In 2021, 12 CGIAR Research Programs (CRPs) and four CGIAR Platforms came to a close. This summary report presents an overview of the work of the CGIAR Genebank Platform between 2017 and 2021 and highlights its key achievements over this five-year period.

**OVERVIEW**

**CGIAR Genebank Platform**

*Led by the Crop Trust*

*In partnership with* AfricaRice, the Alliance of Bioversity International and CIAT, the International Maize and Wheat Improvement Center (CIMMYT), the International Potato Center (CIP), the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Institute of Tropical Agriculture (IITA), the International Livestock Research Institute (ILRI), the International Rice Research Institute (IRRI), and World Agroforestry (ICRAF)
Led by the Crop Trust, the CGIAR Genebank Platform enabled the 11 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 (ITPGRFA). The Genebank Platform was an essential component of a global system on the conservation and use of plant genetic resources for food and agriculture (PGRFA).

The Genebank Platform was part of the Crop Trust’s overall effort to safeguard globally important ex situ collections and promote a rational, efficient, and sustainable global system. The Crop Trust provided oversight of the Platform. Day-to-day implementation of the Platform’s activities was performed by the managers of the CGIAR genebanks and germplasm health units (GHUs), and by CGIAR policy experts.

Through the Genebank Platform, the CGIAR genebanks responded to thousands of requests for germplasm from users worldwide every year. The Genebank Platform took an active approach to fostering two-way engagement between genebanks and users – the genebanks supplied germplasm and information, and users provided new information on the germplasm they received. Links with the CGIAR agrifood system (AFS) CRPs, the Excellence in Breeding Platform, and the Big Data Platform featured prominently in this exchange.

Within CGIAR, all CRPs and Platforms made use of the services provided by the Genebank Platform. The Genebank Platform facilitated the work of breeders by developing tools that allowed researchers to find the necessary germplasm more easily.

Outside CGIAR, the Genebank Platform received requests for germplasm and support from universities, national agricultural research systems (NARS), advanced research institutes, genebanks, nongovernmental organizations (NGOs), farmer groups, and the private sector. The Genebank Platform consolidated and expanded partnerships with these groups to bring in new users and to encourage a more productive two-way flow of information.

In 2017, the CGIAR Advisory Services (CAS) Secretariat Evaluation Function coordinated an evaluation of the Genebank Platform to serve as a baseline. Evidence from the evaluation was integrated in the Platform’s design and implementation from 2017 onward.
The Genebank Platform consisted of three modules:

- The Conservation module, which supported the genebanks in strategically exploiting new opportunities, conserving more diversity, and responding to more demands while controlling costs.

- The Use module, which assisted the genebanks in exploiting tools and data that resulted from the large-scale genotyping and phenotyping initiatives of the AFS CRPs and other Platforms.

- The Policy module, which helped CGIAR to proactively engage in the acquisition, development, and dissemination of genetic resources to ensure a supportive policy environment for CGIAR genebanks, breeding programs, and national partners.

The work of the Genebank Platform aimed to ensure that:

- Germplasm accessions were healthy and available for immediate distribution.
- Germplasm accessions were safety duplicated.
- Germplasm accessions were documented to facilitate their use.
- Quality management systems were in place in all genebanks and GHUs.
- Genebank processes complied with international policy.
The activities of the Genebank Platform were targeted specifically to bring about increased conservation and use of genetic resources with the aim of achieving CGIARs’ System Level Outcomes, as set out in the CGIAR Strategy and Results Framework 2016–2030 (particularly sub-intermediate development outcome 1.4), and the United Nations’ Sustainable Development Goals (particularly target 2.5).

Between 2017 and 2021, CGIAR genebanks distributed a total of 473,621 germplasm samples (3.8 million accessions). Consistently over the five-year period, germplasm distribution to requesters outside CGIAR exceeded distribution within CGIAR (Figure 1). Of all requested samples, 212,930 (39%) were provided to CRPs, and 260,691 (61%) were distributed to non-CGIAR recipients in 139 countries.

External distributions varied by user from 2017–2021. In 2021, 34% of external distributions were made to NARS and national genebanks, 51% to advanced research institutes and universities, and 7% to the commercial sector, NGOs, farmers, and individuals (Figure 2).

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1 The content in this section is drawn from the EiB Annual Reports, which are included in the Resource section of this Summary Report. The complete list of EiB achievements can be found on the CGIAR Results Dashboard.
From 2017–2021, the majority of Genebank distributions were made to India (40%), with additional distributions made to China (10%), Morocco (9%), and Italy (8%), among other countries.
From 2017–2021, traditional landraces and wild relatives represented the majority of resources distributed (56%) (Figure 4).

By the end of 2021, CGIAR genebanks were managing a total collection of 739,653 crop, forage, and tree accessions, including 26,329 in vitro accessions and 33,889 accessions held as trees or plants in the screenhouse or field. Approximately 83% of total accessions were immediately available for international distribution. Of the seed accessions, 71% were secured in safety duplication at two levels and 88% were duplicated at the Svalbard Global Seed Vault. Seventy percent of clonal crop collections were safety duplicated in the form of cryopreserved or in vitro cultures.

**FIGURE 4: CGIAR genebank distributions by material type, 2017–2021**

<table>
<thead>
<tr>
<th>Year</th>
<th>Traditional Cultivar/Landrace</th>
<th>Breeding/Research Material</th>
<th>Advanced/Improved Cultivar</th>
<th>Wild</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>41%</td>
<td>28%</td>
<td>7%</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>2018</td>
<td>51%</td>
<td>25%</td>
<td>6%</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>2019</td>
<td>60%</td>
<td>18%</td>
<td>16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>63%</td>
<td>15%</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>65%</td>
<td>21%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In terms of distribution by crop, 24% of distributed samples were rice, 15% were wheat, and 14% were chickpea (Figure 5).
Key challenges and risks during implementation of the Genebank Platform

Key challenges

VARIANCE FROM PLANNED PROGRAMS AND ACTIVITIES

Between 2017 and 2021, the Genebank Platform reassessed its priorities and focus as a result of changing circumstances, opportunities, and challenges. Notable adjustments and pivots included:

▸ In 2018, resources were pooled between seven genebanks, and samples from multiple crops were sent to Diversity Arrays for DArTseq genotyping. The project focused on assessing the genetic heterozygosity within and between seed accessions to inform managers and users on patterns of diversity within collections. The project succeeded in sending 15,000 DNA samples from 865 accessions to Diversity Arrays. In 2020, the data derived from these samples generated 526,000 single nucleotide polymorphisms and provided a striking picture of the distribution of diversity within collections. The study helped to guide improvements in collections and genebank processes for specific crops.

▸ In 2020, the COVID-19 pandemic required genebank and GHU staff to shift to remote work. In addition to keeping staff safe during lockdowns, all genebanks focused on avoiding the loss of accessions by sustaining sufficient numbers of staff in the laboratories, screenhouses, and fields to carry out critical operations. These processes included monitoring cold rooms, subculturing in vitro accessions, and processing seed from harvest to cold room. Harvests were lost in a small number of cases only. Genebanks and GHUs continued to prioritize requests for germplasm and phytosanitary testing. Although germplasm distributions declined by around 50% compared to pre-pandemic years, more than 90% of requests were fulfilled.

▸ As a result of One CGIAR developments and other considerations, the Genebank Platform adopted one data management system for all CGIAR genebanks. This was more ambitious than the original proposal, which aimed to support the adoption of GRIN-Global in six Centers. Piloting of GRIN-Global was completed in 2021.

The content in this section is drawn from the Genebank Annual Reports, which are included in the Resource section of this Summary Report. These Reports contain a complete list of challenges and risks.
Management of risks

PROGRAMMATIC RISKS

▸ Funding.
The Crop Trust engaged in activities to raise funds to support both the Genebank Platform and the endowment for the long-term financing of the CGIAR genebanks. In support of this goal, staff developed donor partnerships and communications, and worked more closely with the System Management Office. In 2021, funding from the European Commission and the German Federal Ministry for Economic Cooperation and Development (BMZ) allowed the Crop Trust to meet its commitment of US$15 million to the Genebank Platform.

CONTEXTUAL RISKS

▸ Sharing benefits from the use of genebank-associated sequence data.
Tensions surrounding this debate risked undermining policy support from the ITPGRFA for CGIAR Center operations, as well as any publicly funded initiative to sequence genebank collections and make data available.

In response, the Genebank Platform submitted a detailed paper to the Secretariat of the Convention on Biological Diversity Secretariat in 2017 highlighting the benefits of genetic sequencing to the conservation and use of genetic resources. The Genebank Platform also continued its engagement in international policy discussions.

▸ Security of collections.
In two cases, political measures prevented the distribution of materials that should have been available in accordance with those Centers’ ITPGRFA Article 15 Agreements. To address this, Centers engaged and negotiated with the countries in question. By 2020, the importance of safety duplication was acutely apparent following the use of Svalbard Global Seed Vault deposits to reconstitute the seed collections at ICARDA after its move from Syria, and the use of safety duplicates in tissue culture collections to replace cultures that could not be subcultured quickly enough in lockdown conditions.
Key challenges and risks during implementation of the Genebank Platform CONT’D

▸ The system for tissue culture collections was at serious risk of collapse due to lockdowns and reduced staff capacity. In response, several Center genebanks used cryopreservation to ensure that accessions remain viable for decades and only require replenishing if the sample is used. The Clonal Crop Community of Practice developed a Global Cryopreservation Initiative to advance work on cryopreservation and provide support to national genebanks to cryopreserve their collections. The Crop Trust is helping the group to raise funds with support from BMZ.

INSTITUTIONAL RISKS

▸ Institutional financial management practices constrained the management of genebank budgets and the pursuit of cost efficiencies. Constraining issues arose from general financial management practices, attribution of full-cost recoveries, effectiveness of data management tools, procurement practices, and the effects of unexpected and last-minute changes in institutional income.

▸ Weakness of data management systems. The legacy of documentation significantly affected knowledge of the identity, health, and viability of individual accessions. The introduction of a quality management system and performance targets improved documentation and critical review of processes. Using one data management system instead of multiple systems streamlined improvement efforts and facilitated the implementation of stronger data management practices and tools.

▸ One CGIAR Transition was a highly intensive process for many staff in 2021. Special areas of focus included the development of proposals for new initiatives and the status of Centers that are not participating in the transition. Throughout discussions in 2021, CGIAR reiterated its commitment to obligations under Article 15 of the Plant Treaty, even for Centers that are not currently part of One CGIAR. The transition’s effects on governance are under review and, the group will communicate these issues with the wider community at the Plant Treaty Governing Body meeting in September 2022.
From 2017–2021, the Genebank Platform provided both short- and long-term training to **9,760 men** and **4,095 women**.

From 2017–2021, the Genebank Platform published **335 peer-reviewed papers**. Of these, **79%** were open access and **86%** were published in ISI-indexed journals.

The figures in this report reflect reporting valid as of July 15, 2022.
From 2017–2021, the Genebank Platform had $151.44 million in total funding. Over this period, Windows 1 & 2 represented 67% of funding, Window 3 represented 1%, and Bilateral represented 32% (Figure 8).

The content in this section is drawn from CGIAR’s annual Finance Reports.
The Genebank Platform’s top funder (Figure 9) was the CGIAR Trust Fund for Windows 1&2, followed by the Global Crop Diversity Trust, Germany, and the Bill & Melinda Gates Foundation. The Genebank Platform was implemented by AfricaRice, the Alliance of Bioversity and CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IITA, ILRI, and IRRI, with the Global Crop Diversity Trust as the lead institution (Figure 10).
Resources

▸ Genebank Platform Annual Report 2017
▸ Genebank Platform Annual Report 2018
▸ Genebank Platform Annual Report 2019
▸ Genebank Platform Annual Report 2020
▸ Genebank Platform Annual Report 2021

▸ CGIAR Annual Performance Report 2017
▸ CGIAR Annual Performance Report 2018
▸ CGIAR Annual Performance Report 2019
▸ CGIAR Annual Performance Report 2020
▸ CGIAR Annual Performance Report 2021

▸ CGIAR Results Dashboard
▸ CGIAR Financial Report Dashboards
▸ Evaluation of CGIAR Excellence in Breeding Platform: Inception Report