

## Croplands Research Group Meeting

Room B400, Hertfordshire University, Hatfield, United Kingdom

8 September 2017

# Meeting Report

## OVERVIEW

The ninth meeting of the Croplands Research Group (CRG) of the Global Research Alliance on Agricultural Greenhouse Gases (“the Alliance”) was held at Hertfordshire University, Hatfield, United Kingdom on 8 September 2017 following the 6<sup>th</sup> International Symposium on Soil Organic Matter. The Alliance meeting was chaired by USA (Dr Jane Johnson, USDA-ARS), Brazil (Dr Ladislau Martin, Embrapa), and Spain (Dr Rosa Mosquera, University of Santiago de Compostela) as Co-Chairs of the Group.

This report is a summary of the key discussions and outcomes of the meeting. PDF’s of the presentations including those from networks leaders unable to attend can be downloaded from the resource library on the Global Research Alliance website (<https://globalresearchalliance.org/library/2017-croplands-research-group-meeting-hatpenden-uk/>).

## PARTICIPANTS

The meeting was attended by 20 participants, representing 14 Alliance member countries, and invited experts.

- **Alliance Members attending:** Brazil, Canada, China, Denmark, Finland, Germany, Norway, Republic of Korea, Poland, Spain, Sweden, Switzerland, United Kingdom, USA.
- **Invited Experts:** CABI and IFDC
- **Secretariat:** New Zealand

## MEETING OUTCOMES

The meeting achieved the following outcomes:

- Reviewed the activities and leadership of the Networks.
- Updated the CRG work plan and identified how activities fit with the new Research Group framework.
- Identified activities to support the Networks and align with the Alliance Flagships.

- Developed a plan for communication and coordination among Co-Chairs, Networks and Members.

## SUMMARY OF DISCUSSIONS

### OPENING REMARKS

The ninth meeting of the Croplands Research Group was opened by Dr Jane Johnson from USDA-ARS as Co-Chair of the Group. Dr Johnson then introduced the two other Co-Chairs of the Group Dr Ladislau Martin of Embrapa, Brazil and the newly appointed third Co-Chair - Dr Rosa Mosquera, University of Santiago de Compostela, Spain.

The Group was welcomed to the UK by Dr Luke Spadavecchia, DEFRA. The UK had been member of the Alliance since 2010 and this was the first opportunity to host a meeting.

#### Overview of the Group

Dr Johnson presented the Group with an update of activities since the 2016 meeting in Phoenix AZ, including a review of the report presented by the Research Group Co-Chairs at the 2017 Council meeting in Japan.

At the coordination meeting in Japan the Research Group Co-Chairs updated the work plan elements to clarify how Research Groups, Flagships and capability building activities fit together. The updated framework also shows how the Research Groups are moving from technologies and practices, to monitoring reporting and verification (MRV's), and towards supporting national actions.

The Croplands Research Group report to the Council was based on the responses provided by the Network leaders and Group participants. Dr Johnson noted that one of the Group's actions for the day was to evaluate how it has impacted the countries that contribute and to agree on how to communicate the stories of the Alliance.

### SECRETARIAT UPDATE

The Alliance Secretariat provided an update to the Group on activities of the Alliance since the 2016 Council meeting, including new Members and Partners and an update on Research Group pages on the Alliance website.

The Alliance now has 48 Member Countries, with South Africa and Zimbabwe joining in the past year. Following the decisions at the 2016 Council meeting the Alliance now works with 14 Partner organisations, and at the 2017 Council meeting agreed to invite nine additional organisations to become partners of the Alliance, including:

- the Asian Development Bank;
- International Fund for Agricultural Development;
- International Soil Reference and Information Centre (ISRIC);
- Global Agri-business Alliance (GAA);
- World Business Council on Sustainable Development (WBCSD);
- Sustainable Agriculture Initiative Platform (SAI Platform);
- International Fertiliser Development Centre (IFDC);
- Caribbean Agricultural Research & Development Institute (CARDI); and
- Forum for Agricultural Research in Africa (FARA).

Outcomes from the Council meeting that are of relevance to the Research Groups include the decision to complete an inventory of Members capability building needs and fellowships and training events that could be used to support Alliance activities. The Research Group Co-Chairs also proposed developing regional capability building activities, which will be coordinated across all Research Groups. This would make the benefit received from these activities, for the Alliance and institutes and researchers attending, more visible. Council members have been asked to support these activities by identifying experts that could help to develop workshop programmes and deliver the workshops.

Recent updates to the Alliance website had provided additional space for each of the four Research Groups to showcase activities and the work of their Networks. Groups are now able to showcase key projects and outcomes, and upload meeting documents. The website now includes a resource library, so that all of the Alliance outputs and documents are located in one place and visitors to the site are easily able to search by document type and research group. At the Council meeting members agreed that all meeting documents would now be made publically accessible in the resource library, and the member's area would be removed.

## **ACTIVITY UPDATES**

### **GRAMP**

Dr Jagadeesh Yeluripati, James Hutton Institute, UK - presented on the development of the Global Research Alliance Modelling Platform (GRAMP - <http://www.gramp.org.uk/>), which has now been online for three years, and recent update of activities.

The open source code of the DNDC model will be available to download from GRAMP next year. At the moment the model is not open, with many different versions in use, but no easy way of telling which elements have been changed or if the results are comparable. New model families Century and DAYCENT are expected to be finalised and placed on the website in the next few weeks. The BASFOR and BASGRA models will be the next in line to be completed.

Webinars that have been hosted on GRAMP have been posted to a YouTube channel (<https://www.youtube.com/channel/UC8SpAtocukWYmmmTL8niWCA>)

The platform currently has around 700 members, 100 new members since last year, and needs more experts that are able to respond to requests and contribute to the site.

### **Literature Database**

An update on the Croplands Literature Database (<http://www.lib.k-state.edu/gracroplands/>) was presented by Dr Chuck Rice, Kansas State University. The database is hosted by the library at Kansas State University and brings together published literature related to greenhouse gas emissions from cropping systems. The database is searchable by croplands crop, country, climate etc.

The library database is now hosted on an open access cloud service, and students that work for Kansas State University library are trained in adding new references - so the database is constantly being updated. The group is welcome to provide references, or their own reference libraries for inclusion in the database – contact Livia Olsen ([livia@ksu.edu](mailto:livia@ksu.edu)).

## **NETWORK UPDATES**

*Not attending: irrigation efficiency, integrated crop-livestock systems, nutrient management*

Network leaders attending the meeting provided an overview of activities since the 2016 meeting, and presented on the next steps planned for each Networks. In the afternoon each Network was given time to develop further activities and discuss these with the Group.

## **Peatlands Management**

Network Leader: Hanna Silvennoinen, Norway

Countries Participating: Finland, Germany, Netherlands, Norway, Sweden, Switzerland, UK.

The Peatlands Management Network increased its membership at the 2016 meeting in Phoenix, although countries with tropical peatlands (e.g. Indonesia) are not currently represented and the Network intends to invite these countries to join.

The Network action plan includes holding a teleconference in late September or October 2017 to coordinate activities across all group members. Funding has been granted to organise a small workshop, which will be held late autumn 2017 or early spring 2018.

A proposal for a session at the European Geosciences Union General Assembly 2018 (EGU) (Vienna, Austria, 8–13 April 2018) has been submitted, the scope of the session will reflect the networks aims and cover experimental projects, modelling and policy support.

During the discussion the Group suggested that the Network work with the FACCE-JPI thematic programme on soils (TAP Soils). The Group also offered to provide contacts from North America that have an interest in peatlands, and the Secretariat will provide Indonesian contacts that may be interested in participating in the Network.

## **Landscape Management**

Network Leader: Xunhua Zheng, China.

Countries Participating: China, France, Germany, Spain, USA.

The Network has a number of ambitious aims:

- To improve and validate models at the landscape level.
- Develop processes model based decision tools.
- Develop project proposals for collaborative activities
- Coordinate activities with Integrative Research Group.

The Network has received funding from the National Science Foundation of China (NSFC) and UNEP for a five year project on the effects of climate and management practices on yield and the GHG footprint of maize cultivation. Maize cultivation systems will be compared in Kenya (tropical) and China (temperate) looking at the crop yield, nitrogen inputs, and greenhouse gas footprint across multiple inputs and sites.

## **Conservation Agriculture**

Network Leader: Craig Drury, Canada.

Countries Participating: Argentina, Canada, Denmark, Germany, Italy, Spain, Sweden, USA.

The Network has 18 members and has coordinated activities during the year through email and phone discussions.

Network Activities:

- Finalised a Factsheet on conservation agriculture practices, this factsheet has been published on the Alliance website.
- Identified ~10 new datasets related to conservation agriculture, the data and information will be included in MAGGnet.

- Conducting a meta-analysis to determine which conservation agriculture practices reduce the most greenhouse gas emissions for different conditions and agriculture systems. Funding from Agriculture and Agri-Food Canada has been provided for a student, and a Spanish researcher (Diego Abalos) has agreed to run the analysis. The draft meta-analysis should be completed by the next meeting of the Group.
- Planning to host a symposium on conservation agriculture practices in January 2019, and publish a special issue.

#### Future Activities:

- Conduct a literature review to capture work that has already been published.
- Identify experts in other areas e.g. remote sensing, that could contribute to the Network.
- Reporting on mitigation practices (e.g. 4R) in agricultural greenhouse gas inventories, how these could be reflected in inventories.

### **Agroforestry Systems**

Network Leader: Richard Farrel, Canada and Rosa Mosquera, Spain and Renato Rodrigues, Brazil.

Countries Participating: Brazil, Canada, France, Spain, USA and the World Agroforestry Centre

The Agroforestry Systems Network has 16 members and is now looking to increase regional participation by involving other regional networks, the European Agroforestry Federation (EURAF), Agroforestry Innovation Network (AFINET) and national agroforestry groups such as those established in Mexico and India.

The Network is finalising its factsheets – but notes that a number of organisations have produced similar factsheets on agroforestry practices (GACSA, FAO). There are also opportunities to collaborate with other organisations on research at the tree-crop interface and adoption impediments.

#### New activities for the Network:

- Dr. Renato Rodrigues, from Embrapa, Brazil, accepted the position of Coordinator of the Agroforestry Systems Network.
- Inventory of long term experiment sites.
- Contribute to Openaire (free database) for agroforestry data.
- Alignment of activities with the Integrative Research Group.
- Participate at the EURAF conference - May 2018 in the Netherlands.
- Opportunities to develop a global network on Agroforestry (IUAF), the EU has networking funding for developing countries.
- Survey about policies in low carbon agroforestry for the 48 Alliance members.
- Metadata analysis on the environmental, social and economic aspects.
- Contribute to a book on fostering agroforestry practices that is being written.

### **Low Carbon Agriculture Plan in Brazil**

A presentation from Co-Chair Ladislau Martin, Brazil, showcased the activities of the Brazilian Low Carbon Agriculture Plan that provides stimulus (not subsidies) to Brazilian farmers to adopt conservative practices management to reduce greenhouse gas emissions from Brazilian agriculture. Currently six main practices are eligible in this Plan: no-till, recovery of degraded pastureland,

biological nitrogen fixation, planted forest, integrated crop-livestock-forestry systems, and manure management. The goal is to mitigate 133.9 to 166.2 Million of Mg CO<sub>2</sub> eq. with these practices until 2020, in reference to a 2005 baseline.

In the presentation recent achievements from integrated crop-livestock forest system were highlighted, as an excellent option to sustainable intensification practices mainly in the tropics, with 11.5 million of hectares under this system in Brazil, in 2016, overcoming the initial goal of the Low Carbon Agriculture Plan. This Plan has strong and direct connection with activities of the Flagships for Soil Carbon Sequestration, Enteric Fermentation and Inventory. This Plan also connects well with the possible new Alliance Flagship on Circularity in Climate Smart Food Production. Brazil is totally open to expand cooperation in this subject with Alliance Members.

### **Discussion**

Dr Johnson provided a brief update on the Networks that were not present in the meeting. The Integrated Nutrient Management Network is looking for a new leader, the Group was asked to suggest any colleagues they may be aware of who would be able to lead this Network and to contact the Co-Chairs. The Irrigation Network is a small group but have some activities under development. The Integrated Livestock Systems Network has some similarities with the Agroforestry Network, the Group was asked if the two Networks should be combined to increase resourcing and coordinate activities, the Co-Chairs will follow up and discuss this with the Network leaders.

The Networks are each asked to develop a summary document, providing a brief overview of the Networks aims, activities, contact/leader, so that this can be shared with the Alliance membership and increase participation.

To improve coordination it was suggested that Networks organise regular meetings or ways of keeping in contact with Network member's for example:

- Organise a call every 3 months;
- Email updates every month; and
- Networks coordinators to report quarterly to the Co-Chairs.

The Group was asked to share success stories from their countries. Examples of what countries, organisations, individuals have achieved because of the Alliance, these stories should be shared these with the Secretariat and the Group so that we can learn from others experiences and build on these successes.

## **PARTNER PRESENTATIONS**

### **CABI International**

Dr Janny Vos, Strategic Partnerships Director of CABI (<http://www.cabi.org/>) was invited to speak about opportunities for collaboration between the Alliance and CABI, including with our respective Flagships. CABI has been a Partner of the Alliance since 2015 and is working to transfer information into knowledge, communicating a range of science based topics to build knowledge and capability.

There are obvious links for the Alliance to CABI's work on plant health, as plant health is also related to climate. A change in climate can increase farmer reliance on pesticides, reduce crop productivity and yield and affects farmer incomes.

The Plantwise database and plant clinics are a flagship activity of CABI, the plant health data is collected at on the ground farmer plant clinics and is uploaded to an online database. This can be used by countries to identify problems that are occurring in the field and what might be required to

resolve these. Clinic data can be combined with other information such as GIS location mapping data, which can help to track disease outbreaks and target regions for treatments or prevention

A suggestion for joint activities was to hold an Alliance and CABI side event to inform our respective memberships of activities. The Group also saw value in involving CABI with MAGGnet to develop joint activities.

CABI is also working with the Climate Change, Agriculture and Food Security (CCAFS) programme in some of their climate smart villages to develop expanded plant clinics, sharing knowledge on plant health issues but also other practices such as fertiliser use and irrigation that are related to greenhouse gases. Similarly, CABI could help to extend Alliance information more widely through their networks.

### **International Fertiliser Development Centre**

Dr Prem Bindran, of the International Fertiliser Development Centre (IFDC - <https://ifdc.org/>) spoke on the projects of this organisation and the Virtual Fertiliser Research Centre. The Virtual Fertiliser Research Centre works not just on fertiliser, but across the value chain and has 30 projects underway in 25 Countries. The projects scope covers the import of products at one end of the value chain through to selling of crops/products at market, as farmers need to be able to access fertilisers and other farm inputs as well as be able to reach a market where they can sell their produce.

Activities are developed on two scales, building local businesses and growing a specific sectors for a region e.g. development and training of systems for on the ground implementation. Projects include the consideration of appropriate fertiliser technologies, how to scale up implementation as well as research and development and policy.

The 4R practice of nutrient stewardship asks farmers to identify the right fertiliser, apply it at the right time, use the right amount, and target application to the right place. IFDC has been measuring greenhouse gas emissions to understand the impacts of changing fertiliser practices, across the whole system. Other areas of interest include:

- identifying new ways of delivering fertilisers such as through endophytes, soil bacteria, mycorrhizae fungi and root exudates;
- new innovations that are better targeted for specific crops and situations;
- targeting of fertilisers to improve soil condition by understanding which micro or macro nutrients are limiting plant growth; and
- improving the nutritional content and concentration of crops through agronomic fortification.

The Alliance could help to quantify the emission from some of these newer areas of research. Another opportunity is to design packages that increase yield and reduce emissions e.g. a yield map could be combined with a map of emissions.

## **FLAGSHIPS DISCUSSION**

The participants then separated into breakout groups and discussed how the CRG can contribute to the projects developed under the two most relevant Alliance Flagships, Soil Carbon Sequestration and Agriculture GHG Inventory. Another breakout group discussed the development of a Nitrous Oxide Flagship.

### **Soil Carbon Sequestration**

- Align efforts within countries to combine funds.

- Consider the wider benefits of increased carbon in soil e.g. structure, economics, soil health and the ways that these are quantified to demonstrate the benefit of increased soil carbon related to other properties.
- Identify regionally specific practices that drive soil carbon sequestration.
- A lack of information about tropical soils suggests there may be an opportunity to develop a soil carbon project in the tropics.
- Complete a meta-analysis of the croplands literature database for research in tropic zones. There is a Brazilian post-doc undertaking a global analysis in this field, but a specific focus on tropical systems is also required.
- The peatlands and tropical soils work should also be included in the Soil Carbon Sequestration Flagship.

### **Inventory**

- Enhancing inventory structure and demonstrating mitigation in NDCs were seen to be the two most useful areas for the CRG to contribute.
- The Group could collaborate by sharing data, information from MAGGnet etc.
- Agree that a focus on NDCs is key to ensure the low carbon technologies and practices that countries are already promoting are able to be captured and reported in the national inventory.
- Develop methodologies that countries can use to move to 2006 IPCC guidelines.

### **Nitrous Oxide**

For many countries N<sub>2</sub>O is the driving greenhouse gas emission from the agriculture sector. The group discussed activities that would align with those the CRG already planned, and others that could lead to quick success.

- The Conservation Agriculture Network already has a work plan that aligns well with the scope of this Flagship and these activities should be incorporated.
- The Group has a number of existing datasets for greenhouse gas emissions. What are the ways to mine this information e.g. prepare the data in a suitable format for inputs to models.
- Compare and review research on natural and synthetic nitrous oxide inhibitors e.g. Brachiaria.
- Breeding legume species for better nitrogen efficiency.
- Opportunities to align with existing research collaborations e.g. FACCE-JPI, which has strong Alliance participation already. Identify which projects are the best links for the Flagship and use these collaborations as a way to increase participation in the CRG.
- Make sure that the activities developed by the Flagship are transferrable to all countries, the outputs should not only be highly tech, but also applicable for developing countries.

### Discussion

The Group was reminded that they should contact their Council representative to find out which Flagships and activities their country has agreed to support. Members of the CRG should inform their Council representative of activities developed in the CRG that would be of most benefit.



The Secretariat agreed to circulate the Flagship information, including taskforce contacts to the Group.

## NEXT MEETING

A proposal to hold the 2018 meeting in Rio de Janeiro, Brazil alongside the 21st World Congress of Soil Science - 12-17 August 2018 was presented to the Group by Co-Chair Ladislau Martin. The suggestion would be to hold the meeting ahead of the congress (Saturday 10 and Sunday 11) as a one day meeting or a 1 and ½ day meeting at the convention centre where the congress would also be held. There could be an opportunity to hold sessions with the Paddy Rice and Integrative Research Groups if they also hold annual meetings at this congress.

Suggestions for the 2019 meeting included an Agroforestry meeting in Montpellier and the International symposium on soil organic matter to be held August 2019 in Adelaide, Australia.

## MEETING OUTCOMES

Action	By who
Identify additional Experts interested in contributing to GRAMP.	All Members
The group is welcome to provide references, or their own reference libraries for inclusion in the database	All Members
Expert Peatlands contacts from North America provided to the Network	North American Members
Indonesian contacts that may participating in the Peatlands Network	Secretariat
Discuss future activities of the Integrated Livestock Systems Network and Agroforestry Network – combine Networks?	Co-Chairs Network leaders.
Identify new leader for the Nutrient Management Network	All Members
Renato Rodrigues agreed to lead the Agroforestry Network	Renato Rodrigues, Embrapa
Each Network to complete a document providing a brief overview of the Networks aims, activities, contact/leader.	Network leaders
Regular communication (calls or emails) to be organised within Networks	Network leaders Network members
Network to report quarterly to the Co-Chairs	Network leaders Co-Chairs
Inform Soil Carbon Sequestration Flagship of topics important to CRG: <ul style="list-style-type: none"> <li>• Peatlands</li> <li>• Tropical Soils</li> <li>• Regionally specific practices for soil carbon sequestration</li> </ul>	Secretariat

<p>Inform Agricultural GHG Inventory Flagship of topics important to CRG:</p> <ul style="list-style-type: none"> <li>• Data sharing data, use of the MAGGnet database</li> <li>• Ensure the low carbon technologies and practices that countries are already promoting are able to be captured and reported in the national inventory.</li> <li>• Develop methodologies that countries can use to move to 2006 IPCC guidelines.</li> </ul>	Secretariat
<p>Development of a Nitrous Oxide Flagship</p> <ul style="list-style-type: none"> <li>• CRG to contribute to the Taskforce</li> <li>• Members to identify other contacts that should be involved – including to lead.</li> <li>• Identify other projects (CRG, regional or national) that align with/contribute to the Flagship.</li> </ul>	Co-Chairs All Members
Members to share success stories from their countries	All Members
Contact country council representatives to inform of CRG outcomes, and ask about country support for Flagships.	All Members
Flagship information, and taskforce contacts circulated to the Group	Secretariat

## APPENDIX 1: Participants list

Country	Attendees
<b>Alliance Member Countries</b>	
Brazil	Ladislau Martin: EMBRAPA ( <a href="mailto:ladislau.martin@embrapa.br">ladislau.martin@embrapa.br</a> ) Renato Rodrigues: EMBRAPA ( <a href="mailto:renato.rodrigues@embrapa.br">renato.rodrigues@embrapa.br</a> ) Pedro Machado: EMBRAPA ( <a href="mailto:pedro.machado@embrapa.br">pedro.machado@embrapa.br</a> )
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<b>Secretariat: Deborah Knox (<a href="mailto:deborah.knox@mpi.govt.nz">deborah.knox@mpi.govt.nz</a>)</b>	
<b>Invited Participants</b>	
CABI : Dr Janny Vos, Strategic Partnerships Director CABI ( <a href="mailto:j.vos@cabi.org">j.vos@cabi.org</a> ) IFDC : Dr Prem Bindraban, Director of European-Netherlands Office IFDC & Executive Director Virtual Fertiliser Research ( <a href="mailto:pbindraban@ifdc.org">pbindraban@ifdc.org</a> )	