters, Parque Estação Biológica

Brasília, DF - Brazil

11-12 July 2015

Meeting Report

OVERVIEW

The seventh meeting of the Croplands Research Group (CRG) of the Global Research Alliance on Agricultural Greenhouse Gases ("the Alliance") was held at Embrapa Headquarters, Brasilia, Brazil on 11 and 12 July 2015 ahead of the World Congress on Integrated Crop-Livestock-Forest Systems. The Alliance meeting was chaired by USA (Dr Alan Franzluebbers, USDA-ARS) and Brazil (Dr Ladislau Martin, Embrapa) as Co-Chairs of the Croplands 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 25 participants, representing 12 Alliance member countries, and invited experts.

- **Alliance Members attending:** Brazil, Canada, Chile, Denmark, Japan, Korea, Netherlands, Norway, Poland, Spain, UK, USA.
- **Alliance Members unable to attend:** Australia, Argentina, China, Colombia, Costa Rica, Finland, France, Germany, Ghana, Ireland, Italy, Malaysia, Mexico, New Zealand, Nicaragua, Indonesia, Peru, Philippines, Sweden, Switzerland, Thailand, Uruguay, Viet Nam.

MEETING OUTCOMES

The meeting achieved the following outcomes:

- Update from the Alliance Secretariat including outcomes from the latest Council meeting.
- Research updates from member countries.
- Report on the activities of the CRG.
- Updates from the Inventory and Monitory (I&M) Cross-Cutting Group and the identification of joint activity areas.
- Agreement to update the 2011 Action Plan by restructuring the components of the CRG into new focused theme areas.
- Next steps for the Group and discussion about future meetings.

SUMMARY OF DISCUSSIONS

OPENING REMARKS

1. The seventh meeting of the Croplands Research group was opened by Co-Chair Dr Ladislau Martin, Director of the Research and Development Institute, Embrapa. The Co-Chair was pleased that Brazil had the opportunity to host the meeting and welcomed the Croplands Research Group and members of the Inventory and Monitoring Cross-Cutting Research Group (I&M) to Embrapa.

2. The meeting was held prior to the World Congress on Integrated Crop-Livestock-Forestry Systems (http://www.wcclf2015.com.br/), and a special session on Monday 13 July considering greenhouse gas emissions and removals from integrated farm systems was organised to link in with the objectives of the Alliance. The Congress was promoted by Brazilian Agriculture Research Corporate (Embrapa), Ministry of Agriculture, Livestock and Food Suply of Brazil and Federal University of Rio Grande do Sul and as partners: Global Research Alliance on Agricultural Greenhouse Gases, American Society of Agronomy and International Centre for Tropical Agriculture (CIAT).

Review of Debrecen Meeting

3. Alan Franzluebbers, US Co-Chair of the Group provided a review of the activities and outcomes from the sixth Group meeting In Debrecen, Hungary, August 2014. The Alliance now has 46 member countries, and to reflect this same increase in membership within the CRG the Group needs to develop additional activities in between annual meetings and progress workplan activities.

4. Outcomes form the 2014 CRG meeting included:

- A focus on promoting the Alliance and its objectives.
- Updates from the Alliance Secretariat and country representatives.
- Participation from the Soil Carbon and Nitrogen Cycling Cross-Cutting Group Co-Chair to the meeting.
- Reports of the activities ongoing in each of the three CRG Components.
- Agreement to develop regular CRG seminars using the Global Research Alliance Modeling Platform (GRAMP) web platform.
- Identification of ways that the Group would improve communication among members (e.g. Facebook) and with partners, including CABI who attended the last meeting of the Group.
- Identifying new collaborations and activities.

- Discussion on the opportunities for dialogue and communication across all groups and members.

Member Country Updates

5. Each Member presented a short summery of the research activities underway in their country and opportunities to collaborate within the Group. A summary of the key activities presented is provided in Appendix 2 and the presentations are available on the website.

OVERVIEW OF EMPRABA

6. Embrapa President Dr Mauricio Lopes welcomed the Group to Brasilia and provided the Group with an overview of Embrapa, its history and activities.

7. Brazil has developed a science based advanced tropical agriculture model to become a food producing country in a tropical climate with old soils, low in nutrients. The commitment of the government to focus on food production was a key driver for the country and has led to Brazil's large research and education systems. The science centres are regionally located across Brazil to develop production systems that are appropriate to the specific local crops and conditions. Research is focused on ways to increase the total output of agricultural production without needing to increase the amount of land converted to agriculture. Brazil wants to balance natural resources and be both an important producer of food and protect the country's natural diversity.

8. Embrapa has recently established a strong partner emphasis, including private sector investment, and public-private partnership agreements both nationally and internationally to ensure that technology transfer is happening.

9. Dr. Maurício also highlighted the efforts of the country in mitigate greenhouse gas emissions from Agriculture, based in the Low Carbon Agriculture Plan (ABC Plan) - one of the biggest initiatives in the world to build Sustainable Agriculture.

SECRETARIAT UPDATE

10. The presentation from the Secretariat included an update on the outcomes from the most recent meeting of the Alliance Council, membership of the Alliance and updates on activities and meetings of the other Research Groups. The 2015 meeting of the Alliance Council will be held in Des Moines, Iowa, with the US as meeting hosts taking up the role of Council Chair from the current Council Chair, the Netherlands.

11. The Alliance now has 46 member countries participating in its activities, with the most recent members Dominican Republic, Egypt, Lithuania and Tunisia all having joined due to participation in regional projects and workshops of the Alliance.

12. The Secretariat announced the new Alliance website would soon be launched, which was developed in response to the Council's request to raise the profile of the Alliance. The Alliance website has been designed to make sure that the large amount of information it holds is able to be easily navigated and so the Research and Cross-Cutting Groups and more able to promote their work.

13. A discussion on Alliance communications then followed, the Secretariat manages an Alliance twitter account (@GRA_GHG) and the CRG now has a Facebook page. The Group was reminded that the Alliance website allows for member country pages that provide contact information for the Group representatives as well as a list of Alliance projects and activities that the country participates in. This page is a useful way to promote the Alliance within countries, as it helps other scientists know what their country is involved in the Alliance and the people to contact for more information.

REPORT ON THE AGRICULTURAL PEATLANDS AND WETLANDS COMPONENT

14. An update on Component 2 was presented by Lillian Øygarden from the Norwegian Institute for Bioeconomy Research. The Component has a small number of active participants, although the topic of high greenhouse gas emissions from agricultural peatlands was identified at the 2014 CRG meeting to be of importance for many members in the Alliance.

15. Current Component activities:

- An overview of the ongoing research activities to be provided on the website.
- Publications and reports regarding the management practices to reduce emissions from peatlands.
- Compilation of GHG emission datasets to contribute to management systems and modeling activities under other CRG components.
- Best management practices and technologies for peatland restoration.
- Synthesis article in the journal Climate Policy "GHG mitigation of agricultural peatlands requires coherent policies".

16. The component is proposing a joint workshop for March 2016 (date to be confirmed) with the topic of "Model tools for GHG estimation from cultivated peat soils". The workshop will be developed in cooperation with the Nordic Association of Agricultural Sciences and could include the development of a project proposal on modelling hydrology in peat soils. Countries that are interested in contributing to the development of the Workshop as part of the scientific committee should contact Kristiina Regina (Kristiina.regina@luke.fi).

17. The Group discussed how they can make sure the article in Climate Policy and the case studies it includes is useful for Alliance members and how this can best be shared with Council Members at the 2015 Council meeting. As a first step the paper's authors should contact all the Council representatives of the countries that contributed to the case studies highlighted in the paper, to make sure they are aware of the paper and ask if they wish to present the paper.

18. The Group discussed how the Alliance can contribute to the IPCC's definition of peat soils, which is currently limited to histosols, although these are only one type of peatland/wetland soils. Countries that are involved in the IPCC should suggest a wider definition of organic soil types to be considered by this organisation. As the IPCC guidelines on peatlands are currently being updated representatives to both the CRG and the IPCC will make sure the paper on policy management options is raised with the IPCC. The paper was thought to be something that the Group could replicate for management policies of other agricultural systems e.g. drylands.

REPORT ON COMPONENT 3 ACTIVITY - GRAMP

19. The launch of the Global Research Alliance Modeling Platform (GRAMP) was presented by Jagadeesh Yeluripati, from the James Hutton Institute. The platform was officially launched on World Environment Day, 5 June 2015, and has a number of new features since the Group was last updated on the progress of this activity.

20. GRAMP now includes a project function, which allows a number of people working on a common activity to share ideas and information among the group. Alliance members are able to use this feature to communicate on activities once they have registered for a login to GRAMP. Also new is a survey tool that is used to develop questions and request responses from the GRAMP membership. GRAMP is now collaborating with MAGGnet to show the experimental sites on an interactive map, with some information about each site also provided.

21. The Webinar function is now available to use and the CRG can use this to schedule a webinar series as was proposed during the 2014 CRG meeting. All Alliance members are invited to register as members of GRAMP and make use of the platform. As the funding for the websites' establishment

has now run out the developers are requesting that members that find this site useful, once they are part of the community, look at providing support to the platform.

22. GRAMP will be promoted as a tool that can be used by the Soil Carbon and Nitrogen Cross-Cutting Group and other Research Groups in the Alliance. GRAMP is targeted at students, researchers and modellers with a focus on training modules that are different from the modelling activities under way in the other Research Groups.

REPORT ON COMPONENT 1 ACTIVITY- LIBRARY RESEARCH DATABASE

23. An update on the open access library database was presented to the Group by Chuck Rice, Kansas State University. The Database provides citation information, abstract, and a link to journal articles that relate to research on agricultural greenhouse gas emissions research in croplands and is hosted by the Kansas State University Library - http://www.lib.k-state.edu/gracroplands/. The database is searchable by crop, climate and country so that similar research activities and results can be easily found.

24. The Database continues to be updated and the science librarians who manage it are identifying ways that research papers produced by countries (e.g. grey literature) may be included in the database using members to verify the research. To provide any comments on the database or share your publications list for upload to the database contact Livia Olsen (livia@ksu.edu) or through ResearchGate Livia_Olsen.

25. Both the Paddy Rice Research Group and the Livestock Research Group are interested in developing similar publications databases, although the resources will need to be found to support the time for a science librarian who can assist when setting up a library database.

REPORT ON COMPONENT 1 ACTIVITY- MAGGNET

26. The report on the Managing Agricultural Greenhouse Gases network (MAGGnet) was presented by Mark Liebig, USDA-ARS. MAGGnet is an activity under Component 1 that aims to develop an international database on agricultural management practices and how these influence greenhouse gas emission fluxes. MAGGnet is a network of experimental sites and research expertise. The database is Excel based and requires researchers to fill out basic metadata (e.g. climate, soil, crop, and management) from their experiment sites that have been published in peer reviewed literature.

27. Progress since the last CRG meeting:

- New sites have been added and the data updated from other sites. The database now includes 20 countries and 315 experiments.
- The database now allows for key findings and literature references to be included alongside site data.
- Development of a metadata sharing agreement for those who have added site information.
- MAGGnet has collaborated with the Paddy Rice Research Group adapting the worksheet to collect data specific to rice production.
- Development of the GRAMP interface, to share metadata though an interactive map.
- Collaboration with FACCE-JPI project activities, compiling response data and selecting experiment sites.

28. Next steps for the network:

- Continue to expand the meta-database.
- Progress on the FACCE-JPI project workplans.
- Refine and update input for the GRAMP interactive map.
- Explore further collaborations (I&M Cross-Cutting Group) and partnerships (e.g.CABI).

UPDATE ON CABI PARTNERSHIP

29. CABI was invited to present at the 2014 CRG meeting, and a partnership proposal was presented to the Group. CABI approved the Alliance as an affiliate member during their Executive Council meeting in April 2015 and the Alliance Council will consider CABI as a Partner at the Council Meeting in September. CABI has resources that the Alliance can benefit from, with the Alliance providing technical information that can be distributed to CABI members and regional contacts.

30. The question for the Group is if the existing activities of the CRG are activities that CABI could help to promote as a partner organisation? The Co-Chairs propose that the Group develop a set of summary documents outlining management strategies to mitigate GHG emissions and that help agricultural systems adapt to climate change. Small groups of interested members would develop these fact sheets of 2-4 pages that summarise what is known now, and could be updated in the future. These summaries could be presented to science policy leaders and CABI may support this activity by helping with the presentation and dissemination.

31. The Group discussed how this partnership could move forward and how to ensure that the information distributed did not misrepresent the science by oversimplifying the outcomes and options. CABI would not be the only partner to promote CRG activities within the Alliance, but one way to get Alliance information translated into something meaningful and shared more widely. There may be other organisations that could similarly promote activities of the Alliance.

INTERACTION WITH THE INVENTORIES AND MONITORING CROSS-CUTTING GROUP

32. To identify areas of collaboration between the CRG and the I&M Cross-Cutting Group, I&M Group Co-Chair Brain McConkey provided an overview of the five existing work areas on the I&M Group work plan and possible collaborative activities. The I&M Group are focusing on a limited number of active areas where lead countries and resources have been identified, and ensuring that the Group is able to achieve its goals. The five current work areas are:

Inventories

1. The application of remote sensing and earth observation technologies in the development of inventories. This includes methodologies and examples. The activity is led by the UK who have completed a stocktake of 13 countries and their experience of using this technology.
2. Quantification of the mitigation and adaptation strategies in inventories to address synergies and trade- offs. This activity is led by the Netherlands who have organised a South-East Asian farm systems workshop, a joint workshop with CCAFS, and plan to develop a network involving representatives from all Alliance Research Groups.
3. Guidance for determining emissions intensity metrics which may be used to support policy development. This is an area of interest for the Group, but not currently active.
4. Sharing knowledge and facilitate collaborations to improving national inventories. A stocktake has been completed for this activity, with Canada leading the work area.

Monitoring

5. Developing a best practice guidance on monitoring soil organic carbon (SOC) stocks over space and time. Canada is leading this activity, which is important to all Alliance Research Groups. A post-doc is currently undertaking a literature analysis.

33. The I&M Group met additionally during the evening of 11 July 2015 to discuss possible areas of collaboration with the CRG that had been identified following presentations on the CRG component work areas earlier in the day:

1. Cross-cutting at higher level: linking crop – livestock via food systems.

    - Sharing experience to quantify inter-related GHG emissions and removals in upscaled estimates having tradeoffs and/or synergies.
2. Moving up tiers and creating links between inventories and mitigation options (synergies & trade-offs). Example areas may include:
    - wetlands.
    - shared experiences/developing guidance on application of Tier 3 models for inventory and policy.
    - shared experiences/developing guidance on prioritisation of measurements.
3. The metrics of adaptation and mitigation: what to monitor in which farming/cropping systems e.g. Uncertainties of upscaled estimates.
4. Case studies and benchmarking.

PROPOSALS FOR NEW ACTIVITIES AND NETWORKS

34. The Group then reviewed the current workplan and activities proposed during the 2014 CRG meeting. Based on this a discussion was held on re-structuring the Group into multiple, focused theme areas or networks to widen the participation of members in the Group.

35. The role of the Alliance is to share the science knowledge that is already known to each member country and translate the combined information in a way that can be used by farmer organizations, policy makers and other scientists. The Group is not currently looking to generate new science or redoing the scientific work that has already been done, given no new resource allocation. Instead it is focused on understanding what resources are available in each country and packaging this knowledge together with a little extra effort.

36. The CRG has a number of strong activities already e.g. GRAMP, MAGGnet, agricultural peatlands, and should build on these activities as well as developing activities in the research areas that have been proposed by members previously.

37. The Co-Chairs proposed that the CRG Components be renamed as Networks, to fit with the structure of other Alliance Research Groups, and to facilitate additional networks be created. A total of nine Network areas were identified, although members are welcome to suggest other Network areas.

38. Proposed Networks for the CRG:

1. Agroforestry Systems.
2. Conservation agriculture.
3. Integrated crop-livestock systems.
4. Integrated nutrient management.
5. Irrigation efficiency.
6. Landscape management of agricultural systems.
7. Modeling of carbon and Nitrogen fluxes in diverse agro-ecosystesms.
8. Peatland management.
9. Small farm resource management.

39. The Co-Chairs will develop a framework for these Network areas over the coming months and suggest that Member countries consider which Network areas are most relevant to their country, as well as key scientists that should be involved. Each Network could have around 5-10 countries involved.

40. The Networks will be developed over the next six months, with an initial activity to be summaries (2-4 pages) outlining the progress of research in this area and key mitigation options. The summaries should be accessible to the science-informed public - a translation of the science but not a dumbing down of the information. By developing the summaries and identifying the experts in

each country, the current level of knowledge and any gaps, the Networks will develop a workplan of activities, and have a base of knowledge that could be used to develop funding proposals.

41. The Group proposed that Networks could also be developed for important crops (e.g. the Netherlands lead a potato network), specific climates or a grasslands network that coordinates activities with the LRG and the I&M Groups.

42. The Group agreed with the revision of the CRG workplan, and the proposal to restructure the CRG into Networks (or another name if chosen) beginning with the nine areas proposed by the Co-Chairs. Members will comment on the document sent out by the Co-Chairs on this topic.

COMMUNICATION ACTIVITIES

43. The Brazilian Co-Chair provided an overview of the Group's methods of communication, including recent activities. The need to communicate the outcomes of CRG activities is essential to growing the Group as well as staying relevant for current members. The Group has previously discussed how Partners such as CABI may be of use in helping the Group share their information and the use of webinars following the launch of GRAMP.

44. Opportunities for the Group to communicate achievements externally include:

- Sharing Alliance research outcomes and related country activities on the CRG Facebook page (https://www.facebook.com/GRAcroplands).
- Updating the Group webpages, including sharing of presentations from the Alliance special session at the ICFL congress, once the new Alliance website goes live.
- Include mitigation actions from different countries or regions on the website.
- Share links to related conferences, including developing sessions or side events separate from annual meetings where possible.
- Prepare summary documents that can be used to address wider audiences.
- Establish a working group that can develop a document that outlines how the group implements activities e.g. north-south, south-south cooperation activities as well as developing regional collaborations.

NEXT STEPS AND MEETING

45. A list of next steps for the Group are outlined below:

- Affirmation of leadership roles – The US Co-Chair position will be handed over to Dr Jane Johnson in the coming year. The current and incoming US Co-Chairs will work together over the coming year to ensure a smooth handover.
- Country activities to be promoted on the Alliance Member Country webpages or through a presentation that can be shared (country involvement in the Alliance, ongoing actions, future plan).
- Members should ensure the presence of official representatives at meetings.

46. The Group identified the location for the next meeting as Phoenix, Arizona, USA alongside the ASA-CSSA-SSSA "Tri Societies" 2016 annual meeting. The date for this meeting is 6-9 November 2016 with the CRG meeting likely to take place on Thursday-Friday 10-11 November following the conference. The Co-Chairs will look into the possibility of arranging a special session to highlight CRG research and activities during the congress with possible options including:

- Grasslands and grazing systems.
- Dryland cropping and cross-cutting issues.
- Mitigate options for different regions/systems.
- Nitrogen management.
- Uncertainties in GHG measurements in modelling.

APPENDIX 1: Participants List

Country	Attendees
Alliance Member Countries	
Brazil	Ladislau Martin: Embrapa (Ladislau.martin@embrapa.br) Renato Rodrigues: Embrapa (renato.rodrigues@embrapa.br) Paulo Galerani: Embrapa (paulo.galerani@embrapa.br) Robert Boddey: Embrapa (bob.boddey@embrapa.br) Pedro Machado: Embrapa (pedro.machado@embrapa.br) Beata Madari: Embrapa (beata.madari@embrapa.br)
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Chile	Carlos Ovalle, INIA (covalle@inia.cl)
Denmark	Lars Munkholm: (lars.munkholm@agrsci.dk)
Japan	Ayaka Kishimoto-Mo: National Institute for Agro-Environmental Sciences (mow@affrc.go.jp) Shirato Yasuhito, National Institute for Agro-Environmental Sciences (yshirato@affrc.go.jp)
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Norway	Lillian Øygarden: Norwegian Institute for Bioeconomy Research (lillian.oygarden@nibio.no)
Poland	Magda Walker, (mwalker@iung.pulawy.pl)
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UK	Jagadeesh Yeluripati: James Hutton Institute (Jagadeesh.yeluripati@hutton.ac.uk)
USA	Alan J. Franzluebbers: USDA-ARS (alan.franzluebbers@ars.usda.gov) Mark Liebig: USDA-ARS (mark.liebig@ars.usda.gov) Charles Rice, Kansas State University (cwrice@ksu.edu) Marlen Eve, USDA (marlen.eve@osec.usda.gov) Mark Powell USDA (LRG)
Other Participants	
William Salas, wsalas@agsemail.com (GRAMP)	
Secretariat: Deborah Knox (Deborah.knox@mpi.govt.nz)	

APPENDIX 2: Country Updates

Brazil

General activities and research support in low carbon agriculture to improve agriculture and reduce emissions through ABC plan programmes and funds until 2020. Topic areas include:

- integrated systems,
- no till farming,
- biological nitrogen fixation,
- restoration of grazing lands,
- planted forests, and
- treatment of animal waste.

A multi-institutional lab has been established to manage and monitor programmes under the low carbon agriculture ABC plan. Brazil is hoping to engage more with the Alliance and have more scientists from Embrapa share the knowledge gained from this programme.

The FLUXUS Project

Aims to estimate greenhouse gas (GHG) emissions, emission factors and carbon balance in grain crop production systems in Brazil, provide advice for policy and mitigation actions.

- Data collection from different environments (savannah, planted forests, amazon, and southern pampas grasslands) and different crops (rice, soybean, wheat, cow pea) as well as different production systems.
- Each site is measuring soil carbon and nitrogen stocks, biomass, productivity. Greenhouse gases measured are CO_2, CH_4 and N_2O using manual static chambers and some micromet measurements.
- The measurements are collected for 1-2 years at each site, to improve modelling, upscaling, information and databases, and the evaluation of mitigation strategies.

Canada

National activities in Canada include the Agriculture and Greenhouse Gas Programme (AGGP). Discussions regarding its renewal are undergoing. The programme funds university led research that fits with the aims and objectives of the Alliance.

The current GHG research at the national level is largely organised into sectoral clusters (e.g. dairy cluster). AAFC's Sustainability Metrics programme is continuing the development of the GHG inventory system for agriculture.

Brief report on Soil Carbon and Nitrogen Cycling and Livestock Research Group workshop on soil carbon sequestration in grasslands systems (Lodi Italy, 25 June 2015).

- France is considering the development of an international programme on this activity, which may fit under the Alliance.
- Discussion about the possible use of the MAGGnet template to include grasslands sites to the database.
- Canada is leading an activity on how to improve SOC monitoring in grasslands systems, and identifying tools to monitor carbon change in grasslands
- This area is a good cross-cutting issue that can be supported by participants across the Alliance Research groups.

Chile

Chile has a national focus on reducing emissions 20% by 2020, and is developing an agricultural NAMA on the "recuperation of degraded soils".

- Five practices to improve carbon sequestration are subsidised. These are improved pastures through phosphorus and clover, incorporation of crop residues, zero till, addition of composts, and addition of stabilised poultry manure.
- Each practice to improve soils is paired with a neighbouring site using current practices for the past 5 years.
- Measuring SOC, total N, extractables, biomass etc.
- Possible policy effects could include credits for meeting national GHG goals, improvement to modelling data, soil maps and climate data.

Chile has volcanic andosols that are difficult to calculate GHG emissions from and would be interested in collaboration with other countries that have these soils.

Denmark

Ongoing research:

- Measuring GHG emissions from peatlands and strategies for mitigation.
- N_2O emissions from winter cover crops. Measurements in winter and spring from cover crops with and without fertiliser (pig slurry). Treatments show high N_2O fluxes when fertiliser is applied with the crop, an effect that needs to be considered when using a cover crop as a mitigation measure.
- The effects of rotation and tillage on carbon storage - seven years of experiments, results from two different sites and sampling levels.
    - The sites with the diverse rotation treatments where straw is removed shows a loss of carbon compared to treatments where residues are left on field.
    - The effect of tillage is also compared, the direct drilling site showed an increase in carbon storage in the top layer of soil compared to other treatments.

Japan

Shared information on Alliance activities across Research Groups, since most scientists are from one research institute (National Institute for Agro-Environmental Sciences -NIAES). Japan is a Co-Chair of the PRRG and is developing collaborations and activity sharing across the CRG and the PRRG.

Ongoing Alliance projects and related research:

- Organic amendment to reduce N_2O emissions.
- Participating in MAGGnet - nine sites from Japan have been included.
- Developing the DNDC model for andosols using GRAMP.
- Improved SOC inventory using the Roth C model.
- Developed a web tool to calculate GHG emissions (similar to Comet Farm).

Other opportunities for collaboration:

- Japan would be willing to share knowledge of GHG emissions from upland soybean and wheat crops.
- Request support from the Alliance on research relating to upland andosols.

Poland

Funding has been received for a project to observe climate changes until 2030 and to implement low carbon farm practices, including low mineral fertilisers. Eight experimental farms are involved comparing common and traditional practices. The second year of experiments will compare modern practices. The results will be used to develop agriculture policies and Poland hopes to share results and ideas with the Alliance in the future.

Netherlands

A CRG potato network report has been completed as a Wageningen University position paper. The network will cover the different production systems for potatoes focusing on water requirements, pest and diseases, climate effects etc. The network will identify mitigation options related to fertiliser application, crop rotation and farm management. The report will be made available on the Alliance website identifying opportunities depending on regional/specific issues.

Key outcomes:

- Technology development is key.
- Technology transfer is lagging.
- Adaptation is specific to local conditions, with some common areas.
- Increasing efficiencies.
- Local priorities and systems need to be linked e.g. Farm managements and farm priorities should be identified by speaking to farmers.

Norway

The Ministry of Agriculture in Norway is undertaking a review of future adaptation to climate change in Norway, the current policies and their possible effects. This fits in with the climate goal to be a low emission society across all sectors by 2015. Activities underway to support this review:

- Agricultural emissions calculator developed to compare different scenarios and options, including diet changes, reduction of food waste, peat soil cultivation and a change of agriculture production systems.
- Experimenting with wet/compacted soil crops, to reflect possible changes in climate and harvesting times.
- Experiment to heat grasslands and look at the impacts of warming in this environment.
- Biochar research on the production and properties required to maintain the stability of biochar in soils.
- New Activity on modelling – collecting biochar data for Alliance modeling network
- Research to restore peatlands.
- N_2O emissions from clover - very high during winter period from the soil and roots.
- A long term experiment on crop rotation systems is now collecting GHG emissions data with automatic chambers.
- Project on GHG mitigation from crop soils using mafic mineral application.

Spain

Spain has replicated the structure of the Alliance across national system, and has found that membership in the Alliance has improved the communications between scientists and policy makers. It would be helpful to know how other country maintain the links between science and policy.

Current GHG research activities in Spain include:

- Participating in the GACSA and hoping to coordinate efforts across both organizations.

- About to undertake a new stocktake of national research activities, as this helps to coordinate research and outcomes.
- Funding croplands research with a focus on the impact of management practices.
- Completing a stocktake on crop and livestock projects that include adaption.

United Kingdom

Current GHG research activities in the UK fund include:

- Agricultural GHG R&D platform, brings together 16 institutes to develop collaborations with funding of £13 million available.
- Identification of Tier 2 emission factors for the UK, by bringing together all existing data to improve the national inventory. This includes work to finalise specific N_2O emission factors, which will be lower than the current Tier 1 factor used.
- Providing open access to data from long term research experiment sites, these may also be incorporated into the MAGGnet database.
- About to launch a new research project on sustainable intensification. The project will use a top down approach identifying the markets and drivers at the landscape scale and farm level rather than an upscaling approach.

GRA activities:

- Adding UK research site data to MAGGnet.
- Launch of the GRAMP website, now open to contributions for ongoing site maintenance.
- Peatlands management practices.
- Opportunities to develop collaboration under the European Union Horizon 2020 funding programme.

USA

The USA regularly updates the US page of Alliance activities on the Alliance website. The webpage also includes the list of key contacts that attend the research Group meeting.

Current GHG research activities in the US:

- Quantifying GHG Fluxes in agriculture and forestry, a review of US methods for inventory that could be a useful source of information.
- USDA-ARS has a national programme developing a soil and air action plan involving a number of national networks; Conservation Effects Assessment Project, GRACEnet, Livestock GRACEnet, and Resilient Economic Agriculture Practices.
- NIFA has research networks to study the effects of climate change on regional crop (and livestock) production systems
    - *www.sustainablecorn.org*
    - *www.reacchpna.org*
    - *www.sustainabledairy.org*
    - *www.greatplainsgrazing.org*
- Coordinated Agricultural Project (CAP) on Bioenergy with regional activities and networks.
- USDA has climate hubs taking research and transforming into useable information for producers.