

CGIAR Research Program on MAIZE

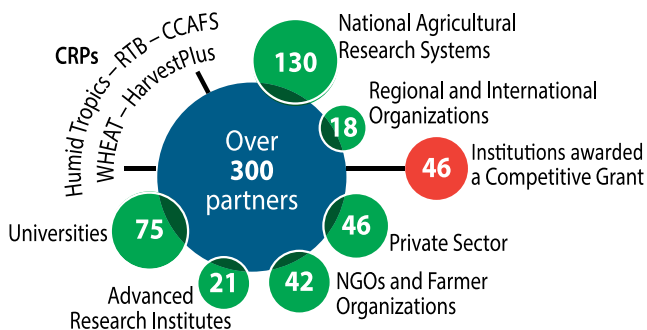
The CGIAR Research Program (CRP) on MAIZE unites more than 300 partners in maize research and development to achieve a greater strategic impact on maize-based farming systems in Africa, South Asia and Latin America.

MAIZE is led by the International Maize and Wheat Improvement Center (CIMMYT); its main partner is the International Institute of Tropical Agriculture (IITA).



For MAIZE, partnership means collaboration, working together to combine expertise and learning, seeking allies at all levels where positive changes can be made. The diversity of MAIZE partners means that the right research output is introduced where it is needed, in situations where it will be sustainable.

Through its Competitive Grants Initiative (CGI), MAIZE also funds innovation by awarding grants to non-CGIAR researchers capable of filling research gaps.



Why MAIZE?

Nutrition

Together with rice and wheat, maize provides at least **30 percent of the food calories** of more than 4.5 billion people in 94 developing countries. They include **900 million consumers** whose income is less than US \$2 per day and for whom maize is the preferred staple, including 120 -140 million poor farm families.

Gender

Women in African, Asian and Latin American maize-based farming systems invariably contribute a major proportion of agricultural labor, yet are held back by a lack of access to land, credit, information and markets.

National food production must be improved by addressing the needs of women and other disadvantaged groups through the adoption of agricultural technologies, including small-scale mechanization that frees up labor for other opportunities. Improvements to female nutrition and livelihoods are directly linked to the health and prosperity of their children.

A Sustainable Strategy for Food Security

MAIZE's strategy is to ensure that publicly funded international agricultural research helps most effectively **to stabilize maize prices and double the productivity of maize-based farming systems, making them more resilient and sustainable and significantly increasing farmers' income and livelihood opportunities, without using more land and as climates change and fertilizer, water and labor costs rise.**

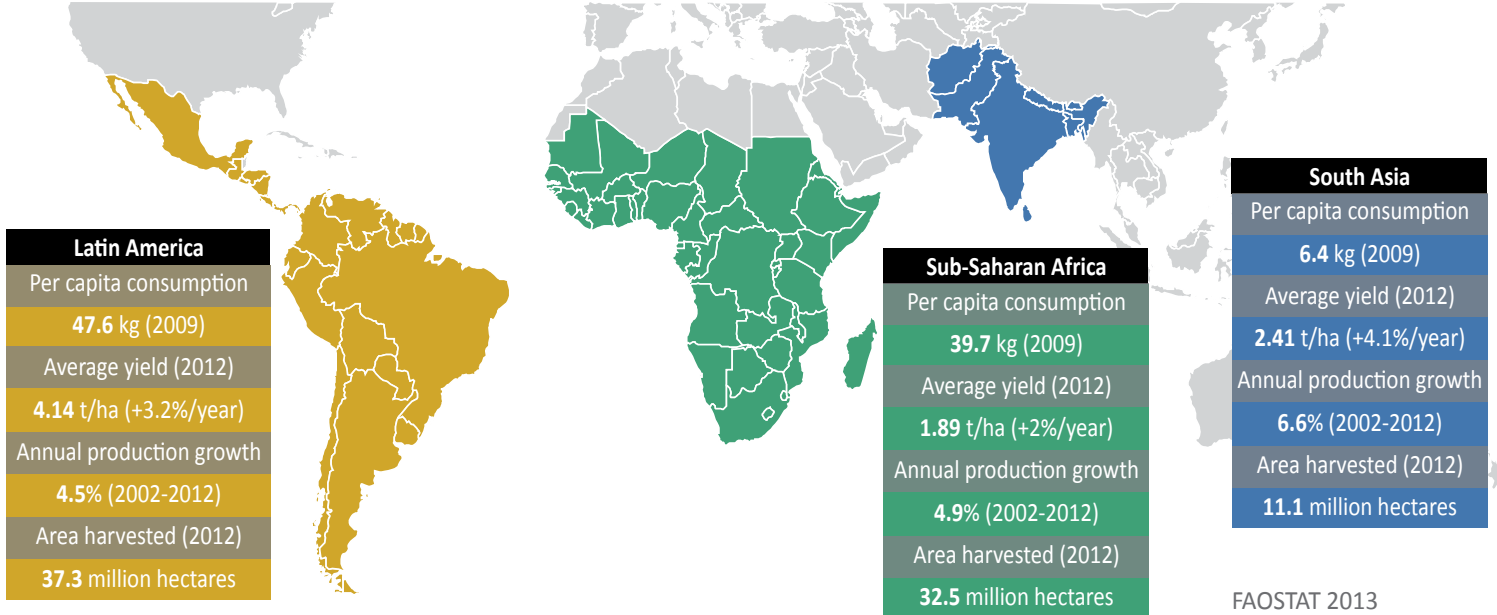
Challenges and Opportunities

By 2050 global maize consumption is expected to increase from **32 to 52 kilograms** per person per year. Changing diets, population growth and the demand for maize as a source of fuel and animal feed will increase consumer prices.

At current projections, climate variability will increase the risk of poor or lost harvests in some areas. Tropical and sub-tropical regions, home to over 90 percent of resource-poor farmers, are especially vulnerable. **Food price increases** in 2008 and 2010 showed how closely the fortunes of poor consumers are tied to shifts in food availability.

Farmers will need new varieties and technologies to adapt to changing climates, drought, flooding and new diseases, and to sustainably grow more with less to improve food and nutritional security. Three research strategies meet these key challenges.





1. Sustainable intensification and income opportunities

Sustainable intensification combines **conservation agriculture techniques** with **precision agriculture** and **integrated soil fertility management** technologies to increase production, resilience and incomes for smallholders while maximizing resource use efficiency.

Collaborating with partners and farmers in **87 Innovation Platforms** and **13,500 study sites**, MAIZE develops solutions for 20 million smallholders in six farming systems around the world, home to 22 percent of all malnourished children.

Innovation Platforms are the primary spaces in which stakeholders not only receive the results of our research, but become actively involved in setting priorities. The Royal Tropical Institute (KIT) is conducting a study to understand how stakeholder collaboration actually takes place in MAIZE projects.



Take it to the Farmer, Mexico
The initiative has now reached 200,000 smallholder farmers, increasing the profitability of Mexico's maize-based farming systems by US \$105 million in 2013.



Cereal Systems Initiative in South Asia
The project reached 185,000 farmers through rural innovation hubs, trained 750 mechanized service providers and facilitated women's access to machinery in 2013.

Remote sensing and information and communication technologies are used to understand how smallholder farmers manage their fields, and deliver the information they need.

Investigations of **farming systems and landscapes** help to understand farmers' choices and model outcomes so that interventions lead to sustainable, positive change.

Through partnerships and innovation platforms, the **Sustainable Intensification of Maize-Legume Based Cropping Systems for Food Security in Eastern and Southern Africa** project has contributed to the release of 40 new maize varieties and in 2013 reached 40,000 farmers – nearly half of them women – with capacity-building activities.

The **Farm Mechanization and Conservation Agriculture** project brings small-scale machinery adapted to reverse the decline of farm power in Sub-Saharan Africa. Women and men farmers benefit from reduced drudgery.

Nutrient Expert® ICT tool that helps farmers to apply fertilizer precisely to each field.



2. New maize varieties for the poor

High-yielding, nutritionally enhanced and stress-tolerant hybrids and open-pollinated varieties (OPVs) maize varieties are seen as a **critical vehicle** to enhance the lives of the poorest producers and consumers across the target geographies of MAIZE.

MAIZE focuses on farmers that are living in more **stress-prone, rainfed environments**. New improved maize varieties are tested regionally with national public and private sector partners under ideal conditions, managed stress and farmer conditions. Those varieties that perform better than current varieties under both favorable and stress conditions are being promoted by national agricultural research and extension systems, seed companies and NGOs.

Hill Maize Research Project, Nepal



The project supports 226 community-based seed companies (whose members are 60 percent women and 70 percent from disadvantaged groups). The companies produced 1,036 tons of improved maize in 2012.

Drought Tolerant Maize for Africa Project



Led by CIMMYT and IITA, DTMA distributed 17,000 tons of drought-tolerant maize seed in 13 African countries through a network of more than 100 small- and medium-scale seed producers and companies.

MAIZE works with more than 180 small- and medium-sized **seed companies** and 226 **community-based seed producers** supporting disadvantaged farmers in key areas.

New challenges to production arise quickly and require a **rapid response**. The weed *Striga* infests 2.4 million hectares of maize in Sub-Saharan Africa, causing crop losses of 30 to 80 percent. IITA and CIMMYT spearhead the adoption of resistant maize varieties, herbicides, bio-control and dual-cropping systems to improve yields by 126 percent in areas infested by *Striga*.

In 2011, **maize lethal necrosis disease (MLN)** spread quickly throughout East Africa and is a threat to the majority of maize grown in Africa. A **new MLN facility** opened in partnership with the Kenya Agricultural Research Institute (KARI) screens disease-resistant varieties for regional seed producers.

New facilities such as the doubled haploid (DH) breeding facility in Kenya offer **advanced capabilities to national researchers** and **smaller seed companies**. DH technology cuts breeding times by half. These facilities are **training hubs** for future generations of African researchers and technicians.

3. Integrated post-harvest management

Food spoilage and waste account for **annual losses of US\$310 billion** in developing countries. Maize is one of the most important staple food crops in Sub-Saharan Africa, providing food and income to more than 300 million resource-poor smallholders in eastern and southern Africa, but farmers suffer heavy post-harvest losses estimated at **20-30 percent**, due to inadequate storage techniques.

MAIZE aims to **reduce those losses** by 25 percent in target areas by 2030 and improve food safety and market opportunities (reducing aflatoxin and fumonisin in the value chain) through the commercial production and distribution of maize storage technologies (**silos and bags**) and aflatoxin bio-control (**Aflasafe™**).

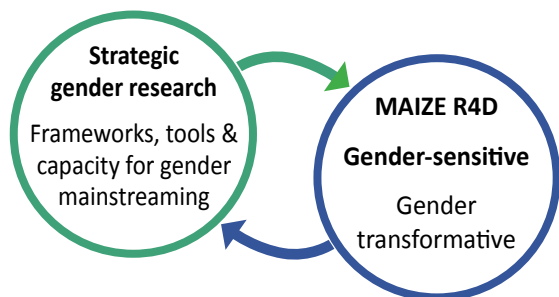
Effective Grain Storage Project



Artisans are trained to create a local industry producing metal grain silos. Toxins produced by fungal infections of maize cause growth defects and cancers, making it unsuitable for export. But by applying Aflasafe™, the toxin-producing fungi are driven out.

Gender Strategy

Promote equality of opportunity and outcomes for resource-poor women and men in maize-based systems.



A **gender audit** of MAIZE has been completed to assess gender targeting and mainstreaming within the CRP.

- 13 percent of MAIZE budget is allocated to gender
- 35 CIMMYT scientists trained in new gender-awareness research support tool
- 30 percent of participants in capacity-building activities in 2013 were female

A **cross-CRP gender study** will be completed in 2015, using case studies of gender dynamics in agricultural innovation to inform responsive research design.

Funding



W1 and W2 allow MAIZE to formulate a comprehensive R4D agenda, involving many partners and projects:

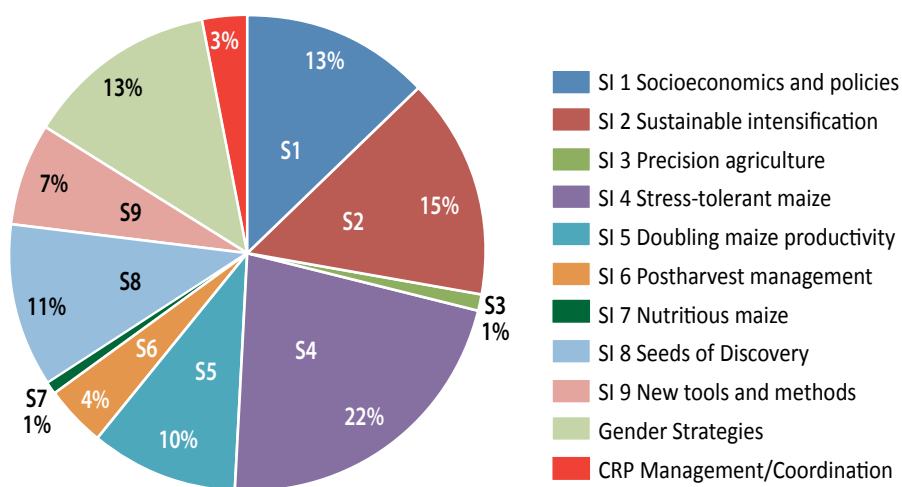
- Quick multi-partner response to maize lethal necrosis (MLN) disease in East Africa
- Use of doubled haploid (DH) technology to cut breeding times by half
- Over 17,000 tons of drought-tolerant maize seed produced in 13 African countries
- Drought and heat tolerance breeding network for Africa and South Asia with Climate Change, Agriculture and Food Security (CCAFS)
- Equal opportunities for female and male farmers
- Assessment of drivers of changes in systems modeling (with Wageningen University)

Return on investment

- 87 innovation platforms and 13,500 study sites
- 100 collaborators receiving MAIZE germplasm
- Support for 180 small- to medium-size seed companies and 226 community-based seed producers
- 1,004 capacity-building events held for 50,000 people in 27 countries in 2013

MAIZE Spending per Strategic Initiative* (2013)

Total: \$58.8 million



* Work in MAIZE is divided among nine Strategic Initiatives

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MAIZE CRP is led by the International Maize and Wheat Improvement Center (CIMMYT) and the International Institute of Tropical Agriculture (IITA)

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