



Collecting seed from regeneration plot at ICARDA's Terbol station. Photo: Michael Major/Crop Trust

Through the Platform, CGIAR genebanks safeguard a unique global resource of crop and tree diversity and respond to thousands of requests for germplasm from users in more than 100 countries worldwide every year.

The CGIAR Genebank Platform, led by the Crop Trust, enables CGIAR genebanks to fulfill their legal obligation to conserve and make available accessions of crops and trees on behalf of the global community under the International Treaty on Plant Genetic Resources for Food and Agriculture.

The CGIAR genebanks and germplasm health units (GHU) employ more than 400 skilled staff to monitor, test, germinate, multiply, characterize, clean, culture, store, and distribute germplasm under high scientific standards of operation, and to deal with individual requests for crop diversity from users worldwide as well as within the CGIAR.

The Genebank Platform supports the core genebank operations and activities to improve efficiency, enhance use and ensure compliance with international policy. Through the Platform, the genebanks ensure the increased **conservation** and **use** of the collections they manage in the framework of an improved and supportive **policy** environment.

CONSERVATION MODULE

CGIAR does more for less.

New technologies, knowledge and processes offer the possibility of further raising standards to become more efficient and more effective. The genebanks work to exploit new opportunities, conserve more diversity and respond to more demands while controlling costs.

USE MODULE

CGIAR responds to breeders' needs for genetic diversity and new traits.

The genebanks align their operations towards more targeted use and exploitation of the collections. This they do by enriching the data associated with them. In particular, genebanks are exploiting the tools and data resulting from the large-scale genotyping and phenotyping initiatives of the CGIAR Research Programs and other CGIAR Platforms.

POLICY MODULE

CGIAR engages in shaping international genetic resources agreements.

CGIAR's acquisition, development and dissemination of genetic resources and data are directly affected by international agreements. The CGIAR must proactively engage in the development of these processes to ensure that they create a supportive policy environment for CGIAR genebanks, breeding programs and national partners.

Impacts by 2022

The 11 CGIAR genebanks are strategically located in centers of crop diversity, which ensures that germplasm acquisitions and distributions are comprehensively global, with a diverse partner and user base. Distribution figures reported from the genebanks since 2012 illustrate that every genebank has a truly global outreach (Figure 1).

Between 2012 and 2017, CGIAR genebanks distributed more than 700,000 samples. It is challenging to trace the use and impact of even a small proportion of these materials. The uses and the users are highly diverse and differ among crops and geographical regions.

About two thirds of all germplasm distributed outside the CGIAR is destined for developing countries (Figure 1).

An increasing proportion of germplasm requested by external groups is used for research, but crops like tropical forages, dryland crops and tree species continue to be requested for evaluation and direct use (Figure 2).

To illustrate the contribution of the genebanks to increased crop productivity, IRRRI reported in 2012 that the 12 most popular IRRRI genebank accessions have been used in more than 1000 breeding crosses each, and of 4317 released rice varieties, 90% of the non-IRRRI varieties and 100% of the IRRRI varieties had at least one genebank accession in its pedigree.

Similarly, a study of the use of the CIAT genebank revealed that 60% of the 411 bean varieties released since 1976 contain material from CIAT's collection.

There is a reasonable basis to expect increased demand for germplasm. Present-day technologies for disease indexing, high-throughput sequencing and phenotyping and screening data have the potential to create a dramatic increase in value and demand for diversity.

Most Centers report an overall increase in distribution in recent years and, given a supportive policy framework and strong phytosanitary controls, this can be expected to continue. The annual rate of distribution between 1985 and 2009 for nine CGIAR genebanks was 39,970 samples. Between 2012 and 2014, the same nine genebanks reported an annual average distribution of 91,973 samples.

In order to ensure the great impact by 2022, the Genebank Platform has set numerous targets to ensure that the genebanks and germplasm health units conform to international standards as published by the FAO and aim for the following targets:

- ▶ 90% of accessions are healthy and available for immediate distribution.
- ▶ 90% of accessions are safety duplicated.
- ▶ 90% of accessions are documented to facilitate their use.
- ▶ Quality Management Systems are in place in all genebanks and germplasm health units.
- ▶ All acquisitions and distributions comply with international policy.



Diversity Bringing Benefits to Southeast Asia

Kasetsart 50 (KU 50) is an improved cassava variety developed by CIAT and Kasetsart University in Thailand. It is grown over one million hectares in Thailand and Vietnam and is expanding to other countries in the region. KU 50's pedigree traces back to a key parent called CMC 76, a Venezuelan landrace that was collected in 1967 and conserved in the CIAT genebank. No other institute would have been able to provide such a range of cassava diversity. This diversity is what was needed to break the narrow genetic base and poor yields that had hampered cassava production. The aggregate economic benefits from the adoption of KU 50 are estimated to exceed US\$97 million.

Direct Release from Genebank

In the early 1980s, the Indian state of Karnataka was suffering. Its principle commercial crop, pigeonpea, was being devastated by wilt. Researchers screened a pigeonpea accession called ICP 8863 in the ICRISAT genebank and discovered it was resistant to wilt. The seeds were directly released from the genebank to state programs in Karnataka which released it as "Maruti". Farmers adopted the release and within a few years, the pigeonpea industry was restored. Thirty years later, Maruti is still the favored pigeonpea variety in Karnataka and the industry is thriving.





CGIAR genebanks germplasm distribution from 2012 to 2017 (countries shaded in yellow) and genebank locations.

- AfricaRice • Cote d'Ivoire
- IITA • Nigeria
- Bioversity International • Belgium
- CIMMYT • Mexico
- ICARDA • Morocco and Lebanon
- CIAT • Colombia
- ICRISAT • India
- ILRI • Ethiopia
- CIP • Peru
- IRRI • Philippines
- ICRAF • Kenya

Germplasm Distribution and Use

35 CROP COLLECTIONS



44%

Within CGIAR

AfricaRice Bioversity CIAT CIMMYT CIP
ICRAF ICRISAT IITA ILRI IRRI ICARDA

56%

Outside CGIAR

NARS Universities Private Sector
Farmers Other

THE PATH TO FOOD SECURITY

There are two major pathways leading from genebanks to farmers: one that runs through the CGIAR research programs and the other that runs directly to national partners.

The pathways vary by crop and the type of users who receive the germplasm. Some crops, e.g. forages, bean, yam, and millet, are distributed predominantly outside the CGIAR.

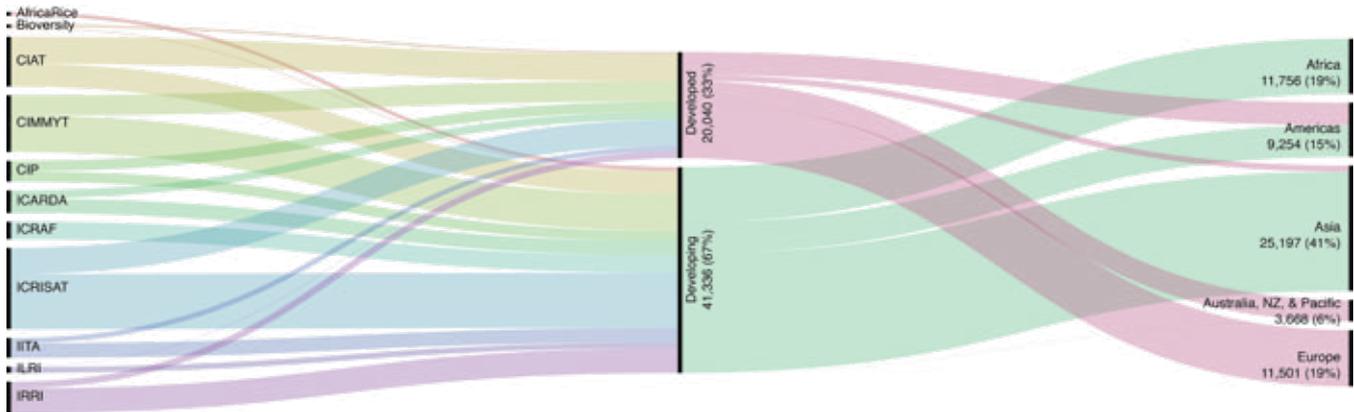


Figure 1. Samples distributed by each Center to users outside the CGIAR and geographical region of recipient in 2017

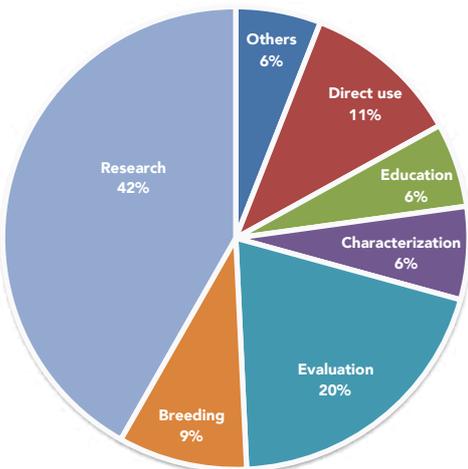


Figure 2 (left). External requests for germplasm according to purpose of request in 2017

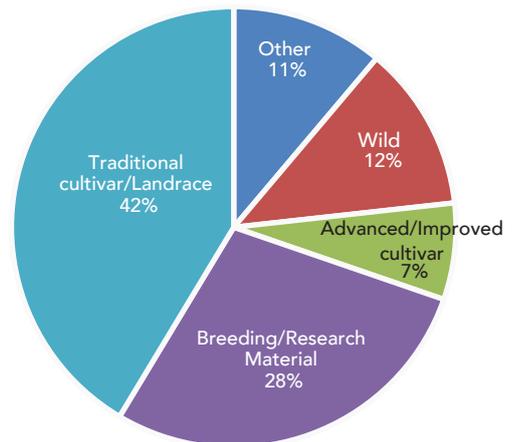


Figure 3 (right). Germplasm distribution by type in 2017

Global Partners for Impact



AfricaRice



The CGIAR Genebank Platform is a Crop Trust-CGIAR partnership.

Working to Achieve the Global Goals

The genebanks, as a key driver of international exchange of plant genetic resources for food and agriculture, are fundamental to delivering the CGIAR Strategy and Results Framework and three System Level Outcomes of reduced poverty, improved food and nutrition security, and improved natural resources systems and ecosystem services. Most directly, the Genebank Platform contributes to achieving Targets 2.5 and 2.a of the UN Sustainable Development Goals.

Target 2.5: by 2020 maintain genetic diversity of seeds, cultivated plants, farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge as internationally agreed.

Target 2.a: increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development, and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular in least developing countries.



The Genebank Platform supports the core activities of the CGIAR genebanks: conserving and making available crop and tree diversity. It ensures that the genebanks meet international standards, improve efficiency and ensure more effective use within an enabling policy environment.

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