

# Annexes to Final Report

## Evaluation of Partnerships in CGIAR

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Independent  
Evaluation  
Arrangement

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## ANNEX A. Methodology

### *Phasing of the evaluation*

The evaluation took place in four phases, starting in January 2016. In the Preparatory phase IEA compiled and reviewed key documentation, recruited team members and established an Expert Resource Group (RG). During the inception phase from April to June the evaluation framework and approach were developed, the team met in Rome to agree on the methodology, and an inception report was prepared. Preliminary information was also collected from CGIAR managers and a small number of key informants. During the Inquiry and Analysis phases, between July and October 2016, team members gathered data and information and analysed findings as described below. Members of the RG provided advice on methodology, suggestions for interviewees and specific written inputs, and reviewed the inception report. The Reporting phase included a meeting in Rome in October 2016, facilitated by a member of the RG, to review and distil the various products of the evaluation and agree on the content of the report. Preliminary results were presented to CGIAR managers and one representative of a strategic partners, in two webinar sessions (mid December 2016) held at different times to accommodate time differences; feedback from the webinars was considered during report drafting. Text was then prepared by each team member and the report drafted by the team leader under guidance from IEA. The draft report was reviewed internally by IEA and two external experts before being distributed to stakeholders for comments in early May 2017.

### *Evaluation frameworks*

The evaluation reviewed a number of references on the performance of partnerships in international institutions<sup>1</sup>. It found no standardised methodology for an evaluation of this kind. This is not surprising as evaluations of partnership arrangements in large organizations are been tailored to the specific purpose of the evaluation and the nature of the organization. Accordingly the evaluation devised its own frameworks to meet the needs of the Terms of Reference. Reference was made to literature from the CGIAR reform, in particular the report of Wording

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<sup>1</sup> Bezanson, K., Narain, S. and Prante, G. 2004. *Independent evaluation of the partnership committees of the CGIAR*. Washington, D.C.: CGIAR Secretariat.; Bezanson, K.A. and Isenman, P. 2012. *Governance of New Global Partnerships: Challenges, Weaknesses, and Lessons*. CGD Policy Paper 014. Washington DC: Center for Global Development. (available at <http://www.cgdev.org/content/publications/detail/1426627>); Caplan, K., Gomme, J, Mugabi, J. and Stott, L. 2007. *Assessing Partnership Performance: Understanding the Drivers for Success*. Building Partnerships for Development in Water and Sanitation (BPD); Feinstein, O. 2010. *Evaluation and development: the partnership dimension*. In UNICEF. 2010. *From policies to results: Developing capacities for country monitoring and evaluation systems*. Ed. M. Segone; IEG (Independent Evaluation Group). 2011. *The World Bank's Involvement in Global and Regional Partnership Programs: An Independent Assessment*. Washington, DC: World Bank; ISPC, 2015. *Strategic study of good practice in AR4D partnership*. Rome, Italy. CGIAR Independent Science and Partnership Council (ISPC), viii + 39pp + annex 49pp

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Group 2<sup>2</sup>, the literature review carried out by CIP<sup>3</sup> and ISPC's good practice review that focused on multi-stakeholder partnerships<sup>4</sup>.

Evidence gathering was organised according to two frameworks described below, in order to ensure rigour and consistency.

### *Evaluation questions*

The overarching question for the evaluation was the following: **To what extent has the CGIAR reform of 2008 been successful in a) strengthening partnerships and, b) through this, increasing the likelihood of achieving CGIAR goals?**

It was subdivided into three areas of enquiry, termed "key questions". Within each question, the evaluation searched for evidence of what has changed since 2008 and the extent to which the reform has contributed.

1. To what extent have actions taken by the CGIAR since 2008 resulted in partnerships that are strategically selected and fit-for-purpose?

This question addressed the strategic choices made by Centers and CRPs in selecting the partnerships in which they engage, the extent to which these are coherent with program objectives and impact pathways, and the fitness for purpose of the resulting partnerships.

2. To what extent do the CGIAR's systems facilitate good partnering and has this improved as a result of the reform?

This question addressed the extent to which policies, procedures and monitoring, evaluation and learning systems within Centers, CRPs and the CGIAR system can facilitate (or hamper) the identification of partners and the implementation of partnerships.

3. To what extent are partnerships making the CGIAR more effective in delivering on its agenda?

This question addressed the results achieved from partnerships. All partnerships have some level of investment and transactions costs. The evaluation looked for indications that CGIAR research programs, through working in partnership, are achieving results that each partner could not have achieved by working alone.

The key questions, and a set of sub-questions elaborated for each of them, guided the design of stakeholder interviews that provided the substantive part of the primary data collected for the evaluation.

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<sup>2</sup> CGIAR. 2008. The Future of Partnerships in the CGIAR: Report of Working Group 2 (Partnerships) to the Change Steering Team of the CGIAR, August 11 2008 (available at [http://www.cgiar.org/www-archive/www.cgiar.org/changemanagement/pdf/WG2\\_FutureofPartnerships\\_FINAL\\_Sept16\\_2008.pdf](http://www.cgiar.org/www-archive/www.cgiar.org/changemanagement/pdf/WG2_FutureofPartnerships_FINAL_Sept16_2008.pdf)).

<sup>3</sup> Horton, D, Prain, G. and Thiele, G. 2009. Perspectives on partnership: A literature review. Working Paper 2009-3. 111 p. International Potato Center (CIP), Lima, Peru.

<sup>4</sup> ISPC, 2015. *Strategic study of good practice in AR4D partnership*. Rome, Italy. CGIAR Independent Science and Partnership Council (ISPC), viii + 39pp + annex 49pp



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### *Partnership landscape*

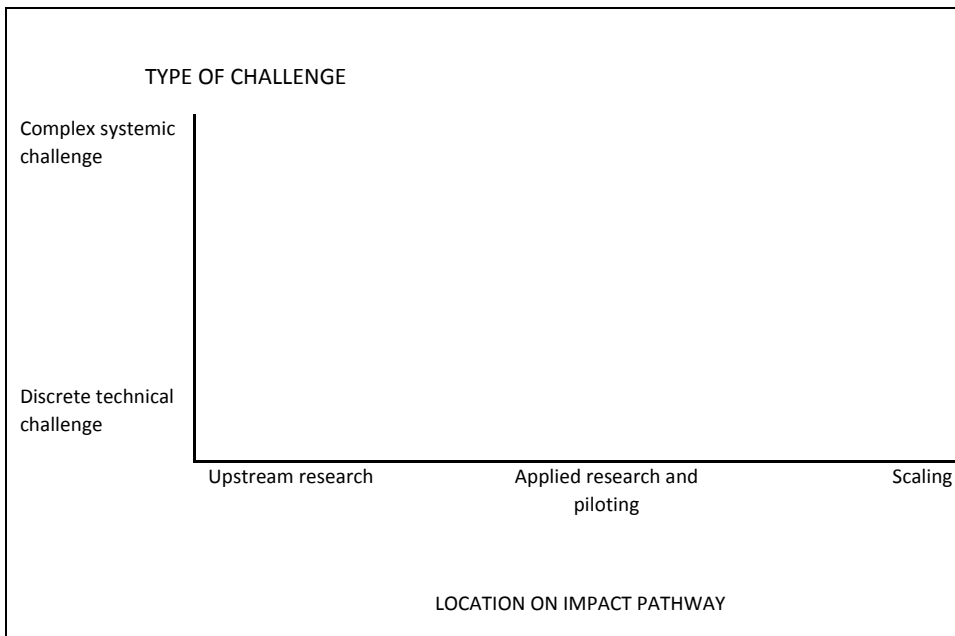
“Partnership landscape” is the term used in the evaluation to encompass the partnership context and the range of partnership models in which Centers and CRPs engage. Mapping the partnership landscape has assisted the evaluation to review the choices that are made by CGIAR relative to research goals, and to develop questions and case studies.

CGIAR partners and partnerships have been described and classified in various ways. The CGIAR describes itself as an Agricultural Research for Development partnership, and is engaged in both internal (between Centers and CRPs) and external partnerships. However, existing typologies in published CGIAR documents have tended to be of partners rather than partnerships. The evaluation chose to classify partnerships rather than partners because classification of partners was found to be less useful for the present purpose - a partner organization may appear in more than one functional category, may be working with the CGIAR in an activity different from the way they are traditionally described, and may be part of a bilateral or multilateral partnership.

The evaluation mapped CGIAR partnerships within a landscape that encompasses the context in which the partnerships take place and the types of partnerships in which Centers and CRPS engage in order to deliver their planned research outputs and outcomes.

The evaluation was interested in two elements of **partnership context** (see Figure 1 below). One was the type of challenge addressed by partnerships, ranging from discrete technical challenges such as the development of a new plant variety or livestock vaccine, to complex systemic challenges like improving human nutrition or mitigating impacts of greenhouse gases. As chapter 1 discusses, CGIAR must address not only specific technical problems but also the global challenges defined formerly by the millennium development goals and now the sustainable development goals, and it needs to engage in partnerships that are suitable for both. The second element of partnership context was the location along the impact pathway where CGIAR partnerships are working, from upstream research to scaling of technology and knowledge. As section 1.2 discusses, one expectation of CGIAR reform was that new partnerships would be developed for applied research and scaling.

**Figure 1: Conceptual framework for CGIAR partnership context**



*Source: Evaluation team and ISPC (2015)*

The evaluation also looked at **partnership models**. The framework defined in the inception report considered only two elements: the number of partners (few to many) and the level of formality of the relationship between them. However, the semi-structured interviews and case studies used to gather evidence have elicited additional information about the types of partnership models in which CRPs and Centers are operating, and this is discussed in chapter 2.

### **Sources of evidence**

The following activities were carried out to gather and analyse evidence.

### **Synthesis of evaluative and historical information on partnerships**

This exercise, carried out mostly during the inception period, extracted information on and relevant to partnerships from evaluation reports and made a preliminary synthesis.

The following sets of documents were consulted:

- Reports of CRP evaluations
- Reports of previous reviews of partnership carried out by and for the CGIAR e.g. the ISPC strategic study published in 2015
- ISPC commentaries on CRP Proposals

In addition, a member of the RG provided briefing notes giving a historical perspective on partnerships in CGIAR.

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### *Exploratory interviews*

Exploratory face-to-face interviews were carried out with nine CRP managers, two Center DDGs, representatives of ISPC, the CO, the FC and GFAR and representatives of two external partner organizations (IFAD and FAO).

### *Observation at multi-stakeholder meetings*

The team leader and IEA attended the third Global Conference on Agricultural Research for Development multi-stakeholder meeting (GCARD3) held in Johannesburg, observed plenary sessions and informally interviewed a number of participants. One team member and IEA attended the CIMMYT 50<sup>th</sup> anniversary celebrations.

### *Characterization of partnerships – partnership landscape*

This process was begun during the inception phase with the development of the conceptual framework for a partnership landscape described in section 2.3.

During the inquiry phase, a survey was conducted of all Centers and CRPs. Each was asked to provide a list of up to 15 partnerships defined by themselves as “most critical for delivery of the CRP’s (or Center’s) mandate”. For the purposes of the survey, a partnership was defined as “a recognized relationship between a CGIAR Center or CRP and another institution<sup>1</sup> within or external to CGIAR, to undertake activities jointly that contribute to achievement of each institution’s mandate, within the context of delivering a defined research or development output<sup>2</sup> or advancing a defined institutional goal<sup>3</sup>”. A partnership might have few or many partners and could be formal or informal.

<sup>1</sup>The institution as a whole, part of the institution, or a member of the institution.

<sup>2</sup> From a strategic framework or equivalent.

<sup>3</sup> Institutional goals might include e.g. access to resources or ability to influence.

For each partnership, specific information was requested about the reason or the partnership, the year it started, the size of the partnership and where is operated along the impact pathway. 13 CRPs and four Centers<sup>5</sup> responded to the request, and a database of 212 partnerships was compiled.

To complement the landscape information, data collected by the previous Institutional Learning and Change (ILAC) initiative, on CRP stakeholder mapping (system wide as well as for the CRPs on RTB and WHEAT) was reviewed.

### *Review of Fund Council and Consortium Board meeting minutes*

The evaluation reviewed meeting minutes of the CGIAR Fund Council (1st meeting in February 2010 until 15th meeting in May 2016) as well as the Consortium Board (1st meeting in March 2010 until the 22nd meeting in November 2015).

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<sup>5</sup> AfricaRice provided the information at a time when the overall analysis was completed and therefore the data is not reflected in overall numbers on landscape. However, it has been reviewed qualitatively.



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### *Review of documents on drivers, strategies, policies and implementation*

The evaluation reviewed documented evidence of partnership strategies, policies and implementation plans, as well as reflection and learning related to partnerships, at all levels of CGIAR but particularly from CRPs and Centers.

Sources of published information included the following:

- Published CGIAR system level strategic documents (like the Strategy and Results Framework)
- Published partnership strategies of Centers and CRPs, including those in CRP proposals and extension proposals from phase 1 and CRP2 proposals
- Reports on activities to promote reflection and learning about partnerships e.g. in CRP annual reports and workshop reports from Centers and CRPs and published documents of ISPC
- Published theories of partnership where relevant

### *Review of literature and data on operation of and delivery through partnerships*

The evaluation reviewed available literature and data on:

- Center expenditures associated with partnerships
- Joint outputs reported in annual reports
- Trends in the number of peer reviewed publications by CGIAR staff together with partners and/or the diversity of partner co-authors in 2011-2012 compared to 2015-2016. Analysis included only journal articles in Thomson Reuters Web of Science journal database. 2012 and 2015 articles were randomly sampled, with a total of 1276 articles (approximately 50% of all articles published) in proportion of publishing volume of CRPs (CRPs and Centers in 2012). Meta data on author numbers, order and affiliations, and citations were recorded from Web of Science. Co-authors were classified as Northern (OECD countries – universities and all other partners) and Southern (developing countries – universities and all other partners without differentiating advanced institutes). Note was made of private sector and development agency co-authors.

### *Interviews with key informants*

Key informants, which include CGIAR and non CGIAR stakeholder were a very important source of primary data. Three main stakeholder groups were identified (CGIAR stakeholders, donors and external partners) and for each group a set of core questions was developed in a semi-structured interview guideline format, based on the evaluation key questions and sub-questions. Interviews lasting from 40 minutes to an hour and a half were conducted face to face, by phone or by Skype. Most of the interviews were conducted by team members, with the exception of seven with donor representative conducted by IEA. Typed records of the interviews were coded and analysed with QDA Miner Lite software.

The following summarises the number of interviews conducted with each group of stakeholders. Additional interviews were conducted in connection with case studies (see below). The list of persons interviewed can be found in Annex C.

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**Table 1: Interviews by stakeholder type**

	Inception phase	Inquiry phase: core interviews	Inquiry phase: case studies	Total
CGIAR: Center, CRP and system managers	14	30	19	63
Donor representatives	1	19	1	21
External partner representatives	4	28	31	63
<b>Total</b>	<b>19</b>	<b>77</b>	<b>51</b>	<b>147</b>

### *Electronic survey of CGIAR researchers*

An electronic survey was conducted of Flagship Project (FP) leaders. This was to elicit perspectives from people working from day to day with partners and in field situations, whose perspective might be different from those of CRP leaders. A questionnaire with four open questions was sent to 145 FP leaders and a response was received from 53 (36 percent) of them.

### *Case studies*

Six main case studies were conducted, based on three types of partnership, and their reports are reproduced in Annex n. They focussed on the relationships between Centers/CRPs and their external partners. They were selected to add value to the evaluation by adding richness and detail and providing opportunities to explore the evolution of partnerships over time.

The case studies were as follows:

- A. Engagement in multi-stakeholder partnerships to address complex global challenges
  - a. Global Agenda for Sustainable Livestock
  - b. Global Alliance for Climate-Smart Agriculture (GACSA)
- B. Scaling of technology through partnership
  - a. Partnerships to scale up Allantoca in Africa
  - b. Scaling of Stress Tolerant Rice Variety (strv) technology through partnerships
- C. Partnering for better upstream research
  - a. Seeds of Discovery (SeeD)
  - b. Partnerships for research on metabolomics in RTB

Partnership types B and C were chosen because they related to specific expectations of the reform, namely that more partnerships would be developed for upstream research and for scaling. Type A was chosen because literature review during the inception period had revealed the increasing importance of engagement with global multi-stakeholder partnerships and also the potential challenges inherent in such partnerships.

Each team member took responsibility for the two case studies associated with one type of partnership. Case studies were reported according to a common template but the evidence gathering for each was case-specific.

Literature and websites were reviewed. An initial consultation was held with the CRP or Center manager most closely associated with the case study. The case study leader then drew up a list

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of interviewees and designed purpose-made questions. Interviews were conducted by Skype or phone, between seven and 16 for each case study. Observation was carried out at a GACSA strategy meeting held in Rome.

In addition to the six main case studies, a short note was prepared by a member of the RG on the Biosciences eastern and central Africa (BECA) hub, located at ILRI in Nairobi. This is an example of a partnership developed specifically to provide biosciences capacity development.

## **ANNEX B. Evaluation team and resource group**

### *Evaluation team profiles*

#### **Anni McLeod (team leader)**

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Anni is a livestock economist with extensive experience in research strategy, planning and management. She has a PhD on Modelling the epidemiology of infectious animal diseases from The University of Reading, UK. Anni has worked for 30 years with governments, international agencies and research systems worldwide. For seven years Anni was the Senior Livestock Policy Officer in the Animal Production and Health Division of FAO, she also contributed to FAO's culture change initiative and to the strategy for the gender programme. For four years she was based at the Kenya Agricultural Research Institute as leader of the socio-economics skills group for a DFID-funded project. Recently Anni was the team leader in the IEA commissioned evaluation of the CGIAR Research Program on Livestock and Fish.

#### **Julio Berdegué Sancristan**

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Julio was Principal Researcher at Rimisp-Latin American Center for Rural Development, Santiago, Chile at the time of the evaluation. Since April 2017 he is the Assistant Director-General/Regional Representative for Latin America at FAO. He holds a Ph.D. in Social Science from Wageningen University, The Netherlands. Julio has published extensively on different aspects of rural development, including on territorial development, rural non-farm employment, the role of small and medium cities in rural development, and the changing structures of agri-food and rural markets. He has worked as a consultant for international bodies such as the World Bank, the International Fund for Agricultural Development (IFAD), the Inter-American Development Bank, FAO; research and higher education establishments in the US and Europe; and for Latin American governments and small farmer economic organisations. He is a member of the Editorial Board of the Agricultural Economics Journal.

#### **Paul Teng**

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Paul is Professor and Dean of the Graduate Studies and Professional Learning at the National Institute of Education, Nanyang Technological University in Singapore. He has a PhD on Agricultural microbiology/System research from University of Canterbury in New Zealand. In early 2000 he was DDG of Reach at the World Fish Center and previous to that worked for Monsanto as Asia-Pacific Vice President on Public Affairs and Asia-Pacific Director on Science & Technology. In 1990s he was at IRRI as Program leader on cross-ecosystems research. He has participated in several boards, advisory bodies and reviews on S&T. Recently Paul was a team member in the IEA commissioned evaluation of the CGIAR Research Program on Global Rice Science Partnership (GRiSP).

### *Resource group profiles*

#### **Javier Betrán**

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Javier has a PhD in plant breeding. Javier is currently the Head of the Maize Breeding Europe, Africa and Middle East for Syngenta. He is an expert in Plant breeding, quantitative genetics, agronomy, statistics, biotechnology, environment, abiotic and biotic stresses, and people development. Javier has extensive international experience in maize breeding. He has a large publication record on maize breeding, and was a postdoctoral research and breeder at CIMMYT in 1990s. He has collaborated with international organizations like the Rockefeller Foundation as well as CGIAR centers. Javier was an evaluation team member in the evaluation of the CRP on MAIZE (2015).

#### **Julian Gonsalves**

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Julian is an experienced facilitator, manager, action researcher and advocate for over 35 years in the areas of international agriculture and rural development. Julian served for three years on the CGIAR's NGO Committee, which was set up in 1995. He is a proponent of participatory approaches. He has worked in more than 35 countries since his career in 1980. He has a PhD in extension education and international agriculture from Cornell University, Ithaca, New York, which he pursued under a grant from the Rockefeller Foundation. He has a Masters Degree from Michigan State University where he specialised in knowledge utilization strategies. He has a BS degree in Agronomy from the University of Agricultural Sciences in Bangalore, India.

#### **Selcuk Ozgediz**

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Selcuk spent most of his working life at the World Bank. He worked for 27 years with the CGIAR, as part of the Fund Office (former Secreteriat), based in the World Bank. As a final task for the CGIAR he prepared an institutional history of this global research system, which was published by the CGIAR Fund Office in 2012. Selcuk was also part of the Working Group 2 on Partnerships during the Reform Process of the CGIAR. In recent years Selcuk has served as consultant to several other World Bank units, including the World Bank Inspection Panel, Eastern Europe and Central Asia and Middle East and North Africa. He has a PhD in Political Science from Michigan State University.

#### **Ed Rege**

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Ed is an animal scientist with a strong background in animal genetics and breeding. He has a combined teaching and research experience of over 30 years, and has authored or co-authored some 225 publications, including 178 peer-reviewed scientific articles and technical papers in conference proceedings, with emphasis on genetic improvement of livestock and livestock management. He is also a trained and experienced organizational development expert, skills which he has effectively used in supporting his work as a senior manager in ILRI (International Livestock Research Institute) and its partners, in project development and implementation processes. At ILRI, he was the initiator and Head of Animal Genetic Resources program and

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coordinated global activities on characterization and conservation of indigenous animal genetic resources of developing countries for over 12 years. Before starting PICO-Eastern Africa, he was the Director of the Biotechnology Theme of ILRI, the pro-gram content of which included the development of vaccines and diagnostic tools for tropical livestock diseases, gene discovery and delivery of genetic change, and characterization and conservation of animal genetic resources.

### **Jim Sumberg**

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Jim is a Research Fellow at the Knowledge, Technology and Society Team, Institute of Development Studies (IDS) at University of Sussex. He is an agriculturalist by training, with PhD from Cornell University on Plant Breeding and Animal Nutrition, and has over 25 years of experience of research on small-scale agriculture, natural resource management, agricultural research policy, and food and rural development in tropical regions, with a particular emphasis on sub-Saharan Africa. He has participated in evaluation of agriculture and natural resource management projects. His past work experience includes, among other, The New Economics Foundation in London, University of East Anglia (Senior Lecturer in NRM) and CARE, and brief periods in WARDA and CIAT. He has published in change in agricultural systems, innovation and policy. Jim was the evaluation co-team leader of the evaluation of the CRP on Aquatic, Agricultural Systems (2015).



## ANNEX C. List of people interviewed

Surname, Name	Position	ORG/CRP	Category
Abubakar, Yusuf	Executive Secretary	Agricultural Research Council of Nigeria	Partner
Aparicio, Roberto	Rural Development, Food Security, Nutrition Unit at EuropeAid	EC	Donor
Arnesen, Odd Eirik	Senior Adviser, Department for Climate, Energy and Environment	Norad	Donor
Atta-Krah, Kwezi	former CRP Director	CRP Humidtropics	CGIAR
Austin, Nick	Interim Executive Director of the CGIAR System Organization	CGIAR	Donor
Baccioni, Enrico	Initiative Manager – Healthy diets from sustainable food systems	Bioversity	CGIAR
Baenziger, Marianne	DDG	CIMMYT	CGIAR
Bardhan Roy, Subir Kumar	Advisor, Krishi Rashayan,	West Bengal (Private seed company)	Partner
Barker, Ian	Barker, Ian	Syngenta Foundation	Partner
Becerra, Augusto	Program Leader	CIAT	CGIAR
Bernhardt, Michel	Advisor for Technology Transfer	GIZ	Partner
Bertram, Rob	Chief Scientist, Bureau for Food Security	USAID	Donor
Bonierbale, Meredith	Head of Breeding and Genetics	CIP	CGIAR
Boubakary, Barry	Chargé de Programme Education, Coordonnateur du PREPP (Programme Régional d'Education) et formation des Populations Pastorales en zones transfrontalières)	APESS	Partner
Bouman, Bas	CRP DIRECTOR	CRP GRiSP	CGIAR
Brajcich, Pedro	Former DG	INIFAP	Partner
Braun, Hans	Director, Wheat Global Program and CRP WHEAT	CRP WHEAT	CGIAR
Brooks, Karen	CRP Director	PIM	CGIAR
Bruce-Oliver, Samuel	Director of Strategic Partnerships	AfricaRice	CGIAR
Buckler, Edward	Adjunct Professor, Buckler Lab for Maize Genetics and Diversity	Cornell University	Partner
Bulte, Erwin	Professor of Development economics, Chair of Development Economics Group (DEC)	Wageningen Agricultural University	Partner
Byerlee, Derek	Independent consultant	n/a	Partner
Caccamo, Mario	Head of Crop Bioinformatics	National Institute of Agricultural Botany, CAMBRIDGE UK	Partner
Cackler, Mark	Manager, Agriculture and Food Security	World Bank	Partner
Campbell, Bruce	CRP Director	CRP CCAFS	CGIAR

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Carberry, Peter	DDG for Research	ICRISAT	CGIAR
Carsan, Sammy	Associate scientist	ICRAF	CGIAR
Cavalieri, Tony	Senior Program Officer, Agricultural Development	Bill and Melinda Gates Foundation	Donor
Charron, Dominique	Director of IDRC's Agriculture and Environment program	IDRC	Donor
China, Richard	Director, Strategic Partnerships and External Engagement	Bioversity	CGIAR
Clayton, Andrew	Social Development Advisor	DFID	Donor
Colmey, John	Director, Communications, Outreach and Engagement	CIFOR	CGIAR
D'Hont, Angélique	Genomic researcher	CIRAD	Partner
Dashiell, Kenton	DDG for Partnerships and Capacity Development	IITA	CGIAR
Derksen, Tom	Managing Director Agriculture	SNV	Partner
Dijkman, Jeroen	Senior Agricultural Research Officer	ISPC	CGIAR
Diks, Rob	Senior Technology Manager	Unilever, Netherlands	Partner
Dinesh, Dhanush	Global Policy Engagement Manager	CRP CCAFS	CGIAR
Dixon, John	PRINCIPAL ADVISOR	ACIAR	Donor
Dongxin, Feng	Director General of Department of International Cooperation	Chinese Academy of Agricultural Sciences	Donor
Downing, Bill	Consultant, former Head of Partnerships and Operations	CRP AAS	CGIAR
Dugan, Patrick	DDG/R	WorldFish	CGIAR
Fabre, Pierre	n/a	EC	Donor
Fraser, Paul	Professor, School of Biological Sciences	Royal Holloway	Partner
Garay, Carlos	Seed Manager	CIMMYT	CGIAR
Gaur, Vinod Kumar	Chairperson and Managing Director, National Seed Corporation (NSC)	PUSA, NEW DELHI	Partner
Gautam, Mukesh	Former Managing Director	Uttar Pradesh State Seed Corp.	Partner
Gill Maggie	Chair	ISPC	CGIAR
Gonzalez, Santos	n/a	PIONEER	Partner
Guha, Jyotirmoy	n/a	GMS Agritech Pvt. Ltd., KOLKATA, WEST BENGAL	Partner
Hearne, Sarah	Seed Maize Lead	CIMMYT	CGIAR
Hernandez Ramirez , Roberto	Co Chair	Latin American Conservation Council	Partner
Hillbur, Ylva	DDG	IITA	CGIAR
Holderness, Mark	Executive Secretary	GFAR	CGIAR
Howlett, David	Climate Change and Livelihoods Adviser	DFID	Partner
Hubert, Bernard	President	Agropolis International/France	Donor
Hughes, Karl	Head of Monitoring, Evaluation and Impact Assessment (MEIA) Unit.	ICRAF	CGIAR

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Hughes, Terry	Distinguished Professor - ARC Australian Laureate Fellow. ARC Centre of Excellence for Coral Reef Studies	James Cook University	Partner
Ismail, Abdelbagi	Director	STRASA PROJECT, IRRI	CGIAR
Jamnadass, Ramni	Genetic Resources Specialist	ICRAF	CGIAR
Jayne, Thomas	University Foundation Professor	Agricultural, Food, and Resource Economics, Michigan State University	Partner Partner
Jeffries, Peter	Chief Executive	GALVmed	
Kamau, Felix	Africa Area Director	The Nature Conservancy	Partner
Kilian, Andrzej	Director	Diversity Arrays Technology	Partner
Kommerell, Victor	Program Manager	CRP WHEAT	CGIAR
Koyama, Osamu	Research Strategy Office	JIRCAS	Partner
Kroma, Margaret	ADG Patnerships & Impact	ICRAF	CGIAR
Kulakow, Peter	Head, Cassava Breeding Unit	IITA	CGIAR
Linton, John	Commercial Director	Natural Resources Institute (NRI), UK	Partner
Magnusson, Ulf	Professor, Department of Clinical Sciences	SLU	Partner
Mathur, Shantanu	Manager, UN RBA Partenrships	IFAD	Partner
Matteoli, Federica	Project Manager, NRCD	FAO	Partner
McDermott, John	CRP Director	CRP AHNH	CGIAR
Mitchell, Lesley	Chief Policy Advisor and Head of Policy, Humane Sustainable Agriculture	World Animal Protection	Partner
Narvaez, Jorge	Vice Minister	Ministry of Agriculture of Mexico (SAGARPA)	Donor
Nasi, Robert	CRP Director	CRP FTA	CGIAR
Ndangalasi, Henry J.	Professor	Botany Dept., University of Dar EsSalaam	Partner
Neelam, Ganesh	Director	TATA TRUST, INDIA	Partner
Nichterlein, Karin	Agricultural Research Officer	FAO	Partner
Ojukwu, Chiji	Director of the Agriculture and Agro-Industry Department (OSAN)	AfDB	Donor
Ortiz, Cynthia	Postgraduate Student	CIMMYT	CGIAR
Ortiz, Oscar	DDG Research	CIP	CGIAR
Osawa Martinez, Estela	n/a	University of Guadalajara	Partner
Perry, Brian	Independent consultant	Independent consultant	Partner
Petithuguenin, Philippe	Deputy director general for Research and Strategy, in charge of international partnership	CIRAD	Partner
Pineiro, Martin	Director	International Centre for Trade and Sustainable	Partner

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		Development	
Pixley, Kevin	Director, Genetics Resources Program and Seeds of Discovery Program	CIMMYT	CGIAR
Qaim, Matin	Professor of International Food Economics and Rural Development	Georg-August-University of Goettingen	Partner
Quinn, Victoria	Senior Vice President of Programs	Helen Keller International	Partner
Rabbi, Ismaeil	Genomic resources Scientist	IITA	CGIAR
Rabbinge, Rudi	Professor Emeritus in Sustainable Development and Food Security	Wageningen Agricultural University	Partner
Randolph, Tom	CRP Director	CRP L&F	CGIAR
Restrepo, Juan Lucas	Chair	GFAR	CGIAR
Reyes, Ernesto	Livestock manager, international institutions, coordinator of sheep network	Agribenchmark	Partner
Rijsberman, Frank	CEO	CGIAR	CGIAR
Robinson, Mike	Chief Scientist	Syngenta Foundation	Partner
Rodericks, Andrea	AREA Director	CARE	Partner
Roux, Nicolas	Theme Leader, Genetic Resources Conservation and Use	Bioversity	CGIAR
Rutatina, Fidelis	Director	NOVEL TANZANIA	Partner
Salinas, Gilberto	Deputy Leader, Seeds of Discovery	CIMMYT	CGIAR
Sandhu, J.S.	DDG CROPS	ICAR, Delhi, INDIA	Partner
Schultz, Paul-Theodor	Official delegate to L&F PPMC, Senior Adviser on Agriculture	GIZ	Partner
Shaw, Paul	Database Developer / Computational Biologist	James Hutton Institute	Partner
Sibanda, Lindiwe	Chief Executive Officer and Head of Mission	FANRPAN	Partner
Singh, R.K.	ED	NEFORD , Uttar Pradesh	Partner
Singh, Sukhwinder	Wheat Lead, Seed Initiative at CIMMYT	CIMMYT	CGIAR
Singh, Uma Shaker	Director	STRASA South Asia, INDIA	CGIAR
Singh, Vaibhav Kumar	Wheat Pathologist	Indian Agricultural Research Institute	Partner
Sivasankar, Shoba	CRP Director	CRP Grain Legumes and Dryland Cereals	CGIAR
Smart, Rebecca	Program Officer for Global Affairs	Government of Canada	Donor
Steinfeld, Henning	Head, AGAL	FAO	Partner
Tarawali, Shirley	Assistant Director General, Secretary to the ILRI Board of Trustees	ILRI	CGIAR
Thiele, Graham,	CRP Director	CRP RTB	CGIAR
Thönnissen, Carmen	Programme Officer for Int. Agr. Research	Swiss Agency for Development and Cooperation	Donor
Tolentino, Bruce	DDG/PARTNERSHIPS	IRRI	CGIAR
Tollervey, Alan	Head of Agriculture Research	DFID	Donor
Torquebiau, Emmanuel	Climate Change Officer	CIRAD	Partner

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Tuan, Nguyen	Chief of Division for Science, Technology and Environment	Institute of Water Resources Planning (IWRP), VIETNAM	Partner
van Gilst, Daniel	Senior Adviser, Department for Climate, Energy and Environment, Section for Environment and Food Security	Norad	Donor
Van Ijssel, Wynand	Policy Advisor, Dept. for Sustainable Economic Development	Ministry of Foreign Affairs, Netherlands	Donor
Van Rheenen, Teunis	Head of Partnerships/Business Development	IFPRI	CGIAR
Van der Blik, Julie	Director, Partnerships and Knowledge Management	IWMI	CGIAR
Variar, Mukund	FORMER OFFICER-IN-CHARGE, UPLAND RICE RESEARCH STATION, HAZARIGH.	ICAR, JHARKAND	Partner
Vernier, Phillipe	Direction Générale Déléguée à la Recherche et à la Stratégie	CIRAD	Partner
Verreth, Johan	Professor, Department of Animal Sciences. Subdivision, Aquaculture and Fisheries	Wageningen Agricultural University	Partner
Victor, Michael	Knowledge Management and Communication Coordinator	CRP WLE	CGIAR
Vidal, Alain	Director of Strategic Partnerships	CGIAR	CGIAR
Villarreal, Marcela	Director of FAO's Office for Office for Partnerships, Advocacy and Capacity Development	FAO	Partner
Visscher, Steve	Deputy Chief Executive	The Biotechnology and Biological Sciences Research Council	Partner
Voegele, Juergen	Chair	CGIAR System Council	Donor
Waage, Jeff	Chair	Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH)	Partner
Wadsworth, Jonathan	Executive Secretary	Fund Council	Donor
Wang, Ren	Assistant Director-General of the Agriculture and Consumer Protection Department	FAO	Partner
Watson, Dave	Program Manager	MAIZE	CGIAR
Zandstra, Andre	Director, Partnerships and Communications	CIAT	CGIAR
Zavala, Francisco	Professor	Universidad de Nuevo Leon	Partner

## ANNEX D. Partnership landscape

The following are results of analysis of the evaluation’s survey of critical partnerships. All Centers and CRPs were requested to provide information on up to 15 of the partnerships they considered most critical to their operation. 13 out of 15 CRPs responded. Three Centers provided information about critical partnerships additional to those for the CRPs they lead.

Total number of partnerships provided:

CRP/Center	
A4NH	23
CCAFS	8
Dryland Cereals	12
Dryland Systems	8
FTA	17
Grain Legumes	34
L&F	21
MAIZE	17
PIM	10
RICE	9
RTB	11
WHEAT	8
WLE	10
CENTERS	
AfricaRice	15)
Bioversity	5
CIMMYT	4
IFPRI	11
IWMI	4
<b>TOTAL</b>	<b>212</b>

*Note: the information from AfricaRice was received after the overall analysis was completed and therefore the 15 partnerships are not included in the analysis below. The partnerships have however been looked at in a qualitative way.*

*Missing: Aquatic Agricultural Systems in phase 2: FISH), Humidtropics; most Centers*

Partnerships which were included by more than one CRP/center:

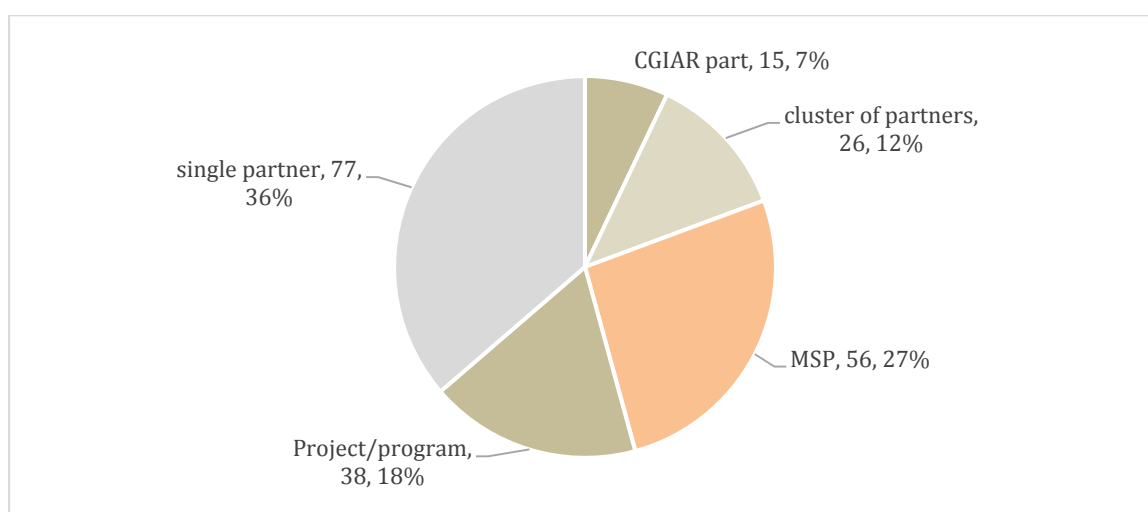
Partnership	Provided by	Comment
Helen Keller International (HKI)	A4NH	Included also by IFPRI for A4NH
	IFPRI	
Indian Council of Agricultural Research	Dryland Cereals	Important partner for work in India
	Grain Legumes	
	IWMI for WLE and	



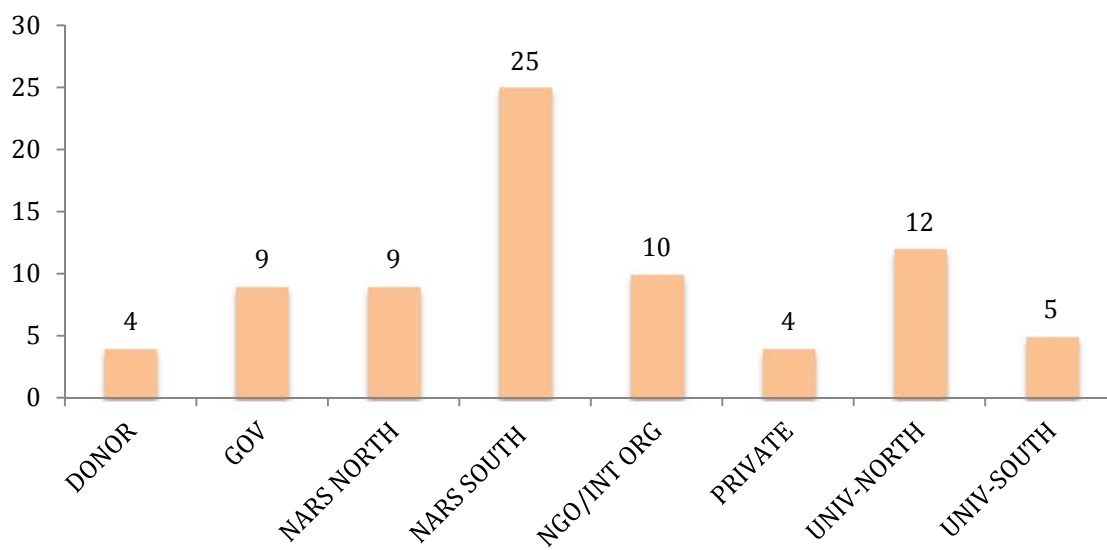
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	CCAFS	
Harvest Plus	A4NH	MAIZE work with Harvest Plus focuses on Zambia
	MAIZE	
BMZ/GIZ Scaling Out Partnership with 7 CRPs	MAIZE	BMZ funded position (50/50)
	WHEAT	
Royal Tropical Institute (KIT)	L&F	L&F: on issues of gender and youth
	MAIZE	MAIZE partnership is broader (innovation systems, gender)
East Africa Dairy Development Project	CCAFS	Started later for CCAFS, CCAFS mentioned GHG emission reduction as one objective,
	L&F	

### Overview of partnerships by broad type

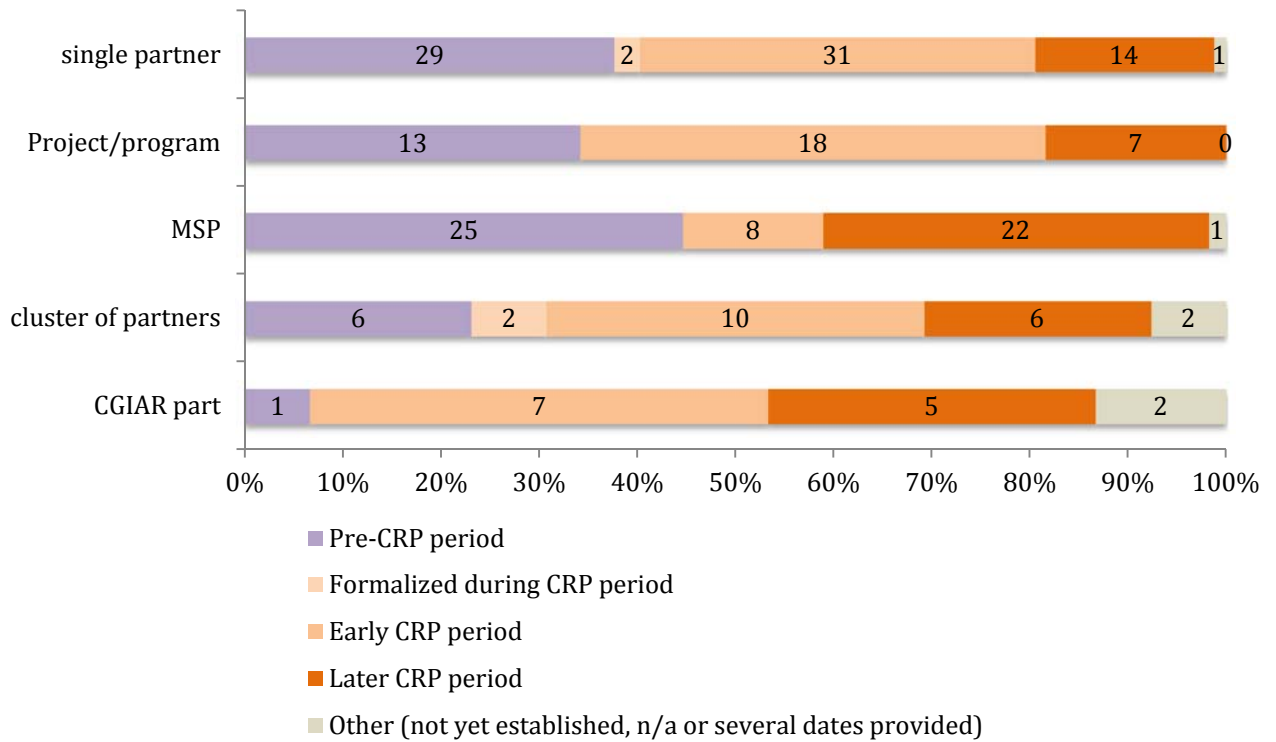


### Types of single partners (total of 77)



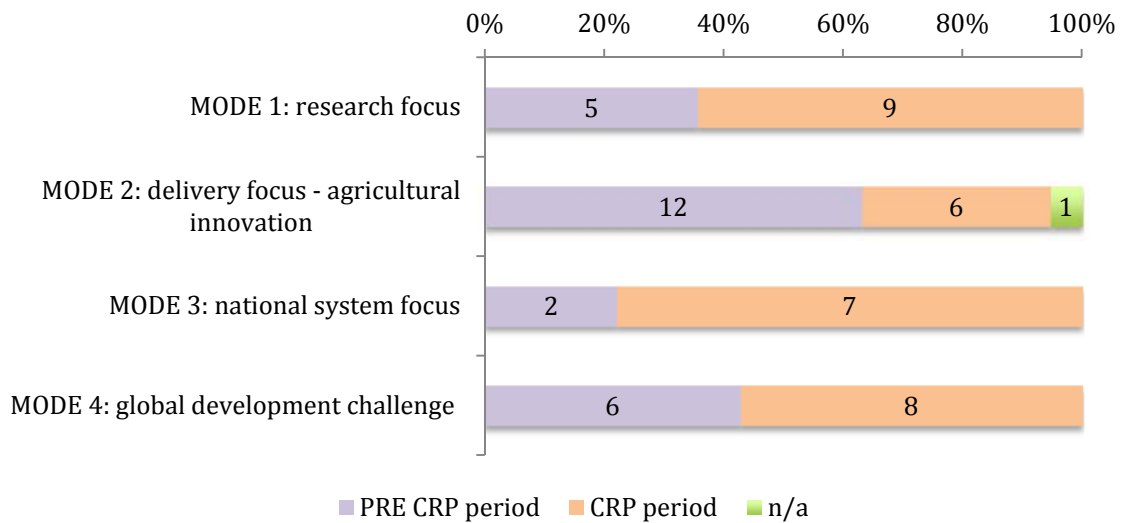
## Evaluation of partnerships in CGIAR – ANNEXES TO FINAL REPORT

### When the partnership was initiated:



Numbers in bars = the numbers of partnerships.

### Multi Stakeholder Platforms by time established



Numbers in bars = the numbers of partnerships.

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Modes according to ISPC Strategic Study *of good practice in AR4D partnership* (2015) page 6:

**- Mode 1: Agricultural research partnerships.**

Agricultural research organizations collaborate to develop new knowledge on discreet technical dimensions of prioritized problems and opportunities. This usually involves collaboration between public research organisations, including universities. Priorities framed by public policy imperatives or by private industry sponsored funding.

**- Mode 2: Agricultural innovation delivery partnerships.**

Agricultural research organizations collaborate in agricultural production and agribusiness innovation that delivers new products and services that create value for farmers and companies. Partnerships, platforms and alliances are used as a mechanism to organize collaboration among public agricultural research organisations and the private sector, NGOs, and farmers groups. Priorities framed by the convergence of technology push from research, demand pull from farmers and markets, and by public policy imperatives.

**- Mode 3: National Agri-food systems innovation partnerships.**

Agricultural research organizations participate in the efforts of public policy and private sector to catalyse innovation in agri-food systems that creates social, economic, and environmental value in line with national development plans. Inter-linked farm-to-policy multi-stakeholder processes and partnerships used to organize collaboration and participation of relevant stakeholders at multiple levels. Priorities framed by negotiation between public and private sectors and articulated in national development plans.

**- Mode 4: Global development innovation partnerships.**

Agricultural research organizations participate in efforts of national and global public and private sector stakeholders to catalyse innovation in economic and social systems to achieve social, economic, and environmental development targets set by the SDG's. Global architectures of MSP platforms used create coherence between global and local agendas and implementation strategies. Priorities framed by global negotiation and agreement in the SDG's.

## ANNEX E. Publication analysis

The analysis of CGIAR scientific publications included only journal articles in Thomson Reuters Web of Science journal database.

2012 and 2015 articles were randomly sampled, taking a total of about 50 percent of all articles published in proportion of publishing volume of CRPs. For 2012, records of Centers were used to complement those of the CRPs, because reporting of publications by CRP was not systematic. The total sample was 1276 articles.

Meta data on author numbers, order and affiliations, and citations were recorded from Web of Science database. Co-authors were classified as Northern (OECD countries – universities and all other partners) and Southern (developing countries – universities and all other partners without differentiating advanced institutes). Note was made of private sector and development agency co-authors. Statistical analysis, using Chi-square test, was done for establishing whether some trends were significant.

This report presents a summary of the findings of the analysis, followed by presentation of the main findings regarding CGIAR publishing in section II. and more details findings about organizations that CGIAR has published with in section III.

### 1. SUMMARY

- CGIAR researchers publish mostly with partners (nearly 90 percent in 2015)
- Publishing with Northern partner only has increased from 2012 to 2015 by about 10 percent and is now close to 40 percent of all articles. Publishing with Southern partners only has decreased by nearly 10 percent and is now less than 20 percent of all articles. This change is statistically significant.
- There has been no change in articles co-authored by Centers together, which is about 14 percent of all articles.
- CGIAR researchers are middle authors in about 35 percent of articles looking across different partnerships.
- CGIAR researcher is a corresponding author in about 40 percent of articles.
- Particularly in articles where there are authors both from North and South, CGIAR is a middle author (in 2012 >50%, 2015 <50%). Does this result challenge the hypothesis that CGIAR is a catalytic partner that brings North and South together?
- Articles written in partnership where Northern partners are involved have been cited more than articles that have only CGIAR authors or articles with only Southern partners (the lowest citations). There could be these explanations:
  - the topics published with Northern partners are of more interest to international research community;
  - the articles written together or by Northern authors are targeted on higher ranking journals (as was observed).
- Articles written in partnership where Northern partners are involved are more often targeted at well-ranking journals and successful in being published in these journals than articles authored by CGIAR alone or in partnership with Southern partners only. The trend is towards higher ranking journals in all kinds of authorships. There could be the following explanations:

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- the topics and therefore journal targeting differ; articles by CGIAR only or with Southern partners may be of higher local/regional relevance. However North-South partnerships also show targeting of higher ranking journals;
- the articles written in partnership with Northern authors are of higher quality, and thus more successful in getting to well-ranking journals.

### 2. ANALYSIS OF PUBLICATIONS

#### GENERAL PICTURE

##### Overview of results

	2012		2015		Change
	#	%	#	%	%
Total sample	459		817		
Authorship includes partners	387	84.3	712	87.1	2.8
Only CGIAR	72	15.7	105	12.9	-2.8
CGIAR single Center	68	14.8	97	11.9	-2.9
Of those, single author	8	11.8	11	11.3	-0.4
More than 1 Center	63	13.7	113	13.8	0.1

- Vast majority of research publishing is done with partners.
- There is no change in authorship involving more than one Center.

##### Types of co-authorships

	2012	2015	Change
	%	%	%
Northern partners only	27.0	36.6	9.6
Southern partners only	29.8	19.7	-10.1
North and South	25.5	30.1	4.6

- Proportion of co-publishing with Northern partners only has increased by nearly 10 percent of all articles; publishing with Southern co-authors only has gone down by 10 percent. These changes are statistically significant.
- Publishing together with private sector remains limited.

##### CGIAR's role in co-publishing

Analysis of lead authorship includes all articles. Analysis of middle authorship includes only articles with more than two authors.

Joint authorship with partners	2012		2015	
	#	%	#	%
Number of articles (% of total)	387	84.3	712	87.1
CGIAR 1st author	127	32.8	197	27.7
Joint 1st author	35	9.0	125	17.6
Corresponding author	158	<b>40.8</b>	270	<b>37.9</b>

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- CGIAR author has a lead role (1<sup>st</sup> and/or corresponding author) in less than half of publications; trend is down.

Partnership - more than 2 authors	2012		2015	
	#	%	#	%
Number of articles (% of total)	366	79.7	671	82.1
Middle author (not 1st, last or corresponding)	129	35.2	241	35.9

- Large proportion (about 35 percentage) of articles where CGIAR researchers do not seem to pay a major role but tap into research written by others and likely designed by others. The analysis did not observe a practice of presenting authors in alphabetic order.

### AUTHORSHIP IN DIFFERENT KINDS OF PARTNERSHIPS

Partnership with Northern partner only	2012		2015		Change %
	#	%	#	%	
Number of articles (all)	124		299		
CGIAR 1st author	43	34.7	97	32.4	-2.2
Joint 1st author	10	8.1	56	<b>18.7</b>	10.7
Corresponding author	46	<b>37.1</b>	123	<b>41.1</b>	4.0
1st or joint but not corresponding	0		36	12.0	12.0

- Increase in joint authorship as first author
- Increase in cases where first author is not the corresponding author.
- Given different practices in different disciplines, interpretation of these changes is not clear.

Partnership with Northern partner only	2012		2015		Change %
	#	%	#	%	
Number of articles (>2 authors)	110		270		9.1
Last or joint last only	22	20.0	44	16.3	-3.7
Middle author (not 1st, last or corresponding)	53	48.2	83	<b>30.7</b>	-17.4

- In articles with >2 authors CGIAR is middle author less often (still 30% of articles). This seems to be due to increased joint authorship and corresponding authorship.

Partnership with Southern partner only	2012		2015		Change %
	#	%	#	%	
Number of articles (all)	137		161		
CGIAR 1st author	55	44.4	53	32.9	-11.4
Joint 1st author	15	12.1	21	13.0	0.9
Corresponding author	72	<b>58.1</b>	72	<b>44.7</b>	-13.3

- CGIAR 1<sup>st</sup> authorship and corresponding authorship decreased. Changes were not significant.



## Evaluation of partnerships in CGIAR – ANNEXES TO FINAL REPORT

Partnership with Southern partner only	2012		2015		Change
	#	%	#	%	%
Number of articles (>2 authors)	131		150		
Last or joint last only	29	22.1	33	22.0	
Middle author (not 1st, last or corresp.)	24	18.3	40	<b>26.7</b>	8.3

- In articles with >2 authors, CGIAR is middle author more often due to reduced role as 1<sup>st</sup> or corresponding author. Change is not significant.

Partnership involving North and South co-authors	2012		2015		Change
	#	%	#	%	%
Number of articles (all articles have > 2 authors)	117		245		
CGIAR 1st author	22	18.8	43	17.6	
Joint 1st author	10	8.5	46	18.8	10.2
Corresponding author	34	29.1	71	29.0	
1st/joint 1st, not corresponding	5	4.3	29	11.8	7.6
Last only	8	6.8	21	8.6	
Joint last author	2	1.7	11	4.5	2.8
Middle author (not 1st, last or corresp.)	68	<b>58.1</b>	113	<b>46.1</b>	-12.0

- Joint 1<sup>st</sup> authorship has increased significantly and subsequently the “middle” authorship has diminished from 2012 to 2015.
- CGIAR is a middle author in nearly half of all the articles. It suggests that CGIAR doesn’t have a leading role in designing or writing the research when Northern and Southern authors are in the partnership. This is significantly different from CGIAR co-authoring with Southern partners only where CGIAR has more of a leading role. With Northern authors only, CGIAR’s position as middle author was less in 2015 than in 2012.

### EFFECT OF PARTNERSHIP IN CITATIONS

2012 Citations	CGIAR only		Northern partners only		Northern partners involved		Southern partners only	
	#	%	#	%	#	%	#	%
Number of articles	72		124		240		137	
Low 0-9	48	66.7	52	41.9	121	50.5	107	78.1
High >10	24	33.3	72	58.1	119	49.6	30	21.9

- For 2012, citations can be expected by now – some 4 years later.

## Evaluation of partnerships in CGIAR – ANNEXES TO FINAL REPORT

- Involvement of Northern authors in the partnership led to significantly more citations than when CGIAR was co-authoring with Southern partners only. Comparing articles with CGIAR authors alone with those where only Northern partners were co-authors, the latter articles had significantly more often citations >10.

2015 Citations	CGIAR only		Northern partners only		Northern partners involved		Southern partners only	
	#	%	#	%	#	%	#	%
Number of articles	105		299		544		161	
0	36	34.3	71	23.7	136	25.0	69	42.9
Med 1-5	58	55.2	186	62.0	327	60.1	74	46.0
Fast growing >5	11	10.5	42	14.0	81	14.9	18	11.2
Any citations		65.7		76.0		75.0		57.1

- For 2015, citations were divided into 3 categories where the highest. >5, is called fast growing citations. It is still early to observe citation fully.
- Involvement of Northern authors in the partnership led to significantly more citations than when CGIAR was co-authoring with Southern partners only.

### EFFECT OF PARTNERSHIP IN TARGETING AND SUCCEEDING IN PUBLISHING IN WELL-RANKED JOURNALS

#### 2012

Deviance from Average Journal Category IF	CGIAR only		Northern partners only		Northern partners involved		Southern partners only	
	#	%	#	%	#	%	#	%
Number of articles	67		115		123		107	
% ≤average IF	65.7		57.4		79.7		62.6	
% >average IF	34.3		42.6		20.3		37.4	

#### 2015

Deviance from average Journal Category IF	CGIAR only		Northern partners only		Northern partners involved		Southern partners only	
	#	%	#	%	#	%	#	%
Number of articles	102		293		158		242	
% ≤average IF	63.7		51.9		75.3		55.8	
% >average IF	36.3		48.1		24.7		44.2	

- All articles for which there was IF information were included in this analysis.
- In both years, the trends were similar. Articles with Northern co-authors only or with involvement of Northern co-authors were published more often in journals ranking above average in their respective Web of Science category than when authorships was CGIAR only or with Southern partners only.

### 3. ANALYSIS OF CO-AUTHORS

#### Overview

	2012	%	2015	%
TOTAL NUMBER OF AUTHORS	2063		5958	
of which CGIAR	571	28%	2111	35%
Of which EXTERNAL	1492	72%	3847	65%

Number of publications	459	817
Average Number of authors per publication	4.48	7.30

#### Countries with highest number of partner institutions involved in co-publishing

2012	# of Inst.	2015	# of Inst.
USA	85	USA	97
India	52	India	77
UK	45	UK	56
China	35	Germany	43
France	28	Australia	42
Australia	26	China	38
Kenya	16	France	32
Japan	15	Netherlands	25
Indonesia	13	Kenya	22
Canada	13	Japan	20
Netherlands	12	Vietnam	19
Belgium	11	Indonesia	18
Germany	11	South Africa	18
Mexico	11	Ethiopia	14
Uganda	9	Pakistan	14
Spain	9	Bangladesh	12
Turkey	9	Belgium	12
Nigeria	8	Spain	11
		Canada	11
		Mexico	9

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### Institutions with highest number of co-authored articles

Institution	Articles 2012	Institution	Articles 2015
CAAS, China	30	Wageningen Univ.	51
Wageningen Univ.	14	CSIRO, Australia	24
Univ. Nairobi	13	USDA	21
Univ. California Davis	12	Univ. Queensland	20
CSIRO, Australia	11	CIRAD, France	20
CIRAD, France	10	Chinese Academy of Sciences	17
INRA, France	10	Bonn Univ.	17
Makerere Univ	10	Cornell Univ.	17
Cornell Univ.	9	Univ. Western Australia	16
KARI, Kenya	8	Indian Agr. Res. Inst.	14
Michigan State Univ./Michigan Institute of Technology	7	Washington State Univ.	14
IRD, France	7	CAAS, China	13
Univ. Hohenheim	7	Catholic Univ. Louvain	12
Univ. Georgia	7	Swedish Univ. Agr. Sci.	12
USDA	7	KARI/KARLO, Kenya	11

## ANNEX F. Case studies

### ANNEX F 1. Global agenda for sustainable livestock

This case study is designed to illustrate CGIAR engagement in a multi-stakeholder partnership (MSP) in which it is not the main convenor. The report is based on a) a review of literature: publications related to the founding of the Global Agenda; strategy and policy documents from the website; participant lists and presentations from six annual Multi-stakeholder meetings; and b) interviews with six members involved in the Guiding Group and two observers. The author was Senior Officer for Livestock Policy at FAO from December 2003 until March 2011, and was a contributor to FAO documents that strongly influenced the initiation of the Agenda for Sustainable Livestock. However she was not involved in setting up the Global Agenda and has never participated in any of the meetings.

#### 1. Background

##### *Objectives and origin*

The Global Agenda for Sustainable Livestock is a multi-stakeholder partnership set up by FAO (which continues to host the Technical Support Team) to promote the idea that the livestock sector can be sustainable and to encourage investment in sustainable livestock development. The Global Agenda's website<sup>6</sup> describes it as "is a partnership of livestock sector stakeholders committed to the sustainable development of the sector".

The vision and mission are described as follows:

"The Global Agenda's vision is to enhance the livestock sector's contribution to sustainable development. Its mission is to enhance livestock stakeholders' commitment, investments and adoption of good practices and policies in support of the UN 2030 Agenda for Sustainable Development. Its goal is to facilitate dialogue, generate evidence and support adoption of good practices and policies in furtherance of livestock-related SDG targets and objectives. A strategic framework, together with key outcomes, will be defined and corresponding outputs, activities and budgets will be published in an Action Plan every three years."<sup>7</sup>

At the 2016 annual multi-stakeholder meeting, a declaration (the "Panama Declaration") was signed linking the goals of the Agenda with the Sustainable Development Goals (SDGs).

The Global Agenda is one of only two global partnerships devoted to livestock, the other one being the Livestock Global Alliance hosted by the World Bank, which has an overlapping agenda to raise the profile of the livestock sector and share knowledge about it, but a considerably smaller membership; only five IGOS that work on livestock. Four of the IGOs listed as partners in

<sup>6</sup> <http://www.livestockdialogue.org/about-agenda/about-the-agenda/en/>, accessed 20/09/2016

<sup>7</sup> Global Agenda for Sustainable Livestock. 2016a. Rules and Procedures, June 2016 (available at [http://www.livestockdialogue.org/fileadmin/templates/res\\_livestock/docs/2016/2016\\_GASL\\_rules\\_and\\_procedures.pdf](http://www.livestockdialogue.org/fileadmin/templates/res_livestock/docs/2016/2016_GASL_rules_and_procedures.pdf))

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the Livestock Alliance (FAO, ILRI, the World Bank, and the World Organization for Animal Health) have representatives on the Guiding Group of the Global Agenda (the structure of the Global Agenda is described in section 2). The World Bank leads the Livestock Alliance and is a member of the Global Agenda, although not in the Guiding Group. IFAD is a member of the Livestock Alliance and has occasionally attended meetings of the Global Agenda but is not on the Guiding Group. The Global Agenda allows the private sector, NGOs, CSOs and ARIs to be full members, which the Livestock Alliance does not. The Global Agenda thus offers CGIAR a broad scope for engagement with other organizations interested in livestock development and the relationship between the livestock sector and the SDGs.

The idea for the Global Agenda grew from international discourse and disquiet about the role of the livestock sector and the limited investment in development of the sector. The publication “Livestock’s Long Shadow” (FAO, 2006) describing the negative impacts of livestock on the environment through, among other things, emission of greenhouse gases, drew considerable attention to the livestock sector but has also been cited as one of the reasons for reluctance by donors to invest in livestock development. However, the World Development Report of 2008 (World Bank, 2007), produced when the current ILRI Director General was Senior Livestock Advisor at the Bank, highlighted the many positive contributions of livestock to the livelihoods of people in developing countries. A later FAO publication, “The State of Food and Agriculture 2009: Livestock in the Balance”<sup>8</sup> concluded that there had been under-investment and policy neglect in a large sector that drives development, has a high growth rate, provides five of the most-traded global commodities and positively affects livelihoods. “Livestock in a Changing Landscape,”<sup>9</sup> a multi-author publication to which ILRI contributed, provided a comprehensive review of the forces shaping the livestock sector, and described among other things the responses that could be put into place to prevent and mitigate environmental damage and develop environmental services from livestock keeping.

The Global Agenda was officially “born” in 2010, after a presentation to FAO’s Committee on Agriculture (COAG), a committee of Member States, suggested that FAO might set up a Committee on Livestock. Member States preferred the idea of a multi-stakeholder livestock forum, an idea that was also encouraged at a COAG side event by the Dutch, Ethiopian and Indian governments and by ILRI. Endorsement by COAG has given FAO a mandate to establish and support the Global Agenda - which it has done since 2010 and continues to do — and to allocate staff time to pursuing the stated objectives of the partnership. ILRI was a founder member and has continued to be an active member.

Initially the Global Agenda focused on livestock and the environment, since this was a concern for the whole sector, and an issue that was not well addressed by other fora or standards-setting bodies. (By comparison, animal health and food safety are, respectively, addressed by OIE and the Codex Alimentarius, and form part of WTO’s Sanitary and Phytosanitary agreement to which WTO members must adhere, while social and equity dimensions are covered by other organizations that work on livestock). After lengthy discussion during the early months of the forum, the Global Agenda’s focus was broadened to include three topics considered to

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<sup>8</sup> FAO. 2009. The State of Food and Agriculture 2009: Livestock in the Balance. Rome, FAO.

<sup>9</sup> Steinfeld, H, Mooney, H., Schneider, F. and L.E. Neville (eds). 2010. Livestock in a Changing Landscape Volume 1. Washington DC, Island Press



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encompass the main factors affecting the sustainability of the sector (see below). In addition, it aims to provide greater clarity about the meaning of “sustainability” when applied to the livestock sector. In 2013-14 the Global Agenda published a narrative of 10-12 pages laying out the broader scope of its work on the website.<sup>10</sup>

As described on its website the three main prongs of the Global Agenda’s work are:

- Global food security and health (“an inclusive approach to managing disease threats at the animal-human-environment interface”)
- Equity and growth (“a viable growth in value chains that have access to all necessary resources and services, and in which the poor can find secure livelihoods and participate in growing markets or take up other opportunities outside the sector”)
- Resources and climate (“Livestock production based mainly on materials not competing with direct use as human food, and incentives and rewards for environmental stewardship”)

However, the bulk of its work to date has remained within the area of livestock and environment.

### *Structure, leadership and management*

The partnership model has evolved over time, becoming gradually more formal. A set of Rules and Procedures documented in 2016 lays out the current membership and leadership arrangements and the principles under which the Agenda operates (see note 7 above).

The principles underpinning the Rules and Procedures are:

- “1. Stakeholders work towards a common goal, with success determined by the commitment of each single one.
2. Dialogue is facilitated across a broad range of actors and sectors, and diverse parties are aligned around a common vision, goal, or objective.
3. Stakeholders realize mutual benefits from the process through win-win agreements, and in so doing learn from each other.
4. Equity and inclusiveness are guaranteed for all partners.
5. Transparency and accountability are ensured through agreement on governance mechanisms, including who participates in decision-making, and on rules and modalities of cooperation.”

It is possible to engage with the Global Agenda as a signed-up member or an observer:

**Members.** Membership requires the representative of an organization to sign a brief document committing to the Agenda’s Consensus Document, although applications for membership must

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<sup>10</sup> Global Agenda for Sustainable Livestock. 2014a. Towards Sustainable Livestock. (available at [http://www.livestockdialogue.org/fileadmin/templates/res\\_livestock/docs/2014\\_Colombia/2014\\_Towards\\_Sustainable\\_Livestock-dec.pdf](http://www.livestockdialogue.org/fileadmin/templates/res_livestock/docs/2014_Colombia/2014_Towards_Sustainable_Livestock-dec.pdf))

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be screened by an Agenda Support Team based in FAO and approved by the Guiding Group. A risk management and due diligence screening are applied to “prevent conflicts of interest, undue influence on policy making and the possibility of any party securing an unfair advantage”, but in principle the partnership aims to be open and inclusive, and members interviewed believe that the principle is adhered to.

Membership is voluntary and driven by member interests. Very little core funding is available, so members must bring their own funding or pursue funding together. Limited travel assistance to attend meetings has been provided to some organization representatives.

**Observers.** Any organization can attend the annual multi-stakeholder meeting, or read documents published on the website. Observers cannot be part of the governance and management structure.

The Global Agenda has an elected chair and is led, governed and does work through three officially constituted structures.

**Guiding Group.** The highest and most formally constructed tier, which provides overall leadership and guidance, is the Guiding Group. It now has approximately 20 members. Initially, Guiding Group membership was not very clearly defined, but since the October 2013 Multi-Stakeholder meeting in Ottawa it has become more formalised. There is now representation from each cluster, usually the co-leaders of the Clusters.<sup>11</sup> The Guiding Group develops strategy. It was intended that there would be a smaller executive committee of the Guiding Group to implement the decisions of the group, but this has not been established. As a Cluster co-leader, ILRI automatically has the right to participate in Guiding Group meetings and usually does so.

**Agenda Support Team.** A secretariat, hosted by FAO, which supports the management of the Agenda.

**Clusters/Focus Area Groups.** Representatives of a member organization can be part of a Cluster, representing a stakeholder group, or a Focus Area Group, working on a specific topic. There are currently seven Clusters (public sector, private sector, research/academia, donors, NGOs, social movements/community based organizations and INGOs/multi-lateral organizations) and three active Focus Area Groups (closing the efficiency gap, restoring value to grasslands and waste to worth) as well as Action Networks on dairy, silvopastoral systems and livestock-environment assessment.

Each cluster or group organizes itself and develops principles of operation.

ILRI has been co-leader of the research/academia cluster from the start, although recently at the suggestion of the new Chair it has reduced its involvement in this group and moved to the INGO/multi-lateral cluster. It has also taken part in Focus Area groups, although limited funding and an inability to make a clear link to the structure and work plan of the Livestock and Fish

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[http://www.livestockdialogue.org/fileadmin/templates/res\\_livestock/docs/2016/2016\\_Guiding\\_Group\\_Meeting\\_Minutes\\_ROME.pdf](http://www.livestockdialogue.org/fileadmin/templates/res_livestock/docs/2016/2016_Guiding_Group_Meeting_Minutes_ROME.pdf)

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(L&F) CRP have resulted in a lower level engagement than ILRI would have liked. Some of the of the work done through Focus Areas Groups seems to have a very clear connection with L&F research on silvopastoralism (led by CIAT in Latin America) and in dry areas (led by ICARDA in Ethiopia), and CIAT presented work on climate change done through CIAT at the Cali Multi-stakeholder meeting. However, CIAT and ICARDA are not listed as Global Agenda members.

**Governance mechanisms** (see note 7 above) mostly relate to the selection of the Guiding Group Chair (elected every 2 years) and members (selected by their Cluster groups). There is no separate governance body but those interviewed consider that the structure and decision making process are fair and fit for purpose - “well organized and ruled according to democratic principles”.

### ***2. Motivation for involvement***

The Global Agenda has been able to attract quite a broad membership of public, private, non-government and civil society organizations.

All of those interviewed indicated a general interest in furthering the cause of livestock development. They gave reasons related to the cause of their own organizations or those like them, which can be generally categorized as:

- Helping to “grow the livestock investment pie”. For ILRI and FAO this is both an altruistic and a self-interested agenda.
- Having a space in which to voice the views or results of their organization to a large audience.
  - Researchers are motivated to join in order to have the opportunity to talk to a development audience at annual multi-stakeholder meetings.
  - NGOs and CSOs are motivated by the opportunity to present their organization’s change agenda to a wide range of stakeholders.
- Being publicly associated with a sustainability agenda. This is seen to be important for some large private-sector organizations that wish to be perceived as environmentally responsible – although concerns have been voiced by some CSO organizations about inclusion of the private sector, and that that not enough concrete action has been taken by the private sector to back up their stated interest in sustainability. It can also be important to NGOs and CSOs to find ways to make their own specialized work relevant to a broad sustainability agenda.
- The possibility to hear the views of others, including others who are not natural bedfellows.
- The potential to work with organizations that they otherwise might not meet or to further collaborations that have already been established in other settings.
- The potential to develop collaborations through the partnership to secure funds for future work.
- Involvement in the Agenda ranges from occasional attendance as an observer at meetings to active participation in a Cluster, Focus Area Group or the Guiding Group. It was clear from those interviewed that their motivation to participate is still strong, despite the time, effort and sometimes funds that their organizations have needed to commit in order to remain actively involved.

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The 2016 Panama meeting is seen as something of a breakthrough. More than 170 livestock sector stakeholders attended and new members were signed up. The “aspirational” objectives are reported to have made countries more comfortable to get on board because they can sign up to livestock objectives under the umbrella of the SDGs, especially SDG 17 as a way to achieve 1-16. There are now 17 countries signed up, including some East African, South and Central Asian and Central American countries.<sup>12</sup>

### **3. Strength of partnership**

In common with any MSP with a very broad membership, the Global Agenda experiences a wide and fluctuating level of engagement from member organizations, even those listed as members on its website.

Those interviewed were mostly active members of clusters, networks and the Guiding Group, whose views are likely to err towards the positive. However, the interviews were also candid, with concerns as well as benefits freely aired. Two highly knowledgeable observers were also interviewed, and their observations largely confirmed the impressions received from the other interviewees. The following key points emerged:

- The partnership has been moving forward, albeit slowly – it has grown and evolved.
- The partnership walks a balance between inclusivity and the need for some formality in governance and appears to have been successful in doing so. All of the main stakeholder groups are represented at the highest level of leadership and governance. Those interviewed, from all of the stakeholder groups, showed a healthy professional respect for each other and acknowledged the efforts made to maintain inclusivity. There has been strong evidence of FAO in both the leadership and the Focus Action Groups, but others have also been actively engaged. The presentations at multi-stakeholder meetings have come from a range of organizations that appears reasonably representative of the membership.
- The Global Agenda has been sustained by a fairly small and dedicated group of core partners. New core partners have joined, but there have been few departures. This stability in the core membership has given the partnership an institutional memory.
- Although the members represent organizations, the work of the Global Agenda is not necessarily linked to the broader work programmes of their organizations. For example, FAO’s Animal Health and Production Division, which was a key founder member, has not become broadly engaged; the Livestock & Fish CRP led by ILRI is only loosely linked; CCAFS has made very little input.
- The relative informality and low level of core funding have meant that the partnership has relied very strongly on the interest and continued commitment of members. It is unlikely there have been many free riders in clusters or action groups, because there was too little funding to attract them. However, the core active membership has been much smaller than the total list of members or attendants at meetings. The lack of

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<sup>12</sup> Global Agenda for Sustainable Livestock. 2016d. 6th meeting on Sustainable Livestock, Panama 20-23 June 2016. Meeting summary (<http://www.livestockdialogue.org/events/events/multi-stakeholder-meetings/panama-20-23-june-2016/en/#sthash.BBAEy4kF.dpuf>)

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funding has also led to a very uneven pattern of development, with activities described as “lumpy”.

- The partnership is at an interesting and challenging stage, where it has maintained sufficient momentum and growth to be credible, but also faces frustration on the part of some members about slow progress towards goals. At the Panama meeting in 2016, for the first time, the seeds of concrete results were presented; there was strong presence at the meeting from Latin America, a region where the livestock sector is very important, and the findings presented on silvopastoralism and ecosystem services were relevant to Latin American needs.<sup>13</sup> At the same time, there is frustration from an academic perspective about slow progress in conceptual thinking towards arriving at clear definitions of, or benchmarks for, “sustainability” in the livestock sector. Equally, there is frustration from development practitioners on the ground about the inability to secure funding for projects through collaborations developed within the Global Agenda. One challenge in moving the Agenda forward has been that each annual meeting is independent, with no core of funded activities between meetings other than what the focus areas have been willing and able to take forward. One of the groups has been very good at setting an agenda and doing work, the others have been less successful.

### **4. Enabling systems**

FAO provides a secretariat and support team based in Rome. A limited amount of core funding has been provided by individual countries, mostly to support hosting of and travel to major meetings of the partnership.

The system has a website on which background documents, minutes of meetings and information resources are easily accessible.

It is administratively simple for an organization to join – they need only sign the consensus document and wait to be approved. To be an active member requires participation in meetings (the annual multi-stakeholder meeting, in a different country every year, at least two meetings a year for the guiding group, and a variable number of physical and virtual meetings for clusters and research action groups and networks). Members of action groups and networks also conduct research and carry out other activities, which may be linked to projects and programmes or be part of the normal programmed work of their organizations – no research is funded by core funds of the Global Agenda.

Risks for the partnership have included:

- Impatience from some participants about slow progress towards concrete results. This has resulted partly from the natural pace of developing a global MSP, but also because only the main meetings have been self-funded by the participating organizations. Knowledge-generating activities have made progress where they were linked to existing projects and programmes but otherwise have proceeded unevenly.
- Impatience from some participants that hoped-for funding as a result of collaborative proposals developed under the umbrella has not yet materialised. Uneasiness from

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<sup>13</sup>List of presentations available on this link <http://www.livestockdialogue.org/events/events/multi-stakeholder-meetings/panama-20-23-june-2016/documents/en/>

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NGOs/CSOs in particular about the presence – some would say dominance – of the private sector.

- The need for COAG’s continuing mandate for the governance of the partnership and the continued involvement of FAO (for example, the governance structure and linkages to the SDGs were reviewed in COAG 25 in September 2016).<sup>14</sup> To date, the mandate has continued to be granted.
- Competition from the Livestock Alliance, which has an overlapping Agenda and IGO membership (those interviewed did not consider this a strong risk).

The risks have not so far prevented the partnership from moving forward, although membership and participation have been somewhat opportunistic, depending partly on geography.

### ***5. Benefits realised and unrealised***

The Global Agenda has a clearly stated mission to “...enhance livestock stakeholders’ commitment, investments and adoption of good practices and policies in support of the UN 2030 Agenda for Sustainable Development...”.

The mission contains three initiatives: knowledge sharing; change of practice, which can happen on a small or large scale, and; change of policy.

Knowledge sharing has been the most active part of the Global Agenda. This was particularly evident at the Panama meeting, which presented ideas on environment, anti-microbial resistance and poverty, but has also been the case in previous meetings. Action on practice and policy has been slow.

The following benefits were reported by those interviewed:

- The close relationship that has developed among the most active members, including those that had not previously worked together.
- The experience of being closely involved in a global initiative that has a change agenda.
- Visibility and participation in a global space.
- One interviewee (not from the private sector) described the Global Agenda as “the only comparable global livestock initiative, the best and most reliable... what makes it different is that private industry is part of the process”.
- The opportunity to present highlights of important scientific findings to a wide audience.
- Changes in the global narrative about livestock and changes in the narrative of some of the members of the Global Agenda.
- New awareness of what others are doing and how livestock are perceived.
- The growing interest and participation of countries.
- Good work in some action groups and networks, with some useful good-practice guidelines emerging.
- Collaboration with other members to develop a funding proposal.

There are also a number of potential but as yet unrealised benefits. The following were identified from testimony of interviewees and detailed scrutiny of the website:

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<sup>14</sup> FAO, 2016. Report of the 25th Session of the Committee on Agriculture, Rome, 26-30 September 2016.

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- Until recently there has been little new research presented at meetings and in documents (this appears to be changing for the better).
- The website, which contains separate pages for each of five action networks and six multi-stakeholder meetings, is a good place for those involved in an activity to access documents about it, is not well laid out as an information portal on specific subjects. By contrast, that of the Livestock Alliance contains much less material, but it more clearly laid out as an information portal and easier to navigate.
- CGIAR has taken very little advantage of the opportunity to showcase what it does. Very few of the presentations at meetings have been made by CGIAR staff, and almost none on research or new “big picture” analyses. Some of CGIAR’s work is embedded in presentations of groups, and it could be argued that this is a good thing and evidence of partnership, but the work presented represents a very small proportion of the livestock research that CGIAR is conducting with partners. There are some notable absences, such as applied research on silvopastoral systems by CIAT and partners in Nicaragua under the L&F CRP, which is not mentioned in any of the presentations on silvopastoral systems. ILRI has attempted to map L&F’s work more closely to that of the Global Agenda, and to have work done by L&F FPs used as case studies, but with limited success.
- After four years, there is limited evidence of clear and usable indicators for “sustainable” livestock production in specific production systems that can be applied by NGOs or the private sector.
- Where good-practice guidelines have been produced, there has been very little concrete action to make use of them. This may be more of a failure to manage expectations than a failure of the partnership, since it was never intended to be a development programme; it produces and shares knowledge that can then be used to secure funding for practical action. However, the Global Agenda was meant as a forum where research results could be accessed quickly, and it is evident that for some members they are not appearing quickly enough.
- Policy guidelines have been very slow to emerge. (This is not surprising.) When they do, some may be immediately implementable by government agriculture ministries while others will need to be pushed into other international initiatives on environment, public health and nutrition.

There is unrealised potential for CGIAR to have an impact in the Global Agenda. It has played an important part in the strategy of the partnership, but considerably less in the action. It may be reluctant to engage more strongly in the Global Agenda, because a) it has not worked out a strategy for engagement of its livestock programme with the global discourse on SDGs; b) the future funding of the Global Agenda is uncertain (this appears to be a minor issue for CGIAR); or c) in order to pursue an action agenda towards expanding investment in the livestock sector it must also participate in the Global Alliance, and has finite time to give to each partnership.

### ***6. Implications for CGIAR***

It has been important for CGIAR to have a presence in the Global Agenda and to influence the evolution of the partnership, but at present it seems to be undecided about the role it should play.

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A small but carefully targeted input from ILRI has kept CGIAR strategically engaged, but the contribution of CRPs to the knowledge products from the partnership has been limited and is almost invisible in meetings of the partnership and on its website. If CGIAR wants to use this partnership to showcase research, or demonstrate an intellectual lead in the global discourse on livestock and the SDGs, it will need to engage more heavily and comprehensively.

It is certainly challenging for the fairly small number of senior CGIAR scientists who work on livestock to engage in two global livestock fora with overlapping mandates, attempt to engage with OIE and through it WTO, and engage with broader global fora on climate change, nutrition and human health, in which livestock are often poorly represented. However, CGIAR has the advantage that it is not expected to directly create changes in practice and policy. Its direct responsibility is to produce strong research evidence and package it in a way that allows partners to use it in changing practice and policy.

The fact that the Global Agenda, like many broadly-constituted MSPs, is likely to be more successful in sharing knowledge than changing policy, need not be an impediment to CGIAR. On the contrary, it provides an ideal environment to display and discuss research findings on the role of livestock in delivering international public goods (IPGs), in a forum where the livestock sector does not have to fight for space with other, more influential sectors. Members of the Global Agenda are also members of other MSPs where the action agenda is stronger, or they are NGOs and CSOs who put research to use. As the largest international livestock research organization with an SDG mandate, ILRI should be leading the way in defining what “sustainable” production means and could also be a conduit for making a clearer and more concrete link between the Global Agenda and all the CRPs that work on livestock-related issues (Livestock, A4NH and CCAFS).



## ANNEX F 2. Global Alliance for Climate Smart Agriculture

This case study is chosen to illustrate CGIAR engagement in a multi-stakeholder partnership (MSP) in which it is not the main convenor. The report is based on a) a review of literature and audio visual material: documents and videos related to the founding of GACSA; strategy and policy documents from the website; b) interviews with seven members of whom three are from different CGIAR entities and four from other organizations; c) observation of a Strategic Committee meeting in October 2016.

### 1. Partnership background

#### *Objectives and origin*

According to the mission statement on the its website, the mission of the Global Alliance for Climate Smart Agriculture (GACSA) is mainly that of knowledge sharing.

“The mission of the Alliance is to address the challenges facing food security and agriculture by tapping the wealth and diversity of resources, knowledge, information and expertise, from and between its members, in order to stimulate concrete initiatives at all levels.

It provides a forum for those who work on climate-smart agriculture to share and exchange experiences, information and views on issues that need immediate attention what works and what does not when adapting to climate change and mitigating greenhouse gases in the agriculture sector.”

The members interviewed have various views about GACSA’s agenda – some consider that a primarily knowledge-sharing agenda is appropriate, as it allows the alliance to be inclusive and fairly informal, while some would prefer more of a change agenda.

GACSA is one of several large-scale initiatives on climate smart agriculture, defined as “agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals”.<sup>15</sup> FAO and the World Bank are important knowledge sources, the latter working in collaboration with CGIAR. FAO’s CSA programme began after the publication of a 2010 paper<sup>16</sup> and produced a Sourcebook in 2013.<sup>17</sup> The World Bank promotes CSA as part of a Climate Change Action Plan and provides an online guide to the subject developed in collaboration with the CCAFS CRP (see Note 15 above).

Other large CSA alliances include:

- an African Climate Smart Agriculture Alliance, launched after being endorsed by the 31st African Union Summit in June 2014.

<sup>15</sup> CCAFS/World Bank. Undated. Climate smart agriculture portal (<https://csa.guide/>)

<sup>16</sup> FAO. 2010. “Climate-Smart” Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Rome (available at <http://www.fao.org/docrep/013/i1881e/i1881e00.pdf> )

<sup>17</sup> FAO. 2013. Climate Smart Agriculture Sourcebook. Rome (available at <http://www.fao.org/docrep/018/i3325e/i3325e.pdf>)

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- The World Business Council for Sustainable Development (WBSCD), a private sector alliance based in the USA and India, has a CSA action agenda.
- The Rainforest Alliance and Sustainable Agriculture Network work together with farmers on CSA.

Major global policy decisions on climate change, including those related to CSA, are made within the United Nations Framework Convention and Climate Change (UNFCCC), where CGIAR is an observer, and in the World Economic Forum.

GACSA was formally launched in September 2014 at the UN Secretary General’s Climate Summit, and had a first annual forum at FAO in Rome in January 2015. Events leading up to the launch are reported to have been:

- A proposal, led mainly by the Dutch government, to develop a framework for a climate smart agriculture forum, which brought together various stakeholders including the Netherlands, Vietnam, Nigeria, Norway and South Africa, CCAFS representing CGIAR, FAO and some NGOs.
- A meeting between UN Secretary General Ban Ki- Moon and Special Representative for Food Security and Nutrition David Nabarro (Special Adviser on 2030 Agenda for Sustainable Development since December 2015) to discuss how to bring agriculture into climate discussions.

CGIAR, represented most strongly by CCAFS and the CO, was a very active founder member and initially had quite a strong convening role but has gradually withdrawn from this role, although it still maintains a place on the strategic committee.

### *Structure, leadership and management*

GACSA is an independent alliance, governed by its members, with a governance process described in a published governance document.<sup>18</sup>

It is hosted by FAO, which provides a Facilitation Unit and Secretariat in FAO headquarters in Rome. There are four ways to engage in the alliance:

**Observer** (open to organizations, not individuals). 12 organizations are registered as observers. Individuals cannot register as observers but are allowed to attend the annual forum.

**Member** (open to organizations, not individuals). 153 member organizations are currently said to be registered (although the most recent list<sup>19</sup> identifies 128). Members represent national governments, IGOs, NGOs, CSOs and the private sector. Organizations that agree with the aims and framework document of GCASA can register by emailing the facilitation Unit. CGIAR is a member through the CO.

**Action group participant** (open to individuals and organizations, including observers). There are three action groups: Knowledge; Investment (looking at public and private investment); and Enabling Environment (looking at policies and strategy related to CSA). CCAFS initially co-

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<sup>18</sup> GACSA. 2015. Governance and structure (available at <http://www.fao.org/3/a-au668e.pdf>)

<sup>19</sup> GACSA. 2016. Members list Version 28::11 May 2016. Addendum to the Framework Document.

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facilitated the Knowledge group with FAO, but has handed over to CIRAD. CCAFS also participates in the other two other action groups but has never co-led them.

Membership of action groups is voluntary. Action groups develop their own governance processes, meet on a schedule that they individually agree, and report their progress to the Strategic committee.

The Knowledge group is reported to have been very active and productive, the other two less so.

**Strategic committee members** (elected from members). The strategic committee is elected from volunteer members and is chaired by two co-chairs, on a rotating basis, ideally one from a developed country and one from a developing country. The Strategic Committee meets almost every two months, annually approves the programme of work and budget, and oversees the implementation of GACSA activities. The CO is a member.

All GACSA members and observers have the opportunity to meet at an Annual Forum where they discuss work done and ideas.

The governance structure of GACSA represents a change since the Dutch-led initiative that preceded it. It is more formal and also more transparent, with resulting benefits and costs. The transparency is generally welcomed, but some members find the decision-making process slow and cumbersome. Comments from those interviewed:

- “very inclusive governance but decision making is not very clear”
- “loose and inefficient”
- “CSA is a very broad definition, there is a heated debate [about what implementation should involve]”
- “there are challenges to keeping things moving ... the knowledge side has gone well, perhaps it is the easiest part to do ... there is a lot happening in this space [CSA], so there are still opportunities for GACSA, but for some it is taking a long time to be clear what the added value is of it”
- “the meetings are very long and have no substance – they try the patience of anyone who wants to talk about substance”
- “is it a change agenda? Or is it networking and information sharing? They have reverted into the latter, because the former required leadership and drive and money. Depending on what your expectations are, it is not really effective [in driving change]”.

While several Centers and the CGIAR Consortium are listed as members, the non CG members interviewed universally see CCAFS as the CGIAR’s representative entity. CCAFS cannot be a member, since it is not an institution, but it has developed a strong brand. In the experience of the evaluation team it is unusual for a CRP to be more strongly recognised by partners than the Center that leads it, or represents it at country level. The CCAFS leader has been engaged strategically, and a CCAFS staff member has been designated as a focal point, spending on average 20% of his time on GACSA-related activities, while CCAFS co-convened the Knowledge Action Group of GACSA.

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Among Centers, CIAT and ICRAF are reported to have been very active, CIFOR and IFPRI have been involved in some activities but less active. IITA and IRRI are not members but have produced inputs for GACSA, delivered through CCAFS. Bioversity has attended meetings and presented but not otherwise been active.

### **2. Motivation for involvement**

Motivation for involvement of members includes:

- Interest in CSA. For some countries, such as Norway, the UK and the Netherlands, this is high on their development agenda.
- The wish to present ideas and knowledge and to learn from others.
- The potential to meet a broad range of people with a common interest in CSA.
- For CCAFS, there is a natural alignment between the work done by the CRP on CSA and the aims of GACSA. GACSA provides good opportunities to share CCAFS research findings with a wide audience. However, GACSA is not a stand-alone engagement. It fits seamlessly into CCAFS' growing collaboration with the World Bank, attempts to make inputs into UNFCCC COPs, and engagement with national governments.

### **3. Strength of partnership**

It is hard to get a sense of the overall strength and sustainability of GACSA as a partnership because of its size and heterogeneity.

A strategic committee meeting observed by the evaluation (attended by 30 people including representatives of IGOs, countries, CGIAR, African and European NGOs and a regional farmer association) had a friendly and cordial atmosphere, but it appeared that the group was very mixed in their interests and objectives. The discussion revealed that there was a gap between the grassroots organizations and other members, and there did not appear to be any strong "glue" in terms of concepts or a common program of work to hold the entire group together.

At the same time, it was reported to the strategy meeting that there is collaboration on the ground between GACSA members and that CCAFS has been working with CSOs on climate change in India. It was also reported to the evaluation team by interviewees that a sense of camaraderie and commitment exists within action groups. The Knowledge group has been particularly active. It has the task of facilitating dialogue and debate on CSA among the experts involved in GACSA, organizing electronic and face to face meetings with scientific institutions, and was responsible for the production of seven "Practice Briefs".

Challenges to the strength of the partnership have included:

- Tension around the nature of GACSA as an alliance. Some of those involved want it to be a more formal system with charters and signatures by ministers while others see it as a platform to bring people together, including the private sector, NGOs and CSOs. Some members consider it appropriate that the agenda is mostly one of knowledge sharing, while others would like to see more direct action for change. The interviews and observations carried out by the evaluation team found a consistent picture of diversity of viewpoints about what GACSA should be trying to achieve.

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- Frustration and loss of interest of some members as a result of the inclusive governance process. While this process encourages buy-in from members, it results in every decision involving many discussions, and at times a lack of clarity about what decision has been taken. Comments at the strategic committee meeting: “we are a family”; “we are not a project” “the framework is all about action” but “we do not have the resources to actually deliver”. At the same time “we should do things – GACSA is not an entity separate from its members!”
- Resistance by NGOs and CSOs to the idea of CSA, including adverse publicity directed at GACSA (CIDSE, 2015; Climate Smart Agriculture Concerns, 2015).<sup>20</sup> This has not stopped the alliance from operating but it has taken time and resources to address, and it makes it difficult to bring the private sector, NGOs and CSOs together if each group is suspicious of the others.

### **4. Enabling systems**

A Facilitation Unit (currently 8 people) is hosted by FAO and provides a secretariat. It is funded through a 5 year (2015-2019) multi-donor trust fund, with contributions from Norway, Switzerland and USA. The Unit works to formal, published terms of reference formulated by GACSA members and work programme.<sup>21</sup>

The transition from the former Dutch-led initiative to GACSA has resulted in a loss of the funding formerly provided by the Dutch Ministry of Agriculture.

The core funding has enabled GACSA to maintain a website and secretariat and to host annual meetings and strategic committee meetings. However, it was noted at the strategy meeting that GACSA is currently not financially sustainable beyond 2019.

### **5. Benefits realised and unrealised**

Members interviewed reported the following benefits:

- A great many knowledge products produced and published. On the website the evaluation team found a compendium and seven separate practice briefs produced under the GACSA umbrella, as well as two IRRI/CCAFS practice briefs. All had Center or CCAFS logos (the GACSA products also had logos of other GACSA members). There were also 13 videos on CSA practice. GACSA has provided good publicity for CGIAR research as well as the opportunity to share research results quickly and broadly.
- A growing and broad membership, in spite of the tension between some stakeholder groups.
- Excellent networking opportunities.

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<sup>20</sup> See, for example, CIDSE. 2015. Over 350 civil society organisations say NO to ‘Climate Smart Agriculture’. Press release. (available at <http://www.cidse.org/newsroom/civil-society-proposals-to-european-leaders-at-the-eu-celac-summit-1.html>) and Climate Smart Agriculture Concerns. 2015. Don't be fooled! Civil society says no to “climate smart agriculture” and urges decision-makers to support agroecology (available at <http://www.climatesmartagconcerns.info/cop21-statement.html>)

<sup>21</sup> GACSA. 2015b. TERMS OF REFERENCE OF THE FACILITATION UNIT (FU) Version 03 :: 9 March 2015 :: Draft for endorsement Addendum to the Framework Document (GACSA 1) (available at <http://www.fao.org/3/a-au670e.pdf>)

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Potential benefits as yet unrealised relate mostly to the work of the Investment and Enabling Environment groups. They have been less active than the Knowledge group, which has the simplest task, since there are a great many information and knowledge products available to share. Translating them into investment has been less successful so far, but perhaps this is not surprising as the alliance has only been active for two years. The Investment Group has produced two concept notes, one on metrics,<sup>22</sup> a topic it proposes to work on in 2016-17, and one on accessing climate finance.<sup>23</sup> If this group produces concrete outputs, such as metrics that can be tested on the ground and advice on financing projects, it could make an important contribution to cementing links between research and development interests within the alliance.

The Enabling Environment group has the hardest task, as decisions about climate change policy are highly political. It is not likely that an alliance like GACSA can directly influence climate change policy – in order to do so it would have to become a different and more formal partnership. In the opinion of one interviewee – shared by the evaluation team – the best opportunity that it is likely to have is by producing excellent science that can then be fed in to other fora such as the UNFCCC COP (to influence policy) and the World Business Council (to influence voluntary action by the private sector).

### ***6. Implications for CGIAR***

CGIAR, through CCAFS and the CO in particular, had a very heavy engagement when GACSA was initiated. The CO's head of partnerships has a personal interest in environment and climate change and has been very active in promoting partnerships in this subject area, while CCAFS had an obvious interest in promoting a global forum. CGIAR is beginning to reduce its level of engagement but is likely to maintain an active interest, with GACSA as one of a portfolio of partnerships in which it engages. If CGIAR withdraws considerably, according to interviewees for this study, GACSA is likely to become a very different kind of alliance.

While accepting that GACSA is a young alliance that may deliver more in the future, this case study has raised interesting questions about the nature of CGIAR participation in MSPs that deal with global issues such as climate change. If GACSA is able to deliver knowledge IPGs, such as global metrics that can be widely applied, or local initiatives on climate smart agriculture, then arguably it will have been a good investment of CGIAR resources, even if it is not able to directly influence high level policy. However, it could also be argued that the same results might have been achieved by separate, more focussed alliances, rather than one large one. CGIAR (notably CCAFS, but also other CRPs) already works at country level with a number of NGOs and CSOs; it could have found a way of convening them to share experiences and join together to look for grants. CGIAR also works with ARIs on modelling and metrics, and could have brought them together into a loose network, or a consortium to apply for climate change funding. If GACSA's place within the CGIAR portfolio is as a forum for disseminating and discussing research findings

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<sup>22</sup> GACSA. 2016b. Developing Metrics for Climate Smart Agriculture. (available at [http://www.fao.org/fileadmin/user\\_upload/gacsa/AF/SC/GACSA\\_IAG\\_-\\_Metrics\\_Note.pdf](http://www.fao.org/fileadmin/user_upload/gacsa/AF/SC/GACSA_IAG_-_Metrics_Note.pdf))

<sup>23</sup> GACSA. 2016c. Making Climate Finance Work in Agriculture. (available at [http://www.fao.org/fileadmin/user\\_upload/gacsa/AF/SC/GACSA\\_IAG\\_-\\_Climate\\_Finance\\_Note.pdf](http://www.fao.org/fileadmin/user_upload/gacsa/AF/SC/GACSA_IAG_-_Climate_Finance_Note.pdf))

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to a wide audience, it could have been configured as a portal, hosted by FAO or within CGIAR, and run with modest annual funding.

The overriding argument for large MSPs like GACSA is that they have the potential to bring the private sector together with public research and NGOs and CSOs; but the evaluation team's observation from this and other MSPs reviewed is that for this kind of alliance to work, it needs operational finance distributed across all stakeholder groups, and some clearly defined projects.

## ANNEX F 3. Scaling Up *Allanblackia* in Africa

### 1. Background<sup>24</sup>

The Allanblackia Partnership is a public-private partnership (PPP) to sustainably produce and market an oil from the seeds of the Allanblackia tree, which grows in tropical Africa.

There are nine species in the genus *Allanblackia*, all of which are found in the moist forests of West, East, and Central Africa, from Sierra Leone to Tanzania. The trees have been used for centuries as a source of edible oil, medicines, and timber. Allanblackia seeds contain a solid white fat which has traditionally been used for cooking and soap making. Mature trees are able to produce more than 10 kg of oil per year.

Around 2000, the multinational consumer goods company Unilever analysed Allanblackia oil and found that the oil's composition and structural properties were perfect for products such as margarine and confectionary. Unilever decided to explore using Allanblackia oil in their supply chain and began working with subsistence farmers in several African countries with the intention of creating a new edible oil crop that could be grown in agroforestry systems.

Unilever established an initial partnership to develop supply chains for wild harvested Allanblackia in Ghana and Tanzania. When it was realized that wild harvesting would generate only a maximum of 200 tons of oil a year, not enough to make it commercially sustainable, the initiative sought to create a planting programme involving local farmers.

The Novella Africa partnership was formed by Unilever in 2002 to work on establishing a sustainable supply of Allanblackia oil through domestication, tree management and conservation strategies, while maintaining existing supply chains. The partnership involved more than 30 organizations at international, national, and local levels. Contributions were voluntary at the time, which allowed the project to become established with relatively limited investments. The partnership's website describes it in these terms:<sup>25</sup>

“The Allanblackia Partnership (a.k.a. The Novella Partnership) is a public-private partnership including local communities, non-governmental organisations, donor agencies and private companies formed in 2002 to ensure the success and sustainability of increasing Allanblackia production for all of its benefits”.

In 2006, a research and development program was established, led by the World Agroforestry Center, to generate the knowledge required to domesticate the species in village nurseries.

Difficulties in managing the project with respect to focus, mass, speed, and accountability led to a restructuring of the partnership in 2009.

### 2. Components and partners

The 2002 partnership involved more than 30 organizations at the international, national, and local level.

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<sup>24</sup> Background information from different Allanblackia and ICRAF reports.

<sup>25</sup> <http://www.Allanblackiapartners.org/global-partners>



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Currently, five global partners form the Novella Partnership (FORM International, ICRAF, IUCN, UEBT, UNILEVER)

The Novella development countries are Tanzania, Ghana, and Nigeria. In each country, local and national government institutes, especially national research institutes, and NGOs are participants. The list at inception of the partners for each country is as follows: <sup>26</sup>

### Ghana

- Forest Research Institute, Ghana (FORIG)
- International Tree Seed Centre (ITSC)
- Institute of Cultural Affairs, Ghana (ICA-Gh)
- Technoserve
- Achimota Vegetable Oil Mills (AVOM)
- Unilever Plantations Ghana: Twifo (TOPP) and Benso Oil Palm Plantation
- Form International (FORM)
- Diadem Foundation

### Nigeria

- German Technical/Development Cooperation (GTZ)
- Pro-Natura International Nigeria (PNI)
- Community Resources Empowerment and Development Organization (CREDO)
- Forestry Research Institute of Nigeria (FRIN)
- State Agricultural Development Programmes (State ADPs)
- Federal Government of Nigeria (FGN)
- Shell Petroleum Development Company (SPDC)
- River State Sustainable Development Programme (RSSDP)

### Tanzania

- Tanzania Forest Research Institute (TAFORI)
- Amani Nature Reserve (ANR)
- Institute of Cultural Affairs, Tanzania (ICA-Tz)
- INADES Formation Tanzania
- Tanzania Forest Conservation Group (TFCG)
- Faida Mali.

Other partners have included The International Cocoa Organization (ICCO), Save My Future Foundation (SAMFU), Aarhus Karlshamn (AAK) and the Sustainable Development Institute (SDI), although there is little information on their roles.

### ***3. Motivation for involvement***

The Novella Africa partnership is very much an African venture, with African research institutes, universities, and NGOs playing key roles. They work actively alongside harvesters, farmers, buyers, oil-seed crushers, and others in the private sector. The involvement of international institutions and significant donor support has been vital to establishing the project. A core

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<sup>26</sup> From Alice Muchigi, ICRAF, undated.

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strategy is to use participatory tree domestication to ensure that the farmers are beneficiaries of the initiative.

Unilever used its convening power as a large multinational company to motivate and convince the initial set of partners to enter in a collaborative effort to develop a sustainable supply chain based on sourcing the oil from smallholder plantings (not estate cropping) through a development model that met commercial and public goals of improving livelihoods and conserving biodiversity. Unilever was motivated partially by the obvious business benefits of a new oil that could be used for margarine production with less chemical processing and lower refraction than palm oil – thus reducing the company’s ecological footprint by reducing energy use and chemical waste. In addition, Unilever was also motivated by its declared commitment to support a smallholder production base that could foster local enterprise. Unilever saw itself as developing a market for the finished products, but did not want to organize or control the supply chain. Hence its interest in promoting a partnership approach.

The World Agroforestry Center (ICRAF) was approached by Unilever to provide research expertise and through ICRAF’s global role to coordinate all research activities aimed at establishing an appropriate domestication strategy for *Allanblackia* to enable its wider cultivation in farming landscapes. ICRAF was motivated by the alignment of the partnership’s goals to its mandate and by the potential to demonstrate a new technology upscaling model using PPPs and an indigenous tree species. More specifically, the partnership was attractive to ICRAF as the research for development (R4D) issues resonated well with its mandate within the CG, especially research Issues in domestication,<sup>27</sup> such as:

- Low seed germination: the first comprehensive germination trial was started in early 2003 at the Forestry Research Institute, Ghana (FORIG) and after 12 months fewer than 1% of seeds had germinated.
- Uncertain sexuality of the species: forest inventory assessments undertaken in Ghana and Tanzania in 2002/3 indicated size-class distributions but did not enumerate the different sexes. Herbarium specimens and taxonomic accounts indicated that *Allanblackia* is dioecious but did not discuss sex ratios, heterogamy or sexual reversion.
- Long time to fruiting: fruits were being harvested from natural forest and on-farm remnants and these were typically large and old (>30 years of age). Literature suggested 12-15 years to first fruiting.
- Dwindling natural populations: forest habitat conversion and removal of on-farm trees were threatening some local populations and the basis for selection.
- Uncertainty about planting density and niches: all on-farm trees were forest remnants and naturally regenerating wildings, and thus their distribution was semi-random. Most trees occurred as persistent trees in fallows or as shade trees in cocoa and tea fields.
- Farmer’s inexperience in propagation of *Allanblackia*: farmer nurseries relied largely on forest-germinated seedlings that were transplanted into nursery bags. Spontaneous tree planting (testing or adoption) was very rare.

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<sup>27</sup> Ofori, D.A., Kehlenbeck, K., Munjuga, M., E. Asaah, C. Kattah, F. Rutatina, and R. Jamnadass. 2013. *Allanblackia* species: A model for the domestication of high potential tree crops in Africa. *Acta Horticulturae* 979, 311–318.

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The International Union for Conservation of Nature (IUCN) was motivated by its role in the partnership to ensure that the development of the new commodity would be done in an environmentally sound and socially equitable way and that biodiversity aspects were taken into account throughout the different steps of seed processing along the supply chain. A further incentive was a project funded by the Swiss State Secretariat for Economy (SECO) which saw IUCN undertake coordination and supervision, including the development of best-practice guidelines to be used by all stakeholders along the supply chain. These guidelines included advice on wild harvesting of *Allanblackia* seed, and assessments and implementation of ways to use the tree in forest landscape restoration.

The Union for Ethical BioTrade (UEBT) has been involved, in alignment with its mandate, to develop a sustainable standard and a verification framework for the *Allanblackia* supply chain. UEBT has also been identifying potential niche markets for *Allanblackia* oil and provided training on UEBT standards at the local level, especially in Ghana and Tanzania.

FORM International joined the Novella Partnership formally only in 2013 although an earlier collaboration started in 2010 when Form international supported Unilever to upscale *Allanblackia* production in Ghana. FORM helped to establish and manage an *Allanblackia* agroforestry demonstration farm of 65ha and then developed strategies to improve and expand production of *Allanblackia* plants and to monitor and evaluate the process of the cultivation and production. A sound *Allanblackia* business model was developed and training was offered to partners from Ghana, Nigeria and Tanzania. FORM's motivation to join the Novella partnership would thus appear to be solely a business one based on recognized expertise and track record.

National entities were overwhelmingly motivated by the potential to develop a new income-generating crop for smallholder farmers through partnership with the private sector and ICRAF. The fact that *Allanblackia* is a local crop was also a strong factor. That this partnership is being driven by Unilever, a non-CGIAR entity, with ICRAF one of the key partners, has meant that to some extent, CG considerations have been peripheral to the operations of the partnership.

### ***4. Nature and strength of partnership***

#### ***Partnership evolution***

In 2006, a research and development program was established, led by the World Agroforestry Center, to generate the knowledge required to domesticate the species in village nurseries.

In 2009, as a result of difficulties in managing the project with respect to focus, critical mass of partners, speed, and accountability, the partnership was restructured. A core team was formed of the following organizations, each of which bring specific expertise to the project and its key goal of proving that *Allanblackia* can be successfully scaled-up at large volumes with attractive prices: Unilever, World Forestry Center, IUCN, Union for Ethical Biotrade, Form International, and local *Allanblackia* companies (Novel Development Ghana Ltd, Novel Development Tanzania Ltd and Project Novella Nigeria/Rivers State Sustainable Development Agency).

The collaboration has been formalized via contracts between Unilever and the World Agroforestry Center, the local *Allanblackia* companies and Form International. An independent

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chairperson heads the team. There is also a technical team that meets and reports regularly, and a web-based tool has been established to share project information.

One national partner who was interviewed offered the following:

As the project progresses through different stages, the partnerships are being reviewed on a regular basis to ensure the right organizations are involved for the right activities. When a partner no longer fits the criteria of the partnership it will be replaced.

### *Contribution of core team partners*

Each of the partners is contributing to the project in-kind and financially:

- Unilever: business components, potential market outlet for Allanblackia, investment in product development and establishment of a supply chain.
- Local Allanblackia companies: implement local wild harvest supply chain, link to farmers, and implement components of the domestication activities (planting).
- World Agroforestry Center: development of propagation methods, gene conservation, and integration of Allanblackia into agroforestry farming systems.
- International Union for Conservation of Nature (IUCN): research into the ecology and abundance of Allanblackia, sustainable harvesting and biodiversity conservation.
- Union for Ethical Bioproducts: certification to organic and fair trade standards.
- Form International: designing and implementing planting models.

### *Contribution of partners in relation to need*

The success of the Novella Partnership is firmly grounded on national partners who provide local context and expertise. The National Agricultural Research Institutes and Stations (NARS) and local NGOs collaborate with leading international institutions to undertake domestication research, and to sensitise and mobilise rural communities. In addition, donors are and have been contributing to the project, including the International Fund for Agricultural Development (IFAD), The Dutch Ministry of External Affairs (through SNV Netherlands Development Organisation), Austrian Development Agency, Danish International Development Agency, UK Department for International Development, European Commission, German Federal Ministry for Economic Cooperation and Development (BMZ), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Swiss State Secretariat for Economic Affairs (SECO), Swiss Agency for Development and Cooperation (SDC) and Mars Inc.

The main actions of the partners, which belies their contributions, centre around:

- Sensitization and encouragement of farmers to participate in Allanblackia domestication
- Germplasm collection across the ecological range, development of propagation methods (sexual and asexual) and gene conservation
- Studies on ecology, abundance, sustainable harvesting and biodiversity conservation
- Integration of Allanblackia in agroforestry farming systems
- Facilitation and development of marketing networks and supply chains

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- Development of poverty alleviation options in the rural areas through promotion of Allanblackia.<sup>28</sup>

### *Country-level interactions*

The team composition and operation of the supply chain for Allanblackia varies in the three countries.

In Ghana, FORIG is the “anchor partner and even without the Novella Partnership or ICRAF, has its own programme on domestication of indigenous trees with economic value”.

In Nigeria, the supply chain is government led. Once collected, the Allanblackia seeds are dried and brought to collection centres where they undergo quality certification. The seeds are sent to central oil-extraction facilities for extraction under the supervision of the local Allanblackia companies. Most of the oil produced is purchased by Unilever, although the food company Nutriswiss and a cosmetic company have also purchased Allanblackia oil.

In Tanzania, there is a shift from farmers’ groups to a cooperative structure with greater private sector involvement.

### *5. Enabling systems*

The success of the partnership has depended on various factors,<sup>29</sup> primarily:

- Transparency
- Agreement on a common goal leading to common key performance indicators and the development of an agreed work plan
- Sharing of information, best practices and areas of key learning
- Contractual arrangements, which specify the deliverables
- Monitoring (through a neutral arbitrator) to ensure medium- and long-term goals are met
- Acknowledgment of successes.

The commitment of current partners is demonstrated by the time and resources they are investing in the project.

ICRAF is of the opinion that this is an example of a successful PPP, although Unilever feels that commercial success has yet to be proven.

### *6. Benefits from partnership*

From the literature and interviews it has become obvious that this PPP has generally given differential benefits to each partner.

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<sup>28</sup> Shrestha, R.B. and Akangaamkum, A.D. 2008. Novella partnership, a partnership for poverty reduction through sustainable enterprise development based on Allanblackia. SNV Ghana, Pp 20.

<sup>29</sup> Jamnadass R., Langford K., Anjarwalla P., and Mithöfer D. Public-Private Partnerships in Agroforestry. In: Neal Van Alfen, editor-in-chief. Encyclopedia of Agriculture and Food Systems, Vol. 4, San Diego: Elsevier; 2014. pp. 544-564.

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### **Technical**

The partnership has resulted in technical benefits for all members, especially in the area of the domestication process, with a noteworthy benefit being the ability to break seed dormancy and reduce the time for harvested seeds to germinate.

In terms of domestication, seedlings from 121 mother trees have been established in three genebanks and protocols for vegetative propagation (cuttings, grafting and marcotting) developed. Success rates in propagation continue to improve with close to 80% rooting achieved with cuttings and 70% with marcotting. The long seed dormancy period that has frustrated farmers in efforts to produce planting stocks is being reduced with 66% germination being achieved in 90 days. Additionally, ICRAF and NRIs have enabled vegetative propagation to produce higher yielding clonal planting material.

Although there is still significant work to be done, the first successes of the domestication programme have been reported: seed germination has been reduced from 7 to 3 months and the first generation of *Allanblackia* started fruiting after 6 years from seed. Domestication efforts will continue to further develop superior trees through vegetative propagation. These selections will bear fruit in less than 4–5 years, will grow vigorously and will fruit regularly with large fruit. Scientists are working with farmers to capture the most desirable traits from wild trees and reproduce superior types as clonal cultivars. Experiments are performed on farms, in rural resource centres and specific pilot plots. Rural resource centres, managed by national agriculture institutes in the participating countries, community groups, and local NGOs, also disseminate *Allanblackia* knowledge to farmers and serve as diffusion hubs for new technologies, germplasm and knowledge. They have their own tree nurseries, mother blocks (plots of female trees with desirable traits) and demonstration plots, and train farmers in *Allanblackia* propagation and cultivation. The seven centres in Ghana also support private satellite nurseries in villages near to remote farmers.<sup>30</sup>

Currently, efforts are focussed on the mass production of seedlings of selected, superior trees, and the development of sound agroforestry systems for large-scale integration of *Allanblackia* with other crop production systems on farms.

### **Social**

More than 10,000 farmers have planted 200,000 *Allanblackia* seedlings in Tanzania, Ghana, and Nigeria. The 15 rural resource centres in these three countries are providing training and seedlings to farmers.

### **Marketplace**

Functioning local supply chains are in operation in all three countries and there are approximately 250 local buyers that provide a link between harvesters and buyers.

A monitoring and evaluation program is being implemented which will provide the data needed to assess the future viability of the *Allanblackia* business.

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<sup>30</sup> Asaah E., Tchoundjeu Z., Ngahane W., Tsobeng A., Kouodiekong L., Jamnadass R., Simons AJ. 2011. *Allanblackia floribunda*: a new oil tree crop for Africa: amenability to grafting. *New Forests* 41:389-398

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### *Sustainable farming*

IUCN has produced guidelines on best practice for wild harvesting of *Allanblackia* and efforts are being made to ensure that the domestication programme enhances biodiversity. For example, the integration of *Allanblackia* into small-scale cocoa farms is being promoted in West Africa to support more biodiverse and resilient agricultural landscapes.

### *7. Unrealised expectations*

Currently, the potential market demand for *Allanblackia* oil (estimated at more than 30,000 ton per year) cannot be met by harvesting fruits of wild *Allanblackia*, which yields about 200 ton per year, although this fluctuates. It may be 10–15 years before the first yields of significant size will become available, so keeping farmers interested and enthused is a challenge.

In 2016 the project is expected to deliver sufficient data to conclude on the feasibility of upscaling *Allanblackia*

## ANNEX F 4. Scaling of Stress Tolerant Rice Variety (STRV) Technology Through Partnerships

### 1. Background

This partnership is a multi-year initiative to develop and deliver rice varieties tolerant abiotic stress to farmers in less favourable environments in South Asia (SA), primarily in East India, Bangladesh and Nepal. The project *Stress-Tolerant Rice for Africa and South Asia (STRASA)*<sup>31</sup>, funded by Bill & Melinda Gates Foundation (BMGF), is part of the GRiSP CG Research Program and is one of IRRI's megaprojects on stress tolerant rice varieties (STRVs).

The focus of this case study will be on East India, and only varieties tolerant to submergence & drought will be considered.

Overall, the STRASA has the following phases:

- Phase 1 (2007–Feb 2011), focused on the development of the STRVs
- Phase 2 (March 2011–Feb 2014), emphasized capacity strengthening for researchers and seed producers and promoting the exchange of germplasm and knowledge
- Phase 3 (Mar 2014 – Feb 2019)

### Partnership summary

IRRI launched STRASA in 2007 in collaboration with AfricaRice. The project's vision was to deliver stress-tolerant, high-yielding varieties to at least 18 million farmers in South Asia within 10 years. At the outset, the founding partners realized that to accomplish this vision would require partnership with many entities within national systems. Over time, a strong network of more than 690 partners was built in SA, including research institutions, governmental and non-governmental organizations, private sector and seed companies (private and public sector), most using their own resources.<sup>32</sup>

### Composition of partnership

- CGIAR Centers – IRRI, AfricaRice
- National programmes: Government of India through poverty alleviation and climate change programmes, including the “National Food Security Mission” and “Bringing Green Revolution to Eastern India”
- State governments in eastern India: Odisha, West Bengal, Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh
- Government of Bangladesh
- Government of Nepal
- International donors: USAID, EC, IFAD & BMGF
- NGOs: BRAC (Bangladesh)
- Balasore Social Service Society (BSSS), Odisha; Catholic Relief Services (CRS)

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<sup>31</sup> Project website at <http://strasa.irri.org/>

<sup>32</sup> Details of these in-kind contributions are provided in other relevant sections of this report, where available.



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- Private sector: West Bengal Seed Association (Kolkata), GMS Seeds Pvt. Ltd., Ramnagar Seeds Farm
- Farmers' organizations

### *Leadership & management structure (STRASA in South Asia)*

Dr Abdel Ismail is overall leader of the STRASA project, but there are also leaders assigned to areas like agronomy, social science, etc.

Regionally, a coordinator implements the program. The SA regional coordinator is Dr U.S. Singh.

In each country, there is also a National leader, under whom are specialists in different domains.

### *2. Motivation for involvement*

The CG Centers, IRRI and AfricaRice, saw the STRASA project as an opportunity to practice their principle of working with local partners to achieve sustainable outcomes and impact. Each operates through several partners specific for each country, including government, nongovernment, and private-sector partners.

Apart from individual entities, the project also aligned with existing networks such as the Consortium for Unfavorable Rice Environments ([CURE](#)), the International Network for Genetic Evaluation of Rice ([INGER](#)) and specialized networks for multilocation testing, including the East India Rainfed Shuttle Breeding Network (EIRLSBN). Many networks operational during Phases 1 and 2 are being strengthened and expanded for rigorous evaluation of stress-tolerant lines. The relationships with GRISP and CURE further ensure widespread distribution of STRASA STRV products beyond the target countries to generate potentially large spill over benefits.

One important national system partner, the small and medium private seed companies, appear to have initially been convinced by the public sector that there was a business opportunity. Gradually, they became important partners in the seed multiplication and distribution system. As the potential of the STRVs was increasingly demonstrated and local officials and communities became aware of the value of STRVs, the existing partners realized the need to enlist groups which had stronger grassroots presence, such as NGOs and civic groups.

The main motivation in almost all cases may be described as self-interest to benefit from participating.

### *3. Strength of partnership*

As a partnership model, STRASA STRV functions like a network with a CG Center (IRRI) providing much of the leadership, albeit shared with NRIs and organizations involved in agriculture development, achieving its goals through external and internal funding. Underpinning the strength of the partnership, many interviewees mentioned the strong commitment of all partners to a common goal of improving the livelihood of rice farmers in the marginal land and belief in the new STRV technology. While there are bilateral and tri-lateral formalized agreements, there does not appear to be a formalized compact that unites all the partners.

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A strength of the partnership is that individual partners all seem to be clear about their respective contributions to and roles in the different phases and parts of the partnership.

For example, the Indian government, through its two mega-schemes the National Food Security Mission (NFSM) and Bringing Green Revolution to Eastern India (BGREI), accepted STRVs from the STRASA project as a major technology for promotion through key programs and initiatives related to food security and climate change in SA. India provided substantial support for upscaling of these new varieties. Since 2015, Ministry of Agriculture & Farmers Welfare, Government of India, has allocated 30% of the budget for rice in NFSM and BGREI to the promotion of stress tolerant rice varieties. Most states in eastern India (Uttar Pradesh, Bihar, Odisha, Assam, Jharkhand, Chhattisgarh and West Bengal) used their own resources to take these varieties to needy farmers. In addition, the project attracted substantial additional investments from international sources and private companies.

The Umbrella STRASA project further succeeded in bringing countries in the region together to discuss and agree on crosscutting strategies to facilitate sharing of knowledge and germplasm. STRASA facilitated an agreement by India, Bangladesh and Nepal on 18 October 2014 to share the evaluation data and varieties released in their respective countries for release and commercialization in the other two countries. Under this agreement, India directly approved 4 stress tolerant rice varieties from Bangladesh and two from Nepal for cultivation in India. Similarly, Nepal notified one drought tolerant variety from India. This saved 4-5 years. All STRASA varieties are regularly tested in almost all Southeast Asian countries and some of them have been commercialized in the Philippines (two), Indonesia (five), and Myanmar (two). Additional resources are generated in these countries for out-scaling the varieties.

A substantial number of partners participated in various training activities, including 872 scientists from SA supported to attend formal training workshops at IRRI and in the region. In Bangladesh, the Department of Agricultural Extension (DAE) was supported to train 363 scientists through a training of trainers (ToTs) program in quality seed production and storage. More than 76,600 farmers (26% women) were trained in good management practices, and in quality seed production, handling, and storage.

### ***Contribution by partners to STRV development***

One strength of the partnership is that it includes partners with the strong technical capacity to develop the STRVs.

The project uses extensive trait discovery pipelines to provide tolerance alleles, protocols, and tools to accelerate variety development. The approach of transferring large-effect QTLs into mega-varieties through marker-assisted backcrossing (MABC) has been effective for tackling abiotic stresses, especially in the case of submergence tolerance.<sup>33</sup> Genes or QTLs conferring tolerance of submergence and drought have been accurately mapped and markers developed

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<sup>33</sup> Mackill DJ, Ismail AM, Singh US, Labios RV, Paris TR. 2012. Development and rapid adoption of submergence-tolerant (SUB1) rice varieties. *Adv. Agron.* **115**:299-252.

Ismail, A. M., Singh, U. S., Singh, S., Dar, M. H., & Mackill, D. J. 2013. The contribution of submergence-tolerant (Sub1) rice varieties to food security in flood-prone rainfed lowland areas in Asia. *Field Crops Research*, **152**: 83–93. doi:10.1016/j.fcr.2013.01.007.

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and deployed for developing new varieties. These varieties showed considerable impact in stress-affected areas.

Progress in Phase 3 is expected to be faster and more substantial using the newly restructured breeding pipelines and infrastructure, which include shorter breeding cycles and larger genetic gains, as well as the extensive evaluation networks such as MET, and the regional hub in SA. Many pipeline varieties with multiple stress tolerance will be available to farmers, along with knowledge on their improved management. The plan is to distribute these varieties to at least 14.6 million farmers in SA and properly document and track adoption and impact. The production of sufficient, high-quality seed required in this phase (about 323,000 tons through formal and informal means) will be facilitated through an expanded network of partners and alignment with local and regional initiatives.

### *Contribution of partners to implementation (delivery)*

The establishment of the networks in the three SA countries represents a clear strength. Table 1 shows growth in the number of partners involved in that part of the partnership concerned with the delivery of submergence STRVs in East India.

Within the STRASA partnership, seed multiplication is split among the various partners. The production and provision of breeder seed (BS) is the responsibility of NRIs, such as ICAR in India. Foundation seed (FS) is produced by various institutions including research institutes, federal and state agriculture and extension departments, seed corporations and private seed companies. Production of certified seed (CS) is carried out by these same organizations and also by individuals and groups of farmers after receiving training. There is also coordination of effort and linkage with programmes supported by state or national governments.

Table 1. STRV Swarna-Sub1 for submergence tolerance – number of partners engaged in delivery (out-scaling) in India. (Source: updated from Ismail et al., 2013, see note 33 above)

YEAR	No. PARTNERS
2007	21
2008	45
2009	100
2010	120
2011	131
2012	140
2016	194

IRRI/STRASA played a catalytic role in mustering strong support and commitment from national systems for all processes involved in out-scaling. Approximately 139500 tons of seed of Sub1 varieties (mainly Swarna-Sub1) was produced in the wet season of 2015 in SA, reaching about 5.58 million farmers, and covering more than 2.79 million ha during the WS of 2016.

The State government of Uttar Pradesh supported Narendra Dev University of Agriculture and Technology (NDUAT) to produce more than 180 tons of the STRV seed during the Wet Season of 2009, the year Swarna-Sub1 was released. This provided an impetus for rapid dissemination

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throughout India – a departure from the norm when only a limited quantity of seed is available at the time of a variety’s release, considerably slowing the dissemination process.

The State governments of Uttar Pradesh, Bihar, Odisha, and West Bengal initiated programmes to multiply and disseminate Swarna-Sub1 seed to cover about 1 million ha in each state over three years. These states are also promoting Swarna-Sub1 through other programmes such as seed villages, subsidized seed schemes, seed minikits and cluster demonstrations, all with the purpose of replacing Swarna with Swarna-Sub1 and bringing it to flood-prone areas where it had not previously been possible to grow modern varieties.

### Evolution of partnership

This is best shown by the figure below. The number of each type of partner, and the number of partner types committed to delivery of STRVs have increased over the period 2007 to 2013, covering the first two phases of the STRASA project.

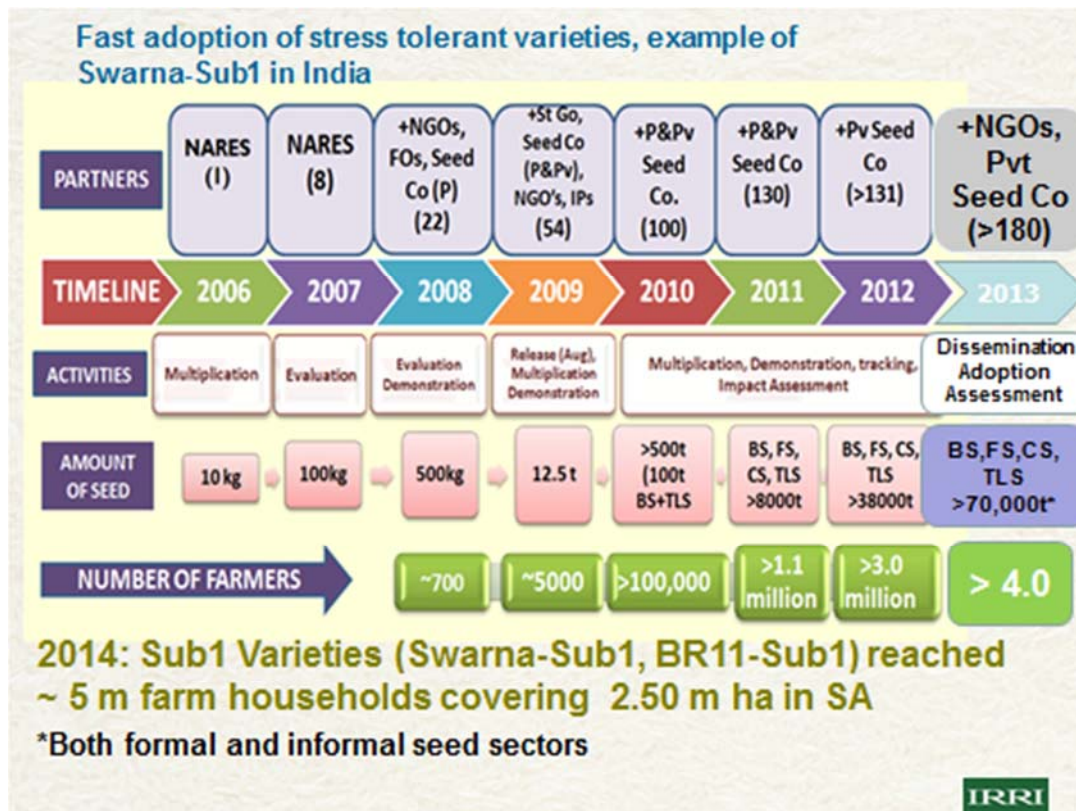


Figure 1. Evolution of partnership to deliver STRV for Submergence tolerance, Swarna-Sub1, in India. Key to Figure: FOs = Farmers’ Organizations; Seed co. (P) = Seed Companies (Public); Pv = Private; NGOs = non-government organizations; St. Go = State governments; IPs = international partners; BS = breeder seed; FS = foundation seed; CS = certified seed; TLS = truthfully labelled seed. (Source: Ismail et al., 2013 (see note 33 above); Ismail, pers. comm. 2016)

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### **4. Enabling systems**

While it is difficult to pinpoint any single critical factor responsible for the success of this partnership, several enablers stand out.

#### **A strong network of partners (>690 in South Asia)**

Most of these partners participated using their own resources. It was the first time that IRRI moved beyond research organizations to work with developmental organizations on such a large scale. Strong networks of seed dealers and distributors network in public and private sectors contributed not only to seed business but also to awareness generation about new varieties. This network made it possible to fast-track varietal release and quality seed multiplication and dissemination. The partnership also mobilized strong financial and policy support and commitment from policy makers. The Government of India became a partner and spent more than \$ 150 million over the last 6 years (2011-2016) to promote seed multiplication and dissemination of Sub1 varieties to farmers in flood-prone areas.

#### **Local officials receptive to a proven, useful new technology**

STRVs were demonstrated through 120 trials in seven stress-prone Indian states to some 27,000 farmers in 74 districts. State Agriculture Departments, Central Rice Research Institute (CRRI) and state agricultural universities (SAUs), District level staff, Krishi Vigyan Kendras (KVKs) and ICAR institutes were all active partners in creating awareness about STRVS.

#### **Presence of strong leaders and champions among partners**

Dr U.S. Singh, the South Asia Coordinator, was able to mobilize additional investments from state governments in eastern India, the government of Bangladesh, government of India, government of Nepal and international donors such as USAID, EC and IFAD.

The key NARES institutions such as ICAR came out in strong support of the technology, adopted it and internalized strategies, with financial support, to deliver the technology. This is exemplified by the large number of mini-kits and cluster demonstrations of the STRVs funded by the Indian government, which far surpassed what the project funding generated by IRRI was able to provide.

#### **Strong ownership of partnership to ensure scalability**

An important strategy of STRASA, and implicitly of the STRV partnership, is the development and assurance of strong ownership of the project products by national programs and partners and their free availability as public goods. The project works directly with relevant NARES in addressing problems that are of high priority to them and are part of their national strategies. In addition, the impacts of these stress-tolerant varieties on the livelihoods of poor farmers became apparent early in the project. Together, these factors ensured significant national support from partner countries for swift commercialization and delivery of these new varieties. Early successes built a momentum for partnering. Spill over is being seen in countries that are not the primary targets of this project, where numerous stress-tolerant varieties were released and others are being evaluated.

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Additionally, STRASA reduces risk by having multiple partners. By having a diversity of partners, STRASA has managed to break the national monopolies on collaboration.

For funds dispensed by the STRASA management, the rules and regulations under which the partnership has operated are the very strict financial and project management rules of IRRI. Transfer of funds from donors to partners *via* STRASA are accompanied by written agreements with a specific work plan and budget and review every year. Only 80% of the budget is released each year, with the rest after review. However, a large number of partners mainly seed companies are participating using their own resources.

STRASA is also embedded into GRiSP, thereby giving a larger framework for the project and the STRV objectives.

### **5. Benefits from partnership**

The STRV partnership has clearly demonstrated the maxim that “the whole is more than the sum of its parts”. In doing so, it allowed each partner to derive benefit from the partnership and demonstrate its contribution to solving the problem of abiotic stresses in rain fed rice-growing environments in marginal areas, whether it is in multiplication of certified seed or last mile delivery. *Ex post* scientific studies have documented the impact at different phases of the partnership.<sup>34</sup> For rice subject to short-duration submergence of 7-14 days, a 45% increase in yield of the varieties with the Sub-1 gene is common when compared with non-submergence tolerant varieties.

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<sup>34</sup> Singh US, Dar MH, Singh S, Zaidi NW, Bari MA, Mackill DJ, Collard BCY, Singh VN, Singh JP, Reddy JN, Singh RK, Ismail AM. 2013b. Field performance, dissemination, impact and tracking of submergence tolerant (Sub1) rice varieties in South Asia. *SABRAO J. Breed. Genet.* **45**:112-131.

Dar MH, Janvry A de, Emerick K, Raitzer D, Sadoulet E. 2013. Flood-tolerant rice cultivars reduce yield variability and raise expected yield, differentially benefitting socially disadvantaged groups. *Sci. Rep.* **3**:3315. DOI: 10.1038/srep03315.

Emerick, K., de Janvry, A., Sadoulet, E. and Dar, M.H. 2016. Technological Innovations, Downside Risk, and the Modernization of Agriculture. *American Economic Review*, **106**(6): 1537–1561. <http://dx.doi.org/10.1257/aer.20150474>



## ANNEX F 5. Seeds of Discovery

This case study is designed to illustrate CGIAR partnerships aimed at producing advanced and relatively more upstream research outputs and outcomes. The report is based on: (a) review of project documentation including detailed annual reports from 2001 to 2015, and all relevant web pages of CIMMYT and of project partners; (b) interviews (average 45 minutes long) with 13 non-CIMMYT, non-CGIAR partners of different types (ARI, NARS, private sector, government, students), and; (c) interviews with six CIMMYT managers and scientists.

### 1. Background

“Seeds of Discovery” (SeeD, also known in Mexico as MasAgro Biodiversidad) started as one of the four components<sup>35</sup> of the “Sustainable Modernization of Traditional Agriculture” (MasAgro) programme, a joint initiative of Mexico’s Ministry of Agriculture (SAGARPA) and of CIMMYT. MasAgro, and SeeD, were launched in April 2011.

CIMMYT is the custodian of 140,000 wheat seed samples and 28,000 maize seed samples.<sup>36</sup> In the original proposal to SAGARPA, CIMMYT argued that this vast genetic diversity remained a largely unknown and untapped resource, stored away in genebanks. SeeD was justified as an initiative to characterize (genetically and phenotypically) this genetic diversity, and make databases of this information available as international public goods. The project was presented by CIMMYT and heralded by the President of Mexico, as “a gift from Mexico to the World”.<sup>37</sup>

The emphasis was that this novel resource would make a significant contribution to sustaining the productivity and production of these cereals in a climate change context (drought and heat tolerance), while also allowing them to be more efficient users of nutrients and energy. SeeD has also worked on more conventional traits such as disease resistance and grain quality.

### Components and partners

SeeD has the following components:

1. Genotyping
2. Phenotyping
3. Pre-breeding
4. Capacity development, a component that includes both bioinformatics and software development, and training.

Together, genotyping and phenotyping are the heart of the project. They allow CIMMYT and its partners to: (a) systematically access the world’s largest maize and wheat seed collections; (b) use DNA-sequencing techniques and field experiments to establish the relationship between the genetic “fingerprints” and the traits of interest (e.g., drought tolerance or disease resistance),

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<sup>35</sup> The other components are MasAgro Wheat, MasAgro Maize, and MasAgro Farmers

<sup>36</sup> CIMMYT’s website

<sup>37</sup> <https://www.youtube.com/watch?v=4ztaTrJrC3U>

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thus building genetic maps for both crops, revealing the genetic information that was “hidden” in the genebank collections.

Non-CGIAR partners are involved in the **genotyping** and phenotyping components. In both of these components these partners play critical roles that could not be substituted by CIMMYT because of scientific capacity and expertise, location, staffing and funding constraints. Key genotyping partners include Mexico’s National Agricultural, Forestry and Livestock Research Institute (INIFAP) and University of Guadalajara, a Mexican seed company (NOVASEM), Cornell University, and a private company in Australia (Diversity Arrays Technology PTY Ltd, DARt).

With respect to the **phenotyping** work, important partners include INIFAP, the Mexican subsidiary of DuPont Pioneer, and India’s Council for Agricultural Research (ICAR) and Agricultural Research Institute (IARI).

The first two components have generated massive amounts of complex data, that needs to be properly curated, organized, stored and managed, in order for it to be a useful resource for its intended users. After storage, it needs to be visualized in user-friendly ways. The bioinformatics and software development activities, are thus also extremely important for the success of the project. CIMMYT depends on the work of non-CGIAR partners, prominently including DARt in Australia and public advanced research institutes in the United Kingdom (James Hutton Institute, Roslin Institute, and the National Institute of Agricultural Botany (NIAB). The UK’s Biotechnology and Biological Sciences Research Council (BBSRC), through its Newton Fund, supports some of the UK partners’ work in this area. In Mexico, the University of Guadalajara and a private seed company (UNISEM), also contribute to this sub-component.

The **pre-breeding component** uses the novel genetic data generated to identify sources of trait improvement and to introgress that variation into existing, well-adapted and well-performing wheat and maize varieties, to improve one or more traits. These are the materials that CIMMYT will then make available to plant breeders from around the world. There are several partners involved in the pre-breeding component, including:

- Mexico: INIFAP and DuPont Pioneer in Mexico
- India, the Punjab Agricultural University (PAU), CSK HPKV, Palampur; IARI, New Delhi; Indian Institute of wheat and Barley research, Karnal (IIWBR); National Institute of Abiotic Stress Management, Pune
- Pakistan: Nuclear Institute of Agriculture, Tandojam, Sindh, Pakistan
- Iran: Dryland Agriculture Research Institute, Maragheh, Iran
- Kenya: KALRO, Njoro, Kenya
- China: Wheat Research Institute, Academy Agricultural Sciences, Ganzou, China
- USA: Washington State University, South Dakota State University, USA).

In the upcoming crop season, ten new partners from India (five), China (three), and Pakistan (two) will join the program.

In addition, since the novel genetic information is freely accessible, any public or private organization can do its own pre-breeding work.



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The **training sub-component** supports graduate and postgraduate students and established plant breeders to understand and make use of the methods and tools used in the different components, and to access and use the genetic data produced by the project. Mexico's Universidad Autónoma Agraria Antonio Narro, Universidad Autónoma de Nuevo León and Instituto Tecnológico de Sonora are partners in this component, together with DuPont Pioneer, Iowa State University and Cornell University.

Finally, it should be mentioned that CIMMYT, SAGARPA through the Centro Nacional de Recursos Genéticos, and DArT, created and maintain a laboratory known as SAGA (Servicio de Análisis Genético para la Agricultura, or Genetic Analysis Services for Agriculture) today housed in CIMMYT. The idea is that SAGA can become a self-sustaining, probably legally-independent joint venture organization that can continue to provide genomic services to Mexican public and private clients after SeeD and/or MasAgro end. The SAGA initiative would institutionalize and sustain some of the partnerships created by SeeD. This initiative has been slow to take off because the partners have been unable to define a self-sustaining, fee-charging business model that can fit within the legal constraints that affect CIMMYT and the Mexican official partners. DArT is keen to make it work and to work with SAGA as a networked laboratory, in a manner similar to what is starting to take place in Kenya with a lab based in ILRI's BESA campus.

Many of the Mexican partners have been selected through an open call competitive process. The evaluation committee includes CIMMYT and external partners who have played that role for a few years.

Overall, there are about 20 partners, of which 17 have been funded by the MasAgro Biodiversidad project. Of the partners, 53% are Mexican and the rest are international; the latter group almost disappears in 2015 and 2016. Table 1 lists the partners by component.

Table 1. Partners by component

Component or sub-component	In Mexico	Outside Mexico
Genotyping	INIFAP, CINVESTAV (LANGEBIO)	Cornell University, DArT
Phenotyping	INIFAP, Pioneer, CINVESTAV, PROSECOP, ICAMEX, UAAAN, UACH, UAEM, UdeG, Univ. Politec. Fco I Madero	Pantnagar University; Punjab Agricultural University; CSK HPKV Palampur; IARI New Delhi; National Institute of Agriculture, Tandojam, Sindh, Pakistan; Dryland Agriculture Research Institute, Maragheh, Iran; KALRO, Njoro, Kenya
Pre-breeding	INIFAP, Pioneer	Pantnagar University; Punjab Agricultural University; CSK HPKV Palampur; IARI New Delhi; National Institute of Agriculture, Tandojam, Sindh, Pakistan; Dryland Agriculture Research Institute, Maragheh, Iran; KALRO, Njoro, Kenya

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Bioinformatics		Earlham Institute (UK), Cornell University; James Hutton Institute; Roslin Institute; DArT
Training	Instituto Nacional de Investigaciones Forestales y Agropecuarias (INIFAP), Universidad Autónoma Agraria Antonio Narro, Universidad Autónoma de Nuevo León, Universidad de Guadalajara, Colegio de Postgraduados, Centro de Investigación y Estudios Avanzados (CINVESTAV), Instituto Tecnológico de Roque, Universidad Autónoma Chapingo, Universidad Autónoma del Estado de México, Instituto Tecnológico de Sonora, and Universidad de Occidente.	Cambridge University, Iowa State University, Cornell University, Texas A&M University, North Carolina State University
Donors	SAGARPA	CGIAR (window 1 and window 2 grants to WHEAT and MAIZE). BBSRC

### *SeeD and MasAgro Biodiversidad within CIMMYT*

It takes some effort to understand the relationships and differences among MasAgro Biodiversidad, SeeD and some of the components of the WHEAT and MAIZE CRPs. A relatively complex nested structure has been created within CIMMYT:

- All the SeeD activities and outputs are mapped to Flagship Products 2 of the WHEAT and MAIZE CRPs. SeeD could be seen as a subset of the WHEAT and MAIZE CRPs.
- SeeD is also described as a “multi-project initiative” that today includes as its basic units the MasAgro Biodiversidad component of the overall MasAgro program; the CGIAR’s MAIZE and WHEAT CRPs, and; a computational infrastructure and data analysis project supported by the UK’s Biotechnology and Biological Sciences Research Council (BBSRC).<sup>38</sup>
- MasAgro Biodiversidad refers to the components, activities and outputs funded by the Mexican government, which by and large prevents the use of its resources to support the work of international partners outside the country. Thus, MasAgro Biodiversidad is a subset of SeeD, while also being one of the four components of the overall MasAgro project.

This convoluted organizational arrangement to cover what — at the level of SeeD — are essentially well integrated objectives, components, activities and outputs, is a direct result of

<sup>38</sup> CIMMYT. Undated. Seeds of Discovery. Brochure.

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the obligation of CIMMYT to accommodate the requirements, rules and guidelines of different donors, mainly the CGIAR and the government of Mexico. As one might expect, interviewees reported that this nested arrangement increases transaction costs due to unnecessary layers, additional reporting, and the need to “compartmentalize” the staff and their time according to the different sources that fund their work.

From the perspective of partnerships, this arrangement contributes to a problem that will be discussed in detail later, namely the difficulty of external partners to have a better understanding of the overall project, or, as one source said, “to have a sense of the bigger picture.” While the need to differentiate SeeD and MasAgro Biodiversidad has been driven by the government of Mexico’s constraints on the use of its funding, an additional underlying issue is that a fundamentally bilateral project needs to respond to the requirements of a donor (the CGIAR in this case) whose contribution to the project is minimal.

### **Funding**

SeeD/MasAgro Biodiversidad was started with the support of the government of Mexico, and Mexican funding continues to account for more than 85% of the annual budget. The original commitment of the government of Mexico was a cash contribution of USD 138 million over a ten-year period for the MasAgro programme as a whole. Of this, about one third was for the gene discovery component that was so central to the project’s narrative and justification. In half that period, between 2011 and 2015, the actual contribution of Mexico has been USD 118 million, of which 34% has been used by SeeD. It has been, by far, the largest ever commitment of a developing country in support of a CGIAR Center.

The support from Mexico to MasAgro/SeeD has been maintained by two governments led by two different political parties, something that is mentioned with admiration by the Mexican sources interviewed. In 2013-2014, however, the government introduced some changes in its policy regarding MasAgro. These changes resulted first in a reduction of 27% of the 2014 contribution relative to the average of previous years. Secondly, the government required that its funding be used mostly to support the work in Mexico by CIMMYT and its Mexican partners. This measure impacted more strongly on SeeD because it is the more upstream component of MasAgro and the one that relied to a greater extent on international partners. SeeD’s budget cut was 53% relative to the average of the preceding years. MasAgro Biodiversidad used to receive around 38% of the Mexican funds; in recent years it is receiving slightly less than 30%, about USD 3.9 million per year.<sup>39</sup> One should note, however, that the contribution of Mexico at its lowest point, continues to be 13% higher than the USD 13.8 million per year that was the original commitment of the national government.

Two factors probably explain the strong and continued commitment of Mexico to supporting MasAgro. The first is the very strong alliances that the project has established with several of the state (provincial) governments of Mexico, led by governors from different political parties, as well as with several Mexican agricultural and agrifood private sector firms and with private sector associations. These public and private sector users of MasAgro technology are among the project’s most important partners as allies in the policy-making process that results in the

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<sup>39</sup> Actual contributions were USD 4.49 million, USD 4.07 million, and USD 3.19 million in 2014, 2015 and 2016.

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annual budget. With this support, CIMMYT has been capable of making a credible argument and winning the support, by now, of three different ministers of agriculture. The second factor in maintaining support for SeeD is the results in maize and wheat yield and sustainable intensification shown in different parts of Mexico by the more downstream component of MasAgro – MasAgro Farmer. These farmer-level results in fact are the main argument used by the government sources interviewed to explain why it continues to make sense for Mexico to invest in this project.

The support of the government of Mexico has been complemented with grants from the UK's BBSRC, and from the CGIAR through the WHEAT and MAIZE CRPs. These contributions amount to approximately USD 2.1 million over three years, and part of this funding (particularly BBSRC's) went directly to SeeD partners other than CIMMYT. In addition, private seed and R&D companies, NARIs in Mexico and elsewhere, and several universities and research institutes in OECD countries, have made important in kind contributions, mainly in the form of researcher's time, access to software, use of laboratories and field experiments.

It should be noted that between a quarter and a third of the SeeD partnership agreements do not involve funding support in either direction, or a very minimal level of funding compared to the actual in-kind contributions of the partners.

### **2. Motivation for involvement**

As noted above, SeeD has about 20 direct partners, i.e. those with whom it has formal agreements. The key partners are of six types:

- Advanced research institutes and universities in OECD countries
- Private biotech companies
- Mexican national research institutes and universities
- National research institutes and universities in other developing countries like (prominently) India and Guatemala
- Private large, medium and small seed companies
- Governments that fund the project

As expected, the motivations for participation vary across these types of partners. Scientists in advanced research institutes and in advanced biotech companies, almost unanimously highlight the fact that SeeD is an unprecedented project in scientific complexity and scope.<sup>40</sup> Several of them mentioned that they see SeeD as a unique opportunity to upgrade their methods and tools to be able to deal with the challenge of making available the genetic diversity of the largest collections of wheat and maize varieties and landraces, characterizing tens of thousands of wheat and maize samples and of managing the resulting data. For example, one partner argues that

“[N]atural variation in maize landraces hold[s] the future of maize agriculture. It is clear we cannot do the experiments in the USA: we do not have all the environments relevant for climate change, nor all the skills. It is clear that leadership needed to come from Mexico.”

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<sup>40</sup> According to one source, comparable only to the “3000 genomes” project of IRRI and China.

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For some partners in advanced research institutes, applying their science to global food security is an incentive. These motives are strong enough for several of them to make sizable in-kind contributions to the project, or to direct funding from their own projects and sources to SeeD-related activities.

Breeders in seed companies and in developing country NARS, express two main reasons for their participation. First, having direct and early access to the novel genetic diversity that is being discovered by SeeD, to use it in their own breeding programs to improve the materials available in their country. And secondly, the development of their capacities and their professional reputation, as a result of working with scientists that they and their peers consider among the best in the world. For the private sector seed companies, there is of course the expectation that in the medium and long term this collaboration will result in their varieties being more competitive and thus more profitable.

All breeders and scientists expressed great interest in the fact that SeeD would yield methods, tools and information that would greatly accelerate their genetic or bioinformatics research and plant breeding programs and result in significant cost reductions. As one source explained, “given the funding environment, greater efficiency and cutting costs is very important.”

The primary motivation of the Mexican private agrifood sector, which provided political support to the project, and of the Mexican national and state-level governments, are similar. They see maize, and to a lesser extent wheat, as very important components of their agricultural sector and of consumers’ basic diet. The volatility of maize yields and production is a cause of serious concern, as is the fact that close to three million smallholder farmers, depend partly on maize for their livelihoods and their household food security. These partners hope that MasAgro will make a contribution to improving and stabilizing yields and production. The agrifood private sector does have a view that Mexican agriculture needs to be more science-based, an idea that is at least nominally shared by several policy makers; CIMMYT is seen as an important contributor to this goal.<sup>41</sup>

### **3. Strength of partnership**

All but one of the 13 non-CIMMYT SeeD partners interviewed consider this to be a very successful project, both in terms of progress made against its own objectives and also in terms of meeting these partners’ particular expectations and priorities. The effectiveness and quality of the partnership is generally assessed as high to very high, and those who have worked in other partnerships with other CGIAR Centers have a very high opinion of SeeD relative to their other experiences. Some sources mentioned that the quality and effectiveness of SeeD is above average even when compared with partnerships among advanced research institutes within OECD countries:

“... given the magnitude of the project, this project delivered far better than most projects of the CGIAR or of the USDA that I know. This project was rolling and producing

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<sup>41</sup> As is normal nowadays, this is a contentious expectation. There are other actors in Mexico who identify CIMMYT and MasAgro with a type of “industrial agriculture” that they reject as a model for their country. The issue of transgenic maize is a very sensitive issue in Mexico, and while CIMMYT is not doing any research of this kind in the country, it is seen by many as part of the pro-GMO side in the dispute.

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data and results within one year. I've seen all sorts of CGIAR bioinformatics projects not delivering anything after five or even nine years" (Senior scientist in an advance research institute in an OECD country)

CIMMYT managers and scientists are of the opinion that they engage in real partnerships in the sense that there is a co-development of scientific and technological results with their partners. Everyone at CIMMYT agrees that it would be impossible for CIMMYT to have done SeeD or anything remotely comparable in the absence of these partnerships.

The partners believe the same: regardless of their position in the project, they consider that their contributions are important and meaningful and, in many instances, critical to the overall success of the program. Some see this at a more strategic level in that the effect of their participation is truly strategic, and, to some extent, not easy to replace due to the advanced knowledge and other capacities they possess. In other cases, the contributions are more tactical and often other partners could do the same work equally well. Some partners are selected because of their own specific capacities, while others probably because they have access to geographies that are important for the project (e.g., some of the phenotyping needs to be done in certain environments).

The opinions of the partners are in general agreement with the CIMMYT view of "co-development", but are more nuanced, and vary according to the original expectations of the partners themselves. Those partners who are in SeeD for scientific reasons, aired the following views on the quality of partnerships:

- Several of the ARI partners did participate on more or less equal terms with CIMMYT staff, in the development of the early ideas and research design. For example, some attended the original meeting in Los Angeles, California, where CIMMYT gathered a small group of scientists to ask whether it was possible to characterize the wheat and maize genebanks, and if so, how. In two days, that meeting came up with what one source called "a reasonable and balanced compromise" that solved debates that had been going on for a long time in the international scientific community. Another example is that the proposals to BBSRC that support the work of the all-important group of UK partners, were developed and written jointly by CIMMYT and by scientists of the different institutes; the SeeD-related work funded by the Newton Fund is led by a non-CIMMYT scientist.
- Some partners see the nature of the partnership evolving from "true scientific partnership" to "something close to service provision" as the different initiatives mature. One source explained that this evolution was natural and made sense. When the problem is new and the science, methods and tools need to be established, partners need to work with each other to develop the best possible solutions. Once that has occurred, it becomes a matter of applying those solutions to carry out segments of the work that need to be done. They see this as a normal and cyclical process: "At the start, during the design of the project and the experiment design. I was very much at the table. During implementation, I was involved in the analysis, but not involved in the implementation of the experiments. There are other groups doing that."
- Some ARI partners, which CIMMYT considers to be engaged in true scientific partnerships, believe that their participation in scientific research and outputs has been

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below their expectations: “From the start, I was always under the idea that we would be full partners and would derive scientific results, but it has been basically providing a solution. We have only submitted one scientific paper out of this collaboration. We are not a service department; it is easy to see informatics people as service or solution providers, that is a general problem.”

Partners involved in the phenotyping and pre-breeding work also are generally happy and satisfied with the quality of the partnership and with the results they have achieved. They also value the opportunities for their own capacity development. However, they too raise some issues:

- Most of them see themselves as being involved in service provision and believe that they have a lesser role in the design of the overall research initiatives within which their specific tasks fit. They do participate to some extent in deciding tactical issues, such as for example the specific traits they will be working on, or the field experiment designs. Also, these partners have less access and less frequent access to and dialogue with the top CIMMYT project managers and leaders, who, by contrast, engage sometimes on a weekly basis with some of the ARI partners. CIMMYT staff visit their experiments periodically, and this is explained by CIMMYT as opportunities for technical and scientific dialogue and engagement and for data gathering, but some partners see this as “supervision visits”.
- These partners have little knowledge of what is happening in the SeeD/MasAgro Biodiversidad project as a whole, except in very general terms. They have had little if any opportunity to learn about the initiatives or results of other components, particularly the genotyping and bioinformatics, or even about the phenotyping and pre-breeding work elsewhere. They believe that as project partners they are entitled to be informed, and that this would be good for their own capacity development.
- While the collaborations involving ARI partners are often multi-lateral and they have ample opportunity to engage with others besides CIMMYT, the relationship with downstream partners are almost all purely bilateral. This reduces the opportunities for these partners to obtain more from their participation in SeeD/MasAgro Biodiversidad.
- Partners from developing country NARS often are underfunded by their own institutes and governments. They would like CIMMYT to allocate more resources to the pre-breeding work, which is where their interests lie.

In summary, the code word “co-development” used and treasured by CIMMYT, probably has two different meanings. From the view of the overall project strategy (gene discovery and characterization; pre-breeding; capacity development to enhance the use of results; use of the germplasm to improve varieties) there is no doubt whatsoever that CIMMYT and its partners co-develop and jointly manage, implement and fund (in cash or in kind) the total “production line”.

If, however, we take any single link in that chain, co-development and joint implementation take place to quite different degrees. A general rule (which does not apply in every single case) is that there are truer partnerships and more co-development in the upstream links where partners have unique and highly-valuable capacities that CIMMYT does not possess. In a sense this is no different than any complex process involving advanced science at one end and more broadly

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available services at the other end, but there is plenty of room for CIMMYT to improve the ways in which downstream partners (phenotyping and pre-breeding) can benefit more from and contribute in better ways to SeeD. Two obvious and probably feasible ways in which such improvements could take place would be to invest in better communication tools that can link partners among themselves, and to convene more frequent SeeD scientific meetings in which all partners can present and discuss their results.

SeeD does not have a formal learning and knowledge management strategy. This is not to say that these all-important activities do not take place, but rather that the knowledge is tacit, learning is *ad hoc*, and the institutional memory is limited to a large extent to the project reports to the donors. This is particularly true for learning and knowledge management about partnering and partnerships; while CIMMYT has a wealth of experience, and while the partners interviewed also have derived important lessons from their collaboration in SeeD, this is all individual learning and tacit knowledge.

Does it make sense for SeeD to develop its own learning and knowledge management strategies, methods and tools? Probably not. This is an area where CIMMYT-wide solutions should be available, and where the CGIAR system units should be providing some support.

### 4. Enabling systems

Questions about logistics, administrative, reporting, communications and other management systems were addressed at three levels of provision: the different CGIAR system units, the Center, and the SeeD project itself.

**The CGIAR system** is non-existent when it comes to any type of support concerning partnerships. Scientists and managers recognize that while in areas such as gender in science the CGIAR has made significant contributions, when asked about the field of partnerships and of SeeD partnerships in particular, they are unable to identify a single contribution. Some do mention the advice of the Independent Science and Partnerships Council during the review of CRP proposals, but by and large the quality and relevance of the analysis regarding partnerships is seen as mediocre and of limited value.

**Partners** generally have a positive opinion of the support provided by the SeeD managers. Two representative comments are: “The logistics and the management were very good” and “Top job; superb logistics and management. A huge and complex task and they delivered.” However, others thought that, while reasonably good, there were areas in which support systems were below the best international standards for scientific organizations, particularly in the use of cutting-edge project management and project communications tools.

**CIMMYT and SeeD managers** have developed and adopted a number of systems and tools to improve the efficiency and to reduce the costs of partnering and of partnership management. Prominent examples include:

- A legal services unit that plays a critical role in helping SeeD scientists to deal with such issues as intellectual property rights, patents and so on. The legal services office is also responsible for approving contracts and agreements with partners.
- An open call competitive mechanism to identify, evaluate and select partnership projects, based on ideas developed by the partners in response to guidelines and



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priorities developed by CIMMYT. This mechanism is very well thought of by CIMMYT and by the partners involved.

- A standard log frame and milestone-based contract for all partnerships, which is effectively linked to reporting tools and systems. While CIMMYT needs to deliver lengthy and detailed quarterly reports to SAGARPA covering every single milestone and activity in every MasAgro component, this cumbersome and time-consuming task is almost totally transparent to the individual partners, who need only produce relatively simple reports that are captured in a spreadsheet-based system that has been developed and improved continuously over the years.
- Good support from a designated CIMMYT staff member to every SeeD partnership. Contact is frequent, informal and collegial, and allows most implementation problems that may arise to be dealt with expediently.

Partners flag certain shortcomings in terms of the support systems:

- Project management and communication systems are below the standards used by several of the ARIs in their own institutes and environments. This is raised in particular in connection with the difficulty that partners have in getting good information about what is going on in the SeeD project as a whole.
- One frequent complaint among the CIMMYT partners interviewed is the length of time it takes to get contracts approved by CIMMYT. One partner complained that the standard contract of CIMMYT clashes with the legal requirements of his university, and that resolving the problem has been a cumbersome problem.
- For those partners who receive funding through CIMMYT/MasAgro from the government of Mexico (mostly but not exclusively partners in the country), a major hurdle is that government funds do not reach CIMMYT for the first several months of each year<sup>42</sup>. This is a generalized problem in Mexico, not limited to SAGARPA or to MasAgro. CIMMYT, in turn, has a rule that agreements cannot be signed or funds disbursed to partners, until the government has officially approved and signed the annual agreement with CIMMYT and begun transfer of funds. This means that for several months each year, partners must trust CIMMYT to eventually cover the costs of their work in the first months of the year.

However, *by far* the biggest limitation on partners and partnerships is that funding is decided, contracted and allocated on an annual basis. External partners and CIMMYT staff alike argue that this is a severe limitation on the type of research that can be planned and approved. One senior scientist argued that this type of funding is a disincentive to young and mid-career researchers who are looking for less uncertain opportunities. It also creates transaction costs as it forces the agreement of new contracts every year, and also because researchers and administrators have to be 'creative' in dealing with experiments that start in one year and end in another, which is an everyday occurrence in agricultural and biological research.

The legal status of CIMMYT has been a factor preventing SAGA, the joint venture genomic services laboratory, from taking off as an independent and self-sustaining organization.

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<sup>42</sup> This problem affects other donors as well. As of September 2016, CIMMYT had not received the annual grants from USAID.

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However, it is possible that CIMMYT is simply trying to find ways to do things that it is not legally entitled to do. The same legal status that blocks SAGA allows CIMMYT to receive almost all of its funding.

### **5. Benefits from partnership**

According to CIMMYT, some of the main results of SeeD are:

- 100,000 wheat and 31,000 maize accessions have been genotyped, including all of CIMMYT's maize genebank and 30,000 of ICARDA's wheat collection (using CRP WHEAT funds)
- Around 5,000 maize landraces have been evaluated for a range of traits, 400 of the landraces have been used in pre-breeding programs to improve germplasm for disease resistance, drought tolerance, and improved nutritional and grain quality
- Over 1,000 wheat bridging lines have been delivered to partners around the world for use in their breeding programs
- About 250 researchers have been trained in the use of novel genotyping and phenotyping methods, as well as in genetic data management and use
- Around 13 graduate and postgraduate students per year have conducted their research within SeeD.

Public and private sector partners interviewed highlight the following additional results:

- “We now have some of the key landrace genes that are involved in drought resistance, water logging, and a lot of issues of climate change adaptation. We are publishing this in the very best journals, but most importantly, we really have new variation with a far greater potential for climate change adaptation.”
- Generation of an “unprecedented and well-curated genetic resources database”, that will accelerate and increase the precision and effectiveness of breeding programs, while also making available novel genetic diversity for a large number of traits in both maize and wheat.
- Improvement of research methods and tools to be able to accommodate the size and complexity of the SeeD project; these are now being used by other research organizations from a number of countries around the world, including other CGIAR Centers such as IITA and CIP.
- Engagement and contribution of CIMMYT and SeeD partners in larger international genetic diversity initiatives, such as DivSeek.
- Genetic materials (pre-breeding lines) that are being used by private seed companies (large, medium and small) and by NARs breeding programs from around the world.
- Several scientists mentioned that their association with SeeD had resulted in a reputational gain for them and their institutes. In turn, this recognition has turned into new partnerships (including with other CGIAR Centers) and business or funding opportunities.
- Students who have done their research within SeeD explain that the support they have received is far better than anything that their peers are getting from the regular educational system. For example, they were able to attend several international

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conferences and courses, and had regular access and feedback about their research from senior CIMMYT scientists.

- An increased market share for Mexican small and medium seed companies working with CIMMYT from 25% to 35% in the past four years
- Increased wheat and maize yields on almost 1 million hectares in Mexico.
- The contribution made by Mexico to global food security through investment in CIMMYT.

### 6. Conclusions

As should by now be clear, SeeD is a success story when it comes to the CGIAR engaging in more strategic, efficient and more results and impact-oriented partnerships.

SeeD is not a product of the CGIAR reform as it is largely the result of a bilateral project very generously funded by a developing country. SeeD was not evaluated, approved, contracted or funded through the post-reform CGIAR systems and structures. Its links with the MAIZE and WHEAT CRPs are more a formal arrangement to meet CGIAR requirements, in the sense that SeeD could go on in the absence of these CRPs. However, SeeD probably benefited from the post-reform environment that prioritized and valued larger and better integrated projects designed with a strategic outlook, initiatives that almost by definition required the construction of solid partnerships with a diversity of collaborators to be able to deliver.

SeeD demonstrates that this type of project can take place successfully in the context of bilateral funding, and in a sense erodes the frequent complaint of CGIAR Center leaders that the drop in core or semi-core funding (the so called windows 1 and 2 funds) will be catastrophic for the Centers.

SeeD also shows that funding from emerging economies in the South, while driven by national interests and national impact objectives, can also be directed to support advanced science of upstream and midstream to deliver international public goods. This requires a carefully-constructed balance between the international mission of the Centers and the domestic interests of the donor. This is a new setting for the CGIAR Centers that puts into question the classic idea that domestic work is somebody else's job. Today's funding environment is far more diverse and complex than it used to be in the golden years of CGIAR. The notion that that classic funding model is the golden standard, and that any deviation from it is something to be corrected, can only lead to continuous frustration in today's world.

Despite its overall success as a scientific partnership, there are some quite evident opportunities to improve SeeD, and some of these are probably applicable to other CGIAR partnerships:

- Annual funding is a reality that is here to stay. The CGIAR needs to think hard and develop financial mechanisms and instruments that allow risk sharing, so that medium and long term projects and partnerships that are funded on an annual basis can in fact plan and work as if the funding was multi-annual.
- Developing countries like Mexico, but also others who are gaining prominence as CGIAR donors (including India, Nigeria, and Colombia, for example) should relax restrictions on funding of international partners. Such restrictions limit technology transfer from some of the best research organizations in the world to national partners and constrain the

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capacity development potential of these projects. The key criterion should not be to exclude international partners, but to require international partners to work in close partnership with national agencies and, in doing so, make a meaningful contribution to the country's priorities and to capacity development of national partners.

- “Co-development” cannot be defined only to mean that non-CGIAR partners bring to the table critical capacities and assets without which the project would not be viable, and that each partner is a more or less equal actor within the boundaries of the specific sets of tasks or component of the overall project in which it is engaged. In complex projects such as SeeD, true partnerships and co-development need also to happen at the level of the full project. Three obvious measures to move forward are: (a) the implementation of project steering committees that include external partner representatives and that are empowered to make strategic decisions; (b) better project management and communication systems that allow every project partner to be aware of the bigger picture, and; (c) periodic project meetings in which all the partners can present and discuss their results and share ideas for their future work.
- Those partners that have or control unique and highly specialized and sophisticated assets (knowledge, expertise, staff, laboratories) have of course more power in the principal-agent relationship that is inherent to every partnership, and thus are likely to receive a better deal. There is still an imbalance in the way SeeD engages with these and with less advanced partners, many of which happen to be from the developing countries in which CIMMYT is working. It would not only be just for CIMMYT to reduce this imbalance, it would also be good in the medium term for its own legitimate self-interests. It is commendable that SeeD includes a capacity development component, but its share of the MasAgro/Biodiversidad budget in 2014 and 2015 was 15% and 10%, respectively, down from 33% and 31% in 2012 and 2013; perhaps that is something worth looking at. In addition, projects like SeeD should maintain regular consultation and substantive discussion fora where partners involved in the mid- and downstream segments of the project can interact among themselves and with the international staff. There are limitations to what can be asked for and expected, as the CGIAR Centers cannot substitute for the systematic under-investment of national and international donors in NARS, but it is important to be equally clear and explicit about the rights and duties of all partners, regardless of their precise contribution
- The increased reliance on contract-based relationships that have at their core a very clear set of milestones to be delivered by each partner in a given time and within a given budget, has served many positive purposes. But this system has also made it very difficult to give enough space to the legitimate expectations of each partner about tangible and intangible results that are not of the partnership itself. An example is that a project and a contract designed to genotype X number of seed samples under Y and Z conditions, may not take into account the expectation of the partner to be able to publish one or more articles in a top-ranking journal. Giving reasonable space for legitimate “by-products” of a partnership, is probably necessary or at least useful to develop greater trust and a sense of obligation or reciprocity with the partnership.

## **ANNEX F 6. Partnerships for research on metabolomics at RTB**

This case study is designed to illustrate CGIAR partnerships aimed at producing advanced research outputs and outcomes. The report is based on: (a) review of project documentation, and all relevant web pages of the RTB CRP and of project partners; (b) interviews with seven scientists and project managers from the two non-CGIAR partners (CIRAD and RHUL) and from each of the CGIAR centers participating in the project (CIAT, Bioversity, IITA and CIP), and with the RTB CRP Director. Luis Augusto Becerra (CIAT), Michael Friedmann (RTB), Zandra Vasquez (RTB) and Antonio Ricardo Sánchez (CIP), kindly and efficiently compiled and made available project and budget documentation.

### **1. Background**

This case study is about the partnership established to design and implement the project “Enhancing global RTB productivity through more targeted use of global diversity”. The project has been underway since 2012, as part of the Roots, Tubers and Bananas CGIAR Research Program (RTB), which is the source of funding.

This project was approved as a “complementary project” under themes 1 (conserving and accessing genetic resources) and 2 (accelerating the development and selection of cultivars with higher, more stable yield and added value) of RTB. The phase I proposal was submitted in August 2012. In July 2015 the same participants (this time with CIRAD and Royal Holloway University London (RHUL) identified as participating centers) presented a phase II proposal.<sup>43</sup>

The budget requested in the phase I project proposal was USD 4.7 million, while the actual funding contributed by RTB in the period 2012-2015 was USD 5.7 million, with an additional USD 1.3 million in 2016 during the transition between the phase 1 and phase 2. The difference in the actual vs the requested budget is a sign of the importance that the RTB leadership assigns to this particular project as one that can make a very important scientific contribution. The total of USD 7 million (2012-2016), was distributed as follows across centers: CIP, 30%; IITA, 20%; Bioversity and CIAT, 17% each; RHUL, 13%, and; CIRAD, 3%.

This project was selected as a case study, among other reasons, because the Director of RTB considered one of its components to be one of the main outputs of RTB, characterizing it as “a game-changer”. This component, metabolite profiling, or metabolomics, was designated as the key feature of interest for the case study. The key question of this study is then about the characteristics and performance of a partnership established around the introduction into the CGIAR toolkit of a novel, cutting-edge approach to carrying out one of the most traditional, standard functions of CGIAR Centers: the characterization and use of genetic resources. The case study is also of interest because it involved almost as many crops as partnership

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<sup>43</sup> At the time of doing the interviews, most activities under phase II had not actually started, so the case study is largely limited to the first phase, except when discussing the changes that the partners envisioned in the phase II proposal.

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participants. The “glue” of the partnership, the common objective, was methodological, rather than any specific applied agricultural, natural resource or environmental issue.

The collaboration was organized around the goal of “enabling scientists, breeders and field practitioners in RTB-producing countries to make more systematic and targeted use of global genetic diversity, as well as enhance its value for conservation particularly for those RTB genetic resources held by gene-banks in national and international institutes.”<sup>44</sup>

The phase I project was designed to generate three products:

1. Genotyping towards conservation and use of RTB genetic resources for breeding
2. Phenotyping for characterization of RTB genetic resources (which is the locus of the metabolomics work)
3. Breeding applications for exploiting RTB crop evolution and domestication traits.

### *Metabolomics*

Roughly-speaking, a metabolite is a molecule that is the product of a chemical reaction in a plant or animal; ethanol, lactic acid, vitamin B2, are examples. Metabolomics is the study of these metabolites which, because they are the end products of metabolism are a reflection of the genetics and are ultimately responsible for an expressed trait. However, often a plant may have the correct genotype but without the appropriate metabolite composition, the trait of interest will not occur. The metabolite composition in the cell is affected by the interaction between genes and gene products and the environment. For example, the types and amounts of sugars alter in response to stress conditions affecting the organism or cell.

Wikipedia<sup>45</sup> defines metabolomics as the “systematic study of the unique chemical fingerprints that specific cellular processes leave behind”. The “fingerprint” is the set of metabolites found in a given plant or animal (a given genotype) grown in a given environment. In other words, the set of metabolites is a fingerprint of a G X E interaction. More importantly, these metabolite fingerprints are more precise and cheaper to obtain than alternative ways of describing G X E. According to one interviewee, “conventional [phenotypic] characterization of traits leaves around 75% of the variation uncharted to specific genes.”<sup>46</sup> These more precise and relatively cheaper fingerprints, are what makes metabolomics a tool that can be used to improve the understanding (characterization) of genetic diversity, and thus, the desire to use metabolomics in a genetic enhancement or breeding program. Marker Assisted Selection (MAS) is presently the method of choice for precise plant breeding with consumer acceptance. Metabolomics is an integral component of MAS both from the discovery aspect, where molecular markers associated with traits can be identified, and validation of the genotypes at a phenotypic level. As suggested by one of the experts interviewed for this report, “all major agri-tech companies engaged in the production of new varieties utilize metabolomics/metabolite profiling ... to perform impactful science, that delivers tangible benefits from discovery science, metabolomics is an essential component of the genomic tools and resources that must be available within dedicated genomic hubs”.

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<sup>44</sup> Research project profile, phase I

<sup>45</sup> <https://en.wikipedia.org/wiki/Metabolomics> accessed 17 February 2017

<sup>46</sup> Statements in quotes throughout this report, unless otherwise noted, come from the notes taken by the author during the interviews of managers and scientists.

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In the phase 1 project proposal, metabolomics is proposed for use in areas such as understanding aspects of fruit quality and response of roots and tubers to water stress.

### **2. The partners**

The project is implemented by CIAT (lead center), Bioversity International (co-leader), CIP and IITA. The project document (phase I) identifies 28 non-CGIAR partners, but in practice the two active external participants are CIRAD and Royal Holloway University London (RHUL).<sup>47</sup>

Bioversity is the co-leader of the project with CIAT. Its work focuses on banana, in close collaboration with CIRAD. Bioversity is a supporter of the use of metabolomics as a novel and high-potential technique.

In addition to being the lead center, CIAT coordinates the phenotyping component of the project, as reported in the phase I proposal. CIAT's principal investigator is also the main leader of the initiative. In this project, CIAT, with IITA, is focused on cassava. CIAT has also been the main driver and proponent of the use of metabolomics in the project, bringing in RHUL as the expert center on this technology.

CIP entered into this project with a focus on potato and sweet potato and with the advantage of having done more work and progressed further than other partners in the lines of inquiry that the project deals with. It has been a champion of cross-center, cross-crop research on the clonal crops, of which this project is an important example. As host center of RTB, CIP also provides the managerial and administrative support for RTB in general, and for this project in particular.

CIRAD's work in this project is on banana and, to a lesser extent, on yam. Although CIRAD has received only a very small proportion of the project's funding, its scientific contribution and weight is acknowledged by other partners. For the CIRAD team, however, the project is not a critical component of their research strategy.

IITA nominally participates in the project in relation to three crops: banana, cassava, and yam; in practice, it appears that much of its work has focused on cassava. IITA places a strong emphasis on speeding the rate of the breeding process, and has been more reluctant to invest time and resources in the more upstream elements, among which they consider metabolomics.

Royal Holloway University of London is the only participant of the project that is not a full member of the RTB CRP<sup>48</sup>. It was invited to participate in the project because it is one of the leading institutes worldwide on metabolomics applied to plant genomics. Some of the other centers see it as a full and critically-important scientific partner, while for others it is probably closer to a service provider.

### **3. Motivation for involvement**

We must differentiate two levels of involvement. The first one refers to the participation in the project "Enhancing global RTB productivity through more targeted use of global genetic diversity." The second relates specifically to the "metabolomics component" of that project. The degrees of involvement vary significantly across partners.

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<sup>47</sup> CIAT, Bioversity, CIP, IITA and CIRAD are partners in the RTB CRP.

<sup>48</sup> Full program participants are the four CGIAR centers (Bioversity, CIAT, CIP, IITA) and CIRAD.

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For all RTB partners (the individual scientists as well as their institutes), improving the efficiency and the effectiveness of the use of RTB genetic diversity is a mission-critical goal. According to one scientist, the project was designed to “improve access to previously untapped genetic diversity”, while “accelerating the breeding process is a spill over”. For others, the main motivation is to accelerate the rate of crop improvement. In any case, all agree on these two elements, even if they emphasize one or the other relatively speaking.

The phase I proposal refers to RTB crop productivity in the main growing regions being stagnant “for many decades”, due in part to “poor understanding of the RTB genetic resources available to breeding programs”. The expectation is that “a more targeted use of the available genetic diversity of the RTBs gene-pool can overcome the current yield plateau.”<sup>49</sup>

Another argument offered by some interviewees is that “we wanted to exploit the overlap between genetic resources and breeding”, which were two separate themes of the RTB program. The initial project proposal, in fact, was developed by the leaders of RTB theme 1 (genetic resources) and theme 2 (breeding).

The emphasis on metabolomics, and the involvement of an external partner that would contribute that expertise, is a different matter. Here, there are two different visions, if not three, among the six participating institutes.

For some, including the project leaders, metabolomics offered a new, highly-promising approach to better understanding and, thus, more targeted use of RTB genetic diversity for crop enhancement, to a degree that could not be matched by the phenotyping approaches that the RTB CGIAR Centers were used to. The RTB leadership considers the work on metabolomics as one of the most important scientific accomplishments of the CRP so far, one that has a good chance of making game-changing contributions to the genetic improvement of the RTB crops and, through that, to crop productivity, yield stability and product quality.

For others, the inclusion of metabolomics in the project was a top-down decision made by the project leaders, one with which they never felt quite comfortable. “There are a lot of objectives in this project, so you need to prioritize funds and time. If we have more resources, to have for example an expert on metabolomics, we would welcome that.” But, as things stand, they say, “we need to prioritize the low-hanging fruits”, and metabolomics is not one. The researchers who have this view, reluctantly relate to RHUL as a service provider with which they do not have more interaction than necessary (“we send the samples and, up to one year later we receive the data”). The remaining partners realize the weak engagement of some of the collaborators, and perhaps this could be a source of some tension in the partnership: “From the start, [center X] did not want to engage at all” with the metabolomics work, and, “what works with [centers X and Y] is that we get involved in the design of the experiment, while others simply send us materials for analysis.” However, even those that are in the “sceptics” camp recognize some potential role of metabolomics: In contrast to bilateral projects, which are more focused and problem-oriented, this project “allows us to do more exploratory work, to fill a lot of the gaps, building a more complete picture of genetic enhancement... I guess that is the promise of metabolomics.”

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<sup>49</sup> Research project profile, phase I



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A third group are those participants who are perhaps less convinced and less enthusiastic than the “promoters” of metabolomics, but who are sufficiently interested to give it a good try, particularly as it does not distract too many resources from their higher priorities. “We took [the inclusion of metabolomics and of RHUL as a central element of the phenotyping component of the project] as a given, rather than something that was up for discussion; we decided it was ok, that we would try the new technology (metabolomics). Each crop how to decide how to use it, because each crop started the project with a different level of previous progress.” For example, “in potato we already had a library of metabolites, so it was good to have different options to use it.” Another participant frankly stated: “We are sending the samples to (RHUL)... metabolomics was not in my research plan, and is not a priority... we are testing it because it is free, so, why not try? If I had to pay, I would not have done it, it is not a priority. Maybe it is ok for other crops, but not for [crop X].”

It must be stressed, however, that those who are less optimistic about metabolomics, or more sceptical about it, do value highly other lines of work of the project, and the partnership as a whole: “we tested some advanced genotyping approaches, and we have genotyped close to the entire breeding collection of cassava. We have also genotyped 900 landraces, we have phenotyped the regional breeding collections, and CIAT’s Latin American collection. We have a lot of markers in all the chromosomes, and we have the phenotype evaluations, and we can relate the markers to the traits. All this makes our breeding much more focused for a number of traits, and this is now very close to being integrated in the breeding. This is a huge result of the collaboration.”

### ***4. Strength of partnership***

This project originated in a decision by leaders from different centers to develop a joint proposal that would link themes 1 (genetic resources) and 2 (pre-breeding) of the RTB CRP. Some of the partners had already worked together in previous programs, like the Generation Challenge Program. At that very early stage of project design, one of the primary leaders of the initiative came up with the idea of metabolomics as an important element of the phenotyping component of the proposal, and proposed the inclusion of RHUL as the institute that would provide the required scientific leadership and support in this field.

As discussed in the previous section, this was met with quite different levels of enthusiasm and buy in. Has this difference at the start of the process adversely affected the strength of the partnership? It is not possible to answer this question with confidence with the evidence gathered for the case study. On the one hand, the funding allocated to RHUL to pay for the metabolomics work amounts to only 13% of the overall budget of the project; RHUL has probably contributed more than it has received in purely financial terms. And since metabolomics is a core element of the project design in phase I and II, it is fair to say that this initiative would not have been possible without the scientific contribution of RHUL (or another institute with similar expertise). And yet, the tension is there, and, as in any similar circumstance, a significant disagreement over a core component of the research strategy, is probably something that does not help to strengthen a scientific partnership.

Several of the interviewees stressed that the best results of this partnership are grounded on strong bonds between individuals who value working with each other: “It is always the relation

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with individuals that is the key.” While this is the case probably in every single partnership, in this case it takes on an added significance: the project is designed as a cross-cutting initiative involving several clonal crops, and yet, as is natural, most of the individual relationships have been built among people that have met each other over the years working in similar issues on the same crop. That is, many of the individual bonds are crop-based, but the project is intended as a cross-crop endeavour. It is not surprising then when each of the scientists was asked if, within the project, they engaged mostly in bilateral or in multi-lateral relations, all but one answered that their primary exchange was on-to-one, with those working on similar issues or crops. “I Skype with [center A], zero with [center B], a lot with [center C] and some with [center D] ... I don’t remember ever Skyping with all except for administration and budgets.” Another leader stated: “Our relation is bilateral with [center A] and [center B] only”. Another scientist: “it was very multilateral at the beginning, the design and the choice of methods. But during implementation we only have one meeting each year where we report.” And yet another opinion along the same lines: “I interact bilaterally with all the CGIAR centers, but I don’t have the same quality of interaction ... it depends on sharing the same fundamental ideas.”

The lack of multi-lateral engagement is probably made worse by the fact that there have been few (if any) opportunities in which all the researchers involved in the project have met to present and discuss their research: “There are not many opportunities to meet and discuss with all the researchers in the project. It would help; the idea is good, but if people do not meet, it is not easy.” Others add that there are RTB research meetings, but not specific ones for this project, perhaps because “we lack time, and the project is not very large ... and because we don’t have project meetings, we tend to work bilaterally with those we have something in common”; for example, “at [center X] we have developed an independent relationship with RHUL, but for another issue, so we have developed a new bilateral relationship.” One partner sums it up rather harshly and perhaps somewhat unfairly given other evidence: “The main support has been funding, rather than scientific exchange.”

There is no formal steering committee of this partnership. There are two co-leaders, one overseeing the genotyping component and the second one responsible for phenotyping (including metabolomics) and genome-wide association studies. Each center has a principal investigator (PI) who represents their institute in the project. In annual meetings, they make decisions on the research priorities, compare these to actual budgets, and make funding allocations accordingly. Decisions are made by consensus, although several of the interviewees had the opinion that such agreements were frequently not free from significant tension, and perhaps even discord, and that sometimes some of the participants ended up accepting a decision rather than embracing it and feeling comfortable with it.

After the decisions have been taken, there is bilateral contact between the co-leaders and those responsible for the different initiatives. When quality is not as expected, the co-leaders contact the respective center’s PI, and the PI engaged with the scientist directly responsible for the work concerned. The co-leaders eventually write formally to the responsible center leader to ask for an explanation.

While one of the co-leaders argues that the organizational arrangement allows direct access of all researchers to each other, horizontally, without having to wait for meetings or requiring the intermediation of a committee, the different interviews tend to show that such active, multi-

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directional engagement has been quite limited, and, as noted before, that most engagement is on a purely bilateral basis. It could be argued that this relative “communication failure” is a typical case of a “prisoner’s dilemma”, with all participants being responsible for engagement, and thus, no one being responsible for actually making it happen. What is important is that because communication and collaboration tends to be mostly bilateral, among parties who are already mostly aligned, the project could be missing on part of its potential to foster effective cross-center and cross-crop work and collaboration.

All the partners strongly agree that one major hurdle that they have had to deal with is the cuts to CGIAR window 1 and window 2 budgets. Since W1 and W2 were the sole source of funding for this project, the unexpected and sudden cuts were hugely disruptive. “The budget cuts have made it very difficult”, said one partner. Another one echoed: “The unreliability of funding is very damaging ... Each year we have to meet, talk and decide about budgets; every year, over and over. We try to allocate based on the ongoing results, but there are a lot of tensions, and political factors cannot be ignored. And it takes time away from discussing the research, we spend too much time on budgets.” A third opinion on the same issue: “W1 and W2 budget cuts are a very big problem; we had to cut the number of accessions, and we had to reduce the use of metabolomics.”

One important factor stressed by several of the scientists interviewed is that while the budget cuts in 2014 and 2015 were important, this partnership in particular was somewhat sheltered by the RTB leadership. An examination of the actual budget data shows that the 2015 budget was 38.8% lower than in 2014, while the original budget contemplated basically the same budget across these years. However, the cut was not distributed equally across all centers, since CIAT and CIP took a very large cut (their 2015 budgets were 38% and 36% of the 2014 budget, respectively), while IITA was reduced less drastically, and RHUL and Bioversity actually had budget increments that year. It appears that the decision to protect the partnership and the place of metabolomics within it were a prominent criterion in the way the budget reductions were managed.

Another negative factor identified, beyond the budget cuts, was the complex bureaucracy associated with CGIAR or CRP funding procedures, which have to be followed, even when receiving little funding. Related to funding is also the issue of delays and uncertainty of W1/2 funding: “We receive the funding for the year in November, and are expected to use it by the end of the year. I do not plan on the basis of the CRP, if I receive it then I can make more progress, and if I don’t get it, less progress, but my research strategy is not based on the CRP, it cannot be.”

A final element to address is the duration of the project and of the partnership. Probably all of the sources interviewed would agree on the statement of one of the partners: “when you are involved in a cross-center, cross-crop project like this one, things are more complex, and everything takes more time.” This means that “we ran out of time before being able to close the loop in terms of learning from cross-cutting, cross-crop work.” As a result, almost everyone interviewed highlighted the need to continue the collaboration in the new phase of the CRPs: in the phase II proposal, “we became less dispersed; we asked ourselves if each one was going to continue working on its own, or if we wanted to do something really together. We selected a common trait (quality).”

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This type of thinking shows that there has been learning about how to be more effective in doing the kind of complex, cross-cutting collaboration that is inevitable in a multi-crop CRP such as RTB. However, some of the center leaders argue that now that they have established the basics during phase I, to really move forward they need far greater resources than those that can be provided by RTB. “Phase II is a very small investment to really work. We intend to prepare a joint, collaborative proposal, with RTB participating but to raise funding elsewhere.”

One center PI makes an interesting argument. In this person’s view, the different levels of engagement also reflect the appreciation of each center, and of each researcher, for CRPs as a way of organizing the CGIAR’s work: “in [center X], everything we do is mapped to the CRPs we work in, RTB in particular... CRPs are central to our strategy.” In this person’s view, this is not the case in other centers, where bilateral projects continue to guide their strategy.

### **5. Enabling systems**

Almost all the interviewees highlighted the leadership of the primary leader of the project, a CIAT scientist. “From the start, CIAT and Augusto were superb,” and, “Augusto has been exceptional in terms of broadness and strategy, very fair.” And yet another one: “he has gone out of his way to support postgraduate students.”

To non-CGIAR partners, the organization of the RTB CRP is too complicated. “It is not easy to participate; it’s a huge program, complex ... If you are not involved full time, it is not easy to follow or to understand what is going on”. Plus, it changes frequently, “what is a project, a theme, a flagship... it takes a lot of your time.”

Yet, at least for several of the partners, “CIP has provided good administrative support”, and “we are very grateful for the leadership of Graham [Thiele, the RTB director] and the RTB team.”

Those asked if they received any other support from the CGIAR system units, unanimously answered “no”, and some of them also laughed. Besides funding, any other support from the partnership itself? “No, but I do not expect it”

### **6. Benefits from partnership**

Most of the partners were quite positive about the partnership having been a fruitful one in its first years. However, all partners agree that phase I ended just as things were starting to really come together in the form of a number of results that could lead to far more progress in the future. The following are some of the results highlighted by the partners in the interviews.

One effect of the project has been to improve inter-center collaboration, including between those like CIAT and IITA that had been friendly, and sometimes not so friendly rivals. “We each had other genotyping projects before RTB, CIAT with China and IITA with Cornell. We each continued with our approach, but we shared a sample of each other’s diversity; we now have a paper jointly discussing the world’s cassava diversity.”

“This has been unprecedented collaboration. The complementary funding projects have allowed us to do things that are impossible to do with bilateral projects, because they fund one crop or one of a few partners, so there is no cross-center and cross-crop collaboration; only RTB does that”, and this project is one of the best examples.

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There is agreement on the project's ability to generate useful, targeted data that can now be used by breeders. "Breeders for all of these crops, that are vegetatively-propagated, now have a lot of information for several traits that they would not have been able to have in any other way. So, the main effects of this project are much more diversity and much faster time for breeding."

An argument made by those who are more strongly committed to the use of metabolomics is that "this is an unbalanced partnership, in that the external partners (RHUL and CIRAD) are way ahead of the CG's scientific capacities in this field ... We have to work very hard to be up to par, and this has led to new capacities being developed in our centers." But for those who relate to the metabolomics work from a "service provision" perspective, exactly the opposite is true. Probably referring implicitly to RHUL, one scientist argues that "having ARIs as service providers does not add capacity to the less advanced partners, and capacity development is absolutely essential."

There are also crop-specific results that are linked by the PIs directly to this project and this partnership:

"Potato is the most advanced, using it to improve drought tolerance. They are already using it for breeding, with new experimental designs that should improve the way in which they breed."

"In banana, metabolomics is used for phenotyping in vitro, with bio-markers that can be used with seedlings, for early selection of quality of sugars and seedless fruit; this is a game-changer." In the same crop, another scientist adds: "We had sequenced the banana genome before, and thanks to this project we have been able to use the huge data that we had, and to add value to the breeding."

With respect to cassava, "the project has unravelled the population structure of the crop, discovering the center of origin in the humid forests of Peru, Ecuador and Colombia, in the Northwest of the Amazon basin, and the wild relatives. ... We have also found the origin of the African genetic pool." Another partner adds: "In cassava, CIAT is close to getting the markers for white fly and for high beta-carotene, and that would be a game-changer."

"New molecules are being found. For example, in yam they have found steroids that apparently could have applications in medicine. Shikimic acid, the active ingredient in the antiviral compound used to treat certain types of influenza viruses, is present in yam in far greater concentration than the current source ... Unfortunately, the CGIAR discourages findings that are not aligned with the use of crops as food."

Results are lesser in sweet potato, as scientists in that crop are strongly focused on other priorities and have paid less attention to the project.

Could this have been achieved without this project? "I am not sure. In cassava, Gates is a huge donor and a lot would have happened no matter what".

The project has led to new initiatives involving all or some of the partners. One of the external partners explained that "the RTB project and funding was the first, and that paved the way for other money to come in with some new partners. ... RTB allowed the development of the metabolite platform and more rigorous assessment of the germplasm, and it gave us a good

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idea of what could come out of it.” As a result of the collaboration in this project, RHUL is now involved with CIAT and with CIP in other projects with bilateral funding.

An additional benefit of this project is that the work done, the results achieved, and the collaborations that have been established, “are the glue that holds together Flagship 1 on genetic resources in the new phase of the RTB CRP. We created a community, and developed some common platforms.” That can now be used to carry forward new research.

The overall opinion about the benefits of the partnership goes from “reasonably good” to “very good”. One partner says: “On a scale of 1 to 10, a 6. Not bad at all. But we really need to look for a larger project out of it, this has been like seed money. If one project would result out of this work, I would be happier” and give it a higher grade. Another one states: “For me, this has been a very important partnership. My only regret is the lack of time ... too much time wasted on budgets and budget cuts ... we lost so much scarce time.” A third opinion: “Not an excellent, but good to very good partnership. ... Not enough interaction between the partners; no time to manage and take advantage of lessons learned; and the budget cuts that took away so much time.”

### **7. Conclusions**

Two important conclusions can be drawn from this case study. The first relates to the organization and functioning of the partnership, and the second to the tensions associated with the role of metabolomics in the project.

As argued above, this partnership can perhaps be described as a bundle of bilateral linkages that did lead to some significant joint, multi-lateral outputs. By the very nature of the collaboration (and of RTB, one could add), the joint outputs tend to be methodological, while the technological results are specific to the individual crops and thus emerge from the work of a single partner or of sub-groups of partners.

Should one recommend more emphasis on expanding the mechanisms for multi-lateral linkages and exchange? Several of the partners called for the need to have more time and opportunity for all of the partnership researchers to get together periodically to discuss their scientific results. Also, in their design of the phase II project, the partners have implicitly decided to maximize the overlap between their work by selecting a common trait (quality) on which they will all work. That is, they have decided to try to forge a truly multi-lateral collaboration, one that could maximize the cross-cutting (across centers, across crops) nature of their collaboration by getting rid of the one variable that they can control (the trait of interest). There is of course nothing wrong with that.

However, perhaps the way this partnership has (unwittingly) organized its work so far — as a bundle of bilateral, subject- and crop-specific collaborations — is a reasonable and efficient way to run a collaboration when the shared scientific objectives are limited by the fact that each team is working on different crops, traits and issues. Perhaps this is a good organizational answer to the greater challenge that RTB faces (compared with a single commodity CRP) in trying to move forward with fostering and supporting more effective partnerships.

The tension about the inclusion of metabolomics is helpful to ask how a CRP can create space for what to some may look like radical and untimely innovations. Why did RTB need to nest

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what was essentially the strong interest of one or two partners in a wider, multi-partner initiative? A reason given by RTB management team is that cross-cutting lessons learned from venturing into a new area can show value added at the CRP level.

Finally, based on this case study, what next? Three elements seem obvious:

- Technical meetings with researchers from all the centers;
- Improving communications to complement the more natural and stronger bilateral links, and;
- Taking advantage of the sharper common ground and the results achieved so far, to look for larger funding than can be provided by RTB.

And a fourth element that may be helpful and healthy in carrying this agenda forward: the partners need to solve the tension about the use the role of metabolomics in whatever comes next.