



Cassava, a high-energy root crop, is a staple food for millions of poor people. It is also a crop with increasing relevance for industrial uses. Forty years of research at CIAT includes major achievements in the search for sustainable cassava production, as follows:

Impact

- Dozens of varieties developed by CIAT are currently grown in Central and South America.
- In Asia, more than 1 million hectares are planted to cassava varieties that were the result of collaboration between national programs (especially Thailand) and our office on that continent. These varieties, whose yields in many cases doubled, comprise over half of those grown in the region.
- CIAT's collaborative work with IITA¹ in Africa on the biological control of mealybugs and mites saved millions of poor farmers from heavy crop losses.
- Large genetic variability was introduced into African germplasm in a collaborative effort with Brazil.
- Holds the world's largest germplasm collection, including cassava landraces and wild relatives.
- Protocols for rapid multiplication of disease-free planting materials through tissue culture.
- Capacity-building for cassava scientists, including training courses and support of graduate fieldwork.
- Field evaluation of transgenic germplasm and assessment of risk of pollen/gene flow.
- Diagnostic kits for disease detection and evaluation of pathogen diversity.
- Distribution maps for major cassava pests and diseases.
- Identification of biological agents to control pests and diseases, and sources of genetic resistance to biotic and abiotic stresses.

Outputs and products

- Improved elite germplasm for breeding efforts in Asia, Africa (by IITA), and LAC.
- Improved breeding methodologies such as "rapid-cycling recurrent selection".
- Development of a novel quantitative genetic approach to measure epistasis in relevant cassava traits.
- Development of source germplasm for high-quality traits (e.g., high contents of carotenoids, tolerance of postharvest physiological deterioration, whitefly resistance, amylose-free starch, and high-amylose starch).
- Protocols for genetic transformation and the production of double haploids (the latter is under development).
- Molecular markers for useful traits such as resistance to cassava mosaic disease. Development of QTLs in populations derived from heterozygous progenitors.

Main activities and projects

- Improved nutritional quality (provitamin A carotenoids) and AgroSalud project, LAC.
- Development of a protocol to develop double haploids.
- Development of a commercial amylose-free waxy starch variety for Thailand.
- Improving cassava for drought tolerance.
- Evaluation of *Manihot* genetic resources for resistance to pests and diseases (supported by the GCP) and high-quality traits (i.e., starch quality).
- Cassava as a raw material for decentralized bioethanol production (jointly with CLAYUCA).
- Promoting sustainable cassava production in Asia, especially in East Timor.
- Production of partially inbred genetic stocks for desirable traits (jointly with IITA).
- Integrated management of cassava whitefly.
- Improved technologies for postharvest processing (CLAYUCA).
- Promotion of rural development (jointly with CLAYUCA).

Partners and collaborators

- Brazil:** Embrapa; IAC • **Cambodia:** CARDI • **China:** CATAS; Subtropical Crops Research Institute • **Colombia:** AgroSalud; CLAYUCA; Consejo

1. For an explanation of acronyms and abbreviations see www.ciat.cgiar.org/newsroom/pdf/acronyms_syntheses.pdf

Regional Indígena del Vaupés–Mitú; CORPOICA; UNAL • **Cuba:** INIVIT • **East Timor:** MAFF • **Ghana:** WACCI • **Haiti:** Ministry of Agriculture; World Vision • **India:** CTCRI • **Indonesia:** Central Institute for Food Crops; RILET • **Lao PDR:** NAFRI • **Republic of South Africa:** ACCI • **Thailand:** Department of Agriculture–Rayong, DA–Khon Kaen; Kasetsart University; Thai Tapioca Development Institute • **Venezuela:** IDEA–Universidad Simón Bolívar; INIA • **Vietnam:** Hue University of Agriculture and Forestry; IAS/Hung Loc Agricultural Research Center; Tay Nguyen University; University of Agriculture and Forestry (Thu Duc District); VASI/Root Crop Research Center

Private companies

Belgium: CARGILL • **Brazil:** Fadel–Halotek Starch Company • **Colombia:** COLANTA; CONGELAGRO–McCain Frozen Foods; Corn Products Andina; Grupo GPC • **Ghana:** Caltech Ventures • **Netherlands:** AVEBE Starch Cooperative • **Nigeria:** Nigerian Starch Mills • **Republic of South Africa:** CSM • **USA:** National Starch Company

CGIAR centers

CIP • ICRISAT • IITA

Advanced research institutes

Australia: University of Adelaide • **China:** SIBS–ETH Shanghai Center for Cassava Biotechnology • **France:** CIRAD; IRD; University of Montpellier • **Germany:** University of Freiburg • **Japan:** JIRCAS; RIKEN • **Sweden:** University of Uppsala • **Switzerland:** ETH–Zürich • **UK:** John Innes Centre; NRI; University of Bath • **USA:** Cornell University; Danforth Center; OSU; University of Florida

Donors

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