Latin America and the Consultative Group on International Agricultural Research

Snapshots of a Successful Partnership

CGIAR

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Fast Facts: Latin America and the Caribbean

- Total population: 500 million
- Total urban population: 391 million
- Total rural population: 128 million
- Population growth rate: 1.5%
- Life expectancy at birth: 71 years
- Infant mortality per 1,000 births: 28
- Female youth illiteracy: 5%
- 2002 Gross National Income per capita: US$3,280
- Number of countries: 30

An estimated 95 million people in Latin America live in poverty. Latin America is a highly urbanized region. While projections for the year 2020 show a decrease in the proportion of the rural population, the absolute number of rural inhabitants is expected to remain the same. Furthermore, the incidence of poverty and extreme poverty is greater in rural than in urban areas, signaling the continuing need to focus on rural areas as an important part of the sustainable development strategy for the region.

Source: World Bank Annual Report, and World Bank Strategy "Reaching the Rural Poor — A Renewed Strategy for Rural Development, 2003"

Since its inception in 1971, the Consultative Group on International Agricultural Research (CGIAR) has played an important role in fostering agricultural development in Latin America, maintaining a strong tradition of support and presence in the region. The CGIAR can be said to have originated in Latin America as the Mexico-based International Maize and Wheat Improvement Center (known by its Spanish acronym, CIMMYT) was one of the first CGIAR Centers.

From being the principal activity during ancient times to becoming an important source of growth in the present era, agriculture is a strategically important sector in Latin America. Even though agriculture in 1998 accounted for an average of 8 percent of Latin American gross domestic product, this average masks great variation ranging from 5 percent in Mexico, 8 percent in Brazil, 15 percent in Colombia, and 24 percent in Nicaragua. Therefore, agriculture and the rural sector will remain important for promoting growth, creating wealth, and achieving environmental and social sustainability.

The strong partnership between the CGIAR and Latin America is reflected in the fact that three of the oldest CGIAR-supported international agricultural research Centers are headquartered in the region (CIAT, CIMMYT and CIP). In addition, seven CGIAR centers have regional or project offices in Brazil, Colombia, Costa Rica, Ecuador, Honduras, Mexico, Peru, and Nicaragua. Also Brazil, Colombia, Mexico, and Peru are CGIAR members.

In 2003, thanks to the generous support of its investors, the CGIAR invested US$381 million in developing agricultural solutions that helped increase farmer incomes, improved human well-being and protected the environment.

Currently, the CGIAR invests 14% percent (US$54 million) of its budget for generating science-based solutions to problems of agricultural development in Latin America.

A quick survey in 2004 showed that of the more than 202 leading scientists and eminent individuals who serve on the various boards of CGIAR Centers, approximately 10 percent come from Latin America. The Director General of the International Livestock Research Institute (ILRI) and the Executive Director of the CGIAR Science Council are both Uruguayan nationals, and the CGIAR Director is a Brazilian. In addition, several hundred scientific, technical, and administrative staff from the region work at CIAT, CIMMYT, CIP, and regional offices of the various CGIAR Centers headquartered outside Latin America.

Following are some examples of the beneficial impacts of CGIAR-supported research programs in Latin America

- Maize (*Zea mays L.*), one of the most important food crops in the world, originated in Mexico. Sales of commercial maize in Latin America are an important indicator of the extent to which farmers have adopted modern varieties in the region. Latin America represents the largest regional market, where 76 percent of all commercial maize sold during 1996-1997 consisted of varieties developed using CIMMYT germplasm. Moreover, 73% of all maize varieties developed by the private sector in Latin America contained CIMMYT germplasm (www.cimmyt.org).

- The common bean (*Phaseolus vulgaris*) originated in Latin America, and the region is the most important bean growing area in the world. The common bean is an important source of protein for millions of poor people living in Latin America. Since 1970, over 350 bean varieties were released throughout the world, of which 243 varieties were released in Latin America. CIAT, in partnership with Latin American national agricultural research systems (NARS), has played a major role in bean improvement. Over 45 bean varieties derived from CIAT germplasm have been released by 15 NARS in Latin America. Varietal releases with high CIAT content increased in the region, going from 18.9 varieties per year in the 1980s to 24.4 in the 1990s. In 1998, the gross annual value of increased production was US$177 million (www.ciat.cgiar.org).

- Sweetpotato (*Ipomoea batatas*) plays a key role in feeding Peru's rural and urban populations. The crop tackles nutritional deficits, and due to its low cost is a preferred food of choice for poor people. In addition, its plant matter provides fodder for livestock. In 1991, the National Research Program for Potato and Sweetpotato of the National Institute of Agricultural Research (INIA), in collaboration with CIP, released four sweetpotato varieties: Cañetano-INIA, Imperial-INIA, INA-100 INIA and the INIA 306-Huambachero. The new crop varieties have higher yields, averaging between 25 and 30 tons per hectare. This allowed an increase in productivity from an average of 16 t/ha in 1989 to 22 t/ha in 1999 (www.cipotato.org).

- Potato late blight, caused by *Phytophthora infestans*, is a devastating crop disease. Research aimed at developing resistance to late blight is crucial for the welfare of millions of poor farmers and their families who depend on potatoes for their food and livelihoods. CIP scientists are combating late blight disease in major potato producing countries by exploring the efficiency of various potato varieties. The internal rate of return on investments on fighting late blight disease have averaged 27 percent, with a net present value of US$5.4 million, and 31 percent of the estimated share of total benefits going to poor households (http://gilb.cip.cgiar.org).

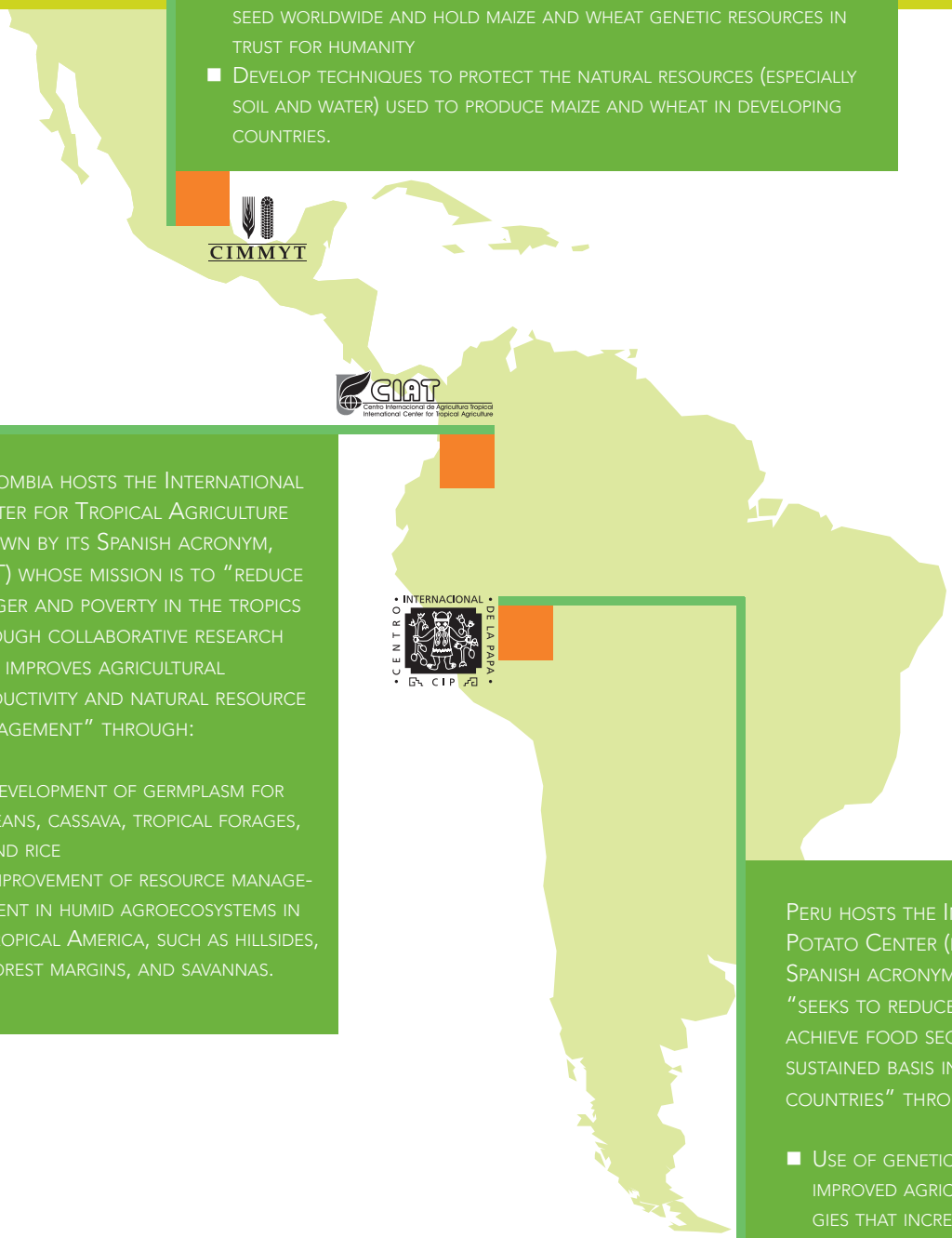
- Rice is also an important food crop in Latin America. CGIAR research is vital for sustaining the productivity and profitability of the region's rice farmers, and this mandate is fulfilled by CIAT. More than 299 rice varieties have been released by 23 national programs in Latin America and the Caribbean. It is a measure of CIAT's success in forging partnerships that over 40 percent of the released varieties were crossed at CIAT and almost all contain germplasm from the Center. At least 13 rice

Partnership to Rescue Latin America's Maize Genetic Resources

The idea was born in March 1991, when leaders of the region's gene banks gathered at CIMMYT to assess maize germplasm conservation in the Americas. Their conclusion: the situation was critical. Thousands of landrace accessions needed regeneration and many seed collections—some unique and no longer sown—were in danger of being lost. During the 1990s, CIMMYT worked with germplasm specialists in 13 Latin American countries to regenerate more than 10,500 endangered seed collections of maize landraces for Latin American countries. Back-up seed sets are conserved at CIMMYT and the US National Center for Genetic Resources Preservation (NCGRP).

Mexico hosts the International Maize and Wheat Improvement Center (known by its Spanish acronym, CIMMYT) whose mission is to act "as a catalyst and leader in a global maize and wheat innovation network that serves the poor in developing countries." CIMMYT scientists and their partners:

- Develop maize and wheat seed that yields well and resists or tolerates diseases, insects, and other stresses, distribute this seed worldwide and hold maize and wheat genetic resources in trust for humanity
- Develop techniques to protect the natural resources (especially soil and water) used to produce maize and wheat in developing countries.



Colombia hosts the International Center for Tropical Agriculture (known by its Spanish acronym, CIAT) whose mission is to "reduce hunger and poverty in the tropics through collaborative research that improves agricultural productivity and natural resource management" through:

- Development of germplasm for beans, cassava, tropical forages, and rice
- Improvement of resource management in humid agroecosystems in tropical America, such as hillsides, forest margins, and savannas.

Peru hosts the International Potato Center (known by its Spanish acronym, CIP) which "seeks to reduce poverty and achieve food security on a sustained basis in developing countries" through:

- Use of genetic resources and improved agricultural technologies that increase the production and use of potato, sweetpotato, and other root and tuber crops
- Better management of agricultural resources in the world's mountain regions.

varieties developed by IRRI and 31 containing at least one parent provided by France's CIRAD have been released in the region. CIAT's work complements that of the Latin American Fund for Irrigated Rice (FLAR), an association of private and public rice organizations that finance and set the agenda for international efforts in rice breeding and crop management (www.ciat.cgiar.org).

Forging New Partnerships: CGIAR Challenge Programs in Action

In 2001, CGIAR launched Challenge Programs (CPs), high impact, research for development programs that bring together a wide range of research partners to target major, global and regional development challenges, facilitate cooperative research and help achieve the Millennium Development Goals.

Generation Challenge Program: Farmers in the developing world face a broad range of agricultural challenges, including pest and disease attacks, low soil fertility, and lack of access to basic inputs such as fertilizers, irrigation, and pesticides. These production constraints often represent the difference between healthy families and hungry families. The Generation CP aims to bridge that gap by harnessing the rich global stocks of crop genetic resources held in CGIAR genebanks and by using advances in molecular biology to create a new generation of plants that meet the food, nutrition, and income needs of poor farmers. The crop groups include cereals, root and tuber crops, legumes, musa and forage species. Eight CGIAR Centers (CIMMYT, CIAT, CIP, ICARDA, ICRISAT, IITA, IPGRI, and IRRI) are collaborating in this effort with six partner institutions in industrialized and developing countries (www.generationcp.org).

HarvestPlus: This challenge program aims to produce nourishing food crops capable of alleviating malnutrition among poor people. Expected outputs include rice with more iron, wheat packed with zinc, and maize strengthened with vitamin A. Through this program, CGIAR scientists and partners are working to combine high micronutrient content with higher yields for improved incomes and family nutrition and health. Seven CGIAR Centers (CIAT, IFPRI, IRRI, CIP, ICRISAT, IITA and ICARDA) are partnering with nine scientific institutions. In September 2003, the Bill and Melinda Gates Foundation awarded US$25 million to the program (www.harvestplus.org).

Water and Food Challenge Program: This program focuses on creating research-based knowledge and methods for producing more food with less water, while protecting the environment. Much of the work is located in Latin America, including the Sao Francisco Basin, which covers over 500 urban centers facing major water management problems. As a key partner, the Brazilian research enterprise EMBRAPA works closely with the Water and Food CP to alleviate poverty by improving the performance of irrigated agriculture. A central aim of this program is to improve water use efficiency in the Andean region, whose river basins encompass Colombia, Ecuador, Peru and Bolivia. Led by IWMI, this research partnership includes CIAT, IFPRI, IRRI and the WorldFish Center along with 11 consortium partners (www.waterforfood.org).

CIMMYT: A Brief History

A pioneer in wheat and maize improvement, CIMMYT was founded in 1966 by the Government of Mexico and The Rockefeller Foundation to support international research in agriculture. In the mid-1960s, success in CIMMYT's high-yielding wheat enabled a rapid response to meeting the food needs of the South Asian subcontinent, where wide scale food shortages had been predicted. In 1971, recognition of the importance of agricultural research led the World Bank, FAO, UNDP, and other donors, including the Ford and Rockefeller Foundations to agree on the creation of a consultative group, or consortium of donors, that would fund international agricultural research. CIMMYT became one of the first CGIAR Centers, and later Mexico became a CGIAR member.

So ancient yet so modern: Food crops of Latin America

Cassava: Whether originated in the Amazon region, Central America or the Northeast of Brazil, cassava (*Manihot esculenta*) is a versatile food, that can be boiled, roasted, baked or consumed as alcoholic beverage. An important source of carbohydrates, it is used with other supplementary food in order to meet food security. In Latin America alone, increased production associated with releases of new cassava in 1998 was 430,000 tons, with an estimated value of $13 million.

Maize: Steeped in the economic, social and cultural traditions of Latin America, maize originated in the Americas between 7,000 to 10,000 years ago. Cave deposits in Tehuacan, Puebla, offer proof that Mexico is the center of origin of the crop. Nowadays, it serves as direct human food not only in Latin America, but in large parts of Africa and Asia. Maize joins rice and wheat as one of the world's three principal food crops.

Potato: From the high Andes to all across the world, the humble potato (*Solanum tuberosum*) is an important highland subsistence crop in all continents. Since its domestication between 10,000 and 7,000 years ago, the potato is a major source of nutrition in developing countries. Growth rates of potato production average 3.9 percent annually in developing countries, with yields rising 1.9 percent and area expanding 2 percent annually.

Sweetpotato: (*Ipomoea batatas*) was domesticated more than 5000 years ago and is said to have originated either in South America or Central America. Sweetpotato is high in carbohydrates and vitamin A and can produce more edible energy per hectare per day than wheat, rice or cassava. Latin America alone produces 1.9 million tons of sweetpotato annually.

Involving farmers in agricultural research

Bringing farmers' perspectives into the research-for-development continuum is a key element of CGIAR strategy. The Comités de Investigación Agrícola Local (CIAL) initiative stands for local agricultural research committees. Implemented by CIAT, CIAL offers farmers the opportunity to express views and engage with scientists on the development and evaluation of different agricultural technologies. Currently, 249 CIALs are active in eight countries in Latin America. The benefits of this initiative range from increased local capacity in formal research methods and improved local planning and management skills to greater availability of improved seed and food security. An example from Cauca, Colombia, shows that over 80 percent of farmers from the village of Pescador adopted a bean variety recommended by the local committee. CIAT estimates a 78 percent rate of return on investments made in developing and applying the CIAL approach. CIAT scientists have shown that increasing farmer's input into research programming is essential for ensuring the relevance, effectiveness and sustainability of the overall development effort (www.ciat.cgiar.org).

The Consortium for the Sustainable Development of the Andean Ecoregion (CONDESAN) is an umbrella body that brings together NGOs, community-based organizations, universities, CGIAR Centers, entrepreneurs and public policymakers for research, training, development and policy initiatives promoting the protection of natural resources and improvements in welfare for Andean populations. CONDESAN is supported by CIP (www.condesan.org).

Additional Facets of Research by CGIAR Centers in Latin America

In addition to three CGIAR Centers with headquarters in Latin America, other CGIAR Centers also have active research-for-development programs in the region. The World Agroforestry Centre and CIFOR support the CGIAR Systemwide Alternatives to Slash and Burn (ASB) Program, working with farmers to identify and develop policy, institutional and technological land-use options that improve rural livelihoods while preserving the Amazon's remaining forests. ASB is a successful global partnership of over 50 institutions (www.asb.cgiar.org).

In another example, CIFOR is helping Latin American countries to promote decentralization of forest management in Bolivia, Brazil, Costa Rica, Guatemala, Honduras, and Nicaragua (www.cifor.org).

In the Andean region, poor farmers use barley as a staple food. In southern Ecuador, a barley seed project was set up by ICARDA and the National Agriculture and Livestock Research Institute (INIAP). Of the more than 500 farmers growing new barley varieties in 1998, many achieved three-fold increases in yields over the national average of 700 kg (www.icarda.org).

ICRISAT has a partnership with the Latin American Commission of Sorghum Researchers to provide new sorghum biodiversity from ICRISAT's global collection and identify lines that combine higher yield performance with tolerance to the South American tropical savanna acid soils. Thanks to strong partnerships among international and national researchers, sorghum yields in Latin America grew from 2.8 t/ha in 1993 to 3.1 t/ha in 2003 (www.icrisat.org).

In addition, given the handsome rates of return achieved from investments in agricultural research, IFPRI economists have worked with national counterparts to ensure sustained support for agricultural research and development activities underway in the region. IPGRI has developed a series of case studies demonstrating the benefits of the latest geographical information systems (GIS) among professionals working on conserving plant genetic resources in the region (www.ifpri.org and www.ipgri.org).

FONTAGRO: Capturing National-International Synergies

The Regional Fund for Agricultural Technology (known by its Spanish acronym, FONTAGRO) is a grant financing mechanism for agricultural research and technology development programs in the Latin American region. CIMMYT, CIP and other CGIAR Centers have participated in FONTAGRO research programs on improving the quality of wheat and potato, while IFPRI economists have worked with counterparts from Argentina, Chile, Colombia and Costa Rica in an innovative research program looking at the implications for agricultural technology design in open and free-trade economies.

In 2004, CGIAR and the Inter-American Development Bank joined FONTAGRO in supporting a competitive grant process leading to an innovative winning proposal by IPGRI on "Technological innovations to improve soil health and quality in banana plantations of Latin America and the Caribbean."

(www.fontagro.org)

Participatory Research and Gender Analysis: CIAT Charts the Way Forward

At CIAT, participatory selection of rice varieties proved to be a successful project for resource poor farmers in the Colombian Andes. In this area, rice is a staple diet for poor people. Because cold night time temperatures are common in the highlands of Colombia, developing upland rice with cold tolerance remains essential for food security. The ethnic minorities of the area — Guambianos, Totoroes, Coconucos — wanted to integrate rice varieties with cold tolerance in their cropping systems. CIAT's emphasis on participatory research helped indigenous farmers to select key traits that were deemed important in developing new rice varieties: tolerance to acidic soils, drought and cold and resistance to rice blast disease. This effort resulted in the development of a new type of rice, christened RHICO (Rice for Hillsides with Cold Tolerance). This research is expected to have strong, positive impacts in confronting food insecurity in the Colombian hillsides.

This project benefited from collaboration with scientists from Le centre de coopération internationale en recherche agronomique pour le développement (CIRAD), France, and support from the Aventis-Institut Foundation of France.

(www.prgaprogram.org)

A Strategic Alliance for the 21st Century

Nourishing the Future through Scientific Excellence

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 and civil society organizations including 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 of the countries with the strongest agricultural sectors have a record of sustained investment in agricultural science and technology. The evidence is clear, research for development generates agricultural growth and reduces poverty.

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, Evolution of CGIAR's Research Agenda).

Agricultural research is delivering results

The CGIAR's more recent outstanding achievements include:

- Quality Protein Maize, a more nutritious type of maize bred for improved human health. QPM is being planted on one million hectares in 20 countries
- New Rices for Africa (NERICAs) are transforming agriculture in the West Africa region. In 2003 it is estimated that NERICAs were planted on 23,000 hectares, and their use is spreading across Africa. In particular, 6,000 hectares were planted in Uganda. In Guinea alone, NERICAs have saved an estimated US$13 million in rice import bills
- Rehabilitating Afghanistan's agriculture; a major seed supply and distribution program has been implemented, and technical assistance is being provided to rebuild agriculture devastated by years of war, strife, and drought
- Integrated aquaculture/agriculture techniques resulting in

increased rice and fish production in Asia through new strains of tilapia that grow 60 percent faster
- Training over 75,000 developing country scientists and researchers
- Reducing pesticide use in developing countries by promoting integrated pest management and biological control methods
- Adoption of zero or low-till farming practices in Africa and Asia, minimizing soil erosion and boosting farm incomes and productivity
- Enabling African producers to exploit international pigeonpea markets
- Agroforestry initiatives developed with community organizations in Asia and Africa
- CGIAR researchers have won the annual World Food Prize four times in the past five years

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 7,600 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 15 Centers are headquartered in developing countries. Africa is 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 knowledge generated by the CGIAR is available to all.

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)

"..... The defense of nature is the defense of mankind."

Octavio Paz, Nobel Prize Acceptance Speech

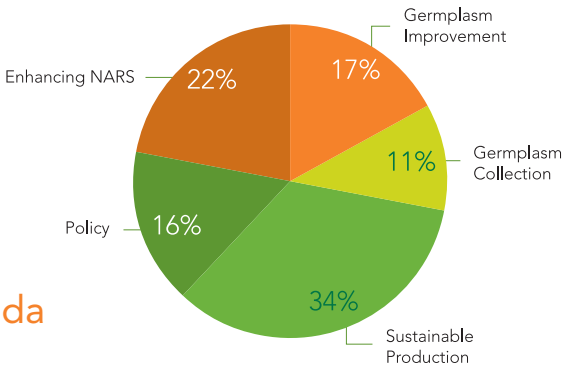
A twenty-first century alliance

Major reforms designed to strengthen science, extend the alliance, streamline governance and maximize impact are gaining ground and yielding benefits. The innovative Challenge Program initiative is designed to address global and regional issues of critical importance such as combating micronutrient deficiencies that affect more than three billion people and addressing water scarcity by improving water use efficiency in agriculture. Challenge Programs are facilitating collaborative research and helping mobilize knowledge, technology and resources.

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. Since 2002, five new members joined the alliance and membership is poised to grow further.

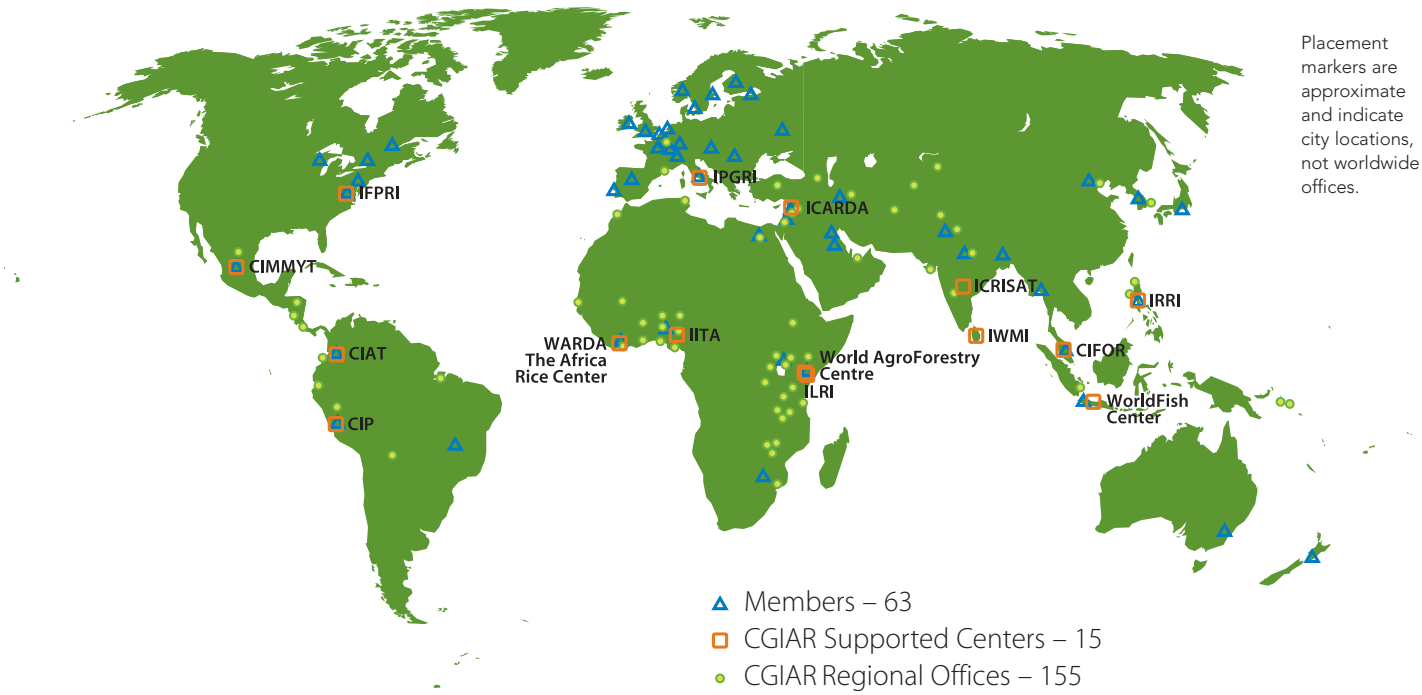
CGIAR members contributed approximately US$381 million in 2003, the single-largest public goods investment in mobilizing science for the benefit of poor farming communities worldwide.

Expenditures by Output, 2003



Evolution of CGIAR Research Agenda

The Global CGIAR



Placement markers are approximate and indicate city locations, not worldwide offices.

The CGIAR's achievements would not be possible without the support and commitment of the 63 members and many hundreds of partner organizations who together form the growing CGIAR alliance.

CGIAR Members

African Development Bank
Arab Fund for Economic and Social Development
Asian Development Bank
Australia
Austria
Bangladesh
Belgium
Brazil
Canada
China
Colombia
Commission of the European Community
Côte d'Ivoire
Denmark
Arab Republic of Egypt
Finland
Food and Agriculture Organization of the United Nations
Ford Foundation
France
Germany
Gulf Cooperation Council
India
Indonesia
Inter-American Development Bank
International Development Research Centre
International Fund for Agricultural Development
Islamic Republic of Iran
Ireland
Israel
Italy
Japan
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Kenya
Republic of Korea
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Malaysia
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Morocco
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OPEC Fund for International Development
Pakistan
Peru
Philippines
Portugal
Rockefeller Foundation
Romania
Russian Federation
South Africa
Spain
Sweden
Switzerland
Syngenta Foundation for Sustainable Agriculture
Syrian Arab Republic
Thailand
Uganda
United Kingdom
United Nations Development Programme
United Nations Environment Programme
United States of America
World Bank

Centers

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

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

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

International Potato Center (CIP)
www.cipotato.org

International Center for Agricultural Research In 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

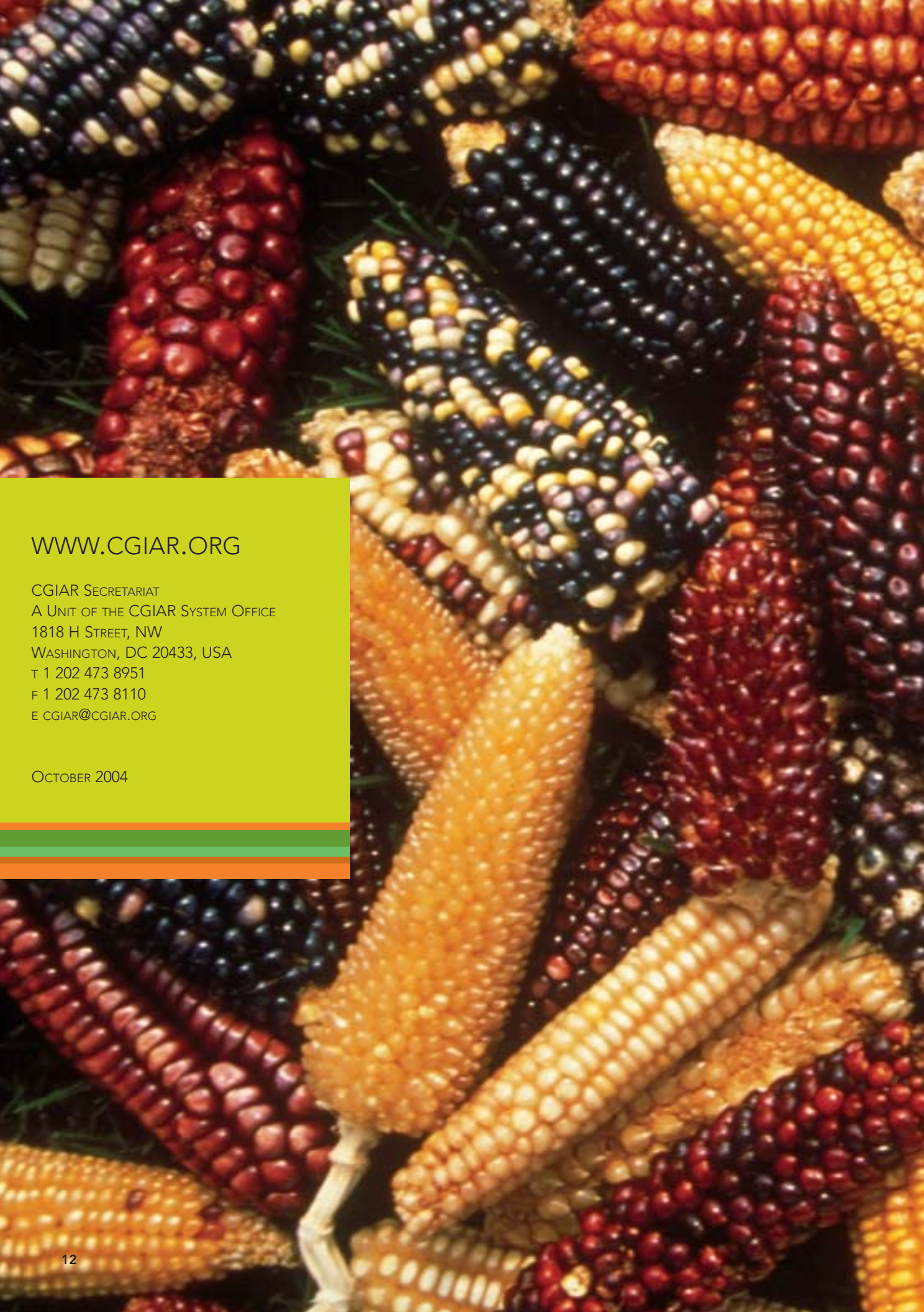
International Rice Research Institute (IRRI)
www.irri.org

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

West Africa Rice Development Association (WARDA)
The Africa Rice Center
www.warda.org

World Agroforestry Centre (ICRAF)
www.worldagroforestry centre.org

WorldFish Center
www.worldfishcenter.org



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