A Partnership for Research and Development
Kenya and the CGIAR
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High-Quality Science for a Diverse Agriculture

Kenya and the Consultative Group on International Agricultural Research (CGIAR) have built a strong and open relationship, based on a shared conviction that research is vital for enhancing and sustaining agricultural productivity.

Two CGIAR-supported Centers—the World Agroforestry Centre (ICRAF) and the International Livestock Research Institute (ILRI)—have their headquarters in Kenya, and it hosts offices of seven other international Centers supported by the CGIAR. A dozen Centers actively collaborate with the country’s national agricultural research system—one of Africa’s most responsive and effective—which is led by the Kenya Agricultural Research Institute (KARI).

Recognizing the value of this partnership, the government of Kenya became a Member of the CGIAR in 1995 and hosted the CGIAR Annual General Meetings (AGM) in 2003.

Together, Kenya and the CGIAR have brought high-quality scientific talent to bear on the challenges of the country’s complex and diversified agricultural sector, which produces flowers and horticultural crops for European markets as well as smallholder staples, such as maize. The country has generated an impressive array of research outputs—including improved crop varieties, effective vaccines against livestock diseases and practical measures to prevent soil erosion.

The Centers supported by the CGIAR have helped advance the country’s development in many ways, working in partnership with its strong network of public sector and civil society organizations. This collaboration has generated large benefits for Kenya’s 22 million small farmers and pastoralists, who make up more than 70 percent of the nation’s total population. Contrary to generally negative trends in sub-Saharan Africa, food production in this country has largely kept pace with population growth. Only in years of severe drought have there been major food deficits.

To help Kenyan farmers achieve greater resilience in the face of harsh climatic conditions, the CGIAR-supported Centers are improving the drought tolerance of basic staples in collaboration with Kenyan partners. They are also working on various fronts to curb desertification, which is strongly associated with climate, and the more general threat of land degradation.

Following are brief descriptions of selected research initiatives in which the Centers and their national partners are applying science to strengthen food security, reduce poverty and halt the degradation of natural resources in Kenya.
Infrared Diagnostics Aid World Bank-Supported Recovery of Degraded Soils

A central challenge for achieving sustainable agriculture in Kenya and other parts of Africa is to overcome the subtle but widespread and serious threat of soil degradation. The World Agroforestry Centre (ICRAF), working in collaboration with private companies in Germany and the USA, has adapted and tested under African farmers’ conditions a new technology that offers a fast, cheap and reliable means of assessing the status of soils and providing farmers with precise and timely recommendations on how to replenish depleted soils and boost crop productivity. Called infrared diagnostics, the technique bypasses the need for conventional soil tests, using infrared light to map degraded lands and soils effectively and efficiently. Infrared diagnostics are currently being employed in a major project, financed by the World Bank and Global Environment Facility (GEF), in which Kenyan scientists are working to halt land degradation on thousands of hectares of farmland skirting Lake Victoria.

Smallholder dairy marketing for nourishment and income

Fifteen years of collaborative research are helping drive Kenya’s boom in smallholder dairy production, which has improved child nutrition while generating incomes and jobs. An award-winning project with smallholder dairies, which contribute up to 80 percent of the milk sold in the country, has strengthened local capacity to market milk products. In this work the International Livestock Research Institute (ILRI) has collaborated with KARI, the Ministries of Agriculture and Livestock and Fisheries Development and the Kenya Dairy Board. Other collaborative projects are helping highland farmers integrate livestock and crops to raise yields and improve soils, determining the severity of droughts in the Horn of Africa and developing new diagnostics and vaccines against East Coast fever and trypanosomiasis. In addition, ILRI is working with Kenya’s pastoral communities to improve livestock breeds, raise household incomes and assess development trade-offs in Kenya’s wildlife-rich rangelands.

New varieties of beans give higher yields

Farmers in western Kenya have adopted new varieties of beans that resist root rots and yield more than twice as much as local varieties that are susceptible to these diseases. In response to a root rot crisis, the International Center for Tropical Agriculture (CIAT) and KARI worked with the Ministry of Agriculture extension service to introduce 27 improved bean varieties. In a complementary participatory research project, local farmers selected 11 of those varieties for wide distribution. Seed of the varieties was multiplied and distributed via women’s groups, the government extension service and an NGO. A recent impact study shows that one of the new bush beans was being grown by 80 percent of farmers surveyed in one district and by 42 percent in another.

Protecting maize from pests

The International Maize and Wheat Improvement Center (CIMMYT) is working closely with KARI to boost maize harvests through technologies that cut losses from pests. Researchers are developing
maize varieties that are resistant to stem borers, for example, which inflict yield losses of 15 percent annually, with an estimated value of US$72 million. The two organizations have also joined forces with the Weizmann Institute in Israel to develop a novel but simple seed treatment method that protects maize from the parasitic weed striga. It infests more than 75 percent of farmland in western Kenya, causing an estimated US$1 billion in crop losses.

**Developing a taste for sweet potatoes**

Over the past 7 years, numerous organizations have worked together to fight vitamin A deficiency in Kenya. Among them, the International Potato Center (CIP), KARI and the Rural Energy and Food Security Organization (REFSO), an NGO operating near Lake Victoria, are jointly introducing orange-fleshed sweet potato in four Kenyan districts, where incidence of vitamin A deficiency is high. CIP's role has been to breed improved varieties of sweet potatoes that meet African consumers' requirements while providing good levels of beta-carotene. The Center sends these to KARI, whose Kakamega station provides a continuous supply of planting materials to REFSO, which organizes the production and distribution of vine cuttings to selected farm families for testing and promotion. More than 3 million vine cuttings have been distributed to some 200 farm families, who in turn have passed the materials on to their neighbors, contributing to better nutrition for thousands of rural people.

**Improvements in barley and other crops for drylands**

Kenya cooperates with the International Center for Agricultural Research in the Dry Areas (ICARDA) in malting and forage barley improvement through its National Plant Breeding Research Center (NPBRC), based in Njoro. ICARDA recently supplied NPBRC with a special collection of 42 elite lines for barley improvement. ICARDA has also contributed to the improvement of food and forage legumes in the country, including chickpea, dry pea, lathyrus and vetch crops, in cooperation with KARI, Moi University, and Kenya’s National Dryland Farming Research Center.

**Helping farmers meet market demand**

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is helping devise an innovative system to open up market opportunities for farmers in semi-arid environments, which account for more than 70 percent of Kenya's land area. The work focuses on grain legumes, for which there is strong domestic and international demand. In this initiative, ICRISAT works with various development partners, including Catholic Relief Services (CRS), to organize farmers into marketing groups. Private-sector partners, such as the Kenya Agricultural Commodity Exchange (KACE), provide market information and facilitate trading, while TechnoServe employs strong expertise in enterprise development to help create a vibrant private sector. On the technology development front, ICRISAT works with KARI to ensure that farmers have varieties that meet market demand as well as other means of intensifying production.
Policy research to improve food security

Kenya is one of six countries involved in an innovative network aimed at reducing poverty and improving food security, with support from the International Food Policy Research Institute (IFPRI), through collaborative research, capacity strengthening and improved communication of research results. Kenya has contributed importantly to the network’s research projects on rural services and agricultural markets and to its capacity-strengthening activities, including a competitive research grants program. The network’s publications include a report on ways to improve the delivery of animal health services on Kenyan farms.

Averting a crop disaster in western Kenya

When a devastating pandemic of the virulent Ugandan variant of cassava mosaic disease (CMD) spread to western Kenya, yield losses were so great that farmers started to abandon cassava cultivation. Six years ago IITA teamed up with KARI to tackle the problem. IITA, based on its experience in fighting the pandemic in Uganda, provided diagnostic tools and CMD-resistant germplasm, which it quickly moved into western Kenya, collaborating with the Kenya Plant Health Inspectorate Service. As a result of rapid multiplication and distribution of the new cassava, with the assistance of participating farmers and NGOs, production has returned to previous levels and is expected to increase.

Promoting African leafy vegetables

Over the past 5 years, the International Plant Genetic Resources Institute (IPGRI), in collaboration with KARI, the Rural Outreach Programme, Family Concern and other partners, has been researching and promoting African leafy vegetables. Major objectives are to provide good seed material for farmers in peri-urban parts of Nairobi, develop agronomic practices for the species and promote consumption so as to create sufficient demand. More than 400 farmers have been organized into associations and trained to grow originally wild species. The associations have been linked to markets, initially to supermarkets and later to fresh produce stores. In addition, the leafy vegetables have been widely promoted through food fairs, cooking competitions and the mass media. The result has been a sharp increase in demand for these originally neglected vegetables. Production has increased over tenfold, raising farmers’ incomes significantly.

Controlling malaria in Kenya

Collaborative research carried out by the International Water Management Institute (IWMI) and the International Centre of Insect Physiology and Ecology (ICIPE) has helped identify opportunities to improve farmers’ health and incomes in Kenya’s Mwea Irrigation Scheme. Scientists examined water management practices specifically for their potential to reduce malaria and other health risks. One method in particular—referred to as the wet/dry irrigation method—proved effective in saving water and in killing mosquito larvae. Farmer cooperatives, faced with water scarcity, have expressed interest in this method for boosting rice production.
Nourishing the Future through Scientific Excellence
The Consultative Group on International Agricultural Research

The Consultative Group on International Agricultural Research (CGIAR) is a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural research Centers that work with national agricultural research systems, civil society organizations and the private sector. The alliance mobilizes agricultural science to reduce poverty, foster human well-being, promote agricultural growth, and protect the environment. The CGIAR generates global public goods that are available to all.

Agriculture, the key to development

In a world where 75 percent of poor people depend on agriculture to survive, poverty cannot be reduced without investment in agriculture. Many countries with strong agricultural sectors have a record of sustained investments in agricultural science and technology. The evidence is clear—investment in agricultural research for development generates growth, reduces poverty and protects the environment.

Agricultural research benefits people and the planet

Agricultural research for development has a record of delivering results. The science that made possible the Green Revolution of the 1960s and 1970s was largely the work of CGIAR Centers and their national agricultural research partners. The scientists’ work not only increased incomes for small farmers, it enabled the preservation of millions of hectares of forest and grasslands, conserving biodiversity and reducing carbon releases into the atmosphere. CGIAR’s research agenda is dynamic, flexible, and responsive to emerging development challenges. The research portfolio has evolved from the original focus on increasing productivity in individual critical food crops. Today’s approach recognizes that biodiversity and environment research are also key components in the drive to enhance sustainable agricultural productivity. Our belief in the fundamentals remains as strong as ever: agricultural growth and increased farm productivity in developing countries creates wealth, reduces poverty and hunger and protects the environment (see graphic, CGIAR’s Evolving Research Agenda, page 6).
Agricultural research is delivering results

The CGIAR’s more recent outstanding achievements include:

- Releasing Quality Protein Maize (QPM) varieties in 25 countries. QPM are currently grown on more than 650,000 hectares
- Transforming agriculture in East and West Africa through the release of New Rices for Africa (NERICAs). It is estimated that NERICAs are planted on 130,000 hectares across Africa, including approximately 60,000 hectares in Guinea and about 10,000 hectares in Uganda
- Selectively breeding a GIFT strain of tilapia which shows an approximate growth rate gain of 70%
- Training over 75,000 developing country scientists and researchers
- Reducing pesticide use in developing countries by promoting integrated pest management and biological control methods
- Adopting low-till farming practices in Asia on 1.2 million hectares across the Indo-Gangetic plains, boosting farm incomes and productivity
- Enabling African producers to access international pigeonpea markets
- Releasing over 45 bean varieties, developed from CGIAR germplasm across Latin America
- Improving forage grasses developed by CGIAR researchers and partners which are currently grown on over 100 million hectares in Latin America
- Planting fodder shrubs in Kenya and increasing smallholder dairy farmers’ income by US$166 per annum

CGIAR’s Evolving Research Agenda
These successes notwithstanding, future challenges are daunting. World population is expected to reach 9 billion people by 2050. Food demand is expected to more than double in a similar time frame. Some 30 percent of irrigated lands are already degraded, and water use is expected to increase by 50 percent over the next 30 years. Science-based solutions for sustaining productivity increases while protecting ecosystems are key to addressing these challenges.

Increasing sustainable productivity, strengthening science-for-development partnerships, protecting the environment

The CGIAR was created in 1971. Today more than 8,500 CGIAR scientists and staff are working in over 100 countries. CGIAR research addresses every critical component of the agricultural sector including—agroforestry, biodiversity, food, forage and tree crops, pro-environment farming techniques, fisheries, forestry, livestock, food policies and agricultural research services. Thirteen of the Centers are located in developing countries. Africa continues to be a priority for CGIAR research. CGIAR research partnerships help achieve the Millennium Development Goals and support major international conventions (Biodiversity, Climate Change, and Desertification).

The CGIAR has five areas of focus

- Sustainable production (of crops, livestock, fisheries, forests and natural resources)
- Enhancing National Agricultural Research Systems NARS (through joint research, policy support, training and knowledge-sharing)
- Germplasm Improvement (for priority crops, livestock, trees and fish)
- Germplasm Collection (collecting, characterizing and conserving genetic resources—the CGIAR holds in public trust one of the world’s largest seed collections available to all)
- Policy (fostering research on policies that have a major impact on agriculture, food, health, spread of new technologies and the management and conservation of natural resources)
Forging New Partnerships: CGIAR Challenge Programs in action

Challenge Programs are new high-impact, research for development programs that tackle major global development challenges through expanded partnerships. Four Challenge Programs are being implemented since 2004:

- “Generation” is unlocking crop genetic diversity through the application of comparative biological knowledge in 11 crops. There are 14 partner institutions involved. Program updates for the first year include genotyping a composite germplasm set representing global genetic resources for a first tier of eleven crops; development of a common phenotyping framework of techniques, plant development stages and parameters to enable cross-species comparison; validation and development of pre-existing markers for drought tolerance and the establishment of molecular breeding communities of practice; design of Generation CP information platform system for genetic resources, genomic and crop information systems and internal project workshops. (www.generationcp.org)

- “HarvestPlus” is an international alliance of over 40 institutions breeding crops with improved micronutrient content. Progress during the first phase of the project focused on: exploring the genetic variation for iron, zinc and B-carotene in rice, wheat, maize, cassava, beans and sweetpotato germplasm; applied breeding; testing the stability of micro-nutrient expression; and dissemination of seed of basic breeding materials and advanced lines to collaborators. New initiatives include the feasibility of a HarvestPlus China program, similar to HarvestPlus and to be funded by the Chinese government and other donors. (www.harvestplus.org)

- “Water and Food” is improving water productivity in agriculture in nine river basins (Andean system, Indo-Gangetic, Kharheh, Limpopo river, Mekong river, Nile river, Sao Francisco, Volta, Yellow river). In its first year, 33 research projects led by 18 different institutions involving over 150 partners have been launched with a total investment of $60 million. A diverse set of activities are underway, including research programs on coastal management in Bangladesh and Vietnam; exploring and evaluating supplemental irrigation techniques in Syria, and improvements in rain water and nutrient use efficiency in Niger. (www.waterandfood.org)

- The Sub-Saharan Africa Challenge Program (SSA CP) developed by a CGIAR partner, the Forum for Agricultural Research in Africa (FARA), is focusing on jumpstarting agricultural development in Sub-Saharan Africa. Fully supported by the CGIAR, this is the first Challenge Program with responsibility for implementation assigned to a partner institution in Africa. The SSA CP
is promoting research that will provide options for smallholders to improve input and output markets for smallholder and pastoral produce, to intensify use of limited resources while maintaining food security and the use of natural resources in a sustainable way. The research will be conducted by Pilot Learning Teams with the communities at different Pilot Learning Sites, which have been already selected through a participatory process. (www.fara-africa.org)

The CGIAR alliance is open to all countries and organizations sharing a commitment to a common research agenda and willing to invest financial support, and human and technical resources. From twelve members in 1971, today’s membership of sixty-four includes a majority of developing countries. Membership is poised to grow further.

CGIAR members contributed US$450 million in 2005, the single-largest public goods investment in mobilizing science for the benefit of poor farming communities worldwide.
A Global CGIAR

Centers supported by the CGIAR

Africa Rice Center (WARDA)  
www.warda.org

International Center for Tropical Agriculture (CIAT)  
www.ciat.cgiar.org

Center for International Forestry Research (CIFOR)  
www.cifor.cgiar.org

International Maize and Wheat Improvement Center (CIMMYT)  
www.cimmyt.org

International Potato Center (CIP)  
www.cipotato.org

International Center for Agricultural Research in the Dry Areas (ICARDA)  
www.icarda.org

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)  
www.icrisat.org

International Food Policy Research Institute (IFPRI)  
www.ifpri.org

International Institute of Tropical Agriculture (IITA)  
www.iita.org

International Livestock Research Institute (ILRI)  
www.ilri.org

International Plant Genetic Resources Institute (IPGRI)  
www.ipgri.org

International Rice Research Institute (IRRI)  
www.irri.org

International Water Management Institute (IWMI)  
www.iwmi.cgiar.org

World Agroforestry Centre (ICRAF)  
www.worldagroforestry.org

WorldFish Center  
www.worldfishcenter.org
Research is a collaborative enterprise

The CGIAR’s achievements would not be possible without the support and commitment of the 64 members and many hundreds of partner organizations who together form the growing CGIAR alliance.

CGIAR Members

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