

Goal

The *in vitro* conservation laboratory at the “Future Seeds” genebank is responsible for conserving, cleaning, and distributing the world’s cassava (*Manihot esculenta* Crantz) collection and its wild relatives. Using standardized procedures, it ensures the genetic integrity, health, and physiological quality of materials maintained under *in vitro* conditions. Thus, the main goal of this laboratory is to safeguard cassava’s genetic diversity for future generations and make it available for research and agricultural use.

The cassava collection, registered under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), is distributed for cultivation, breeding, research, and training. The laboratory benefits farmers by providing access to plant material that is pathogen-free and suitable for requested cropping conditions. It also benefits plant breeders and researchers working to develop more productive, resilient, and nutritious cassava varieties.



Where we work

The *in vitro* conservation laboratory is part of the “Future Seeds” genebank of the Alliance of Bioversity International and CIAT located in Palmira, Colombia, which serves as the Alliance’s main headquarters in the Americas.



How we do it

- **Conservation methods:** Cassava genetic diversity is conserved through tissue culture techniques, in which plantlets are grown in sterile, nutrient-rich media under controlled light, temperature, and photoperiod conditions. The collection is maintained in medium-term storage using slow-growth protocols, which extend plantlet viability and reduce the need for frequent subculturing. For long-term conservation, cryopreservation is being implemented.
- **Pathogen elimination:** Specialized *in vitro* treatments—such as meristem culture, thermotherapy, electrotherapy, and cryotherapy—are applied to eliminate quarantine pathogens.
- **Germplasm distribution:** Pathogen-free cassava materials are distributed upon acceptance of the Standard Material Transfer Agreement (SMTA) and in compliance with phytosanitary regulations. Shipments include comprehensive documentation, such as passport data, characterization details, and a health status report. In addition to *in vitro* plants, tissue and DNA samples are available upon request.
- **Safety backups:** Security duplicates of cassava germplasm are stored nationally and internationally to protect against loss or damage.
- **Research and innovation:** Continuous research improves existing *in vitro* protocols and develops new techniques for conservation and pathogen elimination.

The impact

- The global cassava collection has been maintained under *in vitro* culture conditions for over 40 years, safeguarding its genetic diversity and ensuring long-term availability for crop agriculture, breeding, and research. **The *Manihot* genus collection currently includes 5,951 accessions from 28 countries, comprising 4,946 cultivated landraces, 628 improved lines, and 377 wild species accessions.**
- **Approximately 94% of the collection** has been evaluated and confirmed free of pathogens associated with quarantine diseases, making this diversity available for distribution.
- By 2024, **56,811 germplasm samples** have been distributed to 84 countries around the world. Breeding programs have been the primary users of this cassava diversity.
- Training is provided to national and international researchers in plant tissue culture techniques and their practical applications such as micropropagation, pathogen elimination, and germplasm conservation.

Actions for innovation



Establishment of a cryobank: A cryopreservation protocol for cassava shoot tips is being implemented to establish a secure base collection of the global cassava germplasm for long-term conservation. This collection will be housed in a cryobank facility alongside backup copies of other base and tissue culture collections.



Harmonizing clonal-collection management and documentation with other CGIAR genebanks to establish common standards for safe and efficient germplasm conservation.



Implementing an AI-ready database to enable more effective, data-driven collection management.

Our partnerships



To know more about the program, visit us:



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