More than 70 million people in Africa depend on banana and plantain for food. These major food staples and cash crops are important in the rural and urban economy, and social and cultural life in sub-Saharan Africa (SSA).

Banana and plantain are grown mostly by smallholder farmers in both the East African Great Lakes zone and the West African humid lowlands for processing, brewing, cooking, and as dessert.

Banana and plantain yields, however, have been seriously declining, threatening food security and the livelihoods of millions of subsistence farmers and their families in the region. Declining yields have been attributed to soil degradation, introduced pests and diseases, poor crop husbandry, and drought. Production needs to be intensified to realize value-added chains, while sustaining the natural resource base.

**R4D goal**

As the global lead in research for development (R4D) on banana and plantain, we develop solutions to production constraints and use knowledge of the crops’ agroecology to develop new varieties and better practices that increase profit and improve the quality of banana- and plantain-based food products suitable for market opportunities.

In collaboration with partners, we increase knowledge on ecosystems, social systems, and commodity chains related to banana and plantain production in Africa. We also research ways to improve the profitability of banana and plantain systems.

**R4D outputs and outcomes**

Our major efforts go into combating infestations of diseases and pests using conventional and new methods. We develop hybrids and improved, high-yielding varieties resistant to the major pests and diseases affecting bananas, and with traits selected based on processing and market preferences using biotechnological tools.

For example, we developed 14 black leaf streak disease (sigatoka)-resistant plantain hybrids that are high yielding and that produce high quality fruits. Likewise, in collaboration with advanced research institutes, we produce bacterial wilt-resistant and nematode-resistant varieties. An example is the genetic transformation system to produce banana Xanthomonas wilt (BXW)-resistant varieties using the *pfp* transgenes from other crops developed in collaboration with a national partner.

Moreover, we developed disease-free and more cost-efficient planting materials, more efficient and profitable banana growing systems such as banana-coffee intercropping, and distribution methods for farmers, extension workers, and growers in cooperation with the private industry.

We developed a treatment method for producing nematode-free banana suckers and ways of propagating clean, disease-free planting materials.
for farmers and growers such as tissue culture, enrichment with endophytes, macropropagation, or micropropagation.

To enhance banana growth, we use biorationals or antagonistic plants such as tree marigold, African marigold, and neem, which inhibit nematode population buildup and can be used as green manure, cover crop, or intercrop.

We promote plant healthcare through mobile plant clinics, and build the capacity of partners and growers to diagnose and manage diseases for more sustainable production and to influence advocacy. In collaboration with international, regional, and national partners in the East African Great Lakes region, we launched the region-wide Crop Crisis Control Project to build the capacity of farmers and extension/research staff in diagnosing and managing BXW and producing healthy planting materials. National partners now have an increased capacity to diagnose plant diseases, better manage their crops, and link to other partners across regions and regulatory governments.

Modern-day genetic and genomic resources are being applied to make banana/plantain breeding more efficient, and to characterize the diversity in major pathogens and pests.

In addition, we also work at improving market pathways for commercial tissue-cultured banana with the help of private sector and nongovernmental organization partners. As a result, new markets for bananas and banana products are being created. Growers are now switching from subsistence farming to income generation.

We also undertook capacity building efforts to empower farmers to participate in the seedling delivery process through community-managed nurseries.

Conclusion
Through this program, we provide millions of small-scale farmers with the tools, technologies, and solutions that could help transform banana and plantain into food security and cash crops, foreign exchange earners, and vehicles for economic development.