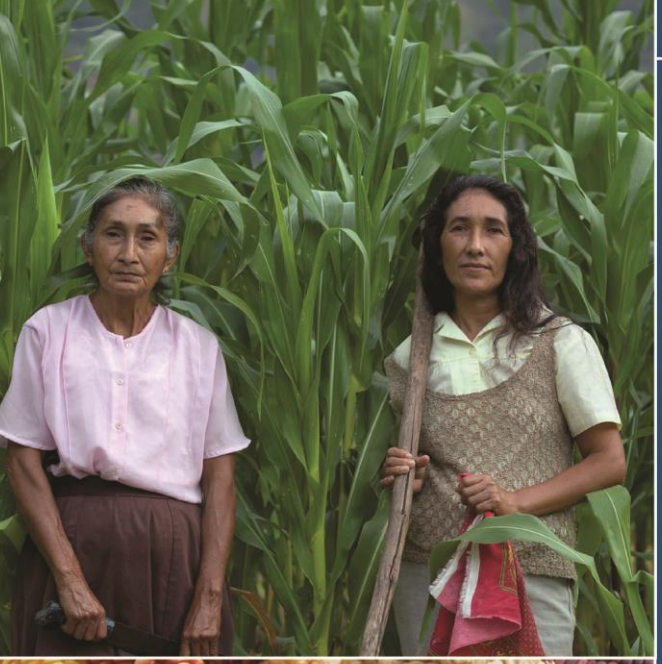

2015 MAIZE CRP

Annual Report

for the Consortium
and the Fund Council

CGIAR

RESEARCH PROGRAM ON
Maize

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List of acronyms

A4NH	CGIAR Research Program on Agriculture for Nutrition and Health
AIS	Agricultural Innovation System
ATTIC	Agro-ecosystem Diversity, Trajectories and Trade-Offs for Intensification of Cereal-based systems
BMGF	Bill & Melinda Gates Foundation
BMS	Breeding Management System
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CGI	Competitive Grants Initiative
CGIAR	Consultative Group for International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CML	CIMMYT maize line
CSISA	Cereal Systems Initiative for South Asia
DH	Doubled Haploid
DTMA	Drought-Tolerant Maize for Africa
DTMASS	Drought Tolerant Maize for Africa Seed Scaling
ESA	Eastern and Southern Africa
FACASI	Farm Mechanization and Conservation Agriculture for Sustainable Intensification
FP	Flagship Project
GOBII	Genomics and Open-source Breeding Informatics Initiative
GL	CGIAR Research Program on Grain Legumes
GRiSP	Global Rice Science Partnership
GS	Genomic Selection
HIR	Haploid Induction Rate
HTMA	Heat Tolerant Maize for Asia
ICIPE	International Centre for Insect Physiology and Ecology
IDO	Intermediate Development Outcome
IEA	Independent Evaluation Arrangement
IITA	International Institute for Tropical Agriculture
IMAS	Improved Maize for African Soils
IMIC	International Maize Improvement Consortium (IMIC)
IP	Innovation Platform
IPNI	International Plant Nutrition Institute
ISMA	Integrated Striga Management for Africa
KALRO	Kenya Agricultural and Livestock Research Organization
KIT	Royal Tropical Institute
L&F	CGIAR Research Program on Livestock and Fish
MARS	Marker-Assisted Recurrent Selection
MasAgro	Sustainable Modernization of Traditional Agriculture program
MLN	Maize Lethal Necrosis
NARS	National Agricultural Research System
NASECO	Nalweyo Seed Company
PIM	CGIAR Research Program on Policies, Institutions, and Markets
QTL	Quantitative Trait Loci
RS	Research Strategy
RTB	CGIAR Research Program on Roots, Tubers and Bananas
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación
SFSA	Syngenta Foundation for Sustainable Agriculture
SIMLESA	Sustainable Intensification of Maize-Legume cropping systems for food security in Eastern and Southern Africa
SIMLEZA	Sustainable Intensification of Maize-Legume Systems for Eastern Zambia
SLOs	System-Level Outcomes
SRF	Strategy and Results Framework
SSA	Sub-Saharan Africa
TSC	Tar Spot Complex
USDA-ARS	United States Department of Agriculture - Agricultural Research Service
USAID	United States Agency for International Development
WEMA	Water Efficient Maize for Africa
WLE	CGIAR Research Program on Water, Land and Ecosystems

Part I – Technical Report

A. Key messages

A.1 Synthesis of progress and challenges

During 2015, MAIZE made strong progress on both of its research strategies, stress resilient and nutritious maize, and sustainable intensification of maize-based systems. At least 7,785,185 hectares were under improved MAIZE-derived technologies or management practices as a result of CRP research; directly reaching 18,407,175 small-holder farmers. In total, 64 improved maize varieties, based on CIMMYT/IITA germplasm, were released through MAIZE partners in 2015 (Figure 1); these include: 44 in sub-Saharan Africa (11 in eastern Africa; 18 in southern Africa; 15 in West Africa); 13 in Latin America (9 in Mexico; 4 in Colombia); and 7 in Asia (1 in India; 3 in Nepal; 3 in Pakistan). Besides high and stable yield potential, some of the special traits stacked in these varieties include drought tolerance, nitrogen use efficiency (NUE), tar spot complex (TSC) resistance, Quality Protein Maize (QPM), increased provitamin A content (through the CGIAR Research Program on Agriculture for Nutrition and Health - A4NH), ear rot or mycotoxin resistance, and *Turcicum* leaf blight resistance (Figure 1). To view an interactive version of this map, click here.

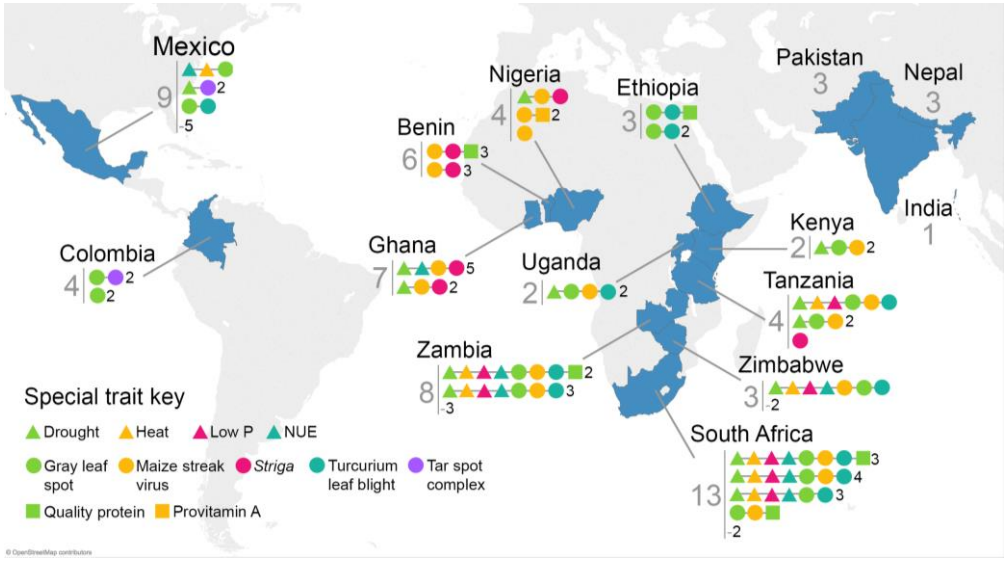

Figure 1: Improved maize varieties released by MAIZE partners in 2015, with depiction of some special traits. The map includes eight provitamin-A enriched varieties based on MAIZE germplasm that were released under A4NH CRP in sub-Saharan Africa (3 each in Zambia and Zimbabwe, and 2 in Nigeria) in 2015.

A.2 Synthesis of two most significant achievements

Targeting tar spot complex disease in Latin America

Tar Spot Complex (TSC) disease causes significant yield losses (20% to 100%) in Mexico, Honduras, Guatemala and parts of South America. In a rapid, and predominantly, Windows 1&2 funded, response to this emerging disease threat, MAIZE researchers have rolled out an integrated control strategy that relies on resistant varieties – the most economical and environmentally friendly option for the region´s smallholder maize farmers. MAIZE scientists and their partners in Southeast Mexico and four Central American countries have established a comprehensive maize testing network, through which seven new TSC-resistant hybrids were evaluated at 30 sites across the region in 2015, and four most promising hybrids were identified for wider testing. By 2014, national partners in

Mexico had already released three TSC-resistant hybrids developed by MAIZE. Five local seed companies are evaluating and promoting two MAIZE-derived TSC-resistant hybrids in preparation for commercialization, and four local seed companies in the country´s southeast have begun promoting a new MAIZE-derived TSC-resistant hybrid. Despite the serious drought, these varieties performed well. In Honduras, a TSC-resistant MAIZE-derived hybrid (DICTA-96) has been proposed for release to national authorities, and at their request, the program is helping multiply seed for official release in the second half of 2016. In Guatemala, two TSC-resistant MAIZE-derived hybrids (HB-15 and HB-16) have been proposed for release in 2015, and seed production is underway. One more MAIZE-derived hybrid (HB-17) was evaluated in Guatemala in 2015 for potential release in 2017.

Moving high-tech to the field in developing countries

In India and Nepal, Nutrient Expert®, developed through a Windows 1&2 funded partnership between CIMMYT, MAIZE and the International Plant Nutrition Institute (IPNI), has become widely recognized as a major climate smart decision support system for yield maximization while optimizing nutrient use. Nutrient Expert® has sparked significant public and private sector interest. In 2015, IPNI and Tata Consultancy Services Limited (TCS) signed a Memorandum of Understanding (MoU) to out-scale the Nutrient Expert® to nearly 100,000 farmers involved in their social initiatives across India. Also in India, DuPont Pioneer has expressed interest to utilize Nutrient Expert® in their Pravakta Programme (serving 30,000 farmers) and the Unnati Abhiyan Programme (serving 1,000 farmers). The Integrated Nutrient Management (INM) Division of the Ministry of Agriculture and Farmers Welfare, Government of India have also included Nutrient Expert®, as one of the key tools for disseminating precision nutrient recommendations under national Soil Health Card program.

Unmanned aerial vehicles (UAVs) and sensors are also being used as an affordable field-based phenotyping tool. This has been possible through a Windows 1&2 funded collaboration between researchers from the University of Barcelona, Spain; CIMMYT, Crop Breeding Institute, Zimbabwe; Instituto Nacional de Innovación Agraria, Peru; and Sustainable Agricultural Institute of the High Research Council, Spain. This technology is now being used by MAIZE scientists in phenotyping for heat, drought and low nitrogen stress tolerance. The results were published in the journal 'Plant Methods' (impact factor 3.10) and are highly accessed on the journal website (more than 5700 times) (Zaman Allah et al, 2015). Preliminary data indicates that selection efficiency for grain yield under abiotic stress can be increased by 10 to 20% using selection for grain yield and traits measured through remote sensing compared to selection for grain yield alone. This approach will be applied to quantitatively measure Maize Lethal Necrosis (MLN) and Tar Spot Complex responses in maize germplasm.

A.3 Financial summary

MAIZE W1&W2 budget for 2015 was USD$ 13.228 million (M) of which US$ 9.775 M was expended. The total budget for MAIZE was US$ 74.452 M. Total expenditures were US$ 60.786 M. MAIZE results were also scaled out through supplementary projects valued at US$14.757 M. MAIZE continued to implement the United Nations Development Program (UNDP) DAC marker in its financial analysis, which estimated a MAIZE gender budget of 16 percent (US$10.313 M). (See Annex 10)

US$ millions	POWB approved budget (2015)	Actual Expenditure (2015)
W1 & W2	13,228	9,775
W3	27,743	21,725
Bilateral	33,481	29,286
Total	74,452	60,786

B. Impact pathway and intermediate development outcomes (IDOs)

In preparation for Phase II of the CGIAR Research Programs, MAIZE developed an impact pathway for the program and nested theories of change for its five Flagships (Annex 3, Figure 5). These theories of change were created in line with the CGIAR's 2016-30 Strategy and Results Framework (SRF) and the United Nations' Sustainable Development Goals and demonstrate MAIZE's contribution. A participatory approach with scientists from both CIMMYT and IITA was used for their development.

MAIZE contributes to the three CGIAR System-Level Outcomes (SLOs) of (1) reduced poverty, (2) improved food and nutrition security for health, and (3) improved natural resource systems and ecosystem services. It also contributes to five CGIAR Intermediate Development Outcomes (IDOs) and eleven associated sub-IDOs. Cross-cutting issues related to climate change, gender and youth, policies and institutions, and capacity development are equally important to the work of MAIZE and have been included in the theories of change.

The completion rate on 2015 deliverables for projects under MAIZE ranges from 63 to 92%, with an overall output achievement above 81%, as documented in MAIZE reporting templates (for W1&2) and bilateral progress reporting (see Annex 1). An overview of FP outputs delivering towards sub-IDOs and SLOs is provided at Annex 3, Figure 6. A list of adoption and impact studies published during 2010-2015 appears in Annex 4b. MAIZE 2015 publications are listed in Annex 9.

C. Progress along the impact pathway

C.1 Progress towards outputs

Impact through innovation

MAIZE supports 168 Innovation Platforms (IPs) and other multi-stakeholder interaction mechanisms across Africa, South Asia and Latin America, fostering interaction and joint work among the maize agrifood system actors, with the aim to facilitate positive change. At both local and national levels, MAIZE IPs aim to: 1) identify needs and opportunities; 2) pilot innovation processes: 3) co-develop, test and adapt new technologies and practices; 4) tackle institutional issues that hinder innovation; and 5) collect, and act on, feedback. Supported through Windows 1&2 funding, MAIZE utilizes global Agricultural Innovation Systems (AIS) expertise from the Royal Tropical Institute (KIT) whilst at the same time building up its own internal AIS capacity. KIT supports capacity strengthening of MAIZE partners in AIS thinking and application.

Concrete outputs from this work are threefold. Firstly, IP performance and sustainability of a number of key MAIZE bilateral projects has been strengthened (e.g., SIMLEZA, SIMLESA, CSISA and MasAgro). Key successes include: 1) enhanced ownership of IPs by national partners and key actors and improved coordination among research institutions and extension agencies (both public and NGOs) (e.g., SIMLEZA and SIMLESA); 2) increasing stakeholders' influence on the research agenda (e.g., SIMLESA and MasAgro), and; 3) increased NARS' interest in mainstreaming AIS in food crops research (e.g., SIMLESA). Secondly, the AIS approach has strengthened collaboration between MAIZE, Humid Tropics and Drylands Systems CRPs. In December 2015, a Windows 1&2 sponsored KIT workshop focused on institutionalizing AIS in MAIZE, and organizing research differently for that matter. During a second Windows 1&2 sponsored workshop, leaders of the large bilateral projects under Humid Tropics and Dryland Systems CRPs, KIT, and key systems experts from CIMMYT played a vital role in developing AIS narrative for the MAIZE-AFS Phase-II full proposal. Thirdly, the AIS approach is slowly being institutionalized in MAIZE sustainable intensification projects. For example, the BuenaMilpa Project in Guatemala used AIS to inform project design and to set up stakeholder interaction mechanisms to define priorities for action and links to research.

Getting the upper hand on aflatoxin

Aflatoxins pose a major threat to public health and grain trade in Africa. In a major effort to counter aflatoxins, capacity to produce the Aflasafe™ family of effective biocontrol products was expanded to meet increasing demand. In 2015, MAIZE scientists began development of biocontrol agents for two countries – Burundi and Uganda. In Burundi, 380 maize and 120 peanut samples were collected, from which 2,910 isolates were obtained, while in Uganda, 256 maize and 186 peanut samples were collected. More than 3,000 isolates obtained from the Ugandan samples are being characterized to identify atoxigenic isolates, which are being purified and sent to our research partner, the Agricultural Research Service of USDA at the University of Arizona in Tucson, for further analysis using simple sequence repeats (SSRs). With the innovative mycological and DNA technologies that MAIZE scientists and their partners used to characterize fungal germplasm, it is possible to identify haplotypes (or DNA variations) that are distributed in several countries of Eastern Africa and could provide the basis for biocontrol products that are effective across the region and not just in individual countries.

In parallel work in southern Africa, MAIZE scientists identified candidate atoxigenic biocontrol isolates from several countries in 2013-2014; in 2015, these were characterized by USDA in Tucson into SSR haplotypes. Haplotype distribution across the region was also determined as an indicator of adaptation. On this basis, several haplotypes were selected as active ingredients for regional products. Two regional haplotypes were found in Tanzania, Mozambique, Malawi, and Zambia. Native isolates belonging to these two haplotypes can now be used to develop regional products for all four countries. In fact, one haplotype appears widely distributed in Africa and is already used in Aflasafe products in Burkina Faso and Nigeria. In West Africa, two biocontrol products were developed – Aflasafe GH01, which is specific to the region and contains four well distributed haplotypes, and Aflasafe GH02, which is for use only in Ghana.

Integrated Germplasm Information System

Recent developments in molecular genetics have created previously unimagined possibilities for developing new crop varieties with unprecedented speed and precision. To ensure that maize improvement for developing countries is in the vanguard, MAIZE scientists are orchestrating the creation of a suite of online tools that will help breeders to enhance the rate of genetic gain for key traits far more efficiently. The task is daunting, given the proliferation of new techniques and massive amounts of genomic and phenotypic data now available. Managing this complexity should get easier with new tools. GRIN-Global, for example, has already achieved international recognition as a superior tool for handling genebank information, which is essential for making good use of crop genetic resources. Two newer tools – KDSmart and KDXplore – will facilitate data collection, curation, and storage, putting these tasks on an essentially real-time basis. Co-funded by Windows 1&2, a tool named Germinate is being designed to aid the sharing and visualization of data from genotyping, phenotyping, and other sources. Another key piece in this puzzle is the inter-institutional partnership under the Genomics and Open-source Breeding Informatics Initiative (GOBII) project, which provides access to tools for genome selection. The centerpiece of this mix is the Breeding Management System (BMS), which will offer plant breeders ready access in one virtual space to resources they need for efficient management of a modern breeding program. The system´s developers made substantial progress this year and are close to having a preliminary version for further evaluation. Throughout 2015, dozens of maize breeders in developing countries used and provided feedback on the current versions of the new information tools. MAIZE co-invests into these tools because progressively more advanced versions will be crucial to accelerate genetic gains across tropical maize breeding programs.

Breeder-ready markers for key traits and genomics-assisted maize breeding

Molecular markers are now basic tools for any modern crop breeding program, and together with doubled haploid technology (which cuts by half the time required for variety development), they bring about a paradigm shift in maize improvement. MAIZE scientists made tremendous progress this year in terms of discovery, validation, and deployment of molecular markers for traits that are important for smallholder production. They also established the world´s biggest public sector infrastructure for maize doubled haploid (DH) development, and generated useful knowledge and products.

Co-funded through Windows 1&2, MAIZE researchers found breeder-ready markers for a specific QTL (quantitative trait locus) on chromosome 1 underlying resistance to maize streak virus (*Msv1*); selection for a set of three markers enable 25% improvement in MSV resistance. These results, published in 2015 (Nair et al., 2015), have already generated interest among maize researchers in several African institutions, who intend to incorporate *Msv1* markers into their breeding programs. About 25,000 lines in the DH breeding pipeline were screened with these markers for MSV resistance. The *msv1* markers are also used to convert six drought and heat tolerant donors into MSV resistant versions.

Well-adapted haploid inducers are one of most important factors for success in DH-based breeding, together with an efficient system for haploid selection and chromosome doubling to derive DH lines. MAIZE scientists identified, validated and deployed molecular markers to select for lines that express the purple kernel color used as a marker after induction crosses, making the process more efficient. By the end of 2015, about 1,100 breeding lines had been screened with these markers for DH-based breeding. Working with an advanced research partner (University of Hohenheim, Germany), MAIZE scientists developed tropicalized haploid inducers and also developed molecular markers to select for a major quantitative trait loci (QTL) (*qhir1*) that contributes to high haploid induction rate (HIR). Some 20,000 segregating progenies were screened with *qhir1* markers for high HIR in crosses with lines resistant to MLN. In addition, 13 small- to medium-effect QTLs for resistance to MLN were identified and deployed in 25 widely used, Africa-adapted and MLN-susceptible inbred lines.

C. 2 Progress towards the achievement of outcomes

Maize lethal necrosis (MLN) update

Maize lethal necrosis (MLN) continued causing serious damage to production in Kenya, where the disease was first reported in 2011. According to the US Department of Agriculture, losses amounted to 10% in 2014/2015, with a value exceeding $50 million. The presence of the disease was also confirmed in Democratic Republic of the Congo, Ethiopia, Rwanda, Tanzania and Uganda (see Figure 2). In response, MAIZE and its partners have put in place a comprehensive solution that benefits the millions of consumers and smallholders already affected, while also shielding those in the path of disease spread.

Figure 2: MLN-affected countries

Supported by Windows 1&2 funding, Five MLN-tolerant hybrids were released during 2013-2015 in Kenya, Tanzania, and Uganda, where national partners are multiplying seed for delivery to farmers in 2016. Meanwhile, in national performance trials, several new hybrids outperformed the first-generation hybrids under disease pressure. MAIZE scientists are also converting 25 MLN-susceptible inbred lines that are widely used in Africa as parents in commercial hybrids into resistant versions through molecular marker-assisted backcrossing. In addition, national research organizations and

seed companies took advantage of the facility set up at Naivasha, Kenya, to have 10,790 germplasm entries screened for the disease, resulting in the identification of several disease-tolerant inbred lines and hybrids.

Beating the heat in South Asia

In the face of temperature increases caused by climate change, South Asia´s vast and growing maize sector urgently needs heat-tolerant maize varieties. To help guide this work, MAIZE researchers used climate data obtained from the CIMP5 database to identify current and future hotspots in the region. They also generated monthly heat stress distribution maps (see Figure 3). Genome-wide association studies (GWAS) revealed multiple haplotypes associated with grain yield and anthesis-silking interval under heat stress, including nine significant haplotype blocks for yield that explain 4 to 12% of phenotypic variation. Twenty marker-assisted selection populations for GWAS leads were submitted for Double Haploid induction and development of heat-tolerant lines.

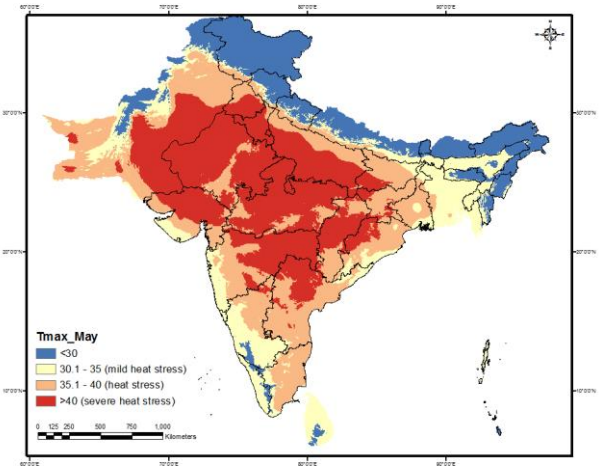

Figure 3: Heat tolerance phenotyping sites in Asia

MAIZE supplied six national partners in Bangladesh, India, and Pakistan with heat-tolerant $F_{2:3}$ families that they had selected on the basis of test-cross performance in their target environments for use in deriving their own heat- tolerant lines. Eighteen first-generation, heat-tolerant hybrids were formally licensed to nine partners in Bangladesh, India, Nepal, and Pakistan for scaling out in their target markets. A total of 131 maize researchers and technical staff from those countries, including 32 women, were trained in developing stress-resilient maize through four training courses and workshops.

More maize for Mexico

The International Consortium for the Improvement of Maize (IMIC), created several years ago under the MasAgro (Sustainable Modernization of Traditional Agriculture) program, registered important gains toward its goal of boosting maize productivity and making the maize seed sector more competitive in Mexico. The local seed companies taking part in the consortium grew in number to 57 in 2015 and increased their sales volume by 6% to nearly 1.2 million 20-kilogram bags. The increase was due in large part to adoption of high performing germplasm provided through MAIZE, which represented 46% of total sales this year. The companies aligned with IMIC now account for 30% of Mexico´s seed market. The portfolio of IMIC hybrids has raised yields from 2.95 to 5.62 tons per hectare in farmers´ fields – an increase of 90%.

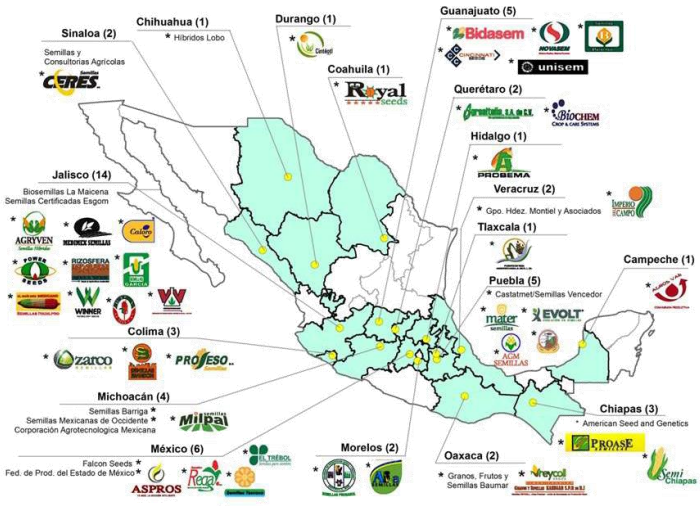

Figure 4: Seed company partners in Mexico

Five local seed companies carried out pre-commercial evaluation of two hybrids resistant to tar spot complex, while four companies in southeastern Mexico took up a new tar spot resistant hybrid.

Crowning the success of drought-tolerant maize breeding

As the Drought-Tolerant Maize for Africa (DTMA) project approached its close (in 2015), MAIZE scientists redoubled their efforts to deliver improved varieties – work that was reinforced by a new project called Drought-Tolerant Maize for Africa Seed Scaling (DTMASS)) and a new stress-tolerant maize for Africa (STMA) project starting in 2016. At least 30 new DTMA varieties were released during 2015, in addition to the more than 180 released previously. An estimated 2.3 million hectares were planted to these varieties in target countries during 2015, benefiting 5.7 million households. In some countries, the improved varieties already occupy more than 100,000 hectares, as is the case for BH661 in Ethiopia, ZM523 in Angola, Pan53 in Zimbabwe, and Sammaz15 in Nigeria.

Replacement of an old hybrid in Ethiopia is typical of developments unfolding in several countries. Release of the hybrid BH660 in 1993 was widely seen as a harbinger of improvement in the country´s maize productivity. Initially, the hybrid was marketed in moist and semi-moist areas of Ethiopia´s Maize Belt, especially in parts of Oromia and the Southern Nations, Nationalities, and People´s Region. Later, it was introduced in the Amhara region as well and has since dominated national maize production, accounting for more than 51% of maize hybrid seed sales as recently as 2013. Performance of the hybrid has declined in recent years, as a result of climate change – with rainfall becoming less reliable and more unevenly distributed. In response, the national maize program released another MAIZE-derived hybrid, BH661, in 2011 and vigorously promoted it across the country. Farmers prefer it because of its superior drought tolerance, earlier maturity, wider agro-ecological adaptation, and higher yield (with a yield advantage of 10% or more in normal years and much higher under drought). Seed production of BH661 overtook that of the old variety in 2014, followed by a fourfold increase in 2015. All seed companies in Ethiopia are now marketing the new hybrid.

Research that points the way forward

MAIZE researchers published over 20 studies in 2015 to document progress towards the achievement of outcomes, covering diverse aspects of maize agro-food systems, documenting adoption and delivering useful insights for decision making at every level – from farmers´ fields to the private sector and policy sphere.

A major opportunity analyzed by MAIZE researcher's centers on India's poultry revolution [Hellin et al, 2015]. Whether domestic production can keep pace with growing national demand depends on increased availability of low-priced, high-quality poultry feed. Even though production of maize, a predominant feed component, has surged in India, the country´s average yields lag behind global and Asian averages. There is thus significant scope for producing more and cheaper feed through maize sustainable intensification, including increased use of maize hybrids. Given the sheer size of India's poultry sector as well as its competitive and entrepreneurial strength, the country is set to play a more active role in the global poultry trade, especially through exports to the Middle East.

C.3 Impacts

MAIZE researchers published seven impact assessment studies in 2015. The development of improved germplasm is central to the work of MAIZE, so a study on variety diffusion in Southern and Eastern Africa provided particularly useful indicators of recent gains [de Groote et al 2015]. The results tell the story of how, by 2009-2010, modern maize cultivars had come to be sown on 6.5 million ha, or 40% of the total maize area (14.7 million ha) in nine study countries. In relation to benchmark figures from the 1990s, Ethiopia (with 28% of its area now planted to modern cultivars),

Malawi (with 43%), and Tanzania (35%) all registered solid gains in adoption, while Zambia (84%) rebounded dramatically from a decline in adoption. Even so, the impact of seed industry development on maize productivity, is still modest, with national average yields surpassing 2 t/ha in just three countries (Ethiopia, Malawi, and Zambia) over the past decade.

Ethiopia stands out as the poster child for agricultural transformation in Eastern and Southern Africa with first major structural investments into agricultural research and development over the past years and this translating into national level impacts. A MAIZE-led study takes stock of the maize revolution in Ethiopia and its instrumental role in agricultural transformation (Abate et al., 2015). Accurately gauging the impacts achieved on the ground by small holders is critical for guiding the decisions of rural people as well as others – especially donors – who want to be sure that research investments yield good and socially inclusive returns. MAIZE published a study measuring the ex post impacts of improved maize varieties on poverty in rural Ethiopia (Zeng et al., 2015). Applying a new procedure to determine the differences between observed and counterfactual income distributions, researchers found that improved maize varieties have led to a 0.8–1.3% drop in poverty depth and severity. Apart from determining what benefits accrue from research, impact studies must also ask who benefits and why or why not. The study shows that smallholder farmers did benefit from improved maize varieties, but the extent of benefits was somewhat curtailed by their sometimes very small landholdings.

Zambia of late has also seen a resurgence in maize productivity and two papers document different aspects of the recent impacts in eastern Zambia. The first paper shows that adoption of improved maize leads to significant gains in crop incomes, consumption expenditure, and food security; resulting in significant poverty-reducing impacts (Khonje et al., 2015). The second paper finds a robust and significant positive impact of improved maize varieties on child malnutrition, with adoption reducing the probability of stunting by an average of about 26% (Manda et al., 2015).

Zambia and Malawi have both supported maize productivity with input subsidy programs in the recent past. Another paper focusing on Malawi established that agricultural input subsidies did not impede crop or dietary diversity (Snapp and Fisher, 2015). Instead, they go on to show that dietary diversity was positively associated with crop diversity (i.e. a direct influence on available food quality).However, even more important for dietary diversity was the role of education, income, market access, and availability of improved storage technologies – i.e. the indirect influence through the commercialization and income that supports diverse food purchases associated with the adoption of modern maize varieties.

Most of the impact studies thus revolved around different aspects of improved maize germplasm. An exception was a study that documented how artisans in Africa gained from received training in the construction of metal silos for grain storage (Ndegwa et al., 2015). Those who were able to manufacture the silos in their own workshops boosted their annual income by about US$ 3,600.

D. Gender research achievements

D.1 Selected gender research achievements

In 2015, MAIZE continued strategic and integrated gender research in a number of areas. The Windows 1&2 supported comparative study on Gender Matters in Small-scale Mechanization was completed and written up (Eedewijk et al., 2015); and a four country (Kenya, Malawi, Zambia and Zimbabwe) comparative gender analysis of hermetic grain storage technologies in eastern and southern Africa was finalized (Kandiwa et al. 2015). An interdisciplinary team of MAIZE researchers collaborated in the review of gender and conservation agriculture in eastern and southern Africa and published a journal article outlining a research agenda (Farnworth et al. 2015). Additional papers on

gender in relation to food security in southern Africa by MAIZE researchers include Kassie et al. 2015, and Mutenje et al. 2015.

Under the cross-CRP Windows 1&2 funded initiative known as GENNOVATE, MAIZE is undertaking comprehensive assessment of gender norms and agency related to agricultural innovation in key target regions. In 2015, this included establishment and training of local field teams in Nigeria, Tanzania, Ethiopia, Zimbabwe and Nepal; as well as planning and implementation of field-level data collection. MAIZE case studies were completed in 27 villages in major maize producing countries Ethiopia (4), Malawi (2), Mexico (6), Nepal (3), Nigeria (4), Tanzania (4) and Zimbabwe (4). In addition, together with WHEAT, MAIZE revised and completed the GENNOVATE Data Coding tree, developed frameworks and procedures for GENNOVATE data cleaning and coding, and set up a coding platform including training and supervision of the coding process. MAIZE and WHEAT also played a leading role in securing additional funding pertinent for entering into data analysis and write up.

As part of a project focusing on promotion and diffusion of Quality Protein Maize (QPM), a series of tools and products were developed to help project staff and partners' mainstream gender in the project's participatory interventions with men and women, and in South Asia MAIZE researchers helped poor women farmers increase their maize harvest and incomes. New Windows 1&2 funded research was initiated in the form of design and methodology development for a study on ways to support equitable benefits among men and women through Agricultural Innovation Platforms in Rwanda (implementation planned for 2016).

Finally, to raise awareness of the role of women in agriculture and portray an often overlooked side of maize-based livelihoods in Mexico, using Windows 1&2 funding, MAIZE published a photo documentary using images and testimonies of different women who described in their words their lives as farmers, food-makers, artisans and vendors.

D. 2 Success and challenges in mainstreaming gender research

In 2015, MAIZE completed the integration of gender into its project cycle and management framework (supported by Windows 1&2 funding), and piloting of selected phases of these will take place in 2016. In addition, MAIZE, using Windows 1&2 funding, worked with Cultural Practice LLC., to develop a gender competency framework and related capacity strengthening program. Piloting of selected modules took place in fall 2015 and the assignment is expected to complete early 2016, after which implementation is expected to begin. Furthermore a draft Gender Policy was formulated, and development of a protocol for gender and social inclusion in participatory research was initiated in 2015.

Over the past five years and in spite of funding constraints, MAIZE has steadily increased its engagement in gender research as is shown by the number of CRP gender staff and consultants, and a greater number of projects with a strong gender focus.

Gender performance self-assessment as per Annex 2: approaching requirements.

E. Partnership building achievements

E. 1 Selected partnership building achievements

In 2015, the Institutional Learning and Change[1] (ILAC) Directorate of Bioversity undertook an "Analysis of the portfolio of activities and networks of the CGIAR Research Program MAIZE". In part, due to the study being conducted half way through Phase-1 of MAIZE; this analysis forms both a base-line of MAIZE partnerships and demonstrates initial changes initiated by MAIZE. The analysis indicates that most interactions were multipurpose: 537 collaborations had research objectives; 535 collaborations sought to implement development activities; 505 reported a capacity development goal; 389 included advocacy and 410 sought other goals such as fundraising. One of the key findings of the study is that MAIZE already has a quite diversified set of partners. According to ILAC (2015), 26 percent of the collaborations studied were enabled by MAIZE. MAIZE also has a clear but not exclusive research focus; only 16 collaborations did not include research as a goal and 5 had only research goals. The study found that MAIZE conducts its research through a broad range of partnerships, not only national research organizations in developing countries (NARS) and advanced research institutions from developed countries but also with farmers and other actors in the innovation system. Accounting for 27 percent of all collaborations, plant sciences and plant health are the most important categories of collaborations for development. Scaling up or scaling out is the second most important category accounting for 15 percent of all collaborations (82) and seed systems, planting material systems, or seedling systems is fourth accounting for 10 percent of the total (52). MAIZE relies heavily on national research organizations and the local private sector for most of its development activities which are supported with germplasm, capacity building and program facilitation/project management from CIMMYT and IITA. Data collection, sharing and management, the third most important category, involves mostly CGIAR and NARS partners. MAIZE also collaborates with multinational companies on breeding and pre-breeding and on plant sciences, and biotechnology; and with national firms on breeding and pre-breeding and machinery, the latter linked to research implementing conservation agriculture in smallholder systems.

E.2 Strategic partnership issues

According to ILAC (2015), MAIZE influenced the organization of the research portfolio. MAIZE has induced significant changes in the topics researched and relative increases in collaborations among CGIAR centres in breeding and pre-breeding, data collection, sharing or data management, ICT or bioinformatics and statistics and research methods. Women's professional networks are at least as developed as those of men. MAIZE has also induced a reallocation of efforts towards seed systems (including multinational as well as national firms), plant sciences (especially with national firms) and monitoring, evaluation and impact assessment. According to ILAC (2015), MAIZE invests important efforts in strengthening its impact pathway. Most researchers collaborate with several non-research partners, indicating that these interactions are a central part of their work. 49 percent of collaborations occur in less traditional research environments (e.g., farmers' fields or markets). Collaborations with the domestic private sector also account for about 8 percent of the total, which show the importance of development of seed delivery systems in MAIZE's impact pathways. On the other hand, collaborations with multinational firms are also an important category, standing at 4 percent of the total. The large proportion of activities in such environments indicates that many researchers work within a research for development framework; i.e., interacting with the actors they seek to influence. Approximately 4 percent of the collaborations were established for research for

[1] The 2015 ILAC Report - Analysis of the Portfolio of Activities and Networks of the CGIAR Research Program MAIZE - is currently under review and will not be publicly available until later in 2016.

development activities. MAIZE also has an important advocacy agenda; in fact, 70 percent of all collaborations were active in this area. The most important group of activities includes contributing to multi-stakeholder dialogs (49 percent), followed by policy influence (19) and policy advice (16).

E. 3 Interactions with other CRPs

MAIZE works closely with a number of CRPs. Some of the major strategic give and take collaborations are outlined in the Annex 6. According to ILAC (2015), collaborations with CGIAR centers were mentioned 178 times, representing 32 percent of all collaborations. These interactions are strongly concentrated on MAIZE's two main partners (CIMMYT and IITA), accounting for 80 percent of the collaborations within the CGIAR and 26 percent of all collaborations. Participation in CCAFS and A4NH was also important. Informal interactions are important for MAIZE researchers; in fact, 32 percent of all collaborations were informal. Informality is higher for collaborations with CGIAR researchers (46 percent) and researchers from organizations in developed countries (42 percent) and lowest for interactions with researchers from developing countries (23 percent). As already mentioned in Section C.1, MAIZE collaborated strongly with leaders of the Humid Tropics CRP (IITA, Wageningen, project managers of large bilateral projects) to ensure a smooth transition into MAIZE-AFS Phase-II.

E.4 Partner usages of CRP's outputs and outcomes

This is outlined in Sections C1 and C2.

F. Capacity Building

According to ILAC (2015), MAIZE's capacity development activities are concentrated on technical training in the areas where CIMMYT and IITA have strong capacities (e.g., breeding or conservation tillage) which account for 47 percent of all collaborations. The second category in importance is facilitation of innovation platforms, research networks or multi-stakeholder dialogs, which account for 19 percent of the total. Technical training and innovation platforms are the most important capacity development areas.

In 2015, MAIZE trained 39,129 people, of which 29% were female. Training was conducted through: meetings, workshops, field days, specialized courses and seminars across 15 countries. Malawi and Zimbabwe had the highest percentage of women participating in training 52% and 51% respectively. The best example of women participation was the training course "Farmers Training on Improved Sweet corn Production" in Bangladesh, where 100% of attendees were female. The SIMLESA field tour in Mozambique also had a high percentage of female participation (43%). MAIZE also continued investment in Capacity Development through BSc, MSc and PhD programs. MAIZE staff (see Annex 12) currently co-supervise a total of 130 students. Of these, 18 BSc, 40 MSc and 11 PhD candidates graduated in 2015. See Annex 11 for further details.

G. Risk management

In 2015, MAIZE regularly assessed and managed risks related to the delivery of results. The three major risks identified in 2014 remain unchanged: (1) W1&W2 budget insecurity and delayed transfer of W1&2 funds, which directly affects CRP research and development operations; (2) unfulfilled obligations by the partners for commissioned and competitive grants; (3) lack of a systematic and integrated approach for monitoring and evaluation at the **output and outcome levels**.

To mitigate risk (1), the CRP Management Committee continues to give priority to multi-year investments of centers and partners, and uses the issuing of new partner grants as the most flexible

component of the budget. MAIZE continues to sign only one-year partner grant contracts, to manage partner expectations and minimize any delays of payments to them. In addition, planned integration of 25% of the Humid Tropics CRP into MAIZE-AFS is risk averse. For example, MAIZE and Humid Tropics agreed to combine budgets for the targeting, synergies and tradeoff and landscape and livelihoods analysis work as it relates to sustainable intensification. All AIS work will be conducted jointly and will piggy-back on existing bilateral projects. For risk (2), MAIZE regularly monitors the fulfillment of obligations by partners and intervenes when necessary to ensure proper completion of grant requirements. As for risk (3), the MAIZE and WHEAT hired a shared junior Monitoring, Evaluation and Learning (MEL) Specialist to support the senior MEL specialist in the development of a **results-based management framework for the CGIAR Phase II**.

H. Lessons learned

H.1 Level of confidence of the response to the key performance indicators

The information reported in Annex 5 is obtained from detailed data found in a variety of sources, including project technical reports and institutional databases. MAIZE is confident in the quality of the indicator information supplied. A review of the institutional lead center's process to collect the quantitative evidence and other types of performance or progress data across the MAIZE project portfolio was undertaken this year. This review allowed for more streamlined data collection and analysis activities. Further areas for improvement to the process will be examined for the following year to facilitate an efficient reporting process. The unclear definitions and measurement practices across the CRPs for the key performance indicators continue to be an issue, especially when reporting at the portfolio level. To ensure consistent and reliable reporting across CRPs, this issue will need to be addressed for phase II of the CGIAR.

H.2 Lessons from monitoring progress of the CRP

Advancements have been made in building a foundation to support effective monitoring at the project and program levels in the last year. A number of pilots and workshops were undertaken with new projects to develop theories of change aligned with those of the CRP. These pilots allowed projects to easily identify how they contribute to the CRP and the CGIAR SRF and formulate their own theories of change to support the project proposal and planning phases. As an outcome from these pilots, a guide to developing project-level theories of change was developed to support future projects. Furthermore, capacity building activities to support the development of project and program theories of change and performance monitoring plans were undertaken by the lead center.

In 2015, MAIZE also drew lessons from the IAU Review, IEA Evaluation and the Social Network Analysis undertaken by ILAC. The IAU Review highlighted the need for MAIZE to hire finance manager to in order to improve monitoring and analysis of W1&2 budgets versus actual expenditure. A senior finance manager has been hired and will be on board in 2016. The IEA Report 2015 stressed the need for greater role specialization in the MAIZE breeding pipeline. CIMMYT is pioneering role specialization in Eastern and Southern Africa, where the institute has a critical mass of maize breeders. Both the ILAC report 2015 and IEA Report 2015 commented that, whilst a stated goal of MAIZE, there was no indication that MAIZE is a better integrating the activities of CIMMYT and IITA. To this end, two important changes have been made: 1) CIMMYT and IITA initiated a single global MAIZE Program (combining CIMMYT and IITA maize breeding efforts), and; 2) the smooth integration of 25% of the Humid Tropics CRP into the MAIZE-AF CRP is supported from senior management through to field scientists. The sustainable intensification Flagship Project for the MAIZE-AFS Phase-II proposal was co-written by key MAIZE, Humid Tropics and Wageningen managers and scientists. Co-development of the sustainable intensification FP in MAIZE-AFS also responded to another key learning from the ILAC study that MAIZE had decreased the effort in socio-

cultural systems and livelihoods/poverty and environmental sciences and natural resources management. Increased MAIZE investments in better understanding of agro-ecological systems trajectories, synergies and tradeoffs (with Wageningen and KIT), AIS with KIT and integration of Humid Tropics are currently rebalancing investments. Given that MAIZE continues to work closely with NARS, the ILAC 2015 report stressed the need for further studies to identify who the NARS interact with to complete the impact pathways. MAIZE acknowledges the need to invest more in scaling research and development of a systematic approach to validating MAIZE impact pathways and theories of change.

Annex 1: MAIZE Indicator of progress in 2015

The "traffic light indicator" sums up the percentage achievement of projects under MAIZE, per Flagship Project (FP) in 2015, regardless of their funding (Windows 1& 2 or bilateral funded). It monitors the progress per FP output, per FP and for the CRP as a whole.

Overall MAIZE performance was 81% on annual milestones/deliverables associated with FP outputs based on projects reported. Despite a number of minor delays, which are being tracked, no significant issues were reported.

2014 Activities Progress by Flagship	**Windows 1 and 2 for Programs**	**Competitive Partner grants**	**Bilaterals and windows 3**	**Total weighed** (bilateral/Window 3: 82%; Windows 1 and 2 for programs 14%; Competitive grants 4%)
1-Sustainable intensification and income opportunities of maize-based cropping system	80	69	91	89
2-Novel tools, technologies and traits for improving genetic gains and breeding efficiency	98	50	94	93
3-Stress resilient and nutritious maize	87	79	90	89
4-Aligning with and strengthening maize seed systems for effective product delivery.	86	60	92	90
5-Inclusive and profitable maize futures	82	56	93	90
Overall	**86**	**63***	**92**	**90**

The quantitative figures (% of achievement) are the result of a standardized qualitative assessment.

The % of achievement was estimated looking at the milestones/deliverables declared in the 2015 work plan and the related achievement assessed by the scientists (*and reviewed by the supervisor*) or by the projects (*in their reports submitted to the donors*). Each project has been weighted to insure that it could be associated to other projects with different number of milestones/deliverables/budget, after that we proceed with the aggregation of the results at CoA and FP level.

The comparison among bilateral, scientists funded using W1&2 and competitive grant, similarly has been done weighting the 3 categories. The weight was done based on the budget allocation: the bilateral projects are the biggest component of our budget, followed by W1&2 allocations to scientists and finally competitive grants (and not the base of investment effectiveness / value-for money/effectiveness).

*As of April 2016, the majority of Competitive and Commissioned Grants were in No-Cost Extension. This is the principal factor responsible for the lower level of achievement.

Annex 2: Performance indicators for gender mainstreaming with targets defined

Performance Indicator	CRP performance approaches requirements	CRP performance meets requirements	CRP performance exceeds requirements
1. Gender inequality targets defined	Sex-disaggregated social data is being collected and used to diagnose important gender-related constraints in at least one of the CRP's main target populations	Sex-disaggregated social data collected and used to diagnose important gender-related constraints in at least one of the CRP's main target populations And The CRP has defined and collected baseline data on the main dimensions of gender inequality in the CRP's main target populations relevant to its expected outcomes (IDOs)	Sex-disaggregated social data collected and used to diagnose important gender-related constraints in at least one of the CRP's main target populations And The CRP has defined and collected baseline data on the main dimensions of gender inequality in the CRP's main target populations relevant to its expected outcomes (IDOs) And CRP targets changes in levels of gender inequality to which the CRP is or plans to contribute, with related numbers of men and women beneficiaries in main target populations
2. Institutional architecture for integration of gender is in place	- CRP scientists and managers with responsibility for gender in the CRP's outputs are appointed, have written TORS. - Procedures defined to report use of available diagnostic or baseline knowledge on gender routinely for assessment of the gender equality implications of the CRP's flagship research products as per the Gender Strategy -CRP M&E system has protocol for tracking progress on integration of gender in research	- CRP scientists and managers with responsibility for gender in the CRP's outputs are appointed, have written TORS and funds allocated to support their interaction. - Procedures defined to report use of available diagnostic or baseline knowledge on gender routinely for assessment of the gender equality implications of the CRP's flagship research products as per the Gender Strategy -CRP M&E system has protocol for tracking progress on integration of gender in research And A CRP plan approved for capacity development in gender analysis	CRP scientists and managers with responsibility for gender in the CRP's outputs are appointed, have written TORS and funds allocated to support their interaction. - Procedures defined to report use of available diagnostic or baseline knowledge on gender routinely for assessment of the gender equality implications of the CRP's flagship research products as per the Gender Strategy -CRP M&E system has protocol for tracking progress on integration of gender in research And A CRP plan approved for capacity development in gender analysis And The CRP uses feedback provided by its M&E system to improve its integration of gender into research

Annex 3: Flagship Projects and Intermediate Development Outcomes

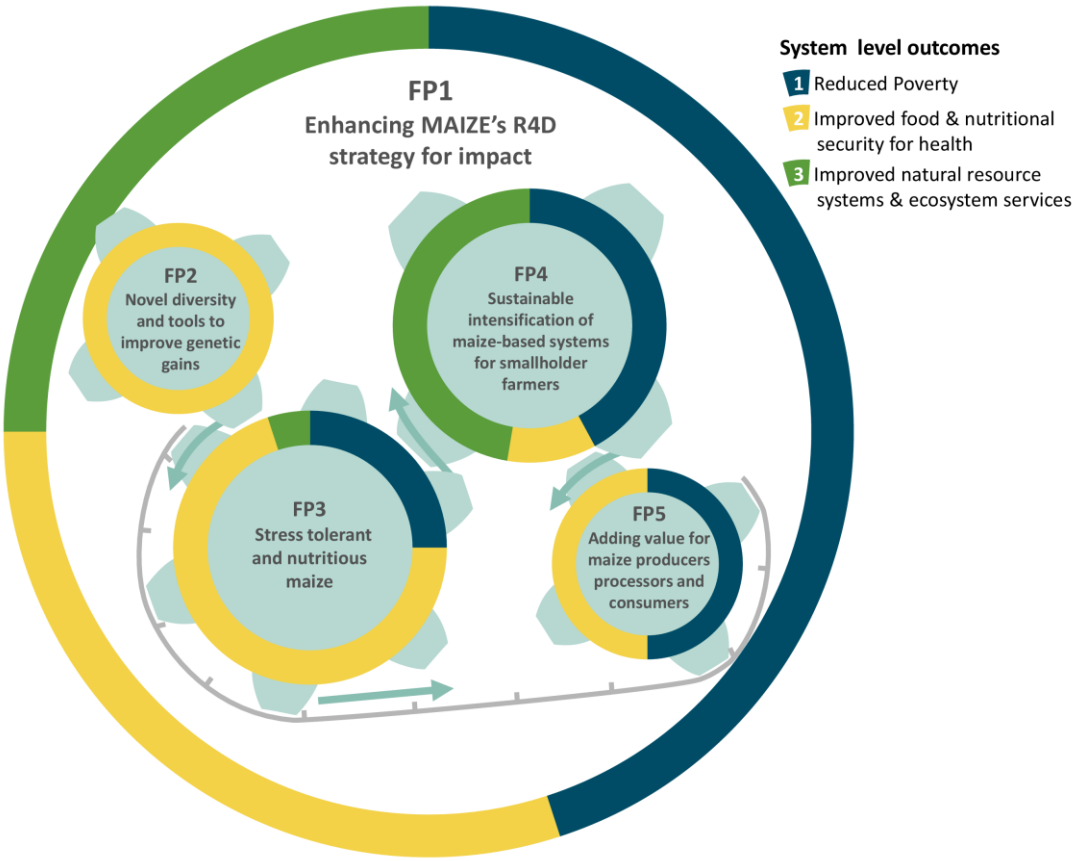

Figure 5: MAIZE Strategy by Flagship Projects

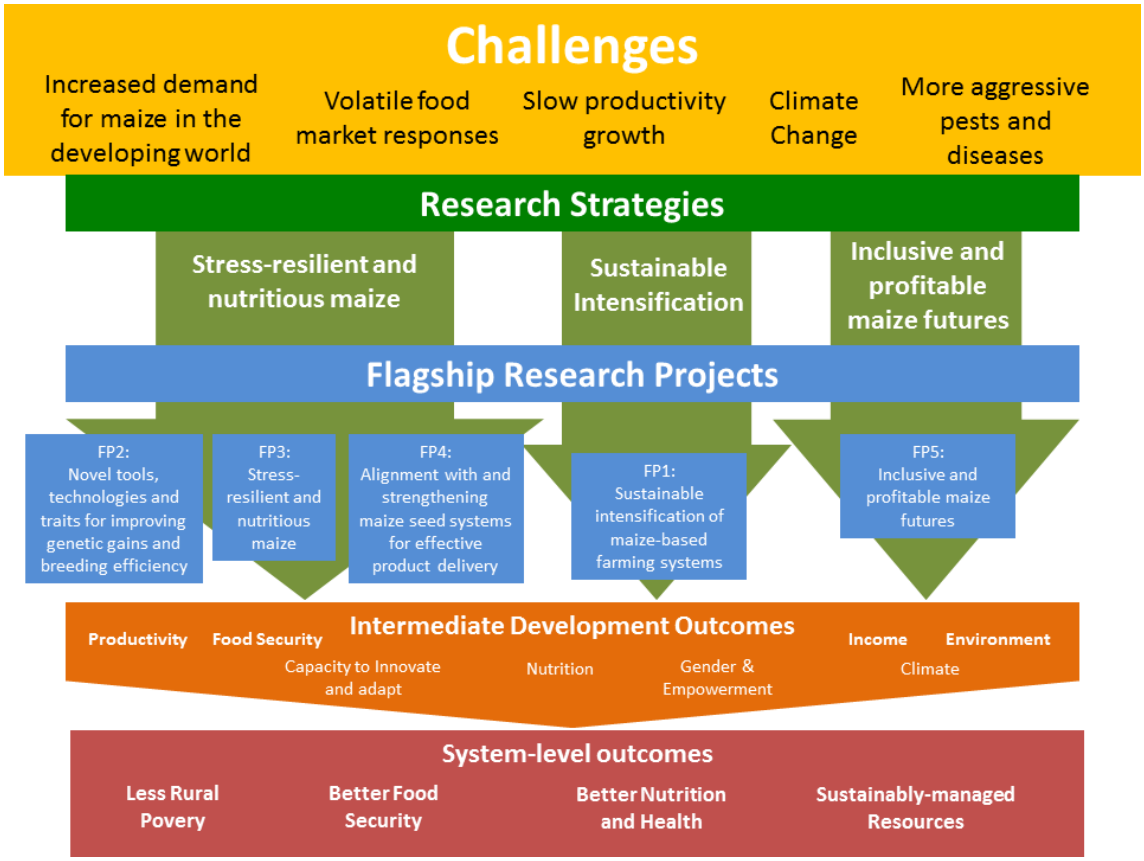

Figure 6: MAIZE Intermediate Development Outcomes

Annex 4a: Progress towards Impact (external reviews)

2009	1. CGIAR Social Science Stripe Review (MAIZE SI1) 2. Hill maize research in Nepal (MAIZE SI4, bilateral) 3. CGIAR Harvest Plus Review (MAIZE SI7) 4. Genotyping at CIMMYT (MAIZE SI9)
2010	1. Water efficient maize for Africa (MAIZE SI4, bilateral) 2. Conservation Agriculture in Southern Africa (MAIZE SI2, bilateral)
2011	1. Cereal Systems Initiative South Asia (MAIZE SI2 &SI3, bilateral) 2. New Seed Initiative for Southern Africa (MAIZE SI4, bilateral) 3. Drought tolerant maize for Africa (MAIZE SI4, bilateral) 4. MycoRed (MAIZE SI6, bilateral)
2012	1. CA and smallholder farmers in E&S Africa-Leveraging institutional innovations and policies (MAIZE SI1, bilateral) 2. NRM research in the CGIAR (MAIZE SI2, SI3) 3. Maize-rice systems in Bangladesh (MAIZE SI2, SI3 bilateral) 4. Enhancing total farm productivity in smallholder CA based systems in Eastern Africa (MAIZE SI2, bilateral) 5. SIMLESA mid-term review (MAIZE SI2, bilateral) 6. Governance & Management of the Cereal Systems Initiative South Asia (MAIZE SI2 &SI3, bilateral) 7. Mechanization in Bangladesh (MAIZE SI2, bilateral) 8. Alignment of MAIZE SI2 with CRP1.2 (internal between two CRPs involved) 9. Water efficient maize for Africa (MAIZE SI4, bilateral) 10. Review of the integrated breeding platform (MAIZE, SI9, bilateral)
2013	1. Gender Audit of MAIZE (MAIZE) 2. Innovation system thinking for improved research impact (MAIZE SI2) 3. New Seed Initiative for Southern Africa (MAIZE SI4, bilateral) 4. International Maize Improvement Consortium (MAIZE SI5) 5. Transgenic strategy (MAIZE SI9) 6. Plant breeding support in the CGIAR (MAIZE SI4-9; BMGF) 7. Biotechnology research in the CGIAR (MAIZE SI4, SI8, SI9, ISPC)
2014	1. Review of Capacity building & Partnerships (MAIZE) 2. Global Gender norms study (FP 5) 3. MLN studies (FP 3) 4. Three countries MAIZE Adoption and Impact Studies (Nepal, Ethiopia and Malawi) (FP5) 5. Trait preferences for Heat Tolerant Maize (FP5) 6. More than 20 value chain studies

	7. More than 10 policy analysis
2015	1. CGIAR- Independent Evaluation Arrangement (MAIZE) 2. CGIAR Internal Audit Unit (MAIZE) 3. Cereal Systems Initiative for South Asia (bilateral – FP1) 4. Water Efficient Maize for Africa (bilateral – FP3) 5. Harvest Plus (bilateral – FP5) 6. Improved Maize for African Soils (bilateral – FP3) 7. Farm Power and Conservation Agriculture for Sustainable Intensification (bilateral – FP1) 8. Adoption Pathways project (bilateral – FP5) 9. Sustainable intensification of maize-legume cropping systems for food security in eastern and southern Africa (SIMLESA; bilateral – FP1)

Annex 4b: Progress towards Impact (Adoption and Impact Assessments)

2010	A meta-analysis of community-based studies on quality protein maize (MAIZE SI7)
	Adoption and continued use of improved maize seeds: Case study of Central Ethiopia (MAIZE SI4, SI5)
	Determinants of Agricultural Technology adoption: the Case of Improved Pigeonpea Varieties in Tanzania. (MAIZE SI2)
	How cost-effective is Biofortification in combating micronutrient malnutrition? An Ex ante assessment (MAIZE SI7)
	Potential for herbicide resistant maize seed for Striga control in Africa (MAIZE SI4)
	Quality Protein Maize: progress, impact, and prospects (MAIZE SI7)
	The effectiveness of quality protein maize in improving the nutritional status of young children in the Ethiopian highlands (MAIZE SI7)
	DTMA ex ante analysis - Potential impact of investments in drought tolerant maize in Africa (MAIZE SI4)
2011	Agricultural technology adoption, seed access constraints and commercialization in Ethiopia (MAIZE SI4, SI5)
	Agricultural Technology, Crop Income, and Poverty Alleviation in Uganda (MAIZE SI1)
	Are soil conservation technologies "win-win?" A case study of Anjeni in the north-western Ethiopian highlands (MAIZE SI2)
	Assessing the influence of neighbourhood effects on the adoption of improved agricultural technologies in developing agriculture (MAIZE)

	Assessing the potential economic impact of Bacillus thuringiensis (Bt) maize in Kenya (MAIZE SI4)
	Determinants of improved maize seed and fertilizer adoption in Kenya (MAIZE SI2)
2012	Adoption and impact of DT maize in Zimbabwe (MAIZE SI4)
	Adoption of Agricultural Technologies in Kenya: How Does Gender Matter (MAIZE)
	Adoption of bio-diversification, conservation tillage and modern seed: Welfare and environmental implications. (MAIZE SI1)
	Adoption of interrelated sustainable agricultural practices in smallholder system: Evidence from rural Tanzania. Technological forecast and social change (MAIZE SI2))
	Adoption of Multiple Sustainable Agricultural Practices in Rural Ethiopia (MAIZE SI2)
	Analysis of Adoption and Diffusion of Improved maize Varieties in Ethiopia (MAIZE SI4, SI5)
	Can Metal Silo Technology Offer Solution to Grain Storage and Food Security Problem in Developing Countries? An Impact Evaluation From Kenya (MAIZE SI6)
	Could farmer interest in a diversity of seed attributes explain adoption plateaus for modern maize varieties in Malawi? (MAIZE SI4)
	Estimating consumer willingness to pay for food quality with experimental auctions: the case of yellow versus fortified maize meal in Kenya (MAIZE SI7)
	Identifying recommendation domains for targeting dual-purpose maize-based interventions in crop-livestock systems in East Africa (MAIZE SI1)
	Impact of modern agricultural technologies on smallholder welfare: Evidence from Tanzania and Ethiopia (MAIZE SI1)
	Improved Maize Technologies and Welfare Outcomes In Smallholder Systems: Evidence From Application of Parametric and Non-Parametric Approaches (MAIZE SI1)
	Maize Impact in Zambia (MAIZE SI4, SI5)
	Poverty Reduction Effects of Agricultural Technology Adoption: A Micro-evidence from Rural Tanzania. MAIZE SI1)
	The choice of spatial and temporal cropping systems diversification in Malawi: impacts on crop income and agro-chemicals use. (MAIZE SI2)
	Welfare Effects of Agricultural Technology Adoption: The Case of Improved Groundnut Varieties in Rural Malawi. (MAIZE SI2)

	Welfare impact of farm input subsidy and improved maize in Malawi (MAIZE SI1)
	Welfare impacts of maize-pigeon pea intensification in Tanzania (MAIZE SI2)
	What determines gender inequality in household food security in Kenya? Application of exogenous switching treatment regression. (MAIZE SI1)
2013	What Determines Gender Inequality in Household Food Security in Kenya? Application of Exogenous Switching Treatment Regression (MAIZE SI1)
	What are the farm-level impacts of Malawi's farm input subsidy program? A critical review (MAIZE SI1)
	Food security as a gender issue: Why are female-headed households worse off compared to similar male-headed counterparts? (MAIZE SI1)
	Household, community, and policy determinants of food insecurity in rural Malawi (MAIZE SI1)
	Mapping the effect of market liberalisation policies on the maize seed systems in Kenya based on micro-evidence from 1992 to 2010 (MAIZE SI1)
	Maize stover use and sustainable crop production in mixed crop–livestock systems in Mexico (MAIZE SI2)
	Gender and Innovation in Agriculture: A Case Study of Farmers' Varietal Preference of Drought Tolerant Maize in Southern Guinea Savannah Region of Nigeria (MAIZE SI4)
	On-farm evaluation of maize varieties in the transitional and savannah zones of Ghana: Determinants of farmer preferences (MAIZE SI4)
	Potential impacts of increasing average yields and reducing maize yield variability in Africa (MAIZE SI4)
	Smallholder Farmers' Perceptions of Drought Risk and Adoption of Modern Maize in Southern Malawi (MAIZE SI4)
	Economic Analysis of Modern Maize Varieties in Malawi (MAIZE SI4)
	Maize for food and feed in East Africa—The farmers' perspective (MAIZE SI7)
	Potential for dual-purpose maize varieties to meet changing maize demands: Overview (MAIZE SI7)
	Potential for dual-purpose maize varieties to meet changing maize demands: Synthesis (MAIZE SI7)
	Assessing the potential of dual-purpose maize in southern Africa: A multi-level approach (MAIZE SI7)
	Identifying recommendation domains for targeting dual-purpose maize-based interventions in crop-livestock systems in East Africa (MAIZE SI7)

2014	The role of farming experience on the adoption of agricultural technologies: evidence from smallholder farmers in Uganda
	From adoption claims to understanding farmers and contexts: A literature review of Conservation Agriculture (CA) adoption among smallholder farmers in southern Africa
	Determinants of smallholder farmers' hybrid maize adoption in the drought prone Central Rift Valley of Ethiopia.
	Impact of Improved Maize Adoption on Welfare of Farm Households in Malawi: A Panel Data Analysis
	Measuring the impacts of Malawi's farm input subsidy program
	Understanding the impact and adoption of conservation agriculture in Africa: A multi-scale analysis.
	Consumer acceptance of quality protein maize (QPM) in East Africa
	Can agricultural input subsidies reduce the gender gap in modern maize adoption? Evidence from Malawi
	Improved maize varieties and household food security: Achieving impact in Tanzania.
	Sustainable Agricultural Intensification in Ethiopia: Achieving maximum impact through adoption of suites of technologies.
	Evaluating the impact of improved maize varieties on food security in Rural Tanzania: Evidence from a continuous treatment approach.
	What determines gender inequality in household food security in Kenya? Application of exogenous switching treatment regression
	Economic, production and poverty impacts of investing in maize tolerant to drought in Africa
	The use of improved maize varieties in Tanzania.
	Exploration of farmers' preferences and perceptions of maize varieties: implications on development and adoption of quality protein maize (QPM) varieties in Zimbabwe.
	Adoption potential of Conservation Agriculture practices in Sub-Saharan Africa: Results from five case studies.
	Adoption and extent of conservation agriculture practices among smallholder farmers in Malawi
	Quantifying the impact of weather extremes on global food security: A spatial bio-economic approach
	Measuring the Effectiveness of Crop Improvement Research in Sub-Saharan Africa from the Perspective of Varietal Output, Adoption, and Change: 20 Crops, 30

	Countries, and 1150 Cultivars in Farmers' Fields
2015	Adoption and Outcomes of Hybrid Maize in the Marginal Areas of India
	Analysis of Adoption and Impacts of Improved Maize Varieties in Eastern Zambia
	Determinants of child nutritional status in the eastern province of Zambia: the role of improved maize varieties
	Determinants of maize stover utilization as feed, fuel and soil amendment in mixed crop-livestock systems, Ethiopia
	Drought tolerant maize for farmer adaptation to drought in sub-Saharan Africa: Determinants of adoption in eastern and southern Africa
	Evaluation of artisan training in metal silo construction for grain storage in Africa: Impact on uptake, entrepreneurship and income
	Ex post impacts of improved maize varieties on poverty in rural Ethiopia
	Factors that transformed maize productivity in Ethiopia
	"Filling the maize basket" supports crop diversity and quality of household diet in Malawi
	Gendered food security in rural Malawi: why is women's food security status lower?
	The influence of gendered roles and responsibilities on the adoption of technologies that mitigate drought risk: The case of drought-tolerant maize seed in eastern Uganda
	Production Risks and Food Security under Alternative Technology Choices in Malawi: Application of a Multinomial Endogenous Switching Regression
	Social and income trade-offs of conservation agriculture practices on crop residue use in Mexico's central highlands
	Speed of adoption of improved maize varieties in Tanzania: An application of duration analysis
	Subsidies promote use of drought tolerant maize varieties despite variable yield performance under smallholder environments in Malawi
	Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa
	Assessing the Effectiveness of Maize and Wheat Improvement from the Perspectives of Varietal Output and Adoption in East and Southern Africa (book chapter in Walker & Alwang)

	Varietal adoption, outcomes and impact (book chapter in Walker & Alwang)
	Varietal generation and output (book chapter in Walker & Alwang)
	Maize technologies and rural poverty reduction in Ethiopia (book chapter in Walker & Alwang)

Annex 5: Key performance indicators

MAIZE CRP

#	CRPs concerned by this indicator	Indicators	Glossary & Comments	Deviation narrative (if actual is more than 10% away from target)	2012	2013	2014	2015	
					Actual	Actual	Actual	Target	TOTAL
KNOWLEDGE, TOOLS, DATA									
1	All	1. Number of flagship "products" produced by CRP	Glossary: These are frameworks and concepts. They should be likely to change the way stakeholders along the impact pathway allocate resources and/or implement activities, i.e., change the way these stakeholders think and act. Each Flagship Project is equivalent to a flagship "product".	Following a standardization of CRP structures, the MAIZE strategy was reorganized around five Flagship Projects (FPs) in 2014, encompassing the nine Strategic Initiatives of the original MAIZE proposal	9	9	5	5	5
2	All	2. % of flagship products produced that have explicit target of women farmers/NRM managers	All Flagship Projects included processes and outputs that explicitly target women farmers/NRM managers: FP1 - Sustainable Intensification FP3 - Stress resilient and nutrious maze FP4 - Alignment with and strengthening maize seed systems for effective product delivery FP5 - Inclusive and profitable maize futures	Following a standardization of CRP structures, the MAIZE strategy was reorganized around five Flagship Projects (FPs) in 2014, encompassing the nine Strategic Initiatives of the	4	6	4	4	5

				original MAIZE proposal					
3	All	3. % of flagship products produced that have been assessed for likely gender-disaggregated impact	All Flagship Projects have been assessed for gender disaggregated impact: FP1 - Sustainable Intensification FP3 - Stress resilient and nutrious maze FP4 - Alignment with and strengthening maize seed systems for effective product delivery FP5 - Inclusive and profitable maize futures	Following a standardization of CRP structures, the MAIZE strategy was reorganized around five Flagship Projects (FPs) in 2014, encompassing the nine Strategic Initiatives of the original MAIZE proposal		9 of which 2 more in-depth	4	4	5
4	All	4. Number of "tools" produced by CRP	Glossary: These are significant decision-support tools, guidelines, training manuals, software, and/or videos that are significant in that they should be likely to change the way stakeholders along the impact pathway allocate resources and/or implement activities	Given that the scope for "tools" includes CIMMYT book chapters, figures are significantly higher than last year	28 (16 co-developed with other CRPs)	27 (17 co-developed with other CRPs)	37	25	191
5	All	5. % of tools with explicit target of women farmers	Tools target men and women users equally			n/a			
6	All	6. % of tools assessed for likely gender-disaggregated impact	Tools target men and women users equally			55			

7	All	7. Number of open access databases maintained by CRP	Maize Doctor, Germinate Maize, Cereal Knowledge Bank, Institutional Multimedia Publications Repository, Institutional Research Data and Software Repository		1	12	5		5
8	All	8. Total number of users of these open access databases	unique visitors (not included: Cereal Knowledge Bank)		592	3,370	64,831[2]	200,000	71,857
9	All	9. Number of publications in ISI journals produced by CRP	From KPI database		84 (18 with other CRPs)	137	64	120	108
10	1,2,3, 4, 6	10. Number of strategic value chains analyzed by CRP				27	24	24	49
11	1,5,6,7	11. Number of targeted agro-ecosystems analyzed/characterized by CRP							
12	1,5,6,7	12. Estimated population of above-mentioned agro-ecosystems							

[2] Please note that 2014 information for indicator number 8 - "Total number of users of these open access databases" was corrected. In 2014, figures for MAIZE unique page views were used instead of MAIZE unique users.

CAPACITY ENHANCEMENT AND INNOVATION PLATFORMS									
13	All	13. Number of trainees in short-term programs facilitated by CRP (male)	From CIMMYT Training database, plus Competitive Partner Grants and IITA Short-term = < 90 days		22,428 (15,144 with other CRPs)	36,588 (151 with other CRPs)	18,058	20,000	27,728
14	All	14. Number of trainees in short-term programs facilitated by CRP (female)	From CIMMYT Training database, plus Competitive Partner Grants and IITAShort-term = < 90 days		5,941 (73 with other CRPs) (IITA 15)	13,592 (73 with other CRPs)	10,056	6,000	11,401
15	All	15. Number of trainees in long-term programs facilitated by CRP (male)	From CIMMYT Training database, plus Competitive Partner Grants and IITA Long-term = > 90 days		37 (5 with other CRPs)	149 (7 with other CRPs)	181	60	60
16	All	16.Number of trainees in long-term programs facilitated by CRP (female)	From CIMMYT Training database, plus Competitive Partner Grants and IITA Long-term = >90 days		16 (1 shared other CRPs)	80 (4 with other CRPs)	86	30	38
17	1,5,6,7	17. Number of multi-stakeholder R4D innovation platforms established for the targeted agro-ecosystems by the CRPs	Latin America - 47, Asia - 42 and sub-Saharan Africa-79		75	87	132	80	168

TECHNOLOGIES/PRACTICES IN VARIOUS STAGES OF DEVELOPMENT									
18	All	18. Number of technologies/NRM practices under research in the CRP (Phase I)	This indicator includes phase I coded lines that went into testing with more than 5 partners, phase I agronomy trials and phase I germplasm	The significant increase in numbers for this criterion are likely due to improved reporting	32,300	30,122	34,123	30,000	47,736
19	All	19. % of technologies under research that have an explicit target of women farmers							
20	All	20. % of technologies under research that have been assessed for likely gender-disaggregated impact			55%				
21	1,5,6,7	21 Number of agro-ecosystems for which CRP has identified feasible approaches for improving ecosystem services and for establishing positive incentives for farmers to improve ecosystem functions as per CRP's recommends				5			
22	1,5,6,7	22. Number of people who will potentially benefit from plans, once finalized, for the							

		scaling up of strategies							
23	All, except 2	23. Number of technologies /NRM practices field tested (phase II)	This indicator includes germplasm characterized on molecular and phenotypic level, germplasm developed and phase II agronomy trials		1,180	1,554	2,063	1,200	2,855
24	1,5,6,7	24. Number of agro-ecosystems for which innovations (technologies, policies, practices, integrative approaches) and options for improvement at system level have been developed and are being field tested (Phase II)			3	4			
25	1,5,6,7	25. % of above innovations/approaches/ options targeted at decreasing inequality between men and women			3				
26	1,5,6,7	26. Number of published research outputs from CRP utilized in targeted agro-ecosystems			32				

27	All, except 2	27.Number of technologies/NRM practices released by public and private sector partners globally (phase III)	This indicator includes phase III agronomy trials and varieties released as a result of MAIZE CRP research	The significant increase in numbers for this criterion are likely due to improved reporting	48	77	34	50	170
POLICIES IN VARIOUS STAGES OF DEVELOPMENT									
28	All	28. Numbers of Policies/ Regulations/ Administrative Procedures - Analyzed (Stage 1)	Please see the list of the papers that sustained/analyzed Policies, Regulations, Administrative procedures: a) The Economic and Environmental Benefits of Sustainable Intensification Practices;b) Resource-conserving practices for smallholder farmers in Africa;c) Adoption of conservation agriculture under alternative agricultural policy and market access indicators: Evidence from Eastern and Southern Africa;d) Measuring the impacts of Malawi's farm input subsidy programme;e) Are there systematic gender differences in the adoption of sustainable agricultural intensification practices: Evidence from Kenya;f) Evaluating the impact of improved maize varieties on food security in rural Tanzania;g) Who benefits from Malawi's input subsidy program?;h) Input subsidies, cash constraints and timing of input supply;i) Economy-wide effects of input subsidies in Malawi: Market imperfections and household heterogeneity;j) Economic, production and poverty impacts of investing in maize tolerant to drought in Africa: An ex-ante assessment, and;k) Can agricultural input subsidies reduce the gender gap in modern maize adoption? Evidence from Malawi.		3	1	12	5	10

29	All	29. Number of policies / regulations / administrative procedures drafted and presented for public/stakeholder consultation (Stage 2)	a) Farm Input subsidies b) The Economic and Environmental Benefits of Sustainable Intensification Practices c) Resource-conserving practices for smallholder farmers in Africa		1	1	3	1	4
30	All	30. Number of policies / regulations / administrative procedures presented for legislation (Stage 3)	Six policies underwent the third stage of the policy reform process (policies were presented for legislation/decree to improve the policy environment for smallholder-based agriculture.)			0	0	1	6
31	All	31. Number of policies / regulations / administrative procedures prepared passed/approved (Stage 4)	Six policies underwent the fourth stage of the policy reform process (official approval (legislation/decree) of new or revised policy / regulation / administrative procedure by relevant authority).			0	0	1	6
32	All	32. Number of policies / regulations / administrative procedures passed for which implementation has begun (Stage 5)	8 policies completed the policy reform process (implementation of new or revised policy / regulation / administrative procedure by relevant authority).			0	0	1	8

OUTCOMES ON THE GROUND									
33[3]	All	33. Number of hectares under improved technologies or management practices as a result of CRP research	Given the lack of a comprehensive system to track global adoption, we synthesized available evidence based on key bilateral project progress reports and performance information collected in various institutional databases. The key geographic countries in which the adoption has been observed include: India, Nepal, Pakistan, Mexico, Bolivia, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Venezuela, Mozambique, Tanzania, Zimbabwe, Angola, Benin, Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, and Tanzania. NOTE: Obtaining information on MAIZE contributions to improved seed production and adoption in Asian countries is a challenging task, as compared to Africa and Latin America. The figures projected here are gross underestimates of the present impact of MAIZE/CIMMYT germplasm in Asia.		313,120	417,000	2,305,462	700,000	7,785,185

[3] Please note that information for indicators number 33 – "Number of hectares under improved technologies or management practices as a result of CRP research" and number 34 – "Number of farmers and others who have applied new technologies or management practices as a result of CRP research" are underestimated. Only information on measured outcomes are included in this analysis. It is expected that many more hectares are sown with improved MAIZE varieties and many more people benefit from MAIZE technologies than are captured in this analysis. These numbers can only be captured through extensive ex-post impact assessment studies.

34	All	34. Number of farmers and others who have applied new technologies or management practices as a result of CRP research	Given the lack of a comprehensive system to track global adoption, we synthesized available evidence based on key bilateral project progress reports and performance information collected in various institutional databases. The key geographic countries in which the adoption has been observed include: India, Nepal, Pakistan, Mexico, Bolivia, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Venezuela, Mozambique, Tanzania, Zimbabwe, Angola, Benin, Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, and Tanzania. NOTE: Obtaining information on MAIZE contributions to improved seed production and adoption in Asian countries is a challenging task, as compared to Africa and Latin America. The figures projected here are gross underestimates of the present impact of MAIZE/CIMMYT germplasm in Asia.		869,778	1,100,000	4,088,967	2,000,000	18,407,175

Annex 6: Interactions of MAIZE with other CPRs

	FPI	FP2, FP3 & FP4	FP5
Commodity CRPs	Give & Take: Innovations tested and integrated at common innovation platforms	Give & Take: Pre-/Breeding technologies & methods	Give & Take: Innovations tested and integrated at common innovation platforms
Systems and NRM CRPs	Give: precision agriculture and approaches to increase input use efficiency Take: systems approaches, technologies, methodologies; help ensure positive or neutral ecosystem impacts	Give: system optimized germplasm Take: Learn about need for further adaptation	
Agriculture for Nutrition & Health		Give: New traits from mining of genetic resources Give & Take: Collaborate on NARS technology adoption	
CCAFS	Give: Technologies & information, long-term experiments; pilots at innovation platform sites Take: Models and tools	Give: Heat adapted germplasm Take: Model impact on Climate Change	
Policies, Institutions and Markets	Give & Take: overcoming value chain bottlenecks		Give: MAIZE specific data and learning Take: Foresight models, cross commodity value chain and seed sector policies
Generation Challenge Program		Give: Bioinformatics tools for use in other crops Take: Integrated breeding platforms	

Annex 7: CRP Financial Reporting (LSeries)

Ref	Description	Comments
	Budget and Financial Reports	
L101	CRP Cumulative Financial Summary	
L106	CRP Annual Funding Summary	
L111	CRP Annual Financial Summary	Total spending for the year by Center, including Gender expenditure
L121	CRP - Expenditure by Natural Classification Report	Included mainly for reconciliation purposes and to eliminate double counting of CGIAR collaboration costs; note that it is the *net* amount (i.e. expenses excluding CGIAR collaboration costs) which should be used as the total for L111 and L131
L131	CRP - Flagship Projects Report	Simplified - Source of funding no longer required; note that this report is still titled "Themes"; transition is underway and some CRPs are already recording costs by Flagship Project. If that is the case for your CRP, please change the title of the report.
L136	Gender Expenditure by Theme	
L141	CRP - Cluster of Activities Report	
	Analytical Financial Reports	
L211	CRP Partnerships Report	

Notes

Most reports are for current year only. Exceptions are L101 which is multi-year (cumulative).

All reports shown here are for individual CRP's. The Consortium Office will prepare consolidated CRP reports.

Budget figures in all of the attached forms should be the annual confirmed budget (POWB) for the year.

W1/2 total will be as the Financing Plan notified by the Consortium Office, and W3/Bilateral the forecast prepared internally.

Actual events since the signing of the PIAs result in the budget per PIA no longer being a meaningful measure of performance.

For reporting purposes, please delete from L121 and L131 Centers not relevant to your CRP

CRP No.3.2 - MAIZE	Cumulative Financial Summary
Period: 01/01/2015- 12/31/2015	

Amounts in USD (000's)

Report Description: L101

Name of Report: Cumulative Financial Summary

Frequency/Period: Annual

Deadline: Every April 15th

Summary Report - by CG Partners

	(a) Total POWB budget since inception					(b) Actual cumulative Expenses					(c) Variance / Balance				
	Windows 1 & 2	**Window 3**	**Bilateral Funding**	**Center funds**	**Total Funding**	**Windows 1 & 2**	**Window 3**	**Bilateral Funding**	**Center funds**	**Total Funding**	**Windows 1 & 2**	**Window 3**	**Bilateral Funding**	**Center funds**	**Total Funding**
5. CIMMYT	54,851	61,889	144,936	-	261,675	51,397	59,992	131,625	-	243,014	3,453	1,897	13,311	-	18,661
11. IITA	7,754	8,938	31,608	-	48,300	7,754	8,382	30,571		46,707	-	556	1,037	-	1,593
Total for CRP	**62,605**	**70,827**	**176,544**	**-**	**309,975**	**59,151**	**68,374**	**162,196**	**-**	**289,721**	**3,453**	**2,453**	**14,348**	**-**	**20,254**
	20%	**23%**	**57%**	**0%**	**100%**	**20%**	**24%**	**56%**	**0%**	**100%**	**17%**	**12%**	**71%**	**0%**	**100%**

CRP No.3.2 - MAIZE

Period: 01/01/2015- 12/31/2015

Amounts in USD (000's)

Annual Funding Summary

Report Description L106

Name of Report: Annual Funding Summary

Frequency/Period: Annual

Deadline: Every April 15th

PART 1 - Annual FINANCE PLAN (Totals for Windows 1 and 2 combined)

Approved Level for Year - Initial Approval
(as per PIA)

Approved Level for Year - Final Amount

PART 2 - Funding Summary for Year

		2014 Actual Funding			
		Windows 1&2	**Window 3**	**Bilateral Funding**	**Total Funding**
	CIMMYT :				
1	BMGF	-	12,564	4,656	17,220
2	CGIAR Fund	8,181	-	-	8,181
3	SAGARPA	-	-	7,089	7,089
4	USAID	-	6,462	14	6,476
5	ACIAR	-	617	3,618	4,235

6	SDC	-	-	759	759
7	SFSA	-	-	580	580
8	U of Twente	-	-	370	370
9	IITA	-	-	252	252
10	IFAD	-	223	-	223
11	Cornell	-	-	155	155
12	ILRI	-	-	128	128
13	ICRAF	-	-	107	107
14	ICAR	-	103	-	103
15	ICRISAT	-	-	101	101
16	Engineers Without Borders	-	-	79	79
17	FAO	-	-	72	72
18	CAAS	-	57	-	57
19	Others < $50k	-	54	253	307
	IITA :				
20	CGIAR Fund (CIMMYT)	1,594	1,342	799	3,736
21	BMGF	-	-	283	283
22	AWF	-	-	160	160
23	MINADER	-	-	96	96
24	USAID	-	190	141	331
25	SYNGENTA	-	-	225	225
26	CORAF	-	-	54	54
27	FARA	-	-	24	24

28	ADA	-	41	0	41
29	AGRA	-	-	92	92
30	AFDB	-	-	8,717	8,717
31	IFAD	-	72		72
32	Netherlands	-	-	58	58
33	SWEDISH UNIV.OF AGRIC. SCIENCE	-	-	20	20
34	WACCI - GHANA	-	-	66	66
35	NIGERIA	-	-	215	215
36	USDA - ARS	-	-	125	125
37	NESTLE - SWITZERLAND	-	-	1	1
38	Others < $?	-	-	(24)	(24)
	Total for MAIZE	**9,775**	**21,725**	**29,286**	**60,786**

CRP No.3.2 - MAIZE
Period: 01/01/2015-12/31/2015

Annual Financial Summary by Centers

Amounts in USD (000's)

Report Description

L111

Name of Report: Annual Financial Summary by Centers & Other Participants

Frequency/Period: Annual

Deadline: Every April 15th

Summary Report - by CG Partners	(a) CRP 2015 POWB approved budget					(b) CRP 2015 Expenditure					(c) Variance this Year				
	Windows 1 & 2	Window 3	Bilateral Funding	Center funds	Total Funding	Windows 1 & 2	Window 3	Bilateral Funding	Center funds	Total Funding	Windows 1 & 2	Window 3	Bilateral Funding	Center funds	Total Funding
5. CIMMYT	11,634	25,545	21,569	-	58,748	8,181	20,080	18,233	-	46,494	3,453	5,465	3,336	-	12,254
11. IITA	1,594	2,198	11,912	-	15,704	1,594	1,645	11,053	-	14,292	-	553	859	-	1,412
Total for CRP	**13,228**	**27,743**	**33,481**	**-**	**74,452**	**9,775**	**21,725**	**29,286**	**-**	**60,786**	**3,453**	**6,018**	**4,195**	**-**	**13,666**
	18%	**37%**	**45%**	**0%**	**100%**	**16%**	**36%**	**48%**	**0%**	**100%**	**25%**	**44%**	**31%**	**0%**	**100%**

Annual Financial Summary by Natural Classification

CRP No. 3.2, MAIZE

Period: 01/01/2015- 12/31/2015

Amounts in USD 000's

Report Description: L121

Name of Report: Financial Summary by Natural Classification lines

Frequency/Period: Annual

Deadline: Every April 15th

	Windows 1 & 2	Window 3	Bilateral Funding	Center Funds	Total Funding	Windows 1 & 2	Window 3	Bilateral Funding	Center Funds	Total Funding	Windows 1 & 2	Window 3	Bilateral Funding	Center Funds	Total Funding
Total CRP 3.2, CRP on Maize	**POWB Approved Budget**					**Actual**					**Unspent/Variance**				
Personnel	4,258	6,627	9,968	-	20,853	4,490	5,458	8,491	-	18,439	(232)	1,169	1,477	-	2,414
Collaborators Costs - CGIAR Centers	-	3,125	1,124	-	4,249	-	3,070	5,294	-	8,364	-	55	(4,170)	-	(4,115)
Collaborator Costs - Partners	(526)	5,261	11,347	-	16,082	639	5,063	3,689	-	9,391	(1,165)	198	7,658	-	6,691
Supplies and services	8,216	7,034	5,060	-	20,310	2,663	4,752	7,868	-	15,283	5,553	2,282	(2,808)	-	5,027
Operational Travel	590	1,177	1,689	-	3,456	426	893	1,349	-	2,668	164	284	340	-	788
Depreciation	(308)	1,545	1,642	-	2,879	323	453	230	-	1,006	(631)	1,092	1,412	-	1,873
Sub-total of Direct Costs	**12,230**	**24,769**	**30,830**	**-**	**67,829**	**8,541**	**19,689**	**26,921**	**-**	**55,151**	**3,689**	**5,080**	**3,909**	**-**	**12,678**
Indirect Costs	998	2,974	2,651	-	6,623	1,234	2,036	2,365	-	5,635	(236)	938	286	-	988
Total - All Costs	**13,228**	**27,743**	**33,481**	**-**	**74,452**	**9,775**	**21,725**	**29,286**	**-**	**60,786**	**3,453**	**6,018**	**4,195**	**-**	**13,666**
LESS Coll Costs CGIAR Centers	-	**(3,125)**	**(1,124)**	**-**	**(4,249)**	-	**(3,070)**	**(5,294)**	**-**	**(8,364)**	**-**	**(55)**	**4,170**	**-**	**4,115**
Total Net Costs	13,228	24,618	32,357	-	70,203	9,775	18,655	23,992	-	52,422	3,453	5,963	8,365	-	17,781

Amounts for each participating center below:

CIMMYT	POWB Approved Budget					Actual					Unspent/Variance				
Personnel	3,520	5,859	8,048		17,427	3,529	4,802	6,381		14,712	(9)	1,057	1,667	-	2,715
Collaborators Costs - CGIAR Centers		3,125	1,124		4,249	-	3,070	600		3,670	-	55	524	-	579
Collaborator Costs - Partners	(546)	4,811	4,172		8,437	620	4,726	2,230		7,576	(1,166)	85	1,942	-	861
Supplies and services	7,740	6,496	3,546		17,782	2,378	4,357	6,100		12,835	5,362	2,139	(2,554)	-	4,947
Operational Travel	478	1,012	1,158		2,648	313	776	734		1,823	165	236	424	-	825
Depreciation	(329)	1,493	1,081		2,245	334	448	119		901	(663)	1,045	962	-	1,344
Sub-total of Direct Costs	**10,863**	**22,796**	**19,129**	**-**	**52,788**	**7,174**	**18,179**	**16,164**	**-**	**41,517**	**3,689**	**4,617**	**2,965**	**-**	**11,271**
Indirect Costs	771	2,749	2,440		5,960	1,007	1,901	2,069		4,977	(236)	848	371	-	983
Total - All Costs	**11,634**	**25,545**	**21,569**	**-**	**58,748**	**8,181**	**20,080**	**18,233**	**-**	**46,494**	**3,453**	**5,465**	**3,336**	**-**	**12,254**
LESS Coll Costs CGIAR Centers	**-**	**(3,125)**	**(1,124)**	**-**	**(4,249)**	**-**	**(3,070)**	**(600)**	**-**	**(3,670)**	**-**	**(55)**	**(524)**	**-**	**(579)**
Total Net Costs	**11,634**	**22,420**	**20,445**	**-**	**54,499**	**8,181**	**17,010**	**17,633**	**-**	**42,824**	**3,453**	**5,410**	**2,812**	**-**	**11,675**

IITA	POWB Approved Budget					Actual					Unspent/Variance				
Personnel	738	768	1,920	-	3,426	961	656	2,110	-	3,727	(223)	112	(190)	-	(301)
Collaborators Costs - CGIAR Centers	-	-	-	-	-	-	-	4,694	-	4,694	-	-	(4,694)	-	(4,694)
Collaborator Costs - Partners	20	450	7,175	-	7,645	19	337	1,459	-	1,815	1	113	5,716	-	5,830
Supplies and services	476	538	1,514	-	2,528	285	395	1,768	-	2,448	191	143	(254)	-	80
Operational Travel	112	165	531	-	808	113	117	615	-	845	(1)	48	(84)	-	(37)
Depreciation	21	52	561	-	634	(11)	5	111	-	105	32	47	450	-	529
Sub-total of Direct Costs	**1,367**	**1,973**	**11,701**	**-**	**15,041**	**1,367**	**1,510**	**10,757**	**-**	**13,634**	**-**	**463**	**944**	**-**	**1,407**
Indirect Costs	227	225	211	-	663	227	135	296	-	658	-	90	(85)	-	5
Total - All Costs	**1,594**	**2,198**	**11,912**	**-**	**15,704**	**1,594**	**1,645**	**11,053**	**-**	**14,292**	**-**	**553**	**859**	**-**	**1,412**
LESS Coll Costs CGIAR Centers	-	**-**	**-**	**-**	**-**	**-**	**-**	**(4,694)**	**-**	**(4,694)**	**-**	**-**	**4,694**	**-**	**4,694**
Total Net Costs	**1,594**	**2,198**	**11,912**	**-**	**15,704**	**1,594**	**1,645**	**6,359**	**-**	**9,598**	**-**	**553**	**5,553**	**-**	**6,106**

Annual Financial Summary by Flagship Project

CRP No. 3.2, MAIZE
Period: 01/01/2015-12/31/2015
Amounts in USD 000's

Report Description	L131
Name of Report:	Financial Summary by Flagship Project
Frequency/Period:	Annual
Deadline:	Every April 15th

	POWB Approved	Current Year Actual Expenditures	Unspent Budget
Summary Report - by Flagship Project			
Flagship 1 - Sustainable intensification of maize-based cropping systems.	18,336	16,354	1,982
Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	11,215	9,186	2,029
Flagship 3 - Stress resilient and nutritious maize.	18,809	16,537	2,272
Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	15,416	9,797	5,619
Flagship 5 - Inclusive and profitable maize futures.	8,932	7,529	1,403
CRP Management/Coordination	1,744	1,383	361
Total - All Costs	**74,452**	**60,786**	**13,666**

CIMMYT			
Flagship 1 - Sustainable intensification of maize-based cropping systems.	12,992	11,442	1,550
Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	10,377	8,433	1,944
Flagship 3 - Stress resilient and nutritious maize.	16,646	14,633	2,013
Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	11,601	6,296	5,305
Flagship 5 - Inclusive and profitable maize futures.	5,510	4,429	1,081
CRP Management/Coordination	1,622	1,261	361
Total - All Costs	58,748	46,494	12,254

IITA			
Flagship 1 - Sustainable intensification of maize-based cropping systems.	5,344	4,912	432
Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	838	753	85
Flagship 3 - Stress resilient and nutritious maize.	2,163	1,904	259
Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	3,815	3,501	314
Flagship 5 - Inclusive and profitable maize futures.	3,422	3,100	322
CRP Management/Coordination	122	122	-
Total - All Costs	15,704	14,292	1,412

CRP No. 3.2, MAIZE
Period: 01/01/2015- 12/31/2015

Amounts in USD 000's

Annual Financial Summary of Gender by Flagship Project

Report Description: L136

Name of Report:	Financial Summary of Gender Expenditure by Flagship Project
Frequency/Period:	Annual
Deadline:	Every April 15th

	POWB Approved	Current Year Actual Expenditures	Unspent Budget
Summary Gender Report - by Flagship Project			
Flagship 1 - Sustainable intensification of maize-based cropping systems.	3,524	3,154	370
Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	561	503	58
Flagship 3 - Stress resilient and nutritious maize.	2,704	2,474	230
Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	2,945	1,845	1,099
Flagship 5 - Inclusive and profitable maize futures.	2,480	2,210	270
CRP Management/Coordination	145	126	19
Total - All Costs	**12,359**	**10,313**	**2,046**

CIMMYT			
Flagship 1 - Sustainable intensification of maize-based cropping systems.	2,497	2,207	290
Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	519	462	57
Flagship 3 - Stress resilient and nutritious maize.	2,393	2,189	204
Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	2,216	1,186	1,030
Flagship 5 - Inclusive and profitable maize futures.	1,530	1,300	230
CRP Management/Coordination	145	126	19
Total - All Costs	9,300	7,470	1,830

IITA			
Flagship 1 - Sustainable intensification of maize-based cropping systems.	1,027	947	80
Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	42	41	1
Flagship 3 - Stress resilient and nutritious maize.	311	285	26
Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	729	659	69
Flagship 5 - Inclusive and profitable maize futures.	950	910	40
CRP Management/Coordination	-	-	-
Total - All Costs	3,059	2,843	216

CRP No. 3.2, MAIZE
Period: 01/01/2015- 12/31/2015
Amounts in USD 000's

CRP Partnership Report

Report Description **L211**

Name of Report: CRP Partnerships Report
Frequency/Period: Annual
Deadline: Every April 15th

Total CRP 3.2, CRP on Maize					**Actual Expenses - This Year**				
Item	**Institute Acronym**	**Institute Name**	**Country**		**Windows 1 & 2**	**Window 3**	**Bilateral**	**Center Funds**	**TOTAL**
CIMMYT :									
1	CIAT	Centro Internacional de Agricultura Tropical	Colombia		-	-	93		**93**
3	ICRISAT	International Crops Research Institute for the Semi Arid Tropics	India		-	33	246		**279**
4	IFPRI	International Food Policy Research Institute	USA		-	270	-		**270**
5	IITA	International Institute of Tropical Agriculture	Nigeria		-	2,008	116		**2,124**
6	ILRI	International Livestock Research Institute	Kenya		-	90	144		**234**
7	IRRI	International Rice Research Institute	Philippines		-	670	-		**670**
9	UOQ	University of Queensland	Australia		50	-	562		**612**
10	EIAR	Ethiopian Institute of Agricultural Research	Ethiopia		1	290	137		**428**

11	KALRO	Kenya Agricultural and Livestock Research Organization	Kenya		-	241	181		**422**
12	ACIAR	Australian Centre for International Agricultural Research	Australia		-	(39)	432		**393**
13	INIFAP	Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias	Mexico		63	-	297		**359**
14	UHO	Universitat Hohenheim	Mexico		-	287	-		**287**
15	WAU	Wageningen University	Netherlands		151	120	-		**271**
16	ARC	Agricultural Research Council	USA		-	246	13		**259**
17	PU	Purdue University	USA		-	208	29		**237**
18	IIAM	International Institute for the Advancement	USA		-	87	108		**195**
19	IPNI	International Plant Nutrition Institute	Mexico		-	158	-		**158**
20	MERU	Meru Agro-Tours & Consultants Co. Ltd (Meru)	Tanzania		-	129	14		**143**
21	SARI	Selian Agricultural Research Institute	Tanzania		-	30	101		**131**
22	CSU	Charles Sturt University	Australia		-	117	-		**117**
23	SAR	Sari External	Mexico		-	111	-		**111**
24	KSEC	Kenya Seed Company	Kenya		-	107	2		**109**
25	NARO	National Agricultural Research Organization	Uganda		-	75	24		**99**
26	ESE	Ethiopia Seed Enterprise	Ethiopia		-	93	-		**93**
27	LANUNIV	Lancaster University	UK		-	90	-		**90**
28	UACH	Universidad Autonoma de Chapingo	Mexico		-	-	86		**86**
29	WSC	Western Seed Company Limited	Mexico		-	84	-		**84**

30	IFFA	Iffa Seed Co Ltd	Tanzania		-	81	-		**81**
31	UTB	Ut Batelle Llc	USA		-	80	-		**80**
32	SHZ	Southern Highlands Zonal Research and Development Institute	Tanzania		-	75	-		**75**
33	STA	Seed Trade Association	Bangladesh		-	74	-		**74**
34	SAT	Suba Agro Trading	Tanzania		-	72	-		**72**
35	KEN	Kendat	Mexico		-	70	-		**70**
36	SCCIZ	Seed Control Certification Institute Zambia	Zambia		-	64	-		**64**
37	MBCU	Meki Batu Vegetable & Fruit Growers Cooperative Union Ltd	Ethiopia		-	61	-		**61**
38	CDA	Centre for Dryland Agriculture Bayero University	Nigeria		-	60	-		**60**
39	NSL	Naseco Seeds Ltd	Mexico		-	60	-		**60**
40	DSL	Dryland Seed Ltd (Dsl)	Mexico		-	55	-		**55**
41	PSL	Pearl Seeds Limited	Uganda		-	55	-		**55**
42	FIC	Farm Inputs Care Centre (Fica) Ltd	Uganda		-	51	-		**51**
43	Others Less Than 50k				355	1,437	246		**2,038**
IITA :									
44	UNILURIO	UNILURIO	MOZAMBIQUE		-		2	-	**2**
45	UNILORIN	UNILORIN	NIGERIA		-	25		-	**25**
46	AFRICARICE	AFRICARICE	Cote d'Ivoire		-		2,921	-	**2,921**
47	CAES - MAK	College of Agricultural and Environmental Sciences, Makerere University	UGANDA		-	28		-	**28**
48	IFPRI	International Food Policy Research Institute	USA		-		569	-	**569**
49	IITA	IITA	ZAMBIA		(1)		3	-	**2**

50	IITA	IITA	GHANA				17		**17**
51	CIMMYT	CIMMYT	MEXICO				73		**73**
52	OAU	Obafemi Awolowo University	NIGERIA		-	1		-	**1**
53	IITA	IITA	NIGERIA		-	29	24	-	**53**
54	ICARDA	ICARDA	TUNISIA		-		2,234	-	**2,234**
55	ICIPE	ICIPE	KENYA		-		8	-	**8**
56	INERA	INERA	CONGO		10			-	**10**
57	INRAB	INRAB	BENIN REPUBLIC		-	47		-	**47**
58	MSC	Maina Seeds Company Ltd	NIGERIA		-		2	-	**2**
59	SARI	SARI	GHANA		-	29		-	**29**
60	BUK	BUK	NIGERIA		-		30	-	**30**
61	NAERLS	NAERLS	NIGERIA		-	9		-	**9**
62	KTARDA	KTARDA	NIGERIA		-		11	-	**11**
63	IER	IER	MALI		-	49		-	**49**
64	CRI	CRI	GHANA		-	23	15	-	**38**
65	IAR	IAR	NIGERIA		-	36	11	-	**47**
66	KU LEUVEN	Katholieke Universiteit, Leuven	BELGIUM				76		**76**
67	IRAD	IRAD	CAMEROON		10			-	**10**
68	BAKER TILLY	Baker tilly	NIGERIA		-		9	-	**9**
69	ARS	United States Department of Agriculture	USA		-	53	11	-	**64**
70	JIRKUR SEED BIU BORNO STATE	Jirkur Seed Biu Borno state	NIGERIA		-		2	-	**2**
71	COLLEGE OF BASIC &SCIE,UNI V OF GHANA	College of Basic & Scie, Univ Of Ghana	GHANA				19		**19**
72	M & B SEEDS & AGRIC.	M & B SEEDS & AGRIC.	GHANA		-	3		-	**3**
73	INSTITUTE D' ECONOMIE RURALE MALI	Institute d' Economie Rurale Mali	MALI				68		**68**

74	SAVANNA SEEDS & LIVESTOCK LTD	Savanna Seeds & Livestock Ltd	NIGERIA		-		8	-	**8**
75	OYO STATE AGRICULTURAL DEV	Oyo State Agricultural Dev	NIGERIA		-		6	-	**6**
76	UNIVERSITE DE PARAKOU	Universite de Parakou	BENIN REPUBLIC		-	5		-	**5**
77	KADUNA STATE AGRICULTURAL DEV	Kaduna State Agricultural Dev	NIGERIA		-		6	-	**6**
78	AVRDC	The World Vegetable Center	TAIWAN		-	-	6		**6**
79	ZADP	Zamfara State Agricultural Development (ZADP)	NIGERIA				6		**6**
80	NADP	Nasarawa State Agricultural Development Project (NADP)					6		**6**
81	KATSINA STATE AGRICULTURAL DEV	Katsina State Agricultural Dev	NIGERIA		-			-	**-**
82	KWARA STATE AGRICULTURAL DEV	Kwara State Agricultural Dev	NIGERIA		-		6	-	**6**
83	BSADP	BSADP	NIGERIA		-		7	-	**7**
Total for CRP 3.2, CRP on Maize					**639**	**8,133**	**8,983**	**-**	**17,754**

5. CIMMYT					**Actual Expenses - This Year**				
Item	**Institute Acronym**	**Institute Name**	**Country**		**Windows 1 & 2**	**Window 3**	**Bilateral**	**Center Funds**	**TOTAL**
1	CIAT	Centro Internacional de	COLOMBIA		-	-	93		**93**

		Agricultura Tropical							
3	ICRISAT	International Crops Research Institute for the Semi Arid Tropics	INDIA		-	33	246		**279**
4	IFPRI	International Food Policy Research Institute	USA		-	270	-		**270**
5	IITA	International Institute of Tropical Agriculture	NIGERIA		-	2,008	116		**2,124**
6	ILRI	International Livestock Research Institute	KENYA		-	90	144		**234**
7	IRRI	International Rice Research Institute	PHILIPPINES		-	670	-		**670**
9	UOQ	University of Queensland	AUSTRALIA		50	-	562		**612**
10	EIAR	Ethiopian Institute of Agricultural Research (EIAR)	ETHIOPIA		1	290	137		**428**
11	KALRO	Kenya Agricultural and Livestock Research Organization	KENYA		-	241	181		**422**
12	ACIAR	Australian Centre for International Agricultural Research	AUSTRALIA		-	(39)	432		**393**
13	INIFAP	Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias	Mexico		63	-	297		**359**
14	UHO	Universitat Hohenheim	Mexico		-	287	-		**287**
15	WAU	Wageningen University	NETHERLANDS		151	120	-		**271**
16	ARC	Agricultural Research Council	USA		-	246	13		**259**
17	PU	Purdue University	USA		-	208	29		**237**
18	IIAM	International Institute for the Advancement	USA		-	87	108		**195**
19	IPNI	International Plant Nutrition Institute	Mexico		-	158	-		**158**

20	MERU	Meru Agro-Tours & Consultants Co. Ltd (Meru)	TANZANIA		-	129	14		**143**
21	SARI	Selian Agricultural Research Institute	TANZANIA		-	30	101		**131**
22	CSU	Charles Sturt University	AUSTRALIA		-	117	-		**117**
23	SAR	Sari External	Mexico		-	111	-		**111**
24	KSEC	Kenya Seed Company	KENYA		-	107	2		**109**
25	NARO	National Agricultural Research Organization	Uganda		-	75	24		**99**
26	ESE	Ethiopia Seed Enterprise	ETHIOPIA		-	93	-		**93**
27	LANUNIV	Lancaster University	UK		-	90	-		**90**
28	UACh	Universidad Autonoma De Chapingo	Mexico		-	-	86		**86**
29	WSC	Western Seed Company Limited	Mexico		-	84	-		**84**
30	IFFA	Iffa Seed Co Ltd	TANZANIA		-	81	-		**81**
31	UTB	Ut Batelle Llc	USA		-	80	-		**80**
32	SHZ	Southern Highlands Zonal Research And Development Institute	TANZANIA		-	75	-		**75**
33	STA	Seed Trade Association	BANGLADESH		-	74	-		**74**
34	SAT	Suba Agro Trading	TANZANIA		-	72	-		**72**
35	KEN	Kendat	Mexico		-	70	-		**70**
36	SCCIZ	Seed Control Certification Institute Zambia	Zambia		-	64	-		**64**
37	MBCU	Meki Batu Vegetable & Fruit Growers Cooperative Union Ltd	ETHIOPIA		-	61	-		**61**
38	CDA	Centre For Dryland Agriculture Bayero University	NIGERIA		-	60	-		**60**
39	NSL	Naseco Seeds Ltd	Mexico		-	60	-		**60**
40	DSL	Dryland Seed Ltd (Dsl)	Mexico		-	55	-		**55**

41	PSL	Pearl Seeds Limited	Uganda		-	55	-		**55**
42	FIC	Farm Inputs Care Centre (Fica) Ltd	Uganda		-	51	-		**51**
43	Others les than 50k				355	1,437	246	-	**2,038**
Total for CRP					**620**	**7,796**	**2,830**	**-**	**11,245**

11. IITA					**Actual Expenses - This Year**				
Item	**Institute Acronym**	**Institute Name**	**Country**		**Windows 1 & 2**	**Window 3**	**Bilateral**	**Center Funds**	**TOTAL**
1	UNILURIO	UNILURIO	MOZAMBIQUE		-		2	-	**2**
2	UNILORIN	UNILORIN	NIGERIA		-	25		-	**25**
3	AFRICARICE	AFRICARICE	Cote d'Ivoire		-		2,921	-	**2,921**
4	CAES - MAK	College of Agricultural and Environmental Sciences, Makerere University	UGANDA		-	28		-	**28**
5	IFPRI	International Food Policy Research Institute	USA		-		569	-	**569**
6	IITA	IITA	ZAMBIA		(1)		3	-	**2**
7	IITA	IITA	GHANA				17		**17**
8	CIMMYT	CIMMYT	MEXICO				73		**73**
9	OAU	Obafemi Awolowo University	NIGERIA		-	1		-	**1**
10	IITA	IITA	NIGERIA		-	29	24	-	**53**
11	ICARDA	ICARDA	TUNISIA		-		2,234	-	**2,234**
12	ICIPE	ICIPE	KENYA		-		8	-	**8**
13	INERA	INERA	CONGO		10			-	**10**
14	INRAB	INRAB	BENIN REPUBLIC		-	47		-	**47**
15	MSC	Maina Seeds Company Ltd	NIGERIA		-		2	-	**2**
16	SARI	SARI	GHANA		-	29		-	**29**
17	BUK	BUK	NIGERIA		-		30	-	**30**
18	NAERLS	NAERLS	NIGERIA		-	9		-	**9**
19	KTARDA	KTARDA	NIGERIA		-		11	-	**11**
20	IER	IER	MALI		-	49		-	**49**
21	CRI	CRI	GHANA		-	23	15	-	**38**

22	IAR	IAR	NIGERIA		-	36	11	-	**47**
23	KU LEUVEN	Katholieke Universiteit, Leuven	BELGIUM				76		**76**
24	IRAD	IRAD	CAMEROON		10			-	**10**
25	BAKER TILLY	Baker Tilly	NIGERIA		-		9	-	**9**
26	ARS	United States Department of Agriculture	USA		-	53	11	-	**64**
27	JIRKUR SEED BIU BORNO STATE	Jirkur Seed Biu Borno State	NIGERIA		-		2	-	**2**
28	COLLEGE OF BASIC &SCIE,UNI V OF GHANA	College of Basic &Scie, Univ of Ghana	GHANA				19		**19**
29	M & B SEEDS & AGRIC.	M & B Seeds & Agric.	GHANA		-	3		-	**3**
30	INSTITUTE D' ECONOMIE RURALE MALI	Institute d' Economie Rurale Mali	MALI				68		**68**
31	SAVANNA SEEDS & LIVESTOCK LTD	Savanna Seeds & Livestock Ltd	NIGERIA		-		8	-	**8**
32	OYO STATE AGRICULT URAL DEV	Oyo State Agricultural Dev	NIGERIA		-		6	-	**6**
33	UNIVERSIT E DE PARAKOU	Universite de Parakou	BENIN REPUBLIC		-	5		-	**5**
34	KADUNA STATE AGRICULT URAL DEV	Kaduna State Agricultural Dev	NIGERIA		-		6	-	**6**
35	AVRDC	The World Vegetable Center	TAIWAN		-	-	6		**6**
36	ZADP	Zamfara State Agricultural Development (ZADP)	NIGERIA				6		**6**

37	NADP	Nasarawa State Agricultural Development Project (NADP)					6		**6**
38	KATSINA STATE AGRICULTURAL DEV	Katsina State Agricultural Dev	NIGERIA		-			-	**-**
39	KWARA STATE AGRICULTURAL DEV	Kwara State Agricultural Dev	NIGERIA		-		6	-	**6**
40	BSADP	BSADP	NIGERIA		-		7	-	**7**
Total for CRP					**19**	**337**	**6,153**	**-**	**6,509**

Annex 8: Contribution of MAIZE to Sub-IDOs, IDOs and SLOs of the new CGIAR 2016-2030 Strategy and Results Framework

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
Reduced Poverty	**Increased resilience of the poor to climate change and other shocks**	Increased household capacity to cope with shocks						
		Reduced production risk						
	Enhanced smallholder market access	Improved access to financial and other services						
		Reduced market barriers						
	Increased incomes and employment	**Diversified enterprise opportunities**						
		Increased livelihood opportunities						
		Increased value capture by producers						
		More efficient use of inputs						

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
Reduced Poverty & Improved food and nutrition security for health	**Increased productivity**	**Reduced pre- and post-harvest losses, including those caused by climate change**						
		Closed yield gaps through improved agronomic and animal husbandry practices						
		Enhanced genetic gain						
		Increased conservation and use of genetic resource						
		Increased access to productive assets, including natural resources						
Improved food and nutrition security for health	**Improved diets for poor and vulnerable people**	**Increased availability of diverse nutrient-rich foods**						
		Increased access to diverse nutrient-rich foods						

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
		Optimized consumption of diverse nutrient-rich foods						
	Improved food safety	Reduced biological and chemical hazards in the food system						
		Appropriate regulatory environment for food safety						
	Improved human and animal health through better agricultural practices	Improved water quality						
		Reduced livestock and fish disease risks associated with intensification and climate change						
		Increased safe use of inputs						
Improved natural resource	Natural capital enhanced and protected,	Land, water and forest degradation (including deforestation) minimized and reversed						

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
systems and ecosystems services	especially from climate change	Enhanced conservation of habitats and resources						
		Increased genetic diversity of agricultural and associated landscapes						
	Enhanced benefits from ecosystem goods and services	More productive and equitable management of natural resources						
		Agricultural systems diversified and intensified in ways that protect soils and water						
		Enrichment of plant and animal biodiversity for multiple goods and services						
	More sustainably managed agro-ecosystems	Increased resilience of agro-ecosystems and communities, especially those including smallholders						

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
		Enhanced adaptive capacity to climate risks						
		Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use						
Climate Change	**Mitigation and adaption achieved**	Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use						
		Increased above- and below-ground biomass for carbon sequestration						
		Improved forecasting of impacts of climate change and targeted technology development						
		Enhanced capacity to deal with climatic risks and extremes						

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
		Enabled environment for climate resilience						
Gender and youth	**Equity and inclusion achieved**	Gender-equitable control of productive assets and resources						
		Technologies that reduce women's labor and energy expenditure developed and disseminated						
		Improved capacity of women and young people to participate in decision-making						
Policies and Institutions	**Enabling environment improved**	**Increased capacity of beneficiaries to adopt research outputs**						
		Increased capacity of partner organizations, as evidenced by rates of investment in agricultural research						

System-level Outcomes (SLOs) / Cross-cutting Issues	Intermediate Development Outcomes (IDOs)	Sub-IDOs	Novel Diversity and Tools	Breeding	Seed Systems	Sustainable Intensification	Adding Value (New FP under Phase II)	Enhanced Impacts
		Conducive agricultural policy environment						
		Conducive environment for managing shocks and vulnerability, as evidenced in rapid resource mechanisms						
Capacity Development	**National partners and beneficiaries enabled**	**Enhanced institutional capacity of partner research organizations**						
		Enhanced individual capacity in partner research organizations through training and exchange						
		Increased capacity for innovation in partner research organizations						
		Increased capacity for innovation in partner development organizations and in poor and vulnerable communities						

Annex 9: List of MAIZE publications in peer-reviewed journals.

MAIZE Publications in 2015	Impact Factor
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 productivity in Ethiopia. Food Security, 7(5): 956-981.	1.495
Abera, W., Hussein, S., Derera, J., Regasa, M.W., Laing, M.D. (2015) Heterosis and combining ability of elite maize inbred lines under northern corn leaf blight disease prone environments of the mid-altitude tropics. Euphytica, 208(2): 391-400, DOI: 10.1007/s10681-015-1619-5.	1.385
Abera, W., Shimelis, H., Derera, J., Worku, M., Laing, M. (2015) Northern leaf blight response of elite maize inbred lines adapted to the mid-altitude sub-humid tropics. Cereal Research Communications, DOI: 10.1556/0806.43.2015.037.	0.607
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.	-
Adebayo, M. A., Menkir, A., Gedil, M., Blay, E., Gracen, V. E., Danquah, E., Ladejobi, F. (2015) Diversity assessment of drought tolerant exotic and adapted maize (*Zea mays* L.) inbred lines with microsatellite markers. Journal of Crop Science and Biotechnology, 18: 147-154.	-
Alamu, O. E., Maziya-Dixon, B., Menkir, A., Olaofe, O. (2015) Effects of husk and harvesting time on provitamin A activity and sensory properties of boiled fresh orange maize hybrids. Journal of Food Quality, 38(6): 387-395.	0.838
Alamu, O. E., Maziya-Dixon, B., Menkir, A., Olaofe, O., Irondi, E. A. (2015) Effect of maturity stages and roasting method on the proximate composition of orange maize hybrids. Global Advanced Research Journal of Agricultural Science, 4: 462-468.	-
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: 55-63.	-
Alumona, J. O., Okechukwu, R., Ozigbo, E., Akinrinde, E. A. (2015) Evaluation of ground cocoa pod husk and NPK fertilizer application for the productivity of maize-okra intercrop on an alfisol of south-western Nigeria. Ibadan Journal of Agricultural Research: 11: 192-200.	-
Atehnkeng, J., Donner, M., Ojiambo, P. S., Ikotun, B., Augusto, J., Cotty, P., Bandyopadhyay, R. (2015) Environmental distribution and genetic diversity of vegetative compatibility groups determine biocontrol strategies to mitigate aflatoxin contamination of maize by *Aspergillus flavus*. Microbial Biotechnology, 9(1): 75-88.	3.081
Baco, M. N., Affoukouk, T., Moumouni, I., Abdoulaye, T. (2015) Is taking gender into account for development and diffusion of agricultural innovations justified? The case of drought tolerant maize in	-

Northern Benin. Journal of Agricultural Extension and Rural Development, 7: 290- 297.	
Badu-Apraku, B., Annor, B., Oyekunle, M., Akinwale, R., Fakorede, M., Talabi, A. O., Akaogu, I. C., Gedil, M., Fasanmade, Y. (2015) Grouping of early maturing quality protein maize inbreds based on SNP markers and combining ability under multiple environments. Field Crops Research, 183: 169- 183.	2.976
Badu-Apraku, B., Fakorede, M., Gedil, M., Talabi, A. O., Annor, B., Oyekunle, M., Akinwale, R., Fasanmade, Y., Akaogu, I. C., Aderounmu, M. (2015) Heterotic responses among crosses of IITA and CIMMYT early white maize inbred lines under multiple stress environments. Euphytica, 206(1): 245-262.	1.385
Badu-Apraku, B., Fakorede, M., Oyekunle, M., Akinwale, R. (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 Agricultural Science, 154(4): 647-661.	1.157
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Annex 10: MAIZE financial highlights

Figure 7: 2015 Budget/expenditure per funding source

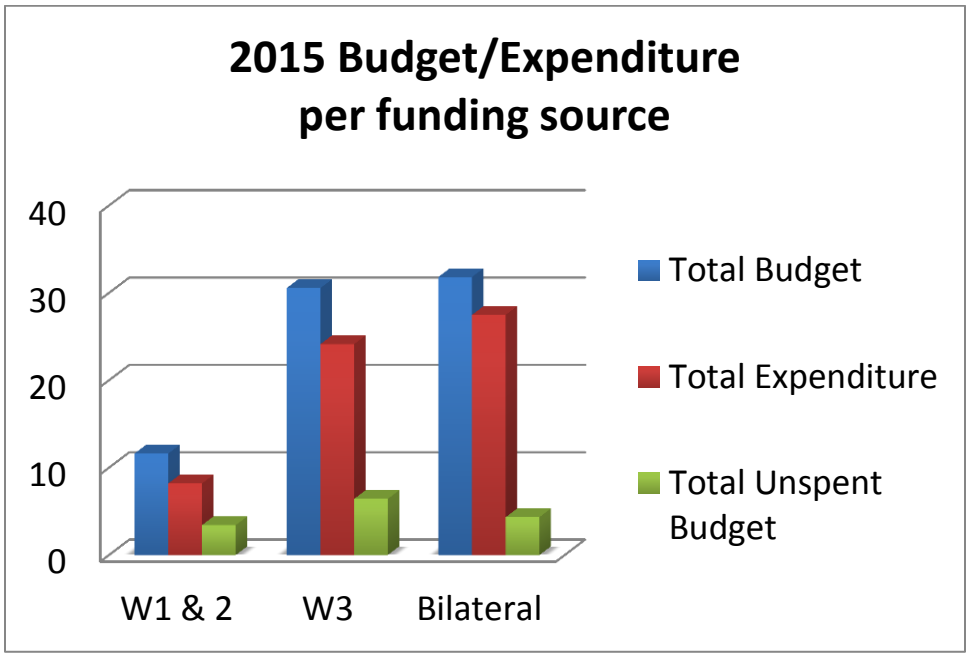


Figure 8: 2015 financial summary by flagship

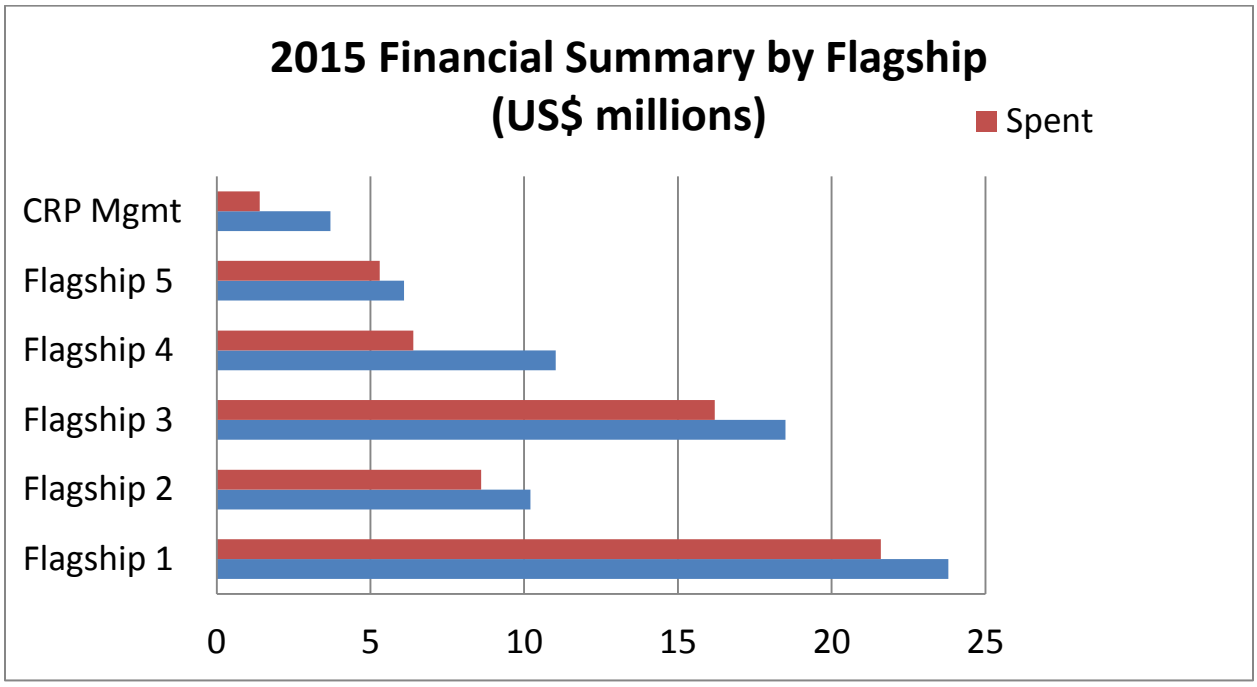
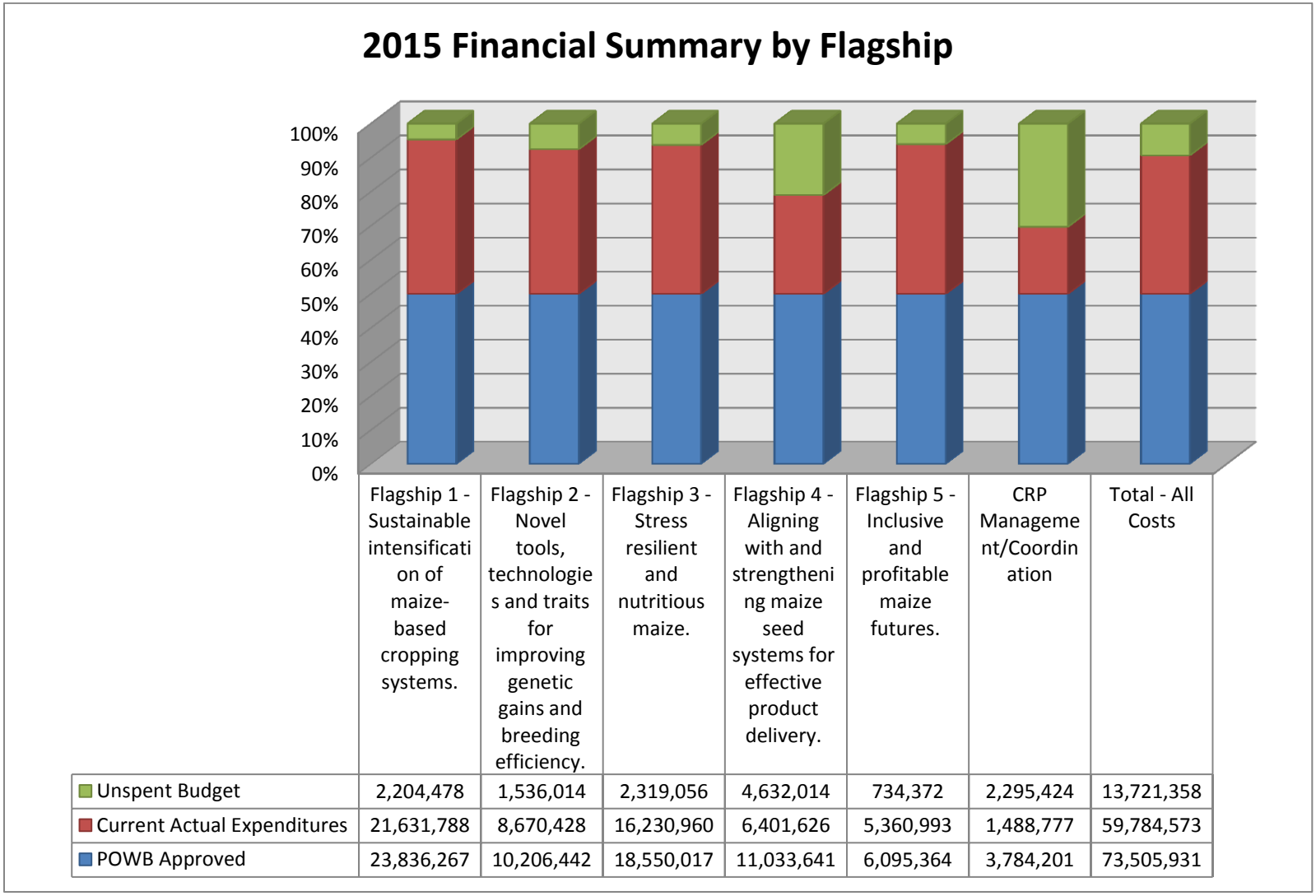
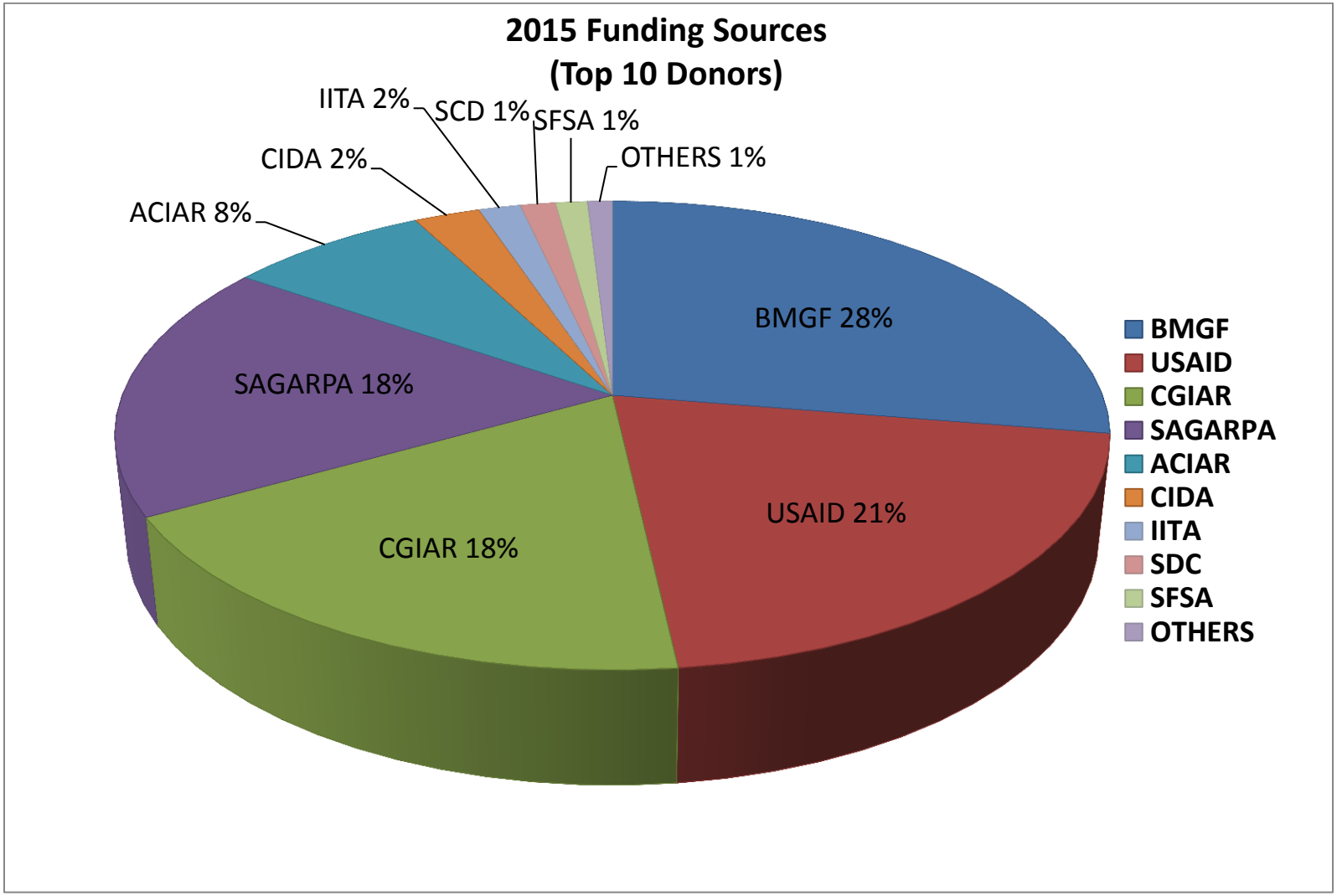


Figure 9: 2015 financial summary by flagship



	Flagship 1 - Sustainable intensification of maize-based cropping systems.	Flagship 2 - Novel tools, technologies and traits for improving genetic gains and breeding efficiency.	Flagship 3 - Stress resilient and nutritious maize.	Flagship 4 - Aligning with and strengthening maize seed systems for effective product delivery.	Flagship 5 - Inclusive and profitable maize futures.	CRP Management/Coordination	Total - All Costs
Unspent Budget	2,204,478	1,536,014	2,319,056	4,632,014	734,372	2,295,424	13,721,358
Current Actual Expenditures	21,631,788	8,670,428	16,230,960	6,401,626	5,360,993	1,488,777	59,784,573
POWB Approved	23,836,267	10,206,442	18,550,017	11,033,641	6,095,364	3,784,201	73,505,931

Figure 10: 2015 Funding sources (Top 10 donors)



Annex 11: Capacity development

Please find an interactive map of MAIZE capacity development activities 2015 here:

Figure 11: MAIZE-sponsored graduates by country, 2015

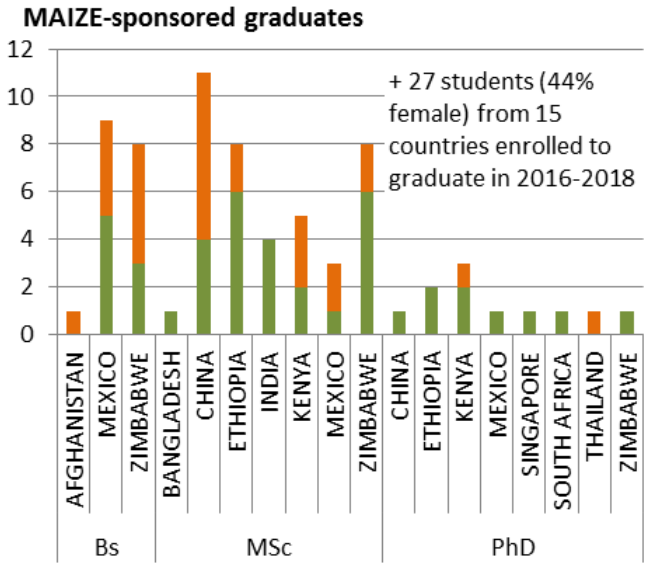
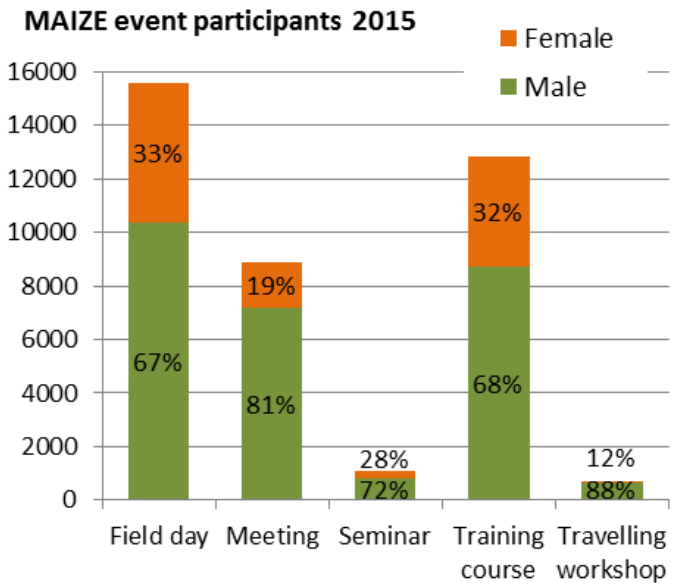
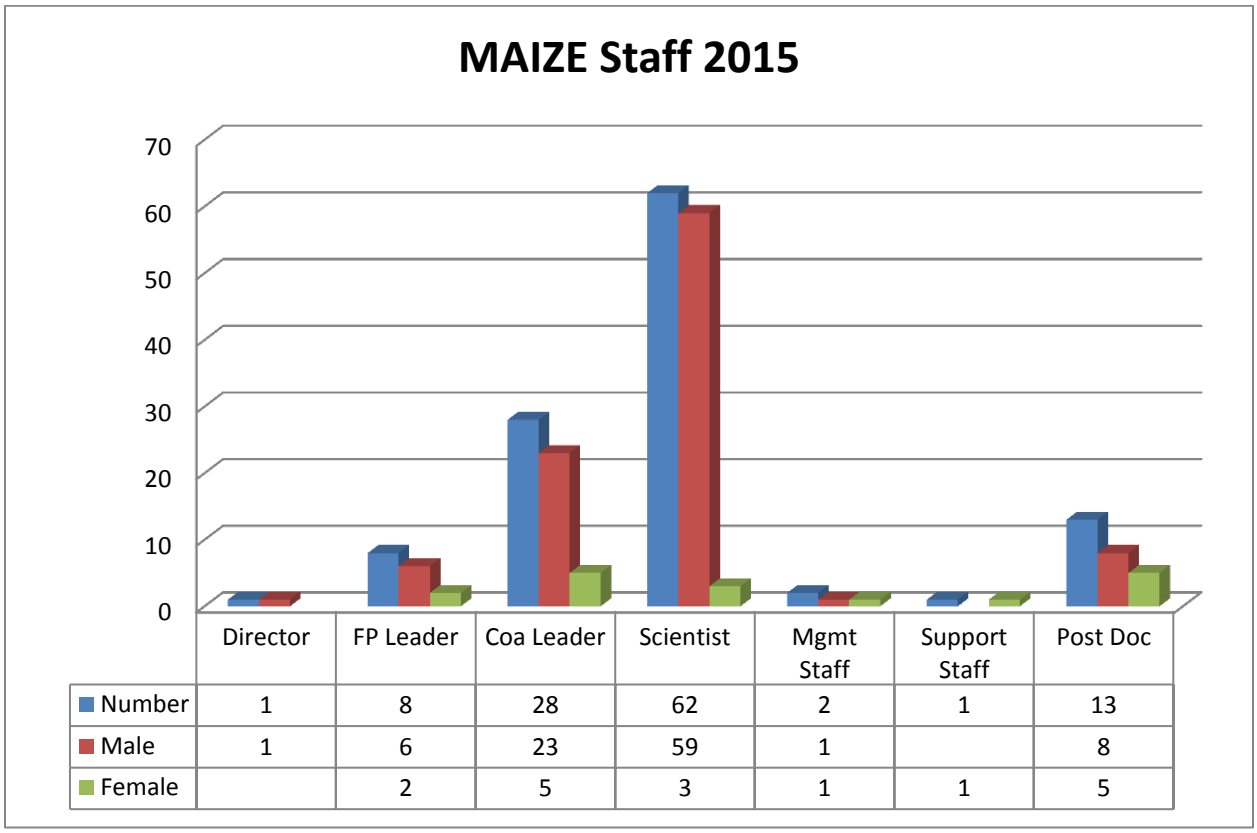


Figure 12: MAIZE event participants 2015



Annex 12: MAIZE Staff

Figure 13: MAIZE staff by position and gender



Role	Total	Male	Female
Director	1	1	
FP Leader	8	6	2
CoA Leader	28	23	5
Scientist	62	59	3
Mgmt Staff	2	1	1
Support Staff	1		1
Post Doc	13	8	5
Total	115	98	17

MAIZE is an alliance of more than 300 research and development partners worldwide.

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