CONSULTATIVE GROUP ON
INTERNATIONAL AGRICULTURAL RESEARCH

Safeguarding the World's Agricultural Legacy

www.cgiar.org

Genebanks are one of the world's most powerful weapons against hunger and poverty. They safeguard collections of genetically diverse seeds and other plant materials, which have considerable potential to keep crops healthy and improve their productivity. Of particular importance are crop wild relatives containing genes for pest and disease resistance, improved nutritional value and tolerance to heat, cold and drought.

The Centers supported by the Consultative Group on International Agricultural Research (CGIAR) operate 11 genebanks, containing more than 650,000 samples of crop, forage and agroforestry species. Those materials include traditional varieties developed through many generations of selection by farmers, as well as wild species, crop breeding lines and improved varieties. They were gathered over three decades through collecting missions undertaken in partnership with national agricultural programs and through donations from other genebanks. The crops conserved range from such major staples as wheat, rice, maize and potato to lesser-known species such as cowpea and pearl millet.

The crop collections held by the CGIAR are the world's largest and most important. In 1994, the international community recognized the need to better protect these holdings, acknowledging that global food security is closely linked to their fate. In response, the CGIAR Centers placed the collections under the intergovernmental authority of the United Nations Food and Agriculture Organization (FAO). In doing so, the Centers made an important legal commitment to hold the collections in trust on behalf of humanity.

A Global System for Conserving and Using Genetic Resources

In a major advance for global agriculture, the International Treaty on Plant Genetic Resources for Food and Agriculture (commonly referred to as the "Seed Treaty") was adopted in 2001, following seven years of negotiations. It came into force in June 2004, after being ratified by 40 governments, and has now been signed by 116 countries.

The Seed Treaty calls for the creation of a multilateral system that enables signatory countries to gain access to selected genetic resources from all other signatories. The 64 major crops and forages covered by that system, representing most of humanity's food supply, are indicated in Annex 1 to the treaty.

The governing body of the treaty adopted a standard contract — called the "Standard Material Transfer Agreement" or SMTA — which states conditions for the exchange of materials. In June 2006, the CGIAR Centers signed agreements with the governing body, which supersede the 1994 agreements and place the collections held at the Centers under the new treaty.

CGIAR genebanks

Africa Rice Center *www.warda.org*
WARDA

Bioversity International
www.bioversityinternational.org

CIAT *www.ciat.cgiar.org*
International Center for Tropical Agriculture

CIMMYT *www.cimmyt.org*
International Maize and Wheat Improvement Center

CIP *www.cipotato.org*
International Potato Center

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

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

IITA *www.iita.org*
International Institute of Tropical Agriculture

ILRI *www.ilri.org*
International Livestock Research Institute

IRRI *www.irri.org*
International Rice Research Institute

ICRAF *www.worldagroforestrycentre.org*
World Agroforestry Centre

The Centers began using the SMTA in January 2007. In the first 8 months of that year, they distributed about 100,000 crop samples. Products of the Centers' research are also being made available under the SMTA, broadening significantly the range of materials distributed. In early 2008, at the governing body's request, the Centers began distributing all of their materials under the SMTA, even those not included in the Annex 1 list.

In addition to dealing with arrangements for sharing genetic resources, the Seed Treaty establishes a mechanism for sharing benefits from these materials. It will draw on royalties levied on commercial products that incorporate material obtained through the multilateral system. The owners of those products will pay a royalty into a specially designated fund, which will be used to boost conservation efforts in developing countries.

The Centers Supported by the CGIAR

Apart from such direct benefits, the treaty also calls for increased information exchange and technology transfer. The aim is to offer farmers and researchers easier access to the knowledge and tools they need to make better use of plant genetic resources.

A United Effort to Sustain Agrobiodiversity

The Seed Treaty commits the CGIAR Centers to ensuring the safety of the collections and to making them accessible to all users. Because the collected materials are alive, they cannot simply be placed under lock and key and withdrawn when needed; rather, they must be kept under carefully controlled conditions to maintain their health and viability. Moreover, their full value can be realized only if their qualities are known and documented.

To fulfill those commitments requires strong collaboration. The CGIAR System-wide Genetic Resources Programme (SGRP) helps make that possible by lending greater cohesiveness to the work of CGIAR Centers and their partners. Through the SGRP, they share information and knowledge, conduct research jointly, establish common policies and practices and contribute to international debate on issues of shared concern.

- Members
- Supported Centers
- Regional Offices

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

One vital collaborative tool is SINGER, the CGIAR System-wide Information Network on Genetic Resources (**www.singer.cgiar.org**). It provides users with a single entry point for finding information about the Center collections and for identifying the materials they need. SINGER forms the core of new efforts to develop a more comprehensive global information system. It will enable users to search genebanks worldwide for genetic traits needed to combat new diseases and cope with climate change.

In 2003, the SGRP embarked on a key initiative, with World Bank support, aimed at ensuring that the Centers' genebank facilities and management practices meet international standards. Now in its second phase, the initiative is strengthening collective action within the CGIAR and facilitating access to the in-trust collections. It is also helping the Centers contribute to the creation of a comprehensive global system for conserving, managing and exchanging plant genetic resources in close collaboration with national and regional partners.

To further ensure the sustainability of global conservation efforts, the CGIAR Centers and FAO jointly established the Global Crop Diversity Trust (**www.croptrust.org**). Already a major supporter of the Centers, the trust is building an endowment fund to provide permanent support for conservation and sharing of genetic resources, both by CGIAR and national genebanks.

The Consultative Group on International Agricultural Research (CGIAR) is a strategic partnership 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 partnership 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.

Nourishing the future through scientific excellence

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The vignettes that follow further highlight how the CGIAR genebanks are helping to improve people's lives around the world.

Smart Solutions to Malnutrition

Vitamin A deficiency is a leading cause of blindness and early death for millions of children worldwide. One of the solutions is an affordable and widely grown food, the orange-fleshed sweetpotato. It is rich in beta-carotene, which the body converts into vitamin A. An assessment by CIP and Michigan State University concluded that the introduction of orange-fleshed sweetpotato in Africa could benefit 50 million children under the age of six.

Drawing on the extensive collection of sweetpotato genetic resources in its genebank, CIP developed 40 new varieties that have high levels of beta-carotene and are well adapted to growing conditions in Africa. These have been distributed to 11 countries in sub-Saharan Africa through a highly successful program known as Vitamin A for Africa (VITAA). The project is being extended to India, where hundreds of thousands of children are at risk.

Warding off a Global Wheat Disease Epidemic

As knowledge of crop landraces and their wild relatives grows, plant breeders will increasingly look to them for solutions to many of the world's plant disease problems. One major threat currently is Ug99, a new race of the stem rust pathogen, first found in Ugandan wheat in 1999. It has been appearing in fields throughout eastern Africa ever since, where it reduces grain yields by up to 71 percent. Ug99 has also spread beyond Africa into Yemen and Iran.

If not curbed soon, Ug99 could create a global rust epidemic within the next 15 years. CIMMYT researchers have screened some 5,000 accessions from their wheat genebank for sources of resistance to Ug99, in collaboration with partners from Ethiopia and Kenya, where the disease is prevalent. Resistance has been found in both wheat cultivars and landraces, and these genebank materials are now being incorporated into crop improvement programs.

Coping with Natural Disaster

The catastrophic tsunami that killed hundreds of thousands of people and devastated 12 Asian nations in 2004 posed unprecedented and immediate

challenges. Among them was rebuilding the livelihoods of the agricultural communities affected.

In Sri Lanka and Malaysia, a crippling effect of the ocean surges was extensive salt and sand damage to coastal regions. Traditional crop varieties could not tolerate the changed conditions, so there was an urgent need for salt-tolerant plants. The IRRI genebank, which contains more than 40 salt-tolerant rice varieties, responded to calls for assistance, providing six tolerant varieties suited to hard-hit countries. CIP also supplied salt-tolerant varieties of potato and sweetpotato to provide additional food sources.

Restoring National Collections

The CGIAR genebanks are invaluable allies for protecting and restoring national crop diversity collections. In Peru, for example, local communities have lost many potato varieties as a result of crop diseases as well as economic and civil strife. Fortunately, varieties lost by the farmers are safely conserved in the genebank at CIP. In 2005, the Center returned hundreds of disease-free samples of native potato varieties to farmers in 12 indigenous communities that work with scientists to conserve potato genetic resources *in situ* in an innovative "potato park" near Cusco.

In 2002, Afghanistan's national genebank was looted, and hundreds of samples of the country's rich agrobiodiversity were destroyed. Generations of Afghan farmers had bred crop varieties that prosper under local conditions and appeal to consumers. ICARDA, ICRISAT and CIMMYT responded to the emergency by multiplying the seed of Afghan crop species conserved in their genebanks and distributing it throughout the country. The Centers also trained more than 850 Afghan researchers, extension personnel and farmers.

Similarly, when it became apparent that war in Iraq was imminent, researchers there hurriedly duplicated seed samples from 28 key crop varieties and sent them to ICARDA's genebank in Syria for safekeeping. Among the 135,000 food and forage seeds maintained at ICARDA, 3,000 varieties are native to Afghanistan, and 1,000 are from Iraq. The seeds preserved have been used to help restore crop diversity in these war-torn regions.

Nearly 50 developing countries in Africa, Asia and Latin America have benefited from CGIAR assistance in the aftermath of conflicts or natural disasters.

In addition to providing appropriate seeds, the genebanks offer expertise and technical assistance that countries need for agricultural recovery. Especially valuable are the Centers' efforts to strengthen the research and development capacities of their many partners, so they can take full advantage of crop diversity to improve livelihoods and health.

The Ultimate Safety Backup

On February 26, 2008, the Svalbard Global Seed Vault (SGSV), a seed storage facility capable of preserving seed for thousands of years, was opened on a remote island above the Arctic Circle. The vault was constructed on a mountain deep inside the permafrost to serve as a repository of last resort for humanity's agricultural heritage. The facility was built by the Norwegian government as a service to the global community. The Global Crop Diversity Trust is funding its operations.

The vault safeguards a cornucopia of rice, wheat, beans, sorghum, sweetpotatoes, lentils, chickpeas and other species. At its opening, 21 national and international institutes deposited nearly 300,000 duplicate samples of seed for long-term safety back-up storage. Of those, more than 200,000 samples — representing crop varieties from Asia, Africa, Latin America and the Middle East — were drawn from the seed collections maintained by the CGIAR Centers. Over the next two or three years, the Centers plan to deposit up to an additional 300,000 duplicate samples of seed to ensure their survival in the event of a major disaster.

FAST FACTS ABOUT THE CGIAR GENEBANKS

- More than 650,000 samples of staple crops and related wild species are held in trust in 11 CGIAR genebanks around the world.
- Over 50,000 samples are distributed freely and without restriction every year for use in research, breeding and conservation; 80 percent go to developing countries.
- Sophisticated research methods and global data networks make the samples more useful and easily accessible. See **www.singer.cgiar.org**
- All samples are stored, characterized and documented in accordance with the highest international technical standards. CIP's genebank is the first genebank anywhere in the world to receive ISO Accreditation for its operations in handling and maintaining disease-free material.

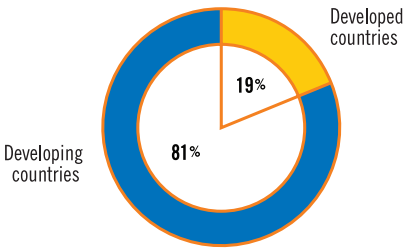
A Vital Resource for Achieving Global Food Security

The CGIAR genebanks exist to serve the public good. By providing a global repository for critical plant genetic resources, they help researchers and farmers develop more nutritious plants that are disease and pest resistant and can cope with drought, flooding and other effects of climate change. Over the past 15 years, the CGIAR genebanks have distributed more than 1 million free samples of seeds and plant materials to researchers and plant breeders.

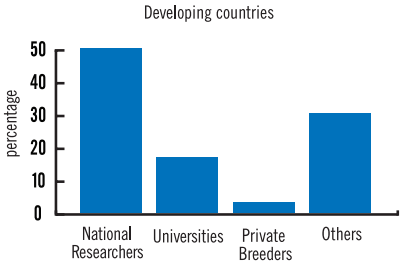
The value of the collections for crop improvement is illustrated by the recent experience of IRRI scientists and university colleagues. From an old Indian rice variety, they retrieved a forgotten gene that can enable modern rice varieties to withstand the devastating effects of flooding. In Southeast Asia alone, this unpredictable menace causes rice harvest losses worth US$1 billion annually. By successfully introducing the gene into local varieties grown in flood-prone areas, scientists have helped ensure a more dependable food supply for poor farmers and their families. Through such developments, the collections contribute importantly to global food security.

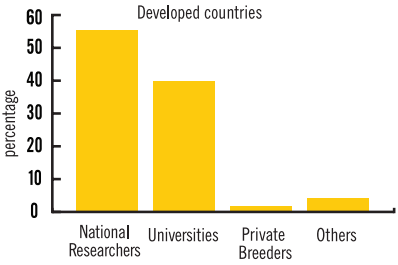
FAO projections suggest that world food production will have to increase by 75 percent before 2050 to meet the needs of growing populations. One of the keys to achieving that goal and warding off further food crises, despite the menace of climate change, is an accessible reserve of crop diversity.

Who Benefits from the CGIAR Collections?

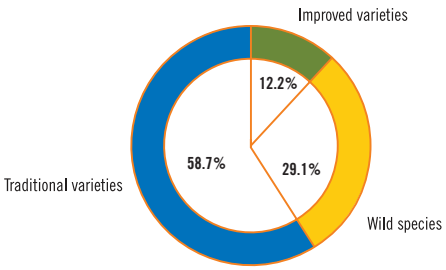


Percentage of samples sent to developed and developing countries since 1995





What's in the CGIAR Genebanks?



Source: CGIAR SGRP

The CGIAR Genebanks — Seeds for Life

The genebanks currently hold a total of 681,140 samples of crops and their wild relatives, of which 655,608 are held in trust.

CENTER	SCOPE OF COLLECTIONS	NUMBER OF SAMPLES held in trust
CIAT	Beans, cassava, forages	65,290
CIMMYT	Maize, rye, triticale, wheat	168,103
CIP	Andean roots and tubers, potato, sweetpotato	13,623
ICARDA	Barley, chickpea, faba bean, forage, lentil, wheat	125,506
ICRAF	*Sesbania*	25
ICRISAT	Chickpea, groundnut, pearl millet and other millets, pigeonpea, sorghum	113,830
IITA	Bambara groundnut, cassava, cowpea, soybean, yam	25,402
ILRI	Forages	18,661
IPGRI	Banana and plantain	989
IRRI	Rice	102,652
WARDA	Rice	21,527
TOTAL		**655,608**