

## Croplands Research Group Meeting Hyatt Regency Long Beach, USA

4 November 2010

# Meeting Report

## OVERVIEW

The first meeting of the Croplands Research Group of the Global Research Alliance on Agricultural Greenhouse Gases (“the Alliance”) was held in Long Beach, USA on 4 November 2010, following directly after the ASA-CSSA-SSSA “Tri-Societies” International Annual Meetings from 31 October – 3 November.

2 The one day Alliance meeting was chaired by the USA (Dr Steven Shafer and Dr Charlie Walthall, USDA) as coordinator of the Croplands Research Group. The meeting was attended by Alliance member and observer country representatives and additional US scientists from the Tri-Societies Meetings.

3 This report is a summary of the discussions and outcomes from the meeting. The PDFs of presentations are provided separately

## PARTICIPANTS

4 The meeting was attended by 35 Alliance representatives and 9 non-representative participants. 17 Alliance member and observer countries were represented.

- **Alliance Members attending:** Argentina, Australia, Canada, Chile, France, Germany, Ghana, Indonesia, Ireland, Japan, New Zealand, Norway, Sweden, UK, USA
- **Alliance Members unable to attend:** Colombia, Denmark, Finland, India, Malaysia, Mexico, Peru, Philippines, Russia, Spain, Uruguay, Vietnam
- **Observers attending:** Brazil, Republic of Korea
- **Observers unable to attend:** China, South Africa, Thailand, European Commission

## MEETING OUTCOMES

5 The meeting achieved the following outcomes:

- Understanding of countries crops emissions research, based on analysis of the Alliance stocktake – and short presentations from participating countries
- Initial thoughts on the structure of the Croplands Group, which will be given further consideration at the next meeting of the Group
- Agreement on activities the Croplands Group will focus on:
  - Short term
    - Stocktake, improvement of information quality and detail, towards a publication of the analysis
    - Development of a publications list of significant GHG emissions research in agricultural croplands systems and relevant websites
    - A contact list of GHG croplands researchers
    - Inventory of protocols, guidelines and methods for soil carbon, GHG flux in crops, temporal, spatial measurements, to build on existing projects such as GRACEnet.
  - Medium to long term
    - A sub-committee in charge of identifying longer term project ideas and opportunities
    - Developing the mechanisms for future collaboration and capacity building
    - Synthesis papers on growing areas of interest, e.g. inventories and methods
    - Catalogue the best mitigation approaches and practices for all member countries
      - a. Inventory level
      - b. Current condition

6 The short term actions should be mostly completed before March 2011, in advance of the next meeting of the Croplands Research Group (to be held at the same time as the next Alliance Senior Officials meeting 1-4 March 2011, France). The Croplands Group will then use this meeting to agree on its longer term objectives, priority actions and sub- group structure, ahead of reporting progress to the Alliance Ministers at the Ministerial Summit, June 2011.

## SUMMARY OF DISCUSSIONS

- 7 The day-long meeting of the Croplands Research Group covered the following topics:
- Dr. Steven Shafer (Deputy Administrator, Natural Resources and Sustainable Agricultural Systems Office of National Programs, USDA) the US coordinator of the Croplands Research Group, opened the meeting with an introduction and overview of the Alliance.
  - An update from the Secretariat on the stocktake process, drafting of the Alliance Charter, outcomes from the recent Paddy Rice and Livestock Research Group meetings, website usage and future milestones. The dates were confirmed for the upcoming Senior Officials Meeting (France, 1-4 March 2011) and the Ministerial Summit (New Zealand, 15-17 June 2011). Countries were encouraged to make early preparations for attendance.
  - Dr Steven Shafer presented an initial analysis of the stocktake results for The Croplands Group followed by short presentations from each country represented about their activities in croplands GHG emissions research.
  - The second half of the day was reserved for discussion of the Croplands Research Group structure and its priorities. This was structured following the “4D Cycle” method of organisational design (Discover, Dream/Envision, Design, Deliver) a technique which has been used before with success in the USDA.
- 8 All presentations from this meeting are available on the Alliance website.

## CHARTER FEEDBACK

8 The Secretariat asked for any comments on the draft charter in particular as it relates to the organisation and the facilitation of the Croplands Research Group. The Alliance’s Governance Group has requested feedback from the Research Groups to further develop the Charter. Specific consideration was to be given on paragraphs 26-43 covering the Operation of the Research Groups and paragraphs 52-59, the role and relationship of Partners. The group was asked to consider if these sections as drafted would best support the work of the Research Groups, whether anything was missing or if anything was covered in too much detail.

10 A question was raised about the Charter mentioning Science Advisory Panels, (para 43) with no clarification on the level they would sit at or specificity on functions, objectives or membership. Agreement was reached that adequate provision for this function was covered in para 20 and as such para 43 could be deleted.

11 The representatives felt that the text in the sections specific to the partners and technical experts/resource persons to work with the Research Groups were adequate given the changes that had been discussed in the Paddy Rice and Livestock Research Group meetings. There were no further comments on para 26-43 regarding membership, participation and governance of the Research Groups.

## ALLIANCE STOCKTAKE

12 The stocktake template had been sent to Alliance countries (members and observers) in July for their completion ahead of the first Research Group meetings. Twenty-two countries had returned complete or partial stocktakes in time for the Croplands meeting. Dr Steven Shafer presented an analysis of the data as it related to the Croplands Group, totalling 443 lines of the overall stocktake. This analysis identified the main categories of research across countries. See the Stocktake overview presentation for this information.

13 It was noted there were differences of interpreting the template between respondent countries. Not all countries define 'projects' the same, and what some countries categorised as cross cutting activities represent significant areas of work for the Cropland Research Group i.e. agroforestry and mixed cropping/livestock systems. Analysing current funding sources showed that although Governments are responsible for the majority of research funding there are also international organisations and industries funding this work and so developing partner relationships will be important to the Group.

14 It was proposed that the stocktake results may be one way of dividing up the Croplands Group into sub-groups. The group was asked to consider if the categories identified were too broad e.g. agronomy, and if the Group should further divide into more specific topics of research and outreach, or how else to represent the 'smaller' topics in this proposed structure.

### Discussion:

15 The Secretariat acknowledged that stocktake templates take longer to complete than was initially anticipated, however the level of data collected is proving valuable to countries by identifying and connecting country's internal programmes. The Secretariat asked how members see the template information being used and for thoughts on how to improve the template to get consistent information across countries and improve the efficiency.

16 The resulting discussion recognised the importance of the detail captured by the stocktake; participants agreed that further effort was required to collect information from universities and smaller organisations.

17 The stocktake process was recognised by the group as a starting point to identifying common issues, but only if it remains current and should be considered as an open-ended process, updated at least once every year.

17 A comment was made that many national and international programmes and organisations have websites where this work is detailed. The websites should be collated and will be listed on the Global Research Alliance website.

### Countries' Stocktakes:

18 Each country representative was asked to give a short presentation summarising their country's stocktake results, and the key message summarising their interest in croplands greenhouse gas emissions research.

#### AUSTRALIA

- Irrigated systems, large dryland systems, mixed cropping systems
- N<sub>2</sub>O emissions under different cropping systems
- Automatic measure techniques and portable systems

- High resolution data collected and feeding in larger modelling effort, to develop better predictive models and inform decision support systems

#### FRANCE

- Focus on spatial variability
- Modelling for arable crops, soil/ atmosphere and crop processes
- Infra-red mobile system
- INRA Meta programme on GHG mitigation 2011-2015

#### CANADA

- Stocktake represents research to tech transfer
- Agricultural Greenhouse Gases Programme (AGGP)
- To develop and transfer knowledge to help Canadian farmers to mitigate greenhouse gas emission.
- Main areas of interest: Livestock, Cropping, Agro-Forestry, Water use efficiency
- Identification of knowledge gaps in these areas.

#### GHANA

- Development of a low carbon growth plan to reduce further degradation of Ghana's carbon sink forests and maintain greenhouse gas emissions at a sustainable level over the next ten years
- Identification of projects to fit into categories of GHG emissions research
- The Centre for Scientific Research is aligning researchers and universities to identify the people with knowledge in this area.

#### BRAZIL

- Nationwide strategy for climate change including agriculture
- Main areas of research in crops, livestock, and forests with cross cutting modelling and emissions data collection working across these.
- Survey of research in carbon soils, crop and pasture across Brazil.

#### NORWAY

- Two main national projects – gas emissions across different crops, IT based calculations for integrated farm emissions
- Main cropping interests: Cereals, organic cereal, grasslands, organic grass
- Manure on grassland, soil measurements, experimental plot – focus on soil variability.
- GHG emissions under winter conditions, compaction experiment
- Cross cutting techniques on how to measure – also emissions from peatland, permafrost, Europe network on soil carbon, Carbon biochar

#### NEW ZEALAND

- Four key themes: Soil C inventories, mechanisms of soil C storage & loss, contributions of soil C to soil functions., management of soil C
- NZAGRC – coordinating agricultural GHG research
- Land use change and intensification – soil organic, temp water, modelling – work with Australian based modelling
- Management to mitigate losses and increase C storage in vegetable crops, cover crops , livestock feed and grazed forage crops
- Tools produced for farmers
- Sustainable land use management.

- GHG footprinting and lifecycle analysis.

#### ARGENTINA

- GHG inventory research and knowledge increasing
- Current emissions levels thought to be over calculated
- INTA coordinating research
- Collaborations with EMBRAPA from Brazil
- Trialling methods to reduce emissions– more than half of crops grown under no tillage system, emissions seen to be affected by soil porosity and temperature.
- Results from field chambers are showing lower results than IPCC calculations

#### INDONESIA

- Increasing production of rice and soy crops for food security
- Selected breeding of crops for adaptation
- Development of Indonesian Carbon Efficient Farming
- The government has invested US \$5.3 million in these research areas

#### JAPAN

- More than half of Japanese croplands are in rice production
- Main research areas: Soil C and N<sub>2</sub>O emissions and mitigation research
- Soil C national monitoring network results since 1979, have 12000 sites, monitor every 5 years
- Long term study of organic matter applied to croplands, to enhance soil C
- Conventional mitigation of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O not always practical for asian climates

#### CHILE

- National inventory agricultural greenhouse gases started in 2006
- 4% of land in agriculture which produces 14% GHG emissions
- No research yet in croplands, have begun research livestock emissions
- A key concern for Chile is to stay efficient and competitive
- Open to work together in the Alliance

#### IRELAND

- Agriculture of key interest, meeting obligations without losing production
- Initiatives mostly livestock, cross cutting, grass and arable focused
- Research focus on inventory establishment and emissions factors for climate
- Moving to mitigation options – land use change, cover crops, tillage, fertilisation, manure, Soil C management.
- Modelling emissions and the effects of land use changes – good range of equipment for measuring this.

#### SWEDEN

- Forest dominates, agriculture in the south – with clay soils, sandy on coast, organic soils from drained wetlands (10% of the agricultural area), produce the most emissions.
- Field measurements – manual chambers and micro-meteorological methods. Modelling for upscaling and mitigation
- Studies of microbiology of soils, to find mitigations options
- Ongoing national and international collaborations – collection of 10-20 years emissions data

## KOREA

- To understand and develop emissions models for main crops grown in Korea: potato, soy, Chinese cabbage, project to run over four years 2009-2012 in four locations
- Ongoing work in rice crops and soil C

## GERMANY

- Main priorities N<sub>2</sub>O emissions– surplus of N in long term agricultural soils
- Research on tillage, fertilisation methods
- Farmed organic soils contribute to emissions
- National inventory of soil C - to a depth of 1m. biochar and hydrochar
- National programme of croplands relating to biogas

## UNITED KINGDOM

- Committed to 80% reduction of emissions by 2050.
- 11% of these reductions must come from agriculture.
- Need to improve inventory, sustainable production and efficiency of resource use
- 12.5 million invested in inventory to improve emissions programmes
- Breeding for more efficient varieties of crops
- Enhance nutrient management and reduce N<sub>2</sub>O emissions

## UNITED STATES

- Agriculture is responsible for 7% of GHG emissions
- Nitrogen fertilisers on croplands are the main cause of N<sub>2</sub>O emissions and 1/3 total ag emissions,
- A key research area is carbon sequestration
- Most stocktake projects identified from USDA, some university research, but not a comprehensive list
- GRACEnet, national programme (Greenhouse gas Reduction through Agricultural Carbon Enhancement network)

## DISCUSSION OF CROSS CUTTING ISSUES

19 The group discussed cross cutting issues and how these teams would function to support the Cropland Research Group and the Alliance as a whole. The coordinators of the cross cutting issues and the Research Groups spoke about how they see the cross cutting teams functioning across the Alliance.

### Soil Carbon and Nitrogen Cycling

20 Australian and France are coordinating the cross cutting issue on soil carbon and nitrogen cycling. They saw this as comprising:

- Measurement techniques and the standardisation of methods
- Modelling Soil C and N
- Methodologies for trade purposes e.g. leakage, financial barriers
- Databases, minimum requirements, format

### Inventories and Measurement

21 Canada and The Netherlands coordinate the cross cutting issue on inventories and measurement. They see their role as working with and through the Research Groups, to facilitate information sharing with a particular focus on:

- GHG emissions inventories and methodologies, quantification and measurement guidance.
- Facilitate to make sure cross-cutting activities are organised across Groups
- Methodology – standardise across all Groups, guidance to all Groups
- Advisory – identify gaps in GHG methodology, communicate opportunities

## STRUCTURE AND FUNCTION

22 The discussion on the Croplands Group structure and function was facilitated with a workshop using a four step process: Discover, Dream / envision, Design, Deliver. This method had been used before in the USDA to good effect.

Discover: *Effective characteristics of other organisations that make them a success*

23 The recurring theme of the discussion was one of trust between the members in the Group and providing a trusted knowledge base to those outside the Group. Participants discussed how existing groups that work well and achieve their goals all share the vision, share the responsibility and share the credit for successes. Effective communication and having clear, realistic milestones and products will lead to the early successes that motivate the longer term projects and attract support from outside organisations.

Dream: *Achievements that would make the Croplands Research Group a success*

24 The group was asked to consider what achievements will make the Cropland Research Group a success.

25 The most important measurement of success was identified as being collaboration of countries and research that could not have happened without the Alliance. Also that the Croplands Research Group would give a new direction in GHG emissions research in agricultural cropping systems.

26 Another measure was that the Croplands Research Group is influential in the development of useful products that can be used by decision makers and is seen as a resource for the mitigation of GHG emissions while still supporting food security.

Design: *Organisational structures required to meet the goals*

27 The discussion then moved to how the Croplands Group could be structured to reach these achievements.

28 The question of group leadership was raised and whether a sub-committee was needed to support the Coordinators of the Group. However the group preferred the suggestion of a co-leader rather than developing another layer of leadership before any further structure is decided upon. It was proposed that the leadership rotates, although no need to force the change if the current chairs and group are happy for the leadership to remain the same. Further leadership discussions are to be left until the group has some idea of its initial work plans and any sub-groups that may be required.

29 The group then moved to thinking about what structure it would require to reach the achievements above. It was proposed that the Group could be divided into sub-groups of work for example: Soil Carbon, emissions and inventory, process/modelling, agronomy/GHG reductions. Another idea was that teams could work in terms of scale; point data, field scale, regional, national, global scale.



30 There was agreement that some short term objectives needed to be identified for the Croplands Group and the structure needed only to support this for now – a full structure could be organised later, using the broad grouping of topics identified in the stocktake. However, there was a further discussion on the merit of forming a sub-committee responsible for the identification of ideas and products that the Group requires. Formation of this committee could be discussed further at the Group’s next meeting.

31 There was a lengthy discussion on some initial projects that the Group should work towards, with most suggestions at the overview and information gathering level – focusing on the connection of researchers and related projects at this time and improving data in the stocktake. The Group also felt that initially bringing together different resources such as publications, website and methodology information, accessible by anyone, would form a base of knowledge that the Group could then work from.

32 Longer term achievements would be based on a more detailed analysis of the Alliance stocktake, identifying opportunities and gaps, as well as other emerging products and issues that are identified by the Group.

33 However, ideas that were discussed included further developing the publications list as a searchable library of data/information/research projects (inventory of data sets) on the Alliance website. Also the Group would like to see a catalogue of the best mitigation options in each member country (at different spatial and temporal scales).

Deliver: *Projects that will see the Group reach its goals*

34 The group felt that there was importance in including researchers at all levels with capacity building activities and workshops that would benefit countries and researchers with less experience in measurement methods and use of equipment. Capacity building will be looked at more in further meetings, but countries are asked to consider the ways in which they can support the Alliance and its goals e.g. Borlaug Fellowships in the USA which have been offered this year to support of the goals of the Alliance.

35 It will be important for the Group to build on the research that is already available by developing *synthesis papers* on common research topics of interest, and to build existing research networks such as GRACEnet to share and collect information. However, it will be essential to get researchers involved from each country that have the country specific knowledge.

36 There was a discussion on communications, e.g. how the Group gets its work out to others, which brought up the idea of Alliance-wide newsletters. The Group would be responsible for providing the information to the Secretariat and the newsletter would then be based on the website rather than emailed to all - this would encourage the use of the website, which the Group should also be using for information sharing amongst itself.

## CONCLUSIONS

37 In concluding the meeting the coordinator presented a summary of the actions arising from the meeting. The countries then agreed that the short term goals of the Group are as follows (square brackets indicate persons responsible):

- **By December 2010:** All countries to have emailed websites of the national/ international croplands GHG programmes as mentioned in country presentations to Steve Schafer to be compiled in a list and made available via Alliance website [everyone]
- **By February 2011:** First draft of library for relevant literature and websites. This will be of benefit to outside organisations such as IPCC, building on the Group's wish to be seen as a knowledge resource [Dr Charles Rice (USA), Dr Bill Slattery(Australia),to coordinate with input from everyone]
- **By March 2011:** Development of a contact list of Croplands GHG researchers, modelled from the LEARN (ruminant-livestock) database of researchers [Dr Steven Shafer, Nancy Cavallaro (USA)]
- **By March 2011:** All countries to update the Stocktake and include research from all relevant organisations. The Secretariat to send out the modified templates to countries. With an aim to publish the analysis results on the Alliance website [Dr Steven Shafer (USA), Secretariat, all countries]
- **By March 2011:** Timeline and method developed to assemble an inventory/ outline of protocols, guidelines and methods (soil C, GHG flux in crops, temporal, spatial) – build on established networks within countries e.g. GRACEnet, to include researchers from all countries [Dr Ronald Follet (USA), Dr Mike Beare(NZ), Dr Brian McConkey(Caanada)]

38 A summary of the possible longer term objectives was then agreed upon:

- Build on the list of relevant literature and websites to produce a searchable data set / information portal [everyone]
- A Croplands committee tasked with discovery of emerging issues/products/analysis and projects for the Group [*sub-committee* members to be identified]
- Setting the stage for collaboration; identifying funding mechanisms/collaboration e.g. Borlaug Fellowship, US [country-specific task]
- Agreed to start making use of website to gather information and for the Secretariat to distribute newsletters. [all to provide information]
- Synthesis papers on growing areas of interest e.g. Inventories and Methods [Dr Ian D. Campbell (Canada) – cross cutting group]
- Catalogue of best mitigation options and recommendations in each member country (at different spatial and temporal scales) [Dr Heinz Flessa (Germany), Dr Guy Richard (France), each country]
  - a. Inventory level
  - b. Current condition

39 The coordinator will prepare more detail on the longer term objectives for the discussion at the next meeting of the Croplands Research Group.

40 In closing USDA thanked all participants for attending and for their involvement and constructive ideas to shape the successes of the Cropland Research Group.

# APPENDIX 1: Participants List

| Country                          | Attendees  |
|----------------------------------|--|
| <b>Alliance Member Countries</b> |  |
| Argentina                        | <b>Ing. Agr. Miguel A. Taboada:</b> National Institute of Agriculture Technology, INTA<br>( <a href="mailto:mtaboada@cnia.inta.gov.ar">mtaboada@cnia.inta.gov.ar</a> )   |
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| Canada                           | <b>Dr Ian D. Campbell:</b> Agriculture and Agri-Food Canada ( <a href="mailto:iand.campbell@agr.gc.ca">iand.campbell@agr.gc.ca</a> )<br><br><b>Dr Brian McConkey:</b> Agriculture and Agri-Food Canada ( <a href="mailto:brian.mcconkey@agr.gc.ca">brian.mcconkey@agr.gc.ca</a> )<br><br><b>Vern Baron:</b> Agriculture and Agri-Food Canada ( <a href="mailto:vern.baron@agr.gc.ca">vern.baron@agr.gc.ca</a> )<br><br><b>Henry deGooijer:</b> Agriculture and Agri-Food Canada ( <a href="mailto:henry.degooijer@agr.gc.ca">henry.degooijer@agr.gc.ca</a> ) |
| Chile                            | <b>Jose Maria Peralta:</b> National Institute of Agricultural Research, INIA ( <a href="mailto:jperalta@inia.cl">jperalta@inia.cl</a> )  |
| Colombia                         | Unable to attend   |
| Denmark                          | Unable to attend   |
| France                           | <b>Guy Richard:</b> National Institute of Agriculture Research (INRA), EA Division<br>( <a href="mailto:guy.richard@orleans.inra.fr">guy.richard@orleans.inra.fr</a> )   |
| Germany                          | <b>Dr Heinz Flessa:</b> VTI Institute of Agricultural Climate Research ( <a href="mailto:heinz.flessa@vti.bund.de">heinz.flessa@vti.bund.de</a> )  |
| Ghana                            | <b>Dr Nicholas Iddi:</b> National Project Coordinator, Ministry of Environment, Science and Technology ( <a href="mailto:nicholasiddi@yahoo.com">nicholasiddi@yahoo.com</a> )  |
| India                            | Unable to attend   |
| Indonesia                        | <b>I. Nyoman Widiarta:</b> Indonesian Center for Food Crops Research and Development<br>( <a href="mailto:manwidiarta@yahoo.com">manwidiarta@yahoo.com</a> )   |
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| Japan                            | <b>Dr Kazuyuki Yagi:</b> National Institute for Agro-Environmental Sciences ( <a href="mailto:kyagi@affrc.go.jp">kyagi@affrc.go.jp</a> )<br><br><b>Kazunori Minamikawa:</b> National Institute for Agro-Environmental Sciences<br>( <a href="mailto:minakazu@affrc.go.jp">minakazu@affrc.go.jp</a> )   |
| Malaysia                         | Unable to attend   |

|                     |  |
|---------------------|--|
| Mexico              | Unable to attend   |
| Netherlands         | Not participating in the Croplands Group   |
| New Zealand         | <b>Dr Harry Clark:</b> NZAGRC ( <a href="mailto:harry.clark@nzagrc.org.nz">harry.clark@nzagrc.org.nz</a> )<br><b>Dr Mike Beare:</b> Plant and Food Research ( <a href="mailto:mike.beare@plantandfood.co.nz">mike.beare@plantandfood.co.nz</a> )<br><b>Dr Andy Reisinger:</b> NZAGRC ( <a href="mailto:andy.reislinger@nzagrc.org.nz">andy.reislinger@nzagrc.org.nz</a> )              |
| Norway              | <b>Dr Lillian Oygarden:</b> Norwegian Institute for Agricultural and Environment Research, Bioforsk, ( <a href="mailto:Lillian.oygarden@bioforsk.no">Lillian.oygarden@bioforsk.no</a> )  |
| Pakistan            | Not participating in the Croplands Group   |
| Peru                | Unable to attend   |
| Philippines         | Unable to attend   |
| Russia              | Unable to attend   |
| Spain               | Unable to attend   |
| Sweden              | <b>Dr Åsa Kasimir Klemedtsson:</b> University of Gothenburg ( <a href="mailto:asa.kasimir@gvc.gu.se">asa.kasimir@gvc.gu.se</a> )   |
| Switzerland         | Not participating in the Croplands Group   |
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| Uruguay             | Unable to attend   |
| Viet Nam            | <b>Dr La Van Kinh:</b> Associate Professor, Institute of Agricultural Sciences for Southern Vietnam( <a href="mailto:lakinh@hcm.fpt.vn">lakinh@hcm.fpt.vn</a> )  |
| <b>Observers</b>    |  |
| Brazil              | <b>Giampaolo Queiroz Pellegrimo:</b> EMBRAPA ( <a href="mailto:giam@cnptia.embrapa.br">giam@cnptia.embrapa.br</a> )  |
| China               | Unable to attend   |
| European Commission | Unable to attend   |
| Korea               | <b>Hyun-Cheol Jeong:</b> National Academy of Agricultural Science ( <a href="mailto:taiji152@korea.kr">taiji152@korea.kr</a> )<br><b>Kyo-Moon Shim:</b> National Academy of Agricultural Science ( <a href="mailto:kmshim@korea.kr">kmshim@korea.kr</a> )<br><b>Seul Bi Lee:</b> National Academy of Agricultural Science ( <a href="mailto:seulvi23@korea.kr">seulvi23@korea.kr</a> ) |
| South Africa        | Unable to attend   |

|  |                  |
|--|------------------|
| Thailand   | Unable to attend |
| <b>Secretariat:</b> Laura Hogg, New Zealand Ministry of Agriculture and Forestry ( <a href="mailto:laura.hogg@maf.govt.nz">laura.hogg@maf.govt.nz</a> )<br>Deborah Knox, New Zealand Ministry of Agriculture and Forestry ( <a href="mailto:deborah.knox@maf.govt.nz">deborah.knox@maf.govt.nz</a> ) |                  |

#### Other Attendees

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