CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

Roots, Tubers and Bananas Research


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More than 300 million people below the poverty line in developing countries depend on root, tuber and banana crops for food and income, particularly in Africa, Asia and the Americas. The CGIAR Research Program on Roots, Tubers and Bananas (RTB) is working globally to harness the untapped potential of those crops in order to improve food security, nutrition, income and climate change resilience of smallholders, especially women and youth.

Why roots, tubers and bananas?

Root, tuber and banana crops – cassava, potatoes, sweetpotatoes, yams, bananas, plantains, and tropical and Andean roots and tubers– are some of the most important staple crops in the world's poorest regions. They provide around 15% or more of the daily per capita calorie intake for the 763 million people living in the least developed countries. Often rich in key nutrients such as pro-vitamin A, RTB crops can significantly improve nutrition and food security. Many RTB crops can be grown with few inputs and often under harsh conditions. Yet they respond very well to intensification and are high yielders in terms of calories produced per hectare. As important cash crops they can help boost family incomes and are frequently grown or marketed by women.

But RTB crops present several common challenges. They are propagated clonally rather than with seeds, which allows yield-reducing pathogens to build up over time. This calls for a strong design of private-public seed systems. The crops' bulk and perishability put pressure on postharvest innovation. High genetic complexity in any variety means breeding is especially difficult.

Who are we?

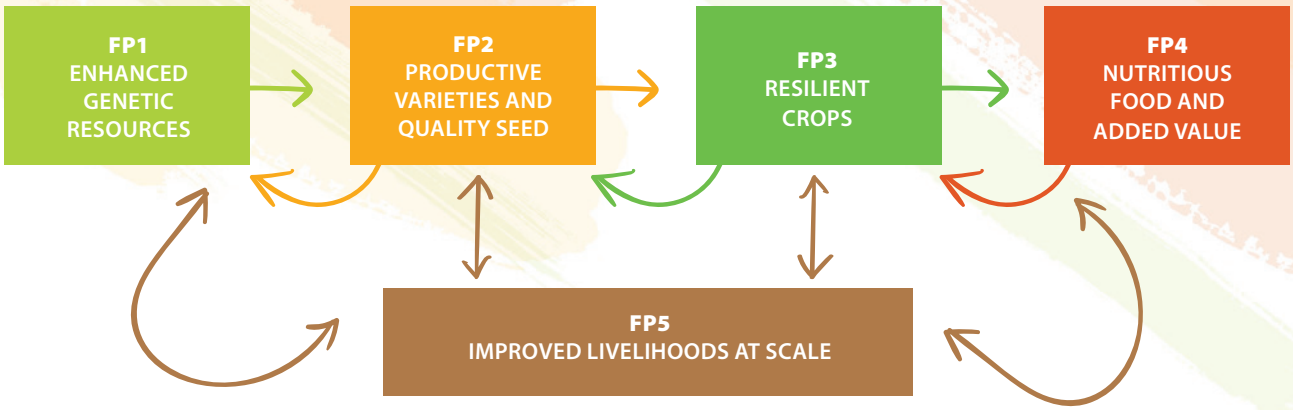
RTB is a collaboration of five research centers with decades of experience in these crops on different continents, including four CGIAR research centers[i] and the French Agricultural Research Centre for International Development (Cirad).[ii] By working with more than 350 other partners, these five centers mobilize complementary expertise and resources; avoid duplication of efforts; and create synergies to increase the benefits of their research for smallholder farmers, consumers and other stakeholders.

What are we doing differently?

RTB is changing the way the research centers work and collaborate, creating a more cohesive and multidisciplinary approach to common challenges and goals. RTB aims to promote greater cooperation among an array of national and international institutions, NGOs and stakeholders' groups while strengthening their capacities as key players. Because the full impact of RTB research depends on how well next- and end-users adopt it, the program's research options are developed together with stakeholders and are informed by their needs and preferences.

[i] International Potato Center, Bioversity International, International Center for Tropical Agriculture, International Institute of Tropical Agriculture

[ii] Cirad represents the French National Institute for Agricultural Research (INRA), Institut de recherché pour le developpement (IRD) and Vitropic.



Women are widely involved in the growing and marketing of RTB crops. Yet they face a different set of constraints than men, and have traditionally been the last to benefit from agricultural research and extension. RTB's comprehensive gender strategy (see gender flyer) is guiding the RTB gender research portfolio in order to improve and implement gender responsiveness. RTB crops also present a wide range of options to stimulate youth employment in processing and seed systems.

How we work

RTB's strategy organizes research around five flagship projects (FP).

Flagship 1 – **Enhanced genetic resources**

This flagship develops and applies leading-edge science toward building advanced tools, methods, models and systems to improve accuracy and scale of breeding and shorten selection cycles. It also adds value to genebanks through enhanced conservation research, the linking of genes or traits to genebank accessions and the increased characterization of diversity, all of which will guide varietal and trait development pipelines for enhanced uptake and impact.

Flagship 2 – **Productive varieties and quality seed**

This flagship develops improved RTB varieties with novel breeding targets, methods and processes that are applied to accelerate genetic gains for key traits across all RTB crops. It uses participatory, gender-responsive tools to understand the traits and criteria that stakeholders consider when adopting or rejecting varieties. End-user intelligence guides breeding processes to ensure that novel breeding targets are integrated. Similarly, FP2 aims to develop and make available good-quality planting materials of diverse, advanced RTB crop varieties that meet the needs and preferences of value chain actors. Predictive modeling and foresight work are used to assess future production, processing and consumption needs that current end-users might not otherwise take into account, so that breeding considers what RTB varieties might need under current and future climates.

Flagship 3 – **Resilient crops**

This flagship seeks to close yield gaps of RTB crops vulnerable to biotic and abiotic threats by monitoring pest and pathogen movement, and assessing risks and design responses for new threats. It also contributes to the development of more climate-resilient and ecologically sustainable production systems, thereby strengthening food security and improving natural resource quality and ecosystem service provision.

Flagship 4 – **Nutritious food and added value**

This flagship is harnessing the nutritional potential of RTB crops more widely, expanding their utilization and adding value through postharvest innovation. Researchers collaborate with breeders to design and develop more nutrient-dense RTB crops, including biofortified varieties, with other market-preferred traits. Market development research is used to strengthen demand-pull and accelerate uptake of nutritious and profitable varieties. FP4 also addresses the perishability of RTB crops through improved storage, transportability and diversified use; and promotes gender-equitable development and youth employment along the value chain. FP4 is also developing improved methods for postharvest process modeling that integrate technical, economic and environmental aspects and enhance the sustainability and profitability of the postharvest sector.

Flagship 5 – **Improved livelihoods at scale**

This flagship aims to enhance and scale socio-technical innovations in RTB-based agri-food-systems to improve smallholder livelihoods, paying special attention to gender equity and youth employment. Using quantitative modeling with stakeholder engagement, FP5 is developing pioneering tools, methods and approaches to facilitate the analysis of trends and opportunities for RTB crops and competing enterprises, and support decision-making on investments for actors at household, landscape, value chain and policy levels. FP5 stimulates sustainable intensification of RTB systems for market linkage, and supports diversification of RTB crops so that smallholders realize improved livelihoods, with more resilience and better nutrition. Co-learning, capacity development and participatory testing of RTB innovations are used to guide innovation and scaling in FP1–FP4. FP5 also strongly engages with other CGIAR Research Programs and their complementary flagships.

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