MAIZE
Agri-Food Systems
PROPOSAL
2017-2022

CGIAR | RESEARCH PROGRAM ON Maize

submitted to
CGIAR
revised version
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Section 3: Annexes

3.1 MAIZE Accountability Matrix - Caveats to address during development of CRP2 full proposals

As set out in Annex 1 to the Final Guidance for the 2nd Call for Full Proposals, the collective portfolio submitted by the Centers/partners in response to this call for full proposals must be accompanied by a summary of how the 23 caveats raised in that annex by the respective stakeholders have been addressed. This annex sets out those caveats, grouped by the body putting forward the topic for added attention in the full proposals

1.1 Caveats expressed by the Joint Consortium Board/Centers/Fund Council Working Group, in its Memorandum to the Fund Council to express support for a 'green light' to move to full proposal development, dated 30 November 2015

Recognizing the advances already made in the re-submitted portfolio in the highly constrained time available, **the full proposals submitted by 31st March 2016 for ISPC review must address to the satisfaction of the ISPC, and contributors, the points set out below, to strengthen further the rationale and coherence of the planned research agenda,** thereby delivering increased confidence that with funding from 2017 onwards, it has the capacity to deliver on SDGs in general and the Results Framework and CGIAR targets as set out in the SRF:

No	Item to address	Relevant CRP(s)	Summary of how the matters has been adequately addressed (Full Proposal sections are referenced)
1	Greater attention to discerning the role of regionally focused yield-gap closing/ sustainable intensification research in the system, as distinct from and a complement to global public goods research in areas such as crop breeding, livestock health, food policy, and others.	AFS programs; Excellence in Breeding Platform	✓ Greater maize-specific focus on facilitating increased rate of genetic gain on the farmer's field by improving the trait pipeline development, capacity building, and by increased replacement of obsolete/less productive varieties. ✓ Increased investment in: i) better understanding of system diversity, dynamics and livelihoods, and ii) better understanding of ecosystems services as they link to sustainable intensification. These areas of work will be greatly enhanced through integration of expertise from the Humid Tropics CRP into MAIZE AFS. ✓ Changes to FP4, including a new CoA 4.4 on Partnership and collaborations models for scaling, and a new partnership on scaling out with GIZ.
2	More clearly articulating the strength of the arguments for	Genebank;	Not relevant for MAIZE. See Genetic Gains Platform proposal.

No	Item to address	Relevant CRP(s)	Summary of how the matters has been adequately addressed (Full Proposal sections are referenced)
	maintaining genebanks and genetic gain as two separate platforms rather than an integrated effort[1]	Genetic gain platforms	
3	Crosschecking that consolidation at the cluster of activities or flagship level has not delivered unintended adverse consequences such as removing clarity for key research priorities and/or increasing transaction costs	All	✓ MAIZE-ISC and Management Committee agreed to integrate FP6 into FP3 and FP4, following donor requests to reduce the number of FPs in the pre-proposal portfolio. ✓ Major caveat: Bilateral funding dominates most FPs and CoAs, limiting the opportunity to better align FP/CoA project portfolio and to better link with other CRPs' projects. Unpredictable W1&2 funding makes it worse.
4	Providing a clearer understanding of National Partners' requirements, and how the scientific and financial program elements support them	All	✓ Not a deficit for MAIZE (see IEA Report on MAIZE, submitted in April 2015). ✓ See MAIZE Partnership strategy, section 1.8 and Annex 3.2; Capacity Development strategy, Annex 3.3.
5	Setting out more clearly the interconnection and resources available for the proposed Communities of Practice in gender/youth and capacity development, with particular attention to ensuring engagement of partners in the respective Communities of Practice. Specifically, ensuring that the proposed communities of practice operate in a way that will result in meaningful progress towards sustainable engagement and impact	All	✓ See PIM FP6 (Cross-cutting Gender Research and Coordination) Major caveat: Communities of Practice rely on voluntary commitments by people who have a full-time job. Expectations about their 'impact' must be commensurate with this level of investment.
6	Reducing as many transaction costs as possible, particularly regarding management burden	All	✓ The MAIZE AFS has been designed to operate as efficiently as possible. The Program Management Unit (PMU) comprises only of core functions. When needed, it leverages additional support from CIMMYT and IITA. The cost of running the PMU is approximately 2% of the overall CRP budget.
7	Providing greater emphasis on soils, animal genetic conservation and the potential impact of big data across the	WLE, all AFS, Livestock, Big	✓ MAIZE identified key Big Data opportunities in each of the Flagship Projects, especially FP1, FP2, FP3 and FP4. ✓ MAIZE FP4 has an enhanced focus on ensuring that agri-systems

[1] There were a number of different views expressed during working group deliberations on this topic. Whilst there was no fundamental opposition to separate platforms, there was a call for making a much stronger case as to why they should be separate.

No	Item to address	Relevant CRP(s)	Summary of how the matters has been adequately addressed (Full Proposal sections are referenced)
	portfolio, not limited to genetic gain	Data platform	diversification and intensification is achieved in ways that protect soil and water (see Table FP4.1 for details). ✓ See Big Data Platform proposal (IFPRI/CIAT), Table 1.4 and 1.5 and FP1 and FP4.

1.2 Caveats expressed by the ISPC, dated 9 December 2015

ISPC comments on the portfolio (a paraphrase of a longer document)

No	Item to address	Relevant CRP(s)	Centers' summary of how the matters has been adequately addressed
Portfolio level			
8	Seek explicit prioritization within CRPs (and also between CRPs); balancing research on 'upstream' science with research on how to scale out and up relevant new knowledge and technologies (while leaving the delivery of impact at scale to organizations with that remit)	All	✓ MAIZE explains its up-/downstream research mix in section 1.6 and elaborates key partners involved at different stages in Table 3.1. ✓ MAIZE has a balanced mix of Discovery-Validation-Scale-out in its portfolio of CoAs (see Section 1.6 on Program structure and flagship projects; Figure 1.6). The balance between upstream research, downstream research, and interaction with partners for large-scale delivery is explained in the flagship project narratives, specifically in the impact pathways, theories of change, and science quality sections. ✓ FP4 CoA 4.4 focuses solely on key research themes related to scaling-up the products of the other CoAs, including analysis of the roles of development actors vis-a-vis research actors in MAIZE.

No	Item to address	Relevant CRP(s)	Centers' summary of how the matters has been adequately addressed
9	Important to capture synergies between CRPs so that the System delivers more than the sum of the CRPs (the One System One Portfolio mantra)	All (statement of portfolio synthesis required)	✓ MAIZE proposes a net increase in inter-CRP collaboration, leveraging the current work on Site Integration (see section 1.7 and Annex 3.7).
10	Clearer explanations of what W1&2 funding will be used for	All	✓ The budget management narrative in each of the MAIZE FPs clearly highlights how W1&2 funding effectively complements the W3/bilateral resources, in addressing the key priorities under both the base and uplift budget scenarios.
11	CRPs should not be expected to adhere to the 'prioritization' undertaken in a very short time-frame to produce the 'Refreshed' submission, but should hold serious discussion with their partners on which activities to prioritize according to the principles which were agreed at FC14	All	✓ The MAIZE R4D portfolio is continuously being shaped by the priorities expressed by the stakeholders, including farmers, public and private R4D partners, high-level experts, and donors. Annually, more than 10,000 farmers, seed companies, extension agents, NGOs and NARES partners provide crucial feedback through more than 3000 maize field days and on-farm demonstrations. At least 800-900 of these clients attend one or more of the 30 annual project workshops/review meetings. ✓ During the past four years, MAIZE has organized e-consultations and phone interviews with dozens of high-level experts and donors. For example, 350 MAIZE partners provided crucial advice during the launch meeting of MAIZE Phase-I in January 2012. In 2014, 2015 and 2016, MAIZE received crucial prioritization advice annually from at least 60 partners.
Platforms			
12	2 new platforms are proposed: Genebanks and Genetic Gains. The ISPC is comfortable with the platform on Genebanks	Not applicable	NA
13	Have concerns about the focus of the proposed Genetic Gains and what the creation of such a platform will mean for the AFS CRPs (and theories of change). The ISPC also found the title of 'Genetic gains' to be inappropriate as what is proposed is only part of the research required to deliver 'genetic gains'. The budget needs to be reviewed	Genetics Gain platform	NA

No	Item to address	Relevant CRP(s)	Centers' summary of how the matters has been adequately addressed
14	Supports the concept of an initiative in Big Data and does not want to see this de-emphasized	Big Data platform	MAIZE does see a CGIAR competitive advantage in contributing to a Big Data initiative for IAR4D/ARD, but not leading one. How effectively MAIZE can potentially contribute to the Big Data platform has been outlined in the narratives of each of the Flagships, especially FP1, FP2, FP3 and FP4.
15	Identify where budget is placed for other arrangements to meet cross cutting system work originally considered through Expressions of Interest at the pre-proposal stage	All c.f. Guidance doc	NA
AFS CRPs			
16	GLDCAS: The rationale for GLDCAS receiving a 'C' rating overall (from the ISPC) related to the breadth of species being considered; the funders are requested to indicate their priorities for this CRP	This addressed to funders not to CRPs	NA
17	FTA has moved tenure and rights to PIM – although PIM don't mention that. FTA also wants to move the restoration work to WLE. Given the decreased budgets overall, these 2 CRPs may not accept these moves and the topics may hence disappear. Clarity on the potential loss of these areas is required	FTA, PIM, WLE	NA
18	Livestock and FISH both wish to move some genetics research across to the new platform as may other CRPs, yet the budget sources for those moves are not clear	Livestock, Fish, Genetic Gain platform	NA
19	MAIZE proposes to move some bilateral projects out of the CRP due to budget cuts. What is an appropriate balance of W1/2 bilateral at the base funding scenario?	MAIZE	The ideal balance for MAIZE is 1 : 3 (W1&2 to Windows 3 and bilateral). The current balance is approximately 1 : 5 (W1&2 to W3/bilateral).

No	Item to address	Relevant CRP(s)	Centers' summary of how the matters has been adequately addressed
20	RAFS (and presumably other CRPs) proposes to reduce the number of targeted IDOs and sub-IDOs – and both RAFS and Wheat make reference to cutting back on capacity development due to budget cuts. Realistic adjustments to current funding and base scenario funding will need to be considered by CRPs and funders	RAFS, WHEAT	NA
Global Integrating Programs			
21	The ISPC is glad that PIM has agreed to take on the role of co-ordination of a System-wide platform or Community of Practice for gender work, although we hope that it will be possible to reinstate the original budget. It is hoped that down-rating gender from a Flagship to 'Cross-cutting work' does not reflect diminishing importance of gender	PIM re role of the FP on gender	NA
22	A4NH and WLE seem to be following the ISPC recommendations (through additional steps for integration with CRPs through defined flagships, while the CCAFS Summary in Annex 2 suggests the budget cuts: 'need a totally new business model', the ISPC understands that only minor changes are now being proposed	A4NH, WLE, CCAFS, PIM	✓ MAIZE is maintaining its traditional linkages with A4NH through FP3 (especially on provitamin A enriched and high-Zn maize) but seeks to expand collaboration with A4NH through the new FP5. MAIZE continues to explore closer collaboration with WLE.

1.3 Additional caveats expressed by the Fund Council during its ad hoc meeting on 11th December 2015.

The Fund Council noted that its granting of a 'green light' to move to full proposal development was subject to the caveats noted by the Working Group and ISPC (in their written submission) and the Fund Council's request for enhanced focus on gender and capacity building. The Fund Council also specifically acknowledged that CGIAR is engaged in an incremental process and some concerns raised by Fund Council members will require additional time and attention before the new portfolio of CRPs is approved.

No	Item to address	Relevant CRP(s)	Summary of how the matters has been adequately addressed
23	Enhanced focus on gender and capacity building	All	✓ MAIZE describes priority investments on gender and social inclusion in Section 1.4 and Annex 3.4. MAIZE invests around 15% of its total resources each year in gender research and gender mainstreaming. ✓ MAIZE describes priority investments under Capacity development in Section 1.10 and Annex 3.3. ✓ See also relevant sections on gender and capacity development in the narrative of each of the MAIZE Flagships.

3.2 Partnership Strategy

The global partners' network of MAIZE is essential for addressing global, regional and sub-regional challenges through the co-generation, brokering, and pipeline stewardship of publicly accessible knowledge, often bound in new technologies and approaches. The **MAIZE Partnership Strategy** is based upon these **assumptions**:

1. MAIZE can achieve outcomes and impact only through partnerships outside and within the CGIAR
2. Different partnerships and partners are needed in the different phases of the non-linear continuum, from knowledge discovery to systemic change (e.g., discovery to scaling out). Table **Table 3.1** depicts this by way of examples.
3. The further MAIZE moves along this continuum, the less it can/should lead and influence (Circle of Influence principle).
4. As products, solutions and approaches developed under MAIZE move towards scaling out/up, partners-of-partners (e.g., boundary partners) become the key drivers of change.

Table 3.1: Different types of partnerships along the knowledge discovery–systemic change continuum.

	Discovery	**Validation**	**Scaling out**
Strategic**			
Regional / Global	PIM and the University of Minnesota for MAIZE foresight. Wageningen UR and the former Humid Tropics CRP for systems characterization and trajectories, synergies and trade-off analysis. Oak Ridge National Laboratory (ORNL) and the University of Minnesota on Big Data. Cornell University on high-density genotyping-by-sequencing (GBS), genomic selection and GOBII.	KIT: Gender and development work. University of Hohenheim: R4D on haploid inducers and DH technology. The University of Barcelona and the private sector on field-based phenotyping. Multinational companies (Monsanto, Pioneer) and partners in SSA (e.g., KALRO, ARC and NARO) on maize transgenic testing under CFTs and stewardship implementation.	GIZ: Build Scaling Out networks. SFSA: Business models and commercialization of scale-appropriate mechanization. CIMMYT-IITA-KIT: Building a functional innovation platform "infrastructure", while simultaneously building on-the-job capacity to facilitate maize system innovation in SSA, Asia and Latin America. KALRO and private sector seed companies on the MLN trait pipeline.

National		A wide array of NARS, seed companies and NGOs are partners in germplasm development and multi-location testing in SSA, LA and Asia Introgression of other institutional germplasm and technologies (e.g., Monsanto under WEMA; Pioneer under IMAS).	NGO collaboration on mechanization business development. Public sector – NARS in Mexico; Guatemala, Haiti, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Rwanda, Zambia, Zimbabwe; Bangladesh, India and Nepal for adaptive research on maize varieties.
		MasAgro Take It To The Farmer: Innovation Systems Approach	
Program-/Project-based			
Regional / Global	Genomic Selection: The next frontier for rapid gains. Integrated Breeding Platform (IBP), DArT and James Hutton Institute (JHI) on database management, medium-density GBS, and breeding informatics. GENNOVATE (11-CRP multi-case studies)	Cereal Systems Initiative in South Asia *Complex agri impact challenges** SARD-SC/MAIZE in 4 SSA countries (AfDB)	
National		MasAgro *Complex agri impact challenges**	
		Sustainable Intensification of Maize-Legumes Systems in Eastern and Southern Africa (SIMLESA) *Complex agri impact challenges**	

As defined in "Good Practice in AR4D Partnership," ISPC Guidance Paper, Sept. 2015 (draft). ILRI's Partnership Strategy (2011) distinguishes between institutional (e.g., with FARA; at Center Mgmt level), strategic and project-driven partnerships.

This strategy **aims** to

1. Make clear to our current and future partners how we wish to handle partnership and why it is so important to MAIZE, based on their feedback;
2. Support program and project leads, as well as MAIZE-MC, to better plan ahead, set up, manage and close well-functioning partnerships at the strategic and operational levels, be they lead, co-lead or participating partner (ILRI Partnership Strategy refers to contractor, equal partner and service provider categories);

3. Develop new kinds of partnerships for specific purposes and in specific contexts: work with new kinds of partners (e.g., ORNL, USA), participate in new types of partnerships (e.g., GIZ and SFSA scaling out multi-CRP partnership).

How will this strategy be **implemented?** By:

A. Giving partnership as such more attention:
    a. Integrating methods and tools along the partnership life cycle into the MAIZE project management cycle;
B. Improving upon screening partners:
    a. In many cases, MAIZE cannot choose its partners (e.g., there is only one, donors stipulate partners). Therefore, a better SWOT analysis at the outset is needed, as well as explicit mutual expectations management (e.g., agree on "how to partner")
C. Staying close to partners and fostering partnership management practices (sustaining, partnering capacity) in three critical areas:
    a. Approaches, methods and tools, such as stakeholder and network analysis, mutual self-assessments and targeted capacity development activities
    b. Relationship management: Roles and Competencies
    c. Building and maintaining a Partnership Knowledge Base
D. Exchange of experiences and know-how with other CRPs in the context of country coordination.

Just as important is **committing resources** to developing and maintaining partnerships:

MAIZE uses a mix of **(co)-funding approaches and modalities** to accommodate different partnership purposes and partner co-funding ability (see **Table 3.2** below).

Table 3.2: MAIZE (co)-funding approaches and modalities.

					Funding source	
		Decision-maker	**Funding timeframe**	**Partner co-funding**	**W1&2**	**bilateral**
MAIZE Competitive Grants	Research; MAIZE = contractor (to non-CGIAR R&D partner sub-grantees)	MAIZE-MC	1-3 yrs; 1 yr contracts	Sometimes; in-kind (salaries, infrastructure use)	Y (MAIZE partner budget)	
MAIZE Commissioned Grants	See above	MAIZE-MC	1-3 yrs; 1-yr contracts	Sometimes; in-kind	Y (see above)	
Global or regional consortium	Equal partners CRP NARS, other International Maize Improvement Consortium	Consortium mgmt. body, Sci advisory body guides. CIMMYT and private sector seed companies	Multi-year	Yes, in-kind & financial	Y	Could be
National, regional or global coordination of R4D	African SROs (e.g., ASARECA)	Members, by consensus	Varies, for coord. only	NA	X	

Bilateral program or project	Research, development; national implementation partner sub-grantees / CSISA	Program or Project Mgr, steering committee, donor	1-3 yrs, depending on bilateral contract	Sometimes		Y
NEW: Joint CRP project	CRPs = equal partners	CRP-MCs	1-3 yrs	NA	Y	

What **kind of partners** does MAIZE work with? Overall, MAIZE has more than 350 partners that together have a tremendous track record. Instead of providing a generic categorization of partners, we provide some examples of collaboration:

1. MAIZE works extensively with both public and private sector partners. In recent years, work with the private sector has expanded considerably. Currently, MAIZE works directly with DuPont, Monsanto, and Syngenta multi-national seed corporations, more than 180 small- to medium-sized (SME) seed companies and 226 community-based seed producers across Asia, sub-Saharan Africa and Latin America. These partnerships vary from exchange of promising germplasm between CIMMYT/IITA and multi-national seed corporations through to development of varieties, along with technical support, to many of the SME seed companies and community-based seed producers.
2. MAIZE works with the University of Wageningen, CIRAD, SAIL (Sustainable Agriculture Innovation Laboratory), Earth Institute-Colombia University, ORNL, and IPNI to develop strategic, scalable approaches based on farming systems analytical frameworks at multiple spatial and temporal scales to support development partners (i.e., "last-mile providers") with knowledge products (including policy briefs and other advocacy materials), decision-support and information systems (including GIS and SMS), which enables them to take to scale targeted options that increase system performance and sustainability.
3. MAIZE works with development partners (such as SFSA, GIZ, Total Land Care, One Acre Fund and machinery manufacturers, etc.) on scaling out of innovations.
4. MAIZE's International Maize Improvement Consortium (IMIC) is the most important source of new genetic variation for maize yield increases, adaptation to climate change, resistance to pests and diseases, and the basis for the rapid response to maize lethal necrosis.
5. MAIZE accesses, develops and transfers scientific innovations to NARS partners as an IPG, through germplasm and data exchange, joint research and capacity development. It uses its convening power to involve ARIs and the private sector in research within pre-competitive domains, e.g., hybrid research, genomic selection, Big Data, mechanization and nutrition research.
6. MAIZE is co-leading an 11-CRP research study on gender norms and women's and men's decision-making within households related to farm planning and management. The study develops synergies among the scarce gender research capacities in ARIs and NARS to empirically analyze gender roles and social norms in maize growing environments. It also examines the way these factors affect maize production and productivity. The study will develop strategies to address gender-based constraints in maize farming systems and the wider environment.
7. MAIZE partners are an important source for building the capacity of NARS students, scientists, technicians and professionals, with up to 12 PhD and 38 MSc. students finishing their higher degrees

every year. In 2015, MAIZE conducted over 1,500 training courses and field days involving over 39,000 farmers and research and development collaborators.

8. The deployment of CGIAR maize staff in regional offices allows close collaboration, understanding of farmer needs, opportunities for engaging local partners in collaborative research and scaling out, which has led to the successful development of sustainable intensification approaches in Asia, Africa and Latin America, as well as south-south collaboration on mechanization.
9. MAIZE shapes the international R&D agenda to address cross-border challenges and foster collaboration among NARS based on delivery of IPG. It engages with sub-regional and regional agricultural research organizations (e.g., ASARECA and APAARI) and launches new international consortia (e.g., IMIC) with partners.

What are MAIZE partners looking for? Surveys underline key elements of the comparative advantage of the centers and their R&D partners:

1. In the first CGIAR Stakeholder Perceptions Survey, research partners rated MAIZE highest among all CRPs on sector-specific knowledge, working effectively with partners and insightful external communications.
2. According to the 2014 IEA Review, "MAIZE has strong research and boundary partners engaged throughout the MAIZE target geographies" and "NARS are appreciative of the collaborations."
3. Indeed, MAIZE's "success rests on strong partnerships and good quality science" (IEA, 2014). For example, "strong partnerships with National Research Programs, and increasingly with the private sector, have enabled rapid effective reaction to MLN in Africa" (IEA, 2014).

Major MAIZE partner planning/consultation events between 2012 and 2016 (outside the significant partner consultations held as part of annual planning meetings for the big bilateral projects).

- 2012, Annual Meeting with 350 MAIZE partners 12th – 20th January.
- 2012, Science Leaders Meeting and Mini Symposium with partners in Montpellier 12th – 22nd June.
- 2012, Dublin II meeting on the CGIAR and CAADP in Dublin 17th to 20th June.
- 2012, BISA Work Planning Meeting in Delhi, 15th to 19th September.
- 2012, GCARD2 Meeting in Uruguay 27th October to 1st November.
- 2013, Consortium Office and ISPC Intermediate Development Outcomes (IDO) meeting in Cali, Columbia, 23rd to 26th March.
- 2013, FARA Science Week, in Accra, Ghana, 15th to 18th July.
- 2013, CGIAR ISPC 8th Meeting, IWMI, Colombo, Sri Lanka, 8th to 13th September.
- 2013, Innovation Transfer into Agriculture / Adaption to Climate Change (ITAACC) and Advisory Service on Agricultural Research for Development (BEAF) , Feldafing, Germany, 18th to 22nd November.
- 2013-14: MAIZE Partner Priorities Survey, with 67 responses from 23 countries regarding priorities for IAR4D versus national research.
- 2014, KIT Innovation Systems Workshop, Amsterdam, Holland, 29th September to 3rd October.
- 2014, 12th Asian Maize Conference at Hanoi, Vietnam, 27th to 29th October.
- 2014, ASARECA multi-CRP coordination meetings (Nairobi, June, and Burundi, December).
- 2015, IITA-CIMMYT 'summit' on CGIAR Maize research, 16th of February.
- 2015, CRP Leaders meeting in Montpellier, 1st to 5th June.

- 2015, High Level Policy Dialogue on Investment in Agricultural Research for Sustainable Development in Asia and the Pacific, at Bangkok on 8th and 9th December.
- 2015, Agricultural Innovation Systems (AIS) Workshop, Wageningen, 11th to 13th December.
- 2015, MAIZE & WHEAT Sustainable Intensification write-shop with CRPs HT, DS 15th to 17th December.
- 2016 Selected R&D partners participate in Full Proposal development.
- (Feb.): Online partner feedback to Full Proposal.
- (Apr.): Participation GCARD3 Conference.

3.3 Capacity Development Strategy

This strategy takes into consideration multiple elements, including the status quo, plus the strengths and weaknesses and opportunities highlighted in the CGIAR Independent Evaluation Arrangement (IEA) Report on MAIZE Phase-I, and review of MAIZE Phase-II Preproposal. The main gaps identified in the MAIZE Phase-I IEA Report[2] can be clustered into the following areas:

a) *Research program management* – The CRP evaluation recommends actions to further improve and maintain science quality through the development of protocols, processes and working instructions for research operations and delivery. Substantial improvements in data sharing and analysis are required. At present there is no formal, structured process to leverage and exchange data globally and among projects. The evaluation highlighted scientists' frustration about the lack of a mechanism for sharing results and experiences across projects.

b) *Strengthening maize science capacity* – a major constraint to AR4D in many developing countries is the insufficient number of skilled scientists and technicians. According to the evaluation, the quality of MAIZE science is good, but greater efforts are needed to enhance opportunities for developing the skills of MAIZE scientists. Another weakness is the lack of skills needed in some key areas such as biotechnology and new techniques and practices. Also, there is a low representation of women among research staff who work on MAIZE. Another challenge facing the research institutions in SSA is the lack of maintenance and the decay of research infrastructure, including the equipment and laboratories, due to inadequate funding.

c) *Gender analytical competencies* – As pointed out in the ISPC commentary on the 2015–2016 MAIZE Extension Proposal and the IEA Report regarding gender mainstreaming performance, this is seen as a high priority to support improved policy, management and decision-making.

d) *Knowledge and technology dissemination, uptake and out-scaling* – Over the years, MAIZE has collaborated with different organizations and applied various research and dissemination approaches to improve the generation and uptake of technologies. Although the CRP has yielded and disseminated successful research outputs, including technologies, approaches and policy outcomes, much more intensive efforts are needed in the coming years.

Key Strategic Actions

The objective of the strategy is to support the development effectiveness of the MAIZE Program. The strategic actions identify high priorities for potential capacity-development activities across FPs, clusters of activities, and technical areas. A set of four strategic priorities have been developed for consideration. These priorities are aligned with the CGIAR CapDev Framework and address all the key elements.

a) *Improving MAIZE science capacity* – Enhancing global maize science capacity is critical for a continual influx of high quality people into careers in maize research. To build a new cadre of maize scientists, the CRP will work closely together with leading universities, NARS, the private sector, and advanced research institutes. Science capacity will be developed through Ph.D. and M.Sc. training. CapDev efforts will link closely with other initiatives such as the AWARD program for African women.

[2] Report of the Independent Evaluation Arrangement (IEA) of the CGIAR Research Program on MAIZE, April 2015.

Particular attention will be given to the training of female scientists who are currently under-represented in MAIZE.

Research capacity will also be built in specific areas such as genetics, genomics, experimental design and data curation to enable staff to harness the potential of these technologies. The plan is to also increase the capacity to more fully understand the impacts of innovations through foresight, targeting and modeling approaches, impact assessment, adoption pathways and factors such as markets, institutions, policies and farmers' risk and preferences. Different types of short-term training will be used to develop and maintain up-to-date knowledge and skills, including coaching and mentoring, workshops, short-term courses and visiting scientist schemes, plus delivery of innovative learning materials, guidelines, tools and protocols.

Given that a major challenge in the NARES is the lack of maintenance and the decay of the research infrastructure, modest support would be provided, especially through W3/bilateral projects, to improve the infrastructure and to enable NARES scientists to successfully conduct their assigned research responsibilities.

b) *Enhancing gender in research design and impact pathways* – CapDev activities will aim at increasing the capacity to analyze the implications of gender for technology adoption and ensuring feedback from analysis to research, conducting strategic gender research for better research prioritization, and developing quality standards for gender analysis, mainstreaming of strategic thinking, theories of change and gender sensitive approaches. In particular, they will increase the capacity of young women and men to participate in decision-making and facilitate their access to markets, value chain opportunities and job opportunities.

Different modes of short-term training will be used in order to develop and maintain up-to-date knowledge and skills of staff in these areas, including coaching and mentoring; workshops, technical short-term courses and visiting scientist schemes; design and delivery of innovative learning materials; and sharing of good practices, guidelines, common tools and protocols.

c) *Improving research-based management, governance, learning and knowledge sharing* – MAIZE recognizes that tools and guidance can make a significant contribution in building the capacity of AR4D practitioners. Therefore, a set of tools, protocols and support materials will be developed to support the development of competency-based approaches and collaboration. Capability in data and information management should also be enhanced, in compliance with CGIAR policies on open-data access. This activity should take root and become an integral part of maize improvement programs and contribute to the sub-IDOs: enhanced genetic gains through tools and methods; efficient management of databases and informatics tools that enhance accessibility of genotypic and phenotypic data; and enhanced use of genetic resources.

Rules and procedures should be developed to guide researchers. All researchers should be required to develop a research data management plan to formalize decisions relating to ownership, retention, storage and disposal of data. This will ensure that researchers continue to understand data in the long term and that re-users of data are able to interpret them.

Capacity for learning and knowledge sharing will be increased in line with the learning strategy to provide opportunities for all partners to update themselves and discuss findings, strengthen their competencies and skills, and hone their research and analytical capabilities. MAIZE relevant resources

will be easily discoverable and in accessible formats (appropriate for the audience) and useful for stakeholders. This will be implemented in collaboration with the various learning functions, which include communications, partnerships, research and information technology to develop a range of knowledge products and dissemination approaches. The learning program is also concerned with the packaging of practices, protocols for improving research capacity, and insights/lessons for knowledge sharing, training and policy advocacy.

Strategic actions to implement this priority include graduate training, short-term training courses, theme-based workshops, visiting scientist schemes, internships, a mentoring and coaching scheme targeting mainly young and mid-career scientists, and the development and dissemination of relevant learning resources through the MAIZE Platform and other media. Specific short-term training courses and workshops on data curation and stewardship, software tools for breeding program management, statistical analysis methods and tools, and genomic data analysis will be organized.

d) *Strengthening capacity in technology dissemination and upscaling* – Much of the CapDev in this area will be through "learning-by-doing" in the innovation platforms for upscaling, as well as through the exchange and sharing of practical experiences at different learning workshops and other experience sharing fora. Syntheses of successful approaches with illustrative case studies and other insights drawn from the action research projects and other sources will provide complementary learning materials to be shared through platforms and other channels.

Additionally, MAIZE will organize and facilitate focused, short theme-based training and learning events to achieve enhanced adoption and impacts from improved maize seed in the following areas: improving small-scale farmers' knowledge of new maize varieties along with complementary crop and land management practices; seed production; business management skills; sustainable intensification; processing and value-addition; and strengthening institutions to influence policy. Other actions in CapDev include cross-projects exchange visits and mentoring of young scientists and practitioners. Lessons and practices for upscaling will be packaged in various forms and in appropriate languages for dissemination.

Implementation, management and delivery

Implementation will build upon the experiences of MAIZE Phase-I and other initiatives. The CapDev will operate in a matrix that cuts across clusters and includes input on needs and priorities from the broader scientific and development communities. The CapDev will support activities where MAIZE has high potential impact; high quality results promote inclusiveness and contribute to the CGIAR research outcomes in terms of human welfare benefits. The guiding principles for operationalization are ''participation and alignment, understanding the context, building on strength, interlinking priorities and continuous learning." To implement the plan, the following are needed: (a) a schedule of activities, identification of results and indicators, clarification of roles and responsibilities; (b) integrating the plan with existing plans of other partners; (c) clarifying the levels of financial and human resources required; (c) establishing a CapDev function to coordinate, monitor and evaluate activities within the overall framework of MAIZE M&E; and (d) adjust the plan as necessary to achieve results. While setting priorities is the rational process of allocating limited resources, in practice, priority setting involves a combination of supply- and demand-oriented methods, consultation with stakeholders, and a resource mobilization program.

Measure of success

Results will be assessed against predefined targets and indicators following the MAIZE M&E framework and in alignment with CapDev indicators for the second phase of CGIAR research. In selecting the indicators during the planning process, MAIZE should take into account: the purpose – what it will be and how it will indicate the required change; the availability – how straightforward is it to collect the relevant data; and the cost – how much it will cost, in terms of time and money, to collect the data. For each activity, the desired output and outcome should be determined, as well as the baseline and target for each indicator. The proposed indicators described below are specific to each priority. They should be combined with more generic indicators, such as number of workshops or trainings provided in each strategic priority, number of people trained, etc. **Table 3.3** below outlines the proposed performance indicators for capacity building.

Table 3.3: Proposed performance indicators for capacity building.

Strategic priority	Proposed performance indicators
Improving MAIZE science capacity	▪ Amount of funding for fellowship programs ▪ Number of fellowships provided (disaggregated by level, gender, department) ▪ Number of participants from NARS and research partner organizations attending ▪ Number of knowledge products generated using innovative research approaches and research process management tools and practices ▪ Increase in the number of peer-reviewed publications led by NARS students and faculty ▪ Availability of funding from CRPs for institutional strengthening
Enhancing gender in research design and impact pathways	▪ Funding made available for design/review of gender-sensitive approaches in partner projects /programs/policies (disaggregated by type of organization) ▪ Number of new policies that support gender-transformative measures (disaggregated by country) ▪ Number of CapDev activities in gender approaches/toolkits initiated (disaggregated by type)
Improving research-based management, governance, learning and knowledge sharing	▪ Number of knowledge products generated using innovative research approaches and research process management tools and practices ▪ Increase in engagement activities between NARS and brokers and end users of research (identifying research needs and subjects; sharing research results) ▪ Proportion of learning materials using media formats accessible to the intended audience ▪ Efficiency of MAIZE internal processes; e.g., percentage of tools, guidelines developed and used ▪ Number of best practices identified, documented and packaged ▪ Increase in learning and MAIZE intellectual assets
Strengthening capacity in technology dissemination and	▪ Number of collaborations (e.g., joint research, training/workshops conducted jointly, shared funding arrangements, common

upscaling	membership in multi stakeholder platforms) with partner organizations ▪ Number of groups and multi-stakeholder (innovation) platforms facilitated by CRP (disaggregated by gender, socioeconomic status, organizational affiliation) ▪ Adaptation, adoption and spread of innovations associated with participating groups, platforms, households, etc. ▪ Number of NARES-researched and field-tested technologies, patents or practices in valorization (through commercialization or public programs) ▪ Number of technologies/tools adopted across partner organizations

3.4 Gender Strategy

Knowledge of gender in maize-based agri-food systems gained in Phase-I and informing Phase-II

Until 2011, the integration of gender and social equity in MAIZE's socioeconomic research was not an institutional priority. It was based on individual interpretations and interests and tended to be donor-driven. Since then, structured, strategic work to create an effective learning research institution able to support, assimilate and mainstream researcher-driven learning on gender in wheat and maize systems has been an important focus. Work to date includes Gender Audits in MAIZE and WHEAT (2013), a Gender Capacity and Awareness Building Program to strengthen scientist research skills in gender (Wong et al. 2015); a Research Management Framework; developing gender in IDO and Flagship Projects (2014-2015); developing gender-responsive Key Performance Indicators; gender budget tracking (DAC); and a Gender Policy (2015 draft). This work has contributed towards a dramatic upsurge in projects integrating gender, from 4 projects in 2012 to 20 in 2014 and 18 in 2015. CRP MAIZE leadership is demonstrating strong support by ensuring gender is addressed at meetings, TOC workshops, reviews, etc.

Challenges to integration between Flagships remain. It can be difficult for upstream scientists to understand how their work on germplasm suited to large environments can address what appear to be trait preferences by small niche groups, including women or particular indigenous communities. Taking gender to the types of scale MAIZE operates on is a further challenge. The increasingly high profile of gender in MAIZE's work can create expectations among scientists and partners for support in gender research and analysis that cannot currently be met with the existing staff capacity. A community of practice is being developed which is expected to help expand analytic skills and knowledge.

Phase-I Learning on Gender in Maize Systems

Between 2013 and early 2016, MAIZE scientists published 24 journal articles and 9 resources (books, monographs, brochures, reports, etc.) and contributed to numerous blogs on gender research. The majority of research has been in maize-based systems in sub-Saharan Africa and Latin America. These efforts are creating a critical mass of knowledge and expertise which can inform improved scientific priorities and research questions for MAIZE as a whole and its Flagship Projects. Important findings from this work are presented in the Gender Strategy (3.4); a summary is provided here, followed by selected examples.

Strategic and integrative gender research was conducted on small-scale mechanization (Eerdewijk and Danielsen 2015), improved post-harvest storage technologies (Kandiwa et al., forthcoming), conservation agriculture (Farnworth et al. 2015), and participatory varietal selection and seed sector development (Kandiwa et al., forthcoming). Significant progress has been achieved in documenting gender aspects of technology adoption and impact assessment, e.g., Teklewold et al. 2013a/b; Gitonga et al. 2013; Teklewold et al. 2013b; Rodney et al. 2013; Fisher and Kandiwa 2013; Ndiritu et al. 2014; Mutenje et al. 2016; Manda et al. 2016). Ongoing projects (e.g., SIMLESA, DTMA, IMAS, FACASI, WEMA, CSISA) have adopted integrative gender research processes, including gender-responsive technology development and testing; integration of gender in value-chain R4D; assessing life histories of women's and men's plots, and action-oriented pilot projects to motivate and engage young adults in improved crops, post-harvest processing and agribusiness opportunities. The learning trajectories of selected research projects are presented here to show how they will inform and influence MAIZE Phase-II gender research.

Intra-household decision-making is central to adoption

The Farm Power and Conservation Agriculture for Sustainable Intensification (FACASI) project began with the assumption – which turned out to be flawed – that it would have a strong impact on gender inclusion by developing, testing and promoting "women-friendly" two-wheeled tractors. However, research conducted in Ethiopia and Kenya showed that although women supply most farm labor and do the most-labor intensive tasks, this often fails to translate into demand for mechanization. This is because women generally control few financial resources (particularly in FHH), have little decision-making power in MHH, and because women's work is socially not valued, nor is its high intensity recognized. The key lesson from Phase-I is that focusing on women-friendly machines is far less important than understanding and working with gender relations and dynamics.

Upstream work is increasingly embracing downstream concerns

In Phase-I, research findings on gender and ethnic trait preferences regarding maize landraces in Mexico and other locations, was fed upstream to scientists in FP2 to help inform their germplasm work (Hellin et al. 2010, 2013). In response to this and other CRP MAIZE work on preferred traits, and under the guidance of FP1 regarding priority setting, FP2 began to assess gender preferences and the gender implications of target traits. It worked on trait pipelines for high beta-carotene, high lysine and specialty traits of particular cultural or income-related importance to certain groups.

Developing partner capacity is vital

In Latin America, MAIZE worked with partners on (1) GENNOVATE, (2) MasAgro Productor, and (3) Feed the Future Buena Milpa Project, Guatemala. In MasAgro, CRP MAIZE partnered with private sector players to develop market-oriented innovation strategies, with public institutions to ensure that research and social inclusion were promoted, and with NGOs to offer training to women and men. While the technologies were the same (improved varieties, conservation agriculture, and soil conservation practices), they were tailored to poorer and mid-level farmers. Socially equitable implementation strategies were central to the Feed the Future Buena Milpa Project, Guatemala, with particular attention on ensuring resource-poor women and indigenous communities (regardless of age) participated effectively. The project partners learned that knowledge among partners on gender, youth and indigenous communities in maize farming systems is low. Integrating gender and social inclusion is a major challenge because of the variety of partners involved and the depth of additional effort required. In Phase II, the implications of soil conservation and other technologies on the labor demand for women and youth will be assessed and interventions adapted accordingly.

Gender in MAIZE Phase-II

Work will continue on mainstreaming gender in the MAIZE Research Management Framework (RMF). Recommendations from the Phase 1 Gender Audit include: (i) deepening the mainstreaming of gender in institutional and programmatic frameworks and procedures; (ii) refining and consolidating mechanisms to support integration of gender in research project design, budgeting and M&E; and (iii) implementing the Gender Equality Competency Framework and the Gender Capacity and Awareness Building Program to support the development of required staff gender equality competencies by level and area of work. Priority areas for gender research encompass: (i) technology development, including on trait preferences, e.g., related to labor- or input-saving, risk reduction, and nutrition and processing qualities; and (ii) technology diffusion and adoption, including access to information, bargaining and decision-making capacity, favorable and inclusive enabling environments, and value chains. Selected projects are presented here. Further R4D is planned in all FPs.

GENNOVATE

MAIZE is a leading actor in GENNOVATE (https://gender.cgiar.org/collaborative-research/gennovate/), a cross-CRP comparative research initiative examining how gender norms and agency influence the ability of men, women and youth to learn about, try out, adopt and adapt new agricultural technologies. In MAIZE, 27 case studies are being prepared in Mexico, Zimbabwe, Malawi, Nigeria, Ethiopia, Tanzania, and Nepal. Phase-II will develop journal papers and other user-orientated data. The findings will provide evidence for contextually grounded systems approaches and actions. This is essential for the design and roll-out of equitable and efficient maize agri-food systems innovations. GENNOVATE will contribute to MAIZE's strategic planning of Phase-II and beyond by: (1) enhancing the gender-responsiveness of targeting, priority setting and theories of change; (2) advancing gender-transformative outcomes of maize research and development interventions at scale; (3) building the evidence base and actions to address the role of gender norms in the adoption of improved maize technologies and related development.

FACASI Systems Analysis Tools for User-Led Empowerment and Change

The Evaluation of Systems Analysis tools in multi-stakeholder Platforms (ESAP) is coordinated by MAIZE. Six systems analysis tools will be assessed for their ability to facilitate discussions, reflections, social inclusion and empowerment leading to systems change among technology end users. They are: Fuzzy Cognitive Mapping (FCM), Social Network Analysis (SNA), Farm Typology FT), Board Games, Ecological Network Analysis, and Efficiency Frontier. FACASI will use FCM and board games with established women's groups in Ethiopia to identify 2WT mechanization entry points for service providers. Analysis will focus on gendered perceptions of the benefits and trade-offs of different types of mechanization. Scenarios will be run to understand the changes in gender-based agricultural labor with each type of mechanization. Scenarios will be presented back to the groups and the efficacy of the tools on reducing women's labor and improving their participation in decision-making assessed over time.

Reducing Risks Associated with Innovation

MAIZE has developed widely available climate-adapted maize germplasm. However, fear of the risks posed by drought prevents widespread adoption. CCAFS is funding research on how index insurance reduces the risk faced by farmers and enhances technology uptake. In Phase-II, research will focus on East and West Africa (Nigeria). Particular attention will be paid to understanding the gender and equity dimensions of insurance initiatives, for example, how socioeconomic differentiation affects farmers' access to index insurance, and how this combines with cultural and geographical features to shape access to markets, institutions and resources required to benefit from index insurance.

Deepening Feedback Loops between Upstream and Downstream Work on Traits

FP2 will continue to draw on research generated in FPs 1, 3, and 5 on traits and trait combination preferences of men and women farmers and consumers in particular contexts. This will include research on novel trait variation and molecular pipelines that address nutritional quality, antioxidants and other issues, for example, herbicide tolerance to help reduce female drudgery. Complementary work in FP5 includes plans to link consumer preferences to sensory and processing characteristics of diverse maize materials through participatory trials with both women and men. Complementary nutrition education initiatives will include women and men, and youth. Additional efforts to address and enhance the nutrient content of maize-based diets (whether through biofortification or diet diversification) will assess and take into account the quantity and quality of women's and children's as well as men's diets.

Sustainable Intensification (SI) in MAIZE

SI knowledge/technology portfolios differentiated for gender, youth and resource-poor communities will be developed. This will include integrating nutrition aspects and crop-livestock systems to promote multi-functional climate-smart farming systems. Moreover, implications of gender-asset gaps for intra-household food security, technology adoption and market participation will be modeled.

Household Methodologies (HHM) in Malawi and Tanzania

Under CCAFS, a small project will work initially in Malawi to evaluate the potential of HHM to promote selection and adoption of climate-smart practices in SIMLESA areas. The ability of HHM to foster gender-transformation will be tracked. Controls will be established. Work will be conducted with National Association of Smallholder Farmers in Malawi (NASFAM) farmer groups. Other partners (the government, the private sector, civil society, research) will be involved to create a learning community of practice.

Two-pronged approach to implement the MAIZE Phase-II Gender Strategy

As described in section 1.4, the Gender Strategy is implemented through:

a) Strategic gender research
b) Mainstreaming gender research into ongoing and future programs and projects while incorporating gender research into institutional frameworks. How is this achieved?

Incorporating the gender research dimension in institutional frameworks

Under the MAIZE Research Management Framework (RMF), funded projects prepare a detailed work plan. Activities planned are assigned to the person responsible in the Research Management System (RMS). This person must provide progress updates at the task and summary task levels. Reports are then aggregated up to the project level and up to the Cluster of Activity, Flagship Project, and CRP levels. Physical progress reported to the RMS is integrated to financial management. This allows the implemented financial and physical issues to be notified and projects to be recalibrated as necessary. Key Performance Indicators (KPIs) are registered at the RMS level. Gender is mainstreamed into all relevant MAIZE research development, implementation and evaluation processes:

- Gender-responsive R4D project design; gender budget tracking (DAC).
- Gender Competency Framework: to strengthen scientist research skills in gender.
- Gender-responsive and sex-disaggregated research implementation in targeting, data collection and analysis, participatory technology testing/evaluation, demonstrations and training.
- Monitoring and evaluation through tracking gender-responsive Key Performance Indicators.
- Accountability for gender-responsive outcomes.

Strong attention will be paid to managing iterative research processes. As results and lessons learned with respect to gender are generated, they will be fed back into FP and CRP learning processes, thus contributing to further development, and calibration of, the programmatic and institutional frameworks. This, in turn, will inform the next generation of research projects and FP implementation.

Tracking and evaluating progress

Under the MAIZE Research Management Framework (RMF), funded projects prepare a detailed work plan. Activities planned are assigned to a specific individual in the Research Management System (RMS). This person provides progress updates at task and summary task levels. Reports are then aggregated up to project level and thence to Cluster of Activity, Flagship Project, and CRP levels. Physical progress reported to the RMS is integrated with financial management reporting. This allows financial and physical issues arising during implementation to be assessed with projects recalibrated as necessary. Key Performance Indicators (KPIs) are registered at the RMS level.

Sex-disaggregated KPIs include the number of: (i) maize lines with characteristics valued by women farmers; (ii) technologies evaluated with explicit relevance for women farmers; (iii) trials conducted with women farmers; (iv) demonstrations conducted with women farmers; (v) technologies demonstrated with explicit relevance for women farmers; and (vi) surveys with sex-disaggregated data. Adoption studies and impact assessments (especially under CoA 1.2) investigate uptake of CRP MAIZE technologies.

3.5 Youth Strategy

Introduction

Ninety percent of the world's young people live in Africa, Asia, and Latin America and the Caribbean. Up to 70% of youth in SSA and South Asia live in rural areas (Bennell, 2010), and 47% of rural youth in Africa work in agriculture (Kokanova, 2013). The combined challenges of continued population growth, declining agricultural productivity growth and environmental depletion pressure AR&D to work on all fronts to enhance agricultural productivity and food security. Young women and men represent a human resource with tremendous development potential, but have often been neglected in AR&D. Recognizing the need to leverage the potential of youth for agricultural development and food security, MAIZE Phase-II will dedicate special attention to exploring avenues for harnessing the capacities and opportunities of young women and men as agents of change in maize AFS. Part of the strategy is to determine MAIZE's comparative advantage in doing youth-related research linked to agricultural systems research.

The rationale for a focus on youth in MAIZE AFS

The agricultural sector's declining ability to attract youth causes concern in the face of continued population growth, rising food demands and natural resource challenges (Sumberg et al., 2012). According to Kokanova (2013), youth working in agriculture are the poorest group of working rural youth compared to rural youth engaged in other sectors, often earning significantly less than the poverty threshold of $1.25 per day, and frequently related to poor nutritional and health status. Across the globe, more and more young people do not see farming as offering attractive livelihood options (Leavy and Hossain, 2014). Increasingly, traditional small-scale farming, which in many parts continues to involve high levels of drudgery and hardship, is no longer enough to make ends meet and raise a family.

Young people today are generally better educated than their parents. However, with higher levels of education typically come greater expectations. But many rural contexts do not offer options that match youth aspirations (Leavy and Hossain, 2014; Chinsinga and Chasukwa, 2012). Farming is a viable choice only for those who can access land and inputs. However, land fragmentation linked to rising population as well as gerontocratic and patriarchal social systems is a key constraint to the development of small-scale agriculture (White, 2012; for Ethiopia, see also Bezu and Holden, 2014). Still, as Leavy and Hossain (2014) note, agriculture could acquire status among young people if it is modern and cash-based rather than subsistence-oriented.

In 2013, global youth unemployment reached 12.6%, with young people almost three times more likely than adults to be unemployed (Table 1). The situation is particularly critical in developing regions where 90% of the global youth population lives. High levels of unemployment and disillusion can lead to social and political instability (the 'Arab spring' of 2010-11 is a recent example), as noted by ILO in its Policy Brief on investments in rural youth (ILO, 2012). The world needs farmers, as well as professionals and entrepreneurs engaged in dynamic, inclusive AFS, to ensure the food and nutrition security of future generations. However, while hopes of developing the agricultural sector are often pinned on the energy and innovativeness of youth and their willingness to take risks (e.g., IFAD, 2013; Adedugbe, 2013), interventions focusing on youth should appeal and make sense to young women and men from their own perspectives (White, 2012).

Defining youth as a social category

The concept of youth as a distinguishable demographic group is socially defined and varies across different contexts.[3] Youth is often viewed as a stage in life of transition from childhood to adulthood, associated with physiological and psychological changes and increasing social and economic autonomy (World Bank, 2006; Bennell, 2007; White, 2012). In many contexts the concept of youth does not exist as such or is delimited by entirely different parameters for entry into adulthood, e.g., age-sets, initiation or rites of passage, the onset of menstruation or childbearing, marriage, death of a parent, working for pay (Keesing, 1981, Potash, 1981 in Quisumbing et al., 2014). However, defining youth as being in transition to adulthood conceals the fact that they are living in the here and now with their own needs, rights and interests (White, 2012; Sumberg in CGIAR Consortium Office, 2015).

Formal, legal definitions of youth typically apply age-based criteria linked to rights or special protective measures and policies (e.g., the right to vote or the uptake of hazardous work) and in many countries the age of 18 marks the legal boundary to adulthood. The UN usually defines youth as persons between the ages of 15 to 24, and children as persons up to the age of 14.[4]

Though in principle the term youth covers both genders, in practice it often refers primarily to young males, thus rendering invisible the gender-based constraints and opportunities young rural women face (Farnworth and Sillah, 2013; Levine et al., 2008; Bertini, 2011). Overall, the social heterogeneity of youth and their embeddedness in different social relations and institutions needs to be understood and taken into account in R&D interventions. In MAIZE, research on youth will be guided by relevant social definitions of this demographic group, taking into account their heterogeneity.

MAIZE Youth Strategy

By including youth-related and –focused research, we address IDO B.1: Equity and inclusion achieved. Informed by the commitment to promote equality of opportunity and outcomes, the objectives as well as the expected impact and outcomes of the MAIZE youth strategy are listed below:

Objectives	• To increase inclusion of youth in multi-stakeholder research partnerships. • To harness the opportunities and innovation capacities of resource-poor young women and men in maize-based AFS.
Impact	• Improved livelihoods due to improved opportunities for young women and men to engage in MAIZE AFS.
Outcomes	• MAIZE scientists and research teams increase research focus on youth's local opportunity structures and their linkages to sustainable agri-food system development. • Increased livelihood opportunities for young women and men, directly or indirectly linked to MAIZE AFS.

[3] This is reflected in national policies; for example, Ethiopia's national youth policy (2004) defines youth as those aged between 15-29, while the National Youth Policy of Nepal (2010) defines youth as "women, men and third gender" persons aged 16-40 years old (http://www.youthpolicy.org/).

[4] However, even within the UN system diverging age brackets exist, e.g. the Youth Fund of UN Habitat includes in the youth category people aged 15-32 years, the African Union extending this from 15-35 years of age. The Convention on Rights of the Child applies to persons up to the age of 18 years.

Overall approach to youth in MAIZE AFS

MAIZE's overall approach to youth focuses on understanding and harnessing rural opportunity structures. Limited research has been conducted specifically on the roles of young women and men in agriculture (Farnworth and Sillah, 2013; Proctor and Lucchesi, 2012; Paroda et al., 2014) and related value chains, and statistics are rarely disaggregated by age (FAO, 2014, p.xvii). Integrating a youth perspective in the MAIZE Phase-II agenda, therefore, has to begin with strengthening the evidence base and establishing a research agenda. Borrowing from Sumberg et al. (2012), key research questions include:

- How are opportunities for engagement with maize farming and maize agri-food system development more broadly structured for young women and men in different places?
- What are the implications of this structuring for consequent patterns of young women and men's engagement with maize farming and maize AFS, as well as for livelihood, poverty, social justice and sustainability outcomes?
- How might particular policy options affect or modify these outcomes?
- What are the politics around these policy options and associated processes?

Emerging findings from GENNOVATE

Current examples from MAIZE Phase-I research with specific attention to the perspectives of rural youth include the cross-CRP comparative research initiative, GENNOVATE, informed by an opportunity structure conceptual framework in which MAIZE plays a lead role (http://gender.cgiar.org/wp-content/uploads/2015/12/GENNOVATE-Flyer_WEB.pdf). As part of this initiative, MAIZE is capturing the views of young women and men regarding social *norms* and *practices* in relation to their aspirations, livelihoods, capacities for innovation, physical mobility, economic opportunities, and family formation.

Initial findings from 23 communities in Zimbabwe, Mexico, Malawi, Nigeria, Ethiopia and Nepal indicate that the aspirations of young men and women are mostly found outside agriculture or NRM activities (see Figure 3.1 below). For many of these young respondents, owning a business, holding a degree, or migrating is fundamental for moving out of poverty. As many relate farming activities with economic stagnation and backwardness, they hope for other opportunities.

At the same time, both young women and men express interest in agriculture-*related* business activities (see Figure 3.2 below). Limited access to knowledge and resources are common constraints for youth respondents across these countries. Young people speak critically about their local opportunity structures and wish for more inclusion and openness. Furthermore, young people ask for technological innovations that reduce drudgery. A young woman from Zimbabwe expresses: "I wish someone could invent tools that dig basins in conservation agriculture so that we do not do it manually since as women we already have the burden of doing all household chores."

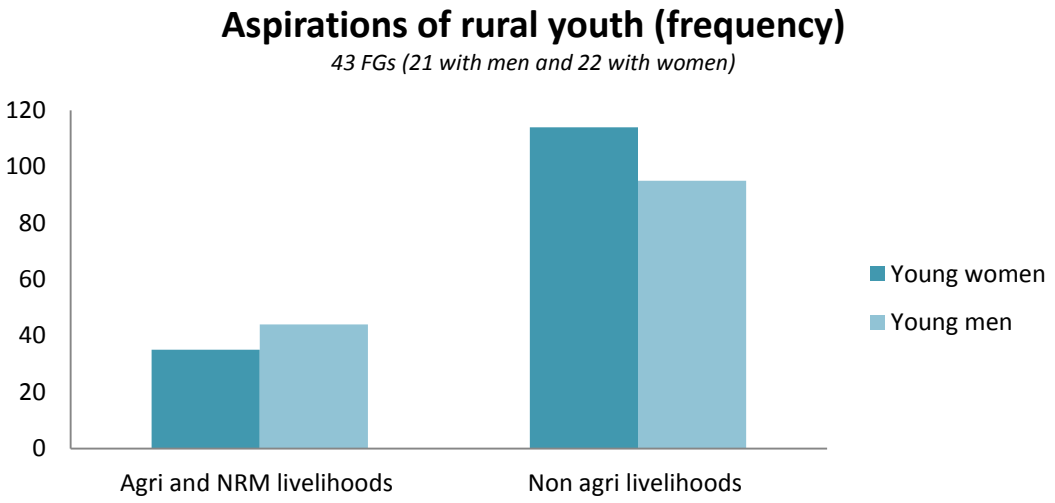

Figure 3.1 Aspirations of rural youth, 2015 data from 23 communities

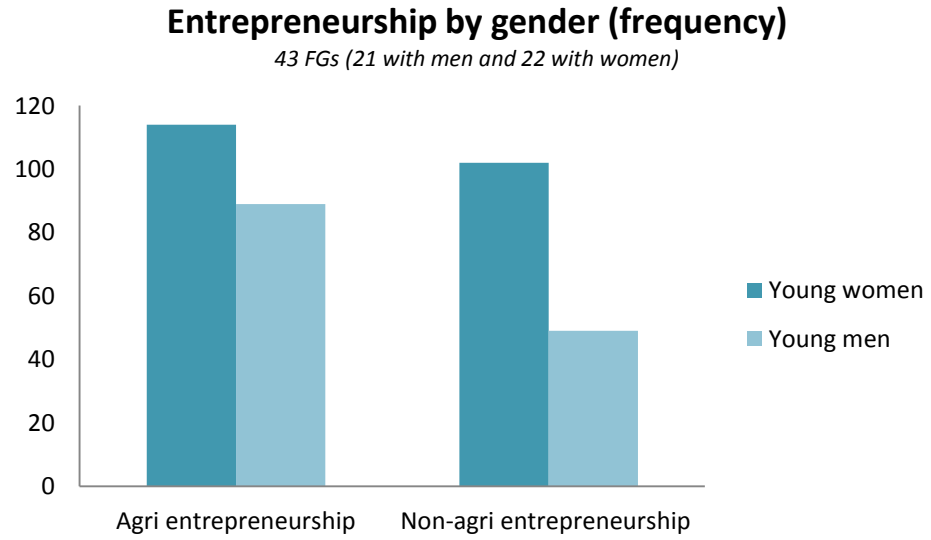

Figure 3.2 Entrepreneurship by gender, agri and non-agri 2015 data from 23 communities

Other youth-responsive work that MAIZE Phase-II can build on includes the MasAgro Productor project, which involves establishing a farmer typology considering age and gender to promote more inclusive innovations. Similarly, children and youth are the priority groups targeted by the Buena Milpa Project in Guatemala, which works on improving young people's and adults' knowledge of traditional crops and diet diversity. Likewise, the IITA Youth Agripreneur Program targets youth via training, business development, strategic alliances and facilitating of market access to establish their own agri-businesses along different value chains.

Integrating youth in MAIZE Phase-II R4D agenda

MAIZE Phase-II will take a two-pronged approach: i) develop and implement a strategic framework for systematically integrating youth-related issues in AFS research; and ii) develop and apply key principles and practices for including youth-related concerns in research.

i) Strategic framework: In 2016, MAIZE is partnering with IDS to develop a strategic framework for its engagement with young people and youth-related issues. The framework will require detailed exploration of the distinction between structural issues and interventions (i.e. that affect or have the potential to affect multiple social groups) and what might be considered "youth-specific" issues and interventions. Structural issues within the agricultural sector affect productivity and access to land, credit, technology and markets. A working hypothesis is that much current policy and development programming that purports to address the youth and agriculture problem is "youth-specific" and therefore fails to address – or even acknowledge – core structural issues.

Development of the strategic framework will draw on findings from GENNOVATE, and on relevant research literature on the structural transformation of agriculture in the developing world; on youth transition, youth employment and young people's imagined futures; and on the "new entrant problem" in developed country agriculture and the use of social protection programs to facilitate inter-generational transfer of key assets like land.

ii) Integrating a youth-lens in MAIZE research practice and procedures: Where relevant, youth will be targeted in MAIZE research projects and increased emphasis put on gathering feedback on the research process from young men and women. In addition to sex-disaggregation, people-level data collection and analysis will also be disaggregated systematically by age and other relevant socioeconomic variables. Where possible and relevant, mixed methods will be applied, combining qualitative and quantitative data collection and analysis and engaging youth as research partners. To take into account the social heterogeneity of youth, representation of diverse groups will be ensured to the extent possible. For projects with a youth focus or component, this dimension will be incorporated in monitoring and evaluation frameworks. Adoption studies, impact assessments, foresight and targeting, and value chain analyses will seek to incorporate youth issues.

As integration of youth in MAIZE research practice and procedures progresses, increased awareness and capacity are expected to lead to an increase in research projects paying special attention to youth. In a first stage of Phase-II, MAIZE will pursue a bottom-up approach by identifying opportunities for youth-centered research that can be included in ongoing projects. Later in Phase-II, MAIZE will increasingly apply top-down approaches, designing new projects with youth components or planning youth-focused projects.

iii) MAIZE will focus its youth-informed and youth-focused research, especially under FP1, FP3, FP4 and FP5. Potential research issues/questions are presented below

FP	Potential research questions
FP1	• What are the structural opportunities and constraints for young men and women to engage in MAIZE AFS? • What are the implications of this structuring for consequent patterns of young men and women's engagement with MAIZE AFS and how might particular institutional arrangements, policy options, programs, technological support or capacity building and training affect or modify these outcomes? • Are young men and women's voices being heard, and what are the best ways to enhance their contribution in policy dialogues?
FP3	• How can youth's priorities be addressed in product development strategies? • How can young people be included as co-designers of agricultural innovations? • How can nutrition development interventions be more inclusive and specifically target women of reproductive age and young children?
FP4	• What types of institutional arrangements and business models can enhance the ability of poor youth to access and benefit from more efficient and labor-saving technologies?
FP5	• What is the role of public/private/NGO sectors in providing market-oriented services to smallholder farmers? How inclusive of youth are these services? How can their inclusiveness be enhanced? • How do we identify and promote income-generating opportunities along the value chain that are attractive to youth? • How can the development and deployment of nutritionally enriched maize be linked to youth engagement in MAIZE AFS? • Do digital technologies strengthen the engagement and contributions of youth in agriculture and how to enhance these contributions?

CIMMYT and IITA, the lead centers of MAIZE, have a long history of developing and deploying nutritious maize varieties, especially QPM. Provitamin A-enriched maize development and deployment (strong linkage with A4NH CRP) is an important addition that is beginning to show results in SSA. Increased emphasis on the nutrition of children and adolescents could bring additional resources to solve the problem of combining high nutritional quality with multiple biotic and abiotic stress resistance and high yield potential. MAIZE would welcome the opportunity to use the best available germplasm to more aggressively combine nutritional traits with agronomic performance and add value to farmers and consumers in target geographies. The nutritional advantages of QPM and provitamin A-enriched maize were demonstrated in recent years by MAIZE and A4NH, respectively. Strong collaboration with A4NH will increase the nutritional benefits for women and children.

3.6 Results-based Management

Purpose

In Phase-II, MAIZE will be implementing a results-based management (RBM) framework. This framework will act as a strategic management system that integrates strategy, results, people, resources, processes and measurements.[5] It will also consist of a set of tools for strategic planning, monitoring and evaluating performance, reporting, improvement and learning.[6] RBM seeks to support greater accountability, transparency, informed decision-making, swift corrective actions, learning from experience and better management of risks and opportunities.

Principles

This framework will be implemented based on a set of globally recognized RBM principles: a culture focused on outcomes; strong leadership in RBM to model results-orientation across the system; participatory approaches at all levels, including partners and stakeholders; learning and adaptation through the use of performance information; accountability and transparency where program staff are held accountable for appropriate levels of results that are acquired and reported in a transparent manner; and a utilization-focused and flexible operational system where RBM tools, procedures and practices can be adapted based on contexts and needs.

Steps in Managing for Results

Given that RBM is a management strategy, the framework will be part of the overall ongoing CRP cycle of planning, budget allocation, risk management, and performance reporting and evaluation, including value for money. Key steps that will be used throughout this cycle include:[7] based on lessons, defining and revising the impact pathways at the CRP level and theories of change at the Flagship level; budget allocation based on performance; planning for monitoring and evaluation; establishing responsibilities and accountabilities; monitoring and analyzing performance and risks information; using performance and risks information; and reporting performance results.

Implementation within CRP

CRP Impact Pathway and Flagship Theories of Change

The CRP impact pathway and Flagship Programs' theories of change as presented in the proposal above were developed during workshops with Flagship teams. A participatory approach was used to capture all views, experiences and known evidence into these theories of change. They serve as the CRP's hypotheses of the way by which change is expected to occur from output to outcome and impact. They are meant to be dynamic document and adapted as evidence is further collected. Assumptions explaining the causality underlying the relationships between the outcomes and impacts were also identified. Key assumptions will be tested to validate the theories of change. Furthermore, critical risks were included and will be monitored to support effective management of the CRP.

[5] "Results-Based Management Lexicon." Government of Canada, Treasury Board of Canada, Secretariat. Web. 02 Feb. 2016. http://www.tbs-sct.gc.ca/hgw-cgf/oversight-surveillance/ae-ve/cee/pubs/lex-eng.asp

[6] "An Introduction to Results Management." Asian Development Bank. Web. 02 Feb. 2016. http://www.adb.org/sites/default/files/institutional-document/32577/files/introduction-results-management.pdf

[7] Ibid.

In terms of high-level outcomes, the CRP will be contributing to the following elements from the CGIAR Strategy and Results Framework:

- System-level Outcomes:
    - 1. Reduced Poverty
    - 2. Improved food and nutrition security for health
    - 3. Improved natural resource systems and ecosystem services
- Intermediate Development Outcomes
    - 1.1 Increased resilience of the poor to climate change and other shocks
    - 1.3 Increased income and employment
    - 1.4 Increased productivity
    - 2.1 Improved diets for poor and vulnerable people
    - 3.2 Enhanced benefits from ecosystem goods and services
- Cross-cutting Intermediate Development Outcomes
    - Climate change – A.1 Mitigation and adaptation achieved
    - Gender and youth – B.1 Equity and inclusion achieved
    - Policies and institutions – C.1 Enabling environment improved
    - Capacity development – D.1 National partners and beneficiaries enabled

Interoperable Tools to Support RBM Implementation

The CRP's RBM framework will be supported by a user-friendly Information Communication Technology (ICT) online platform that will cover the whole program and project management cycles, including pre- and planning, monitoring, reporting, adaptive management (i.e., support decision making and program/project improvements) and learning as part of the operationalization of the CRP's MELIA plan. Given that projects will align to Flagship Projects' theories of change (ToCs), the platform will be structure on the basis of these ToCs. The CRP will ensure that the platform will comply with CGIAR policies (e.g., Open Access and Data Management Policy); is interoperable with other systems, including those of the other lead center; and can produce reports necessary for the CRP. To the extent possible, interoperability with other CRPs' systems will also be sought to support reporting at the portfolio level.

To ensure effective implementation of this ICT online platform, capacity building at various levels will be needed.

3.6.1 Monitoring, Evaluation, Learning and Impact Assessment (MELIA)

Purpose

In order to effectively implement the RBM framework, strengthening monitoring, evaluation, learning and impact assessment (MELIA) will be necessary at both project and program levels. A robust and strategic plan is proposed and will support CRP cycle of planning, budget allocation and reporting steps. Operationalization of the plan will take place following submission of the proposal under the guidance of the CGIAR MEL Communication of Practice (CoP). To the extent possible, the MEL CoP will strive to establish minimal standardization and consistency across the CRPs to contribute to coherent reporting at the portfolio level.

In addition to the above RBM principles, the MELIA strategy will focus on adding value and creating opportunities for adaptive management and learning. The CRP will use a modular approach for the implementation of the strategy, which will include a suite of tools, guidelines and best practices.

Furthermore, plans will be put in place to systematically review the strategy and make necessary adjustments, where required, to better assist staff and management in delivering and improving the performance of the CRP. It is expected that the strategy and its modules will improve over time as more information is gathered and experience in gained in implementing such a framework.

MELIA Strategy Modules

Monitoring

A monitoring plan consisting of a continuous process of collection and analysis of data is proposed on: the performance of the CRP at the output, outcome and impact levels; the key assumptions of the theories of change; and the critical risks.

The definition of indicators to assess these above elements will be conducted by using a two-pronged approach. First, the CRP will seek indicators already in existence that are credible, well-recognized, accessible, and being monitored by other better positioned organizations (e.g., FAO, WB) and/or in national statistics. Second, in cases where there are no suitable indicators, the CRP will develop new indicators with a cost-effective monitoring system in close collaboration with the Flagship teams. Furthermore, the CRP will support and seek to use, where possible, standardized indicators established by the MEL CoP and other communities of practice.

A set of proposed indicators for intermediate development outcomes to which the CRP will be contributing is proposed in table 1.3. Indicators at other levels will be developed during the operational phase after proposal submission.

In addition to the targets identified for SLOs, the CRP will identify targets to indicators, to the extent possible and where appropriate, drawing from existing baselines, studies, and thematic and regional context expertise. The methodology used to identify the targets and to measure progress, as well as key assumptions, will be detailed to ensure transparency.

To complete the monitoring plan, data collection sources and methodologies, responsibilities and timelines will be identified for each of the indicators. A variety of methodologies are expected to be used dependent on the indicators, including document reviews, surveys, case studies, meta-analyses, meta-syntheses, impact assessments, adoption studies and contribution analysis.

Evaluation

Under the CGIAR Policy for Independent External Evaluation, several types of evaluations have been identified to support the system, including IEA commissioned External Evaluation, CRP-Commissioned External Evaluations (CCEEs), and Impact Assessments.

The IEA conducts a cycle of **Independent External Evaluations** of CRPs to provide accountability, support to decision making, and lessons for improving quality and effectiveness of research programs. It is expected that IEA will use CRP monitoring and evaluation information as its primary source of evidence, including CCEEs, impact assessments, and annual monitoring reports.

The CRP will operationalize a rolling evaluation plan to build credible evaluative evidence to support decision-making and lessons for improved and more cost-effective programming. This rolling plan will include CCEEs, impact assessments and other studies identified by CRP management.

The **CCEEs** will most likely be at the Flagship level but could also include other programming elements to evaluation. The conduct of these CCEEs will be spread over the cycle to minimize the burden on management and researchers. The CCEEs will cover at least half of the budgeted activities of a Flagship in a cycle in line with the CGIAR Independent Evaluation Arrangement's Guidance for CRP-Commissioned External Evaluations (January 2015). A maximum budget of $300,000 per year will be identified in the CRP budget for the conduct of these CCEEs. Joint CCEEs will be sought to leverage the resources of multiple CRPs and to assess performance within a geographic focus (likely in line with the site integration plans) or thematic area (e.g., seed systems, nutrition, and gender). They will be conducted in line with the CGIAR Evaluation Standards.

These CCEEs will consist of a systematic and objective assessment of the program based on evaluation criteria related to relevance, efficiency, quality of science, effectiveness, impact and sustainability. They are considered the building blocks to the external evaluations conducted by the IEA.

The CRP proposed rolling plan for CCEEs are presented in **Table 3.4**. The CRP management will annually review this plan to ensure it meets its needs for accountability and learning purposes. Planned impact assessments can be found in the FP1 section of the proposal.

Table 3.4 Proposed rolling plan for CCEEs

CRP PHASE II - Rolling Evaluation Plan

CRP	Review / Evaluation/	Dates		Evaluation Focus	Main Evaluation Topic/Issue	Geographic Focus		Description	Budget	Participating Centers	Evaluation Manager
		Start	End			Focus Country	Non-Focus				
MAIZE	CCEE	2017		FP2 - Novel tools and diversity	relevance, efficiency, quality of science, effectiveness, impact and sustainability	TBD	TBD	Joint evaluation with WHEAT	Max - 300K	CIMMYT, IITA, ICARDA	M. Guertin
MAIZE	CCEE	2018		FP3 - Stress tolerant and nutritious maize		TBD	TBD		Max - 300K	CIMMYT, IITA	M. Guertin
MAIZE	CCEE	2019		FP4 -Sustainable Intensification		TBD	TBD	Joint evaluation with WHEAT	Max - 300K	CIMMYT, IITA, ICARDA	M. Guertin
MAIZE	CCEE	2020		FP1 - Enhancing R4D Strategy for Impact		TBD	TBD	Joint evaluation with WHEAT	Max - 300K	CIMMYT, IITA, ICARDA	M. Guertin
MAIZE	CCEE	2021		FP5 - Adding value		TBD	TBD		Max - 300K	CIMMYT, IITA	M. Guertin
MAIZE	Thematic CCEE	TBD		Thematic - TBD	TBD	TBD	TBD	Based on Management	Max - 300K	CIMMYT, IITA	M. Guertin

Impact Assessment

Globally, impacts are defined as the positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended. Within the CGIAR, impacts are described as the consequences of the CRPs on the state of selected development variables concerning the SLOs, which are themselves related to Sustainable Development Goals. There is increasing recognition that interventions that contribute to complex, indirect causal chains, with multiple partnerships, and with data limitations require a broad range of methods to evaluate effectively, especially at the impact level.

Therefore, the CRP will adopt a mixed methods approach to evaluate its performance, including ex-ante and ex-post i**mpact assessments**. Specific needs of the CPR for the conduct of impact assessments will be identified as part of the monitoring plan as well as by the programming needs for prioritization of research and improved performance.

Impact assessments aim to understand impact (attributable change) and how that impact has been brought about. In order to do so in a way that yields unambiguous results, it is helpful to analyze interventions with a theory-based evaluation (TBE) methodology (Ton, 2012).The basis of this approach is the use of theories of change and the determination of critical nodes where the development process may need to be validated. These critical nodes are the focal points of impact assessment. Depending on the nature of the critical node, (i) whether it is a state or a process, (ii) whether data related to the critical node can be gathered easily or not, and (iii) whether the data is quantitative or qualitative, will determine the type of method that can be employed for the impact assessment, hence the mixed methods. The rigorous application of impact logic for conducting meaningful ex-ante impact assessment allows for determining the key issues that need to be monitored in order to do ex-post impact assessment. For each step in the intervention logic framework there are a number of questions that need to be answered:

- What are the key assumptions and do they need to be tested?
- What outside factors that are not under control of the programme play a key role? How do they form a counterfactual to the intervention logic?
- To what extent are idiosyncratic circumstances at play? Is there scope for generalisations?

Reporting

The annual reporting process will be the key method for the CRP to describe its progress and results achieved as established in the Flagship theories of change. Reporting of results will be conducted at the output and outcomes levels, and when possible, at the impact level. A review of data collected on indicators, assumptions and risks will serve as guides for reporting on results. As part of this process, the CRP will also document any lessons and changes to the implementation of the program, including to the theories of change and monitoring plan.

Learning

In line with the RBM principles, the CRP will be operationalizing a variety of measures to support learning from the information collected from monitoring and evaluation. The CRP will integrate these measures as part of its planning and reporting cycle with clear roles and responsibilities. The measures include:

- annually reviewing and revising the ToCs based on evidence collected, and to the extent possible, conducting contribution analysis to reflect and strengthen the CRP performance story;
- annually conducting reflection sessions on performance and risk information collected;
- adjusting and prioritizing the implementation of the Program in line with the evidence collected;
- implementing and adjusting mitigation measures to manage risks;
- documenting lessons learned and best practices (e.g., meta-synthesis of lessons from evaluations);
- conducting evaluation workshops to reflect on and adjust to the evaluation findings and lessons;
- knowledge management and information sharing; and
- follow-up on learning decisions, including actions plans in response to evaluation recommendations.

3.6.2 Budget Allocation to MELIA

Resources required to implement a robust and credible MELIA strategy have been included accordingly in the CRP's budget.

For the MEL elements of the strategy, a budget of 2% of CRP budget should be allocated. This allocation would cover:

- development and implementation of a stronger monitoring and reporting interoperable platform
- management of data collection measures in various geographies to implement the monitoring plan effectively
- annual conduct of a CCEE, which is estimated at USD 300,000 of consulting fees per evaluation
- MEL specialists to provide MEL expertise to CRP and project leads, build capacity across the lead centers and partners, and coordinate the implementation of the MEL modules

As for impact assessments, detailed information of the budget and coverage can be found under the FP1 section of the proposal.

3.7 Linkages with Other CRPs and Site Integration

Agri-Food System (AFS) CRPs

Much collaboration currently exists between MAIZE and other AFS CRPs, which will be expanded in MAIZE Phase-II (see **Table 3.5**). The priority areas for enhanced linkages are collaborative work on: 1) pre-breeding; 2) sustainable intensification, and; 3) value addition.

1) Cross-commodity pre-breeding, tools, models and methods will be increasingly shared between AFS CRPs to support research and enhance genetic gains in crops other than maize. This will be achieved in part via the Genetic Gains Platform (redesignated in July 2016 as Excellence in Breeding Platform) and through bilaterally funded projects and through promotion of open-access databases, informatics tools, software and breeding support tools (e.g., real-time data curation tools). Cutting-edge biometrics models and methods for genomic selection and high-throughput proxy trait selection developed by MAIZE are widely useful across AFS CRPs. MAIZE's platforms for characterizing and enhancing the use of genetic resources serve as templates or at least serve to inform efforts by other AFS CRPs. High-throughput phenotyping methods and tools, as well as precision phenotyping hubs/sites will be useful to other AFS CRPs. Leveraging phenotyping competencies and best practices, with a view to rapidly translate insights of extensive genetics and breeding research undertaken in MAIZE on other relevant crops with lower research intensities. Other CRPs (such as RICE, WHEAT, GLDC) will share knowledge on G x E x M in mixed cropping systems, where maize is an integral component.

2) Sustainable intensification in target geographies shared with other CRPs will be enhanced through the development and application of improved methodological approaches to analyze multi-commodity farming systems and target technical interventions within specific agro-ecological, socioeconomic and institutional environments. In addition, MAIZE's expertise in agronomy (precision agriculture, appropriate scale mechanization, and nutrient/water management) will be developed and applied with an increasing systems perspective. In return, other AFS CRPs will share knowledge on the performance on maize rotation, intercropped or in combination with rice, wheat, legumes, root crops, livestock and trees. MAIZE will benefit from MAIZE will also collaborate with other AFS CRPs in the development of framework for baselining and monitoring progress at farm and landscape levels. MAIZE will increasingly collaborate with other CRPs (and non CRP instititutions with scaling expertise) to develop and apply increasinly sophisticated business models for upscaling technologies.

3) MAIZE already collaborates with other AFS CRPs and PIM on the development and sharing of methods, tools and data in relation to foresight, impact assessment, gender, value chain/market analysis, and MELIA. In Phase-II, emphasis will be placed on stronger collaboration with CRP and non-CRP partners to develop and apply methods, tools and data for analysis of value addition in agri-food systems/value chains. joint analysis of complementarities and interactions in AFS (including maize and its by-products for animal feed) and advanced processing and postharvest technologies will be increasingly undertaken with colleagues in GLDC, RTB and Livestock CRPs.

Agriculture for Nutrition and Health (A4NH) CRP

Collaborative work with A4NH in MAIZE Phase-I has been focused on developing bio-fortified crops (provitamin A and kernel Zn enriched maize hybrids) and advocating for research products that decrease consumption of aflatoxin-contaminated maize, especially in Africa. CIMMYT and IITA will continue to support A4NH through their Harvest+ work. In Phase-II, MAIZE will continue to accelerate progress in

developing nutritious crops and foods through exploiting the rich genetic diversity of maize. During Phase II, MAIZE will explore the feasibility and genetic variability for additional stacking of nutritional traits in maize varieties within A4NH. MAIZE will develop and produce nutrient enhanced germplasm, markers and breeding tools for maize micronutrients and develop increasinly nutrition-dense maize, which will be shared through MAIZE's global network of breeders and SME for commercialization of biofortified maize. In return, A4NH assist in identifying target areas and priority interventions and partners for nutrition and scale-up. During Phase-II, FP5 will develop stronger collaboration with A4NH and PIM for the adoption and dissemination of bio-fortified products, approaches and lessons to be learned on diet shifts, advocacy for better data capture and integration of value chain research into agri-food systems research. Several areas of iteration and complementarity have been identified with A4NH including food systems and understanding the dynamics of consumption and the differential roles in food systems for people by socio-economic status, age and gender, particularly among adolescent girls and women of reproductive age. There is a need for effective innovations with food suppliers to improve diets through MAIZE AFS – requiring an enabling environment from regulators and policymakers.

Climate Change CRP (CCAFS)

MAIZE contributes to Climate Change CRP (CCAFS) in a number of ways. Firstly, through improved foresight modeling, targeting (in conjunction with other AFS-CRPs, PIM), analysis of climate smart innovations (including weather index insurance; drought/heat tolerance; conservation agriculture). In Phase-I, modelling of future climate effects on production, together with synergies and trade-offs, to target adaptation domains with potential mitigation co-benefits has underpinned decision making in both MAIZE and CCAFS. In return, through its links with policy making bodies, CCAFS acts as a science-based advocate for policy changes to mitigate climate change. Increasngly, new abiotic and biotic stress-resilient improved MAIZE-derived cultivars will be evaluated within climate smart villages under heterogeneous production and socio-economic conditions. In return, CCAFS acts as faciitator, linking this germplasm to scaling-out partnerships. In Phase-II, MAIZE FP4 will work closely with CCAFS around research activities related to: a) participatory evaluation of MAIZE technologies and practices in climate smart villages (CSVs) and other sites where appropriate; b) improved resource use efficiency, particularly nitrogen and water, and impacts of GHG emissions; c) evaluation of the C sequestration potential of SI interventions, and; d) creation of minimum datasets for climate-smart technologies. Through CSVs and other CCAFS research, collaboration with important climate-related actors in both the public and private sectors will be strengthened. FP4 will also integrate with CCAFS in terms of data: (a) the generation of multi-criteria minimum datasets for maize-based systems and standardized methods and metrics to quantify climate smart agricultural technologies and practices over a range of scales; (b) to build a community of practice around climate resilient GxExM technologies and improved cropping system models that better characterize the effects of climate extremes on maize-based systems in terms of yield performance, resource use, GHG emissions, synergies and trade-offs. The GYGA spatial framework will provide a means to explicitly evaluate climate smart options in both current and future climates.

Policies, Institutions and Markets (PIM) CRP

Most of the collaboration between MAIZE and PIM is concentrated in FP1 and FP5. In Phase-I, MAIZE successfully collaborated with PIM in the co-development and sharing of methods, tools and data in relation to foresight, impact assessment, gender, value chain/market analysis through a strong community of practice. Phase-II, with the addition of FP5, MAIZE and PIM will further collaborate on research to determine dietary pattterns, tools for better data capture and integration, and opportunities for value addition and scaling out.

Water, land, and ecosystems (WLE) CRP
The collaboration between MAIZE and WLE is still at an early stage. To date, discussions have focused on how best to integrate the field and farm level knowledge on maize agronomy and systems analysis generated by MAIZE and the landscape level and beyond knowledge generated by WLE.

Genebank Platform
Both FP2 and FP3 of MAIZE will align strongly with the Genebanks Platform. FP2 will focus on the Genotypic and phenotypic characterization of maize genebank accessions/genomic diversity and identification of novel variants for use by breeding programs. MAIZE will generate knowledge about genebank accessions, including definition of core sets to enhance use of genebank accessions. MAIZE FP2 will develop informatics tools to extract knowledge from Genebank data and to inform genebank decisions about gaps and duplications in collections. Ultimately, this will enhance use and impact of genebank accessions. Experience about intellectual property issues affecting the use of genetic resources will be generated and shared between MAIZE and the Genebank and Excellence in Breeding Platforms. The application of genetic engineering tools will be explored.

Excellence in Breeding Platform
MAIZE FP2 and FP3 will have strong linkages to the Excellence in Breeding Platform and others. MAIZE FP2 and the Excellence in Breeding Platform will deploy tools developed by partners; for example, breeding program management software from the Integrated Breeding Platform and web-based visualization tools to interpret complex genomics and phenomics data developed by the James Hutton Institute. Interactions with MAIZE FP2-CoA2.1 and the Excellence in Breeding Platform will ensure that data management and GS prediction analysis pipelines result in useful and timely prediction reports to breeders. The GOBII project, a proposed component of the Excellence in Breeding Platform, is a showcase example of cooperation among these CRPs, involving five major crops. It is already generating interest from alternate crops, and the pioneering work done within GOBII is expected to benefit other non-focus crops within a ten year timeframe. MAIZE FP2 will also have strong linkages to the phenotyping and bioinformatics modules from the Excellence in Breeding Platform for inputs into high throughput/remote-sensing phenotypic data capture, storage, and analysis, and automated image analysis.

With regard to MAIZE FP3, all the six CoAs will be linked to the Excellence in Breeding Platform, MAIZE FP1 and FP2. MAIZE CoA 3.1 and 3.3 will provide promising maize germplasm for targeted environments and cropping systems to FP4, and will receive feedback on their performance through G $\times$ E $\times$ M analyses. Products from CoA 3.3 will form the core for developing novel technologies/processes/products through FP5. Some of the key tools developed by the Excellence in Breeding Platform for cross-cutting areas, such as phenotyping and breeding decision-making, will be validated and deployed in FP3. The FP3 team in turn will also help determine priorities to guide development of new tools in this platform.

Table 3.5: MAIZE Perspective on Site Integration in Phase-II

Countries	Phase-I and Extension	Possible integration In Phase-II	Lead center	Topics/projects	Integration under FP
Sub-Saharan Africa					
Cameroon	Germplasm screening activity	RTB, integration of CIRAD's research	TBD (discussions among CRPs are ongoing)	Access to improved maize germplasm	FP3, FP4
DRC	Germplasm screening activity in the maize-growing provinces (through MAIZE)	RTB	TBD (discussions among CRPs are ongoing)	Access to improved maize germplasm	FP3
Ethiopia	Large portfolio of projects from several CRPs with a significant contribution from MAIZE	MAIZE, WHEAT, FTA, CCAFS, RTB, GLDC, Livestock, PIM, WLE	MAIZE and/or CCAFS and/or Livestock	Adoption of improved maize varieties (see DTMA, NUME), Sustainable intensification (TAMASA, SIMLESA, FACASI, Africa RISING), improved targeting of SI intervention and integrated research on crop, tree, livestock systems	FP1, FP3, FP4 FP5
Ghana	Many IITA-led projects in relation to MAIZE, covering most Flagship Projects; includes Africa RISING, N2Africa	TBD	TBD	Access to improved maize germplasm and sustainable intensification	FP1, FP3, FP4, FP5
Kenya	Many CIMMYT and IITA led projects in Kenya under FP3, 4, 5	WLE, Livestock, FTA, RTB, CCAFS	MAIZE, FTA	Adoption of improved maize varieties (see DTMA, NUME), Sustainable intensification (SIMLESA, FACASI), improved targeting of SI intervention and integrated research on crop, tree, livestock systems	FP3, FP4, FP5

Malawi	MAIZE (SIMLESA, DTMA, DTMASS)	GLDC (ICRISAT), WLE	MAIZE	Diversification, sustainable intensification (Africa RISING)	FP3, FP4, FP5
Mali	Africa RISING in southern Mali	GLDC (ICRISAT), WLE, FTA, Livestock	GLDC AFS	Diversification, intensification and risk in agro-ecologies where maize, sorghum co-exist	TBD
Mozambique	MAIZE (SIMLESA, USAID)	GLDC (ICRISAT and CIAT), Livestock, RTB	MAIZE, RTB	Access to improved maize germplasm and sustainable intensification of maize-bean-livestock systems	FP4
Nigeria	Many IITA-led projects in relation to MAIZE, covering most flagship projects; good integration with GLDC AFS	TBD	TBD	Access to improved maize germplasm and sustainable intensification of maize-bean-livestock systems. Value-addition. Technology targeting (TAMASA).	FP1, FP3, FP4 FP5
Rwanda	FTA, RTB, MAIZE	WLE, Livestock, WHEAT, GLDC	RTB	Access to improved maize germplasm and sustainable intensification	FP3, FP4
Tanzania	MAIZE, RTB, FTA	WLE, Livestock, GLDC, CCAFS, FTA	MAIZE or RTB	Access to improved maize germplasm and sustainable intensification (TAMASA, SIMLESA, FACASI). Value-addition. Technology targeting.	FP1, FP3, FP4 FP5
Uganda	MAIZE, RTB	FTA	TBD	Access to improved maize germplasm and sustainable intensification	FP1, FP3, FP4
Zambia	MAIZE, RTB	CCAFS, GLDC, FTA	TBD (discussions among CRPs are ongoing)	Diversification and intensification (Africa RISING) and nutrient management (SIMLEZA)	FP1, FP3, FP4
Zimbabwe	MAIZE, GLDC AFS	CCAFS	TBD (discussions among CRPs are ongoing)	Access to improved maize germplasm and sustainable intensification. Technology targeting.	FP1, FP3, FP4

Asia					
Bangladesh	MAIZE, RICE	WLE	RICE	Nutrient and water management, salinity management, crop diversification and improved cropping systems linked to markets, Mechanization	FP3, FP4
Cambodia	CIRAD MAIZE absent during Phase I.	CIRAD	TBD (discussions among CRPs are ongoing)	TBD	TBD
India	Large investment under MAIZE, WHEAT, RICE through CSISA in the IGPs. Good integration of CCAFS work in the IGPs with MAIZE and WHEAT. Livestock part of CSISA II but not in CSISA III. CIMMYT-led SRFSI project (ACIAR) mapped under CCAFS.	Develop further integration with WLE and GLDC	MAIZE or RICE. Site integration already exists	Resource conserving technologies (water and nutrients), PPP, scaling of SI practices. Reduction of production risks. Conservation Agriculture. Better targeting of technical innovations. Covering both irrigated and rainfed farming systems.	FP1, FP3, FP4
Laos		CIRAD	TBD (discussions among CRPs are ongoing)	TBD (discussions among CRPs are ongoing)	
Nepal	MAIZE and WHEAT, GRSP. Two distinct agro-ecologies. Rainfed hills and irrigated Terai (IGP)	WLE, FTA, CCAFS	RICE	Access to improved maize germplasm and sustainable intensification	FP3, FP4
Pakistan	MAIZE, WHEAT, GRSP, Livestock, WLE	Idem	WHEAT	Access to improved maize germplasm and sustainable intensification	FP3, FP4

Vietnam	FTA, GRSP MAIZE absent during Phase 1.	MAIZE, RICE	TBD (discussions among CRPs are ongoing)	Access to improved maize germplasm and sustainable intensification	FP3, FP4
			Latin America		
Dominican republic	No activity yet	CCAFS, GLDC	MAIZE	Access to improved/adapted maize germplasm and sustainable intensification	FP3, FP4
Guatemala	USAID Buena Milpa project under MAIZE	WLE, GLDC (CIAT)	MAIZE	Access to improved germplasm. Scaling of SI on-going work. Targeting of interventions	FP4
Haiti	On-going USAID project under MAIZE	GLDC CIAT), WLE	TBD (discussions among CRPs are ongoing)	Access to improved germplasm. Resource conserving technologies (nutrient and soils). Production risk management. Development of viable seed systems	FP1, FP3, FP4
Mexico	MAIZE, WHEAT	GLDC CIAT), Livestock	MAIZE	Access to improved germplasm. SI of maize-bean-livestock systems	FP1, FP3, FP4
Nicaragua	GLDC AFS (CIAT)	MAIZE, Livestock, WLE	GLDC	TBD (discussions among CRPs are ongoing)	FP4

Template 1: Overview of Inter-CRP Collaboration: What MAIZE provides and receive is presented as **Table 1.4**

Template 2a: MAIZE partnerships with other CRPs and Platforms (activities, mode, geographies and outputs sought).

Partner CRP	ACTIVITY AND COUNTRY(IES) IN WHICH THIS TAKES PLACE	ROLE OF MAIZE	ROLE OF COLLABORATING CRP/PLATFORM	COLLABORATION MODE (Complementary / Joint investment)	OUTPUTS / ADDED VALUE
AFS-CRP – RICE	Multi-commodity agri-food system analysis; sustainable intensification and diversification smallholder farmers Geography: tools – global; data – SSA, Asia, LAC	• To provide expertise and knowledge in maize agronomy and maize based systems. • Contribute inputs on mechanization. • Provide an integrative framework for multi-commodity systems including rice and maize. • Improved maize germplasm for sustainable intensification of rice-maize farming systems	Provide additional expertise and resources in system approaches to large on-going W3 projects (e.g., CSISA, SRFSI, API)	Joint investments	• Better targeting of technologies and their integration. • Scaling of innovations in rice-maize cropping systems. • Precision agriculture and approaches to increase input use efficiency • Systems approaches, technologies, methodologies; Helping ensure positive or neutral ecosystem impacts • Sharing expertise and knowledge on deploying novel tools for increasing genetic gains in stress-prone environments,
AFS-CRP – WHEAT	Multi-commodity agri-food system analysis; sustainable intensification and diversification smallholder farmers Geography: tools – global; data – SSA, Asia, LAC	To share scientific expertise from CIMMYT on all FP4 aspects	Sharing approaches, methodologies, sites	Joint investments	• Coherence of approaches between MAIZE and WHEAT by the lead institution (CIMMYT). • Economies of scale, including strategic partnership with advanced research institutions, and capacity development of partners. • Sharing expertise and knowledge on deploying novel tools for increasing genetic gains in stress-prone environments,

AFS-CRP – GLDC	Multi-commodity agri-food system analysis; sustainable intensification and diversification smallholder farmers Geography: tools – global; data – SSA, South Asia, LAC	• To provide system expertise and methodological approaches for the intensification of maize-based systems which also rely on legume based technologies • Maize-specific expertise, data and studies • Systems expertise (multi-disciplinary, multi-scale, multi-commodity) • Co-development of methods and tools • Share expertise and approaches in innovation systems. • Appropriate scale mechanization	• Better access to promising legume germplasm and legume diversification options. • Sharing methodological approaches on systems research and genetic gains improvement.	Presently mainly through SIMLESA project.	• Integration of technical innovations in systems approaches. • Better understanding of trade-offs and synergies in smallholder maize-legume cropping systems • Enhanced agri-food systems analysis capability • Enhanced international public goods and relevance • Enhanced adoption and uptake of innovations • Shared approaches to processing and storage options.
AFS-CRP – RTB	Multi-commodity agri-food system analysis; sustainable intensification and diversification smallholder farmers Geography: tools – global; data – SSA (especially Ethiopia, Kenya, Zimbabwe, Zambia, Mozambique, DRC), South Asia, LAC ,…	• Maize-specific expertise, data and studies • Systems expertise (multi-disciplinary, multi-scale, multi-commodity) • Co-development of methods and tools • Sharing of expertise and approaches in innovation systems. • Appropriate scale mechanization	• Innovation approaches and system analysis • Co-development of methods and tools	Joint investment: Collaborative projects Complementary: AFS specific data and studies	• Scaling strategy and approaches for smallholder systems • Enhanced agri-food systems analysis capability • Enhanced international public goods and relevance • Enhanced adoption and uptake of innovations
AFS-CRP – FTA	Multi-commodity agri-food system analysis; sustainable intensification and diversification smallholder farmers Geography: FTA (presently in Ethiopia, Rwanda and to be outscaled to other SSA countries in Phase-II)	To provide expertise and knowledge in maize agronomy and maize based systems	Integration of commodities in a system approach	Joint investment, presently ACIAR W3 funding	• Integration of technical innovations in systems approaches. • Better understanding of trade-offs and synergies in smallholder systems

AFS-CRP – Livestock	Maize-Livestock farming system analysis; sustainable intensification and diversification smallholder farmers Geography: SSA, particularly Ethiopia, Kenya, and Zimbabwe; South Asia,	• To provide expertise and knowledge in maize agronomy and maize based systems. • Dual-purpose improved maize varieties (for grain and fodder) adapted to the target geographies. • Crop residue tradeoff in mixed systems (feed or mulch)	• Integration of commodities in multi-commodity/system approach. • Synergies and tradeoffs at farm and landscape levels in mixed crop-livestock systems	Joint investment through W3/bilateral funding	• Integration of technical innovations in systems approaches. • Better understanding of trade-offs and synergies in smallholder systems • Enhanced agri-food systems analysis capability • Enhanced international public goods and relevance • Enhanced adoption and uptake of innovations
A4NH	Food system analysis & impact assessment (bio-fortified crops) Geography: tools – global; data – SSA, Asia, LAC	• Maize-specific expertise, data and studies • Co-development of methods and tools	• Shared methods, tools and data • Cross-CRP learning/communities of practice	Joint investment: Methods and tool development; impact assessment (biofortified crops) Complementary: Maize specific data and studies	• Enhanced nutritional and food system analysis capability; • Enhanced international public goods and relevance • Joint capacity building interventions in the target geographies
CCAFS	Foresight and targeting; Climate smart agriculture analysis Geography: tools – global; data – SSA, Asia, LAC	• Maize-specific expertise, data and studies (including drought/heat tolerance; conservation agriculture) • Co-development of methods and tools (including weather index insurance) • Drought and heat tolerant maize as a main approach to climate change adaptation • Improved maize agronomy practices to contribute to CC adaptation and mitigation. • High quality agronomy data for maize-based systems. • Multi-commodity approaches.	• Shared methods, tools and data • Climate change data and expertise; cross-CRP learning/communities of practice • Provide adequate CC frame for SI of maize–based systems	Joint investment: Methods and tool development (incl weather index insurance) Complementary: Maize specific data and studies (including drought/heat tolerance; conservation agriculture); abiotic and biotic stress resilient maize germplasm	• Enhanced climate smart analysis capability • Enhanced international public goods and relevance • CC adaptation and mitigation technologies assessed and scaled. • Joint policy briefs / dialogues / workshops on climate-resilient agriculture

PIM	Foresight and targeting Geography: global	• Maize-specific expertise in crop modeling, bio-economic modeling, innovation pipeline, foresight and targeting • Co-development of methods and tools • Complementary maize specific scenario analysis and foresight and ex ante studies	• Facilitate access, maintain up-to-date and enhance IMPACT model • Co-apply IMPACT model to explore supply-demand analysis of whole agricultural sectors, and for ex-ante impact assessments of technology interventions in various commodities, including maize	Joint investment: IMPACT model Complementary: Complementary methods and tools; maize specific scenarios and studies	• Effectively managed IMPACT model and use capability • Enhanced international public goods and relevance • Enhanced foresight, targeting & priority setting
	Gender analysis; impact assessment; Value chain/market analysis; rural transformation Geography: tools – global; data – SSA, Asia, LAC	• Maize-specific expertise, studies and (panel) data • Co-development of methods and tools	• Shared methods, tools and data • Cross-CRP learning/communities of practice	Joint investment: Methods and tool development; communities of practice Complementary: Maize specific data and studies	
WLE	Global, methodological	Know-how on SI of maize-based systems. Investment through partnership on SI indicators and metrics at field/farm/landscape levels	Methodological support for landscape level research	Joint but to be further developed during Phase-II	Quality and relevance of MAIZE research at landscape scale. Indicators and metrics better serving M&E&L and SRF
Genebank platform	Global, methodological	• Genotypic and phenotypic characterization of genebank accessions • Informatics tools to extract knowledge from the data. • Experience on intellectual property issues affecting the use of genetic resources.	• Expert knowledge about genetic resources and scientific partnerships. • Intellectual property issues affecting the use of genetic resources.	Joint investments	• High-value maize germplam that can potentially increase the genetic diversity in MAIZE breeding programs, for traits of interest

Excellence in Breeding Platform	Global, methodological	Validation and deployment of novel tools / technologies / methodologies in MAIZE breeding pipelines	• Enabling tools for increasing genetic gains • Integrated Breeding Platform / Breeding Management System • Developing and implementing a shared high-throughput genotyping platforms that could support mainstreaming of genomic assisted breeding strategies across crops and institutions. • Leveraging phenotyping competencies and best practices	Complementary investments, besides bilateral funding (e.g., GOBII project)	Enhanced use of novel tools, technologies and best practices in breeding programs, leading to increased genetic gains
Big Data platform	Effective management and leveraging of big data. Geography: global	• To provide clear research questions at system level requiring innovative and 'state of the art' data management. • Sharing of biophysical and socio-economic, GIS and RS data sets • Co-development of methods and tools	• Develop and implement a unified approach among CRPs to the collection, management, access and analysis of large, complex, heterogeneous data sets. (biophysical and socio-economic) • Community of practice to share knowledge, experience, approaches and tools	Joint investments	• Effectively managed Big Data capability • Enhanced international public goods • Better analytical capabilities serving foresight and targeting of technological options. • Improved open-access to systems data. • Better decision support systems and their use in ICT systems. • Improved M&E&L framework through methods for SI indicator and metrics

Template 2b: Plans for site integration in CGIAR target countries

In the countries you have identified as important to your CRP, please complete the template, identifying the steps taken so far - and with a schedule for completion - for site integration (for ++ and + countries) with other CRPs.

Target country (++ and + countries relevant to your CRP)	Define steps taken so far (March 2016) to establish national level engagement with other CRPs towards site integration
Bangladesh Craig Meisner (WorldFish)	In Bangladesh, for over 3 years 7 CGIAR centers representing over 7 CRPs have established a CGIAR Advisory Committee. Through this venue all CGIAR centers plus AVRDC and IFDC meet with our NARS and Ministry officials twice a year. We have met twice in 2015 and will meet 2 times in 2016. All details for this integration as well as 4 CAC minutes are posted on the http://gcard3.cgiar.org/national-consultations/bangladesh/
Burkina Faso Mathurin Zida (CIFOR)	The starting point was the June 6-7 2013 meeting of WLE, FTA and CCAFS in Bonn which agreed to explore areas of cross-CRP synergy (both issue and place-based) in Burkina Faso. All three CRPs had indeed major new research programs in this country, and there was potential to link to CRP Drylands. On 24 August 2013, CIFOR organized a first internal meeting between ICRAF and CIFOR in Ouagadougou to review the expected outcomes of the CRPs' joint initiative in Burkina Faso. A committee was set up at this meeting and was tasked to establish a database of CGIAR projects in terms of targets, location, and partners that would be a basis for discussing improved coordination, but also for joint development of new projects. A 2nd meeting was convened in December 2013 in Ouagadougou with participation of a broader set of partners intervening in Burkina Faso (CRPs FTA, CCAFS, WLE, Drylands, national and other international research institutions, including universities, state and non-state development partners, international NGOs) to review the quality of previous partnerships with CGIAR initiatives in Burkina Faso and to work out a new partnership framework guided by the aim to contribute to the same development pathways in Burkina Faso in a synergetic manner. A 3rd meeting was held in February 2014 with the same set of partners to define a vision, mission and action plan for the partnership framework. It was also agreed to develop a common theory of change aligned to the strategy for accelerated growth and sustainable development of Burkina Faso (SCADD), particularly the national programme for the rural sector (PNSR). The outputs of this meeting were validated by CRPs Leaders. As part of the agreed roadmap, the CGIAR-led initiative for building a thematic and geographical database of all CGIAR projects and those of non-CGIAR actors working in the rural sector of Burkina has been merged with a similar

	initiative led by the SP/CPSA (Permanent Secretariat for Coordination of Agricultural Sectoral Policies) to setting up a map database of Government and development partners' interventions in the areas of rural development in Burkina Faso. The CRPs' joint initiative in Burkina Faso has also partnered with the CCAFS Scenarios program and the SP/CPSA in a specific process aimed at examining the ending PNSR in the context of multiple socio-economic and climatic scenarios, to improve its robustness, flexibility and feasibility in the face of possible diverse futures. This scenario-guided policy revision workshop, held in July 2015, offered a unique opportunity to CGIAR experts (FTA, CCAFS, Dryland, WLE) and national policy making experts and all other workshop participants to identify research areas through which CRPs and CG Centres can contribute to the expected outcomes of the upcoming revised PNSR. Overall, the CRPS' joint initiative in Burkina Faso has set up and followed until now a participatory approach involving CGIAR actors (CRPs and Centres), national actors of Burkina Faso, and other international actors intervening in Burkina Faso, to frame partnership, map research interventions and define development and research priorities to be considered for the rural development of Burkina Faso.
Cameroon **Placeholder until meting to be held March 16th**	No meeting for site integration has been yet held in Cameroon. However I had the opportunity to attend the DRC site integration meeting organized in DRC. In DRC I discussed extensively with Manning-Thomas, Nadia (CGIAR Consortium) who was facilitating this meeting in DRC. In consultation with other CGIAR Centres (IITA, CIFOR, Bioversity) we decided to organize the Cameroon meeting on 16 March 2016. The following institutions are expected to attend this meeting: IITA, CIFOR, Bioversity, ICRAF, IRAD, AVRDC, MINFOF, MINEF, Universities of Yaounde1, IBAYSUP, CRESA. Prior to this meeting, the CGIAR centers based in Cameroon were already working together in projects such as Sentinel Landscapes. ICRAF, CIFOR and Bioversity developed joint teams and worked together on institutional mapping of a landscape, socio-economic characterization and land degradation surveillance. For ICRAF as more most of research activities are covered by FTA, Scientists focussed their activities that are linked to CRP6.1, CRP6.2, CRP6.3, CRP6.4, and CRP6.5. Data collected from this research work were analysed and used for publications of scientific papers. With IITA, ICRAF and IRAD had also worked together for the implementation of Humid Tropics program. Overall, to date, the CRPS' joint initiative in Cameroon has created an approach involving several CGIAR centres (ICRAF, CIFOR, Bioversity), as well as other national partners (like IRAD- Cameroon's Institute of Agriculture for Development) to design partnership and identity research areas and priorities necessary for the development of the rural sector in Cameroon and other countries in the Congo Basin.

	When we meet on 16 March, we will identify research priorities and development a common program to address these.
DR Congo Nzola M. Mahungu (IITA)	National consultation workshop for the integration of CGIAR centers took place in Kinshasa (Democratic Republic of Congo- DRC), February 19th, 2016. Nine CG centers (AfricaRice, CIAT, CIFOR, CIMMYT, CIP, ICRAF, IFPRI, IITA and ILRI,) operating directly or indirectly through partners participated at this workshop. The event brought together more than 60 public-private partners from DRC including the DRC civil society. CRP representatives, NARS, donors and government officials. It was indicated at the workshop that the second phase of CRP's (2017-2025) presents three innovations as compared to the first one: well-integrated portfolio, aligned with national priorities, and coordinated and transparent interaction with local stakeholders and partners. Thus, the national consultation workshop constituted the first step of the integration process and aimed to engage partnership, find synergies and learn about national priorities. During the event, participants debated DRC development challenges and priorities via panel and group discussions.. Participants referred to examples of successful collaborations in DRC and strongly recommended a creation of a national R4D platform by IITA on behalf oc CG centers in consultation with the Institut National d'Etude et Recherche Agronomiques (INERA) as government representative, Federation of farmers Cooperative as civil society representative and the chair of donors community. Other themes identified by participants were to have forge a Common vision; to clearly define AR4D priorities; to aim at Impact at scale; and a strategy on Capacity development. Next step: the R4D platform coordinated by IITA will have its first meeting on 11 March 2012, to discuss amongst other issues: I. The role of the platform in DRC R4D agenda, its evolvement to a steering committee II. The mapping of CRPs present in DRC and refining/aligning CRP II to national priorities III. Explore possibilities of complementarities in sharing IITA and INERA infrastructures wherever feasible
Ethiopia Siboniso Moyo (ILRI)	The Ethiopia CGIAR country collaboration and site integration process is coordinated by a committee representing 11 CGIAR Centers (Bioversity, CIAT, CIFOR, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IFPRI, ILRI and IWMI) that are based in Ethiopia plus 3 others (Africa Rice, IITA and IRRI) who have no offices in the country, 10 CRP focal points, (Climate Change, GLDC, Forest and Agro Forests, Livestock, Maize, Nutrition and Health, PIM, Rice, Roots Tubers & Bananas and WLS&E) and the Genebank platform. This is the larger group that receives all communications on this process and meets quarterly for those who are based here to coincide with the existing Heads of Institutes meetings. This committee also helps with data collection (eg. mapping of ongoing projects in Ethiopia and baselining on the 10 principles of site integration). Out of this we formed a smaller group of six (3 Centers and 3 CRPs) which meets more

	often to plan for meetings and the process in more detail with the help of ILRI Communications and Knowledge Management team which facilitates and helps capture the notes of meetings. We are in the process of activating a wiki for our communications. At strategic points of the planning process we have brought in the Agricultural Transformation Agency and the Ethiopian Institute of Agricultural Research to help us better prepare for the national consultation process. Some key activities to date include: • Creating a database of our major partners/collaborators • Mapping CGIAR Center and CRP work in Ethiopia (November 2015). Continuing to refine. • Engaging in partners' (ATA, RED&FS) national consultations on alignment to GTP II (November 2015 – January 2016). • Conducting National Consultation Meeting (11 December 2015) • Different CRPs/Flagships are conducting focused group consultations (January-March 2016) • Conduct focused group discussion with a target group of stakeholders (women and youth groups, farmers associations and others as agreed in the December meeting) • Joining the Ethiopian Institute of Agricultural research in celebrating their golden jubilee through a series of seminars, technology exhibition and other high level ceremonies. • Creating a wiki for the coordinating committee On 11 December 2015 we held a national consultation whose main objectives were to: 1. Improve understanding of the national priorities and goals for agricultural and related nutrition and health research for development; 2. Present CGIAR work in Ethiopia (major thematic areas, partnerships and geographic location); and 3. Identify major opportunities to align activities across actors around specific themes, including reviewing modalities for country collaboration. Participants were drawn mainly from the Federal Government Departments, Development partners (Donors, NGOs) and very few private sector and farmer association groups. The meeting participants agreed that the follow on focused meetings by CRPs should aim to include the wider stakeholders groups including women and youth. The Roadmap for agricultural and economic growth in Ethiopia is spelt out in the Government's vision was launched in during the last quarter of 2015 through the Growth and Transformation Plan II. The CGIAR should continue to align its programs to that. In addition there are already big ongoing programs led by the Government like the Sustainable Land Management (SLM) to which the CGIAR is already a major player. Following the launch of GTP II there have been a lot of national consultation meetings organised by several of CGIAR partners working on the alignment to GTP II. A good example are the meetings organised by the Agricultural Transformation Agency (ATA) and the Rural Economic Development and Food Security Sector Working Group (RED&FS) to discuss different pillars under GTP II. A number of

	CGIAR Centers participated in these consultations based on subject matter. The months of October-December were a busy time in Ethiopia. The CGIAR national consultation focused on strengthening mechanisms of engagement and seeking ways to better align to national priorities. One of the key recommendations was the need to establish a joint CGIAR-national agriculture research system collaboration and communication mechanism. This mechanism, it was recommended, would establish a permanent secretariat for joint planning, sharing of findings, and monitoring and evaluation. The other areas of collaboration were: the development of joint research proposals, sharing of equipment and resources, streamlining policy engagement, and improving opportunities and modalities of capacity development. The need to facilitate access to laboratory facilities was also highlighted as key. These goals could be achieved through enhanced joint research implementation and supervision. This meeting was fully supported by ILRI and the Livestock and Fish CRP. When contacted most Centers had no budgets to support this meeting. We risked not holding the meeting if the Lead Center had not taken action. This is a gap that the committee has raised in the previous meetings and asked every Center and CRP to seek further clarification from DDGs, CRP Directors and the CO on the way forward. More details on the Ethiopia national consultations can be found on the GCARD3 website. **Next steps:** In our last meeting on the 16th of February we reflected on the December meeting and the follow on focused group meetings by individual CRPs. We further tried to clarify amongst ourselves what we understood site integration to mean? We agreed that so far the CRPs' priorities were well aligned with those of the GTP II and ATA's priorities. This is very promising for upcoming collaboration. We plan to purposely use the GTP II language in our engagements with the national processes and/or document through a flyer how CGIAR is contributing to GTP II. Furthermore we are aiming to identify what each CRP is seeing as the current situation and then the future situation in terms of site integration in Ethiopia from the perspective of the 10 elements which were highlighted in the guidelines, and to turn all that information into a narrative that also looks at collaboration initiatives and at ideas for future integration based on pipeline plans and projects. We were planning for a day's meeting for a smaller group to synthesize this material and write the site integration plan. At the time we discussed this we were not sure what is the level of details the CO is expecting for these plans?

	We also plan to continue the process of refining the mapping of CGIAR work in Ethiopia.
Ghana Olufunke Cofie (IWMI)	Although not initially depicted as 'integration', CGIAR centres that are active in Ghana have been collaborating for a long time by sharing resources and working on different projects together. Since January 2016, nine Centres (AfricaRice, Bioversity, CIAT, CIP, IFPRI, IITA, ILRI, IWMI and WorldFish) and eight CRPs (A4NH, CCAFS, GLDC, Maize, RICE, WLE, RTB, PIM) have been involved in the Ghana Site integration process. First, the Steering Committee (SC) was constituted by official nominations from the Centres/CRPS. Several virtual and face-to-face meetings were held prior to the national consultation workshop which took place from 2-3 March 2016 in Accra. Other preliminary activities carried out by the SC were: (i) mapping of Centre/CRP project locations, thematic focus, target commodities and partnerships in Ghana; (ii) Review of relevant national policy documents as well as donors' priorities for Ghana; and (iii) engagement with and sensitization of local partners on the Site Integration Process. From the mapping and review exercise, the SC identified potential thematic areas for CGIAR collaboration in Ghana. Two key national partners of the CGIAR in Ghana are the Ministry of Food and Agriculture (MoFA) and the Council for Scientific and Industrial Research (CSIR). These two institutions co-organized the National Consultation workshop with the Centres/CRPs. Over 60 people from different stakeholder categories participated in the event. The workshop revealed how the integrated efforts of the CGIAR Centres can actually complement national priorities and those of other partners, towards agricultural transformation in Ghana. Following MoFA's presentation on the national priorities for driving Ghana's Shared Growth and Development Objectives, the participants identified and discussed key themes that could be the CGIAR strategic focus in Ghana. The themes identified were consistent with the preliminary findings from the review done by the SC. The workshop participants also suggested ways of working effectively together (internal integration) and with local partners (external integration). The workshop further provided insight on tracking the progress and impact of the integrations as well as the coordination mechanism to sustain the Site Integration Process. Next steps are: (i) finalise the site integration plan with the information gathered during the workshop; (ii) engage in regular consultation and exchange with the national partners through their representation in the steering committee and (iii) sharing information at national platforms. The SC agreed that sharing of information, as well as collaboration in joint activities and resource mobilisation is paramount to strengthen our integration. Collaboration will commence on the identified themes and with a joint visit to the National Development Planning Commission of Ghana.
India	MAIZE FP3, FP5 and CoA 2.1 were flagged to be of high priority. Alignment with national priorities. In addition to the on going programmes the following points are identified:

	Stress resilient maize germplasm enhancement both for biotic and abiotic stresses. Abiotic: Drought, heat, water logging Biotic: Site specific priorities to be identified. However, BLSB and PFSR are emerging priorities. There is a need for conducting dedicated trials under rain fed conditions particularly in targeted areas such as Rajasthan, Gujarat, MP, Peninsular zone, Bihar, Orissa, HP, JK, Uttarakhand. Development of DH facility and implementation of DH technology for enhanced genetic improvement Trials under various CA and management regimes (G x E x M interaction) to identify suitable hybrids Value addition of existing hybrids (through QPM, dual purpose maize, etc.) for doubling the profitability to farmer Hub for data management which includes deployment and support for BMS Consider the rising importance of maize for food and industrial use (including specialty maize) in light of improving profitability Aflatoxin management needs to be considered. Creating community driers for farmer benefit in Eastern India. Mechanization of maize breeding. Opportunities for Integration SAU/ICAR/CIMMYT collaborative trials with common set of entries Sharing available research and phenotyping facilities with various MAIZE partners at MP, Gujarat, Rajasthan, Maharashtra, CIMMYT-Hyderabad, and BISA. Other facilities and partners in target areas across the country to be identified. Capacity building for DH, precision phenotyping, data management, genomics, etc.
Kenya	Opportunities for enhanced CGIAR – Kenya Partnership ● Utilize a farming system approach in target areas ● Link agriculture, income, nutrition and climate change ● Sustainable intensification and soil health ● BIG Data initiatives to support agriculture decision making ● Capacity strengthening at MSc, PhD and on the job training ● Adopt agroforestry interventions for climate change adaptation and mitigation ● Adopt crop-tree systems for better integration and soil fertility management

	● Develop and adopt sound crop-livestock and small mechanization systems ● Adopt farming system-nutrition-themed interventions CGIAR integration in Kenya ● Sharing facilities at common test sites (benchmark sites, common IPs, stress screening facilities etc.) ● Facilitate networking and continuity in research. ● Adopt collaborative research projects with Kenya NARs. ● Develop national Integrated data management systems (store, manage and share) data. ● Integrate the 'soft' sciences and pay more attention to the impact of CG actions on gender, livelihoods, climate change, and environmental sustainability. ● Provide holistic packages vs components to farmers.
Malawi	TBD
Mali Ramadjita Tabo (ICRISAT)	The Mali CGIAR country collaboration and site integration process is coordinated by a committee representing 7 centers and 1 CRP. Three Mali based CGIAR Centers (ICRISAT, ICRAF, and ILRI), AVRDC, AGRA, Africa Rice ,IITA and CCAFS CRP are members of the steering committee. The committee worked on mapping of on-going projects in Mali by the different centers and CRPS. The committee under the leadership of ICRISAT organized a CGIAR site integration workshop in Bamako from March 01 to 02, 2016. Nearly 70 participants attended the two-day workshop including representatives from the Ministry of Agriculture, Non-Governmental Organizations (NGOs), donor community, private sector, CGIAR centers and farmers group. At the end of the two-day consultation, the participants came up with a draft framework of the site integration, which includes CGIAR Mali current status, principles, gaps and opportunities for site integration, resourcing, communication within and outside the CG as well as mechanisms to monitor progress and assess activities and impact. The main outputs of the integration workshop are outlined below: • The workshop served as background information for participants to build on their individual experiences within their organizations. It also helped the CG partners to upgrade and improve the draft inventory of various research programs and project partnerships in Mali • For more efficiency and increased impact, stronger coordination and collaboration were highlighted. Participants agreed that there is a strategic advantage to integrate activities and programs for the benefit of the final beneficiaries in light of the challenges linked to research funding and human resources. • Participants had a clear understanding of what the gaps and opportunities are in Mali for ARD. In addition, they proposed concrete ideas to improve the collaboration among research partners, NGOs and producers. Another key lesson addressed was the need for research to go beyond the production stage and focus on empowering farmers and NGOs to develop value chains.

	Working groups were formed to reflect on the following five main issues of site integration: (i) key features of integration, (ii) principles for selecting sites, and integrating actions, and (iii) towards effective collaboration and cooperation, (iv) communication and (v) progress tracking and impact assessment. The group discussions were conducted very well and allowed all participants to share their views in a constructive and open way. The working groups demonstrated the presence of vast knowledge that participants have about integration, principles for site selection and collaboration. **Next Steps:** We are in the process of finalizing the brief report for submission to the CGIAR office by March 9th, 2016 and a full report on the national consultation for Mali by March 25th, 2016. The Site Integration plan will be submitted on or before April 29th, 2016. The Site integration process steering committee agreed to meet to discuss the modalities of preparing the CGIAR site integration plan for Mali based on the 10 elements which were highlighted in the guidelines.
Mozambique	TBD
Nepal Arun Joshi (CIMMYT) Sugden Fraser (IWMI)	The process of site integration in Nepal was initiated on November 9, 2015 by organizing a meeting of all CG centres working in Nepal. The site integration steering committee was formed (with one member from each CG/CRP centre). This included CIMMYT, IWMI, Biodiversity Int, IFPRI, IRRI, CIFOR and ICARDA. CCAFS was included in the subsequent meeting. Two meetings were held on 4th and 30th December to share information on work being done by each centre in Nepal and to plan for a stakeholder consultation meeting which was organized at Kathmandu on 11 January 2016. The purpose of the stakeholder meeting was three-pronged: to design the integrated research agenda, to consolidate CGIAR centres, and to coordinate with national actors and strengthen the coordination, collaboration and alignments with partners in line with national priorities and policies. More than 60 participants, representing 34 national institutions participated. The cost of this meeting was shared by all centres. A joint presentation on activities being undertaken by all CG centres on various CRPs in Nepal was presented and two discussion sessions were held. The first one focused on better alignment of current CGIAR research activities, whilst the second one on targeting stakeholders' needs. Opportunities for further alignment of CG programs and CRP integration were identified through shared goals, activities and increased partnerships. The minutes were prepared along with one pager blog and submitted to CGIAR. The next CG-national consultation meeting was proposed to be held in Nepal in January 2017. Highlights included how to better align CG work with national policy issues, demand for continued capacity building of local agricultural scientists, the development of stronger national databases, promoting local genetic resources and the need for research on both climatic and non-climatic stress on agriculture. Ideas for new research avenues were

	also raised. For more info, see https://library.cgiar.org/handle/10947/4148 The next steering committee meeting has been scheduled for 10th March to draft the site integration. This is being done based on the national consultation and experiences of each of the centers in Nepal. In doing all this, the central point will be the Agriculture Development Strategy (ADS 2015-2035) approved by Government of Nepal on 14th August, 2015.
Nicaragua Maya Rajasekharan (CIAT)	To take the **Nicaragua** site integration forward, a steering committee was established with representatives from CIAT, Bioversity, CATIE, ICRAF and CCAFS. As the first priority, a national consultation was held in Managua, Nicaragua from 17-18 November, 2015. Participants included six CGIAR Centers (Bioversity, CIAT, CIMMYT, CIP, ICRAF, and IFPRI), as well as CATIE and CIRAD and 20+ national partners. Centers represented work of nine CRPs (from Phase 1) which are active in the region (A4NH, CCAFS, FTA, Humidtropics, L&F, MAIZE, PIM, RTB, and WLE). Opportunities for further CRP integration were identified, including shared goals, activities, partnerships that would benefit the work being carried out by each program in Nicaragua and a proposed theory of change and impact pathway to carry them out. CIAT covered expenses related to the venue and food, while each participant assumed the cost of their travel and other incidental expenses. https://library.cgiar.org/bitstream/handle/10947/4180/Informe-Reunion-Integracion-2015-English.pdf?sequence=1. With the guidance from the Consortium Office, the steering committee will draft the site integration plan building on the national consultation and past/current experiences of centers in Nicaragua. A clear understanding of what is being proposed in Phase 2 CRP proposals are important before we carry out any further stakeholder consultation. Potential sites of integrative work were identified based on previous and ongoing CGIAR efforts (such as CCAFS climate-smart village (CSV) and FTA sentinel sites) and on priorities of the government (such as the dry corridor). Some integrative work has been already done in Tuma La Dalia CSV between CCAFS and FTA regarding baseline surveys and implementation of agroforestry measures. Developing information and knowledge management systems are essential to sustain dialogue and communication. Unlike other countries, we don't anticipate Nicaragua being a physical hub leading to a single CGIAR office. Political situation in Nicaragua is challenging and therefore engagement with the national Government and collective process towards policy level process are not easy. To meet donor/CGIAR aspirations on site integration, dedicated funding to support coordination and collective efforts are required.
Niger	TBD
Nigeria	The Consultative Group on International Agricultural Research (CGIAR) conducts research on various issues through 15 centers distributed in different countries across the world. National research institutes and other development agencies also work on related aspects of agricultural value chains alongside the CGIAR initiatives. Due to lack of, or

	weak mechanisms to harmonize the operations of these multiple partners, there is a possibility for duplication of efforts and resource wastage especially where several institutions are conducting similar research in isolation in a given site. In order to address the above challenge, the CGIAR and development partners mandated the International Institute of Tropical Agriculture (IITA) to lead a process of integrating research activities and sites in Nigeria, one of the 20 selected countries for site integration in the world. Towards this effort, a national consultation workshop for Nigeria was held in Abuja Nigeria on 16th and 17th November 2015. The workshop focused on: Understanding Nigeria's agricultural research and development strategy; Mapping the CGIAR activities and sites in the country; Developing a common understanding of integration and key principles to be considered; Identifying the roles of various stakeholders in the integration process and; Developing a framework for integration. The main outcomes of the workshop were: • Elements of integration: Participants agreed that effective integration must entail pursuit of common goals, joint action plans, collaboration, inclusiveness, co-ownership and communication. • Integration principles: When selecting sites and issues, consideration must be given to opportunities for value addition on the collaboration and alignment with major issues. To effectively integrate work, there must be local ownership, institutional commitment at the highest level and open dialogue. • Harmonizing focus: There is need to harmonize Consortium Research Program (CRP) thematic focus with priority ARD challenges in Nigeria, while building synergies on the on-going major initiatives such as the agricultural transformation agenda for productivity and sustainability. • Operationalizing the integration: Implementation of an integrated approach requires the understanding of key challenges, guiding principles and specific steps on six important issues – project development, resource mobilization, partnerships, coordination, monitoring and evaluation, and communication. • Integration framework: A comprehensive integration plan must comprise stakeholder consultations to identify the issue/problem, sites and partners. It must also specify the steps for project development and implementation. • Lessons for future planning: The national consultation workshop in Nigeria offered important insights on the need for stakeholder inclusion; collaboration among government entities and CGIAR Centers; understanding national strategies and; scheduling of integration meetings to provide adequate time for discussions and synchronizing such meetings with government calendars to ensure effective government presence and participation so as to create local ownership of the outcomes.
Rwanda Kirimi Sindi (CIP)	The Rwanda CGIAR country collaboration and site integration process is coordinated by a committee of six individuals representing 4 centres. The Rwanda based CGIAR Centres are CIP, CIAT, IITA, and ICRAF. Each centre has one or two individuals as part of the steering committee. The centres have held 4 site integration meetings so far. One was with three main donors represented in Rwanda (USAID, EU, and DFID). The committee is working on mapping all on-going

	projects in Rwanda by the different centres and CRPS. This will be put on a map of Rwanda to assist all the centres understand areas where they is there is potential for synergy in working together. The map will assist the CG centres in communicating the contribution they are having to the donors and government policy makers and speak as one voice. The committee under the leadership of CIP will organized a CGIAR site integration workshop in Kigali on 29th March, 2016. This workshop will bring together an estimated 75 representative of donors, government agencies, other development organizations, civil societies, and financial institutions. There has been an already established forum R4D by Humid and Tropics that brings together all the CGIAR centres, policy makers, and other implementing partners in working together in an integrated manner. The site integration committee has resolved to build on this already on going forum and expand it further to achieve the CGIAR site integration goals. **Next steps:** • We will be setting up a full secretariat to assist in organising the workshop and all the invited participant will get invitation letters by 11th March, 2016. • Next review meeting will be on 18th March, 2016 to review the plans and progress for the workshop preparations • The main workshop meeting to be held on 29th, March 2016. This meeting will gather stakeholders views and then utilizing the recommendation to work on the site integration plan that will be finalized by end of April, 2016. • We will be posting all the minutes to the CG sites in the next two weeks.
Tanzania Regina Kapinga (IITA)	The Tanzania CGIAR country collaboration and site integration process is coordinated by a CG- Tanzania Site integration process group composed of representatives from: The Ministry of Agriculture , Livestock and Fisheries (3 persons), Private Sector (1) , 7 CGIAR Centres (CIAT, CIP, ICRAF, IITA, IRRI, Africa Rice, and ILRI) that are based in Tanzania plus 4 others (Africa Rice, ICRISAT, CIMMYT, Bioversity International) who have no offices in the country, 9 CRP focal points, (Climate Change, Livestock, Maize, Nutrition and Health, PIM, RICE, Roots Tubers & Bananas, WLS&E) and the Genebank platform. From the national stakeholders' consultation workshop which was held in December 2015, principles of success and major opportunities for integration between and amongst CG centers, CRPs and national partners were identified to be: mutual trust, shared vision, shared rules of engagement, joint planning and clearly defined roles, transparency and accountability, flexibility, equal voice in partnership, comparative advantage and collective responsibility. To ensure alignment with the national agricultural priorities, both CG centres and CRPs have to understand the national strategies as elaborated in the Tanzanian Agricultural Sector Development Program (ASDP) Phase II. This implies that both CG centres and/ CRPs, when preparing the proposals that include Tanzania, should ensure to access the ASDPII documents for references so that where possible align the activities with the identified national priorities. IITA therefore as a lead focal centre, in January this year, was invited to participate in a 5-days national ASDPII prioritization workshop whereby we worked closely with the Ministry officials

	and other key stakeholders to identify key areas of focus by the country. The documents from this exercise, have been shared with all the CG site-integration focal persons to share with their respective directors and teams for consideration when developing the draft proposals. It is expected that before final submissions, some of the NARS reps. will get an opportunity to provide input on the proposals which include Tanzania to ensure alignment. We are also currently striving to jointly develop and implement projects that have multiple commodities and disciplines. An example we plan to emulate is that of AFRICA RISING project which although is led by IITA, it has other implementing centres which include-ICRAF, CIAT, ICRISAT, IITA, ILRI, AVRDC, and CIMMYT respectively. These together with various national R4D partners in the country, are demonstrating a good example of collaboration and integration. AFRICA RISING project, is using a common set of research sites and staff from various centres are participating in the implementation the project. In the pipeline is the new CGIAR-FARA-African Development Bank's Africa-wide initiative on FEEDING AFRICA. This potential project known as Technologies for African Agricultural Transformation (TAAT), will implement the scaling up and out of the proven technologies from the CG-centres to about 20 African countries. Tanzania, is one of the focus countries for TAAT project which again will provide an opportunity for about 13 CG centres to work together and also partner with the governments and other agencies from the selected focus countries. On 11- 15 April, IITA in collaboration with AfDB, will convene in Nigeria, a TAAT awareness regional consultative workshop which will be attended by several CGIAR centres, development partners, sub-regional organizations and several national stakeholders from various countries. Regarding the sharing of the CGIAR facilities, IITA –Tanzania office, already is hosting three CG centres–CIP, IRRI, and ILRI. AGRA although not a CG centre is hosted by IITA. ICRAF and Africa Rice centres are located in the neighbouring areas which also makes it easy for consultation and effective use of the CG facilities. Our site-integration process group will regularly communicate via emails and where possible organize meetings at least once every six months. Co-funding of these meetings will be explored and explored. Plans are also under way, to discuss the possibility of organizing a CG- NARS national awareness workshop aimed at popularizing to the new government, our best-bet technologies for scaling-up and out using the internally-sourced resources. Therefore, the workshop will strategically target the policy & decision makers, private sector and other key players for resource mobilization. The selected technologies for popularization should have been tested and proven for potential to reach and impact millions of beneficiaries in Tanzania
Uganda Eldad Karamura (Bioversity)	The site integration process in Uganda is jointly chaired by Bioversity and CIP on a 2-year rotational basis, with Bioversity starting in 2016. A steering committee involving all the 8 CGIAR centres present in Uganda (Bioversity, CIAT, CIP, ICRAF, IFPRI, IITA, ILRI, and IWMI), was formed and held its first meeting on January 27, 2016. At that meeting the 1st Consultation Stakeholder meeting was fixed for 9 March 2016. All centres agreed to share the costs of the stakeholder consultation workshop. A second Steering Committee meeting was held on 11 February 2016,

	following which the chair and co-chair visited some key NARS stakeholders such NARO-Uganda DG and Makerere University. CIAT member consulted with the Uganda National Farmers' Federation, while the IWMI member consulted with teams in the Ministry of Finance. These consultation helped to collect secondary data and afforded us opportunities to interact with key stakeholders. The steering committee resolved that the first stakeholder workshop be co-hosted with the National Agricultural Research Organization (NARO) of Uganda in order to enhance ownership by national partners. The third Steering Committee meeting was held on February 29, 2016 and focused on the plans for the implementation of the Stakeholder Consultation workshop; drew up the program, agreed on the discussion issues and the details of workshop outputs. Other staff members from the CRP working in Uganda are email-looped into all communications regarding the CGIAR site integration process right from the start. We hold internal brief consultations to discuss issues on the structure and content of on meeting agendas and usually arrive at a common consensus. Minutes from these meetings are shared to all members of the steering committee through whom information is shared with respective centre teams. In addition we are collecting information from partners and stakeholders and we hope to build this information into sharable data about our site. Materials collected so far include: - CGIAR major partners/collaborators in Uganda. - documents that highlight national development priorities in Uganda. - CGIAR research work in Uganda. - Individual project activities The CGIAR site integration committee has so far not reached a stage of discussing potential bilateral project or W1/2-funded activities planned in Uganda for joint activities amongst CRPs. However, in our discussions, we noted that for several CRPs operational in Uganda, there are already several clusters of centres collaborating in one or more of the CRPs and sharing sites among themselves and with NARS. The Humidtropics Uganda action sites of Mukono-Wakiso and Kiboga-Kyankwanzi field sites seem to be common sites in which many CGIAR centres are currently working including ILRI, CIP, IITA, Bioversity, ICRAF and CIAT. Furthermore, it was noted that centres were already sharing laboratory facilities along with NARO-Uganda institutes. The workshop on March 9, 2016 will lay the foundation for a long term engagement between the CRPs and Ugandan partners and stakeholders. Our intention at this stage is not to come up with a complete work plan/site integration plan during the actual meeting but to really listen to and discuss with partners and stakeholders about the development priorities for Uganda; what the various stakeholders and partners are doing themselves to meet those priorities and goals; and exploring what the opportunities are for partnership, alignment and working together towards these goals. The outputs of the meeting will guide the development of our site integration plans while informing the CRP II process.

Zambia Peter Setimela (CIMMYT)	The first step towards site integration was the establishment of a steering committee composed of representatives from CIMMYT, ILRI, WorldFish, HarvestPlus, CIAT, IITA, Bioversity, ICRAF, ICRISAT and CIP. The steering committee developed the agenda for the site integration consultation workshop which was held from the 9-10 February 2016 in Lusaka. The workshop brought together stakeholders from the CGIAR Research Programs (CRPs), Ministry of Agriculture and Livestock, research agencies, academic institutions, donors, NGOs and the private sector. The consultative meeting came against the background of the launch of the Second Phase of the CRPs, focusing on integrated research agendas to more effectively contribute to the objectives and targets set by the Strategic and Results Framework of CGIAR and also to align the CRPs research agenda with national agricultural priorities in Zambia. From the workshop, the participants identified key elements that would lead to successful site integration, the key elements are summarised under the headings of: core values, administration and management, technical, communication and resource mobilisation in the workshop report. Furthermore participants identified key activities that would be required to bring about site integration and which areas they would like to proceed in partnership with the CGIAR and CRPs. The Zambian National Agriculture Investment Plan (NAIP) provided a basis for the discussions and is key in ensuring the alignment of the research and development priorities in the Zambia agricultural sector goals. The key issues identified for site integration included the following: a) Resource mobilization to drive the site integration process b) Development of coordination structures to provide strategic direction for site integration c) Shared vision among CGIAR Centers and national partners d) Capacity development of national partners and research infrastructure e) Collaboration mechanisms f) Alignment of CGIAR research activities to national priorities g) Identification of research priorities, effective delivery and scaling-out h) Impactful development initiatives to ensure improved production, food and nutrition security for smallholder farmers in Zambia. i) Coordinated and harmonized communications strategy encompassing learning hubs to share lessons. The workshop also identified critical steps that will lead to the establishment and coordination structures to drive site integration in Zambia.

3.8 Staffing of Management Team and Flagship Projects

Prasanna BODDUPALLI

MAIZE Director; Chair of MAIZE-Management Committee; FP3 Co-leader; CoA 3.2 Co-leader

Time commitment: 100%

Expertise

- As Director of Global Maize Program of CIMMYT, leading a multi-disciplinary team of 45+ scientists located in sub-Saharan Africa, Latin America and Asia, since March 2010; Technical oversight for CIMMYT and Chair/Member of Steering Committees for more than 10 bilateral projects, including DTMA/STMA, IMAS, WEMA, DH-Africa, HTMA, AAA, MasAgro-Maize, etc.
- Established the state-of-the-art maize doubled haploid (DH) facility at Kiboko (Kenya), in partnership with Kenya Agriculture & Livestock Research Organization (KALRO) in 2013; the facility offers maize DH line development service to the breeding programs of CIMMYT, IITA, NARES and SMEs in Africa.
- Since 2012, effectively coordinated the rapid response to the Maize Lethal Necrosis (MLN) in eastern Africa, including establishment of a centralized MLN Screening facility at KALRO-Naivasha (Kenya), in addition to breeding for MLN resistance, and MLN management, through extensive public-private partnerships.
- Formulated and successfully led several multi-institutional and multi-disciplinary projects on maize R4D in India, while serving the Indian Council of Agricultural Research (ICAR); served as AMBIONET (Asian Maize Biotechnology Network) Team Leader for India (1998-2005), and initiated research for the first time on molecular breeding for maize improvement in India.

Employment including current position

- 06/2015 to date: Director, CRP MAIZE; 06/2011 to date: Member of MAIZE Management Committee, and Leader for MAIZE Phase-I FP3 (Stress tolerant and nutritious maize) & FP4 (Strengthening maize seed systems).
- 03/2010 to date: Director, Global Maize Program, CIMMYT.
- 04/1991 to 03/2010: Served ICAR in various capacities, including as National Fellow & Leader of Maize Program, Indian Agricultural Research Institute, New Delhi, India (01/2005 to 03/2010); Maize Geneticist & Faculty Member, Division of Genetics, ICAR-IARI, New Delhi, India (04/1991 to 03/2010).

Education

- Ph.D. in Genetics, ICAR-Indian Agricultural Research Institute, India, 1991
- M.Sc. in Genetics, ICAR-Indian Agricultural Research Institute, India, 1987

Selected Recent Publications

Chaikam V, Martinez L, Melchinger A, Schipprack W, **Prasanna BM** (2016) Development and validation of red root marker-based haploid inducers in maize. *Crop Science* [doi: 10.2135/cropsci2015.10.0653].

Gowda M, Das B, Makumbi D, Babu R, Semagn KF; Mahuku G, Olsen MS, Bright JM, Beyene Y, **Prasanna BM** (2015) Genome-wide association and genomic prediction of resistance to maize lethal necrosis disease in tropical maize germplasm. *Theoretical and Applied Genetics* 128:1957–1968.

Nair S, Babu R, Magorokosho C, Mahuku G, Semagn K, Beyene Y, Das B, Makumbi D, Kumar L, Olsen M, **Prasanna BM** (2015) Fine mapping of *Msv1*, a major QTL for resistance to Maize Streak Virus leads to development of production markers for breeding pipelines. *Theoretical and Applied Genetics* 128: 839-1854.

Shiferaw B, Tesfaye K, Kassie M, Abate T, **Prasanna BM**, Menkir A (2014) Managing vulnerability to drought and enhancing livelihood resilience in sub-Saharan Africa: technological, institutional and policy options. *Weather and Climate Extremes* 3: 67-79.

Cairns JE, Hellin J, Sonder K, , Araus JL, MacRobert J, **Prasanna BM** (2013) Adapting maize to climate change in sub-Saharan Africa. *Food Security* 5: 345-360.

Prasanna BM, Chaikam V, Mahuku G (2012) *Doubled Haploid Technology in Maize Breeding: Theory and Practice.* Mexico D.F.: CIMMYT. 50 pp.

Olaf ERENSTEIN

MAIZE-Management Committee Member & FP1 Co-leader

Time commitment: 50%

Expertise

- Program director of a team of 30+ internationally recruited scientists located in sub-Saharan Africa, Latin America and Asia. The team's research-for-development (R4D) aims to help prioritize, target, understand and enhance wheat and maize interventions for greatest impact and social inclusiveness.
- Since 2013 involved in the CRP's Management Committee.
- Research has focused on R&D implications based on agricultural system and innovation analysis in developing countries, particularly in cereal based systems (maize, wheat, rice).

Employment including current position

- 2013 – to date: Director Socio-economics Program, CIMMYT, Mexico (initially Ethiopia)
- 2009-2012: Senior Ag-economist, CIMMYT, Ethiopia
- 2004-2009: Agro-economist, CIMMYT, India
- 2000-2004: Production economist, Africa Rice Centre (WARDA/ADRAO), Côte d'Ivoire/Mali

Education

- Ph.D. Agricultural Economics, Wageningen University, the Netherlands, 1999
- M.Sc. Agricultural Economics & M.Sc. Tropical Crop Science, Wageningen Ag. University (NL), 1990

Selected Recent Peer-reviewed Publications

Erenstein, O, Gérard, B., and Tittonell, P. (eds.) 2015. Special Issue: Biomass use trade-offs in cereal cropping systems: Lessons and implications from the developing world. Agricultural Systems 134: 1-128.

Krishna, V.V., **Erenstein, O**., Sadashivappa, P., Vivek, B.S. 2014. Potential Economic Impact of Biofortified Maize in the Indian Poultry Sector. International Food and Agribusiness Management Review 17: 109-138.

Kassie, G.T., **Erenstein, O**., Mwangi, W., MacRobert, J., Setimela, P. & Shiferaw, B. (2013). Political and economic features of the maize seed industry in southern Africa. Agrekon, 52(2), 104-127.

Grings, E., **Erenstein, O**., Blümmel, M. (Eds). 2013 Special Issue: Dual-purpose maize. Field Crops Research, 153, 1-112.

Erenstein, O., Sayre, K., Wall, P., Hellin, J., Dixon, J. 2012. Conservation agriculture in maize and wheat based systems in the (sub)tropics: Lessons from adaptation initiatives in South Asia, Mexico and Southern Africa. Journal of Sustainable Agriculture 36(2): 180-206.

Tahirou ABDOULAYE

FP1 Co-leader, CoA 1.4 and 5.4 Co-leader

Time commitment: 50%

Expertise

- Have been involved in evaluation and impact assessment of several projects mainly in West Africa. Research work covers a wide range of rural economic issues including seed systems, farm-level efficiency and also technology evaluation and transfer. More recent research focus on post-harvest losses, innovation systems and value chains and how these can help increase technology uptake by small farmers.
- Led the socioeconomic component of Drought Tolerant Maize for Africa (DTMA) project (CIMMYT-IITA) in West Africa since 2009.
- Coordinator of the Purdue Improved Crop Storage (PICS) project (Sub grant) aimed at promoting hermetic grain storage in West Africa.
- Currently project leader for the PICS3 project working Nigeria and Ghana. This latest phase of the project has reached 1,500 villages in Nigeria and another 1000 villages in Ghana with hermetic storage technology focusing on maize.
- Principal investigator of the Cassava Monitoring Survey (CMS) project aimed at documenting use of improved cassava varieties in Nigeria with the use of fingerprinting for identification.

Employment

- 2007-present Project coordinator and Impact economist, IITA, Nigeria
- 2006-2007 Research fellow with JIRCAS at the Sahelian center of ICRISAT, Niamey
- 2004-2006 Economist, INRAN, Niger
- 1997-2004 Graduate Research assistant and Professional research associate, Purdue University, USA.
- 1994-1995 Graduate research assistant, Purdue University USA
- 1989-1994 Economist at INRAN, Niamey, Niger

Education

- 2002 PhD, Agricultural Economics, Purdue University, USA
- 1995 MSc, Agricultural Economics, Purdue University, USA

Selected Recent Peer-reviewed Publications

Bola Amoke Awotide, Arega D. Alene, **Tahirou Abdoulaye** and Victor M. Manyong, 2015. Impact of agricultural technology adoption on asset ownership: the case of improved cassava varieties in Nigeria. Food Sec. (2015) 7:1239–1258

Abdoulaye T., Abass A., Maziya-Dixon B., Tarawali G., Okechukwu R., Rusike J., Alene A., Manyong V. and Ayedun B, 2014. Awareness and use of improved cassava varieties and processing Technologies. Journal of Development and Agricultural Economics, 6(2), 67- 75.

Bokar Moussa, **Tahirou Abdoulaye**, Ousmane Coulibaly, Dieudonné Baributsa, J. Lowenberg-Deboer, 2014. Adoption of on-farm hermetic storage for cowpea in West and Central Africa in 2012. Journal of Stored Products Research, 58: 77-86.

Dieudonné Baributsa, **Tahirou Abdoulaye**, Jess Lowenberg-DeBoer, Clémentine Dabiré, Bokar Moussa, Ousmane Coulibaly, Ibrahim Baoua. 2014. Market building for post-harvest technology through large-scale extension efforts, Journal of Stored Products Research, 58: 59-66.

Genti Kostandini, Roberto La Rovere, **Tahirou Abdoulaye**. 2013. Potential impacts of increasing average yields and reducing maize yield variability in Africa. Food Policy, 43: 213–226.

Justice Akpene Tambo and **Tahirou Abdoulaye**. 2013. Smallholder farmers' perceptions of and adaptations to climate change in the Nigerian savanna" Regional Environmental Change 13: 375-388.

Kevin PIXLEY

MAIZE-Management Committee Member & FP2 Co-leader

Time commitment: 50%

Expertise

- As Director of Genetic Resources Program of CIMMYT, Provide strategic and administrative leadership for a team of scientists to conserve, and to apply a wide range of genetic and bioinformatics tools to effectively use, genetic diversity of maize and wheat.
- As Associate Professor of Agronomy at the University of Wisconsin: Teach undergraduate and graduate students in agronomy and the College of Agriculture and Life Sciences. Lead the oat breeding program with emphasis on cultivar development while developing opportunities for graduate student research projects
- As Associate Director & Maize Breeder, Maize Program, CIMMYT: develop the research agenda and strategies for CIMMYT Global Maize Program's Projects in Asia and Latin America, and on nutritionally enhanced maize.
- Maize Crop Leader, HarvestPlus Challenge Program (June 2003-2012): Coordinate and lead efforts of a global network of scientists seeking to enhance nutritional value of maize, with particular attention to provitamins A. Lead a maize breeding program to develop maize with enhanced nutritional value for provitamin A and zinc.
- Developed and provided disease resistant inbred lines currently used by private and public sector programs in Africa. Partnered with biotechnologist to investigate use of marker-assisted selection for MSV resistance. Led research guiding students to investigate inheritance and methodology for weevil resistance breeding in maize.
- Published 50 research papers on genetics, breeding and nutrition in refereed international journals of repute.
- Supervised as major advisor 6 PhD, 6 M.Sc (or M.Phil.) and 12 B.Sc. students in plant breeding.

Employment including current position

- 07/2011 to date: Director, Genetic Resources Program, CIMMYT. Co-leader of CRP MAIZE FP2. Project Leader of MasAgro Biodiversidad.
- 09/2009 to 06/2001: Associate Professor of Agronomy, University of Wisconsin, Madison, WI, USA.
- 01/1990 to 09/2009: Maize Breeder, CIMMYT. Held various positions including Program Director, Associate Program Director, Team Leader and Regional Representative for CIMMYT in Zimbabwe/Southern Africa.

Education

- Ph.D. in Plant Breeding, Iowa State University, 1990
- M.Sc. in Crop Physiology, University of Florida, 1985

Selected Recent Publications

Gannon, B., C. Kaliwile, S.A. Arscott, S. Schmaelzle, J. Chileshe, N. Kalungwana, M. Mosonda, **K. Pixley**, C. Masi and S.A. Tanumihardjo. 2014. Biofortified orange maize is as efficacious as a vitamin A supplement in Zambian children even in the presence of high liver reserves of vitamin A: a community-based, randomized placebo-controlled trial. Am. J. Clin. Nutr. 100:1541-50.

Suwarno, W.B., **K.V. Pixley**, N. Palacios-Rojas, S.M. Kaeppler and R. Babu. 2014. Formation of heterotic groups and understanding genetic effects in a provitamin A biofortified maize breeding program. Crop Sci. 54:14-24.

Kandianis, C.B., R. Stevens, W. Liu, N. Palacios, K. Montgomery, **K. Pixley**, W.S. White and T. Rocheford. 2013. Genetic architecture controlling variation in grain carotenoid composition and concentrations in two maize populations. Theor. Appl. Genet. 126:2879-2895.

Babu, R., N. Palacios Rojas, S. Gao, J. Yan and K. Pixley. 2013. Validation of the effects of molecular marker polymorphisms in LcyE and CrtRB1 on provitamin A concentrations for 26 tropical maize populations. Theor. Appl. Gen. 126:389-399.

Pixley, K.V., N. Palacios-Rojas and R.P. Glahn. 2011. The usefulness of iron bioavailability as a target trait for breeding maize (Zea mays L.) with enhanced nutritional value. Field Crops Res. 123:153-160.

Warburton, M.L., P. Setimela, J. Franco, H. Cordova, **K. Pixley**, M. Banziger, S. Dreisigacker, C. Bedoya and J. MacRobert. 2010. Toward a cost-effective fingerprinting methodology to distinguish maize open pollinated varieties. Crop Sci. 50:467-477.

Abebe MENKIR

MAIZE-Management Committee Member; FP2 & FP3 Co-leader

Time commitment: 75%

Expertise

- Maize breeder-geneticist at IITA since 1996.
- Team leader for maize improvement research at IITA since 2001.
- Collaborated with the national agricultural research systems, advanced research institutes, private seed companies, NGOs and CBOs for many years
- Member of the Research Committee of a regional maize network for eight years and as an elected coordinator of the IITA multidisciplinary project on maize-grain legume production systems for three years
- One of the principal investigators of 24 successful projects
- Supervised/guided 15 PhD and 11 MSc students
- Co-editor of 3 books and author or co-author of 137 journal articles, 20 edited book chapters, and 4 monographs
- Received 2015 Crop Science of America Fellow and other awards for his contributions to maize improvement research and product delivery

Education:

- PhD in Plant breeding, Kansas State University, USA in 1993
- MSc in Plant breeding, University of Manitoba, Canada in 1984

Selected Recent Publications

Adebayo, M. A., **Menkir, A.** 2015. Combining ability of adapted and exotic drought-tolerant maize inbred lines under full irrigation and rainfed conditions in Nigeria. Journal of Crop Improvement 29:117-130.

Menkir, A., Rocheford, T., Maziya-Dixon, B., Tanumihardjo, S. 2015. Exploiting natural variation in exotic germplasm for increasing provitamin-A carotenoids in tropical maize. Euphytica 205: 203-217.

Menkir, A., Gedil, M., Tanumihardjo, S. A., Adepoju, A. and Bossey, B. 2014. Carotenoid accumulation and agronomic performanca of maize hybrids involving parental combinations from different marker-based groups. Food Chemistry 148:131-137.

Brown, R., **Menkir, A**., Chen, Z., Bhatnagar, D., Yu, J., Yao, H., Cleveland, T. 2013. Breeding aflatoxin-resistant maize lines using recent advances in technologies - a review. Food Additives and Contaminants: Part A. 30(8):1382-1391.

Abebe Menkir, Dan Makumbi, and Jorge Franco. 2012. Assessment of reaction patterns of hybrids to *Striga hermonthica* (Del.) Benth under artificial infestation in Kenya and Nigeria. Crop Science 52:2528–2537.

Bruno GERARD

MAIZE-Management Committee Member; FP4 Co-leader

Time commitment: 50%

Expertise

- Sustainable Intensification Flagship leader of MAIZE Phase-I
- Research leadership in CIMMYT: team of 42 internationally recruited scientists
- Coordination of multi-center research under CGIAR system-wide initiative (SLP)
- Research interests in geospatial topics, land use, soil fertility and resource management at farm and landscape levels, multi-disciplinary approaches

Employment including current position

- September 2011 – Present: Director, Sustainable Intensification Program, International Maize and Wheat Improvement Center (CIMMYT), Mexico
- September 2008 - August 2011: System-wide Livestock (SLP) Program coordinator, International Livestock Research Institute (ILRI), Ethiopia
- September 2005 - August 2008: Visiting Scientist seconded from ICRISAT to Université Catholique de Louvain, Belgium
- January 2000 - August 2005: Principal Scientist International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Niger

Education

- Ph.D. from the Plant Nutrition department at the University of Hohenheim (2000)
- MSc in Irrigation Engineering, Utah State University, USA (1990)

Selected Recent Peer-reviewed publications:

Akponikpè, P.B.I., Minet, J., **Gérard, B**., Defourny, P., Bielders, C.L., 2011. Spatial fields' dispersion as a farmer strategy to reduce agro-climatic risk at the household level in pearl millet-based systems in the Sahel: A modeling perspective. Agric. For. Meteorol. 151: 215–227.

Bielders, C.L., **Gérard, B**., 2015. Millet response to microdose fertilization in south–western Niger: Effect of antecedent fertility management and environmental factors. Field Crops Res. 171: 165–175.

Mekasha, A., **Gérard, B**., Tesfaye, K., Nigatu, L., Duncan, A.J., 2014. Inter-connection between land use/land cover change and herders'/farmers' livestock feed resource management strategies: A case study from three Ethiopian eco-environments. Agric. Ecosyst. Environ. 188: 150–162.

Powlson, D.S., Stirling, C.M., Jat, M.L., **Gérard, B.G**., Palm, C.A., Sanchez, P.A., Cassman, K.G., 2014. Limited potential of no-till agriculture for climate change mitigation. Nature Climate Change 4: 678–683.

Tittonell, P., **Gérard, B**., Erenstein, O., 2015. Tradeoffs around crop residue biomass in smallholder crop-livestock systems–What's next? Agric. Syst. 134: 119–128.

Valbuena, D., Erenstein, O., Tui, S.H.-K., Abdoulaye, T., Claessens, L., Duncan, A.J., **Gérard, B**., Rufino, M.C., Teufel, N., Rooyen, A. van, Wijk, M.T. van, 2012. Conservation Agriculture in mixed crop–livestock systems: Scoping crop residue trade-offs in Sub-Saharan Africa and South Asia. Field Crops Res. 175–184.

Vanlauwe, B., Wendt, J., Giller, K.E., Corbeels, M., **Gérard, B**., Nolte, C., 2014. A fourth principle is required to define Conservation Agriculture in sub-Saharan Africa: The appropriate use of fertilizer to enhance crop productivity. Field Crops Res. 155: 10–13.

David CHIKOYE

MAIZE-Management Committee Member; CoA 4.3 Co-leader

Time commitment: 20%

Expertise

- David's professional background is research on weed management in the tropics.
- His main research interests include assessing the response of weed seedbanks to control options and promoting the uptake of improved weed, crop and natural resource management options by farmers
- David has trained many postgraduate students and has contributed to authoring over 100 refereed journal articles and conference abstracts or proceedings.

Employment including current position

- Present: Director of the Regional Hub for southern Africa and Plant Production and Health Management at the International Institute of Tropical Agriculture (IITA, Nigeria)
- Postdoctoral fellow at the University of Guelph and lecturer at the University of Zambia

Education

- Ph.D. from the University of Guelph, Canada.
- MSc from the University of Manitoba, Canada
- BSc from the University of Zambia, Zambia

Selected Recent Publications

Chikoye, D., Ekeleme, F., Lum, A.F., Udensi, U.E. 2014. Competition between *Imperata cylindrica* and maize in the forest savannah transition zone of Nigeria. Weed Research, 59:285-292.

Fontem, L.A., Chikoye, D. 2012. Efficacy of herbicide formulations for weed control in maize in a humid tropical environment. Journal of Food Agriculture and Environment, 10(3&4):1572-1574.

Chikoye, D., Fontem, L.A., Menkir, A. 2011. Seed coating herbicide tolerant maize hybrids with imazapyr for *Striga hermonthica* (Del.) Benth control in the West African savanna. Journal of Food Agriculture and Environment, 9(1):416-421.

Menkir, A., **Chikoye, D.** and Fontem Lum, A. 2010. Incorporating an herbicide resistance gene into tropical maize with inherent polygenic resistance to control *Striga hermonthica* (Del.) Benth. Plant Breeding, 129(4):385-392.

Bernard VANLAUWE

FP4 Co-leader

Time commitment: 25%

Expertise

- Joined IITA in Kenya in March 2012 to lead the Central Africa hub and the Natural Resource Management research area. In this capacity, also has an oversight role in the Humidtropics, the Water, Land, and Ecosystems, and the CCAFS CGIAR Research Programs. In 2016, started engaging in the MAIZE CRP.
- Prior to this recent appointment, Bernard was the leader of the Integrated Soil Fertility Management (ISFM) program of the Tropical Soil Biology and Fertility research area of CIAT (TSBF-CIAT). He joined CIAT-TSBF in 2001 and led the development, adaptation, and dissemination of best ISFM options in various agro-ecological zones in sub-Saharan Africa.
- In September 2010, the obtained a Visiting Professor position at the Swedish Agricultural University in Uppsala in the Soils and Environment Department. Before, he worked at IITA in Nigeria (1991 – 2000) and the Catholic University of Leuven, Belgium (1989-1991), focusing on unraveling the mechanisms underlying nutrient and soil organic matter dynamics in tropical agro-ecosystems. In that context, he obtained his PhD in 1996 in Applied Biological Sciences.
- Published over 150 papers in scientific journals and over 160 in other forms and has (co-) supervised over 40 PhD and over 60 MSc students.

Employment including current position

- 2012 – today: Director, Central Africa and Natural Resource Management, International Institute of Tropical Agriculture (IITA), Nairobi, Kenya
- 2010 – today: Guest Professor, Sveriges Lantbruksuniversitet (Swedisch Agricultural University), Sweden
- 2003 – 2012: Senior Scientist and Principal Scientist, Tropical Soil Biology and Fertility Institute of the International Centre for Tropical Agriculture (TSBF-CIAT), Nairobi, Kenya
- 2001 – 2003: Integrated Soil Fertility Management Officer, Tropical Soil Biology and Fertility Programme (TSBF) of UNESO, Nairobi, Kenya
- 1991 – 2001: Junior Expert, Associate Expert, and Associate Scientist, IITA, Ibadan, Nigeria
- 1989-1991: Research Associate, Catholic University of Leuven, Belgium

Education

- PhD, Applied Biological Sciences, Katholieke Universiteit Leuven, Belgium, 1996

Selected Recent Publications

Vanlauwe B, Wendt J, Giller KE, Corbeels M, Gerard B, Nolte C, 2014, A fourth principle is required to define conservation agriculture in sub-Saharan Africa: the appropriate use of fertilizer to enhance crop productivity. Field Crops Research 155: 10-13.

Vanlauwe B, Coyne D, Gockowski J, Hauser S, Huising J, Masso C, Nziguheba G, Van Asten P 2014 Sustainable intensification and the smallholder African farmer Current Opinion in Environmental Sustainability 8: 15-22.

Vanlauwe B, K Descheemaeker, K E Giller, J Huising, R Merckx, G Nziguheba, J Wendt, and S Zingore 2015 Integrated Soil Fertility Management in sub-Saharan Africa: Unravelling local adaptation. Soil 1: 491-508.

Vanlauwe B, Six J, Sanginga N, Adesina, AA 2015 Soil fertility declines at the base of rural poverty in sub-Saharan Africa. Nature Plants 1: 1.

Ronner E, A.C. Franke, **B. Vanlauwe**, M. Dianda, E. Edeh, B. Ukem, A. Bala, J. van Heerwaarden, K.E. Giller 2016 Understanding variability in soybean yield and response to P-fertilizer and rhizobium inoculants on farmers' fields in northern Nigeria. Field Crop Research 186: 133-145.

Giller KE, Andersson JA, Corbeels M, Kirkegaard J, Mortensen D, Erenstein O, and **Vanlauwe B**. 2015. Beyond Conservation Agriculture. Frontiers in Plant Science 6: 1-14.

Vincenzo FOGLIANO

CoA 5.2 Co-leader

Time commitment: 20%

Expertise

- Fields of expertise include food design, thermal treatment, and food bioactives. During his professional career, Vincenzo has had the opportunity to investigate many aspects related to food processing, human nutrition and medical science related to bioactive food compounds. He has worked on the design of functional foods containing dietary fiber, proteins and phytochemicals from different sources in collaboration with many food industries.
- Vincenzo investigated chemical analytical and physiological aspects of the Maillard Reaction with the consequent formation of beneficial and detrimental bioactive products. He also developed an original research line connecting food science and phytochemicals, and their health effects, particularly inflammation and cancer.
- Vincenzo has acted as a consulting expert for some of the main Italian and international food companies. He was coordinator of FP7 EU projects, COST action and strategic national cluster Italian projects, and was a partner in several EU projects since 1998 (FP4). He was president of the International Maillard Reaction Society up to 2012, and member of the advisory board of ILSI Europe as well as of the editorial board of leading food science journals.
- Vencenzo guided 14 Ph.D. students, some of whom now occupy leading positions in academia and the food industry, and is presently supervising 18 Ph.D. students. Authored more than 250 papers published in peer-reviewed international journals with 6000 citations and an h-index of 46. He is cited in the ISI Thompson list of the World's Highly Cited Scientists (www.highlycited.com). Food science with background in chemistry and biochemistry.

Employment including current position

- Professor of Functional Food at the Master degree in Food and Health. Chairman of the degree in Food and Health from 2006 to 2008.
- Professor of Food Chemistry at the Master of Science in Food Science and Technology and the Master of Science in Food and Health
- Director of CRIAcq the center of Aquaculture of the University of Naples "Federico II"
- Full Professor and Chair of the Food Quality and Design Group University Wageningen

Education

- PhD in Food Science, Corvinus University of Budapest
- Master of Science in Chemistry at the University of Rome "La Sapienza".

Selected Recent Peer-reviewed publications

Vitaglione P, Napolitano A, **Fogliano V.** 2008. Cereal dietary fibre as natural functional ingredient to deliver phenolic compounds into the gut. Trends in Food Science and Technology 19: 451-463.

Gokmen V., Serpen A., **Fogliano V.** 2009. Direct measurement of the total antioxidant capacity of foods: the 'QUENCHER' approach. Trends in Food Science and Technology 20: 278-288.

Morales FJ, Somoza V., **Fogliano V.** 2012. Physiological Relevance of Dietary Melanoidins. Amino Acid Journal, Amino Acids 42: 1097-1090.

Troise AD, **Fogliano V.** 2013. Reactants encapsulation and Maillard Reaction. Trends in Food Science & Technology 33: 63–74.

Buono S, Langellotti AL, Martello A, Rinna F, **Fogliano V.** 2014. Functional ingredients from microalgae. Food Funct. 5: 1669–1685.

Anita LINNEMANN

FP5 Co-leader, CoA 5.2 Co-leader

Time commitment: 20%

Expertise

- Anita's expertise is to develop food technological solutions as a means to enhance nutrition security in developing countries, in particular at the bottom-of-the-pyramid in sub-Saharan Africa. For this purpose she applies a consumer-oriented perspective in combination with local food resources and tailor-made food technological practices. Furthermore, she takes the entire food production chain into account to ensure that the food system operates as effective and efficient as possible.
- Anita's work in education and research is characterized by an inter- and transdisciplinary approach and the integration of natural and social sciences. To date, 12 PhD students have graduated under her supervision.

Employment

- Since 1995: Scientific staff member at the Food Quality and Design group of Wageningen University, the Netherlands

Education

- 1994: PhD degree in Tropical Crop Science, Wageningen University, the Netherlands
- 1985: A double MSc degree in Tropical Crop Science and Food Technology, Wageningen University, the Netherlands

Selected Publications

Carvajal-Larenas, F.E.; M. Koziol; **A.R. Linnemann**; M.J.R. Nout and M.A.J.S. van Boekel, 2015. Consumer liking, purchase intent, and willingness to pay for Lupinus mutabilis Sweet in relation to debittering treatments. Food Quality and Preference 40 (part A): 221-229.

Chadare, F.J.; **A.R. Linnemann**; J.D. Hounhouigan; M.J.R. Nout and M.A.J.S. van Boekel, 2009. Baobab food products: a review on their composition and nutritional value. Critical Reviews in Food Science and Nutrition 49(3): 254-274.

Dahiya, P.K.; **A.R. Linnemann**; M.J.R. Nout, M.A.J.S. van Boekel, N.K. Khetarpaul and R.B. Grewal, 2014. Consumption habits and innovation potential of mung bean foods in Hisar District of Haryana State, India. Ecology of Food and Nutrition 53 (2): 171-192.

Hounhouigan, M.H.; P.T.M. Ingenbleek; I.A. Lans; H.C.M. van Trijp and **A.R. Linnemann**, 2014. The adaptability of marketing systems to interventions in developing countries: evidence from the pineapple system in Benin. Journal of Public Policy & Marketing 33 (2): 159-172.

Linnemann, A.R.; E.M.T. Hendrix; R.K. Apaiah and M.A.J.S. van Boekel, 2015. Food chain design using multi criteria decision making, an approach to complex design issues. NJAS Wageningen Journal of Life Sciences 72-73: 13 - 21.

Madode, Y.E.; M.J.R. Nout; E.J. Bakker; **A.R. Linnemann**; D.J. Hounhouigan and M.A.J.S. van Boekel, 2013. Enhancing the digestibility of cowpea (Vigna unguiculata) by traditional processing and fermentation. Food Science and Technology = Lebensmittel-Wissenschaft und Technologie 54 (1): 186-193.

Mpofu, A.; **A.R. Linnemann**; W. Sybesma; R. Kort; M.J.R. Nout and E.J. Smid, 2014. Development of a locally sustainable functional food based on mutandabota, a traditional food in southern Africa. Journal of Dairy Science 97 (5): 2591 - 2599.

Bussie MAZIYA-DIXON

FP5 Co-leader, CoA 3.3, 5.1, 5.2, and 5.3 Co-leader

Time commitment: 50%

Expertise

- As Leader of the Agriculture for Nutrition CRP of IITA, coordinating a multi-disciplinary team of scientists located in West, East, Central, and Southern Africa, since January 2012; Head, Food and Nutrition Sciences Laboratory, and Senior Scientist responsible for research in food technology and nutrition
- Developed and/or contributed to project proposals for research on maize quality, processing and utilization
- As Head of the Food and Nutrition Sciences Laboratory, supervise all laboratory research activities on maize quality and utilization and laboratory staff including budgeting, personnel issues, and procurement of laboratory chemicals and equipment
- Collaborated with national research institutes, non-governmental organizations, and community based groups to increase awareness on maize postharvest research and technologies developed at IITA.
- Conducted the first food consumption and nutrition national survey in Nigeria and other countries in SSA to assess food security, nutritional status, micronutrient deficiencies and nutrient intakes
- Worked with small and medium-scale processing industries on product development, food safety, and environmental hygiene
- Managed and coordinated four special projects. All involve a variety of development partners, colleagues from national and international institutions with specialization in range of different disciplines
- Co-supervised with University partners 10 MSc and 15 PhD degree-related researches in food science/technology at IITA
- Published more than 90 research papers on food quality, processing, and nutrition in international journals, and (co)authored 18 books/ technical manuals.

Employment including current position

- 2012 to Present: Leader, CRP on Agriculture for Nutrition and Health, IITA
- 2013 to Present: Senior Scientist, IITA
- 2000 to 2012: Scientist, Crop Utilization Specialist, IITA

Education

- Ph. D in Food Science, 1992, Kansas State University

Selected Recent Publications

Alamu, O. E., **Maziya-Dixon, B**., Olaofe, O., Menkir, A. 2015. Varietal and harvesting time effects on physical characteristics and sensory properties of roasted fresh yellow maize hybrids. IOSR Journal of Applied Chemistry (IOSR-JAC) 8(2): 55-63.

De Moura, F. F., Moursi, M., Lubowa, A., Ha, B., Boy, E., Oguntona, B. E., Sanusi, R., **Maziya-Dixon. B.** 2015. Cassava intake and vitamin A status among women and preschool children in Akwa-Ibom, Nigeria. PLoS ONE. 10(6) (e0129436):1-14.

Akinola, A. A., **Maziya-Dixon, B**., Ayedun, B., Abdoulaye, T. 2014. Economics of maize, soybean and cowpea processing in the northern regions of Ghana. Journal of Food, Agriculture & Environment 12(2):252–258.

Day, R.S., Douglass, D.L., and **Maziya-Dixon, B.** 2008. Developing a Nigerian-Specific Food and Nutrient Coding Database Journal of Food Composition and Analysis 21: S109-S114.

Natalia PALACIOS ROJAS

FP5 Co-leader, CoA 3.3, 5.1 and 5.2 Co-leader

Time commitment: 50%

Expertise

- Main area of work is the development of maize germplasm with high nutritional quality, including high quality protein maize, high zinc and high provitamin A maize. This includes assessing the nutritional quality of food products and phenotyping of genetic diversity for the nutritional, end-use and culinary quality of maize.
- Served as principal investigator and leader of Harvest plus maize biofortification at CIMMYT for the last 5 years.
- Established and maintains the state-of-the-art maize nutritional quality laboratory at CIMMYT
- Published more than 40 research papers on maize nutritional breeding and plant biochemistry in international journals of repute (more than 3050 citations), besides (co)authoring 7 books chapters and more than 10 magazines and brochures of science.
- Served as (co)-supervisor of 11 Ph.D. and 14 M.Sc. students

Employment including current position

- 07/2013 to date: Senior scientist- Maize nutritional quality specialist, Head of maize quality laboratory, Global Maize program, CIMMYT
- 10/2008 to 06/2013: Scientist- Maize nutritional quality specialist, Head of maize quality laboratory, Global Maize program, CIMMYT
- 01/2007 to 09/2008: Associate scientist, Head of maize quality laboratory, Global Maize program, CIMMYT
- 01/2005 to 12/2006: Post-doctoral scientist Maize quality, Global Maize program, CIMMYT
- 09/2001 to 12/2004: Post-doctoral scientist Max Plank Institute of Molecular Plant physiology, Postdam-Germany

Education

- Ph.D. in Plant Biochemistry, University of East Anglia-John Innes Centre, England, 2000

Selected Recent Publications

Obata, T., Witt, S., Lisec, J., **Palacios-Rojas, N**., Florez-Sarasa, I., Yousfi, S., Araus, J.L., Cairns, J., Fernie, A. Metabolite profile of maize leaves in drought, heat and combined stress field trials reveals the relationship between metabolism and grain yield. (2015). Plant physiology 169: 2665-2683

Chomba, E., Wescott, C., Wescott, J., Mpabalwani, E., Krebs, N., Patinkin, Z., **Palacios-Rojas, N**., Hambidge, M. (2015). Zinc Absorption from Biofortified Maize Meets the Requirements of Young Rural Zambian Children. J. of Nutrition 145 (3): 514-9.

Heying, E., Tanumihardjo, J., Vasic, V., Cook, M., **Palacios-Rojas, N**., Tanumihardjo, S. (2014) Biofortified orange maize enhances β-Cryptoxanthin concentrations in egg yolks of laying hens better than tangerine peel fortificant. J. of Agriculture and Food Chemistry 62: 11892-11900.

Miranda A, Vázquez-Carrillo G, García-Lara S, San Vicente F, Torres JL, Ortiz-Islas S, Salinas-Moreno Y and **Palacios-Rojas N.** (2013). Influence of genotype and environmental adaptation into the maize grain quality traits for nixtamalization. CyTA–J. Food 11:54-61

Babu, R., **Palacios-Rojas, N**., Gao, S., Yan, J., Pixley, K. (2012). Validation of the effects of molecular marker polymorphisms in LcyE and CrtRB1 on provitamin A concentrations for 26 tropical maize populations. Theor. Appl. Genet. DOI 10.1007/s00122-012-1987-3.

Yan, J., Kandianis, C. B., Harjes, C. E., Bai, L., Kim, E., Yang, X., Skinner, D., Fu, Z., Mitchell, S., Li, Q., Salas-Fernandez, M., Zaharieva, M., Babu, R., Fu, Y., **Palacios, N**., Li, J., DellaPenna, D., Brutnell, T., Buckler, E., Warburton, M., Rocherford, T. (2010). Rare genetic variation at *Zea mays crtRB1* increases beta-carotene in maize grain. Nature Genetics, 42(4): 322-327.

Gideon KRUSEMAN

CoA 1.1 Co-leader

Time commitment: 50%

Expertise

- As an ex-ante and foresight specialist, leading this research with a multi-disciplinary team of scientists located in sub-Saharan Africa, Latin America and Asia, since August 2015
- Expert in quantitative economic and bio-economic modeling of complex systems at farm household, community, value chain, national and global levels, using econometric, simulation and mathematical programming techniques..
- Expert in quantitative and qualitative ex-ante policy analysis
- Expert in ex-post impact assessment, monitoring and evaluation

Employment including current position

- 08/2015 to date: Ex-ante and foresight specialist at CIMMYT
- 01/2016 to date: Focal point Big Data at CIMMYT.
- 03/2015 to 08/2016 Consultant Big Data
- 03/2006 to 03/2015: Lead on environmental economic modelling, at LEI Wageningen, ex-ante and ex-post impact evaluation of programs, projects and policies in Netherlands, EU, Tunisia, Egypt and Bangladesh
- 03/2004 to 03/2006: Senior Research fellow at the Institute of Environmental studies in Amsterdam involved in environmental modelling, research on the poverty environment nexus, environmental policy in Ntherlands, EU, Tunisia, Kenya, Ethiopia and Pakistan
- 09/2003-03/2004: Consultant for IFPRI for East African highlands project; consultant for ICCO conserning monitoring and evaluation
- 04/1992-09/2003: worked in different capacities in Wageningen University and DLO research institutes on research related to food security and sustainable land use and research on climate change. Research related to Netherlands, EU, Mali, Costa Rica, Ethiopia and China
- 03/1989 to 04/1992 associate expert for the Andean outreach project of CIAT's bean program covering Peru, Ecuador and Bolivia.

Education

- Ph.D. in Development Economics, Wageningen University, Netherlands, 2000

Selected Recent Publications

Gebrezgabher, S., **G. Kruseman**; M.P Meuwissen, D. Lakner, A.G Oude Lansink (2015) Factors influencing adoption of manure separation technology in the Netherlands. Journal of Environmental Management 150: 1-8.

Hagos, F.; Yawez, E.; Yohannes, M.; Mulugeta, A.; Abraha, G.G.; Abreha, Z.; **Kruseman, G**.; Linderhof, V.G.M. (2013) Small scale water harvesting and household poverty in Northern Ethiopia. in: Nature's Wealth: The Economics of Ecosystem Services and Poverty, Papyrakis, E., Bouma, J., Brouwer, R., Beukering, P.J.H. van (editors) - Cambridge : Cambridge University Press, pp. 265 - 282

Kabubo-Mariara, J.; Linderhof, V.G.M.; **Kruseman, G**.; Atieno, R. (2013) Tenure security and ecosystem service provisioning in Kenya. in: Nature's Wealth: The Economics of Ecosystem Services and Poverty, Papyrakis, E., Bouma, J., Brouwer, R., Beukering, P.J.H. van (editors), Cambridge: Cambridge University Press, pp. . 356 - 372

Kruseman, G. and L. Pelligrini (2013) Institutions and forest management in the Swat region of Pakistan. in: Nature's Wealth: The Economics of Ecosystem Services and Poverty, Papyrakis, E., Bouma, J., Brouwer, R., Beukering, P.J.H. van. (editors) - Cambridge: Cambridge University Press, pp. 234 -258

Woltjer, G.B.; Bezlepkina, I.; Leeuwen, M.G.A. van; Helming, J.F.M.; Bunte, F.H.J.; Buisman, F.C.; Luesink, H.H.; **Kruseman, G**.; Polman, N.B.P.; Veen, H.B. van der; Verwaart, T. (2011) The agricultural world in equations: an overview of the main models at LEI Den Haag : LEI, onderdeel van Wageningen UR, (LEI-Memorandum 11-151

Sika DOFONSOU GBEGBELEGBE

CoA 1.1 Co-leader

Time commitment: 50%

Expertise

- Leader of IITA's strategic foresight research program
- Conducting ex-ante evaluation of improved agricultural technologies related to IITA's mandate crops
- Improving bio-economic models used in ex ante impact assessment studies

Employment including current position

- Scientist, Social Science Dept, IITA, (June 2015 to now)
- Associate Scientist, Socio-economics Program, CIMMYT (Jan 2011 to June 2015)
- Post-doctoral fellow, ReSAKSS, ILRI (Jan 2008 – Jan 2011)

Education

- PhD, 2008, Agricultural Economics (international development), Purdue University, USA
- MS, 2002, Agricultural Economics and Business, University of Guelph, Canada

Selected Recent Peer-reviewed publications:

Robinson, S.; Mason-D'Croz, D.; Islam, S.; Cenacchi, N.; Creamer, B.; Gueneau, A.; Hareau, G.; Kleinwechter, U.; Mottaleb, K.; Nedumaran, S.; Robertson, R.; Rosegrant, M.W.; **Sika, G**.; Sulser, T.B.; Wiebe, K. 2015. Climate change adaptation in agriculture: Ex ante analysis of promising and alternative crop technologies using DSSAT and IMPACT. IFPRI Discussion Paper. no.01469. 73 p

Kindie Tesfaye, **Sika Gbegbelegbe**, Jill E. Cairns, Bekele Shiferaw, BM Prasanna, Kai Sonder, Kenneth J. Boote, Dan Makumbi, Richard Robertson, 2015. Bioeconomic impact of climate change on maize production in sub-Saharan Africa and its implications for food security. International Journal of Climate Change Strategies and Management.

Sika Gbegbelegbe, Uran Chung, Bekele Shiferaw, Siwa Msangi, Kindie Tesfaye, 2014. Quantifying the impact of weather extremes on global food security: A spatial bio-economic approach; Weather and Climate Extremes

Uran Chung, **Sika Gbegbelegbe**, Bekele Shiferaw, Richard Robertson, Jin I. Yun, Kindie Tesfaye, Gerrit Hoogenboom, Kai Sonder, 2014. Modeling the effect of a heat wave on maize production in the USA and its implications on food security in the developing world; Weather and Climate Extremes

Gbègbèlègbè D. S., Lowenberg-DeBoer, J., Adeoti R., Lusk, J., Coulibaly O, 2015. The Estimated Ex Ante Economic Impact of Bt Cowpea in Niger, Benin and Northern Nigeria. Agricultural Economics;

Stirling, C.; Hellin, J.; Cairns, J.; Silverblatt-Buser, E.; Tefera, T.; Ngugi, H.; **Gbegbelegbe, S**.; Tesfaye, K.; Chung, U.; Sonder, K.; Cox, R. A.; Verhulst, N.; Govaerts, B.; Alderman, P.; Reynolds, M. 2014. Shaping sustainable intensive production systems: improved crops and cropping systems in the developing world; Book: Climate change impact and adaptation in agricultural systems

Paswel MARENYA

CoA 1.2 Co-leader

Time commitment: 100%

Expertise

- Agricultural development, policy and technology adoption on maize based smallholder systems of East and Southern Africa.
- Analysis of pathways and impacts of technology adoption among smallholder maize farmers within the framework of sustainable intensification.
- Lead a multicounty project on Identifying Socioeconomic Constraints to, and Incentives for, Faster Technology Adoption: Pathways to Sustainable Intensification in Eastern and Southern Africa (Adoption Pathways).
- Lead the socioeconomics component of a four-year, five-country project on Sustainable Intensification of Maize Legume Systems in East and Southern Africa (SIMLESA).

Employment including current position:

- June 2013 – present: Economist (Technology Adoption and Impacts), International Maize and Wheat Improvement Center (CIMMYT), Addis Ababa.
- March 2010 – May 2013: Post-Doctoral Research Fellow, International Food Policy Research Institute (IFPRI), Washington D.C.
- March 2002 - March 2010: Lecturer, Department of Agricultural Economics, University of Nairobi, Kenya.

Education

- 2008, PhD, Natural Resources Policy and Management, Cornell University, Ithaca, NY, USA.
- 2005, MS, Applied Economics and Management, Cornell University, Ithaca, NY, USA.

Selected Recent Peer-reviewed Publications

Marenya, P, Kassie, M., Tostao E. (2015). Fertilizer use on individually and jointly managed crop plots in Mozambique, Journal of Gender, Agriculture and Food Security, 1(2): 62-83.

Marenya, P., Smith, V.H. and Nkonya E., (2014). Relative Preferences for Soil Conservation Incentives among Smallholder Farmers: Evidence from Malawi. American Journal of Agricultural Economics, 96(3): 690-210.

Marenya, P.P., E. Nkonya, W. Xiong, J. Deustua Rossel and K. Edward (2012) Which would work better for improved soil fertility management in sub-Saharan Africa: Fertilizer Subsidies or Carbon Credits? Agricultural Systems 110: 162-172.

Marenya, P.P., Barrett, C.B. (2009). State-conditional fertilizer yield response on western Kenyan farms. American Journal of Agricultural Economics 91: 991-1006.

Marenya P.P., Barrett, C.B., (2009) Soil quality and fertilizer use among smallholder farmers in Western Kenya. Agricultural Economics, 40(5): 561-572.

Shiferaw FELEKE

CoA 1.2 Co-leader

Time commitment: 50%

Expertise

- Agricultural Policy analysis
- Assessment of impact of technologies
- Track technologies contributions towards key performance indicators such as poverty and food security

Employment including current position

- 2014 - Present: Impact Economist International Institute of Tropical Agriculture (IITA)
- 2007- 2013: Research Associate at the Centre for Tobacco Grower Research

Education

- 2006, PhD, Agricultural Economics, University of Florida, USA.
- 2002, MS, Agricultural Economics, University of Florida, USA.

Selected Recent Peer-reviewed publications:

Tiller, K. **Feleke, S.** and Starnes, J. 2013. "Federal Excise Tax Increase and Its Effects on U.S. Tobacco Production" Empirical Economics, 44 (2): 701-717.

Tiller, K., **Feleke, S**. and Starnes, J. 2010. "Exit among Burley Tobacco Growers after the End of the Federal Tobacco Program" Journal of Agricultural and Applied Economics 42(2):161–175.

Tiller, K., **Feleke, S.** and Starnes, J. 2010. "A discrete-time Hazard Analysis of the Exit of Burley Tobacco Growers in Tennessee, North Carolina and Virginia" Agricultural Economics, 41(5): 397–408.

Feleke, S and Kilmer, R. 2009 "Japanese Market for Imported Fruit Juices" International Food and Agribusiness Management Review 12(4): 1-28.

Lone BADSTUE

CoA 1.3 Co-leader

Time commitment: 50%

Expertise

- Rural Development Sociologist with special focus on gender and social heterogeneity, crop genetic resources improvement and seed systems, knowledge processes, local livelihoods and farmer decision making processes.
- Badstue has over 15 years of experience working with international development issues. She has broad experience working with different types of social actors and multi-disciplinary teams on issues related to rural development processes, including social relations and gender, seed systems and crop genetic resources, technology diffusion, natural resource management and collective action, as well as mainstreaming of gender in institutional procedures and project portfolios. She has long-term experience in several countries of Latin America and in Tunisia and Kenya, and short-term assignments in a number of countries in Sub-Saharan Africa and Asia.
- Badstue is currently Strategic Leader for Gender research at CIMMYT, and chairs the Executive Committee of GENNOVATE, a collaborative research initiative on Gender Norms, Agency and Innovation in Agriculture and Natural Resource Management involving 11 CRPs.

Employment including current position

- October 2011 till present, Strategic Leader for Gender Research, International Maize and Wheat Improvement Center (CIMMYT), Mexico.
- March 2010 – September 2011, Gender and Advocacy Specialist, Helen Keller International (HKI), Kenya.
- October 2007 – February 2010, Socio-Economic and Gender Specialist, African Water Facility (AWF), African Development Bank.
- October 2000 – May 2006, Associate Scientist, International Maize and Wheat Improvement Center (CIMMYT), Mexico.

Education

- PhD Rural Development Sociology, Wageningen University, The Netherlands, 2006.
- MA Social Anthropology, University of Copenhagen, Denmark, 2000.

Amare TEGBARU

CoA 1.3 Co-leader

Time commitment: 50%

Expertise

- Social Anthropology, Gender and rural development
- IITA Gender Specialist and Gender Unit Head (current position)
- Maize Gender Focal Point
- Humid Tropics Gender Research Coordinator

Employment

- 1989-1991 Associate Professional Officer (APO), FAO, Thailand
- 1991 -1991 Rural Sociology advisor, FAO, Bhutan
- 1992 – 1998 University Lecturer & Examiner, Stockholm University, Sweden
- 1998 – 2000 University Lecturer & Examiner, Falun University College, Dalarna, Sweden
- 2000-2005 Senior Socio-economic Adviser, National Agriculture and Livestock Extension Program, Sida, Kenya
- 2005-2007 Agriculture Technology Development and Transfer (ATDT) project Coordinator, CIAT, Rwanda
- 2007-2009 Promoting Sustainable Agriculture in Borno (PROSAB) project coordinator and specialist in Participatory Gender Research
- 2010-2012. IITA Country Representative in Liberia and Gender Specialsit
- 2013- to date. IITA Gender Specialsit and Gender Unit Head, IITA Eastern Agfrica Regional Hub, Tanzania

Education

- PhD. 1998, Social Anthropology, Stockholm University, Sweden
- MSc. 1987, Social Anthropology and Development Studies, Stockholm University, Sweden

Selected Recent Publications

Tegbaru, A. et al. (2016) Gender empowerment outcome as an unforeseen consequence of Health & Nutrition project: the case of the MIRACLE Project. (In Press).

Tegbaru, A., John Fitz Simons, Holger Kirscht and Per Hillbur (2015) Resolving the Gender Empowerment Equation in agricultural research: A systems approach. Journal of Food, Agriculture & Environment 13(3&4):131-139.

Christine Okali, Mike Loevensohn and **Amare Tegbaru (**2014) Interpreting the agricultural transformation agenda – women's roles in seed systems. FAO Discussion Paper, Institute of Development Studies, UK.

Tegbaru, A. (2014) Gender Master Plan. N2Africa Phase II - Putting nitrogen fixation to work for smallholder farmers in Africa. IITA, Nigeria & Wageningen University.

Tegbaru Amare, Holger Kirscht and Eva Rathgeber (2013). Humidtropics Gender Strategy. Humidtropics System Research. IITA. CGIAR.

Jon HELLIN

CoA 1.4 Co-leader

Time commitment: 60%

Expertise

- Jon Hellin has 25 years of experience in agricultural research and rural development (farmers' access to markets, land management, and climate change adaptation and mitigation) including 12 years' field work in Latin America, East Africa, South Asia and the Caribbean.
- He has authored and co-authored two books and over 80 articles (including 50 in peer-reviewed journals).
- His current research interests include making markets work for the poor; and index insurance and farmers' uptake of climate-smart agricultural technologies
- From 2010 - 2014, he led CIMMYT's socio-economics team in the "Sustainable Modernization of Traditional Agriculture" (MasAgro) initiative in Mexico. He also contributed to the MasAgro proposal and subsequent strategic direction of the initiative.
- From 2009 – 2010 he was the interim director of CIMMYT's Socio-economics program while also serving on CIMMYT's Senior Management Committee.
- Since joining CIMMYT in 2005, Jon has contributed to successful proposal writing for projects supported by the Bill and Melinda Gates Foundation, USAID, SDC, European Union and DFiD

Employment

- 2005 – present Poverty and Value Chain Specialist, International Maize and Wheat Improvement Centre (CIMMYT), Mexico
- 2002-2005 International Team Leader, Markets and Livelihoods Programme, ITDG (now called Practical Action), UK
- 2000-2002 Independent consultant
- 1994-1999 Senior Scientific Officer, Natural Resources Institute (NRI), UK but based in Honduras

Education

- 1999 Ph.D. in Geography, Geography Department, Oxford Brookes University, UK
- 1989 MSc. Forestry and its Relation to Land Use. University of Oxford, UK
- 1987 BA Hons. Modern History University of Oxford, UK

Selected Recent Publications

Hellin, J., Krishna, V.V., Erenstein, O. and Boeber, C. 2015. India's Poultry Revolution: Implications for its Sustenance and the Global Poultry Trade. International Food and Agribusiness Management Review Volume 18, Special Issue.

Hellin, J., Bellon, M.R. and Hearne, S. 2014. Maize Landraces and Adaptation to Climate Change in Mexico. Journal of Crop Improvement 28:4, 484-501.

Shiferaw B., **Hellin, J.** and Muricho, G. 2011. Improving Market Access and Agricultural Productivity Growth in Smallholder Agriculture in Africa: What Roles for Producer Organizations and Collective Action Institutions? Food Security 3(4), 475-489, DOI: 10.1007/s12571-011-0153-0.

Donnet, L. and **Hellin, J.** 2011. Los Productores Frente a los Cambios de la Demanda en las Cadenas de Trigo en México y Argentina. Revista Mexicana de Economía Agrícola y de los Recursos Naturales 4(2) pp. 39-48.

Bellon, M.R., Hodson, D. and **Hellin, J.** 2011. Assessing the Vulnerability of Traditional Maize Seed Systems in Mexico to Climate Change. Proceedings of the National Academy of Sciences 108 (33): 13432–13437.

Kate DREHER

CoA 2.1 Co-leader

Time commitment: 60%

Expertise

- As a Germplasm Data Coordinator at CIMMYT since 2013, helps to coordinate efforts to implement institutional databases and tools for storing and utilizing maize and wheat phenotypic, genotypic, and genealogical data.
- Collaborates with members of the CIMMYT Knowledge Management Unit, Sustainable Intensification, and Socio-Economics Programs who focus on the management of agronomic and socio-economic data.
- Serves as a CIMMYT representative to the CGIAR Data Management Task Force and the Wheat Information System Expert Working Group, leads the CGIAR Dataverse Community of Practice, and contributes to the further development of CIMMYT Open Access policies, resources, and implementation plans in conjunction with other CGIAR centers
- At the Carnegie Institution for Science (2007-2013) worked on biological database curation for The Arabidopsis Information Resource (TAIR, www.arabidopsis.org) and the Plant Metabolic Network (www.plantcyc.org) and helped release databases focused on plant metabolism in over 15 species.
- Contributed to 12 articles published in peer-reviewed journals and one book chapter.
- Mentored 8 students at the Carnegie Institution for Science and 6 at the University of California, Davis, and served as a Teaching Assistant for 3 classes at the University of California, Davis.

Employment including current position

- 12/2013 to date: Germplasm Data Coordinator, CIMMYT, México
- 10/2007 to 11/2013: Biocurator, Carnegie Institution for Science, United States of America
- 03/2007 to 10/2007, Molecular Biology Consultant, CIMMYT, México

Education

- Ph.D. in Plant Biology , University of California, Davis, United States of America, 2007
- B.A. in Biology and Economics, Williams College, United States of America, 1999

Selected Recent Publications

Kim T, **Dreher K**, Nilo-Poyanco R, Lee I, Fiehn O, Lange BM, Nikolau BJ, Sumner L, Welti R, Wurtele ES, Rhee SY. (2015) Patterns of metabolite changes identified from large-scale gene perturbations in Arabidopsis using a genome-scale metabolic network. Plant Physiology. 167(4):1685-98.

Dreher K. (2014) Putting the Plant Metabolic Network pathway databases to work: going offline to gain new capabilities. Methods Mol. Biol. 1083:151-71.

Lamesch P, Berardini TZ, Li D, Swarbreck D, Wilks C, Sasidharan R, Muller R, **Dreher K**, Alexander DL, Garcia-Hernandez M, Karthikeyan AS, Lee CH, Nelson WD, Ploetz L, Singh S, Wensel A, Huala E. (2012). The Arabidopsis Information Resource (TAIR): improved gene annotation and new tools. Nucleic Acids Research. 40(Database issue):D1202-10.

Zhang P., **Dreher K**., Karthikeyan A., Chi A., Pujar A., Caspi R., Karp P., Kirkup V., Latendresse M., Lee C., Mueller L.A., Muller R., and Rhee SY (2010). Creation of a genome-wide metabolic pathway database for Populus trichocarpa using a new approach for reconstruction and curation of metabolic pathways for plants. Plant Physiology. 153(4):1479-1491.

Trushar SHAH

CoA 2.1 Co-leader

Time commitment: 20%

Expertise

- Crop informatics – data management and analysis
- Breeding Management System – database and tools for breeding
- Software development for decision support tools - developed tools for Marker Assisted Backcrossing
- Bioinformatics applications – Analysis of WGRS and GBS data with application to crop breeding

Employment including current position

- Jan 2015 to present: Integrated Breeding Hub Manager, IITA, Kenya
- Oct 2009-Nov 2014: Bioinformatics Scientist, ICRISAT, India
- Jul 2007 – Oct 2009: Bioinformatics Specialist, CIMMYT, Mexico

Education

- 1997 MSc (Distinction) – Molecular Modelling and Bioinformatics, University of London, UK
- 1996 BSc (Hons) – Biochemistry, Molecular Biology and Biotechnology, University of Bristol, UK

Selected Recent Peer-reviewed publications

Varshney RK, Chen W, Li Y, Bharti AK, Saxena RK, Schlueter JA, Donoghue MTA, Azam S, Fan G, Whaley AM, Farmer AD, Sheridan J, Iwata A, Tuteja R, Penmetsa RV, Wu W, Upadhyaya HD, Yang SP, **Shah T**, Saxena KB, Michael T, McCombie WR, Yang B, Zhang G, Yang H, Wang J, Spillane C, Cook DR, May GD, Xu X and Jackson SA. (2011) Draft genome sequence of pigeonpea (Cajanus cajan), an orphan legume crop of resource-poor farmers. Nature Biotechnology doi:10.1038/nbt. 2022.

Wen W, Araus J, **Shah T**, Cairns J, Mahuku G, Banziger M, Torres J, Sanchez C And Yan J. (2011) Molecular Characterization of a Diverse Maize Inbred Line Collection and its Potential Utilization for Stress Tolerance Improvement. Crop Science 51:2569-2581.

Morris GP, Ramu P, Deshpande SP, Hash CT, **Shah T**, Upadhyaya HD, Riera-Lizarazu O, Brown PJ, Acharya CB, Mitchell SE, Harriman J, Glaubitz JC, Buckler ES, Kresovich S (2012) Population genomic and genome-wide association studies of agroclimatic traits in sorghum. Proc. National Acad. Sci. USA.

Shutu X, Dalong Z, Ye C, Yi Z, **Shah T**, Ali F, Qing L, Zhigang L, Weidong W, Jiansheng L, Xiaohong Y, Jianbing Y (2012) Dissecting tocopherols content in maize (*Zea mays* L.), using two segregating populations and high-density single nucleotide polymorphism markers. BMC Plant Biology 12:201.

Azam S, Rathore A, **Shah TM**, Telluri M, Amindala B, Ruperao P, Katta M a VSK, Varshney RK. (2014) An Integrated SNP Mining and Utilization (ISMU) Pipeline for Next Generation Sequencing Data. PLoS One 9: e101754.

Doddamani D, Katta MA, Khan AW, Agarwal G, **Shah TM**, Varshney RK. (2014) CicArMiSatDB: the chickpea microsatellite database. BMC Bioinformatics 15: 212.

Mike OLSEN

CoA 2.2 Co-leader

Time commitment: 50%

Expertise

- Fourteen years private sector experience in conventional and molecular maize breeding as part of Syngenta and Monsanto North America breeding teams. Recognized as Monsanto Fellow.
- Two years public sector experience leading the molecular breeding team of the CIMMYT Global Maize Program and providing strategic direction for upstream research efforts.
- Project lead for Improved Maize for African Soils (IMAS), a multi-institutional public-private partnership to develop maize varieties with improved performance under low fertility conditions common in Sub-Saharan Africa.
- CIMMYT Principal Investigator for the Genomics and Open source Breeding and Informatics Initiative (GOBII), a partnership between Cornell University, ICRISAT, IRRI, and CIMMYT to enable routine use of genomic data in applied CGIAR breeding programs through integration of appropriate infrastructure, databases, analysis pipelines, and user interfaces.
- Co-inventor of 25 commercially utilized maize inbred lines and 13 hybrid varieties with US patents issued between 2009 and 2015.

Employment including current position

- 01/2013 to date: Trait Pipeline and Upstream Research Coordinator, Global Maize Program, CIMMYT.
- 06/2008 to 01/2013: Maize Discovery Breeder, Monsanto Company, Minnesota, USA.
- 06/2003 to 06/2008: Maize Line Development Breeder, Monsanto Company, Minnesota, USA.
- 06/2002 to 06/2003: Maize Output Trait Breeder, Monsanto Company, Iowa, USA.
- 06/1999 to 06/2002: Maize Output Trait Breeder, Wilson Genetics (a Syngenta and Land O' Lakes joint venture), Iowa, USA.

Education

- Ph.D., M.Sc. Plant Breeding and Genetics, University of Minnesota, USA, 1999.

Selected Recent Publications

Beyene Y, Semagn K, Mugo S, Tarekegne A, Babu R, Meisel B, Sehabiague P, Makumbi D, Magorokosho C, Oikeh S, Gakunga J, Vargas M, **Olsen M**, Prasanna BM, Banziger M, Crossa J. 2014. Genetic gains in grain yield through genomic selection in eight bi-parental maize populations under drought stress. Crop Science 55, 154-163.

Gowda M, Das B, Makumbi D, Babu R, Seman K, Mahuku G, **Olsen MS**, Bright JM, Beyene Y, Prasanna BM. 2015. Genome-wide association and genomic prediction of resistance to maize lethal necrosis disease in tropical maize germplasm. Theoretical and Applied Genetics DOI 10.1007/s00122-015-2559-0

Nair SK, Babu R, Magorokosho C, Mahuku G, Semagn K, Beyene Y, Das B, Makumbi D, Kumar PL, **Olsen M**, Prasanna B. 2015. Fine mapping of Msv1, a major QTL for resistance to Maize Streak Virus leads to development of production markers for breeding pipelines. Theoretical and Applied Genetics DOI 10.1007/s00122-015-2551-8

Semagn K, Beyene Y, Babu R, Nair S, Gowda M, Das B, Tarekegne A, Mugo S, Mahuku G, Worku M, Warburton ML, **Olsen M**, Prasanna M. 2015. Quantitative trait loci mapping and molecular breeding for developing stress resilient maize for sub-Saharan Africa. Crop Science 55, 1-11.

Zhang X, Pérez-Rodriguez, Semagn K, Beyene Y, Babu R, López-Cruz MA, San Vicente F, **Olsen M**, Buckler E, Jannick J-L, Prasanna BM, Crossa J. 2014. Genomic prediction in biparental tropical maize populations in water-stressed and well-watered environments using low-density and GBS SNPs. Heredity doi:10.1038/hdy.2014.99

Melaku GEDIL

CoA 2.1 & 2.2 Co-leader

Time commitment: 50%

Expertise

- As the Head of Bioscience Center manages a biotechnology laboratory with a user of up to 80 personnel including scientists, technicians, grad students with major tasks of procurement of equipment and lab consumables, promotion, training, financial management, genotyping services, personnel management and communication.
- Broad background in plant breeding, statistical genetics, molecular biology, and bioinformatics for developing and applying an efficient and effective molecular breeding program for pest and disease resistance, quality traits, and abiotic stresses such as drought.
- Genomics and modern breeding approaches such as marker-assisted recurrent selection (MARS), genome wide association study (GWAS), genome selection, linkage/QTL mapping, comparative genomics and bioinformatics.
- Proficient with state-of-the-art lab techniques including DNA sequencing, gene cloning and library screening, variety of PCR techniques including quantitative real-time PCR.

Employment including current position

- 2007 to date, Molecular breeder & Head of Bioscience (since 2010), IITA Ibadan, Nigeria
- 2006 to 2007, SAIC-Frederick NCI-NIH, Maryland, USA
- 2002 to 2006 Georgetown University, Washington DC, USA
- 1999 to 2001, Postdoctoral fellow, molecular genetics, IITA, Nigeria

Education

- Ph.D., Crop Science, Oregon State University, Corvallis, Oregon, Jan, 1999.
- M.Sc., Biotechnology/Bioinformatics (May 2005). Georgetown University, Washington DC.

Selected Recent Publications

Badu-Apraku, B., **Gedil, M**., Annor, B., Talabi, A. O., Oyekunle, M., Akinwale, R. O., Fakorede, M. A. B.,Fasanmade, T. Y., Akaogu, I. A. 2015. Heterotic responses among crosses of IITA and CIMMYT early white maize inbred lines under multiple stress environments (Euphytica, Online First)

Badu-Apraku et al. (2015). Grouping of Early Maturing Quality Protein Maize Inbreds based on SNP markers and Combining Ability under Multiple Stress Environments. Field Crops Research (in print)

Menkir, A., **Gedil, M**., Tanumihardjo, S. A., Adepoju, A., Bossey, B. 2014 Carotenoid accumulation and agronomic performanca of maize hybrids involving parental combinations from different marker-based groups Food Chemistry, 148, 131 - 137.

Azmach, G., **Gedil, M**., Menkir, A., & Spillane, C. (2013). Marker-trait association analysis of functional gene markers for provitamin a levels across diverse tropical yellow maize inbred lines. BMC Plant Biology, 13(227), 1— 16.

Adeyemo, O., Menkir, A., **Gedil, M.** and Omidiji, O. 2011. Carotenoid and molecular marker-based diversity assessment in tropical yellow endosperm maize inbred lines. Journal of Food, Agriculture and Environment 9(3):383-392.

Sarah HEARNE

CoA 2.3 Co-leader

Time commitment: 100%

Expertise

- Assessment of the genomic and phenotypic diversity of the CIMMYT genebank collection of maize and other publically accessible maize genetic resources. GWAS for high priority traits using landrace panels. Selection sweep evaluation for key abiotic, biotic and anthropogenic characteristics of maize landraces. Development of new analytical approaches to explore and understand maize genetic diversity.
- Modelling training population formation, selection techniques and breeding methods for GS advancement to optimize landrace based pre-breeding approaches for oligo and polygenic traits. Pre-breeding using genomic selection and forward breeding.
- Works with bioinformaticians and programmers to develop integrated systems and specific tools for genetic research, breeding application and knowledge dissemination.
- Leadership, oversight, coordination, planning and monitoring of activities within the maize and informatics components of the SeeD initiative.
- Fundraising and research strategy development.

Employment

- 2011 to present: Senior scientist, molecular geneticist and pre-breeder at CIMMYT, Mexico.
- 2008 to 2011: Scientist at; IITA Ibadan & IITA, Nairobi. Plant Molecular Geneticist/Physiologist
- 2005 to 2008: Scientist at; IITA, Nairobi. Plant Molecular Geneticist/Physiologist.
- 2001 to 2003: Postdoctoral Fellow at CIMMYT Mexico. Molecular Geneticist / Physiologist.

Education

- Ph.D. 2001, The University of Sheffield, UK.
- B.Sc. (Hons) 1997 Applied Plant Science. First class. The University of Manchester, UK.

Selected Recent Publications

Gorjanc, G., Jenko, J., **Hearne, S.J**., Hickey, J.M. (2016) Initiating maize pre-breeding programs using genomic selection to harness polygenic variation from landrace populations. BMC Genomics, 17, DOI:10.1186/s12864-015-2345-z

Adebayo, M.A., Menkir, A., Blay, E., Gracen, V., Danquah, E., **Hearne, S.** (2014) Genetic analysis of drought tolerance in adapted × exotic crosses of maize inbred lines under managed stress conditions. Euphytica, 196: 261-270.

Semagn, K., Babu, R., **Hearne, S**., Olsen, M. (2014) Single nucleotide polymorphism genotyping using Kompetitive Allele Specific PCR (KASP): Overview of the technology and its application in crop improvement. Mol. Breeding, 33: 1-14.

Swarts K., Li H., Alberto Romero Navarro J., An D., Romay M.C., Hearne S., Acharya C., Glaubitz J.C., Mitchell S., Elshire R.J., Buckler E.S., Bradbury P.J. (2014) Novel methods to optimize genotypic imputation for low-coverage, next-generation sequence data in crop plants. Plant Genome, 7(3).

Mir, C., Zerjal, T., Combes, V., Dumas, F., Madur, D., Bedoya, C., Dreisigacker, S., Franco, J., Grudloyma, P., Hao, P.X., **Hearne, S**., Jampatong, C., Laloë, D., Muthamia, Z., Nguyen, T., Prasanna, B.M., Taba, S., Xie, C.X., Yunus, M., Zhang, S., Warburton, M.L., Charcosset, A. (2013) Out of America: Tracing the genetic footprints of the global diffusion of maize. TAG, 126: 2671-2682.

Muchero, W., Diop, N.N., Bhat, P.R., Fenton, R.D., Wanamaker, S., Pottorff, M., **Hearne, S**., Cisse, N., Fatokun, C., Ehlers, J.D., Roberts, P.A., Close, T.J. (2009) A consensus genetic map of cowpea [*Vigna unguiculata* (L) Walp.] and synteny based on EST-derived SNPs. PNAS, 106 (43): 18159-18164.

Terence MOLNAR

CoA 2.4 Co-leader

Time commitment: 20%

Expertise

- Management of large-scale multi-location biotic and abiotic stress trials of maize genetic resources that include public-private collaborations and collaborations with NARS partners in Mexico. Currently evaluating 1300 testcrosses with landrace germplasm for drought tolerance in 5 locations and evaluating 900 BC1 individuals for tolerance to tar spot disease complex.
- In 2015 led effort in selecting and evaluating 1000 maize landrace accessions for tolerance to the component viruses of the MLN disease complex. Breeding populations with best 20 landraces currently being developed.
- In 2015 began development of a rapid-cycle nursery system in Mexico that allows 3 cycles in 13 to 15 months (depending on germplasm maturity).
- From 2002 – 2013 led and managed commercial maize breeding programs for DuPont-Pioneer in France and the US. Inbred lines developed in the breeding programs have been parents in at least 9 commercial hybrids registered in EU member countries and at least 3 Pioneer brand commercial hybrids currently being sold in the US central Corn Belt.
- Led the effort for developing the DuPont-Pioneer strategy for breeding with and testing of double-haploids for Maritime and Continental Europe evaluation zones and coordinated the initial implementation of large scale double-haploid breeding in the region.
- Extensive experience in using marker-assisted selection and genomic selection in a maize breeding program including the application of markers for incorporating novel exotic haplotypes into existing elite germplasm. This was accomplished for 1) incorporating elite late maturity US germplasm into elite northern Europe early germplasm and, 2) incorporating elite Brazilian and Mexican tropical germplasm into elite US Corn Belt germplasm.

Employment

- 2013 – present: Senior Research Scientist, Genetic Resource Program, CIMMYT – El Batán, México
- 2011 – 2013: Research Scientist – Maize Breeder, DuPont–Pioneer, Champaign, IL, USA
- 2002 – 2010: Research Scientist – Maize Breeder, DuPont–Pioneer, Pacé, France

Education

- 2002: PhD. Crop ScienceNorth Carolina State University, Raleigh, NC, USA
- 1998: M.S. Crop Science, North Carolina State University, Raleigh, NC, USA

Publications

Prioul, J.L., C. Thévenot and **T. Molnar** (eds). 2011. Advances in Maize. Essential Reviews in Experimental Biology. Vol.2. Society for Experimental Biology.

Robertson-Hoyt, L.A., J. Betrán, G.A. Payne, D.G. White, T. Isakeit, C.M. Maragos, **T.L. Molnar**, and J B. Holland. 2007. Relationships among resistances to Fusarium and Aspergillus ear rots and contamination by Fumonisin and Aflatoxin in maize. Phytopathology 97: 311-317.

Robertson, L.A., M.P. Jines, PJ Balint-Kurti, C.E. Kleinschmidt, D.G. White, G.A. Payne, C.M. Maragos, **T.L. Molnar**, and J.B. Holland. 2006. QTL mapping for Fusarium ear rot and fumonisin contamination resistance in two populations of maize. Crop Science 46: 1734-1743.

Balint-Kurti, M.D. Krakowsky, M.P. Jines, L.A. Robertson, R.K. Baesman, **T.L. Molnar**, M.M. Goodman, and J.B. Holland. 2006. Identification of quantitative trait loci for resistance to southern leaf blight of maize. Phytopathology 96:1067-1071.

Felix SAN VICENTE

CoA 3.1 (Latin America) Co-leader

Time commitment: 30%

Expertise

- As maize breeder/geneticist has spent more than 30 years developing and adapting breeding methods for increasing genetic gains in tropical maize.
- As maize breeding coordinator for Latin America at CIMMYT, leading a multi-disciplinary team of scientists located in Mexico, since January 2011; Project leader for MasAgro-Maize, 2012-2014.
- Since 2010, working with partners in Latin America, has developed 15 hybrids and 8 open pollinated varieties (OPVs) which are grown commercially on about 500,000 ha in 10 countries of Latin America.
- Proposed and released 14 Tropical CIMMYT Maize Lines (CMLs), which are elite germplasm used as parents of maize hybrids in at least 25 different countries worldwide.
- Published more than 35 research papers on maize genetics and breeding in international journals of repute, besides (co)authoring 5 technical manuals and 2 book chapters.
- As a Faculty Member at Universidad Central de Venezuela, guided 2 Ph.D. and 5 M.Sc. students, and received Best Research Paper Award.

Employment including current position

- 01/2014 to date: Principal Scientist, Maize Breeder Lowland Tropics and Maize Breeding Lead Latin America, CIMMYT-Mexico. Flagship Project 3, CoA 3.1 (Latin America) Lead.
- 01/2010 to 12/2013: Senior Scientist, Maize Breeder Lowland Tropics and Maize Breeding Lead Latin America, CIMMYT-Mexico.
- 01/1998 to 12/2009: Served Venezuelan National Institute of Agricultural Research (INIA) in various capacities, including as Principal Scientist & Leader of Maize Program, Venezuela (01/2000 to 12/2009); Maize Breeder, National Cereals Program, INIA, Venezuela (01/1998 to 12/1999).
- 01/1998 to 12/2009. Faculty Member College of Agriculture, Advanced Plant Breeding and Quantitative Genetics, Universidad Central de Venezuela, Venezuela.
- 01/1995 to 12/1997: Postdoctoral fellow. Lowland Tropical Maize Subprogram, CIMMYT- Mexico.
- 11/1982 to 12/1987 and 06/1992 to 12/1994: Scientist and Maize Breeder, National Cereals Program, INIA, Venezuela.

Education

- Ph.D. in Plant Breeding, Iowa State University, USA, 1992

Selected Recent Publications

Cairns JE, Sonder K, Zaidi PH, Verhulst N, Mahuku G, Babu R, Nair SK, Das B, Govaerts B, Vinayan MT, Rashid Z, Noor JJ, Devi P, San Vicente F, Prasanna BM. (2012). Maize Production in a Changing Climate: Impacts, Adaptation, and Mitigation Strategies. In: Donald Sparks (ed.), Advances in Agronomy, 114: 1-58.

Kebede Z, Burgueño J, San Vicente F, Cairns JE, Das B, Makumbi D, Magorokosho C, Windhausen VS, Melchinger AE, Atlin GN (2013). Effectiveness of selection at CIMMYT's main maize breeding sites in Mexico for performance at sites in Africa and vice versa. Plant Breeding DOI:10.1111/pbr.12063.

Miranda A, Vásquez-Carrillo G, García-Lara S, San Vicente F, Torres JL, Ortiz-Islas S, Salinas-Moreno Y, Palacios-Rojas N (2013). Influence of genotype and environmental adaptation into the maize grain quality traits for nixtamalization, CyTA. Journal of Food DOI:10.1080/19476337.2013.763862.

Trachsel S, San Vicente FM, Suarez EA, Rodriguez CS, Atlin GN (2015). Effects of planting density and nitrogen fertilization level on grain yield and harvest index in seven modern tropical maize hybrids (Zea mays L.). Journal of Agricultural Science doi:10.1017/S0021859615000696.

Jill CAIRNS

CoA 3.1 (Africa) Co-leader

Time commitment: 40%

Expertise

- Quantified genetic gains within the maize breeding pipeline in eastern and southern Africa, providing the baseline for measuring future success of the maize breeding pipeline through the addition of new tools and techniques.
- Prioritized climate change research needs for maize systems in Eastern and Southern Africa and led efforts to incorporate heat stress tolerance into CIMMYT maize breeding programs. New hybrids which yield up to five times more than commercial varieties under heat stress are now available for commercialization.
- Established remote sensing capacity within the national maize breeding program of Zimbabwe. Facilitating linkages between advanced research institutes and national research programs.
- Identification of key drought tolerant donors for maize breeding. Through the systematic screening the best inbred lines within the CIMMYT and IITA breeding programs allowed the identification of the most donor tolerant lines. The publication and promotion of these results has resulted in these lines being widely incorporated into international and national breeding programs in sub-Saharan Africa, Mexico and Asia.
- Published more than 40 research papers and book chapters on maize and rice, with over 900 citations.

Employment including current position

- 02/2013 to date: Senior scientist, Global Maize Program, CIMMYT, Zimbabwe.
- 07/2009 to 01/2013: Scientist, Global Maize Program, CIMMYT
- 03/2006 to 06/2009: International Research Fellow, IRRI
- 06/2003 to 02/2006: Postdoctoral Fellow, IRRI.

Education

- Ph.D. in Plant Science, University of Aberdeen, UK, 2003

Selected Recent Publications

Tesfaye K, Gbegbelegbe S, **Cairns JE**, Shiferaw B, Prasanna BM, Boote KJ, Sonder K, Makumbi D, Robertson R (2015) Maize systems under climate change in sub-Saharan Africa: Potential impacts on production and food security. International Journal of Climate Change Strategies and Management 7, 247 – 271.

Zaman‐Allah M, Vergara O, Araus JL, Tarekegne A, Magorokosho C, Zarco‐Tejada PJ, Hornero A, Albà AH, Das B, Craufurd P, Olsen M, Prasanna BM, **Cairns J** (2015) Unmanned aerial platform‐based multi‐spectral imaging for field phenotyping of maize. Plant Methods 11:35

Araus JL, **Cairns JE** (2014) Field high-throughput phenotyping: the new crop breeding frontier. Trends in Plant Sci. 19: 52-61.

Cairns, J.E., J. Hellin, K. Sonder, J.L. Araus, J.F. MacRobert, C. Thierfelder, and B.M. Prasanna (2013) Adapting maize production to climate change in sub-Saharan Africa. Food Sec. 5: 345-360

Cairns, J.E., J. Crossa, P.H. Zaidi, P. Grudloyma, C. Sanchez, J.L. Araus, S. Thaitad, D. Makumbi, C. Magorokosho, M. Bänziger, A. Menkir, S. Hearne, and G.N. Atlin (2013) Identification of drought, heat, and combined drought and heat tolerant donors in maize. Crop Sci. 53: 1335-1346.

Cairns JE, Sanchez C, Vargas M, Ordoñez RA, Araus JL (2012) Maize ideotypes associated with grain yield in different water regimes. Journal of Integrative Plant Biology 54, 107-120.

Bindiganavile S. VIVEK

CoA 3.1 (Asia) Co-leader

Time commitment: 60%

Expertise

- Contributions to maize germplasm improvement figure in the release and commercialization of numerous maize open-pollinated varieties and hybrids in sub-Saharan Africa. Eleven maize inbred lines have been released as CIMMYT Maize Lines (CMLs).
- Coordinated the Affordable, Accessible, Asian (AAA) Drought Tolerant Maize Project, a partnership with national partners, Syngenta and other private seed partners for development and deployment of affordable drought tolerant maize hybrids. This effort has led to the identification of several hybrids which are on the verge of being commercialized.
- Capacity building effort has led to the training of several maize researchers and technicians in maize breeding, experimental design and informatics. Formal capacity building effort has led to the supervision of 9 Master's and 5 Ph.D. students through various Universities.
- Contributions to maize research information management has led to the development of software used by many maize breeders at CIMMYT, public institutions and private seed companies.
- Research findings are published in over 25 refereed journal articles and as two practical manuals.
- Lead the formation of the International Maize Improvement Consortium for Asia – a consortium of over 40 seed companies formed in an effort to better engage the private seed industry of Asia to enable a focused development and deployment of high-yielding and stress tolerant maize hybrids for markets in South and South-East Asia.

Employment including current position

- 01/2015 to date: Maize Breeder and Principal Scientist, Global Maize Program, CIMMYT; Leader for MAIZE FP3 CoA 3.1 (Asia)
- 9/1997 to 12/2014: Various scientist positions at CIMMYT

Education

- Ph.D. in Plant Breeding and Plant Genetics, University of Wisconsin-Madison, USA, 1997

Selected Publications

Wegary D, **Vivek BS**, Labuschagne MT (2014). Combining Ability of Certain Agronomic Traits in Quality Protein Maize under Stress and Nonstress Environments in Eastern and Southern Africa. Crop Science 54(3):1004-1014.

Lobell DB, Banziger M, Magorokosho C, **Vivek B** (2011) Nonlinear heat effects on African maize as evidenced by historical yield trials. Nature Climate Change 1:42-45

Wegary D, Labuschagne M, **Vivek BS** (2011) Effect of Low Soil Nitrogen Fertility on Protein Quality and Endosperm Modification of Quality Protein Maize (Zea mays L.). Field Crops Res 121:408-415

Vivek BS, Krivanek AF, Palacios-Rojas N, Twumasi-Afriyie S, Diallo AO (2008) Breeding Quality Protein Maize (QPM): Protocols for Developing QPM Cultivars. Mexico, D.F.: CIMMYT

Vivek BS, Kasango J, Chisoro S, Magorokosho C (2007) Fieldbook: Software For Managing A Maize Breeding Program: A Cookbook For Handling Field Experiments, Data, Stocks and Pedigree Information CIMMYT

Lava KUMAR

CoA 3.2 Co-leader

Time commitment: 25%

Expertise

- Leading strategies to control emerging and remerging diseases in sub-Saharan Africa, such as maize lethal necrosis, banana bunchy top, cassava viruses, and also facilitating phytosanitary strategy of genebanks, advocacy on strengthening phytosanitary capacity and prevention of disease spread through germplasm.
- Part of the MAIZE team; and involved in the characterization of maize germplasm for maize streak virus resistance, phenotyping breeding lines and understanding genetics and molecular mechanisms of resistance. I am also Cluster leader on Banana virus (RTB) and coordinating GH theme in the Genebank Platform.
- Led, several multidisciplinary and multi-country projects. For example plant health component of seed yam of YIIFSWA project funded by the BMGF, which contributed to establishment of clean planting materials of popular landraces, disease mapping and epidemiology, development of QMP and certification system, capacity development in yam virus diagnostics and seed health management.
- Initiated BBTV Alliance in 2009 (www.bbtvalliance.org) as a continent wide strategy to combat bunchy top disease spread in Africa. Developed sensitive and robust diagnostic tools for the detection of emerging pathogens including Maize chlorotic mottle virus responsible for MLN.
- Authored/co-authored more than 80 peer reviewed journal articles, 10 book chapters and edited books/proceedings. Also co-supervised 6 PhD students, and organized nearly 20 training courses on virus disease diagnosis and control.

Employment including current position

- 01/08/10 to present: Head, Germplasm Health Unit / Virologist: IITA, Nigeria
- 01/08/07 to 31/07/10: Virologist (West & Central Africa): IITA, Nigeria
- 01/01/05 to 30/05/07: Scientist – Virology: ICRISAT, India
- 31/12/04 to 01/09/99: Special Project Scientist (Virology): ICRISAT, India

Education

- PhD Virology, Sri Venkateswara University, Tirupati, India, 2000
- MSc Virology, Sri Venkateswara University, Tirupati, India, 1995

Selected Recent Peer-reviewed publications

Mahuku, G., Lockhart, B.E.L., Wanjala, B., Jones, M.W., Kimunye, N.J., Stewart, L.R., Cassone, B.J., Sevgan, S., Nyasani, J.O., Kusia, E., **Kumar, P.L**., Niblett, C.L., Kiggundu, A., Asea, A., Pappu, H.R., Wangai, A., Prasanna, B.M., and Redinbaugh, M.G. 2015. Maize lethal necrosis, an emerging threat to maize-based food security in sub-Saharan Africa. Phytopathology 105: 956-965.

Sudha Nair, K., Babu, R., Magorokosho, C., Mahuku, G., Semagn, K., Beyene, Y., Das, B., Makumbi, D., **Kumar, P.L**., Olsen, M., and Prasanna, B.M. 2015. Fine mapping of Msv1, a major QTL for resistance to Maize streak virus leads to development of production markers for breeding pipelines. Theoretical and Applied Genetics 1839 - 1854.

Lukanda, M., Owati, A., Ogunsanya, P., Valimunzigha, K., Katsonga, K., Ndemere, H. and **Kumar P.L**. 2014. First Report of Maize chlorotic mottle virus Infecting Maize in the Democratic Republic of the Congo. Plant Disease 98 (10): 1448

Kumar, P.L., Selvarajan, R., Iskra-Caruana, M-L., Chabannes, M. and Hanna, R. 2015. Biology, etiology and control of virus diseases of banana and plantain. Advances in Virus Research 91: 229-269.

Silva, G., Bömer, M., Nkere, C., **Kumar, P.L.** and Seal, S.E. 2015. Rapid and specific detection of Yam mosaic virus by reverse-transcription recombinase polymerase amplification. Journal of Virological Methods 222: 138-144.

P.H. ZAIDI

CoA 3.4 Co-leader

Time commitment: 30%

Expertise

- As Senior Maize Physiologist at CIMMYT-Asia, leading a multi-disciplinary and multi-institutional, including both public and private sector, projects on development and deployment of abiotic stress resilient maize suitable for Asian tropics.
- As project leader further strengthened the collaborative research activities of CIMMYT-Asia with Asian NARS, both public and private sector partners, including a strong abiotic stress breeding and phenotyping network in the region.
- Developed/fine-tuned screening methods and phenotyping protocols for major abiotic stresses, including drought, water-logging and heat stress. Published harmonized field phenotyping protocols for precision phenotyping of key abiotic stresses in tropics.
- Developed and shared new generation of stress-resilient maize germplasm, including multi-parent populations, inbred lines, released stress-resilient elite traits donor as CIMMYT Maize Lines (CML), including CML 562 – CML 565, and developed new elite stress-resilient hybrids that area licensed to partners in the Asian region for deployment and scale-out.

Employment including current position

- 10/2010 to date: Senior Scientist – Asia Regional Maize Program, International Maize & Wheat Improvement Center (CIMMYT).
- 12/2007 to 09/2010: Scientist – Asia Regional Maize Program, International Maize & Wheat Improvement Center (CIMMYT).
- 11/2006 to 11/2007: Senior Scientist (Maize Physiologist and Leader, Abiotic Stress Breeding, All-India Coordinated Maize Program), Directorate of Maize Research, ICAR, New Delhi, India.
- 11/1997 to 10/2006, Scientist (Maize Physiologist and Leader, Abiotic Stress Breeding, All-India Coordinated Maize Program), Directorate of Maize Research, ICAR, New Delhi, India.

Education

- Ph.D. in Crop Physiology, N.D. University of Agricultural Sciences and Technology, Faizabad, India, 1994
- One year course in Executive General Management (EGM) from Indian Institute of Management (IIM), Bangalore, India, 2007.

Selected Recent Peer-reviewed publications:

Zaidi P.H., Z. Rashid, MT Vinayan, GD Almeida, RK Phagna, R Babu (2015). QTL Mapping of Agronomic Waterlogging Tolerance Using Recombinant Inbred Lines Derived from Tropical Maize (Zea mays L). Germplasm. PLOS ONE | DOI:10.1371/journal.pone.0124350

Kleinknecht, K.; J. Möhring, K.P. Singh, **P.H. Zaidi**, G.N. Atlin and H.P. Piepho (2013). Comparison of the performance of best linear unbiased estimation and best linear unbiased prediction of genotype effects from zoned Indian maize Data. Crop Science, 53(4):1384-1391.

Cairns JE, Crossa J, **Zaidi PH**, Grudloyma P, Sanchez C, Araus JL, Makumbi D, Magorokosho C, Bänziger M, Menkir A, Hearne S, Atlin GN. (2013). Identification of drought, heat and combined drought and heat tolerance donors in maize (Zea mays L.). Crop Science 53, 1335-1346.

Zaidi, PH, Zerka Rashid, M.T. Vinayan and T. Anil Babu (2012). Pre-germination anaerobic stress tolerance in tropical maize (Zea mays L.). Aust. J. Crop Sci.: 6(12):1703-1711.

Cairns, J.E., K. Sonder, **P.H. Zaidi**, N. Verhulst, G. Mahuku, R. Babu, S.K. Nair, B. Das, B. Govaerts,M.T. Vinayan, Z. Rashid, J.J. Noor, P. Devi, F. San Vicente and B.M. Prasanna. 2012. Maize Production in a Changing Climate: Impacts, Adaptation and Mitigation Strategies. Advances in Agronomy. 114: 1-58.

Tsedeke ABATE

CoA 3.5 & 3.6 (Africa) Co-leader

Time commitment: 50%

Expertise

- Project Leader of the Stress Tolerant Maize for Africa (STMA); he is also leader of Maize Seed Systems for Africa, based at CIMMYT-Nairobi.
- Prior to joining CIMMYT in 2012, Tsedeke led the Tropical Legumes II (TL II) project jointly implemented by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Center for Tropical Agriculture (CIAT), and the International Institute of Tropical Agriculture (IITA), in Africa and South Asia.
- Tsedeke is best known for his passion for putting agricultural knowledge into practical use – scaling-up and scaling-out improved technologies to impact the lives and livelihoods of smallholder farmers. Tsedeke has widely published on African agriculture.
- Formerly Director General of the Ethiopian Institute of Agricultural Research (EIAR)

Education

- BS in agriculture (high honors, 1977) from University of Florida, Gainesville, Florida, USA
- MS in Entomology/Agriculture (1979) from University of Florida, USA
- PhD in biological sciences (1990) from Simon Fraser University, Vancouver, Canada.

Selected Publications

Abate T. Shiferaw B, Menkir A, Wegary D, Kebede Y, Tesfaye K, Kassie M, Bogale G, Tadesse B, Keno T. 2015. Factors that transformed maize agriculture in Ethiopia. Food Sec. 7:965-981 (DOI: 10.1007/s12571-015-0488-z)

Fisher M; **Abate T**; Lunduka R; Asnake W; Alemayehu Y; Madulu RB. 2015. Drought tolerant maize for farmer adaptation to drought in sub-Saharan Africa: Determinants of adoption in eastern and southern Africa. Climatic Change.

Abate T. 2012 – 2015: DT Maize, a quarterly bulletin of the DTMA project: www.dtma.cimmyt.org

Abate T; Shiferaw B; Gebeyehu S; Amsalu B; Negash K; Assefa K; Eshete M; Aliye S; Hagmann J. 2011. A systems and partnership approach to agricultural research for development: Lessons from Ethiopia. Outlook on Agriculture 40(3): 213-220.

Abate T. 2006. Successes with Value Chain: Proceedings of the International Conference on Scaling up and Scaling out Agricultural Technologies in Ethiopia, 9-11 May 2006. EIAR, Addis Ababa, 275 pp.

Baffour BADU-APRAKU

CoA 3.5 & 3.6 (Africa) Co-leader

Time commitment: 25%

Expertise

- As the leader of the Ghana National Maize Program and Joint Coordinator of the Ghana-CIDA Grains Development Project (GGDP) from 1987 to 1992 a QPM laboratory for the screening of maize genotypes for high lysine content was established in Ghana and used to develop the QPM variety, Obatanpa GH which was released, and widely adopted in Ghana, Benin, Togo, Mali, Senegal, Cameroon, Côte d'Ivoire, Burkina Faso, Nigeria, Chad, Guinea, Uganda, Malawi, Swaziland, Zimbabwe, Mozambique, South Africa, and Ethiopia.
- Through his maize breeding program at IITA since 1992, several Striga-resistant and drought-tolerant early and extra-early populations have been developed and are serving as valuable sources of varieties and inbred lines for breeders of the sub-region. Over the years, many early and extra-early Striga, drought and low soil nitrogen-tolerant varieties and, more recently, hybrids have been developed in his program, formally released, and widely adopted by farmers in the sub-region.
- Baffour has also conducted research to improve maize selection and evaluation procedures including breeding for resistance to multiple stresses, identification of indirect selection criteria, and grouping of evaluation sites into mega-environments using GGE biplot analysis of genotype × trait interaction and factor analysis of repeatability estimates.
- His most recent achievement includes the development of Striga-resistant and low soil nitrogen-tolerant extra-early varieties and hybrids with genes for tolerance to drought at the flowering and grain-filling periods. He led a group of scientists to develop a heterotic grouping method, designated HGCMAT.

Employment including current position

- 2007 to date: Maize Breeder, IITA, Ibadan, Nigeria
- 1992-2006: Coordinator of WECAMAN, and Maize Breeder, IITA
- 1986-1992: Leader of the National Maize Program of Ghana and Joint Coordinator of the Ghana-CIDa Grains Development Project

Education

- MSc in Genetics and Plant Breeding, University of Guelph, Ontario, Canada
- Ph.D. in Genetics and Plant Breeding, Cornell University, Ithaca, New York, USA.

Selected Publications

Badu-Apraku, B., M.A.B. Fakorede , M. Oyekunle, G.C. Yallou, K. Obeng-Antwi, A. Haruna, I.S. Usman and R.O. Akinwale. 2015. Gains in grain yield of early maize cultivars developed during three breeding eras under multiple environments. Crop Sci. 55:527–539. Do:10.2135/cropsci 2013.11.0783.

Badu-Apraku, B., M.A.B. Fakorede, M. Gedil, A.O. Talabi, B. Annor, M. Oyekunle, R.O. Akinwale, T. Y. Fasanmade, M. Aderounmu.. 2015. Heterotic responses among crosses of IITA and CIMMYT early white maize inbred lines under multiple stress environments. Euphytica (DOI 10.1007/s10681-015-1506-0).

Badu-Apraku, B., M.A.B. Fakorede, M. Oyekunle, R.O. Akinwale. 2015. Genetic gains in grain yield under nitrogen stress following three decades of breeding for drought tolerance and Striga resistance in early maturing maize. Journal of Agric. Sci. (doi:10.1017/S0021859615000593).

Badu-Apraku, B. and Fakorede, M. Breeding early and extra-early maize for resistance to biotic and abiotic stresses in sub-Saharan Africa, Plant Breeding Reviews, volume 37, pages 115-199, chapter 3, John Wiley & Sons, Inc, 2013.

Badu-Apraku, B., M.A. B. Fakorede, Menkir and Sanogo. 2012. Conduct and Management of maize field trials. IITA, Ibadan, Nigeria. 59 pp. ISBN978-978-8444-02-2.

Sadananda AJANAHALLI

CoA 3.5 & 3.6 Co-leader (Asia)

Time commitment: 50%

Expertise

- Has 36 years of agricultural research and seed industry experience.
- As CIMMYT Maize Seed Systems Specialist in Asia, supporting institutions of national agricultural research systems and SME enterprises in deployment of maize hybrids to the farming communities in the tropical Asian region.
- Worked in private sector seed industry and companies like NFCL, Advanta, Emergent Genetics, Monsanto & Vibha seeds, at various capacities and roles in research & technology management, supporting commercial objectives of the business
- Worked in Indian Agricultural Research Institute (IARI), New Delhi for 16 years, as rice geneticist and contributed in development of 7 CVRC notified varieties & hybrids and was recognized by Government of India for development of basmati rice cultivars in India.
- Established Rice Breeding & Genetics Research Center (RBGRC), Aduthurai, India, as a shuttle breeding facility for rice breeding.

Employment including current position

- 05/2013 to date: Seed System Specialist for South Asia; Project lead –International Maize Improvement Consortia – Asia (IMIC-Asia) and Seed System lead, Nepal Seed and Fertilizer project.
- 06/1995 to 05/2014: Research & Technology Lead in various seed companies like NFCL, Advanta, Emergent Genetics, Monsanto & Vibha seeds.
- 07/1979 to 05/1995: Served in Indian Agricultural Research Institute (IARI), New Delhi in various capacities as rice geneticist & breeder.

Education

- Ph.D. in Genetics, ICAR-Indian Agricultural Research Institute, India, 1980
- Rockefeller Post-doctoral Fellow at University of Georgia, USA, 1991-1993
- Diploma In Business Management from IGNOU, New Delhi & Cornell University, USA

Selected Publications

Sadananda AR, BS Vivek and PH Zaidi. International Maize Improvement Consortium (IMIC) in Asia: Partnership with seed partners for Client Oriented product development & delivery: 2014. 12th Asian Maize Conference & expert consultation on Maize for Food, Feed, Nutrition and Environmental Security, Bangkok, Thailand, Oct 30-Nov 1, 2014.231-237

Prasanna BM, BS Vivek, **AR Sadananda**, Daniel Jeffers, PH Zaidi, Christian Boeber, Olaf Erenstein, Raman Babu, Sudha K Nair, Bruno Gerard, ML Jat, Natalia Palacios and Kevin Pixley (Ed): 2014. Book of Extended summaries, 12th Asian Maize Conference & expert consultation on Maize for Food, Feed, Nutrition and Environmental Security, Bangkok, Thailand, Oct 30-Nov 1, 2014. Pp 483

Gopalakrishna KS, Waters DLE, Katiyar SK, **Sadananda AR**, Vaddadi S, Henry RJ. 2012. Genome-wide DNA polymorphisms in elite indica rice inbreds discovered by whole-genome sequencing. Plant Biotechnology Journal DOI: 10.1111/j.1467-7652.2011.00676.x.

Siddiq E. A., Singh V. P., Zaman F. U., **Sadananda A. R**., Abraham M. J., Hari Prasad A. S., Anju Mahendru, Natrajan U. S., Nagarajan M., Atwal S. S., Sinha S. N., Chopra N. K., Seth Rakesh, Mahapatra T., Prabhu K. V. and Singh A. K. 2009. Development of high yielding Basmati quality rice varieties. Indian Farming, 59(1): 13-17.

Arturo SILVA HINOJOSA

CoA 3.5 & 3.6 (Latin America) Co-leader

Time commitment: 50%

Expertise

- Leader of the IMIC-LA platform for the regional maize seed industry, public sector researchers, and CIMMYT for improving smallholder maize productivity through improvement and dissemination of high yielding, stress-tolerant, and nutritionally-enhanced hybrids for the Latin American tropics/subtropics, especially in Mexico under the MasAgro Project.
- Established an overall product and marketing strategy for the Africa region, working closely with the business units and leveraging market and economic data for increased efficiency in addressing market needs, while aligning with the ACEA and Africa regional leadership teams on risk and opportunity assessments, resource allocation and decision-making processes.
- Defined the strategies and tactics of the Corn & Sorghum Seed Business, aligned with the Strategic intent of Syngenta in order to reach a significant presence within the corn & sorghum seed market in Mexico creating better and complete offers plus solutions for the grower. Establish the strategic plans of the corn & sorghum seed business in Mexico to deliver profitable growth…
- Developed an integrated Latin America North supply plan that meets demand requirements within defined cost targets. Lead seed sales forecasting processes and analyze to match supply with demand. Coordinate, follow up and update the Production Plan for commercial seeds by crop, brand, and hybrid in order to cover the product requirements of customers as well as the general market.
- Supplied planning and demand forecasting of Corn, Soybeans, Sorghum, Sunflower and Alfalfa sold in Argentina, Bolivia and Uruguay. Responsible for the update, projection and report of the Supply and Demand Information. Development & implementation of a CRM & Sales Information System for dealer performance evaluation.

Employment including current position

- Leader of the IMIC-Latin America at CIMMYT, Mexico (2014 – till date)
- Senior Manager, Marketing and Product Strategy for Africa at Pioneer Hi-Bred (2012-2014)
- Mexico Seeds Manager at Syngenta (2007 – 2011)
- LAN Commercial Seed Planning & Allocations Manager at Monsanto (2002 – 2006)
- Product Manager Southern Cone at Pioneer Hi-Bred (1999 – 2001)
- Sales Manager at ProGenetic SA de CV (1994 – 1998)

Education

- MBA Instituto de Empresa Business School. Madrid, Spain, 2002

Santiago LOPEZ-RIADURA

CoA 4.1 Co-leader

Time commitment: 20%

Expertise

- Systems analysis, modeling and scenario assessment of agricultural systems at different scales
- Multi-criteria and sustainability assessment of farming systems
- Participatory research on systems analysis and co-innovation
- Leadership of work packages in interdisciplinary projects

Employment including current position

- September 2012 – Present: Scientist Sustainable Intensification Program CIMMYT, International Maize and Wheat Improvement Center (CIMMYT), Mexico
- December 2007 – August 2012: Scientist at Joint Research Unit "Innovation and Development in Agriculture and Food" (UMR INNOVATION) of the Institut National de la Recherche Agronomique (INRA), Montpellier, France
- December 2005 – November 2007: Post-doc at the Joint Research Unit Soil, Agro- and Hydro-systems, spatialization (UMR SAS) of the Institut National de la Recherche Agronomique (INRA), Rennes, France

Education

- Ph.D. in Production Ecology and Resource Conservation from Wageningen University (WUR), the Netherlands (2005)
- MSc in Sustainable Agriculture, Wye College, University of London, UK (1997)

Selected Recent Peer-reviewed publications

Frelat R, **Lopez-Ridaura S,** Giller KE, Herrero M, Douxchamps S, Djurfeldt AA, Erenstein O, Henderson B, Kassie M, Paul BK, Rigolot C, Ritzema RS, Rodriguez D, van Asten PJ, & van Wijk MT. 2016. Drivers of household food availability in sub-Saharan Africa based on big data from small farms. PNAS, 113 (2): 458-63

Delmotte, S., Barbier, JM., Mouret, JC, Le Page, C., Wery, J., Chauvelon, P., Sandoz, A., **Lopez-Ridaura, S.** 2016. Participatory integrated assessment of scenarios for organic farming at different scales in Camargue, France, Agricultural Systems, 143: 147-158.

Dogliotti, S., Rodriguez, D., **Lopez Ridaura, S.** ; Tittonell, P. ; Rossing, W. A. (2014) Designing sustainable agricultural production systems for a changing world: methods and applications. Agricultural Systems: 1-2.

Delmotte, S., **Lopez-Ridaura, S**., Barbier, J.-M. & Wery, J. (2013) Prospective and participatory integrated assessment of agricultural systems from farm to regional scales: Comparison of three modeling approaches. Journal of Environmental Management, 129, 493-502.

Lopez-Ridaura, S., van der Werf, H., Paillat, J.M. and le Bris, B. (2009) Environmental evaluation of transfer and treatment of excess pig slurry by Life Cycle Assessment. Journal of Environmental Management 90 (2) : 1296-1304.

Lopez-Ridaura, S., van Keulen, H., van Ittersum, M. K. and Leffelaar, P.A. (2005) Multiscale methodological framework to derive indicators for sustainability evaluation of peasant natural resource management systems. Environment, Development and Sustainability 7: 51-69

Jens A. ANDERSSON

CoA 4.2 Co-leader

Time commitment: 30%

Expertise

- Anthropology of development in Africa
- Development and implementation of on-farm research methodologies, focusing on multi-scale analyses, farmer decision-making and technology integration (adoption);
- Coordination of innovation research and external support to innovation approaches in CRP MAIZE

Employment

- 2012-current Innovation scientist, CIMMYT (working globally), The Netherlands
- Evaluating and redesigning innovation approaches for the co-development and increased adoption of sustainable agricultural practices in CIMMYT's operational areas; Research on technology adoption and impact; Evaluating context-specific technical and economic knowledge needs for farmers, as well as socio-economic and institutional constraints to technology adoption; Supporting cross-regional learning in innovation methods and approaches in agricultural development.
- 2005-2011 Research coordinator, southern Africa, Wageningen University, The Netherlands
- Research programme: 'Competing Claims on Natural Resources: Overcoming mismatches in resource use through a multi-scale perspective'.
- 2004-2006 Postdoc Research Fellow, University of Amsterdam.
- Project: 'Liberalization and changing migration in southern Africa: Migrants, traders and the sociology of economic life in Mzimba district, Malawi.'

Education

- 2002 PhD (cum laude), Social Sciences, Wageningen University
- 1993 MSc (cum laude), Sociology of Rural Development, Wageningen University

Recent publications

Cheesman, S., **Andersson, J.A.** and Frossard, E. (2016) Do closing knowledge gaps, close yield gaps? The Journal of Agricultural Science 6 (forthcoming).

Glover, D., Sumberg, J. and **Andersson, J.A**. (2016) The adoption problem; or why we still understand so little about technological change in African agriculture. Outlook on Agriculture 45(1) (forthcoming).

Giller, K.E, **Andersson, J.A**., Corbeels, M., Kirkegaard, J.A., Mortensen, D., Erenstein, O. and Vanlauwe, B. (2015) Beyond conservation agriculture. Frontiers in Plant Science 6(870).

Farnworth, C.R., **Andersson, J.A**., Misiko, M., Baudron, F., Badstue L., and Stirling, C.M. (2015) Gender and Conservation Agriculture in East and Southern Africa: Towards a Research Agenda. International Journal of Agricultural Sustainability 14 (2):142-165.

Andersson, J.A. and D'Souza, S. (2014) From adoption claims to understanding farmers and contexts: A literature review of Conservation Agriculture (CA) adoption among smallholder farmers in southern Africa. Agriculture, Ecosystems and Environment 187: 116–132.

Baudron, F., **Andersson, J.A**., Corbeels, M. and Giller, K.E. (2012) Failing to Yield? Ploughs, conservation agriculture and the problem of agricultural intensification: An example from the Zambezi Valley, Zimbabwe. Journal of Development Studies 48(3): 393–412.

Andersson, J.A. and Giller, K.E. (2012) On heretics and God's blanket salesmen: Contested claims for Conservation Agriculture and the politics of its promotion in African smallholder farming. In: Sumberg, J. and Thompson, J. (eds.). Contested Agronomy: Agricultural Research in a Changing World. London: Routledge, pp. 22–46.

Alpha YAYA KAMARA

CoA 4.2 Co-leader

Time commitment: 35%

Expertise

- Alpha Kamara is a Systems Agronomist and a Senior Scientist working at the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. He heads the IITA station in Kano, Nigeria and coordinates the Consortium Research Program on Water, Land, and Ecosystems.
- Alpha has extensive experience spanning over 20 years, in the fields of agronomy, soil fertility management, seed systems development, crop science, natural resource management, stress physiology and farmer participatory evaluation of technologies, which enabled him to initiate, design and efficiently implement research and development-oriented project activities in SSA.
- He has led and is currently coordinating and managing several research for development oriented projects that are meant to improve rural livelihoods in sub-Saharan Africa.
- Alpha has contributed to many grant-winning proposals at IITA with a combined value of over 30 million US dollars. He has published over 70 journal articles, 20 articles in books of Abstracts and over 20 papers in conference proceedings in the areas of natural resource management, soil fertility, weed and crop management and crop physiology.

Employment

- March 2007- To date. Savanna Systems Agronomist, International Institute of Tropical Agriculture
- January 2004- February 2007. Project and Systems Agronomist, Promoting Sustainable Agriculture in Borno, project (PROSAB), International Institute of Tropical Agriculture, Ibadan, Nigeria
- April 2002- December 2003. Systems Agronomist, Drought-tolerant maize project, International Institute of Tropical Agriculture
- September 2011- To-date, Coordinator: Consortium Research Program 5 (CRP5). Water, Land, and Ecosystems
- March 2007- To-date: Taskforce leader, Sudan Savanna taskforce of the Kano-Katsina Maradi-PLS of the sub-Saharan African Challenge program, International Institute of Tropical Agriculture

Education

- PhD. 1998, Agronomy and Natural Resource Management, University of Kassel, Germany
- M.Sc 1993, Agronomy, Christian Albrecht's University of Kiel, Germany

Selected Recent Peer-reviewed Publications

Kamara A. Y., Sylvester U. Ewansiha, Abdullahi I. Tofa, and Steve Boahen (2014). Agronomic response of soybean to plant population in the Guinea Savannas of Nigeria. Agronomy Journal 106:1051-1059,

Kamara A. Y., Friday Ekeleme, Jibrin M. Jibrin, Gbessay Tarawali, and Ibrahim Tofa. (2014), Assessment of level, extent and factors influencing Striga infestation of cereals and cowpea in a Sudan Savanna ecology of northern Nigeria. Agriculture, Ecosystems and Environment 188 (111–121

Kamara A.Y, S. U Ewansiha, and A. Menkir (2013). Assessment of Nitrogen Uptake and Utilization in Drought Tolerant and Striga Resistant Tropical Maize Varieties. Archives of Agronomy and Soil Science ; http://dx.doi.org/10.1080/03650340.2013.783204

Kamara A. Y., Sylvester U. Ewansiha, Hakeem A. Ajeigbe and Lucky O. Omoigui (2012). Response of old and new cowpea varieties to insecticide spray regimes in the Sudan savanna of Nigeria. Archives of Phytopathology and Plant Protection, 1–12

Kamara, A.Y, S. U Ewansiha, and A. Menkir, A. I Tofa. (2012) Agronomic response of drought-tolerant and Striga-resistant maize cultivars to nitrogen fertilization in the Nigerian Guinea savannas. Maydica, 57: 114-120.

Stephen K. BOAHEN

CoA 4.3 Co-leader

Time commitment: 25%

Expertise

- Leads a multi-disciplinary team in developing sustainable intensification of maize-based systems through participatory research and extension in Southern Africa.
- Coordinated and managed several multi-institutional and multi-disciplinary projects and currently leading a multi-million dollar USAID public-private partnership scaling up project on common beans, cowpea, groundnut, pigeon pea, soybean and sesame in Mozambique
- Established legume research program and developed improved crop management strategies for legume-based cropping systems with a focus on identifying the physiological and management constraints to agronomic performance; development of sustainable soil fertility management through nitrogen fixation, P application and cropping systems
- Developed seed systems to increase private-sector involvement and improve the effectiveness of community engagement to increase seed sales and uptake of improved soybean and cowpea varieties among smallholder farmers
- Published more than 20 articles in refereed journals and over 15 papers in conference proceedings
- Co-supervised 8 M.Sc. and 4 Ph.D. students.

Employment including current position

- Systems Agronomist: 2007 – Present, International Institute of Tropical Agriculture (IITA), Numpula, Mozambique.
- Research Agronomist: 2003 – 2007, Delta Research and Extension Center, Mississippi State University, Stoneville, MS. USA
- Research Associate: 2001 – 2003, Department of Plant and Animal Sciences, Nova Scotia Agricultural College, Truro, NS Canada.

Education

- Ph.D., Agronomy/Plant Physiology, 2000, University of Saskatchewan, Saskatoon, SK, Canada
- M. Sc., Agronomy, 1995, University of Helsinki, Finland

Selected Publications:

Gyogluu, C., **Boahen, S.K.** and Dakora, F.D. 2016. Response of promiscuous-nodulating soybean (*Glycine max* L. Merr.) genotypes to *Bradyrhizobium* inoculation at three field sites in Mozambique. Symbiosis:DOI 10.1007/s13199-015-0376-5

Kamara, A.Y., Ewansiha, S.U., **Boahen, S.K**. and Tofa, A.I. 2014. Agronomic response of soybean varieties to plant population in the Guinea Savannas of Nigeria. Agron. J. 106:1051–1059.

Kumar, P. L., Sharma, K., **Boahen, S.K.**, Tefera, H., Tamo, M. 2011. First report of soybean witches'-broom disease caused by Group 16SrII phytoplasma in soybean in Malawi and Mozambique. Plant Disease 95(4) 492–495.

Zhang, L., and **Kyei-Boahen, S.** 2011. Effects of spring post-planting flooding on early soybean production in Mississippi. Online. Crop Management doi:10.1094/CM-2011-0722-01-RS.

Zhang, L., J. Zhang, S. **Kyei-Boahen** and M. Zhang 2010. Simulation and prediction of soybean growth and development under field conditions. American-Eurasian J. Agric. & Environ. Sci., 7 (4): 374-385.

L. Zhang and **S. Boahen** 2010. Evaluation of critical shattering time of early-maturity soybeans under early soybean production system. Agric. Biol. J. N. Am., 1(4): 440-447.

Timothy J. KRUPNIK

CoA 4.3 Co-leader

Time commitment: 15%

Expertise

- Since joining CIMMYT, Timothy has led and managed multi-million dollar USAID and EU research for development programs. He currently manages a portfolio of applied and multidisciplinary research efforts in tropical maize, wheat, and rice systems agronomy, farming systems analysis, scale-appropriate farm machinery, and the integration of environmental and development goals in agricultural production.
- Timothy's research in South Asia has actively involved hundreds farmers the implementation and management their own adaptive experimental trials and farming system analyses.
- Prior to CIMMYT, Timothy was affiliated with AfricaRice and partnered with the FAO to conduct on-farm, participatory action research on water saving rice cropping systems, and detailed studies of nutrient balances and water productivity, as well as crop-weed competition under water saving irrigation.
- Timothy has conducted research and has consulting experience in Senegal, India, Madagascar, Bangladesh, Haiti, Ethiopia, and Kenya. He has authored of 21 peer-reviewed papers, one book, and several technical reports and invited presentations, in addition to the development of a number of award winning extension materials including seven farmer-to-farmer educational videos now translated into six languages with documented viewership of over 110,000 farmers and millions of television viewers in South Asia.
- In collaboration with partners, his science into scaling efforts have resulted in over 41,000 farmers utilizing resource conserving and resilient crop management practices on 17,000 hectares in South Asia.

Employment including current position

- CIMMYT: Scientist (August 2014 – Present)
- CIMMYT: Associate Scientist (June 2013 – July 2014)
- CIMMYT: Post Doctorial Fellow (July 2011 – April 2013)

Education

- Ph.D. in Environmental Studies (Concentration in Agroecology). University of California, Santa Cruz, 2011.
- MSc. International Agricultural Development. University of California, Davis, 2014.

Selected Recent Publications

Akter, S., **Krupnik, T.J.**, Khanam, F., Rossi, F.J. 2016.The influence of gender and product design on farmers' preferences for weather-indexed crop insurance. In Press: Global Environmental Change.

Krupnik, T.J., Ahmed, Z.U., Timsina, J., Yasmin, S., Hossain, F., Mamun, A. and A. McDonald. 2015. Untangling crop management and environmental influences on wheat yield variability in Bangladesh: An application non-parametric approaches. Agricultural Systems. 139: 166–179.

Aravindakshan S., Rossi, F., and **T.J. Krupnik**. 2015. What does benchmarking of wheat farmers practicing conservation tillage in the eastern Indo-Gangetic Plains tell us about energy use efficiency? An application of slack-based Data Envelopment Analysis. Energy. 90: 483–493

Krupnik, T.J., Ahmed, Z.U., Timsina, J., Shahjahan, Md., Kurishi, A.S.M.A., Rahman, S. Miah, A.A., Gathala, M.K., and A. McDonald. 2015. Forgoing the fallow in Bangladesh's stress-prone coastal deltaic environments: Effect of sowing date, nitrogen, and genotype on wheat yield in farmers' fields. Field Crops Research. 170: 1–7.

Krupnik, T.J., Santos Valle, S., Hossain, I., Gathala, M.K., Justice, S., Gathala, M.K. and A. McDonald. 2013. Made in Bangladesh: Scale-appropriate machinery for agricultural resource conservation. International Maize and Wheat Improvement Center. Mexico, D.F.

Krupnik, T.J., Shennan, C. and J. Rodenburg. 2012. Yield, water productivity and nutrient balances under the System of Rice Intensification and Recommended Management Practices in the Sahel. Field Crops Research. 130: 155–167.

David KAHAN

CoA 4.4 Leader

Time commitment: 15%

Expertise

- Agribusiness development
- Business modelling
- Innovation Systems
- Agricultural extension
- Farm business management
- Farm economics
- Natural resource management
- Marketing and value chain development

Employment including current position

- Nov. 2013–Present, Agribusiness/ Scaling up Specialist, CIMMYT, International Maize and Wheat Improvement Centre, Addis Ababa, Ethiopia
- 2012 –2013, Principal Officer, Agricultural Innovation and Extension, FAO Rome, Italy
- 2010 –2012, Senior Officer, Agribusiness and Agro-enterprise Development, FAO, Regional Office for Asia and the Pacific, Bangkok, ThailanD
- 2001 –2010, Senior Officer, Agribusiness and Agro-enterprise Development, FAO, Rome, Italy
- 1996-2001 FAO, Chief Technical Adviser, Myanmar.

Education

- Ph.D. Rural Development, University of Reading, UK (1982)
- M.Sc. Farm Management, University of Reading, UK (1976)
- M.A Agricultural Economics, University of Wisconsin, USA (1976)

Selected Recent Publications

Baudron F., **David Kahan** (2015) Re-examining appropriate mechanization in Eastern and Southern Africa: two-wheel tractors, conservation agriculture and private sector involvement, Food Security.

Kahan D. et.al. Agricultural mechanization and small scale agriculture: case study evidence from Eastern and Southern Africa (recently submitted).

Kahan D. et al. (2016) Business models for scaling-up 2WT technologies among smallholder farmers: theoretical underpinnings and empirical observations (recently submitted).

Kahan D. 2013. Market-oriented advisory services in Asia – a review and lessons learned. FAO, Regional Office for Asia and the Pacific.

FAO. 2014. The State of Food and Agriculture: Innovation in family farming (led the writing team).

Kahan D. 2007. Business services in support of farm enterprise development. AGS Occasional Paper, 16, FAO.

William J. COLLINGS

CoA 4.4 Co-leader

Time commitment: 15%

Expertise

- 35 years of Experience primarily in South Asia as a manager, technical specialist and designer of a range of agriculture, resource management, aquaculture/fisheries horticulture and related programs
- Most of his recent work involves the design and management of large multi-sectorial agriculture programs that focus on market based agriculture and include mechanization and livestock, aimed at poor rural smallholders
- He has significant experience in market based value chain approaches, livelihoods and income generating activities in sustainable agriculture, horticulture, aquaculture, livestock and micro-irrigation programs.
- He has significant experience as a manager of large programs working with host governments, multilateral and bilateral donors and the private sector. Apart from national governments, those agencies include the Asian Development Bank, World Bank, the European Community, USAID, CARE, DANIDA, DFID, GIZ, Bill & Melinda Gates Foundations, SAVE the Children, BRAC and others.
- He established Bangladesh's Tropical Forest Conservation Foundation-based on a debt equity swap. He has designed and managed rural credit programs with both NGOs and commercial banks.

Employment including current position:

- December 2014 – Present: Project Leader/COP, CIMMYT, USAID funded CSISA Mechanization and Irrigation Program and Country Coordinator for the regional Gates/USAID Funded CSISA III program and Project Leader for the Bangladesh SIIL Program.
- March 2013- October 2014: COP, Winrock International, USAID KISAN Project. Nepal.
- Managing and administrating USAID's largest Feed the Future initiative in Nepal. This integrated agriculture and nutrition project operates in the western districts of Nepal
- Oct. 2009 – Dec 2012: Regional Director-South Asia, WorldFish Center, Bangladesh Office Responsible for all WorldFish research and program activities in the South Asia region.

Education:

- 1973, BSc in Biology and Chemistry, Jacksonville University, Jacksonville Florida
- 1980, MSc from the Auburn University School of Agriculture, Auburn Alabama

Hugo DE GROOTE

CoA 5.3 & 5.4 Co-leader

Time commitment: 100%

Expertise

- Economic analysis and impact assessment of new maize and wheat technologies
- Farmer participatory evaluation of stress tolerant maize; participatory testing and impact assessment of herbicide resistant maize and other strategies to control striga;
- Economic analysis, impact assessment and consumer acceptance of nutritionally enhanced maize (quality protein maize and maize biofortified with vitamin A);
- Analysis of seed systems and regulatory systems in the region;
- Analysis of market information systems, market chains and efficiency of input markets in reaching the poor;
- Project coordinator/principal investigator (impact of quality protein maize, zinc agronomic fortification, climate smart technology dissemination) or leader of the socioeconomic component (VA maize, grain storage, insect resistant maize, and others).

Employment including current position:

- Agricultural Economist/Scientist (from 1999), Senior Scientist (from 2004), Principal Scientist (from 2009), International Maize and Wheat Improvement Center (CIMMYT), Kenya
- Project Coordinator, Biological Control and Biodiversity (1998-1999), Agricultural Economist (1997-1999), International Institute of Tropical Agriculture (IITA), Benin.
- Agricultural Economist, Royal Institute for the Tropics, Amsterdam, January 1994-February 1997:
- Post-Doctoral Research Fellow, International Food Policy Research Institute (IFPRI), Washington D.C., November 1992-November 1993.

Education:

- 1992, PhD, University of Wisconsin-Madison, US, Agricultural Economics.
- 1981, MSc, Ghent State University, Belgium, Agriculture.

Selected Recent Peer-reviewed Publications

De Groote H., F. Oloo, S. Tongruksawattana, B. Das. 2016. Community-survey based assessment of the geographic distribution and impact of maize lethal necrosis (MLN) disease in Kenya. Crop Protection 82: 30–35.

De Groote H., C. Narrod, S. Kimenju, C. Bett, R. Scott, M. Tiongco and Z. Gitonga. 2016. Measuring rural consumers' willingness to pay for quality labels using experimental auctions: the case of aflatoxin free maize in Kenya. Agricultural Economics 47 (2016) 33-45.

De Groote, H., Chege, C.K., Tomlins, K., Gunaratna, N.S., 2014. Combining experimental auctions with a modified home-use test to assess rural consumers' acceptance of quality protein maize, a biofortified crop. Food Quality and Preference 38, 1-13.

De Groote, H., G. Dema, G. Sonda, and Z.M. Gitonga. 2013. Maize for food and feed in East Africa– the farmers' perspective. Field Crops Research 153, 22–36.

De Groote, H., S. Kimenju, P. Likhayo, F. Kanampiu a, T. Tefera, and J. Hellin. 2013. Effectiveness of hermetic systems in controlling maize storage pests in Kenya. Journal of Stored Products Research 53, 27-36.

Gitonga, Z.M., **Hugo De Groote**, Kassie Menale and Tadele Tefera. 2013. Measuring the impact of metal silos on household maize storage and food security in Kenya using propensity score matching. Food Policy 43:44-55.

De Groote, H., Overholt, W.A., Ouma, J.O., Wanyama, J., 2011. Assessing the potential economic impact of Bacillus thuringiensis (Bt) maize in Kenya. African Journal of Biotechnology 10 (23), 4741-4751.

Michelle GUERTIN

Monitoring & Evaluation Specialist

Time commitment: 50%

Expertise

- Michelle has worked on developing policies and programs, implementing complex national regulatory programs and international negotiations, and monitoring and evaluating programs and policies.
- She has managed multidisciplinary teams for over 10 years and led DFATD's Development Evaluation Directorate as Interim Director for prolonged periods.
- She has represented Canada at several multilateral forums, including the OECD Development Assistance Committee (DAC) and the Multilateral Organization Performance Assessment Network (MOPAN).

Employment including current position

- 2014 to present - Senior Monitoring, Evaluation and Learning Specialist
- 2002 – 2014 - Senior Evaluation Manager Government of Canada
- 2004 – 2008 – Manager – Innovative Partnership Programme, ILRI, Kenya.
- 2003-2004 – Consultant ESAE-FAO, Italy.

Education

- PhD Agricultural and Environmental Sciences at McGill University, Canada.
- MSc. Environmental Sciences at Université de Sherbrooke, Canada.

Selected Recent Publications

- Department of Foreign Affairs, Trade and Development. (2015) Synthesis Report – Summative Evaluation of Canada's Afghanistan Development Program.
- **Guertin, M**., Gaffney, S., Prakash, V., Melanson, J. (2014) Comparative Study of MOPAN and EvalNet Approaches to Assessing Multilateral Organization's Development Effectiveness. Internal Government of Canada, OECD and MOPAN paper. Presented at the DAC Development Evaluation Network and the MOPAN Steering Committee.
- Department of Foreign Affairs, Trade and Development. (2014) Synthesis Report - Bolivia Country Program Evaluation - 2005-2010.
- Canadian International Development Agency. (2013) Development Effectiveness Review of the Asian Development Bank. Canadian International Development Agency. (2012) Development Effectiveness Review of the World Health Organization.

Stephen MUGO

Cross-Cutting – Enhancing local capacities

Time commitment: 25%

Expertise

- Maize Breeder, and Leader of WEMA Project for CIMMYT.
- Has led several bilateral and multilateral maize improvement projects.
- Guided 6 Ph.D. and 10 M.Sc. students.
- Published more than 60 research papers in peer-reviewed journals, 20 book chapters and working papers and technical manuals.

Employment including current position

- 2008 to present - Principal Scientist and Maize Breeder in CIMMYT's Global Maize Program & Project Leader, WEMA-CIMMYT.
- 2004 –2008 Project Leader of the Water Efficient Maize For Africa (WEMA) project
- 2001 – 2003 Project Leader of Strengthening Seed Systems project in Kenya and Uganda
- 1999 – 2004 Project Leader the Insect Resistant Maize for Africa (IRMA) project

Selected Recent Publications

Mwimali M, Derera J, **Mugo S**, Tongoona P. 2015. Response to S1 recurrent selection for resistance to two stem borers, *Busseola fusca* and *Chilo partellus*, in two tropical maize populations. Euphytica. DOI 10.1007/s10681-015-1496-y.

Makumbi D., A. Diallo, F. Kanampiu, **S. Mugo**, and H. Karaya. 2014. Agronomic Performance and Genotype x Environment Interaction of Herbicide-Resistant Maize Varieties in Eastern Africa. Crop Science 55: 540-555.

Beyene, Y., K. Semagn, **S. Mugo**, A. Tarekegne, R. Babu, B. Meisel et al. 2014. Genetic gains in grain yield through genomic selection in eight bi-parental maize populations under drought stress. Crop Sci. 55:154-163.

Tefera T., G. Demissie, S. Mugo, Y. Beyene. 2013. Yield and agronomic performance of maize hybrids resistant to the maize weevil Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae). Crop Protection 46 (2013) 94-99.

Mugo S., S. Gichuki, M. Mwimali, C. Taracha, and H. Macharia. 2011. Experiences with the biosafety regulatory system in Kenya during the introduction, testing and development of Bt maize. African Journal of Biotechnology 10: 4682-4693.

David WATSON

MAIZE Program Manager

Time commitment: 100%

Expertise

- Program and research management; guiding and managing demand-driven agricultural research and agricultural and rural development interventions.
- The transformation and commercialization of agrarian systems (both developed countries and developing countries).
- Sustainable agriculture and rural development education, training and extension.
- Rural, agricultural and agri-environmental policy development.

Employment including current position

- 2012 to present - Program Manager for MAIZE CRP, CIMMYT, Mexico.
- 2008 – 2012 – Director, Project Development and Management, IITA, Nigeria.
- 2004 – 2008 – Manager – Innovative Partnership Programme, ILRI, Kenya.
- 2003-2004 – Consultant ESAE-FAO, Italy.

Education

- 1998 – Ph.D. Human Geography, University of Hull, UK.
- 1993 – MSc. Environmental Policy and Management. University of Hull, UK.

Selected Recent Peer-reviewed publications:

Watson, D.J. (ed). (Chapters in press). Achieving sustainable cultivation of maize. Volume 1: From improved varieties to local applications. Burleigh Dodds Science Publishing.

Watson, D.J. (ed). (Chapters in press). Achieving sustainable cultivation of maize. Volume 2: Cultivation techniques, pest and disease control. Burleigh Dodds Science Publishing.

James, B.D., Bramel, P., Witte, E., Asiedu, R., **Watson, D**., and Okechuku, R. (2011). Expanding the application of cassava value chain technologies through UPoCA Project. African Journal of Root and Tuber Crops, 9: 38.

IARSAF (International Association of Research Scholars and Fellows) (2010). Climate Change, Cropping Systems and Coping Strategies in Impact of Climate Change on Food Security in sub-Saharan Africa. Proceedings of the 13th Annual Lecture/Symposium of the International Association of Research Scholars and Fellows. IITA, Ibadan, Nigeria, 25th February, 2010.

Watson, D.J. and Van Binsbergen, J. (2008) Livestock Market Access and Opportunities in Turkana, Kenya. Research Report 3. International Livestock Research Institute (ILRI), Nairobi, Kenya. ISBN 92–9146–208–X.

Watson, D.J. (2008) Community farmer field school animal health facilitators: Hybridizing private animal healthcare and capacity building in remote pastoralist areas. Research Report 14. ILRI (International Livestock Research Institute), Nairobi, Kenya. 70 pp. ISBN 92–9146–227–6.

Watson, D.J. and Van Binsbergen, J. (2008) Livelihood Diversification Opportunities for Pastoralists in Turkana, Kenya. Research Report 5. International Livestock Research Institute (ILRI), Nairobi, Kenya. ISBN 92–9146–210–1.

3.9 Open Access and Open Data Management

Open Access and Open Data planning, according to the CGIAR Open Access and Data Management Policy ("CG OADMP"), is driven by the target date for implementing Policy mandates by the end of 2018. By then, full Open Access and Open Data should be a reality (CG OADMP has been effective as of October 2, 2013).

Key challenges are:

- Culture change: Since scientists are compelled by the CG OADMP to make their information products immediately, irrevocably, unrestrictedly and freely accessible online, they may face a challenge on how adapting to the current and future requirements. This challenge is also closely related to the following.
- Availability and commitment of resources for implementing Open Access and Open Data. Adequate investments are required for proper compliance with the CG OADMP. Cost drivers are:
    - Implementation, maintenance and improvement of suitable repositories, including hardware infrastructure as well as staff costs for development, maintenance and population. [CG OADMP § 4.1.2]
    - Implementation, maintenance and improvement of interoperability, including the cost of properly tagging all the information products with metadata based on controlled vocabularies. [CG OADMP § 4.1.3]
    - Data storage, format conversion and adequate preservation for future use, including costs related to storage volumes, backup storage and disaster recovery plans. [CG OADMP § 4.1.4]
    - Copyright and Open Licenses, which include the royalties paid for publishing articles under the Gold or Green Open Access ways. [CG OADMP § 4.1.5]
    - Incentives and professional expertise in all areas of Open Access and Data Management. [CG OADMP § 4.1.6]
    - Translation of key documents and other media into pertinent languages. [CG OADMP § 4.1.7]

Planning and implementation

To comply with the CG OADMP, CRP-Management will consider the following issues during project planning and implementation:

- Allocation of staff and material resources for proper implementation, maintenance and improvement of suitable repositories and tools, implementation of interoperability (including metadata tagging), data curation and data quality control, data storage, license management (including royalties for Gold and Green Open Access publishing), counseling on information product management, and translation. [CG OADMP § 4.1.2 to § 4.1.7]
- Properly designing and putting in place coordination mechanisms among participating centers and/or units for ensuring proper Open Access and Open Data implementation. [CG OADMP § 2]
- Establishing and implementing procedures and workflows for meeting the deadlines for making information products Open Access, according to the CG OADMP. [CG OADMP § 4.2]

Brief Data Management Plan

- Expected information product types

  MAIZE expects to produce the following types of information products: Annual reports, books and monographs, brochures, databases, datasets, factsheets/flyers, financial management documents, financial statements, guidelines and manuals, gray literature, journal articles, newsletter/bulletins, non-conventional literature, photographs, posters, presentations, proceedings, reports, reprints, research highlights, research plans, research reports, software, special publications, speeches and presentations, technical bulletins, theses, trip reports, videos/film.

- Formats

  Currently most of the information products are natively created in digital formats, so that these can be immediately stored in proper repositories for "into perpetuity" archiving. Nevertheless, MAIZE will make a special effort to transform relevant legacy information products into digital formats, as a way to preserve institutional knowledge. Moreover, MAIZE will do its best to archive its information products in commonly used and highly compatible digital file formats, such as PDF, CSV, JPG, MP4, etc.

  Storage and preservation of information products

  Currently MAIZE uses the following state-of-the-art digital repositories:

  - CIMMYT Institutional Multimedia Publications Repository
  - CIMMYT Institutional Research Data and Software Repository

  These repositories ensure not only preservation and backup but openness of research outputs via FAIR principles as well. Since the partner center/institutions may not have such repositories in place, it will be necessary to implement similar ones for preserving FAIR principles CRP-wide as well as the center's independence.

- Licensing

  CIMMYT already has different licenses for all its publicly available information products. Those licenses have been approved by its Legal Unit and are shown to the users of the repositories before they can download any information product. Since the partner center has not fully implemented a licensing system, it will be necessary to cover all information products coherently CRP-wide.

- Procedures, workflows and embargo periods

  All procedures, workflows and embargo periods regarding information products must observe the regulations given in the CG OADMP. CRP MAIZE will review procedures, workflows and embargo period(s) currently in place at both centers and will adapt them to comply with the CG OADMP if necessary.

Technical considerations

Information products stored in the repositories cited in the DMP can be found by search engines, and their contents indexed via standard protocols. Those state-of-the-art repositories provide syntactic and semantic interoperability by means of widely used international standards such as OAI-PMH, Agrovoc and Dublin Core; they are hosted in first-class cloud servers so the content is properly backed-up and archived "into perpetuity". The partner center has not implemented such kinds of interoperable repositories, so this should be one of the priority actions to be taken. The repositories currently used in MAIZE are summarized below (**Table 3.9**).

Table 3.9: MAIZE-related information product repositories

Name	Repository Technology	URL	FAIR compliant?
CIMMYT Institutional Multimedia Publications Repository	DSpace	http://repository.cimmyt.org/	Yes
CIMMYT Institutional Research Data and Software Repository	Dataverse	http://data.cimmyt.org/	Yes
IITA Knowledge	Non-specific	http://www.iita.org/knowledge	No

Technical Operations

Given the above considerations, personnel and infrastructures will be allocated to ensure proper development of the following routine and on-demand operations:

- Implementation of suitable repositories and tools (on demand). [CG OADMP § 4.1.2]
- Maintenance and improvement of suitable repositories and tools (routine). [CG OADMP § 4.1.2]
- Implementation of interoperability (on demand). [CG OADMP § 4.1.3]
- Maintenance and improvement of interoperability (routine). [CG OADMP § 4.1.3]
- Implementation of hardware infrastructure, storage volumes, backup storage, and disaster recovery plans (on demand). [CG OADMP § 4.1.4]
- Maintenance and improvement of hardware infrastructure, storage volumes, backup storage, and disaster recovery plans (routine). [CG OADMP § 4.1.4]
- Translation of key documents and other media into pertinent languages (on-demand). [CG OADMP § 4.1.7]
- Data curation, metadata tagging, and data quality control (routine). [CG OADMP § 4.1.3 and § 4.1.4]
- Periodic evidence-based review of the implementation of relevant regulations in force (routine). [CG OADMP § 5]
- Continuous coordination among participating centers to ensure proper Open Access and Open Data implementation (routine). [CG OADMP § 2]
- Training activities covering relevant topics to ensure proper staff knowledge and engagement to accomplishing envisaged Open Access and Open Data objectives (on demand).

Coordination and decision-making

The CIMMYT Knowledge Management, Data Management, Geographic Information Systems and Intellectual Property working group, which holds periodic meetings regarding Open Access and Open Data Management activities, should be extended to include relevant equivalent staff from the partner center, as well as the CRP Program Manager and other relevant staff, in order to jointly define workflows, procedures and governance recommendations that should be followed CRP-wide.

Narrative for required resources (e.g., human and financial)

Besides existing resources (material and human), **Table 3.10** shows additional resources forecasted for MAIZE OA/OD activities (see Uplift budget).

Table 3.10: Additional OA/OD budget proposed for MAIZE Phase-II.

MAIZE Phase-II		
Amount	**Resource**	**Average estimated extra cost per year**
1	Locally Recruited Staff for data curation, data quality assurance prior to final publication, metadata tagging, data storage, coordination with other centers and units and implementation of procedures and workflows related to information product management.	USD 48,700
0.5	Locally Recruited Staff for license management, data storage, counseling on information product management and coordination with other centers and units, shared by both Maize and Wheat CRPs.	USD 17,000
0.5	Locally Recruited Staff for the design, development and implementation of training, shared by both Maize and Wheat CRPs.	USD 17,000
N/A	Server rental and maintenance, storage volumes, backup storage and server disaster recovery set-up	USD 26,000
N/A	Implementation of suitable publicly accessible repositories (outsourcing).	USD 4,000
N/A	Implementation of a FAIR Integrated Library Management System (outsourcing).	USD 2,500
N/A	Maintenance of repositories and Information Library Management Systems.	USD 6,000
N/A	Improvement of suitable publicly accessible repositories, mainly regarding interoperability and dissemination features and channels/pipelines (outsourcing).	USD 50,000
N/A	Translation of key documents and other media into pertinent languages	USD 20,000
N/A	Training materials and fees (books, fees for attending courses, etc.)	USD 15,000
N/A	Fees for publishing in Open Access (see tables below)	USD 292,662
Total average estimated extra cost per year		**USD 498,862**

Total estimated extra cost for 2017-2022 for MAIZE = USD 2,993,172

Table 3.11 shows estimates for MAIZE publishing fees in Open Access, based on the assumption that all articles published in 2015 have been published as Gold Open Access. A 15% annual increase is added to compensate for increments both in scientific production and publishers' prices.

Table 3.11: OA publishing costs for CIMMYT and IITA

CRP MAIZE– Estimated costs for publishing in Open Access		
Year	**Cost (CIMMYT)**	**Cost CIMMYT and IITA (CRP)**
2015	USD 95,145	USD 158,575 (60%-40%)
2016	USD 104,660	USD 174,433 (60%-40%)
2017	USD 120,359	USD 200,598 (60%-40%)
2018	USD 138,413	USD 230,688 (60%-40%)
2019	USD 159,174	USD 265,290 (60%-40%)
2020	USD 183,050	USD 305,083 (60%-40%)
2021	USD 210,507	USD 350,845 (60%-40%)
2022	USD 242,083	USD 403,472 (60%-40%)
Total cost estimate 2017-2022	USD 1,053,586	**USD 1,755,976** (60%-40%)
Average annual cost estimate 2017-2022	USD 175,598	**USD 292,662** (60%-40%)

Explanatory note for the above tables

The "total average estimated extra cost per year" in **Table 3.10** is the result of dividing by 6 (2017 to 2022) the "total estimated extra cost for 2017-2022 for MAIZE" (2,993,172 / 6 = 498,862).

The numbers shown in **Table 3.11** were calculated as follows:

1. The cost for year 2015 is the hypothetical cost of having published all 2015 CIMMYT CRP MAIZE publications in Gold Open Access.
2. The cost for year 2016 is the result of applying a 15% increase to the cost for 2015. The cost for year 2017 is the result of applying a 15% increase to the cost for year 2016 and so on.
3. The "total cost estimate 2017-2022" is the sum of costs from 2017 to 2022: 120,359 + 138,413 + 159,174 + 183,050 + 210,507 + 242,083 = 1,053,586.
4. The "average annual cost estimate" is the result of dividing by 6 (2017 to 2022) the "total cost estimate 2017-2022" (1,053,586 / 6 = 175,598).

We assume that CIMMYT will contribute 60% and IITA 40% of all publications produced in MAIZE Phase-II; these include co-authors in these publications from other partner institutions. For example, since USD 138,413 was estimated for CIMMYT Open Access publications for 2018, this means that IITA Open Access publications for 2018 would amount to USD 92,275. The total cost for Open Access publications for the whole CRP for 2018 would be USD 230,688.

3.10. Intellectual Asset Management

I. Relevance of Intellectual Asset (IA) management for CRPs

All MAIZE participants (the Lead and the Participating Center(s), as well as other partners, to the extent that they are able to align) will treat research results and products developed under MAIZE according to appropriate implementation of CGIAR Principles for the Management of Intellectual Assets and the CGIAR Open Access and Data Management Policy, as described below.

Table 3.12: Critical issues to address in CRP implementation from the IA perspective

Barriers to full adoption	**Actions implemented to address critical issues**	**Envisioned improvements**
Ensuring CGIAR IA principles, center policies, and center contracts are in compliance with local legislation, local markets and local practices.	Prepare agreements to align with CGIAR principles for the Management of Intellectual Assets and with LEA and RUA requirements when local laws and practices differ. Revise internal policies to address critical issues, as well as to align them with local legislation standards and, when possible, with local markets/practices.	Monitor and train partners on local laws and revise internal and CGIAR policies in view of local laws, potentially as part of CRP "Policies and Markets." Focus on local seed laws and regulations that affect dissemination of research outputs.
Lack of incorporation of IA management principles into the project lifecycle.	Include tools in the project management lifecycle to assist in tracking intellectual assets.	Standardize such practices in MAIZE projects.
	Prepare freedom-to-operate analysis for dissemination of CRP outputs.	
	Formulate flow-down obligations and standards from internal and CGIAR policies to participating center(s) and other partners, according to their capacities.	Monitor and train partners.
Align CGIAR IA principles with private sector partner interests.	Draft and negotiate agreements with private partners, in light of CGIAR principles and, if necessary, draft exceptions while ensuring appropriate justification for appropriate dissemination along with the appropriate search and emergency exceptions.	Continue revising internal policies and extend such policies within the CGIAR.

II. Challenges for CRP implementation vis-a-vis IA management

1. CGIAR policy requirements are at odds with private sector interests and stewardship of GMO technologies. This applies for both outputs created through the use of private sector technology or outputs created solely by a center.
2. There are concerns about confidentiality obligations aimed at maintaining trade secrets and delay disclosure of information to provide ample time for enabling patentable inventions in view of CGIAR IA principles.
3. Ensuring that CRP MAIZE has adequate human resources, funding and capacity development to implement in a timely manner all actions needed for proper IA management.
4. Lack of knowledge among NARES of IA practices at the centers.
5. Nonexistence of IP policies within the various NARES.
6. Collecting, exporting and licensing seed in view of the International Treaty on Plant Genetic Resources for Food and Agriculture and the Nagoya Protocol.

III. Project planning and implementation

1. The Lead Center IP and Legal Unit will intervene in the following phases of the project management lifecycle (highlighted in **Table 3.13** below):

Project phase	Intervention from the IP and Legal Unit
Planning	Direct and/or participate in drafting of documents for work plan, data management, knowledge management, and dissemination of results. IP and Legal will handle contractual obligations (including subgrants) to ensure appropriate planning. If appropriate, prepare preliminary FTO assessment for dissemination of results.
Implementation, monitoring and evaluation	Draft and negotiate agreements, including material transfer agreements. As needed, monitor work scope, risk issues and legal issues in moving forward with project. Draft commercial licenses, if necessary, for dissemination of outputs. Assist with any audits, if necessary. If appropriate, prepare preliminary FTO assessment for dissemination of results. Assist in implementing methods and tools such as legal documents and legal language to be incorporated into documents used in the project lifecycle.
End of the project	Administrative closeout, ensure sharing of information and/or materials, closing out contracts and tracking finalization of any confidentiality clauses.

2. Accountability for the appropriate implementation of CGIAR principles will be handled as follows:
    a. Participating centers are also CG centers and, therefore, their policies and procedures should be consistent with those of the CGIAR; additionally, the Lead Center will ensure this approach by contractual obligation and the right to audit the Participating Center;
    b. The Lead Center will encourage compliance by non-CGIAR partners, to the extent possible, for example, through subgrant contractual obligations.
    c. The Lead Center will create appropriate stewardship issues so not to expose third parties to not be in compliance with IA principles. It is the exception, rather than the rule, that a new language will be needed. For example, in germplasm, CIMMYT does not disclose confidential pedigree information. Additionally, in data and information product management, CIMMYT

repositories and management plans will be applicable to results generated by partners and, to the extent possible, CIMMYT will lead such management.

3. Implementation is subject to available budget; capacity building for incorporating CGIAR policies into project planning and implementation will be developed and provided through guidelines, training, etc.

Table 3.14: Key dissemination pathways for maximizing global impact

Type of Intellectual Asset	Dissemination pathway	IP + Legal contributions
Data and Information Products (databases, publications, multimedia, reports, training materials, software, algorithms, maps)	- Multi-lingual Open Access repositories - Adapted information dissemination channels to specific target groups, e.g., farmers - Licensing	• Development of global licenses for dissemination as "international public goods" • Legal advice on: - access to third-party technologies/ data/ software/information; - agreements to publish information products through publishers and/or scientific journals; - freedom-to-operate opinions; and - development of IA management strategies to achieve greater impact.
Know-how (protocols, how-to guides, best practices)	- OA repositories - Partnership approaches and capacity development - NARs - Extension specialists - Partners and collaborators	Legal advice on: - development of IA management strategies to achieve greater impact; - dissemination strategies and global licenses for that purpose; - access to third-party know-how; and - management of confidential/ proprietary information.
Germplasm (physical, dissemination)	- As international public goods/through NARs - Public and private partnerships - Networks - Participatory development	• Preparation of licenses and other kinds of applicable agreements to access and give access to germplasm, including SMTA/MTAs; • Legal advice on: - germplasm collection and exportation; - germplasm transfer; - contract negotiation for PPP; - freedom-to-operate opinions; - dissemination strategies for scaling up and out; and - data dissemination.
Agronomic technologies (sustainable intensification, SI)	- On-farm management/ participatory research	Legal advice on: - farmer's rights, germplasm collection and transfer, use of traditional knowledge and prior informed consent; - freedom-to-operate opinions; - ethics in research and privacy matters; - contract negotiation for accessing third-party technologies and/or for collaboration/ use of patents; and - data dissemination.
Agronomic special category: Specialized machinery	- Scaling up and out - Networks	Legal advice on - contract negotiation and drafting, including for accessing third-party technologies and/or for

		granting access to third parties, collaboration/ use of patents; - dissemination strategies for scaling up and out; and - data dissemination.
New tools/protocols, such as newly discovered DNA, RNA, enzymatic and analytical methods and processes for use in biotechnology discovery and/or trait development, including, but not limited to, transformation tools and methods, promoters, introns, enhancers, DNA and RNA modification tools, etc.	- Licensing - Partnerships	Legal advice on - contract negotiation and drafting, including access to third-party technologies; - freedom-to-operate opinions; - use of patents; and - dissemination strategies.
Traits	- Licensing - Partnerships	Legal advice on - contract negotiation and drafting, including access to third-party technologies; - freedom-to-operate opinions; - use of patents; and dissemination strategies.

Table 3.15: Operations (technical infrastructure, planned activities)

IA/IP operations category	Policy, procedure, work process status (provide ref docs if apt)	Policy, procedure, process owner	Estimated cost core budget	Additional investment, budget needed
Incorporation into Lead Center project cycle	Project management lifecycle (in draft form)	Project Managers + IP & Legal	IP & Legal: 5% FTE of one IP Counsel + 3% FTE of General Counsel	+ 5 % FTE of one IP Counsel + 2% FTE of General Counsel
Incorporation into project cycle for participating centers, non-CGIAR partners	In accordance with CIMMYT policies and decisions taken in the CRP-MC; Subgrant	CRP Managers + Participating Centers/ non-CGIAR partners		
IA/IP tracking	Project management lifecycle (in draft)	Project Leader + IP & Legal	IP & Legal: 5% FTE of one IP Counsel	+15 % FTE of one IP Counsel
Negotiation of partner agreements	IP Policy & IP Manual (approved, under revision for update)	Project Leader + IP & Legal	IP & Legal: 15% FTE of each IP Counsel (2)	+10% FTE of each IP Counsel (2)
Convention on Biological Diversity/Farmer's Rights/Nagoya Protocol /International Treaty for Plant Genetic Resources for Food &Agriculture	Germplasm Policy (in draft)	Project Leader + IP & Legal	IP & Legal: 5% FTE of one IP Counsel	+15 % FTE of one IP Counsel
Ethics in Research & Privacy Protection	Ethics in Research Policy (in draft)	Project Leader + IP & Legal	IP & Legal: 5% FTE of one IP Counsel	+15 % FTE of one IP Counsel

Policy development, update of existing policies	IP Policy; IP Manual; Copyright and Authorship Policy; Germplasm Policy (in draft); Ethics in Research Policy (in draft); Project Management lifecycle;	IP + Legal	IP & Legal: 10% FTE of each IP Counsel (2) + 5% FTE of General Counsel	+ 15% FTE of each IP Counsel (2) + 5% FTE of General Counsel
CGIAR Coordination	CRP management	Project Managers	N/A	N/A

Table 3.16: Coordination and decision making (i.e. Policies, procedures, committee, task force)

Topic that triggers coordination of MC with IP + Legal for decision-making	**Coordination /decision-making procedure**	**Applicable policy and status**	**Estimated cost core budget**	**Additional investment, budget needed**
Accessing technology that has or may have restrictions for results dissemination	Legal advice during the project through participation in MC meetings / application of polices in documents produced	CIMMYT Intellectual Property Policy and Manual (approved, under revision for update)	5% FTE of each IP Counsel (2)	+ 3% FTE of each IP Counsel (2)
Granting limited exclusivity agreements for commercialization, whether as part of a partnership or a dissemination strategy	Legal advice during the project through participation in MC meetings / application of polices in documents produced	CIMMYT Intellectual Property Policy and Manual (approved, under revision for update) CGIAR Principles for IA Management	5% FTE of each IP Counsel (2)	+ 10% FTE of each IP Counsel (2)
Partnership or strategies that include the possibility of registering IPRs	Legal advice during the project through participation in MC meetings / application of polices in documents produced	CIMMYT Intellectual Property Policy and Manual (approved, under revision for update) CGIAR Principles for IA Management Germplasm Policy (in draft form)	5% FTE of each IP Counsel (2)	--
Planning direct/specific research activities, particularly if they involve: Germplasm collection and transfer; Licensing of tools and traits Interaction with human subjects/ communities; Scaling up and out; Data dissemination through non-standard platforms.	Legal advice during the project through participation in MC meetings / application of polices in documents produced	Policies applicable to all matters: CIMMYT Intellectual Property Policy and Manual (approved, under revision for update) CGIAR Principles for IA Management For specific topics: Germplasm Collection: CIMMYT Germplasm Policy (in draft); Interaction with human subject/communities: CIMMYT Ethics in Research Policy (in draft); Data dissemination: CIMMYT Research Data and Information Management Policy and CGIAR Open Access Policy.	10% FTE of each IP Counsel (2)	+ 10% FTE of each IP Counsel (2)

* Additional decisions by the Lead Center-MC will be made following relevant CGIAR and Lead Center policies.

IV. Indicative resources (HR and budget statement)

CIMMYT human resources that will support CRP implementation include:

1. CIMMYT general counsel to focus on general coordination and oversight of legal implications (10% FTE devoted to CRPs).
2. CIMMYT IP counsel with background in legal matters related to germplasm development and deployment. (10% FTE devoted to CRP MAIZE, in addition to approximately 25% FTE to be invested in projects that are linked to CRP MAIZE and approximately 20% FTE devoted to policy drafting and implementation as well as capacity building at CIMMYT, which will have a direct impact on CRP MAIZE).
3. CIMMYT IP counsel with background in legal matters related to data and information product development and deployment. (10% FTE devoted to CRP MAIZE, in addition to approximately 25% FTE to be invested in projects that are linked to CRP MAIZE and approximately 20% FTE devoted to policy drafting and implementation as well as capacity building at CIMMYT, which will have a direct impact on CRP MAIZE).
4. CIMMYT legal specialist to support IP Counsel's activities. (5% FTE devoted to CRPs in addition to approximately 20% FTE to be invested in projects that are part of CRP MAIZE).
5. CIMMYT administrative support (as needed).

3.11 Targeted abiotic and biotic stresses under MAIZE FP3

Region	Major abiotic stresses	Major biotic stresses
Sub-Saharan Africa	• Drought • Poor soil fertility (sub-optimal soil N and P; soil acidity) • Heat • Combination of stresses (drought + heat; heat + sub-optimal soil N)	• Maize lethal necrosis (MLN) • Maize streak virus (MSV) • Turcicum leaf blight (*Exserohilum turcicum*) • Gray leaf spot (GLS; *Cercospora zeae-maydis*) • Maydis leaf blight (*Bipolaris maydis*) • Common rust (*Puccinia sorghi*) • Southern rust (*Puccinia polysora*) • Stalk and ear rots (*Diplodia* and *Fusarium* spp.) • Kernel and ear rots *(Aspergillus* and *Fusarium* spp.) • Parasitic weed *Striga* (*Striga asiatica* and *S. hermonthica*) • Stem borers (*Chilo* sp., *Busseola fusca* and *Sesamia calamistis*) • Large grain borer (LGB; *Prostephanus truncatus*) • Maize weevil (*Sitophilus zeamais*)
Asia	• Drought • Drought + heat • Drought + waterlogging • Heat • Waterlogging • Cold • Salinity • Lodging • Soil acidity • Sub-optimal soil P and N	• Downy mildews (*Peronosclerospora* species) • Banded leaf and sheath blight (BLSB; *Rhizoctonia solanai* f.sp. *sasakii*) • Post-flowering stalk rots (PFSR) • Gray leaf spot (GLS; *Cercospora zeae-maydis*) • Turcicum leaf blight (*Exserohilum turcicum*) • Maydis leaf blight (*Bipolaris maydis*) • Common rust (*Puccinia sorghi*) • Southern rust (*Puccinia polysora*) • Kernel and ear rots *(Aspergillus* and *Fusarium* spp.) • Stem borers (*Chilo* sp.; *Busseola fusca*) • Maize weevil (*Sitophilus zeamais*)
Latin America	• Drought • Soil acidity/Al toxicity • Heat • Sub-optimal soil P	• Tar spot complex • Corn stunt complex • Turcicum leaf blight (*Exserohilum turcicum*) • Gray leaf spot (GLS; *Cercospora zeae-maydis*) • Maydis leaf blight (*Bipolaris maydis*) • Common rust (*Puccinia sorghi*) • Southern rust (*Puccinia polysora*) • Stalk and ear rots (*Diplodia* and *Fusarium* spp.) • Kernel and ear rots *(Aspergillus* and *Fusarium* spp.) • Large grain borer (LGB; *Prostephanus truncatus*) • Maize weevil (*Sitophilus zeamais*)

3.12 MAIZE Target Product Profiles for Sub-Saharan Africa, Latin America and Asia (under CoA 3.1 and 3.3).

Sub-Saharan Africa

Sub-region	Agro-ecology	Proportion of maize area in the region (%)	Target products*	Improved germplasm providers (with relative ranking)**	Justification for MAIZE investment in Phase-II
Eastern Africa	**Highlands**	15	Late maturing (170-190 days), high yielding, nitrogen use efficient (NUE), acid soil tolerant, **disease (MLN, MSV, TLB, GLS, PS, ear rots) resistant** maize	Seed companies (1), NARS (2), CIMMYT (3)	MAIZE provides improved highland germplasm to help specific countries where seed companies have not invested (e.g., Rwanda and Burundi). Also, overall genetic gains in the highlands have decreased and productivity has stagnated over the years due to a very narrow genetic base.
	Upper humid mid-altitudes	25	Medium maturing (130-145 days), high yielding, **NUE, DT, acid soil tolerant,** aflatoxin, and disease (**MLN, MSV, TLB, GLS, PS, ear rots)** resistant maize	CIMMYT (1), Seed companies (2), NARS (3)	MAIZE is the major provider of adapted and diverse elite germplasm with relevant traits (e.g., MLN in DT genetic backgrounds); opportunities for upstream research to increase genetic gain and productivity.
	Lower humid mid-altitudes	40	Medium maturing (120-130 days), high yielding, **NUE, DT disease (MLN, TLB, GLS, PS, ear rots) , *Striga*, aflatoxin,** and insect pest (*B. fusca*) resistant maize	CIMMYT (1), Seed companies (2), NARS (3)	
	Dry mid-altitudes	10	Early maturing (100-120 days), high yielding, **DT, heat, NUE, MLN, *Striga*, aflatoxin**, and post-harvest insect pest resistant maize	CIMMYT (1), Seed companies (2), NARS (3)	MAIZE is the major provider of adapted DT, NUE and heat tolerant germplasm, with relevant traits (e.g., MLN); opportunities for upstream research to increase genetic gain and productivity.
	Humid lowlands	5	Early maturing (90-120 days), high yielding, DT, heat tolerant, NUE, disease (including MLN), aflatoxin, **pre- (*C. partellus*) and post-harvest (LGB, maize weevil)** insect pest resistant maize	CIMMYT (1), Seed companies (2), NARS (3)	MAIZE is the major provider of diverse, well-adapted, early-maturing drought, NUE, and heat tolerant germplasm with specific traits in high demand (e.g., MLN); potential for further increasing productivity.

	Dry lowlands	5	Extra-early maturing (80-100 days), high yielding, **DT, heat tolerant, NUE, aflatoxin, pre- (*C. partellus*) and post-harvest (LGB, maize weevil) insect pest resistant** maize	Seed companies (1), CIMMYT (2), NARS (3)	MAIZE is the major provider of diverse, well-adapted, early-maturing drought, NUE, and heat tolerant germplasm with other relevant traits (e.g., MLN); potential for further increasing productivity. Also, overall genetic gains in the highlands have decreased and productivity has stagnated over the years due to a very narrow genetic base.
Southern Africa	**Sub-tropical temperate**	2.1	Early to late maturing (115 to 145 days to PM), high yielding, DT, **heat tolerant**, **NUE**, disease (GLS, TLB, PLS, MSV and ear rots) resistant, and photoperiod sensitive maize	Seed companies (1), NARS (2), CIMMYT (3)	MAIZE provides diverse, well-adapted, early to late maturing, drought, NUE, and heat tolerant germplasm with other relevant traits (e.g., photoperiod sensitive germplasm with unique plant ideotype); potential for further increasing productivity.
	Mid-altitude humid warm	29.6	Early to late maturing (115 to 145 days to PM), high yielding, DT, **heat tolerant**, NUE, **disease** (GLS, MSV, HT, PS, PLS, MLN and ear rots) resistant, **acid soil tolerant**, **low P tolerant**, stem borer and post-harvest insect pest resistant maize	Seed companies (1), CIMMYT (2), NARS (3)	MAIZE is the major provider of stress resilient and diverse elite germplasm with appropriate and gender preferred traits (e.g., heat tolerance, NUE, MLN, aflatoxin, stem borers, post-harvest pests, in DT genetic backgrounds); opportunities for upstream research to increase genetic gains and productivity.
	Mid-altitude humid hot	26.4	Early to late maturing (115 to 145 days to PM), high yielding, DT, **heat tolerant**, NUE, **disease** (GLS, MSV, HT, PS, PLS, MLN and ear rots) resistant, acid soil tolerant, low P tolerant maize	Seed companies (1), CIMMYT (2), NARS (3)	
	Mid-altitude dry	19	Extra-early to medium maturing (90 to 135 days to PM), high yielding, DT, **heat tolerant**, NUE, **disease** (**PS, MSV, MLN and ear rots) resistant**, low P tolerant and *Striga* tolerant maize	CIMMYT (1), Seed companies (2), NARS (3)	

	Lowland tropical humid	6.8	Extra-early to medium maturing (90 to 135 days to PM), high yielding, DT, **heat tolerant**, NUE, **disease** (DM, MSV, MLN, PS, GLS, HT and cob rots) resistant, **acid soil tolerant**, low P tolerant and *Striga* tolerant maize	CIMMYT (1), NARS (2), Seed companies (3)	MAIZE is the major provider of diverse, well-adapted, extra-early to medium maturing drought, NUE, and heat tolerant germplasm with specific traits (e.g., DM, heat tolerance) of interest, with potential for further increasing productivity (especially in Mozambique and Angola).
	Lowland tropical dry	15.1	Extra-early to medium maturing (90 to 135 days to PM), high yielding, **combined heat and drought tolerant**, disease (PS) resistant, **aflatoxin**, NUE, **stem borer** resistant, and ***Striga* tolerant** maize	CIMMYT (1), Seed companies (2), NARS (3)	MAIZE is the major provider of diverse, well-adapted, extra-early to medium maturing germplasm combining drought and heat tolerance with NUE, and with specific traits of interest (aflatoxin, stem borers), with potential for further increasing productivity.
	Highlands	1	Early-medium to late maturing (120 to 145 days to PM), high yielding, NUE, **disease (PS, GLS, MLN, HT, and ear rots) resistan**t, acid soil tolerant, low P tolerant, photoperiod-sensitive, and cold/frost tolerant maize.	CIMMYT (1), Seed companies (2)	MAIZE provides improved highland germplasm to help specific countries in southern Africa. These countries do not have the genetics required to address the needs of their highland areas. Germplasm has to be sourced from as far Ethiopia or South America.
West Africa	**Sudan Savannah**	15	Extra-early (80-85 days) and early (90-95 days) maturing, high yielding, **DT and heat stress tolerant, resistant to *Striga hermonthica,*** foliar diseases (SLR, SLB, CLS, and MSV), aflatoxin and NUE.	IITA (1), Seed companies (2), NARS (3)	MAIZE is the major supplier of extra-early and early maturing improved maize germplasm, with relevant abiotic and biotic stress tolerant traits, to meet the needs of smallholders in areas with short growing cycles and further enhance productivity.

	Guinea Savannah	40	Early (90-95 days), medium (105-110 days) and late (110-130 days) maturing, high yielding, **DT and HT, resistant to *Striga hermonthica*, foliar diseases (SLR, SLB, CLS, and MSV), aflatoxin and NUE.**	IITA (1), Seed companies (2), NARS (3)	MAIZE supplies primarily medium (105-110 days) and late (110-130 days) maturing maize germplasm with tolerance to key abiotic and biotic stresses to exploit the long growing period and further enhance farm level productivity.
	Southern Guinea Savannah	25	Early (90-95 days), medium (105-110 days) and late (110-130 days) maturing, high yielding, **DT, resistant to *Striga hermonthica*, foliar diseases (SLR, SLB, CLS, and MSV), ear rots, aflatoxin and NUE.**	IITA (1), Seed companies (2), NARS (3)	
	Forest / Transitional Zone	20	Early (90-95 days), medium (105-110 days) and late (110-130 days) maturing, high yielding, **resistant to foliar diseases (SLR, SLB, CLS, and MSV), ear rots, aflatoxin, insect pests (*Sesamia calamisti*s and *Eldana saccharin*a) and NUE.**	IITA (1), Seed companies (2), NARS (3)	

*Traits highlighted in bold are particularly limiting genetic gains, and are important for product success.

**Improved maize varieties deployed by SME seed companies and NARS are largely based on MAIZE germplasm, except in the eastern Africa highlands and mid-altitude areas in southern Africa, where unique germplasm is used by seed companies.

Latin America

Sub-region	Agro-ecology	Proprtion of maize area in the region (%)	Target products*	Improved germplasm providers (with relative ranking)**	Justification for MAIZE investment in Phase-II
Meso America and the Caribbean	**Highlands**	15	Medium-early maturing (230-240 days), high yielding, cold tolerant (CT), **drought tolerant (DT), disease (common rust, ear rot)** resistant maize	CIMMYT (1), Seed companies (2), NARS (3)	MAIZE provides unique improved highland germplasm with tolerance to drought and disease resistance (common rust and ear rot) to help smallholders in specific regions where seed companies have not made significant investment (e.g., Mexico's Central Highlands).
	Mid-altitude	25	Medium maturing (170-180 days), high yielding, **DT, NUE and disease (TLB, GLS, stalk and ear rots)** resistant maize	Seed companies (1), NARS (2), CIMMYT (3)	MAIZE is a relevant provider of adapted and diverse elite germplasm with tolerance to abiotic stresses (drought, crowding stress, nitrogen use efficiency) and disease resistance (e.g. TLB, GLS, stalk and ear rots). Opportunities for increasing genetic gain by using modern enabling technologies (e.g., DH, genomic selection, precision phenotyping).
	Lowland Tropics	60	Medium maturing (140-150 days), high yielding, **DT, heat tolerant (HT), NUE and disease (tar spot complex, northern corn leaf blight, corn stunt complex, ear rot)** resistant maize	CIMMYT (1), Seed companies (2), NARS (3)	MAIZE is a major provider of adapted and diverse elite germplasm with tolerance to abiotic stresses (drought, heat, nitrogen use efficiency) and disease resistance (e.g., TSC, NCLB, CSC, and ear rot). Opportunities for increasing genetic gain by using modern enabling technologies (e.g., DH, genomic selection, precision phenotyping).

Western and Northern South America (Andean)	**Highlands**	5	Medium-early maturing (240-250 days), high yielding, cold tolerant (CT), **DT and disease (common rust, ear rot)** resistant maize	NARS (1), CIMMYT (2), Seed companies (3)	MAIZE provides unique improved highland germplasm with tolerance to drought and disease resistance (common rust and ear rot) to help smallholders in specific regions where seed companies have not made significant investment (e.g., Mexico's Central Highlands).
	Mid-altitude	15	Medium maturing (170-180 days), high yielding, **DT, NUE, and disease (TLB, GLS, stalk and ear rots)** resistant maize	Seed companies (1), NARS (2), CIMMYT (3)	MAIZE is a relevant provider of adapted and diverse elite germplasm with tolerance to abiotic stresses (drought, crowding stress, nitrogen use efficiency) and disease resistance (e.g., TLB, GLS, stalk and ear rots). Opportunities for increasing genetic gain by using modern enabling technologies (e.g., DH, genomic selection, precision phenotyping).
	Lowland Tropics	80	Medium maturing (140-150 days), high yielding, **DT, HT, NUE and disease (TLB, GLS, ear rot)** resistant maize	Seed companies (1), CIMMYT (2), NARS (3)	MAIZE is a major provider of adapted and diverse elite germplasm with tolerance to abiotic stresses (drought, heat, nitrogen use efficiency) and disease resistance (e.g., NCLB, GLS, and ear rot). Opportunities for increasing genetic gain by using modern enabling technologies (e.g., DH, genomic selection, precision phenotyping).

*Traits highlighted in bold are particularly limiting genetic gains, and are important for product success.

**Improved maize varieties deployed by SME seed companies and NARS are largely based on MAIZE germplasm, except in mid-altitude areas where unique germplasm is used by seed companies.

Asia

Moisture regime*	Irrigation	Proportion of maize area in the region (%)	Target products**	Comparative advantage***	MAIZE target countries/areas
Rainfed season; High rainfall areas	Nil	15	Medium-full maturity, high-yielding, short to medium height, **waterlogging tolerant (WLT)**, disease [TLB, MLB, **BLSB, DM (Indonesia)**, rust, GLS] resistant maize	MAIZE: 80 MNCs: 20	NE India, Indonesia, Bangladesh, Vietnam, Philippines, Cambodia, Sri Lanka
Rainfed season; Assured moisture areas	Protective	11	Full maturity, high-yielding, **water use efficient (WUE), nutrient use efficient,** and disease (TLB, DM, rust, **BLSB,** GLS) resistant maize	MAIZE: 20 MNCs: 80	South India, Thailand, South China, Indonesia, Sri Lanka
Rainfed season; Low rainfall (<500 mm) areas	Nil	16	Early maturity, high-yielding, short to medium height, **drought tolerant (DT) or DT + heat tolerant (HT)** and disease (**PFSR**, ear rots, DM) resistant maize	MAIZE: 80 MNCs: 20	C & W India, Pakistan, Afghanistan, and northwestern Bangladesh
Rainfed; Medium rainfall (800-1200 mm) areas, but with erratic rainfall distribution	Nil	38	Early to medium maturity, high-yielding, **DT + WLT / DT + HT**, and disease (**PFSR, BLSB**, MLB, GLS) resistant maize	MAIZE: 60 MNCs: 40	IGP (India), Sri Lanka, Nepal, Bhutan, Thailand, Myanmar, Laos, Vietnam
Irrigated; Dry season	Full	13	Full maturity, high-yielding, short to medium height, **cold tolerant, WUE, nutrient use efficient**, and disease [***Macrophomina*, DM (Indonesia)**] resistant maize	MAIZE: 20 MNCs: 80	India, Bangladesh, southern China, Thailand, Indonesia, Vietnam, Nepal
Irrigated; Spring season	Full	7	Early maturity, high-yielding, **HT, WUE**, and shoot fly resistant maize	MAIZE: 80 MNCs: 20	Pakistan, India, Vietnam, Nepal

*In yellow-highlighted seasons, there is high penetration of hybrids from MNCs; however, SME seed companies do serve niche/unreached markets and require MAIZE germplasm. Also, MAIZE contributes improved donors for abiotic/biotic stress traits to both public and private sectors serving across regions in Asia.

**Traits highlighted in bold are particularly limiting genetic gains, and are important for product success.

***MAIZE largely denotes CIMMYT maize germplasm in Asia, deployed through NARS and SMEs.

3.13 MAIZE Target Nutritional Traits under FP3 (CoA 3.3)

Region	Target countries	Spill-over countries	Products with nutritional traits	Rationale of prioritization
Africa	• Ethiopia • Kenya • Countries where A4NH activities on provitamin A are focus (Zambia, Nigeria, Malawi, etc.)	• Tanzania • Malawi • Zimbabwe • Ghana	• Provitamin A • Kernel Zn in QPM and non-QPM backgrounds	• Malnutrition indices in the countries • White maize consumption • Complementation of priority areas of A4NH
Asia	• Nepal • India • Indonesia	• Bangladesh • Vietnam • Pakistan	• Combinations of Provitamin A, kernel methionine, high oil • Kernel Zn in both non-QPM and QPM (yellow and white) backgrounds	• Maize for food consumption patterns • Spill-over countries have increasing demand for maize feed
Latin America	• Haiti • Bolivia • Countries where A4NH activities on high Zn and provitamin A are focus (southern Mexico, Guatemala, Nicaragua, Colombia)	• Honduras • El Salvador • Ecuador • Peru	• Kernel Zn in QPM and non-QPM backgrounds	• Malnutrition indices in countries • Maize pattern consumption • Complementation of priority areas of A4NH

3.14 References

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3.15 MAIZE Ongoing Projects (as of March 2016)

S.No.	Project Title	Funding Agency	Target Countries	FP1	FP2	FP3	FP4	FP5
Global / Cross-cutting Continents								
1	Genomic and Open-source Breeding Informatics Initiative	Bill & Melinda Gates Foundation (BMGF)	Global		yes			
2	Integrated Breeding Platform / Breeding Management System	BMGF, UKAID, European Commission, IFAD, CGIAR, SDC	Global		yes			
3	Establishing Elevated Temperature Thresholds for Grain Set and Reproductive Growth of Tropical Maize Hybrids for Use in Models to Determine Regions of Vulnerability. Implementing organization: University of Florida	CGIAR: MAIZE CRP Competitive Partners' Grant	Global			yes		
4	Towards farm innovation and enabling policies	Wageningen University	Global	yes				
5	MAIZE CRP Innovation Systems: An opportunity to operationalize innovation system thinking for improved research impact – Phase III. Implementing organization: Royal Tropical Institute (KIT)	CGIAR: MAIZE CRP Competitive Partners' Grant	Zambia, Kenya, India, Mexico (linked to SIMLEZA, CSISA, MASAGRO, SIMLESA)	yes			yes	
6	Biofortification of tropical maize to combat micronutrient malnutrition (high proVA and high zinc)	HarvestPlus through CRP A4NH	Benin Republic, DRC, Ghana, Mali, Nigeria, Zambia, Zimbabwe, Malawi, Nicaragua, Guatemala, Mexico and Colombia			yes		yes
7	Lime-cooking maize processing technology (nixtamalization) from Mexico to Kenya	Mexican Agency for International Cooperation	Mexico, Kenya					yes
8	Spurring a Transformation in Agriculture through Remote Sensing (STARS)	BMGF	Bangladesh, Nigeria, Mali, Tanzania, Uganda				yes	

9	System trajectories, diversity and cross-scale trade-offs; targeting innovations for the sustainable intensification of maize-based agro-ecosystems. Implementing organization: Wageningen UR	CGIAR: MAIZE CRP Competitive Partners' Grant	Nepal, Bangladesh, Ethiopia, Mexico				yes	
10	Feed-the-Future Initiative	USAID	Ghana, Kenya, Senegal, Guatemala, Haiti	yes			yes	yes
11	Developing approaches for sustainable access to mechanization for smallholder farmers - focus on dryland farming. Implementing organization: Syngenta Foundation for Sustainable Agriculture	CGIAR: MAIZE CRP Competitive Partners' Grant	Nepal, Bangladesh, Mexico				yes	
12	How to assure access to affordable high quality maize seed: what works and consequences for program design. Implementing organization: Royal Tropical Institute (KIT)	CGIAR: MAIZE CRP Competitive Partners' Grant	Mexico, Zambia, Malawi, India	yes				
Africa								
13	Stress Tolerant Maize for Africa (STMA)	BMGF and USAID	Benin, Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe	yes	yes	yes		
14	Improved Maize for African Soils (IMAS)	BMGF and USAID	Kenya, South Africa, USA		yes	yes		
15	Water Efficient Maize for Africa (WEMA)	BMGF and USAID	Kenya, Mozambique, South Africa, Tanzania and Uganda		yes	yes		
16	Africa Rising Project – IITA	USAID	Africa	yes		yes	yes	
17	Managing maize lethal necrosis (MLN) in eastern Africa through accelerated development and delivery of resistant maize germplasm and seed systems support	BMGF & Syngenta Foundation for Sustainable Agriculture (SFSA)	Eastern Africa			yes		

18	Controlling the spread and impact of MLN in Sub-Saharan Africa through improved diagnostic capacity and MCMV-free commercial seed production	USAID	Kenya, Tanzania, Uganda, Ethiopia, Rwanda, Malawi, Zambia, Zimbabwe			yes		
19	Drought tolerant maize for Africa seed scale-up (DTMASS)	USAID	Ethiopia, Kenya, Mozambique, Tanzania, Uganda, Zambia	yes		yes		
20	Malawi Improved Seed Systems and Technologies (MISST) – ICRISAT	USAID	Malawi	yes		yes		
21	Role of crop diversification for food and nutrition security in sub-Saharan Africa	Food and Agriculture Organization (FAO) of the United Nations (UN)	Ethiopia, Malawi	yes				
22	Infant foods from local resources as a pathway to better food and nutrition security in Benin	Food & Business Applied Research Fund (ARF)	Benin					yes
23	West Africa Seed Program	CORAF/WECARD	Benin, Burkina Faso, Ghana, Mali, Niger, Nigeria, Senegal			yes		
24	The Multinational - CGIAR Project: Support to Agricultural Research for Development on Strategic Commodities in Africa (SARD-SC)	AfDB, SARD-SC, IPI	Benin, C'te d'Ivoire, DR, Congo, Eritrea, Ethiopia, Ghana, Kenya, Madagascar, Mali, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Tanzania	yes		yes	yes	yes
25	Increasing research technicians capacity for supporting plant breeding through short training courses	AGRA	Burkina Faso, Ghana, Mali, Niger, Nigeria			yes		
26	Agricultural Investment and Market Development Project (AIMDP)-IITA	MINADER	Cameroon	yes				
27	The development and expansion of sustainable agriculture activities in the periphery south of Faunal Reserve of Lomako Yokokala mainly in the territory of Djolu and Befale (MLW Landscape)	AWF	DR Congo				yes	
28	Youth Agribusiness Development Initiative (YADI)	IFAD	DR Congo, Kenya, Nigeria	yes				

29	Putting Nitrogen Fixation to Work for Smallholder Farmers in Africa (N2Africa) Phase II	Wageningen, WVI, ZOA Uganda	DR Congo, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda				yes	
30	Appropriate mechanization for sustainable intensification of smallholder farming in Ethiopia	Deutsche Gesellschaft für Internationale Zusammenarbeit	Ethiopia				yes	
31	Nutritious Maize for Ethiopia (NuME)	Ministry of Foreign Affairs, Trade and Development, Canada	Ethiopia			yes	yes	yes
32	Harvard U/ATAI-Quality Protein Maize in Ethiopia	Harvard University	Ethiopia					yes
33	Sustainable intensification of maize-legume cropping systems for food security in eastern and southern Africa (SIMLESA)	Australian Centre for International Agricultural Research (ACIAR)	Ethiopia, Kenya, Malawi, Mozambique, Tanzania			yes	yes	
34	Identifying socioeconomic constraints to and incentives for faster technology adoption: Pathways to sustainable intensification in eastern and southern Africa	ACIAR	Ethiopia, Kenya, Malawi, Tanzania, Mozambique	yes				
35	Taking Maize Agronomy to Scale in Africa (TAMASA)	BMGF	Ethiopia, Kenya, Nigeria, Tanzania				yes	
36	Farm Mechanization & Conservation Agriculture for Sustainable Intensification (FACASI)	ACIAR	Ethiopia, Kenya, Tanzania, Zimbabwe				yes	
37	WACCI PhD Plant Breeders Training	UG_LEGON, WACCI	Ghana			yes		
38	Aflatoxin Genetic Resistance in Maize	USDA-ARS	Ghana, Nigeria			yes		
39	Sustainable Intensification of Key Farming Systems in the Sudano-Sahelian Zone of West Africa	USAID	Ghana, Mali				yes	

40	Integrated Management of Maize Lethal Necrosis in Eastern and Central Africa	Association for Strengthening Agricultural Research in Eastern and Central Africa (ASERECA)	Ethiopia, Kenya, Uganda, Tanzania, Rwanda, Burundi, Sudan		yes	yes	yes	
41	Trees 4 Food Security (sub-grant)	ACIAR	Ethiopia, Rwanda				yes	
42	Improving and Sustaining Maize and Cowpea Productivity among Smallholder Farmers through use of conservation agriculture technologies in Mozambique and Malawi	IIAM	Malawi, Mozambique,				yes	
43	How to use crop growth models for designing and evaluating new maize-based cropping systems for smallholder farms in southern Africa. Implementing organization: Unité de Recherche AIDA, CIRAD-Persyst	CGIAR: MAIZE CRP Competitive Partners' Grant	Malawi, Mozambique, Zambia and Zimbabwe			yes	yes	
44	Transforming Key Production Systems: Maize Mixed Systems in East and Southern Africa	USAID	Malawi, Tanzania,				yes	
45	Fertilizer, Maize and Sustainable Intensification in Sub-Saharan Africa. Implementing organization: Michigan State University	CGIAR: MAIZE CRP Competitive Partners' Grant	Malawi, Zambia	yes			yes	
46	Assessment of the suitability for intercropping of contrasting maize and cassava varieties under intensified agronomic regimes along a transect through southern DR Congo. Implementing organization: IITA	CGIAR: MAIZE CRP Competitive Partners' Grant	Nigeria				yes	
47	Maize lethal necrosis disease: investigating risks and pre-emptive management in West Africa. Implementing organization: IITA (Federal University of Technology (FUT)	CGIAR: MAIZE CRP Competitive Partners' Grant	Nigeria			yes		
48	Dissemination of foundation seeds and planting materials of improved varieties of maize, soybean and cassava to stimulate the production of good quality certified seeds/planting materials in Nigeria.	AGRA	Nigeria			yes	yes	
49	PICS 3 project – dissemination of PICS bags for maize storage in Nigeria and Ghana	BMGF	Nigeria, Ghana					yes

50	N2Africa Phase II - Putting nitrogen fixation to work for smallholder farmers in Africa	BMGF	Nigeria, Ghana, Tanzania, Uganda, Rwanda, DR Congo, Malawi, Mozambique				yes	
51	Maize foresight and targeting poor maize consumers: research implications. Implementing organization: University of Pretoria	CGIAR: MAIZE CRP Competitive Partners' Grant	South Africa	yes				
52	Taking stock: the evolving nutritional roles of maize for human nutrition through food and feed in developing countries. Implementing organization: University of the Free State	CGIAR: MAIZE CRP Competitive Partners' Grant	South Africa	yes				yes
53	HTPPs (High-throughput Phenotyping Platforms) and open-source image processing tools for maize foliar disease assessments. Implementing organization: University of Barcelona	CGIAR: MAIZE CRP Competitive Partners' Grant	Sub-Saharan Africa			yes		
54	The Dynamics of Improved Maize Varieties Adoption in Tanzania. Implementing organization: Southern University and A&M College	CGIAR: MAIZE CRP Competitive Partners' Grant	Tanzania	yes				
55	Macronutrient fortification of first-line food cereals with milk protein to produce affordable value-added cereal products in Uganda/East Africa	Food & Business Applied Research Fund (ARF)	Uganda					yes
56	Production and use of biochar, compost and lime as component of integrated soil fertility management in smallholder farming systems of eastern Uganda	ADA	Uganda				yes	
57	Enhanced nutrition security through traditional fermented foods in Zambia	Food & Business Global Challenges Programme (GCP) of NWO-WOTRO, the division of the Netherlands Organization for Scientific Research (NWO)	Zambia					yes
58	Enhancing the effectiveness of systems analysis tools to support learning and innovation in multi-stakeholder platforms. Implementing organization: Royal Tropical Institute (KIT) and Wageningen UR	CGIAR: MAIZE CRP Competitive Partners' Grant	Zambia	yes			yes	

59	Support to agricultural research for development of strategic crops in Africa	SARD-SC	Zambia, Nigeria, Mali, Ghana	yes		yes	yes	yes
60	Integrating Crop and Livestock production for Improved Food Security and livelihoods in rural Zimbabwe (ZimCLIFS)	ACIAR (through ILRI)	Zimbabwe				yes	
61	Screening maize germplasm for tolerance to combined heat and drought stress in Zimbabwe: Crop Breeding Institute	CGIAR: MAIZE CRP Competitive Partners' Grant	Zimbabwe			yes		
Asia								
62	Climate resilient maize for Asia (CRMA) for ensuring food security and enhancing income for resource-poor farming communities in the tropics	BMZ/GIZ	India, Bangladesh, Vietnam, Thailand	yes		yes		
63	Sustainable and resilient farming systems intensification in the Eastern Gangetic Plains (SRFSI)	ACIAR	Bangladesh, India, Nepal				yes	
64	Cereal Systems Initiative for South Asia, Mechanization & Irrigation (CSISA-MI)	USAID	Bangladesh			yes	yes	
65	Ensure sufficient food and nutrition through maize cultivation for marginalized groups of people in Bangladesh. Implementing organization: BRAC	CGIAR: MAIZE CRP Competitive Partners' Grant	Bangladesh				yes	
66	Cereal Systems Initiative for South Asia (CSISA)	USAID and BMGF	Bangladesh, India, Nepal	yes		yes	yes	
67	Heat stress resilient maize for South Asia through a public-private partnership (HTMA)	USAID	Bangladesh, Nepal, India, Pakistan			yes		
68	Training program for Chinese young scientists	Chinese Academy of Agricultural Sciences	China		yes			
69	Toward sustainable maize production in China: Discovery and validation of elite genetic and genomic resources for high nitrogen and phosphorus use efficiency and tolerance to poor soil fertility	Natural Science Foundation of China	China			yes		
70	Development of high QPM + methionine-enriched inbred lines	ICAR and MAIZE	India			yes		yes

71	Evaluation and deployment of stress resilient maize hybrids (derived through MAIZE CRP) in the rainfed maize regions of Southern Karnataka. Implementing organization: University of Agricultural Sciences, Bangalore	CGIAR: MAIZE CRP Competitive Partners' Grant	India			yes		
72	Identification of maize hybrids suitable for rainfed conditions of Odisha. Implementing organization: Orissa University of Agriculture & Technology	CGIAR: MAIZE CRP Competitive Partners' Grant	India			yes		
73	Production Risks and Welfare Implications of Maize Hybrids on the Subsistence Farms of South India. Implementing organization: Tamil Nadu Agricultural University	CGIAR: MAIZE CRP Competitive Partners' Grant	India	yes				
74	Promotion of hybrid maize through evaluation seed production and on-farm demonstration. Implementing organization: G. B. Pant University of Agriculture & Technology, Pantnagar	CGIAR: MAIZE CRP Competitive Partners' Grant	India			yes		
75	Testing and deployment of new drought resilent maize hybrids in the rainfed maize regions of Karnataka, India. Implementing organization: University of Agricultural Sciences, Raichur	CGIAR: MAIZE CRP Competitive Partners' Grant	India			yes		
76	Feed the Future Nepal Seed and Fertilizer Project	USAID	Nepal	yes		yes	yes	
77	Identification and deployment of hybrid maize varieties to promote food security, nutrition and economic growth of disadvantaged farmers in the hills of Nepal. Implementing organization: Hariyali Community Seed Company Pvt. Ltd. Nepal	CGIAR: MAIZE CRP Competitive Partners' Grant	Nepal			yes		
78	Maize seed system – case study Pakistan. Implementing organization: Inter-cooperation, Pakistan	CGIAR: MAIZE CRP Competitive Partners' Grant	Pakistan	yes				
79	Evaluation & commercialization of CIMMYT maize hybrids resilient for drought and heat tolerance in Pakistan: Jullundur Pvt Limited	CGIAR: MAIZE CRP Competitive Partners' Grant	Pakistan			yes		
80	Agricultural Innovation Project (AIP)	USAID	Pakistan	yes		yes		

81	Economics of maize seed production in Thailand. Implementing organization: Kasetsart University	CGIAR: MAIZE CRP Competitive Partners' Grant	Thailand	yes				
Latin America								
82	Biofortified maize for improved human nutrition	HarvestPlus	Guatemala, Nicaragua, El Salvador, Honduras, Colombia, Panama, Haiti		yes	yes		yes
83	Assessment of maize-based farming systems and their contribution to food secure and resilient farms in The Mountain region of Guerrero, México. Implementing organization: Universidad Nacional Autónoma de México	CGIAR: MAIZE CRP Competitive Partners' Grant	Mexico	yes			yes	
84	Desarrollo y promoción del uso de semillas mejoradas en el sur de Mexico y Centro América para agricultores de temporal. Implementing organization: Universidad Autónoma Chapingo	CGIAR: MAIZE CRP Competitive Partners' Grant	Mexico				yes	
85	Identify/ Optimize strategies for sustainable Management of Tar Spot Complex (TSC) of Maize in Central America and Colombia. Implementing organization: Universidad Autónoma de Chiapas (UNACH)	CGIAR: MAIZE CRP Competitive Partners' Grant	Mexico				yes	
86	Identify/ Optimize strategies for sustainable Management of Tar Spot Complex (TSC) of Maize in Central America and Colombia. Implementing organization: Universidad de San Carlos, Guatemala	CGIAR: MAIZE CRP Competitive Partners' Grant	Mexico				yes	
87	MasAgro	SAGARPA	Mexico	yes	yes	yes		yes
88	Resistance Mechanism of Maize to Tar Spot Complex and Germplasm Selection. Implementing organization: INIFAP	CGIAR: MAIZE CRP Competitive Partners' Grant	Mexico		yes	yes		
89	Retention of provitamin A carotenoids and anthocyanin content in traditional maize food products	Mexican Council of Science	Mexico					yes

90	La Panamericana supporting a more sustainable intensification of family agriculture in Central America: CIAT	CGIAR: MAIZE CRP Competitive Partners' Grant	Nicaragua	yes			yes	
91	Peru-Apoyo al CIMMYT para generar technologias rentables y ambientalmente	Government of Peru	Peru			yes		

3.16 MAIZE Existing and Potential Partners (as of March 2016)

Note: MAIZE has more than 350 research and development partners worldwide. The table below is a non-exhaustive list of the major partners either already involved in MAIZE projects during Phase-I or can be potential partners in MAIZE Phase-II.

S. No.	Reference to specific or multiple CoA and/or FP	Partner Institution	Type of organization (standardization of type)	Existing partner?	Purpose of collaboration (indicative, and not certainly exhaustive)	Competitive advantage of the partner
1	MAIZE FPs	Australian Centre for International Agricultural (ACIAR)	Government Agency	Yes	Strategy planning and implementation. Financial support	Regional strategy development and implementation
2	MAIZE FPs	Bill and Melinda Gates Foundation (BMGF)	International cooperation agency / donor	Yes	Strategy planning and implementation. Financial support for maize breeding, seed systems and maize agronomy/production.	Regional strategy development and implementation; advocacy partnerships and networking
3	MAIZE FPs	Global Affairs Canada	Government Agency	Yes	Strategy planning and implementation. Financial support	Regional strategy development and implementation
4	MAIZE FPs	Deutsche Gesellschaft für Internationale	Government Agency	Yes	Strategy planning and implementation. Financial support	Regional strategy development and implementation;
5	MAIZE FPs	Ethiopian Institute of Agricultural Research (EIAR)	NARES	Yes	Development, demonstration and promotion of improved maize technologies and practices	Previous experience in an array of projects on maize R&D in Ethiopia

6	MAIZE FPs	Indian Council of Agricultural Research (ICAR), Indian Institute of Maize Research (IIMR), and All-India Coordinated Research Project on Maize	NARES	Yes	Partner in maize breeding; phenotyping sites with representative agro-ecology in target environments; IMIC partner; conservation agriculture; socio-economics.	Previous experience in an array of projects on maize R&D in India.
7	MAIZE FPs	SAGARPA -Secretaria de Agricultura, Ganaderia, Desarrollo	Government agency	Yes	Strategy planning and implementation. Financial support	Previous experience in an array of projects on maize R&D in Mexico.
8	MAIZE FPs	Swiss Agency for Development and Cooperation	Government agency	Yes	Strategy planning and implementation. Financial support	Regional strategy development and implementation
9	MAIZE FPs	USAID	International cooperation agencies (e.g., CIRAD or GIZ)	Yes	Strategy planning and implementation	Regional strategy development and implementation, advocacy partnerships and networking
10	MAIZE FPs	Various media (print, audio, visual and web-based)	Other (specify)	Yes	Advocacy and extension	Awareness creating, capacity development and implementation
11	MAIZE FPs	Various National Agriculture Research Organizations in SSA, Asia and Latin America	NARES	Yes	Phenotyping, breeding, seed systems, data collection, training and data analysis. Germplasm evaluation and release. Lead surveys and survey report analysis. Participate in joint research publication. Lead and organize research outreach activities. Generate technology, provide training to extension agents, farmers and other partners; receive training. Surveys, consumer	Physical resources (land, irrigation), human capacity, strong evaluation network, locally adapted germplasm, links to small and medium-size seed sectors. Research collaboration and implementation, incl. context-specific knowledge, expertise and policy linkages. Competent in capacity building. Technology evaluation and dissemination. Rich experience in research

					preferences, processing	and variety release and registration.
12	MAIZE FPs	Various universities (in-country and ex-patriate)	University	Yes	Leverage quality resources to maximize research and technical capacity building	Experience and well-established facility for research and training
13	MAIZE FPs	Nepal Agricultural Research Council (National Maize Research Program)	NARES	Yes	Enhancing maize production and productivity through the best varieties and nutrient management practices in Nepal	Geographic location. Increase production and productivity of maize and maize-based cropping system for improving the food and feed security in Nepal
14	1.1	DLO/LEI (Ruben and team)	ARI	Yes	Yield gap analysis; poverty, food security and nutrition linkages	
15	1.1	PEP	International NGO	Yes	Economy-wide modeling	Previous experience
16	1.1	Tamil Nadu Agricultural University	University	Yes	Production Risks and Welfare Implications of Maize Hybrids on the Subsistence Farms of South India	Location, expertise
17	1.1	Universidad Nacional Autónoma de México	University	Yes	Assessment of maize-based farming systems and their contribution to food secure and resilient farms in The Mountain region of Guerrero, México	Expertise
18	1.1	University of the Free State	University	Yes	Taking stock: the evolving nutritional roles of maize for human nutrition through food and feed in developing countries	Expertise
19	1.1	University of Pretoria	University	Yes	Maize foresight and targeting poor maize consumers:	Experience

					research implications	
20	1.2	Ethiopian Public Health Institute (EPHI)	NARES	Yes	Impact assessment in health and nutrition	Knowledge and experience in health and nutritional impacts in Ethiopia
21	1.2	Gottingen University	ARI	Yes	Nutritional impacts	Previous experience
22	1.2	Institute of Agricultural research of Mozambique - IIAM	NARES	Yes	Increasing sustainable agricultural production in Mozambique (Maize/Legume) through conservation agriculture.	Expertise, Location
23	1.2	Norwegian University of Life Sciences	University	Yes	Conduct research on impact of maize biofortification and storage on human nutrition and health using RCTs, household modeling and CGE; capacity building	Scientific expertise in nutrition, health and statistics, RCTs, bio-economic and household modeling and computable general equilibrium (CGE) complements well with ours
24	1.2	Other CRPs – ME&L Community of Practice	Other CGIAR centers	Yes	Develop consistent and aligned ME&L framework, share best practices, build capacity	Research and capacity building
25	1.2	ReNAPRI (Regional Network of Agricultural Policy Research Institutes in Africa)	Other	Yes	Policy dialogue and data analysis	ReNAPRI has a comparative advantage in outreach activities and reaching policy makers. It is a network of seven national agricultural policy research institutes (DR Congo, Kenya, Tanzania, Malawi, Mozambique, South Africa and Zambia)
26	1.2	Southern University and A&M College	University	Yes	The Dynamics of Improved Maize Varieties Adoption in Tanzania	Expertise, location

27	1.2	Virginia Tech (Alwang and team)	ARI	Yes	Impact assessment	Previous experience
28	1.3	International Plant Institute -IPNI -Africa Program	ARI	Yes	Ex-ante assessment of Agronomic and Economic benefits of fertilizer use in maize production under variable farm, climatic and soil fertility conditions in Kenya and Zimbabwe/ Enhancing the capacity for dissemination of site-specific maize production intensification technologies under variable farm, climatic and soil fertility conditions in Kenya and Zimbabwe.	Expertise in smallholder precision nutrient management, decision support tools for diverse farming systems
29	1.3	International Plant Institute (IPNI) - Asia Program	ARI	Yes	Assessment of agronomic and economic benefits of fertilizer use in maize production systems under variable farm size, climate and soil fertility conditions in Eastern India. Agronomic, economic, social and environmental benefits of improved nutrient management practices in maize production systems under variable farm size, climate, soil fertility conditions and farmer resource endowment in India and Nepal	Expertise in smallholder precision nutrient management, decision support tools for diverse farming systems

30	1.3	Zambia Agriculture Research Institute	NARES	Yes	Develop and adapt crop, soil and plant protection technologies so as to provide a high-quality, appropriate and cost effective service to farmers	Largest agricultural research entity in the country.
31	2.1	CIMAT	Research Institute	Yes	Research center of excellence and scientific development; recognized nationally and internationally; strengthened its convening and integration of a critical mass in groups of high scientific performance, and be a model of efficiency and growth and social impact for other research centers.	Previous experience
32	2.3	COLPOS	University	Yes	Genetic analysis, phenotyping	Good previous experience; Genetic resource research
33	2.3	North Carolina State University, USA	University		Contributing to genetic analysis and identification of donor germplasm and alleles	Expertise in genetic resource research
34	2.4	Dow AgroSciences	Multinational private sector		1) Drought evaluation; 2) Heat evaluation; 3) Fusarium ear rot evaluation; 4) Tar spot evaluation	Geography (sites in key areas where CIMMYT does not have a station), expertise in phenotyping, in-kind services for planting and harvesting
35	2.4	Universidad Autónoma Agraria Antonio Narro	University		Abiotic and biotic stress evaluation	Geography (sites in key areas where CIMMYT does not have a station)

36	2.4	Universidad Autónoma de Nuevo León	University		Fusarium ear rot evaluation	Geography (sites in key areas where CIMMYT does not have a station). Expertise in Fusarium ear rot evaluation.
37	3.1	DICTA	NARES	Yes	Local testing of improved germplasm. Phenotyping for key diseases in hot spots	Local presence, infrastructure, hot spot and expertise
38	3.1	DuPont-Pioneer	Multinational private sector	Yes	In Mexico: 1) Drought evaluation 2) Heat evaluation 3) Fusarium ear rot evaluation 4) Tar spot evaluation; In Asia: Heat tolerant maize	Expertise in genomics, transgenic technologies, phenotyping, DH, seed systems, and in-kind services
39	3.1	Free State University	University	Yes	Training of Ph.D. students	Strong history of collaboration in breeding
40	3.1	GMRI, China	NARES	Yes	Phenotyping sites with representative agro-ecology in target environment	Geographical location. Previous experience on abiotic and biotic stress breeding and phenotyping
41	3.1	IAS, Ho Chi Minh city, Vietnam	NARES		Phenotyping sites with representative agro-ecology in target environment	Geographical location. Previous experience on abiotic and biotic stress breeding and phenotyping
42	3.1	ICTA	NARES	Yes	Local testing of improved germplasm. Phenotyping for key diseases in hot spots	Local presence, infrastructure and expertise
43	3.1	IDIAP (Panama)	NARES	Yes	Local testing of improved germplasm. Phenotyping for drought	Local presence, infrastructure, dry environment and expertise

44	3.1	INTA (Nicaragua)	NARES	Yes	Local testing of improved germplasm. Phenotyping for key diseases in hot spots	Local presence, infrastructure, hot spot and expertise
45	3.1	MMRI, Pakistan	NARES	Yes	Heat stress phenotyping sites with representative agro-ecology in target environment	Geographic location. Previous experience on abiotic and biotic stress breeding and phenotyping
46	3.1	NMRI, Hanoi, Vietnam	NARES	Yes	Phenotyping sites with representative agro-ecology in target environment	Geographic location. Previous experience on abiotic and biotic stress breeding and phenotyping
47	3.1	NSFCRC, Thailand	NARES	Yes	Phenotyping sites with representative agro-ecology in target environment	Geographic location. Previous experience on abiotic and biotic stress breeding and phenotyping
48	3.1	Universidad de San Carlos	University	Yes	Phenotyping for key diseases in hot spots	Local presence, infrastructure and expertise
49	3.1	University of Leeds, UK	University	Yes	Meta-data analysis combined with climate data	Leading in climate projections (lead author of IPCC) and agricultural modeling
50	3.2	DSMZ, Germany	ARI	Yes	Diagnostics and virology	Experience in diagnostics
51	3.2	IAPSC	International cooperation agency	Yes	Surveillance, phytosanitary policy and advocacy	African regional phytosanitary body
52	3.2	ICIPE	ARI	Yes	MLN vector ecology and biocontrol	Expertise in entomology
53	3.2	RECs (CORAF, ASARECA, ACTESA)	International cooperation agency	Yes	Policy, advocacy, capacity development	African regional agricultural policy and implementation
54	3.2	Regional Seed Trade Associations (e.g., AFSTA)	Other	Yes	Supporting commercial seed sector for MLN-free seed production; policy and advocacy; phenotyping sites	Development of seed enterprise capacity in Africa; niche phenotyping network; technology scaling up

					with representative/distinct agro-ecology in target environment	
55	3.2	University of Western Australia	University		Epidemiology	Modeling
56	3.2	University of KwaZulu-Natal South Africa	University	Yes	Introgression of host plant resistance to aflatoxin and fumonisins contamination into adapted and elite line parents of maize hybrids	leading institution of higher learning on the African continent
57	3.2	USDA-ARS/Ohio State University	National agriculture research organizations (NARS)	Yes	MLN epidemiology and genetics	Experience in maize virology
58	3.2	Various regulatory agencies in Africa	Ministries or other public offices (not public research organizations)	Yes	Quarantine; pest/disease surveillance monitoring; seed certification; policy and regulatory guidelines	Capacity development and policy implementation
59	3.2	Various NPPOs (National Plant Protection Organizations in eastern and southern Africa)	Government	Yes	MLN Phytosanitary Community of Practice	Regulatory role in phytosanitation
60	3.3	National Maize Research Program-Nepal	NARES	Yes	Identification and dissemination of farmers' preferred nutritious maize varieties suitable for food, feed, silage and fodder in Nepal	Previous Experience

61	3.3	University of Flinders (Australia)	University	Yes	Contribute to develop and validate methodologies (quality traits)	Good previous experience in developing and validating micronutrient analytical tools to support breeding programs
62	3.3	University of Wisconsin	University	Yes	Carotenoid expertise	Provide scientific capacity for provitamin A maize
63	3.3	Various health and nutrition clinical agencies	Other (specify)	Yes	Evaluate nutritional quality of genotypes (e.g., QPM)	Well-equipped labs and experience in nutritional assessment
64	3.4	International Center for Bio-saline Agriculture (ICBA), Dubai	ARI		Salt tolerance phenotyping tools and system	Expertise in phenotyping tools and salt stress technologies
65	3.4	University of Barcelona, Spain	University	Yes	Collaboration in developing, validating and deploying digital imaging platform for phenotyping	Expertise in digital imaging platform and maize physiology
66	3.6	Hariyali Community Seed Company Pvt. Ltd. Nepal	Private Sector	Yes	Identification and deployment of improved maize varieties to promote food security, nutrition and economic growth of disadvantaged farmers in the hills of Nepal	Community based seed production in remote areas of Nepal
67	3.6	Kasetsart University	University	Yes	Economics of maize seed production in Thailand	Expertise, location
68	3.6	NASECO Seeds Ltd.	Private Sector	Yes	Fulfill the need for improved seeds of the farming community in Uganda and beyond, to help them build more prosperous and successful lives	Contributes to food security by being a leading supplier of improved seeds for food crops in Uganda and the Great Lakes Region.

69	3.6	SEAN Seed Service Centre Limited (SSSC)	Private Sector	Yes	Identification and promotion of multiple stress tolerant high yielding and low cost hybrids towards doubling maize productivity in mid-hills of Nepal	Expertise
70	3.6	SeedCo Ltd.	Private Sector	Yes	Seed Co develops and markets certified crop seeds, mainly hybrid maize seed, but also cotton seed, wheat, soya bean, barley, sorghum and ground nut seed.	Expertise and location
71	3.6	Semilla Nueva	National NGO	Yes	Local testing of improved germplasm	Local presence, infrastructure and expertise
72	3.6	Suba Agro-Trading & engineering Co. Ltd.	Private Sector	Yes	Identification of multiple stress tolerant, high yielding, easy to produce and low cost hybrids for smallholder farmers in mid-altitude zone of Northern Tanzania	Reliable extension service a nationwide distribution network and infrastructures, a team of highly qualified personnel as well as extensive and well-tailored product range. We also provide key technology on input use and management.
73	3.6	Somali Agricultural Technical group	Private Sector	Yes	Test drought-tolerant maize hybrids in the Lower Shebelle region of Somalia	Cooperate with international, national, regional, and local communities in the sustainable development of Somali agriculture, and conservation of the natural resource base to solve the prevailing food crisis in Somalia

74	3.6	G. B. Pant University of Agriculture & Technology, Pantnagar, India	University	Yes	Promotion on hybrid maize through evaluation seed production and on farm demonstration	Expertise in plant breeding
75	3.6	University of Agricultural Sciences, Raichur, India	University	Yes	Testing and deployment of new drought resilient maize hybrids in the rainfed maize regions of Karnataka India	Expertise in plant breeding
76	3.6	Orissa University of Agriculture & Technology, India	University	Yes	Identification Maize Hybrid suitable for rainfed condition of Odisha	Geographical location, expertise
77	3.6	UdeG	University	Yes	Local testing of improved germplasm	Local presence, infrastructure and expertise
78	3.6	WinWin Agri-Tech Ltd., Rwanda	Private Sector	Yes	increase awareness on quality seed production and marketing, and to improve the skills and knowledge among new small seed companies, as quality seed production and marketing are challenges the sector is yet to overcome	Promoting the use of improved maize varieties
79	3.6	Various farmer organizations, CBOs and NGOs	Farmer organizations and CBOs	Yes	On-farm monitoring; technology testing and adoption; Supply and processing of certified seed	Stakeholders and beneficiaries
80	3.6	Various indigenous seed companies and community-based seed producers in target countries	Seed companies	Yes	Produce and market certified seeds of nutrient-rich maize varieties	Endowed with the requisite infrastructure for seed production and marketing. Can sustainably market nutritious maize to farmers

81	3.6	Various Ministries/Bureaus of Agriculture	Ministries or other public offices (not public research organizations)	Yes	Institutionalize ("scale up") improved varieties, practices and equity	Leverage in national-level policies, standards and protocols, including access issues such as finance
82	3.6	Various poultry and farmer associations	Farmer organizations and CBOs	Yes	Provide information on maize needs and preferences. Also link with farmers to purchase maize grain	End users of maize grain
83	3.6	Various seed industry organizations	National private sector		Facilitating communication among partners, end users and regulators, about maize hybrids and resolve conflicts, if any	Communication with partners, end users and national regulators
84	4.1	CIRAD, France	ARI	Yes	Secondment of CIRAD modeler to CIMMYT/Nairobi to support meta-analysis (from Sept. 2015) co-funded by W1/2,TAMASA, and CIRAD	Previous experience
85	4.1	Global Agricultural Monitoring (GEOGLAM)		Yes	Contribution to remote sensing and crop monitoring efforts	Previous experience
86	4.2	Bayero University, Kano (Nigeria)	University	Yes	Development and testing DST for matching maize varieties to environments	Technology development
87	4.2	Savanna Agricultural Institute (Ghana)	NARES	Yes	Evaluate and disseminate maize technologies	Local adaptation of technologies
88	4.2	University of Ghana, Legon (Ghana)	University	Yes	Development and testing of DST to match maize varieties to environments	Technology development

89	4.3	Dryland Seed Ltd -DSL	Private Sector	Yes	Focuses on seed for the drier parts of Kenya	Dryland has taken varieties of a range of crops that researchers had produced and has commercialized them and is changing the lives of thousands of poor people
90	4.3	Oklahoma State University, USA	University	Yes	Collaboration on GreenSeeker technology	Previous experience
91	4.4	Amio (Ethiopia)	National private sector	Yes	Import/ manufacture of 2WTand accessories	Assurance of sustainability.
92	4.4	Bain New Holland, Grownet (Zimbabwe)	National private sector	Yes	Import/ manufacture of 2WTand accessories	Assurance of sustainability.
93	4.4	CSIR-Savanna Agricultural Research Institute	NARES	Yes	Linkages with farmers in the Northern, Upper East and Upper West Regions with appropriate technologies to increase their food and fibre crop production based on a sustainable production system which maintains and/or increases soil fertility	Responsive to farmer needs and national development
94	4.4	IDE	International NGOs	Yes	Facilitate partnerships with the private sector for scaling up	Considerable experience in the development of new technologies. IDE: Lead activities related to market development but under close CIMMYT guidance
95	4.4	Kishen Farm Equipment (Tanzania)	National private sector	Yes	Import/ manufacture of 2WT and accessories	Assurance of sustainability. Manufacturers are likely to contribute
96	4.4	OXFAM	International NGO	Yes	Facilitate partnership with the private sector for scaling up	Considerable experience in the development of new technologies

97	4.4	Save the Children	International NGO	Yes	Facilitate partnership with the private sector for scaling up	Considerable experience in the development of new technologies
98	4.4	World Vision	International NGO	Yes	Facilitate partnerships with the private sector for scaling up	Considerable experience in the development of new technologies. World vision: Broad outreach in eastern and southern Africa. Access to markets and finance
99	4.4	Various financial organizations, incl. micro-finance	National private sector	New	Access to finance for value chain actors for scaling up.	Essential condition for adoption and scaling up
100	4.4	Various private food processing companies	National private sector	Yes	Access to knowledge related to grain quality and sustainability standards	Access to information on nutrition and sustainability indicators and integration of the value chain
101	5.1	Consejo Empresarial de la Industria del Maíz y sus Derivados,A.C. (Enterprise Council for Maize Industry)	National private sector	Yes	Network of maize millers and processors in Mexico	Previous experience linking with maize millers and processors in Mexico
102	5.1	Hampton Creek Co.	International private sector (not multinational)		Exploring plant proteins	Expertise on use of plant-derived proteins in food
103	5.1	Instituto de Nutrición de Centroamérica y Panamá (INCAP) (Nutrition Institute for Central America and Panama)	Ministries or other public offices (not public research organizations)	Yes	Conduct survey on consumption of nutritious foods; evaluate nutrition impact of agricultural interventions	Previous experience
104	5.1	Kellogg's	International private sector	Yes	Food science and product development	Expertise in food business

105	5.4	Obafemi Awolowo University	University	Yes	The technological flagship of the West African sub-region, as evidenced by its application of modern technology	International Reputation
106	1.1; 1.2; 1.3; 1.4	PIM CRP (IFPRI-led)	Other CGIAR centers and associated partners	Yes	Foresight and bio-economic modeling; global futures (PIM 1.1); science policy (PIM 1.2); ex-post impact assessment (PIM 1.3); gender tools, collaboration; value chain analysis tools (PIM 3)	Previous experience
107	1.1; 1.2; 1.4; 3.4; 4.1; 4.2; 4.3; 4.4; 5.1; 5.2; 5.3; 5.4	Wageningen UR	University	Yes	Inter laboratory assessment (quality traits); conduct research on impact of maize biofortification and storage on human nutrition and health using RCTs; lead the inter-laboratory assessment of analytical platforms hubs. Research on adoption and scaling up. Research on service provider business models. Seed value chains. Leading Activity 5.2. Assessing risk management tools (Managing risk of maize farmers in Zambia)	Provider of high quality and worldwide inter-laboratory tests. Expertise in food product development form harvest to plate

108	1.1; 1.2; 2.3; 4.2; 4.3; 4.4; Capacity development	UC Davis, USA	University	Yes	Advising of Ph.D. and M.Sc. students embedded in MAIZE supported research projects. Research on adoption and scaling up. Research on service provider business models. Impact assessment (DT maize and weather index insurance RCT). Diversity analysis	Expertise in population genetics, genomics, climate adaptation traits
109	1.1; 1.2; 4.1; 4.2; 4.3	Michigan State University, USA	Advanced research institutes (ARIs)	Yes	Conduct research on impact of maize biofortification and storage on human nutrition and health using RCTs; initial contacts with Sieg Snapp to further develop collaboration on maize-legume agronomy in SSA and development of Indicators and metrics for SI (SIIL related), household modeling and CGE; capacity building; modeling DT maize	Their scientific expertise in nutrition, health and statistics, RCTs, bio-economic and household modeling and computable general equilibrium (CGE) complements well with ours
110	1.1; 1.4	University of Pretoria + MSU	University	Yes	Maize markets foresight in SSA	Previous experience
111	1.1; 1.4; 3.1; 4.1; 4.2; 4.3	CCAFS	Other CGIAR centers and associated partners	Yes	To improve crop models, identify changes in future breeding targets, targeting of new technologies for climate-vulnerable hotspots, mining of meta-data, scaling up and out of climate-resilient G/E*M combinations. Bio-economic modeling. Weather index-	CCAFS is leading climate research for agricultural purposes. Working at village level in system mode.

					based insurance	
112	1.1; 2.1; 3.1; 3.2	UMN-InStepp	University	Yes	Impact and foresight of MAIZE. MLN epidemiology. Big Data	Experience in maize virology, socioeconomics, big data analysis
113	1.1; 4.1; 4.2; 4.3	Oak Ridge National Laboratory (ORNL), USA	ARI	Yes	Data analysis and integration; leading the development of Landscape Crop Assessment Tool (LOCAT) funded by CSISA. In Phase II, additional collaborations related to big data and geospatial tools are envisaged	Previous experience
114	1.1; 4.1; 4.2; 4.3; 4.4	Georgia Tech University, USA	University	Yes	Ex-ante impact assessment; valuation reduced risk. Scale-appropriate machinery engineering and prototype development under CSISA. Research on adoption and scaling up. Research on service provider business models	Previous experience
115	1.2; 1.3; 1.4; 4.2	Royal Tropical Institute (KIT)	ARI	Yes	Gender integration, equality and professional capacity enhancement; fuzzy cognitive mapping, games, agent-based simulation (ESAP); agricultural innovation systems, gender and mechanization. Facilitate a greater understand of gender-preferred traits by region/area; seed value chains; mechanization	Leading research groups in gender and agriculture

116	1.2; 3.1; 3.3; 4.4; 5.1; 5.4	Purdue University	University	Yes	Provide source maize germplasm to enhance pro-vitamin A; conduct research on impact of maize biofortification and storage on human nutrition and health using RCTs; partner in HTMA Project; product development and processing. Research on adoption and scaling up. Research on service provider business models. Conduct research on maize drying, mycotoxins and food processing	Critical supplier of novel sources for pro-vitamin A enrichment. Expertise in food product development
117	1.2; 5.4	Harvard School of Public Health	University	Yes	Conduct research on impact of maize biofortification and storage on human nutrition and health using RCTs and household modelling and CGE; capacity building	Their scientific expertise in nutrition, health and statistics, RCTs, bio-economic and household modeling and computable general equilibrium(CGE) complements well with ours
118	1.3; 4.4	WOCAN; Total Landcare; Fondo para la Paz	International NGO	Yes	Research implementation, context-specific knowledge and expertise, subject matter expertise, research-into-use collaboration	Previous experience
119	2.1; 2.2	Tecnologico de Monterrey	University	Yes	Insect tolerance in maize	Good previous experience and expertise on conducting insect bioassays in maize

120	2.1; 2.2	TGAC – The Genome Analysis Centre	Multinational private sector		Genotypic data storage and computationally intensive analysis	Good reputation; performs bioinformatics analysis on multiple, complex data sets; hosts one of the largest computing hardware facilities dedicated to life science research in Europe
121	2.1; 2.2; 2.3	Cornell University	University	Yes	1) Contributing to the ultra-high-density genotypic characterization of maize lines and single plants from populations; 2) Leading the GOBII project to provide solutions for storing and utilizing low-to-ultra-high-density genotypic data in routine (e.g., QC) and advanced (e.g., GS) breeding applications. Research on adoption and scaling up. Research on service provider business models.	Good previous experience; provider of low-cost, high quality data provision and capacity building
122	2.1; 2.2; 2.3	Diversity Arrays Technology (DArT)	Multinational private sector	Yes	1) Genotyping, phenotyping and data analysis; 2) Mobile data capture application and data curation software. Contributing to the high density genotypic characterization of maize lines and populations using single plant and composite methods, expertise on linkage mapping and diversity analysis	Good previous experience; provider of proprietary tools and technologies; low-cost, high quality data provision and capacity building; currently working to establish feasibility of PPP

123	2.1; 2.2; 2.3	Integrated Breeding Platform	Other	Yes	Breeding management system	Co-located with CIMMYT; selected to deliver tools of the GOBII work; developing a system of regional support hubs around the globe; training members of NARS and SMEs in their use; providing a free, open-source product
124	2.1; 2.2; 2.3	James Hutton Institute	ARI	Yes	Phenotypic and genotypic data warehouses and visualization tools. Leading the development and regular update of the Germinate software as well as other data visualization tools including: Genotypic: Flapjack, Strudel; PCA: Curly Whirly; Pedigree: Helium	Good previous experience, good record of providing useful visualization tools; experience with private sector entities but desire to provide open-source software; member of the plant breeding API development group
125	2.1; 2.2; 2.3	Langebio	University	Yes	Genetic analysis, greenhouse phenotyping	Good previous experience. Genetic resource research
126	2.1; 2.3	Huazhong Agricultural University, Wuhan, China	University		1) High-throughput and functional genomics for biotic and abiotic stress tolerance; 2) Candidate gene analysis and marker conversion	1) Expertise on identification of candidate genes and development of trait-specific markers 2) Complementary funding from the national program; research students; expertise
127	2.1; 2.3; 2.4	LGC technologies	Multinational private sector	Yes	Developing final, trait-linked, routinely usable markers: Low density markers and KASP assays	1) Previous experience developing trait-specific markers and genotyping assays. 2) Relatively low cost, efficient in time, reliability

128	2.1; 2.3; 3.1	CAAS	NARES	Yes	Genomic analysis. Contribution to development of the maize pan-genome and markers, and stress tolerant maize.	Genomic data analysis and improvement of the reference genome. Maize breeding.
129	2.2; 2.3	Center for Research and Advanced Studies of the National Polytechnic Institute (CINVESTAV), Mexico	Advanced research institute (ARI)	Yes	Leader in below-ground microbial interactions. Advising of Ph.D. and M.Sc. students embedded in MAIZE-supported research projects. With economic contribution (tuition, costs)	Previous experience
130	2.2; 2.3	DivSeek	International NGO	Yes	Information sharing systems	Will work with existing, emerging and future initiatives to characterize crop diversity and develop a unified, coordinated and cohesive information management platform to provide easy access to genotypic and phenotypic data associated with genebank germplasm.
131	2.2; 2.3; 3.1	University of Hohenheim, Germany	University	Yes	Maize doubled haploid technology. Genomic selection for complex trait improvement in maize.	Jointly developed and deployed tropical haploid inducers. Genetic basis of maternal haploid induction in maize. Models for genomic selection in maize.
132	2.3; 2.4; 3.1	INIFAP	NARES	Yes	1) Drought evaluation; 2) Rapid cycle nursery 3) Phenotyping and data analysis 4) Tar spot evaluation	1) Good previous experience, germplasm experts, GIS resources, geographical advantage; 2) Geography (sites in key areas where CIMMYT does not have a

						station)
133	2.3; 3.1	UAAAN	University	Yes	Phenotyping and data analysis	Geographic advantage. Previous experience on abiotic and biotic stress breeding and phenotyping
134	2.3; 3.1; 3.6	UACH	University	Yes	Genetic analysis, local testing of improved germplasm. Phenotyping for key diseases in hot spots	Good previous experience; genetic resource research. Local presence, infrastructure and expertise
135	2.3; 4.4	University of Texas-Austin	University		Data analysis and capacity building. Research on adoption and scaling up. Research on service provider business models	Expertise in population genetics, genomics, climate adaptation traits, field phenotyping
136	2.4; 3.1	Semillas Moreno Retis	Multinational private sector		Rapid cycle nursery services	Geography (sites in key areas where CIMMYT does not have a station)
137	2.4; 3.1	Servicios Agrobal	Multinational private sector	Yes	Rapid cycle nursery services	Geography (sites in key areas where CIMMYT does not have a station)
138	2.4; 3.1; 3.2; 3.6	Various private medium-size seed companies	Seeds company	Yes	Phenotyping, joint product development, seed deployment, MLN-free commercial seed production; leading local promotion of new technologies and practices. Identifying hybrids for niche target area and supplying seed in a sustainable manner.	Niche phenotyping network, commercially viable germplasm, seed scale-up and marketing. Trial expenses and cost of deployment borne by partner.

139	3.1; 3.2; 3.6	Various small and medium enterprise (SME) seed companies in SSA, Asia and LA.	Seeds companies	Yes	Testing of stress resilience hybrids, lines and OPVs; uptake of new stress resilient germplasm for product development and/or release.	Physical resources (land, irrigation), human capacity, expanded testing network
140	3.1; 3.2; 3.6	AATF (African Agricultural Technology Foundation)	International NGO	Yes	Supporting development and deployment of improved maize hybrids in eastern and southern Africa. Collaboration on transgenic technologies. MLN-free commercial seed production.	Development of seed enterprise capacity in Africa
141	3.1; 3.2; 3.6	Various medium and large seed companies (including Pioneer and Monsanto)	Multinational private sector	Yes	Identification of the best hybrids, rapid multiplication and sell to farmers; MLN diagnostics and MLN-free commercial seed production protocols	Have facility, know-how and dissemination network to rapidly scale up improved hybrids and reach more farmers
142	3.1; 3.2; 3.6; 4.3; 4.4	Syngenta Foundation for Sustainable Agriculture (SFSA)	International NGO	Yes	Abiotic and biotic stress resilient maize germplasm; MLN R4D; advocacy; scale-appropriate mechanization; PPP	Geography (sites in key areas where CIMMYT does not have a station); expertise in phenotyping; in-kind services for planting and harvesting, Public and private partnerships, extension
143	3.1; 3.2; 3.6; 5.2; FP1, FP2, FP4	Kenya Agriculture and Livestock Research Organization (KALRO)	NARES	Yes	Breeding, phenotyping, DH, MLN, consumer acceptance of lime-cooked products, seed systems, conservation agriculture, socioeconomics	Expertise in Kenyan agricultural systems and value chains
144	3.1; 3.3; 3.6	Yunnan Academy of Agricultural Sciences (YAAS), China	NARES	Yes	Phenotyping sites with representative agro-ecology in target environment. Deploying improved maize	Hosts CIMMYT-China team in YAAS. Sub-tropical maize breeding; previous experience on abiotic and biotic stress

					varieties.	breeding and nutritious maize
145	3.1; 3.6	BARI, Bangladesh	NARES	Yes	Phenotyping sites with representative agro-ecology in target environment. Development and delivery of stress tolerant maize.	Geographical location. Previous experience with abiotic and biotic stress breeding and phenotyping
146	3.1; 3.6	CENTA	NARES	Yes	Local testing of improved germplasm; phenotyping for key diseases in hot spots	Local presence, infrastructure and expertise
147	3.1; 3.6	CHIBAS	National NGO		Local testing, promotion and pilot seed production of improved germplasm	Local presence, infrastructure, and expertise
148	3.1; 3.6	CORPOICA	NARES	Yes	Local testing of improved germplasm	Local presence, infrastructure, and expertise
149	3.1; 3.6	CRDD	Ministries or other public offices		Local testing of improved germplasm	Local presence, infrastructure, and expertise
150	3.1; 3.6	FEDERECAFE	National NGO	Yes	Local testing of improved germplasm; phenotyping for key diseases	Local presence, infrastructure, hot spot and expertise
151	3.1; 3.6	FIDAR	National NGO		Local testing of improved germplasm	Local presence, infrastructure, and expertise
152	3.1; 3.6	FIPAH	National NGO	Yes	Local testing of improved germplasm	Local presence, infrastructure and expertise
153	3.1; 3.6	ICeRI, Indonesia	NARES	Yes	Phenotyping sites with representative agro-ecology in target environments	Geographical location. Previous experience on abiotic and biotic stress breeding and phenotyping
154	3.1; 3.6	INIA (Peru)	NARES	Yes	Local testing of improved germplasm	Local presence, infrastructure, and expertise
155	3.1; 3.6	INIA (Venezuela)	NARES		Local testing of improved germplasm	Local presence, infrastructure, and expertise

156	3.1; 3.6	INIAF (Bolivia)	NARES	Yes	Local testing of improved germplasm	Local presence, infrastructure, and expertise
157	3.1; 3.6	INIAP (Ecuador)	NARES	Yes	Local testing of improved germplasm	Local presence, infrastructure, and expertise
158	3.1; 3.6	Jullundur Pvt. Limited	Private Sector	Yes	Evaluation & commercialization of CIMMYT maize hybrids resilient for drought and heat tolerance in Pakistan	Geographical location, expertise
159	3.1; 3.6	Novasem, Mexico	Multinational private sector	Yes	1) Drought evaluation 2) Heat evaluation 3) Fusarium ear rot evaluation 4) Phenotyping; 5) Deployment of improved maize hybrids	Geography (sites in key areas where CIMMYT does not have a station), expertise in phenotyping, in-kind services for planting and harvesting
160	3.1; 3.6	ORE	National NGO	Yes	Local testing, promotion and pilot seed production of improved germplasm	Local presence, infrastructure, and expertise
161	3.1; 3.6	Selected State Agriculture Univeristies (SAUs)	University	Yes	Phenotyping, breeding, seed systems, physical infrastructure for DH facility	Strong evaluation network; locally adapted germplasm; links to small and medium seed sector
162	3.1; 3.6	University of Agricultural Science, Bangalore	University	Yes	Evaluation and deployment of stress resilient maize hybrids (derived through MAIZE CRP) in the rainfed maize regions of Southern Karnataka	Expertise in plant breeding
163	3.1; 3.6	Various NGOs	National NGOs	Yes	Provide training to farmers and other partners; receive training. Hybrid testing for deployment	Competent in seed marketing. Localized presence. Grassroot reach in target regions

164	3.1; 4.1; 4.2; 4.3	Stanford University	University	Yes	Meta-data analysis combined with climate data; new research collaboration is under discussion for crop monitoring work in South Asia under CSISA Phase III	Leading in modeling and meta-data analysis
165	3.1; 5.1	EMBRAPA	NARES	Yes	Knowledge exchange in breeding for low soil fertility and maize product development and processing	EMBRAPA has made major advances in maize breeding for low P and soil acidity (through conventional and molecular techniques). Expertise on food product development form harvest to plate
166	3.1; 5.2	University of Nairobi, Kenya	University	Yes	Food science in target country. Breeding for aflatoxin resistance	Expertise in food science and local maize consumption in Kenya
167	3.2; 3.6	Alliance for Green Revolution in Africa (AGRA)	International NGO	Yes	Supporting commercial seed sector for MLN-free seed production; policy and advocacy for improved seed delivery.	Development of seed enterprise capacity in Africa
168	3.2; 4.2; 4.3	Washington State University (USA)	University	Yes	MLN virology and genetics. Conservation agriculture.	Experience in *Potyvirus* virology
169	3.3; 4.1; 4.2; 4.3; FP5	ILRI	CGIAR center	Yes	Good previous experience in identifying superior maize for livestock, feed and fodder phenotyping (quality traits); integrated research in mixed crop-livestock systems (Ethiopia, Zimbabwe, South Asia). To be further developed	Development of maize for feed; lead the feed and fodder phenotyping platform to support breeding of dual-purpose maize

170	3.3; 5.1	A4NH	Other CGIAR centers and associated partners	Yes	Survey and consumption of nutritious foods	Cross-cutting CRP on Agriculture for Nutrition and Health
171	3.4; 4.1; 4.2; 4.3	Quanta Lab, Cordoba, Spain	ARI	Yes	Collaboration on developing, validating and deploying digital imaging platform for phenotyping. World leading group on UAV remote sensing, high resolution image analysis to support our PA work. W1/2 grant recipient	Expertise in digital imaging platform and data processing
172	3.6; 4.2	BRAC	International development organization	Yes	Ensure sufficient food and nutrition through maize cultivation for marginalized groups of people in Bangladesh	Considerable experience in agricultural development
173	3.6; 4.2	Meru Agro-Tours & Consultants Co. Ltd. (Meru)	Local Private Sector	Yes	Specializes in Agricultural inputs business. Currently the main business activities and services are multiplication, distribution and retailing of agro seeds; importation, distribution and retailing of agrochemicals, fertilizers, agricultural equipment and provision of advisory services on farm input use and management	Agro input business in Northern Tanzania and through its network of agents/stockiest for the rest of the country.
174	3.6; 4.4	CARE	International NGO	Yes	Facilitate partnerships with the private sector for scaling up	Considerable experience in the development and scaling of new technologies and innovations

175	3.6; 4.4	Catholic Relief Services	International NGO	Yes	Facilitate partnerships with the private sector for scaling up	Considerable experience in development and scaling of new technologies and innovations
176	3.6; 4.4	Institute of Agricultural Research (IAR) (Nigeria)	NARES	Yes	Evaluate and disseminate maize technologies	Local adaptation of technologies
177	3.6; 4.4	World Vision; Plan Intl; Save the Children, etc.	International NGO	Yes	Large-scale technology dissemination	Experience in and dedication to livelihood and health promotion
178	3.6; 4.4	Various extension services	Extension agencies	Yes	Conduct training for farmers and other partners, and promote the adoption of improved seed	Competent in technology transfer
179	3.6; 4.4	Various multinational private sector input providers (Synenta, BASF, …)	Multinational private sector	Yes	Access to marketing networks, efforts and methodologies; import/ manufacture of 2WTand accessories. For identifying hybrids for niche target areas and supplying seed in a sustainable manner	Outreach capacity. Assurance of sustainability
180	3.6; 4.4	Various SME (seed and input suppliers, grain processors, input suppliers)	National private sector	Yes	Distribute seed to farmers; process and market grain and grain products; supply inputs	Competent in seed marketing; competent in grain processing and marketing
181	3.6; FP5	Various maize industries	National private sector	Yes	Provide info on sector preferences; link farmers to purchase maize grain	End users of maize grain
182	4.1; 4.2	FAO	International cooperation agency	Yes	Surveillance, policy and advocacy. Collaboration under FACASI on CA and joint development of training materials.	Global network and experience in implementing regional surveillance programs

183	4.1; 4.2; 4.3	CIAT	CGIAR center	Yes	Farm level analysis and trajectories, data on crops common in maize-based systems and common bean breeding and agronomy	Previous experience
184	4.1; 4.2; 4.3	Earth Institute at Columbia University, USA	University	Yes	Collaboration on geospatial issues through TAMASA + AfSIS linkages	
185	4.1; 4.2; 4.3	GLDC CRP	Other CGIAR centers and associated partners		Providing legume germplasm. Development and harmonization of methods and approaches	Site sharing. Collaborative work in agro-ecologies where maize and millet/sorghum co-exist (Southern and West Africa)
186	4.1; 4.2; 4.3	International Institute for Applied Systems Analysis (IIASA), Austria	ARI	Yes	Development of indicator, metrics to assist SI assessment at landscape and regional scale. Land use/land cover change analysis. Crowd sourcing of environmental indicators	Development of data capturing, acquiring and analytical strategies in the cocntext of ICT4Agr efforts
187	4.1; 4.2; 4.3	International Plant Nutrition Institute (IPNI), Canada	ARI	Yes	Development of nutrient expert decision support tool for maize. MAIZE W1/2 Asia and Africa and TAMASA subgrantee	Expertise in smallholder precision nutrient management, decision support tools for diverse farming systems
188	4.1; 4.2; 4.3	Kansas State University, USA	University	Yes	Collaboration under Sustainable Intensification Innovation Lab (SIIL). Regional SIIL coordinator based at CIMMYT Bangladesh. Future work to develop indicators and metrics for SI. Small-scale mechanization. Several	Previous experience

					project proposals recently submitted to KSU/SIIL	
189	4.1; 4.2; 4.3	KU Leuven, Belgium	University	Yes	TAMASA Ph.D. scholarships and graduate students co-supervision in Mexico	Previous experience
190	4.1; 4.2; 4.3	Universidad Autónoma Metropolitana (UAM), Mexico	University	Yes	Contributing to development and implementation of multi-scale farming systems analysis in Mexico; leverage quality resources to maximize research and technical capacity building	Experience and well-established facility for research and training
191	4.1; 4.2; 4.3	Université Catholique de Louvain, Belgium	University		Development of ESA Sentinel-2 project to support remote sensing work to be developed during P. Defourny's sabbatical leave at CIMMYT in 2016	Previous experience
192	4.1; 4.2; 4.3	University of Twente, ITC, Netherlands	University	Yes	Remote sensing (STARS project)	Previous experience
193	4.1; 4.2; 4.3	Water Center at Columbia University, USA	University		Geospatial water-related research under CSISA Phase III	Strong expertise in key research topics
194	4.1; 4.2; 4.3	WHEAT	WHEAT partners	Yes	Deep synergies between the two CRPs FP4 with common design, methodologies and technical innovation. Large bilateral projects covering both crops (CSISA, SRFSI, MasAgro)	Previous experience
195	4.1; 4.2; 4.3	WLE	Other CGIAR centers		Soil conservation at landscape scale. Development and harmonization of methods	Strong expertise in key research topics, shared locations and goals.

					and approaches. Site sharing	
196	4.2; 4.3	Charles Sturt University, Australia	University	Yes	Research on mechanization in support of FACASI. W1/2 funding	Previous experience
197	4.2; 4.3	CSIRO, Australia	ARI	Yes	Salinity assessment, hydrological assessment, APSIM. Work in Bangladesh under CSISA-MI and SRFSI	
198	4.2; 4.3	ICRAF	CGIAR center	Yes	Collaboration under Tree for Food Project. New collaboration to be developed for soil quality indices and rapid soil quality assessment	Previous experience; hosts CIMMYT-Kenya team
199	4.2; 4.3; 4.4	RICE (old GRiSP) CRP	Other CGIAR centers and associated partners	Yes	Joint work in South Asia (e.g., CSISA); possibilities of site integration	Builds on same framework as rice crop manager
200	Capacity development	Texas A&M (Agricultural and Mechanical College of Texas)	University	Yes	Training and capacity development	Strong history in plant breeding and training
201	Capacity development	University of California, Davis – African Plant Breeding Academy (AfPBA)	University	Yes	Training and capacity development	Good experience in organizing capacity development courses for local partners in Africa
202	FP5	University of Vienna, Austria	University	Yes	Development of cheap/accurate aflatoxin detection kit.	Experience in aflatoxin detection.
203	FP5	Various national institutes of food processing and post-harvest technologies	National private sector		Sample testing	Laboratory facilities

3.17 Technical Competencies of Selected Key Partners of MAIZE

Note: MAIZE has more than 350 research and development partners worldwide, including an array of outstanding scientists and professionals. Since it is not possible to highlight the technical competencies of all these partners here due to space limitation, we present here a limited number of key partners who serve as Principal Investigators of MAIZE-supported projects and/or provided significant inputs for MAIZE Phase-II conceptualization. We acknowledge the invaluable support and contributions of all other partners who could not be listed here.

FP1: Enhancing MAIZE's R4D Strategy for Impact

Principal Investigator / Key Collaborator	Organization	Key Project(s) / Product(s)	Relevant Key Publications / Experience
Erwin Bulte	Wageningen Univ	Impact assessment	Bulte, E., Beekman, G., Di Falco, S., Hella, J., & Lei, P. (2014). Behavioral Responses and the Impact of New Agricultural Technologies: Evidence from a Double-blind Field Experiment in Tanzania. AJAE, 96(3), 813-830
Michael Carter & Travis Lybbert	Univ. of California, Davis	Impact assessment (drought tolerant maize & weather index insurance randomized-control trials)	Carter, M. R., Laajaj, R., & Yang, D. (2013). The Impact of Voucher Coupons on the Uptake of Fertilizer and Improved Seeds: Evidence from a Randomized Trial in Mozambique. AJAE, 95(5), 1345-1351. Lybbert, T. J., Magnan, N., Bhargava, A. K., Gulati, K., & Spielman, D. J. (2013). Farmers' Heterogeneous Valuation of Laser Land Leveling in Eastern Uttar Pradesh: An Experimental Auction to Inform Segmentation and Subsidy Strategies. AJAE, 95(2), 339-345.
Nilupa Gunaratna	Harvard Univ	Nutritional impacts	Gunaratna, N. S., De Groote, H., Nestel, P., Pixley, K. V., & McCabe, G. P. (2010). A meta-analysis of community-based studies on quality protein maize. Food Policy, 35(3), 202-210.
Thomas Jayne	Michigan State Univ.	Maize markets foresight in SSA	Jayne, T. S., Chamberlin, J., & Headey, D. D. (2014). Land pressures, the evolution of farming systems, and development strategies in Africa: A synthesis. Food Policy, 48, 1-17.
Genti Kostandini	Univ. of Georgia	Ex-ante impact assessment; valuation reduced risk	Kostandini, G., La Rovere, R., & Abdoulaye, T. (2013). Potential impacts of increasing average yields and reducing maize yield variability in Africa. Food Policy, 43, 213-226.
Ruerd Ruben	Wageningen Univ Research Centre/DLO	Yield gap analysis; poverty, food security and nutrition linkages	Ruben, R., & Pender, J. (2004). Rural diversity and heterogeneity in less-favoured areas: the quest for policy targeting. Food Policy, 29(4), 303-320.

Phil Pardey	Univ. of Minnesota	Ex ante impact and foresight	Pardey, P. G., Beddow, J. M., Hurley, T. M., Beatty, T. K. M., & Eidman, V. R. (2014). A Bounds Analysis of World Food Futures: Global Agriculture Through to 2050. Australian Journal of Agricultural and Resource Economics, 58(4), 571-589.
Franz Wong	Royal Tropical Institute (KIT)	Gender integration, equality and professional capacity enhancement	Wong, F. F. (2012). The micro-politics of gender mainstreaming: the administration of policy in humanitarian work in Cambodia. Gender & Development, 20(3), 467-480.
Matin Qaim	Gottingen	Nutritional impacts	Qaim, M., & Kouser, S. (2013). Genetically Modified Crops and Food Security. PLoS ONE, 8(6), e64879
Ken Cassman; Martin van Ittersum	Univ. of Nebraska; Wageningen UR	Agro-ecological spatial framework for improved upscaling, impact assessment, and locating fieldwork and innovation testing	Van Bussel, L.G.J., P. Grassini, J. van Wart, J. Wolf, L. Claessens, H. Yang, H. Boogaard, H. de Groot, K. Saito, K.G. Cassman and M.K. van Ittersum. 2015. From field to atlas: Upscaling of location-specific yield gap estimates. Field Crops Res. 177: 98–108; Van Wart J, van Bussel LGJ, Wolf J, Licker R, Grassini P, Nelson A, Boogaard H, Gerber J, Mueller ND, Claessens L, van Ittersum MK, Cassman KG. 2013. Use of agro-climatic zones to upscale simulated crop yield potential. Field Crops Res. 143:44-55

FP2: Novel Diversity and Tools for Increasing Genetic Gains

Principal Investigator / Key Collaborator	Organization	Key Project(s) / Product(s)	Relevant Key Publications / Experience
David Marshall	James Hutton Institute	Germinate Database; Genomic data visualization software tools (e.g. Curly Whirly); Genomic analyses	Milne, I, **David Marshall.** 2013. Using tablet for visual exploration of second-generation sequencing data. Brief Bioinform. 14(2):193-202.
Edward Buckler	Cornell University	Seeds of Discovery and others; Genomic data analysis, allele mining	Tian, F., E.S. Buckler. 2011. Genome-wide association study of leaf architecture in the maize nested association mapping population. Nature Genetics 43:159-162.
Peter Wenzl	DivSeek/Global Crop Diversity Trust	Seeds of Discovery and similar; trait discovery; applied genomics research	Akbari, M., P. Wenzl, A. Kilian. 2006. Diversity arrays technology (DArT) for high-throughput profiling of the hexaploid wheat genome. Theor Appl Genet 113:1409-1420.

John Hickey	Roslin Institute, University of Edinburg	Applied genomic selection models	Clark, S.A., J.M. Hickey, H.D. Daetwyler and J.H.J. van der Werf. 2012. The importance of information on relatives for the prediction of genomic breeding values and the implications for the makeup of reference data sets in livestock breeding schemes. Genetics Selection Evolution 44:4
Fernando Gonzalez	DuPont Pioneer, Mexico	MasAgro, SeeD and others. Provide phenotyping sites for key traits, e.g. GLS and tar spot	DuPont Pioneer is a key private sector partner for phenotyping and breeding collaboration.
Ricardo Ernesto Preciado	INIFAP Mexico	MasAgro, SeeD and others. Oversees phenotyping and breeding nursery site.	INIFAP (Mexico) is a key National Program partner that provides access and technical support at several locations in Mexico.
Ruairidh Sawers	CINVESTAV-Langebio, Mexico	MasAgro, SeeD. Genomics expertise; gene discovery and validation.	Gonzalez-Munoz, E., R.J.H. Sawers. 2015. The maize (*Zea mays* ssp. *mays* var. B73) genome encodes 33 members of the purple acid phosphatase family. Front. Plant Sci. 6:341. doi: 10.3389/fpls.2015.00341
James Holland	North Carolina State Univ -	MasAgro, SeeD and others. Pre-breeding (use of genetic resources); genomics	McMullen, M.D.,… J.B. Holland and E.S. Buckler. 2009. Genetic Properties of the Maize Nested Association Mapping Population. Science 235:737-740.
Jianbing Yan	Huazhong Agricultural University, Wuhan, China	SeeD and other projects. Genomics; marker development expertise.	Li, H.,… and J. Yan. 2013. Genome-wide association study dissects the genetic architecture of oil biosynthesis in maize kernels. Nat. Gen. 45:43-50.
Andrzej Killian	Diversity Arrays Technology	MasAgro, SeeD and others. Next generation sequencing technology and associated expertise	Milczarski, P.,… A. Kilian and M. Rackoczy-Trojanowska. 2011. A High Density Consensus Map of Rye (Secale cereale L.) Based on DArT Markers. PLoS ONE 6(12): e28495
Sidney N. Parentoni	EMBRAPA Brazil	SeeD and others; discover & apply haplotypes for biotic & abiotic stress; develop predictive models incorporating high density markers, GxE effects.	Teixeira FF, S.N. Parentoni,…and M.J. Cardoso. 2010. Evaluation of maize core collection for drought tolerance. Crop Breed. Appl. Biotech. 10:312-320

FP3: Stress Tolerant and Nutritious Maize

Principal Investigator / Key Collaborator	Organization	Key Project(s) / Product(s)	Relevant Key Publications / Experience
Mark Edge	Monsanto	Water Efficient Maize for Africa (WEMA) Project Lead for Monsanto	Mark Edge's expertise is in biotech research ánd seed business development. He is responsible for leading commercial introduction of Monsanto's biotech corn drought trait and developing commercial business related to water management issues. Previously, he was Monsanto's Europe and Africa marketing team leader.
Marc Albertsen	DuPont-Pioneer	Improved Maize for African Soils (IMAS) project (funded by BMGF and USAID) Project Lead for DuPont-Pioneer	Marc is DuPont Fellow, Research Director, and leader of Pioneer's reproductive biology group, a research discovery and development group assembled to increase the reproductive productivity of crops, including maize.
Mitch Tuinstra	Purdue University, USA	Heat Tolerant Maize for Asia (HTMA) Project Lead for Purdue University	Ciampitti IA, Murrell T, Camberato J, Tuinstra MR, Friedemann P, Vyn T. 2013. Physiological Dynamics of Maize Nitrogen Uptake and Partitioning in Response to Plant Density and N Stress Factors: II. Reproductive Phase. Crop Science 53: 2588-2602.
Trilochan Mohapatra	Indian Council of Agricultural Research	ICAR-CIMMYT Collaborative Program on Maize R4D	Director-General of ICAR; Has significant experience in developing climate-resilient and nutritionally enriched improved crop varieties, besides genomics of crop plants.
Shihuang Zhang	Chinese Academy of Agricultural Sciences (CAAS)	ICAR-CIMMYT Collaborative Program on Maize R4D	Coordinator of National Maize Research & Development Program in China, and a long-term partner of CIMMYT, including MAIZE Phase-I.
Md. Amiruzzaman	Bangladesh Agricultural Research Institute (BARI)	Heat Tolerant Maize for Asia (HTMA) Project Lead for Bangladesh Team	Chief Scientific Officer & Head, Plant Breeding Division of BARI; long-term partner of CIMMYT, including MAIZE Phase-I.
Torbert Rocheford	Purdue University, USA	Collaborative HarvestPlus Project on 'Biofortification of Tropical Maize to Combat Micronutrient Malnutrition'	Owens BF, Lipka AE, Magallanes-Lundback M, Tiede T, Diepenbrock CH, Kandianis CB, Kim E, Cepela J, Mateos-Hernandez M, Buell CR, Buckler ES, DellaPenna D, Gore MA, Rocheford TR (2014) A foundation for provitamin A biofortification of maize: Genome-wide association and genomic prediction models of carotenoid levels. Genetics 198: 1699-1716.
Margaret G. Redinbaugh	USDA-ARS/Ohio State University, USA	"Controlling the spread and impact of MLN in Sub-Saharan Africa through improved diagnostic capacity and MCMV-free	Redinbaugh, M.G., and Zambrano-Mendoza, J.L. (2014) Control of virus diseases in maize. In: Lobenstein G, Katis N, eds. Control of Plant Virus Disease: Seed-Propagated Crops. Waltham, MA USA: Academic Press,

		commercial seed production" (Project funded by USAID and BMGF)	pp. 391-429.
Anne W. Wangai	KALRO, Kenya	MLN Project in Africa (funded by BMGF and SFSA)	Wangai, A.W., Redinbaugh, M.G., Kinyua, Z.M., Mahuku, G., Sheets, K., and Jeffers, D. (2012) First report of *Maize chlorotic mottle virus* and maize lethal necrosis in Kenya. Plant Dis. 96:1582.
Jose Luis Araus	University of Barcelona, Spain	MAIZE Phase-I Competitive Grant Project on "Development of low-cost, high throughput phenotyping platforms"	Araus JL, Cairns JE (2014) Field high-throughput phenotyping: the new crop breeding frontier. Trends in Plant Sci. 19: 52-61.
Robert L. Brown	USDA-ARS/Southern Regional Research Center, USA	MAIZE Phase-I Competitive Grant Project on "Identification of gene markers in aflatoxin-resistant maize lines developed through the IITA-ARS Collaboration"	Chen Z-Y, Brown RL, Menkir A, Cleveland TE (2012) Identification of resistance-associated proteins in closely-related maize lines varying in aflatoxin accumulation. Mol. Breeding 30: 53-68.
Charles Spillane	National University of Ireland, Galway	Collaborative NUIG-IITA on 'Post-Graduate Research and Training Programme focusing on Research to Nourish Africa'	Azmach G, Gedil M, Menkir A, Spillane C (2013) Marker-trait association analysis of functional gene markers for provitamin A levels across diverse tropical yellow maize inbred lines: BMC Plant Biology 13:227
Ephrame Havazvidi, Joseph Mito & Dean Muungani	SeedCo, Africa	SeedCo is an important partner in scaling-up and delivering several MAIZE hybrids in SSA through projects such as DTMA and DTMASS.	http://www.seedco.org
William Bett	Kenya Seed Company	KSC has been a long-term partner of CIMMYT, and actively commercializes a large number of MAIZE hybrids in eastern Africa; presently scaling-up and commercializing several improved hybrids derived from DTMA, WEMA and MLN-Africa Projects.	http://www.kenyaseed.com
John MacRobert	Quality Seed CC & Mukushi Seeds, Africa	Both Quality Seeds and Mukushi Seeds partner with MAIZE in scaling-up and commercializing several MAIZE hybrids (including normal and QPM) in southern Africa.	Quality Seed CC is a supplier of quality-assured seed of the best available Quality Protein Maize (QPM), common maize and specialty maize varieties for farmers in specific farming contexts producing maize for particular markets. Quality Seed CC also provides a confidential and quality-assured foundation seed production service to African Seed Companies on a contractual basis.
Nicolai Rodeyns	NASECO Seeds	Active partner in scaling-up and delivering several MAIZE hybrids in Uganda, through various projects, including DTMA, WEMA, DTMASS and MLN-Africa.	http://www.nasecoseeds.com

Zubeda Mduruma	Aminata Qualiy Seeds	Aminata Quality Seeds & Consultancy Ltd is a local, private seed company, owned by Zubeda. All of the Aminata's products are CIMMYT-derived, and deployed for the benefit of smallholders in Tanzania.	
Joe DeVries and George Bigirwa	Alliance for Green Revolution in Africa (AGRA)/Program for Africa's Seed Systems (PASS)	AGRA complements as well as partners with MAIZE in supporting SME seed companies in Africa, besides capacity building. AGRA, through PASS, plays a key role in MLN-Africa Project, especially in supporting MLN-free commercial seed production and deployment.	http://www.agra.org
Denise Kyetere	African Agricultural Technology Foundation (AATF)	WEMA Project lead implementing institution; also active partner for MAIZE in Phase-I in deploying Striga resistant hybrids in eastern Africa.	Deploying improved MAIZE hybrids, through an array of seed company partners in eastern and southern Africa.
Aberra Debelo	Sasakawa Africa Association / Sasakawa Global 2000	Active partner of MAIZE in Ethiopia, Nigeria, Mali and Uganda, focusing on improved adoption of higher-yielding varieties (including QPM under NuME Project in Ethiopia) and enhanced production practices by smallholders.	http://www.safe.org
Ivan Rwomushana	AFSTA (African Seed Trade Association)	AFSTA is a not-for-profit membership association formed in 2000 to champion interests of private seed companies in Africa. Currently, AFSTA has about 100 members comprising of seed companies and National Seed Trade Associations, among others. AFSTA actively partners with MAIZE in the MLN-Africa Project.	http://afsta.org
Bijendra Pal	Bioseed-Asia	Active partner under International Maize Improvement Consortium (IMIC) in Asia.	Long experience in developing and deploying improved maize hybrids in South and SE Asia
D.B. Bhandari	Hariyali Community Seed Company, Nepal	MAIZE Phase-I Competitive Grant Project. First community seed company producing and marketing improved maize seed in the hills of Nepal (established and supported by	Gadal N, Bhandari DB, Pandey A, Dilli Bahadur KC, Dhami NB (2014) Community-managed seed production company in the hills of Nepal. In: Prasanna BM et al. (Eds). Book of Extended Summaries, 12th Asian Maize Conference and Expert Consultation on Maize for Food, Feed,

		Hill Maize Research Project till 2015)	Nutrition and Environmental Security. Bangkok, Thailand, October 30 – November 1, 2014. CIMMYT, Mexico D.F. and APAARI, Bangkok, pp. 238-242.
Md. Abdul Mazid & Sudhir Chandra Nath	BRAC (Bangladesh Rural Advancement Committee)	Partners with MAIZE in scaling-up and deploying improved MAIZE hybrids in Bangladesh, and more recently in eastern Africa.	http://www.brac.net
Maria Esther Rivas	Bidasem, Mexico	Maria Esther Rivas is director general of a small seed company, Bidasem, based in the central Mexican plains region known as the Bajio. Each year her company produces >20,000 bags of maize seed, each holding 22.5 kg. The company's maize hybrids have all been developed from freely-available CIMMYT parent lines.	http://www.bidasem.com

FP4: Sustainable Intensification of Maize-based Systems for Better Livelihoods of Smallholders

Principal Investigator / Key Collaborator	Organization	Key Project(s) / Collaboration	Relevant Key Publications / Experience
Ken Cassman	Univ. of Nebraska	Collaboration with Global Yield Gap Atlas which is an international project with collaboration among agronomists with knowledge of production systems, soils, and climate governing crop performance in their countries. A standard protocol for assessing yield gap and water productivity will be applied for all crops and countries using a bottom-up approach based on actual data and robust crop simulation models.	Stevenson, J.R., Serraj, R., Cassman, K.G., 2014. Evaluating conservation agriculture for small-scale farmers in Sub-Saharan Africa and South Asia. Agric. Ecosyst. Environ.
Martin van Ittersum	Wageningen University and Research Center (WUR)	Same as above + contribution to IITA/CIMMYT TAMASA project in Ethiopia, Tanzania and Nigeria (co-supervision of project funded PhD students)	Ittersum, M. van, Cassman, K., Grassini, P., 2012. Yield gap analysis with local to global relevance—A review. F. Crop. Res.

Sieg Snapp	Michigan State University	Mentoring graduate students and young scientists in agronomy, soil science (particularly biology), geography, applied economics, and agricultural systems modeling. In addition to PhD student advising, MSU has considerable experience in short courses and training in research for development skills, including: applied agroecology, participatory research, remote sensing and management/analysis of big data. Contribution on SI indicators and metrics (USAID SIIL/KSU) funding to MSU	Chikowo, R., Zingore, S., Snapp, S., Johnston, A., 2014. Farm typologies, soil fertility variability and nutrient management in smallholder farming in Sub-Saharan Africa. Nutr. Cycl. Agroecosystems 100, 1–18.
Cheryl Palm	Earth Institute at Columbia University	Mentoring of graduate and post-graduate students. Contributions to: 1) develop, test and evaluate cost effect methods for measuring the SI indicators as multiple scale and for multiple stakeholders; 2) efficient monitoring systems using these methods for field collection, to analysis workflows, to tools for effective feedback-interactions with the multiple stakeholders. Along with Sieg at MSU, Cheryl is co-leading the USAID project (through SIIL/KSU) on SI metrics and indicators	Palm, C., Blanco-Canqui, H., DeClerck, F., Gatere, L., Grace, P., 2013. Conservation agriculture and ecosystem services: An overview. Agric. Ecosyst. Environ.
Eric Scoppel and Marc Corbels	CIRAD	Secondment of Marc Corbels from September 2015 to CIMMYT Nairobi to support MAIZE FP1 and FP4 on system's analysis and modeling. CIRAD, CIMMYT and IITA are intending to develop closer collaboration throuhg the development of W3/bilateral project under Phase II. CIRAD is also willing to integrate their research in south-east Asian maize-based systems under MAIZE CRP.	Corbeels, M., de Graaff, J., Ndah, T.H., Penot, E., Baudron, F., Naudin, K., Andrieu, N., Chirat, G., Schuler, J., Nyagumbo, I., Rusinamhodzi, L., Traore, K., Mzoba, H.D., Adolwa, I.S., 2014. Understanding the impact and adoption of conservation agriculture in Africa: A multi-scale analysis. Agric. Ecosyst. Environ. 187, 155–170.
Mariana Wongtschowski	KIT, Netherlands	Mariana has been a MAIZE key partner during Phase-I (W1/2 funded) contributing to methodological development and implementation of innovation approaches in Africa, Asia and Latin America. Other KIT scientists also contributed to gender research and research on institutional arrangements. KIT will continue to be a partner in MAIZE Phase-II.	Nederlof, S., Wongtschowski, M., van der Lee, F. (2011) Putting heads together: agricultural innovation platforms in practice. KIT Publishers, KIT Development, Policy & Practice.
Roel Merckx	KU, Leuven	Roel Merckx is presently involved in TAMASA project through PhD students. His contribution related to the 'state of the art' methods and tools for improved nutrient management will be enhanced in Phase-II	Six, L., Smolders, E., Merckx, R., 2014. Testing phosphorus availability for maize with DGT in weathered soils amended with organic materials. Plant Soil 376, 177–192.
Johan Six	ETH, Zurich	Johan Six will contribute to MAIZE research on SI and soil fertility issues from a system's perspective.	Vanlauwe, B., Six, J., Sanginga, N., Adesina, A.A., 2015. Soil fertility decline at the base of rural poverty in sub-Saharan Africa. Nat. Plants 1.

Pablo Zarco-Tejada	Institute for Sustainable Agriculture (IAS), National Resaearch Council, Cordoba, Spain	Pablo Zarco has been the recipient of MAIZE and WHEAT W1/2 funding to build CIMMYT's capacity on the use of UAV and airborne instruments, and management/processing of RS data. The on-going collaboration will be maintained/reinforced during Phase II (including contribution to phenotyping).	Delalieux, S., Zarco-Tejada, P.J., Tits, L., Jimenez Bello, M.A., Intrigliolo, D.S., Somers, B., 2014. Unmixing-based fusion of hyperspatial and hyperspectral airborne imagery for early detection of vegetation stress. Sel. Top. Appl. Earth Obs. Remote Sensing, IEEE J. 7, 2571–2582.
Raul Zurita-Milla	ITC, University of Twente	ITC is leading the remote sensing STARS project funded by BMGF. Raul and ITC colleagues will assist MAIZE to implement best RS methods and practices, and contribute to capacity building of several partners in the field of geospatial research.	Imran, M., Stein, A., Zurita-Milla, R., 2015. Using geographically weighted regression kriging for crop yield mapping in West Africa. Int. J. Geogr. Inf. Sci. 29, 234–257.
Kaushik Majumdar	International Plant Nutrition Insitute (IPNI)	Kaushik has been the recipient of MAIZE W1/2 funding under phase I to develop field level nutrient management decision support tools in South Asia. IPNI Africa (Shamie Zingore) was also the recipient a MAIZE grant. Further IPNI contribution is expected in Phase-II on scaling soil fertility management tools.	Dutta, S.K., Majumdar, K., Satyanarayana, T., 2014. India: Nutrient Expert: A precision nutrient management tool for smallholder production systems of India. Crop. Soils 47, 23–25.
Jeroen Groot	Wageningen University and Research Center (WUR)	Jeroen and other colleagues at Farming Systems Ecology Group received MAIZE and WHEAT W1/2 funding. The research project 'Trajectories and Trade-offs for Intensification of Cereal-based Systems (ATTIC)' is hosting four PhD students working in Ethiopia, Bangladesh, Nepal, and Mexico. ATTIC provides an excellent platform to research and exchange on farming systems analyses and modeling.	Valbuena, D., Groot, J.C.J., Mukalama, J., Gérard, B., Tittonell, P., 2014. Improving rural livelihoods as a “moving target”: trajectories of change in smallholder farming systems of Western Kenya. Reg. Environ. Chang. 1–13.
Saidi Mkomwa	African Conservation Tillage Network (ACTN)	ACTN is a registered as a pan-African not-for-profit membership association that was initially commissioned with geographical focus on Southern, Central and East Africa. However, the Network has expanded responding to active interest from rest of the continent to west and North Africa. Existing potential for synergistic collaborations and knowledge sharing, enriched by the diversity, across the continent has justified ACTN reformation into a pan-African establishment with networking value within and between regions. Membership to the Network is voluntary bringing together stakeholders. Strong collaboration with CIMMYT/MAIZE was developed under FACASI project and should further develop under Phase-II.	Baudron, F., Sims, B., Justice, S., Kahan, D.G., Rose, R., Mkomwa, S., Kaumbutho, P., Sariah, J., Nazare, R., Moges, G., Gérard, B., 2015. Re-examining appropriate mechanization in Eastern and Southern Africa: two-wheel tractors, conservation agriculture, and private sector involvement. Food Security. 1–16.

Trent Bunderson	Total Landcare	TLC's mandate is to improve the livelihoods of smallholder farmers in the region with a focus on community based approaches to increase agricultural production, food security and incomes within a context that ensures sound management of their natural resources. A key thrust is to provide information to decision-makers to improve policies that support economic development and growth in a sustainable manner. CIMMYT has collaborated extensively with TLC in Zambia and Malawi, providing scientific backstoping to TLC scaling efforts.	http://www.totallandcare.org/
iDE, Bangladesh		iDE is a non-profit, non-governmental organization with over 30 years of experience in designing and delivering market based anti-poverty programs. We believe that markets can be a powerful force for improving the prosperity of rural communities. Throughout our programs we deploy business models, appropriate technologies, and agricultural science to facilitate market systems which work for the poor. iDE is a key scaling partner for our CSISA-MI project.	http://www.ide-bangladesh.org/
Ken Cassman; Martin van Ittersum	Univ. of Nebraska; Wageningen UR	Agro-ecological spatial framework for improved upscaling, impact assessment, and locating fieldwork and innovation testing	Van Bussel, L.G.J., P. Grassini, J. van Wart, J. Wolf, L. Claessens, H. Yang, H. Boogaard, H. de Groot, K. Saito, K.G. Cassman and M.K. van Ittersum. 2015. From field to atlas: Upscaling of location-specific yield gap estimates. Field Crops Res. 177: 98–108. Van Wart J, van Bussel LGJ, Wolf J, Licker R, Grassini P, Nelson A, Boogaard H, Gerber J, Mueller ND, Claessens L, van Ittersum MK, Cassman KG. 2013. Use of agro-climatic zones to upscale simulated crop yield potential. Field Crops Res. 143:44-55.

FP5: Adding Value for Maize Producers, Processors and Consumers

Principal Investigator / Key Collaborator	Organization	Key Project(s) / Product(s)	Relevant Key Publications / Experience
Silverio Garcia	Tecnologico de Monterrey	Postharvest technologies for Mexico and Central America (Project funded by Mexican government-SAGARPA)	Castro-Alvarez F, William M, Bergvinson D, Garcia-Lara S. 2014. Genetic mapping of QTL for maize weevil resistance in a RIL population of tropical maize. Theoretical and Applied Genetics 128
Gricelda Vazquez	INIFAP (Mexico)	Maize grain quality for lime-cooking (Project funded by Mexican government-SAGARPA)	Miranda, A., Vázquez-Carrillo, G., Garcia-Lara, S., San Vicente, F., Torres, J.L., Ortiz, S., Salinas-Moreno, Y., Palacios-Rojas, N. (2012). Influence of genotype and environmental adaptation into the maize quality traits for nixtamalization. *CyTA Journal of Food (*DOI:10.1080/19476337.2013.763862)
Michael Blummel	ILRI	Superior dual-purpose maize hybrids for more and better food and fodder- MAIZE phase I	Erenstein, O., Blümmel, M. and Grings, E. 2013. Potential for dual-purpose maize varieties to meet changing maize demands: Overview. Field crop res.
Kingsly Ambrose	Purdue University	Reduction is post-harvest losses of cereal grains (Feed the Future Innovation Lab). Effect of aeration on grain pack factor for corn.	J. Boac, R.P. Kingsly Ambrose, M. Casada, R. Maghirang, and Dirk Maier. 2014. Applications of discrete element method in modeling of grain postharvest operations. Food Engineering Reviews, 6:128-149.
Betty Bugusu	Purdue University	USAID Feed The Future Food Processing and Post-harvest handling Innovation Lab Focus Development and Assessment of a Fortified Instant Cereal Produce for Senegalese Market.	Sarah Davis Ohlhorst, SD, Slavin, M, Bhide, JM, Bugusu, B. 2012. Use of Iodized Salt in Processed Foods in Select Countries around the World and the Role of Food Processors. Comprehensive Reviews in Food Science and Food Safety 11(2): 233-284.
James Lowenberg-DeBoer	Purdue University	Postharvest storage	Otoo, Miriam, Germaine Ibro, Joan Fulton and J. Lowenberg-DeBoer (2015). Micro-Entrepreneurship in Niger: Factors Affecting Success of Women Street Food Vendors," *Journal of African Business* (forthcoming).
Klein E. Ileleji	Purdue University	Global Food Security Initiative Seed funded project on Post-Harvest Loss and Mycotoxin Reduction in the Commodity Value Chain in Maize (Corn) Production in Ghana. Purdue Improved Drying Stove (PIDS) R&D.	Opit, G.P., S. McNeill, and K. Ileleji*. 2011. Use Integrated Pest Management (IPM) when Storing Grain… for Good and Safe Control of Grain Pests, & for Increased Food Availability and Profits. Poster. Oklahoma State University Cooperative Extension, Stillwater, OK. Extension Publication # L-351.

Mario G. Ferruzzi	Purdue University	Phytochemicals, micronutrients and health: Analysis in food and biological matrices; Bioavailability of polyphenols and carotenoids; Effects of processing on micronutrient and phytochemical stability, bioavailability and bioactivity; Nutritional/functional product development.	Ferruzzi, M.G., Bordenave, N., Hamaker, B.R. (2012) Does flavor impact function? Potential consequences of polyphenol-protein interactions in delivery and bioactivity of flavan-3-ols from foods. *Physiology and Behavior.* 107(4):591-597.

3.18 Flagship Budget and Analysis

CRP on Maize
FP1 Enhancing Maize's R4D Strategy for impact

Prepared by:	Ramiro Tovar
Date submitted:	

Template version 2015-01-14.1

Legend for cell formatting:

Enter information into light yellow cells
Enter actual expenditures into green cells
Blue cells will be populated by CO

GENERAL INFORMATION

Proposal Information

CRP Name	CRP on Maize
Flagship Title	FP1 Enhancing Maize's R4D Strategy for impact
How are you using the template?	Consolidated Flagship
CRP Lead Center's Name	CIMMYT
Requested Amount	**$23,082,509**
Total Project Cost	**$34,276,022**

Budgeting & Reporting Periods

Anticipated Start Date	01-Jan-17
Anticipated End Date	31-Dec-22
Project Duration (months)	72.0

Reporting Periods	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Period Start Date	**01-Jan-17**	**01-Jan-18**	**01-Jan-19**	**01-Jan-20**	**01-Jan-21**	**01-Jan-22**		
Period End Date	**31-Dec-17**	**31-Dec-18**	**31-Dec-19**	**31-Dec-20**	**31-Dec-21**	**31-Dec-22**		
Number of Months	12.0	12.0	12.0	12.0	12.0	12.0		

Other Budget Factors

Is this a new version of a previously approved budget?	No

Participating Partners' information

	List of Participating Partners	Primary Indirect Cost (IDC) Rate	Pass-thru IDC Rate
1	CIMMYT	15.0%	5.0%
2	IITA	16.5%	16.5%
3			
4			
5			

FINANCIAL SUMMARY & REPORTING

Expand/Collapse sections to see/hide the budget and actuals & projections →

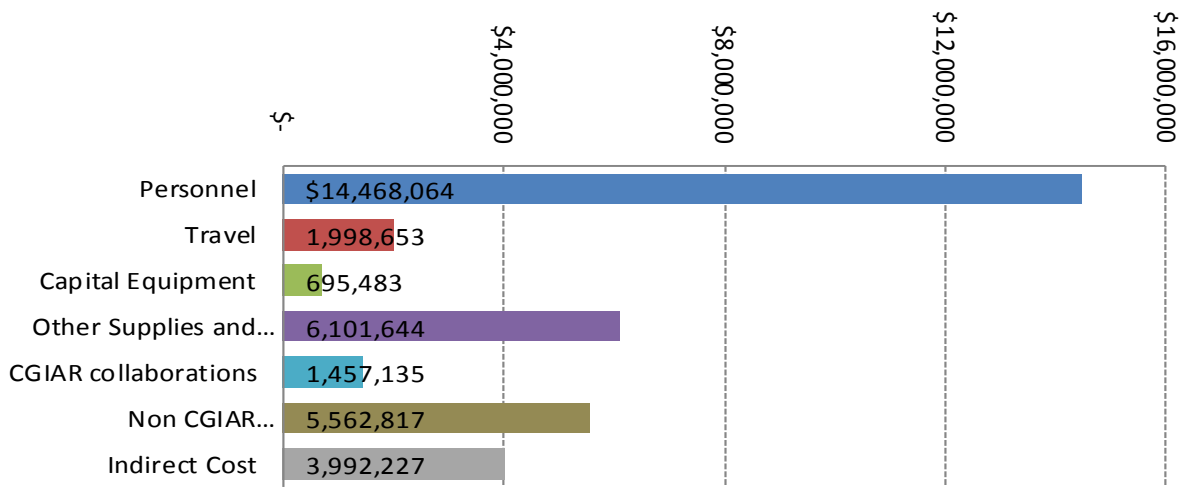
Budget

Budget

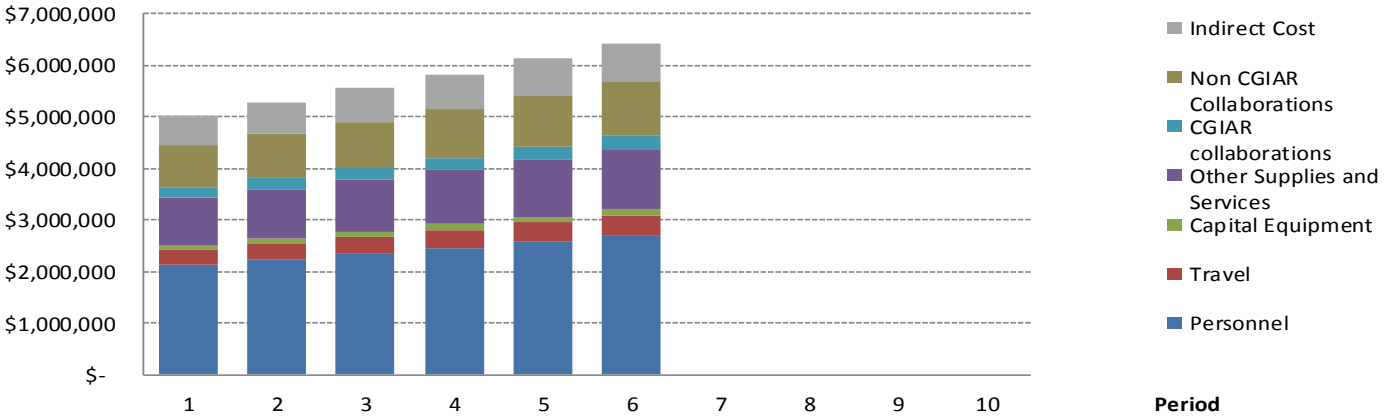
Prepared by: Ramiro Tovar

	Period 1 Jan-17 - Dec-17 Budget	Period 2 Jan-18 - Dec-18 Budget	Period 3 Jan-19 - Dec-19 Budget	Period 4 Jan-20 - Dec-20 Budget	Period 5 Jan-21 - Dec-21 Budget	Period 6 Jan-22 - Dec-22 Budget	TOTAL
Uses of Funds by Expense Category							
Category							TOTAL
Personnel	$ 2,127,058	$ 2,233,411	$ 2,345,082	$ 2,462,336	$ 2,585,453	$ 2,714,725	$ 14,468,064
Travel	293,837	308,529	323,956	340,146	357,159	375,025	1,998,653
Capital Equipment	102,248	107,361	112,729	118,363	124,283	130,500	695,483
Other Supplies and Services	897,050	941,902	988,997	1,038,425	1,090,364	1,144,905	6,101,644
CGIAR collaborations	214,225	224,936	236,183	247,986	260,390	273,415	1,457,135
Non CGIAR Collaborations	817,833	858,724	901,661	946,723	994,076	1,043,800	5,562,817
TOTAL DIRECT COST	**4,452,251**	**4,674,864**	**4,908,607**	**5,153,979**	**5,411,725**	**5,682,369**	**30,283,796**
Indirect Cost	586,928	616,274	647,088	679,435	713,412	749,090	3,992,227
TOTAL BUDGET	**$ 5,039,179**	**$ 5,291,138**	**$ 5,555,695**	**$ 5,833,415**	**$ 6,125,137**	**$ 6,431,459**	**$ 34,276,022**
Breakdown of Budget by Participating Parti							
							TOTAL
CIMMYT	$ 4,137,827	$ 4,344,719	$ 4,561,955	$ 4,790,000	$ 5,029,542	$ 5,281,071	$ 28,145,114
IITA	901,352	946,419	993,740	1,043,415	1,095,595	1,150,388	6,130,908
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
TOTAL BUDGET	**5,039,179**	**5,291,138**	**5,555,695**	**5,833,415**	**6,125,137**	**6,431,459**	**34,276,022**
Funding Plan							
Sources of Funding Needed							TOTAL
W1+W2	$ 1,867,255	1,960,618	2,058,648	2,161,534	2,269,648	2,383,177	$ 12,700,881
W3	1,526,284	1,602,598	1,682,728	1,766,826	1,855,198	1,947,996	10,381,628
Bilateral	1,645,640	1,727,923	1,814,319	1,905,054	2,000,291	2,100,286	11,193,513
Other Sources							-
TOTAL FUNDING PLAN	**5,039,179**	**5,291,138**	**5,555,695**	**5,833,414**	**6,125,137**	**6,431,459**	**34,276,022**
Sources of Funding Secured							TOTAL
W1+W2 (Assumed Secured)	1,867,255	1,960,618	2,058,648	2,161,534	2,269,648	2,383,177	$ 12,700,881
W3	194,812	-	-	-	-	-	194,812
Bilateral	1,024,857	268,098	-	-	-	-	1,292,955
Other Sources							-
TOTAL SECURED	**3,086,923**	**2,228,715**	**2,058,648**	**2,161,534**	**2,269,648**	**2,383,177**	**14,188,647**
TOTAL FUNDING GAP OVER/(UNDER)	**$ (1,952,255)**	**$ (3,062,423)**	**$ (3,497,047)**	**$ (3,671,880)**	**$ (3,855,488)**	**$ (4,048,281)**	**$ (20,087,375)**
W1+W2 (Required from SO)	-	-	-	-	-	-	-
W3 (Required from FC Members)	(1,331,472)	(1,602,598)	(1,682,728)	(1,766,826)	(1,855,198)	(1,947,996)	(10,186,816)
Bilateral (Fundraising)	(620,783)	(1,459,825)	(1,814,319)	(1,905,054)	(2,000,291)	(2,100,286)	(9,900,558)
Other Sources (Fundraising)	-	-	-	-	-	-	-

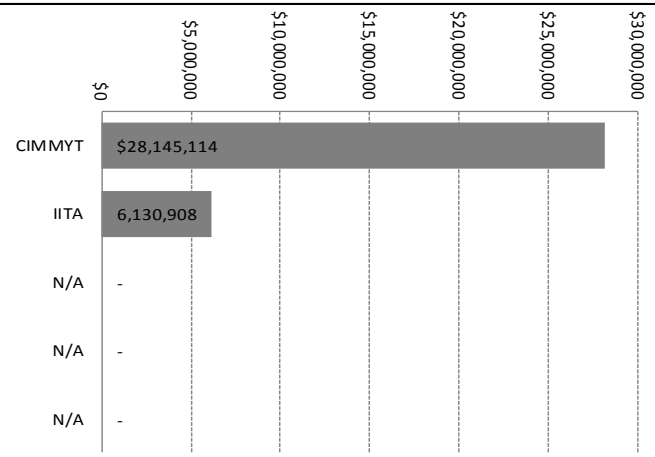
Total Amount by Category



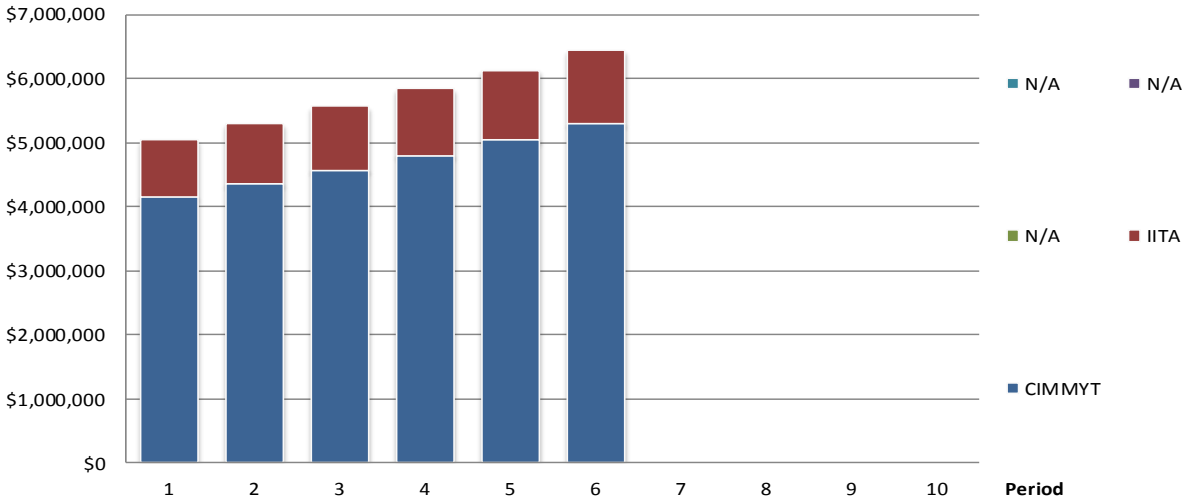
Amount by Category for Each Period



Total Amounts for Additional Dimension



Amounts for Additional Dimension



CRP on Maize
FP2 Novel Diversity and Tools for increasing Genetic Gains

Prepared by:	Ramiro Tovar
Date submitted:	

Template version 2015-01-14.1

Legend for cell formatting:

Enter information into light yellow cells
Enter actual expenditures into green cells
Blue cells will be populated by CO

GENERAL INFORMATION

Proposal Information

CRP Name	CRP on Maize
Flagship Title	FP2 Novel Diversity and Tools for increasing Genetic Gains
How are you using the template?	Consolidated Flagship
CRP Lead Center's Name	CIMMYT
Requested Amount	**$45,551,396**
Total Project Cost	**$50,953,774**

Budgeting & Reporting Periods

Anticipated Start Date	01-Jan-17
Anticipated End Date	31-Dec-22
Project Duration (months)	72.0

Reporting Periods	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Period Start Date	**01-Jan-17**	**01-Jan-18**	**01-Jan-19**	**01-Jan-20**	**01-Jan-21**	**01-Jan-22**		
Period End Date	**31-Dec-17**	**31-Dec-18**	**31-Dec-19**	**31-Dec-20**	**31-Dec-21**	**31-Dec-22**		
Number of Months	12.0	12.0	12.0	12.0	12.0	12.0		

Other Budget Factors

Is this a new version of a previously approved budget?	No

Participating Partners' information

	List of Participating Partners	Primary Indirect Cost (IDC) Rate	Pass-thru IDC Rate
1	CIMMYT	15.0%	5.0%
2	IITA	16.5%	16.5%
3			
4			
5			

FINANCIAL SUMMARY & REPORTING

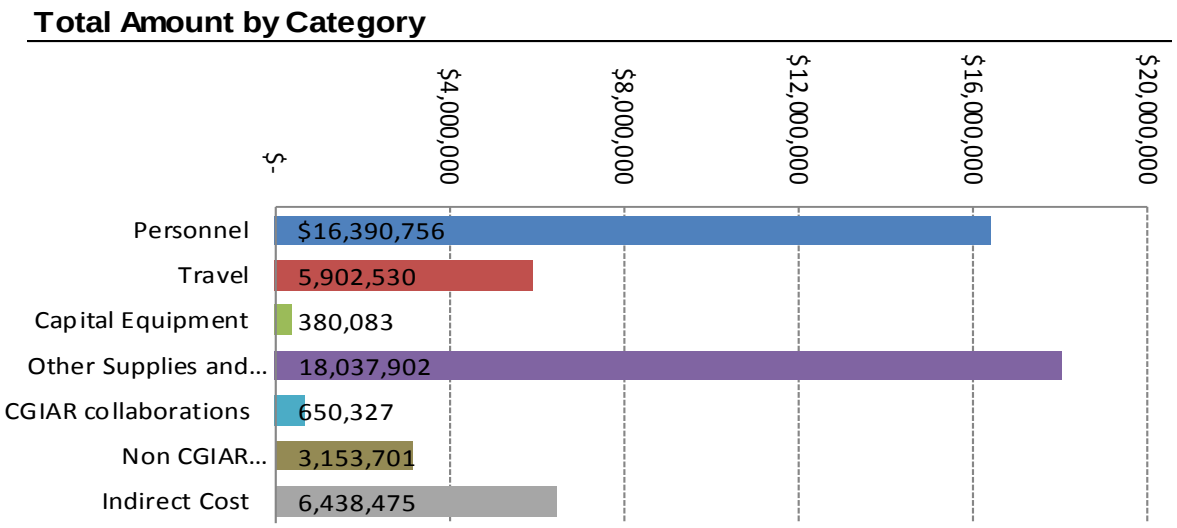
Expand/Collapse sections to see/hide the budget and actuals & projections →

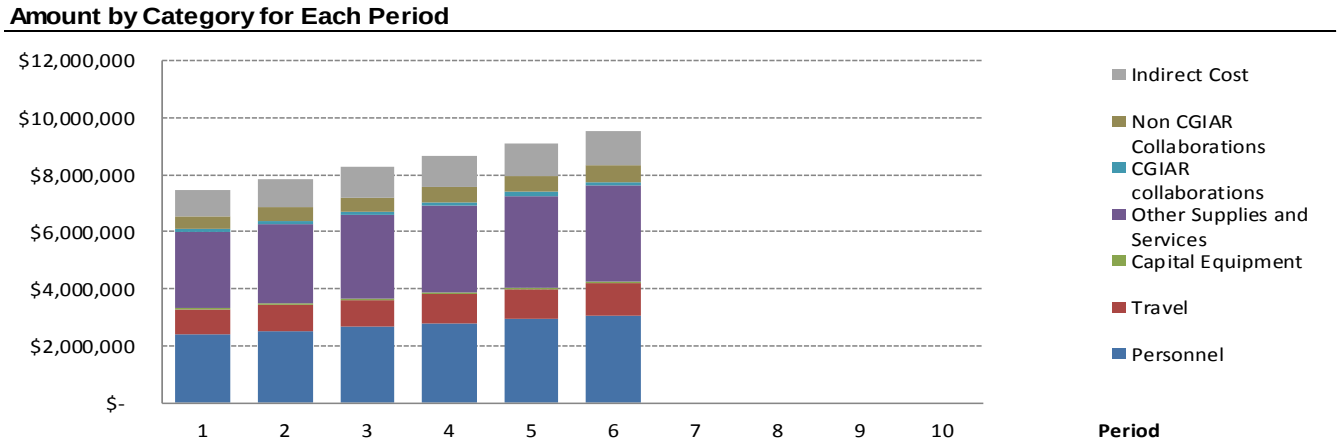
Budget

Budget

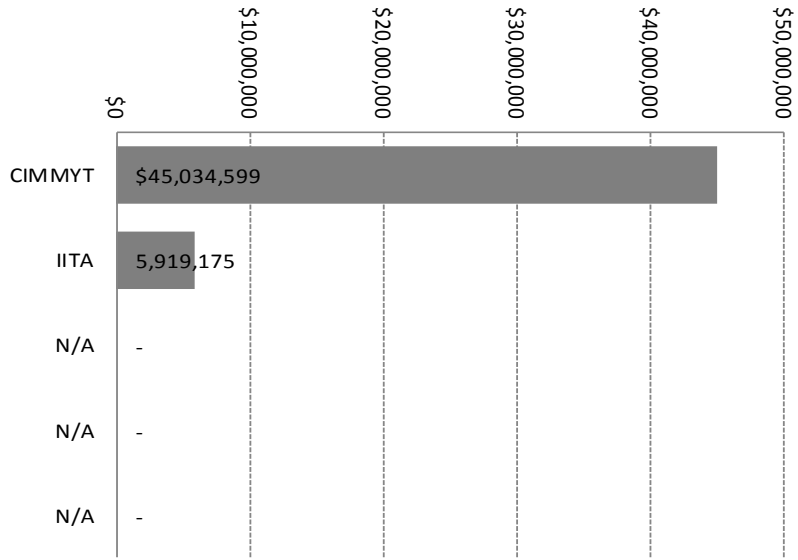
Prepared by: Ramiro Tovar

	Period 1 Jan-17 - Dec-17 Budget	Period 2 Jan-18 - Dec-18 Budget	Period 3 Jan-19 - Dec-19 Budget	Period 4 Jan-20 - Dec-20 Budget	Period 5 Jan-21 - Dec-21 Budget	Period 6 Jan-22 - Dec-22 Budget	TOTAL
Uses of Funds by Expense Category							
Category							
Personnel	$ 2,409,727	$ 2,530,214	$ 2,656,725	$ 2,789,561	$ 2,929,039	$ 3,075,491	$ 16,390,756
Travel	867,777	911,165	956,724	1,004,538	1,054,782	1,107,543	5,902,530
Capital Equipment	55,879	58,673	61,607	64,685	67,921	71,318	380,083
Other Supplies and Services	2,651,892	2,784,486	2,923,711	3,069,830	3,223,374	3,384,609	18,037,902
CGIAR collaborations	95,610	100,390	105,410	110,678	116,213	122,027	650,327
Non CGIAR Collaborations	463,650	486,832	511,174	536,721	563,567	591,756	3,153,701
TOTAL DIRECT COST	**6,544,534**	**6,871,761**	**7,215,349**	**7,576,013**	**7,954,896**	**8,352,745**	**44,515,299**
Indirect Cost	946,569	993,898	1,043,593	1,095,758	1,150,557	1,208,100	6,438,475
TOTAL BUDGET	**$ 7,491,104**	**$ 7,865,659**	**$ 8,258,942**	**$ 8,671,771**	**$ 9,105,454**	**$ 9,560,844**	**$ 50,953,774**
Breakdown of Budget by Participating Parti							
							TOTAL
CIMMYT	$ 6,620,881	$ 6,951,925	$ 7,299,521	$ 7,664,391	$ 8,047,695	$ 8,450,186	$ 45,034,599
IITA	870,223	913,734	959,421	1,007,380	1,057,759	1,110,658	5,919,175
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
TOTAL BUDGET	**7,491,104**	**7,865,659**	**8,258,942**	**8,671,771**	**9,105,454**	**9,560,844**	**50,953,774**
Funding Plan							
Sources of Funding Needed							TOTAL
W1+W2	$ 2,285,078	2,399,331	2,519,298	2,645,206	2,777,512	2,916,444	$ 15,542,869
W3	4,411,786	4,632,375	4,863,994	5,107,083	5,362,526	5,630,762	30,008,527
Bilateral	794,241	833,952	875,650	919,480	965,417	1,013,638	5,402,378
Other Sources							-
TOTAL FUNDING PLAN	**7,491,104**	**7,865,659**	**8,258,942**	**8,671,770**	**9,105,454**	**9,560,845**	**50,953,774**
Sources of Funding Secured							TOTAL
W1+W2 (Assumed Secured)	2,285,078	2,399,331	2,519,298	2,645,206	2,777,512	2,916,444	$ 15,542,869
W3	746,354	-	-	-	-	-	746,354
Bilateral	756,476	339,233	300,179	-	-	-	1,395,888
Other Sources							-
TOTAL SECURED	**3,787,907**	**2,738,564**	**2,819,477**	**2,645,206**	**2,777,512**	**2,916,444**	**17,685,110**
TOTAL FUNDING GAP OVER/(UNDER)	**$ (3,703,198)**	**$ (5,127,094)**	**$ (5,439,465)**	**$ (6,026,564)**	**$ (6,327,943)**	**$ (6,644,400)**	**$ (33,268,663)**
W1+W2 (Required from SO)	-	-	-	-	-	-	-
W3 (Required from FC Members)	(3,665,432)	(4,632,375)	(4,863,994)	(5,107,083)	(5,362,526)	(5,630,762)	(29,262,174)
Bilateral (Fundraising)	(37,765)	(494,719)	(575,471)	(919,480)	(965,417)	(1,013,638)	(4,006,490)
Other Sources (Fundraising)	-	-	-	-	-	-	-

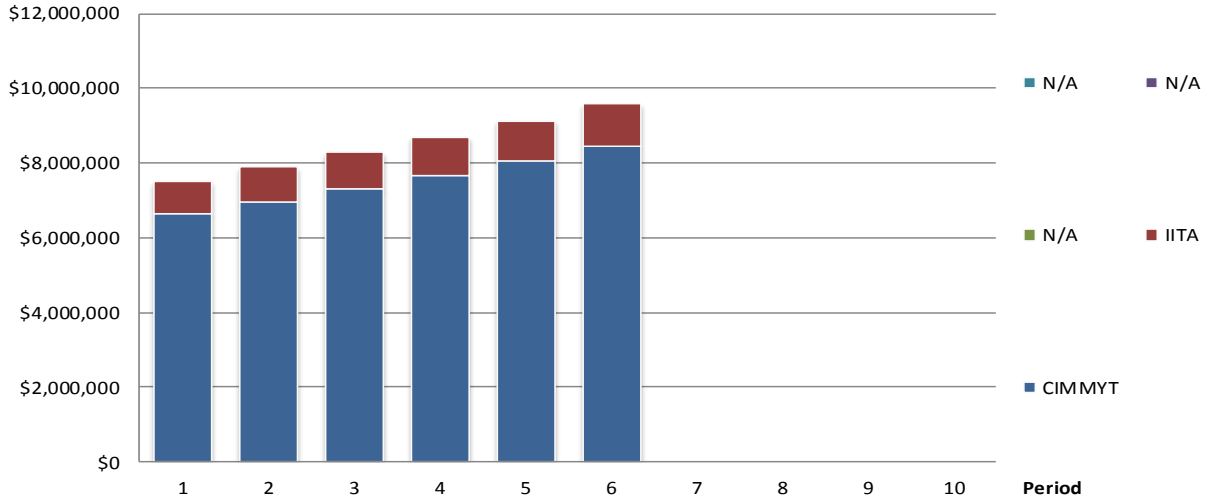

Total Amount by Category
$-
$4,000,000
$8,000,000
$12,000,000
$16,000,000
$20,000,000
Personnel
$16,390,756
Travel
5,902,530
Capital Equipment
380,083
Other Supplies and...
18,037,902
CGIAR collaborations
650,327
Non CGIAR...
3,153,701
Indirect Cost
6,438,475


Amount by Category for Each Period
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
1
2
3
4
5
6
7
8
9
10
Period
Indirect Cost
Non CGIAR Collaborations
CGIAR collaborations
Other Supplies and Services
Capital Equipment
Travel
Personnel

Total Amounts for Additional Dimension



Amounts for Additional Dimension



CRP on Maize
FP3 Stress Tolerant and Nutritious Maize

Prepared by: Ramiro Tovar

Date submitted:

Template version 2015-01-14.1

Legend for cell formatting:

Enter information into light yellow cells
Enter actual expenditures into green cells
Blue cells will be populated by CO

GENERAL INFORMATION

Proposal Information

CRP Name	CRP on Maize
Flagship Title	FP3 Stress Tolerant and Nutritious Maize
How are you using the template?	Consolidated Flagship
CRP Lead Center's Name	CIMMYT
Requested Amount	**$121,088,433**
Total Project Cost	**$189,857,993**

Budgeting & Reporting Periods

Anticipated Start Date	01-Jan-17
Anticipated End Date	31-Dec-22
Project Duration (months)	72.0

Reporting Periods	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Period Start Date	**01-Jan-17**	**01-Jan-18**	**01-Jan-19**	**01-Jan-20**	**01-Jan-21**	**01-Jan-22**		
Period End Date	**31-Dec-17**	**31-Dec-18**	**31-Dec-19**	**31-Dec-20**	**31-Dec-21**	**31-Dec-22**		
Number of Months	12.0	12.0	12.0	12.0	12.0	12.0		

Other Budget Factors

Is this a new version of a previously approved budget? No

Participating Partners' information

	List of Participating Partners	Primary Indirect Cost (IDC) Rate	Pass-thru IDC Rate
1	CIMMYT	15.0%	5.0%
2	IITA	16.5%	16.5%
3			
4			
5			

FINANCIAL SUMMARY & REPORTING

Expand/Collapse sections to see/hide the budget and actuals & projections →

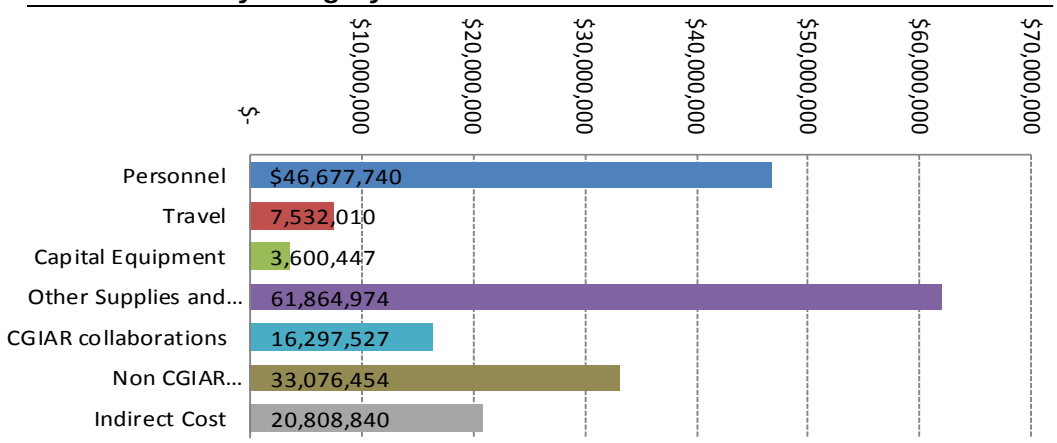
Budget

Budget

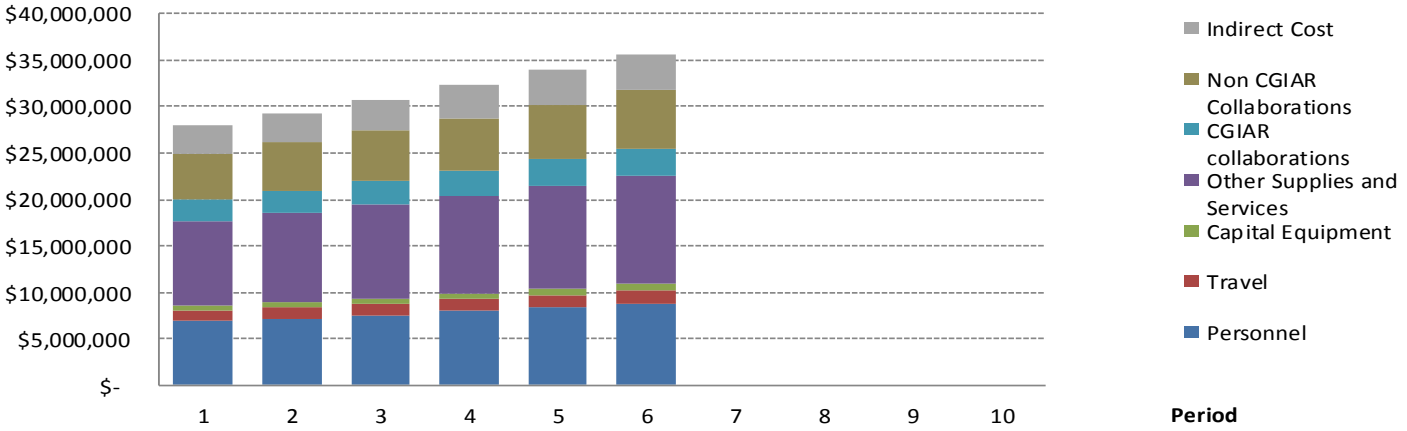
Prepared by: Ramiro Tovar

	Period 1 Jan-17 - Dec-17 Budget	Period 2 Jan-18 - Dec-18 Budget	Period 3 Jan-19 - Dec-19 Budget	Period 4 Jan-20 - Dec-20 Budget	Period 5 Jan-21 - Dec-21 Budget	Period 6 Jan-22 - Dec-22 Budget	
Uses of Funds by Expense Category							
Category							TOTAL
Personnel	$ 6,862,443	$ 7,205,565	$ 7,565,844	$ 7,944,136	$ 8,341,342	$ 8,758,410	$ 46,677,740
Travel	1,107,339	1,162,706	1,220,841	1,281,856	1,345,971	1,413,297	7,532,010
Capital Equipment	529,330	555,796	583,586	612,752	643,400	675,583	3,600,447
Other Supplies and Services	9,095,249	9,550,011	10,027,512	10,528,660	11,055,275	11,608,266	61,864,974
CGIAR collaborations	2,396,026	2,515,827	2,641,618	2,773,639	2,912,369	3,058,048	16,297,527
Non CGIAR Collaborations	4,862,826	5,105,967	5,361,265	5,629,207	5,910,765	6,206,424	33,076,454
TOTAL DIRECT COST	**24,853,212**	**26,095,873**	**27,400,667**	**28,770,250**	**30,209,122**	**31,720,028**	**169,049,152**
Indirect Cost	3,059,267	3,212,230	3,372,842	3,541,433	3,718,545	3,904,523	20,808,840
TOTAL BUDGET	**$ 27,912,479**	**$ 29,308,103**	**$ 30,773,508**	**$ 32,311,683**	**$ 33,927,668**	**$ 35,624,551**	**$ 189,857,993**
Breakdown of Budget by Participating Partı							
							TOTAL
CIMMYT	$ 25,982,789	$ 27,281,929	$ 28,646,025	$ 30,077,856	$ 31,582,125	$ 33,161,702	$ 176,732,426
IITA	1,929,690	2,026,174	2,127,483	2,233,827	2,345,543	2,462,850	13,125,567
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
TOTAL BUDGET	**27,912,479**	**29,308,103**	**30,773,508**	**32,311,683**	**33,927,668**	**35,624,551**	**189,857,993**
Funding Plan							
Sources of Funding Needed							TOTAL
W1+W2	$ 3,123,179	3,279,338	3,443,305	3,615,392	3,796,224	3,986,114	$ 21,243,552
W3	14,678,969	15,412,918	16,183,564	16,992,375	17,842,287	18,734,768	99,844,881
Bilateral	10,110,331	10,615,847	11,146,640	11,703,916	12,289,157	12,903,669	68,769,559
Other Sources							-
TOTAL FUNDING PLAN	**27,912,479**	**29,308,103**	**30,773,508**	**32,311,683**	**33,927,668**	**35,624,551**	**189,857,992**
Sources of Funding Secured							TOTAL
W1+W2 (Assumed Secured)	3,123,179	3,279,338	3,443,305	3,615,392	3,796,224	3,986,114	$ 21,243,552
W3	5,873,682	-	-	-	-	-	5,873,682
Bilateral	3,842,163	594,438	8,781	8,781	-	-	4,454,164
Other Sources							-
TOTAL SECURED	**12,839,025**	**3,873,777**	**3,452,086**	**3,624,173**	**3,796,224**	**3,986,114**	**31,571,398**
TOTAL FUNDING GAP OVER/(UNDER)	**$ (15,073,454)**	**$ (25,434,326)**	**$ (27,321,422)**	**$ (28,687,510)**	**$ (30,131,444)**	**$ (31,638,437)**	**$ (158,286,594)**
W1+W2 (Required from SO)	-	-	-	-	-	-	-
W3 (Required from FC Members)	(8,805,287)	(15,412,918)	(16,183,564)	(16,992,375)	(17,842,287)	(18,734,768)	(93,971,199)
Bilateral (Fundraising)	(6,268,167)	(10,021,409)	(11,137,859)	(11,695,135)	(12,289,157)	(12,903,669)	(64,315,395)
Other Sources (Fundraising)	-	-	-	-	-	-	-

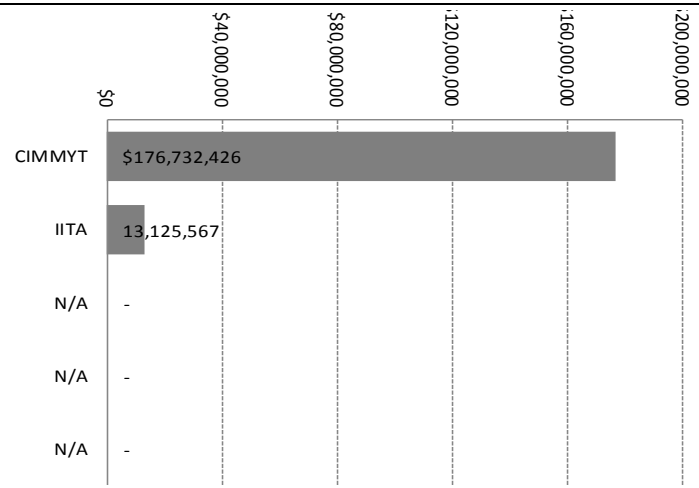
Total Amount by Category



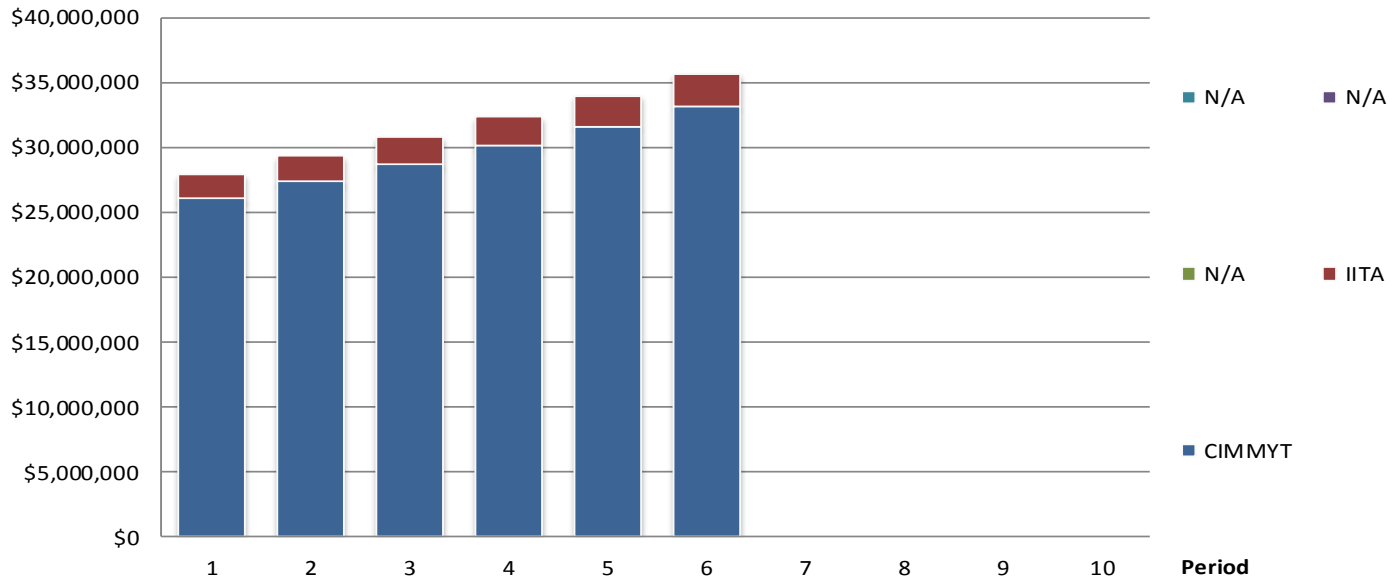
Amount by Category for Each Period



Total Amounts for Additional Dimension



Amounts for Additional Dimension



CRP on Maize
FP4 Sustainable intensification of maize-based systems for better livelihoods of smallholders

Prepared by:	Ramiro Tovar
Date submitted:	

Template version 2015-01-14.1

Legend for cell formatting:

Enter information into light yellow cells
Enter actual expenditures into green cells
Blue cells will be populated by CO

GENERAL INFORMATION

Proposal Information

CRP Name	CRP on Maize
Flagship Title	FP4 Sustainable intensification of maize-based systems for better livelihoods of smallholders
How are you using the template?	Consolidated Flagship
CRP Lead Center's Name	CIMMYT
Requested Amount	**$78,521,615**
Total Project Cost	**$161,187,980**

Budgeting & Reporting Periods

Anticipated Start Date	01-Jan-17
Anticipated End Date	31-Dec-22
Project Duration (months)	72.0

Reporting Periods	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Period Start Date	**01-Jan-17**	**01-Jan-18**	**01-Jan-19**	**01-Jan-20**	**01-Jan-21**	**01-Jan-22**		
Period End Date	**31-Dec-17**	**31-Dec-18**	**31-Dec-19**	**31-Dec-20**	**31-Dec-21**	**31-Dec-22**		
Number of Months	12.0	12.0	12.0	12.0	12.0	12.0		

Other Budget Factors

Is this a new version of a previously approved budget?	No

Participating Partners' information

	List of Participating Partners	Primary Indirect Cost (IDC) Rate	Pass-thru IDC Rate
1	CIMMYT	15.0%	5.0%
2	IITA	16.5%	16.5%
3			
4			
5			

FINANCIAL SUMMARY & REPORTING

Expand/Collapse sections to see/hide the budget and actuals & projections →

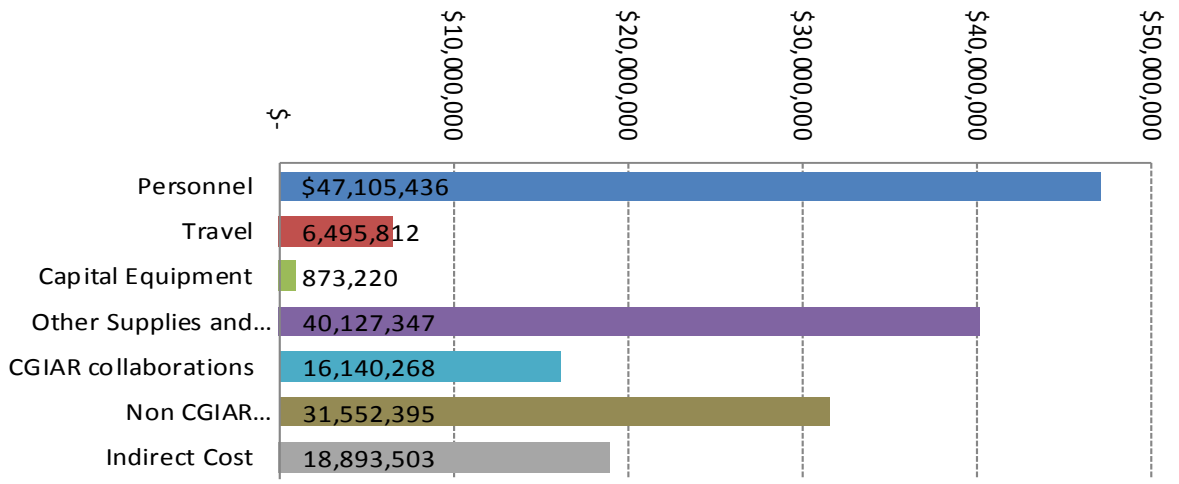
Budget

Budget

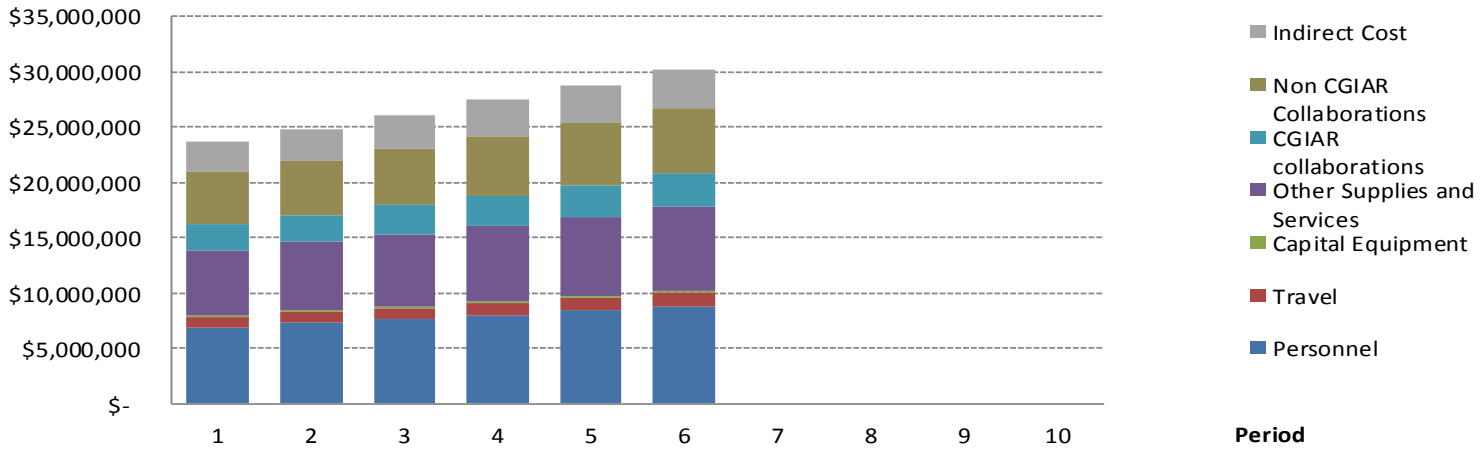
Prepared by: Ramiro Tovar

	Period 1 Jan-17 - Dec-17 Budget	Period 2 Jan-18 - Dec-18 Budget	Period 3 Jan-19 - Dec-19 Budget	Period 4 Jan-20 - Dec-20 Budget	Period 5 Jan-21 - Dec-21 Budget	Period 6 Jan-22 - Dec-22 Budget	TOTAL
Uses of Funds by Expense Category							
Category							TOTAL
Personnel	$ 6,925,322	$ 7,271,588	$ 7,635,167	$ 8,016,926	$ 8,417,772	$ 8,838,661	$ 47,105,436
Travel	955,000	1,002,750	1,052,887	1,105,508	1,160,802	1,218,866	6,495,812
Capital Equipment	128,379	134,798	141,538	148,611	156,044	163,850	873,220
Other Supplies and Services	5,899,432	6,194,404	6,504,124	6,829,182	7,170,760	7,529,445	40,127,347
CGIAR collaborations	2,372,906	2,491,551	2,616,129	2,746,876	2,884,267	3,028,540	16,140,268
Non CGIAR Collaborations	4,638,762	4,870,700	5,114,235	5,369,831	5,638,415	5,920,452	31,552,395
TOTAL DIRECT COST	**20,919,800**	**21,965,790**	**23,064,080**	**24,216,934**	**25,428,060**	**26,699,813**	**142,294,477**
Indirect Cost	2,777,678	2,916,562	3,062,390	3,215,467	3,376,275	3,545,130	18,893,503
TOTAL BUDGET	**$ 23,697,478**	**$ 24,882,352**	**$ 26,126,470**	**$ 27,432,401**	**$ 28,804,335**	**$ 30,244,944**	**$ 161,187,980**
Breakdown of Budget by Participating Partı							
							TOTAL
CIMMYT	$ 11,907,687	$ 12,503,072	$ 13,128,225	$ 13,784,438	$ 14,473,819	$ 15,197,708	$ 80,994,950
IITA	11,789,791	12,379,280	12,998,244	13,647,963	14,330,516	15,047,235	80,193,030
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
TOTAL BUDGET	**23,697,478**	**24,882,352**	**26,126,470**	**27,432,401**	**28,804,335**	**30,244,944**	**161,187,980**
Funding Plan							
Sources of Funding Needed							TOTAL
W1+W2	$ 2,563,385	2,691,555	2,826,132	2,967,375	3,115,795	3,271,649	$ 17,435,891
W3	8,980,685	9,429,720	9,901,206	10,396,041	10,916,023	11,462,049	61,085,724
Bilateral	12,153,407	12,761,078	13,399,132	14,068,982	14,772,517	15,511,247	82,666,363
Other Sources							-
TOTAL FUNDING PLAN	**23,697,478**	**24,882,352**	**26,126,470**	**27,432,399**	**28,804,335**	**30,244,944**	**161,187,978**
Sources of Funding Secured							TOTAL
W1+W2 (Assumed Secured)	2,563,385	2,691,555	2,826,132	2,967,375	3,115,795	3,271,649	$ 17,435,891
W3	7,416,468	6,183,861	2,608,125	854,847	-	-	17,063,301
Bilateral	6,798,940	3,756,779	-	-	-	-	10,555,719
Other Sources							-
TOTAL SECURED	**16,778,793**	**12,632,195**	**5,434,258**	**3,822,222**	**3,115,795**	**3,271,649**	**45,054,911**
TOTAL FUNDING GAP OVER/(UNDER)	**$ (6,918,685)**	**$ (12,250,157)**	**$ (20,692,212)**	**$ (23,610,177)**	**$ (25,688,540)**	**$ (26,973,296)**	**$ (116,133,067)**
W1+W2 (Required from SO)	-	-	-	-	-	-	-
W3 (Required from FC Members)	(1,564,218)	(3,245,859)	(7,293,080)	(9,541,194)	(10,916,023)	(11,462,049)	(44,022,423)
Bilateral (Fundraising)	(5,354,468)	(9,004,299)	(13,399,132)	(14,068,982)	(14,772,517)	(15,511,247)	(72,110,644)
Other Sources (Fundraising)	-	-	-	-	-	-	-

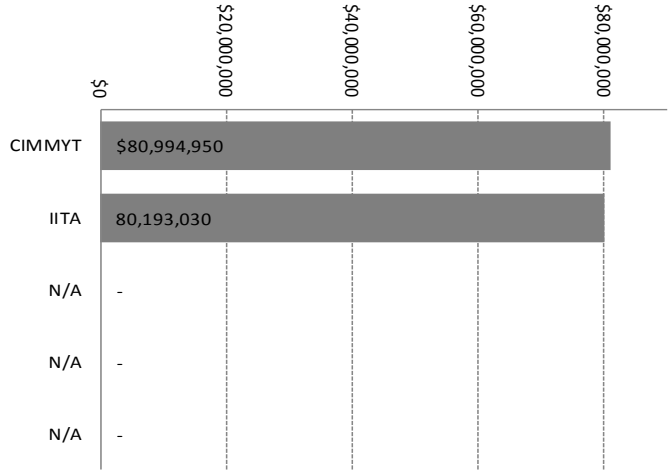
Total Amount by Category



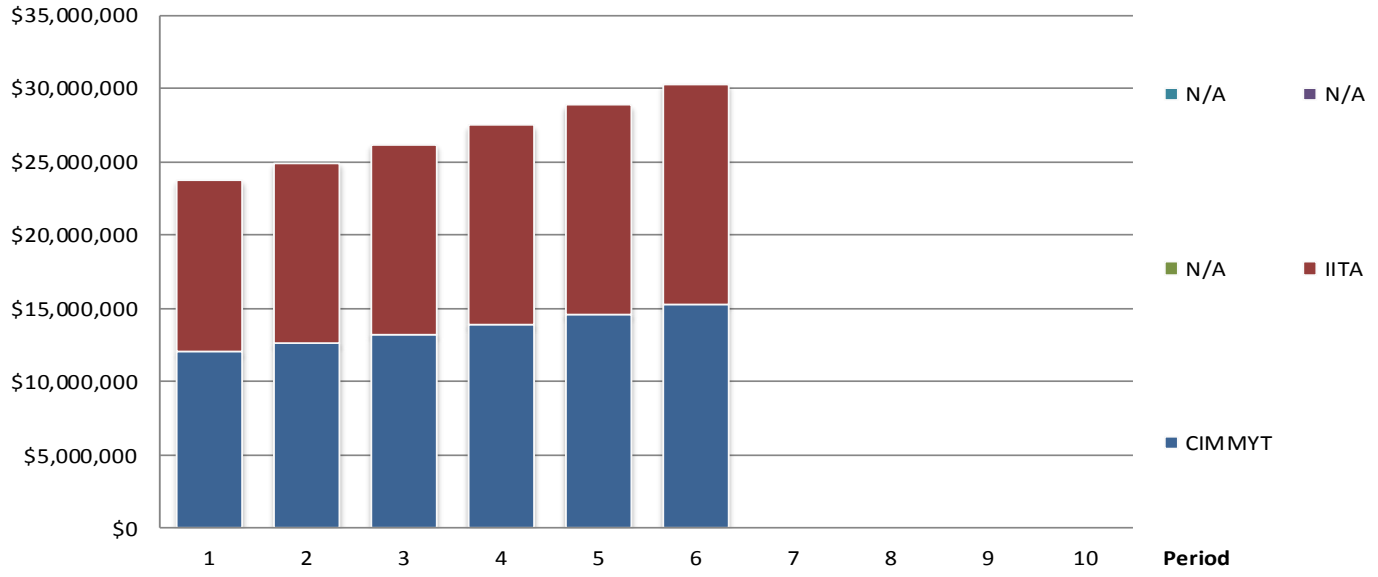
Amount by Category for Each Period



Total Amounts for Additional Dimension



Amounts for Additional Dimension



CRP on Maize
FP5 Adding Value for Maize Producers, Processors and Consumers

Prepared by:	Ramiro Tovar
Date submitted:	

Template version 2015-01-14.1

Legend for cell formatting:

Enter information into light yellow cells
Enter actual expenditures into green cells
Blue cells will be populated by CO

GENERAL INFORMATION

Proposal Information

CRP Name	CRP on Maize
Flagship Title	FP5 Adding Value for Maize Producers, Processors and Consumers
How are you using the template?	Consolidated Flagship
CRP Lead Center's Name	CIMMYT
Requested Amount	**$9,553,507**
Total Project Cost	**$15,218,865**

Budgeting & Reporting Periods

Anticipated Start Date	01-Jan-17
Anticipated End Date	31-Dec-22
Project Duration (months)	72.0

Reporting Periods	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Period Start Date	**01-Jan-17**	**01-Jan-18**	**01-Jan-19**	**01-Jan-20**	**01-Jan-21**	**01-Jan-22**		
Period End Date	**31-Dec-17**	**31-Dec-18**	**31-Dec-19**	**31-Dec-20**	**31-Dec-21**	**31-Dec-22**		
Number of Months	12.0	12.0	12.0	12.0	12.0	12.0		

Other Budget Factors

Is this a new version of a previously approved budget?	No

Participating Partners' information

	List of Participating Partners	Primary Indirect Cost (IDC) Rate	Pass-thru IDC Rate
1	CIMMYT	15.0%	5.0%
2	IITA	16.5%	16.5%
3			
4			
5			

FINANCIAL SUMMARY & REPORTING

Expand/Collapse sections to see/hide the budget and actuals & projections →

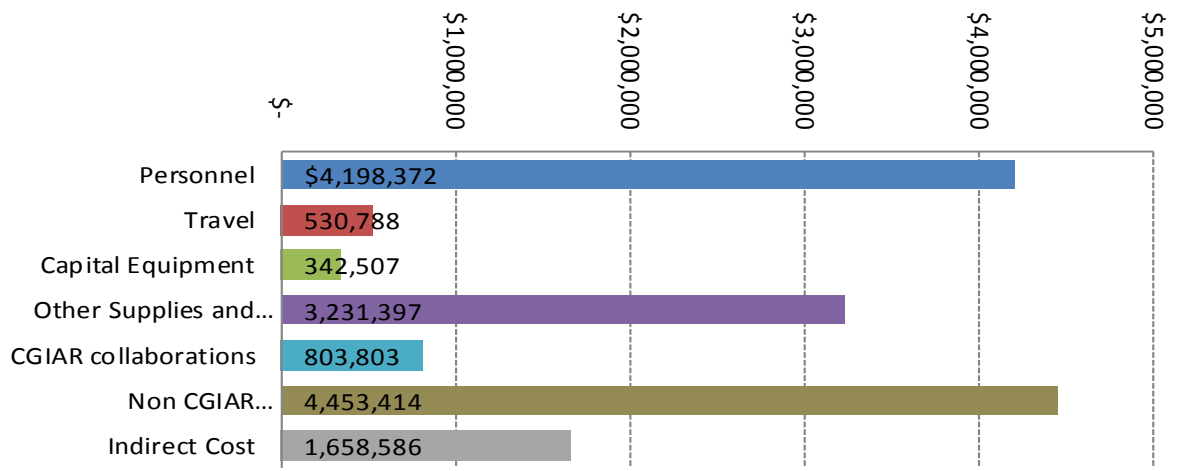
Budget

Budget

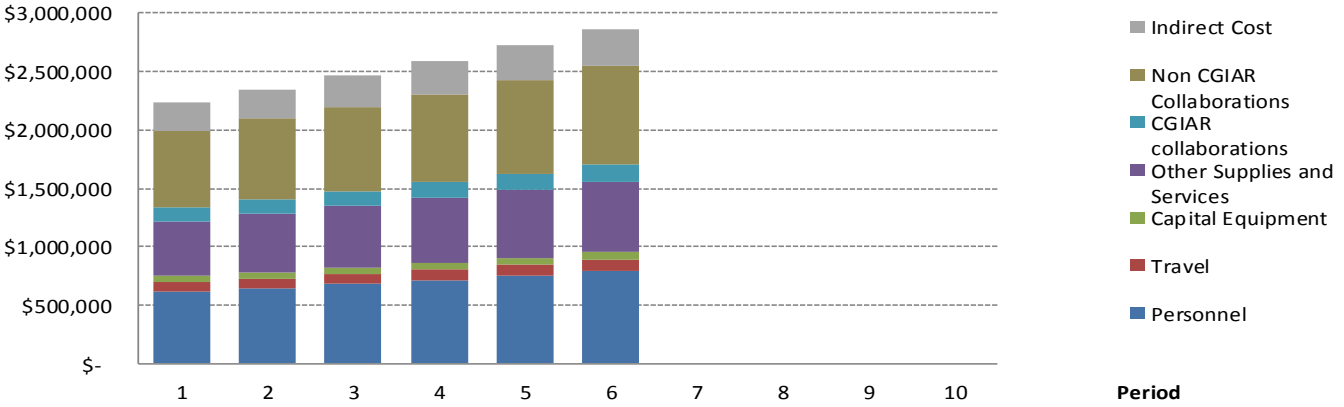
Prepared by: Ramiro Tovar

	Period 1 Jan-17 - Dec-17 Budget	Period 2 Jan-18 - Dec-18 Budget	Period 3 Jan-19 - Dec-19 Budget	Period 4 Jan-20 - Dec-20 Budget	Period 5 Jan-21 - Dec-21 Budget	Period 6 Jan-22 - Dec-22 Budget	
Uses of Funds by Expense Category							
Category							TOTAL
Personnel	$ 617,234	$ 648,096	$ 680,500	$ 714,525	$ 750,252	$ 787,764	$ 4,198,372
Travel	78,035	81,937	86,034	90,334	94,852	99,596	530,788
Capital Equipment	50,355	52,872	55,516	58,290	61,206	64,268	342,507
Other Supplies and Services	475,073	498,826	523,768	549,944	577,451	606,335	3,231,397
CGIAR collaborations	118,173	124,082	130,286	136,797	143,640	150,825	803,803
Non CGIAR Collaborations	654,731	687,467	721,841	757,916	795,825	835,633	4,453,414
TOTAL DIRECT COST	**1,993,601**	**2,093,281**	**2,197,945**	**2,307,807**	**2,423,225**	**2,544,421**	**13,560,280**
Indirect Cost	243,841	256,033	268,835	282,273	296,390	311,213	1,658,586
TOTAL BUDGET	**$ 2,237,442**	**$ 2,349,314**	**$ 2,466,780**	**$ 2,590,081**	**$ 2,719,615**	**$ 2,855,634**	**$ 15,218,865**
Breakdown of Budget by Participating Partı							
							TOTAL
CIMMYT	$ 1,302,924	$ 1,368,071	$ 1,436,474	$ 1,508,272	$ 1,583,706	$ 1,662,917	$ 8,862,364
IITA	934,518	981,243	1,030,306	1,081,809	1,135,909	1,192,717	6,356,501
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
TOTAL BUDGET	**2,237,442**	**2,349,314**	**2,466,780**	**2,590,081**	**2,719,615**	**2,855,634**	**15,218,865**
Funding Plan							
Sources of Funding Needed							TOTAL
W1+W2	$ 1,038,785	1,090,724	1,145,260	1,202,497	1,262,643	1,325,801	$ 7,065,709
W3	365,750	384,038	403,240	423,393	444,570	466,807	2,487,797
Bilateral	832,907	874,552	918,280	964,191	1,012,402	1,063,026	5,665,359
Other Sources							-
TOTAL FUNDING PLAN	**2,237,442**	**2,349,314**	**2,466,780**	**2,590,081**	**2,719,615**	**2,855,634**	**15,218,865**
Sources of Funding Secured							TOTAL
W1+W2 (Assumed Secured)	1,038,785	1,090,724	1,145,260	1,202,497	1,262,643	1,325,801	$ 7,065,709
W3	203,257	-	-	-	-	-	203,257
Bilateral	578,399	101,094	26,487	-	-	-	705,980
Other Sources							-
TOTAL SECURED	**1,820,440**	**1,191,818**	**1,171,747**	**1,202,497**	**1,262,643**	**1,325,801**	**7,974,946**
TOTAL FUNDING GAP OVER/(UNDER)	**$ (417,002)**	**$ (1,157,496)**	**$ (1,295,033)**	**$ (1,387,584)**	**$ (1,456,972)**	**$ (1,529,833)**	**$ (7,243,919)**
W1+W2 (Required from SO)	-	-	-	-	-	-	-
W3 (Required from FC Members)	(162,493)	(384,038)	(403,240)	(423,393)	(444,570)	(466,807)	(2,284,540)
Bilateral (Fundraising)	(254,508)	(773,458)	(891,793)	(964,191)	(1,012,402)	(1,063,026)	(4,959,379)
Other Sources (Fundraising)	-	-	-	-	-	-	-

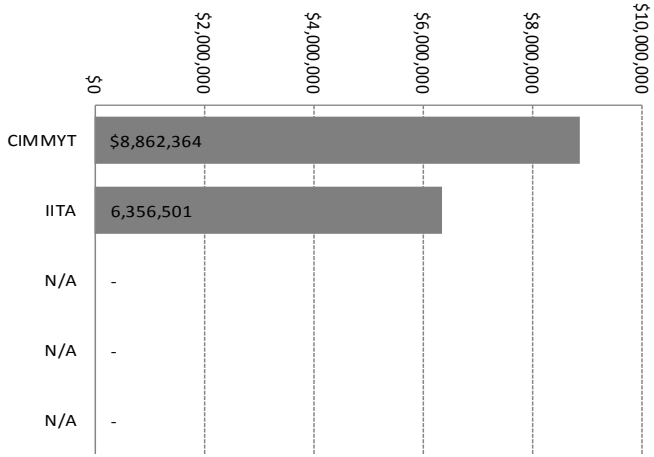
Total Amount by Category



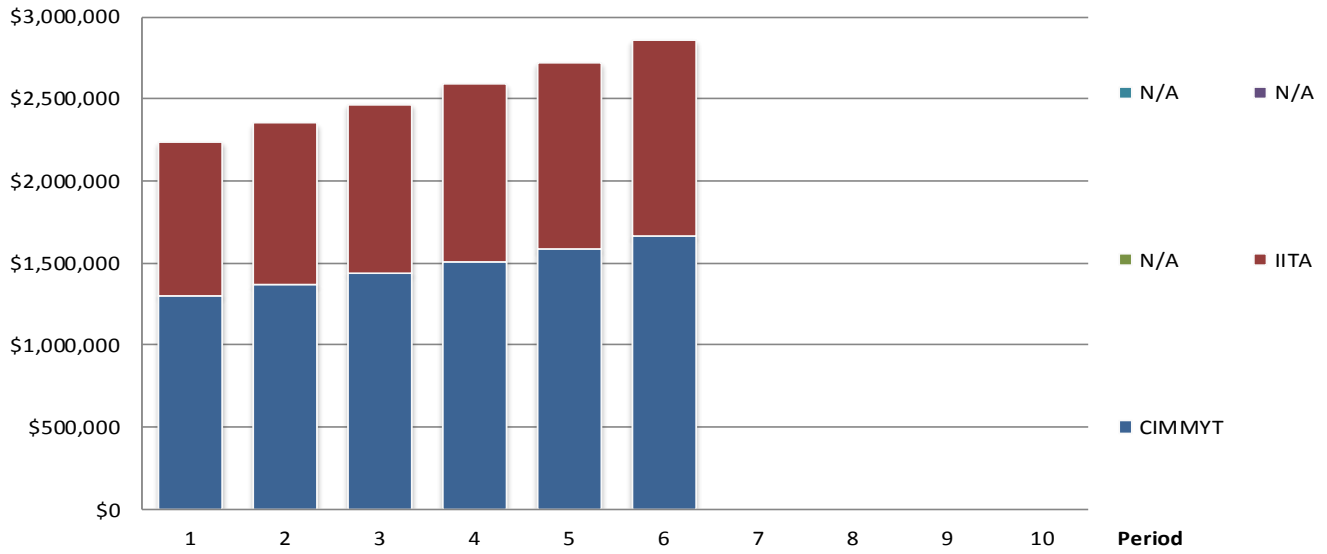
Amount by Category for Each Period



Total Amounts for Additional Dimension



Amounts for Additional Dimension



CRP on Maize Management

Prepared by: Ramiro Tovar

Date submitted:

Template version 2015-01-14.1

Legend for cell formatting:

Enter information into light yellow cells

Enter actual expenditures into green cells

Blue cells will be populated by CO

GENERAL INFORMATION

Proposal Information

CRP Name	CRP on Maize
Flagship Title	Management
How are you using the template?	Consolidated Flagship
CRP Lead Center's Name	CIMMYT
Requested Amount	**$11,034,855**
Total Project Cost	**$11,034,856**

Budgeting & Reporting Periods

Anticipated Start Date	01-Jan-17
Anticipated End Date	31-Dec-22
Project Duration (months)	72.0

Reporting Periods	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Period Start Date	**01-Jan-17**	**01-Jan-18**	**01-Jan-19**	**01-Jan-20**	**01-Jan-21**	**01-Jan-22**		
Period End Date	**31-Dec-17**	**31-Dec-18**	**31-Dec-19**	**31-Dec-20**	**31-Dec-21**	**31-Dec-22**		
Number of Months	12.0	12.0	12.0	12.0	12.0	12.0		

Other Budget Factors

Is this a new version of a previously approved budget? No

Participating Partners' information

	List of Participating Partners	Primary Indirect Cost (IDC) Rate	Pass-thru IDC Rate
1	CIMMYT	15.0%	5.0%
2	IITA	16.5%	16.5%
3			
4			
5			

FINANCIAL SUMMARY & REPORTING

Expand/Collapse sections to see/hide the budget and actuals & projections →

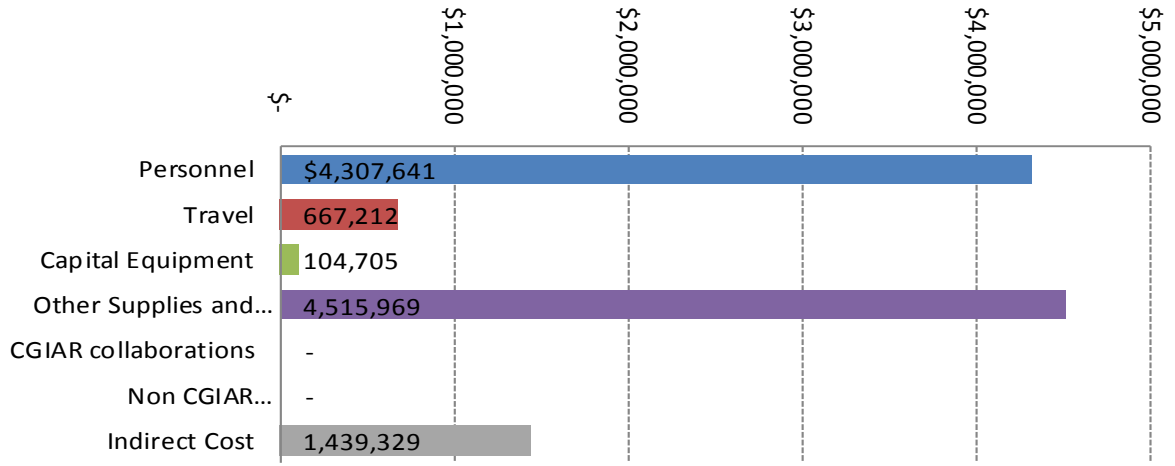
Budget

Budget

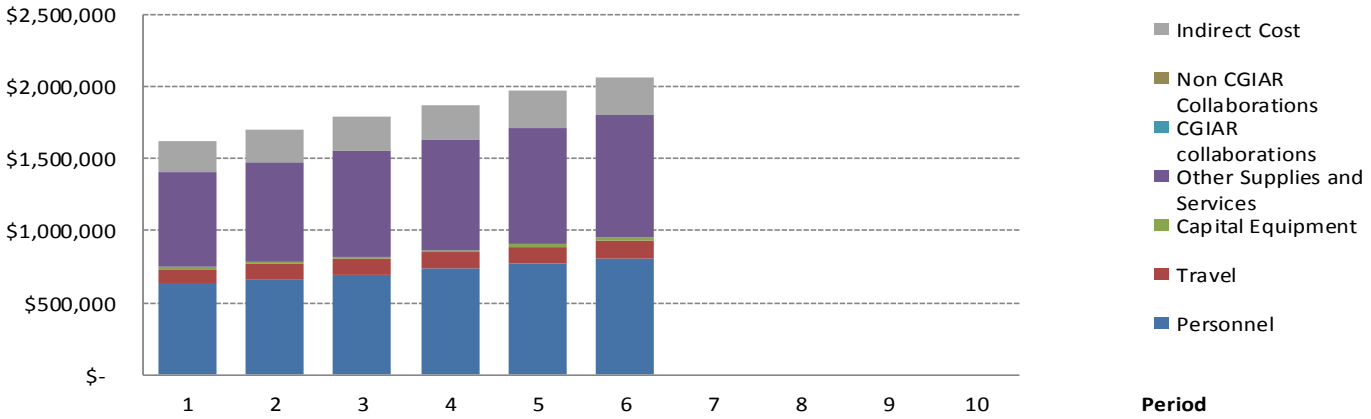
Prepared by: Ramiro Tovar

	Period 1 Jan-17 - Dec-17 Budget	Period 2 Jan-18 - Dec-18 Budget	Period 3 Jan-19 - Dec-19 Budget	Period 4 Jan-20 - Dec-20 Budget	Period 5 Jan-21 - Dec-21 Budget	Period 6 Jan-22 - Dec-22 Budget	TOTAL
Uses of Funds by Expense Category							
Category							TOTAL
Personnel	$ 633,298	$ 664,963	$ 698,212	$ 733,122	$ 769,778	$ 808,267	$ 4,307,641
Travel	98,092	102,997	108,146	113,551	119,231	125,195	667,212
Capital Equipment	15,394	16,163	16,971	17,820	18,711	19,647	104,705
Other Supplies and Services	663,928	697,124	731,980	768,563	807,004	847,371	4,515,969
CGIAR collaborations	-	-	-	-	-	-	-
Non CGIAR Collaborations	-	-	-	-	-	-	-
TOTAL DIRECT COST	**1,410,712**	**1,481,247**	**1,555,309**	**1,633,056**	**1,714,724**	**1,800,479**	**9,595,527**
Indirect Cost	211,607	222,187	233,296	244,958	257,209	270,072	1,439,329
TOTAL BUDGET	**$ 1,622,318**	**$ 1,703,434**	**$ 1,788,606**	**$ 1,878,014**	**$ 1,971,932**	**$ 2,070,551**	**$ 11,034,856**
Breakdown of Budget by Participating Partı							
							TOTAL
CIMMYT	$ 1,622,318	$ 1,703,434	$ 1,788,606	$ 1,878,014	$ 1,971,932	$ 2,070,551	$ 11,034,856
IITA	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
N/A	-	-	-	-	-	-	-
TOTAL BUDGET	**1,622,318**	**1,703,434**	**1,788,606**	**1,878,014**	**1,971,932**	**2,070,551**	**11,034,856**
Funding Plan							
Sources of Funding Needed							TOTAL
W1+W2	$ 1,622,318	1,703,434	1,788,606	1,878,014	1,971,932	2,070,551	$ 11,034,855
W3		-	-	-	-	-	-
Bilateral		-	-	-	-	-	-
Other Sources							-
TOTAL FUNDING PLAN	**1,622,318**	**1,703,434**	**1,788,606**	**1,878,014**	**1,971,932**	**2,070,551**	**11,034,855**
Sources of Funding Secured							TOTAL
W1+W2 (Assumed Secured)	1,622,318	1,703,434	1,788,606	1,878,014	1,971,932	2,070,551	$ 11,034,855
W3							-
Bilateral							-
Other Sources							-
TOTAL SECURED	**1,622,318**	**1,703,434**	**1,788,606**	**1,878,014**	**1,971,932**	**2,070,551**	**11,034,855**
TOTAL FUNDING GAP OVER/(UNDER)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
W1+W2 (Required from SO)	-	-	-	-	-	-	-
W3 (Required from FC Members)	-	-	-	-	-	-	-
Bilateral (Fundraising)	-	-	-	-	-	-	-
Other Sources (Fundraising)	-	-	-	-	-	-	-

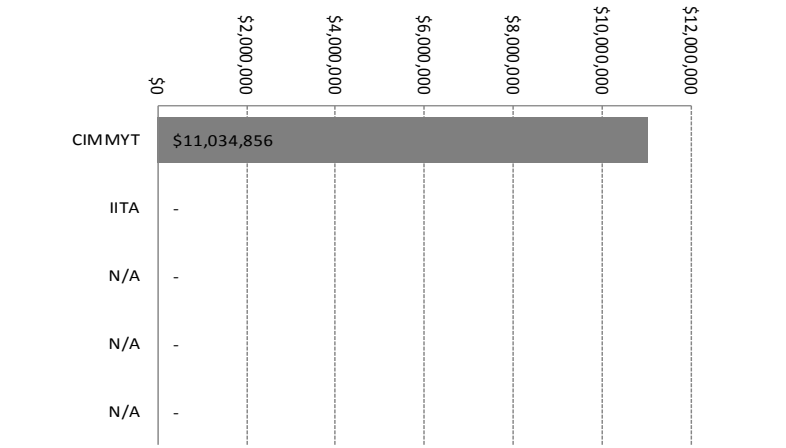
Total Amount by Category



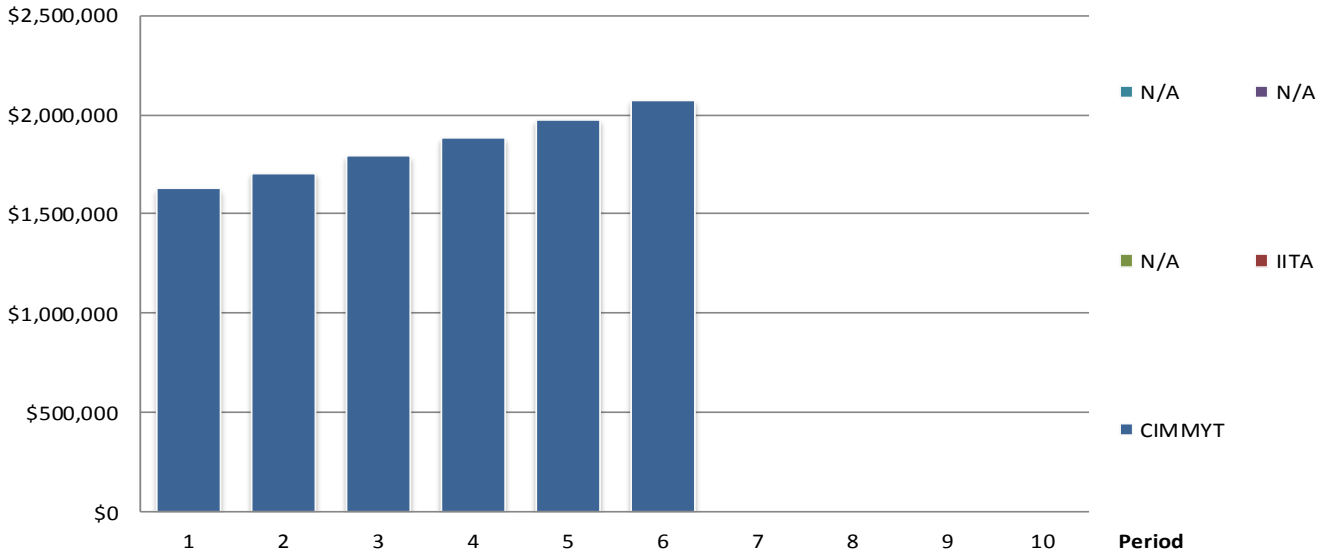
Amount by Category for Each Period



Total Amounts for Additional Dimension



Amounts for Additional Dimension



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