Conservation and Use of Genetic Resources (Genebanks)

An attempt to present ToC

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Participation: Genebanks community
Genebanks for the future

- will be part of a rational, efficient and effective system in which genebanks work in close partnerships with each other ensuring that the benefits of innovation reach those who most need them.
- will meet the needs of immediate users more accurately and efficiently, including those needing both material and in-depth genomic information.
- will achieve this by using a wide range of technological advances and by interacting more closely with the user community, to ensure that it conserves the right genetic resources in the right way, and closely matches resources to the needs of users.

The ability to ensure delivery of the right material to users will vastly increase the Return on Investment in genebanks.
Loss of biodiversity underpinning food systems to provide adequate and more nutritious and diverse diets

Climate change creating new challenges to crops and causing failure of food systems

Limited capacities of national systems to share conservation responsibilities

Reluctance of key actors to share plant genetic resources impeding research
Theory of change - Genebanks

Challenge

• Loss of biodiversity underpinning food systems to provide adequate and more nutritious and diverse diets
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Work Packages

• Guarantee availability of diversity in perpetuity through actively curated collections in compliance with international laws and standards
• Futureproofing collections & exchange to increase efficiency and effectiveness
• Supporting breeding programs and increasing value and use of collections
• Strengthening the Global System by enhancing capacity building and partnerships with NARES

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**Impact areas**

- Nutrition, health and food security: more diverse, resilient and nutritionally diverse agrifood systems
- Poverty reduction, livelihoods and jobs: higher yielding crops increase farmers’ employment and income
- Gender equality, youth and social inclusion: varieties with adaptive traits respond to men, women and youth preferences
- Climate mitigation and adaptation: climate proofed varieties with novel traits from genebanks increase resilience
- Environmental health and biodiversity: agrobiodiversity conserved to reduce the loss of genetic variation

2030
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Outputs

• Disease-free, viable, documented germplasm provided to diverse users.
• New efficient and effective methods to strategically conserve difficult crops introduced.
• Evidence-based contributions made to international policy-making.
• Smarter and more targeted use of collections facilitated for diverse users.
• Complementary roles strengthened and conservation actions taken to enable international and national partners and to expand the scope and the efficiency of the global system.

Outcomes

• Breeding, research and development actors continuously make advances through utilizing Genebank material.
• Global System of germplasm conservation and exchange is more efficient and cost effective through sharing information, technologies and capacity building.

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Nutrition, health and food security: more diverse, resilient and nutritionally diverse agrifood systems.

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2024

2030
What is the Genebank delivering? Germplasm for breeders
Tangible products, technologies, services and institutional arrangements

• **novel genetic resources/populations** capturing key genomic diversity in an elite genomic background for breeders and trait development researchers, that support pre-breeding work by removing the most time-consuming and expensive stages of trait development.

• high-density **genotyping information** (sequencing or high-density fingerprints) of genebank material to accelerate allele mining and gene discovery efforts and improve conservation efforts by highlighting genetic diversity of accessions.

• Online **portal** to advertise and visualize discovery-ready genetic materials for trait development.
Smarter and more targeted use of diversity enabled for diverse users through tools, methods, databases, and intelligence.

Product profile driven datasets and genetic resources developed for faster and more efficient exploration and use of germplasm.

Demand driven genebank services developed and customized.

Output

End of Initiative

Actor Type/Name

Assumption
Causal Logic

Breeders (within and outside CGIAR) request and use materials

There is demand from breeders for tools, methods, database, and intelligence. If products are made available, breeders will use them.

Trait development teams use datasets

There is demand from Trait development teams for product driven datasets. If products are made available, Trait development teams will use them.

National systems release varieties

There is demand from breeders for tools, methods, database, and intelligence. If products are made available, breeders will use them.

National systems require genetic materials to develop varieties. If material is available, national systems will release new varieties.

SeEdQUAL: delivering genetic gains in farmers' fields

Varieties are adopted by farmers

Farms requires new improved varieties relevant to their needs. If varieties are available, farmers will adopt them.
What is the Genebank delivering?
Tangible products, technologies, services and institutional arrangements

Germplasm for Direct Use – restoration, reconstruction of agricultural systems, strengthening informal seed sector, etc..

• **Multiplication** of perennial species or species with long life cycle, forages, crop landraces for direct use by farmers, NGOs, Development Agents, Government agencies and scientists.

Germplasm use by (other than breeders) researchers:

  Taxonomy, phylogenetics, molecular biology, physiology, anatomy, etc
What is the Genebank delivering? Knowledge: Protocols for Genebanks community: Tangible products, technologies, services and institutional arrangements

• Cryopreservation protocols, standards and procedures for reliable long-term storage of crops diversity (clones, recalcitrant seeds and pollen) in base collections and safety back-up, for training the entire Genebank international community.

• Updated protocols for the improved management of seed collections of wild species (inc. forages, trees, CWR) to ensure effective conservation and thence availability of biodiversity to users for One CG genebank curators and the wider genebank and user communities

• Cryotherapy protocols for efficient elimination of intracellular pathogens for safe conservation and distribution of clonal crops for their use by Genebank staff

• Conservation toolbox serving as a knowledge resource base to effectively and efficiently conserve genetic resources in national genebanks
What is the Genebank delivering? Institutional arrangements:
Tangible products, technologies, services and institutional arrangements

• **A strategy** for CGIAR Initiatives to maximize availability of genetic resources and genomic information including harmonized CGIAR policies, policy instruments and best practices for operating under existing international legal agreements, and proposals for improving international policy support from the Plant Treaty and CBD.

• **A one-stop, centralized service/helpdesk** providing information, resources, one-on-one feedback for OneCGIAR scientists to ensure compliance with Centers' Article 15 Agreements under the Plant Treaty, national access and benefit-sharing laws, phytosanitary regulations, and applicable CGIAR policies.

• **Dashboard** on germplasm distribution to track the international exchange of plant genetic resources and monitor the demand for germplasm by different types of users in partner countries, including outreach and donor engagement.
Who are the users/partners?

• National and regional Agriculture Research Organizations
• NARS (National and Regional genebanks)
• Advanced Research Institutes
• Universities
• Seed companies
• Secretariats of ITPGRFA, CGRFA, IPPC
• Crop Trust
• National and Regional Plant Genetic Resources networks
• Other Treaty Art. 15 signatories
• Regional economic and political organizations
• Governing Body of the Plant Treaty
• Farmers
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CGIAR Initiatives:
- Accelerated Breeding: Meeting Farmers needs with Nutritious, Climate-Resilient Crops
- Accelerating crop improvement through precision genetic technologies
- Market Intelligence for More Equitable and Impactful Genetic Innovation
- ASPIRE: agri-silvo-pastoral food systems resilience
- SeEdQUAL: delivering genetic gains in farmers’ fields
- Plant Health and rapid response to protect Food and Livelihood Security
- ALL regional initiatives
Thank you and stay safe