



RTB Complementary Grant: Status brief

BBTD containment and recovery: Building capacity and piloting field recovery approaches through a learning alliance

Purpose

To (1) pilot community and farm household recovery strategies, informed by understanding of gender roles and household typology in banana bunchy top disease-affected areas; (2) test alternative approaches to develop supply chains for virus-free planting material, and (3) build knowledge and predictive tools of virus-vector-host interactions, cropping system and farmer management

Target countries

Benin, Burundi, Congo Brazzaville, Cameroon, DR Congo, Gabon, Malawi, and Nigeria

Partners

Bioversity International, Uganda and France
IITA, Nigeria and Cameroon
CIRAD, France
University of Ibadan, Nigeria
University of Dschang, Cameroon
Bvumbwe Research Station, Malawi
Université de Kinshasa, Kinshasa, DRC
Université de Kisangani, Kisangani, DRC
Université d'Abomey-Calavi and INRAB, Republic of Benin
Ministry of Agriculture and Rural Development, Cameroon
Institut National de Recherche Agronomique, Congo Brazzaville
Institut des Sciences Agronomiques du Burundi (ISABU), Burundi
Programme de Développement d'Agriculture Rurale (PDAR), Gabon
Chercheur à l'Institut de Recherches Agronomiques et Forestières (IRAF), Gabon
Nigerian Agricultural Quarantine Services & National Institute of Horticultural Research, Nigeria
Community organizations and farmer groups in the respective pilot sites

Project background

Banana bunchy top disease (BBTD) caused by the *Banana bunchy top virus* (BBTV, genus *Babuvirus*, family *Nanoviridae*) renders plants unproductive and eventually kills affected plants. BBTD spreads into new fields along with infected planting material and through the banana aphid, *Pentalonia nigronervosa*, which is widespread in all banana and plantain-producing areas. BBTD was first reported from Africa in 1901, moving slowly. However, extensive spread into new production areas has been observed during the last two decades. The disease has very recently invaded the border region between Bénin and Nigeria in West Africa, jumping across much of Cameroon and Nigeria. More limited spread has also been seen in the central Great Lakes in higher altitudes and into the Kivu provinces in Democratic Republic of Congo (DRC), neighbor to the largest banana-producing country in Africa — Uganda.



Considering the urgent need for collective action to tackle the escalating BBTB threat to banana in sub-Saharan Africa, the CGIAR Research Program on Roots, Tubers and Bananas (RTB) granted a project titled 'Banana bunchy top disease containment and recovery in sub-Saharan Africa: Building capacity and piloting field recovery approaches through a learning alliance'. This project, under the framework of RTB, implemented by Bioversity International, IITA, and CIRAD, together with a range of national partners in Benin, Nigeria, Cameroon, Gabon, Congo Brazzaville, DR Congo, Burundi and Malawi, is focused on:

- (i) the piloting of community and farm household recovery strategies, informed by an understanding of gender roles and household typology in BBTB-affected areas;
- (ii) testing alternative approaches to develop supply chains for virus-free planting material; and
- (iii) building knowledge and predictive tools of virus-vector-host interactions, cropping system and farmer management.

The partners represent the broad range of climatic zones, cropping systems, and banana and plantain cultivars under threat from BBTB. In the recent RTB priority assessment exercise, the approach based on recovery of affected areas with BBTB-free planting material provided a 70% return on research investment (<http://www.rtb.cgiar.org/publication/view/strategic-assessment-of-banana-research-priorities-rtb-working-paper-2014-1/>).

Progress & achievements

This initiative was flagged off with an inception workshop in Bujumbura, Burundi in January 2014. The eight pilot zone teams met to formulate field scale approaches to recovery of BBTB-infested areas. This includes (i) eradication of infected plants to generate a banana-free fallow, (ii) the design of a supply flow for BBTB-free planting material, and (iii) the establishment of clean fields in the banana free zone with virus-free planting material. Several sites had already begun to pre-test the approach in the years before the workshop and reported that fields following the proposed approach were still free of BBTB two years after establishment, suggesting promise of this approach. All sites have partnered with new communities to establish banana-free fallows and a supply chain for BBTB-free planting material. Clean suckers, macropropagation and/or tissue culture plants have been used depending on the site. Common protocols for monitoring for aphids and appearance of BBTB in nurseries, in banana free fallows, and in new fields will contribute to the development of a model to tease out key variables to reduce the reinfection rate in nurseries and in new fields.

In July 2014 delegations from the pilot sites were convened in Montpellier, France, for training on lab detection of banana viruses and clean seed principles in a workshop titled 'Banana virus diagnostics for clean seed production, safe germplasm exchange and surveillance of invasive bunchy top disease'.

The project is also building on previous work to assess the extent of BBTB spread in the target countries/pilot zones to track disease expansion especially into new zones. Similarly, the project is continuing evaluation of banana and plantain landraces and synthetic hybrids in endemic sites to assess their performance against BBTB and banana aphid. This work has demonstrated *Musa* cultivars with a high degree of tolerance to BBTB that can be utilized in endemic areas. Work is in progress to understand the mechanisms of tolerance.



Molecular epidemiology work is targeting understanding the diversity of virus and vector and its influence on infection rate. This research so far led to the characterization of genomes of BBTV isolates from Benin, Nigeria, and Cameroon, and work is in progress in other countries. Research work on vector diversity is mainly focused on determining the aphid species occurring on *Musa* and studies on any variability in transmission efficiency to understand the vector influence on rate of transmission. Diagnostic tools for BBTV detection in host and vector has been improved, including standardization of LAMP-based diagnostic test towards developing a quick field test.

The project, which will extend through the end of 2015, has also focused on building research capacity through three PhD studies and up to 10 MSc students on aspects of cropping system, epidemiology and ecology of BBTVD, varietal reaction to disease and socioeconomic studies. The project has also partnered with the gender group of RTB and the Consortium to identify the household and community dimensions to mobilizing to recovery areas from BBTV.

This initiative is building on the recent investments to contain BBTVD and has unified relevant stakeholders within and between BBTVD-affected countries in sub-Saharan Africa to work towards a common mission. Although pilot sites are limited to one or two communities in each country, they are proving as effective platforms for testing new strategies and technologies, learning and forming excellent in situ venues for training and capacity strengthening. The pilot zone concept can be up- and out-scaled with additional funding, including activity expansion into five other BBTVD-affected countries (Angola, Central African Republic, Equatorial Guinea, Rwanda, and Zambia) not considered in this phase.

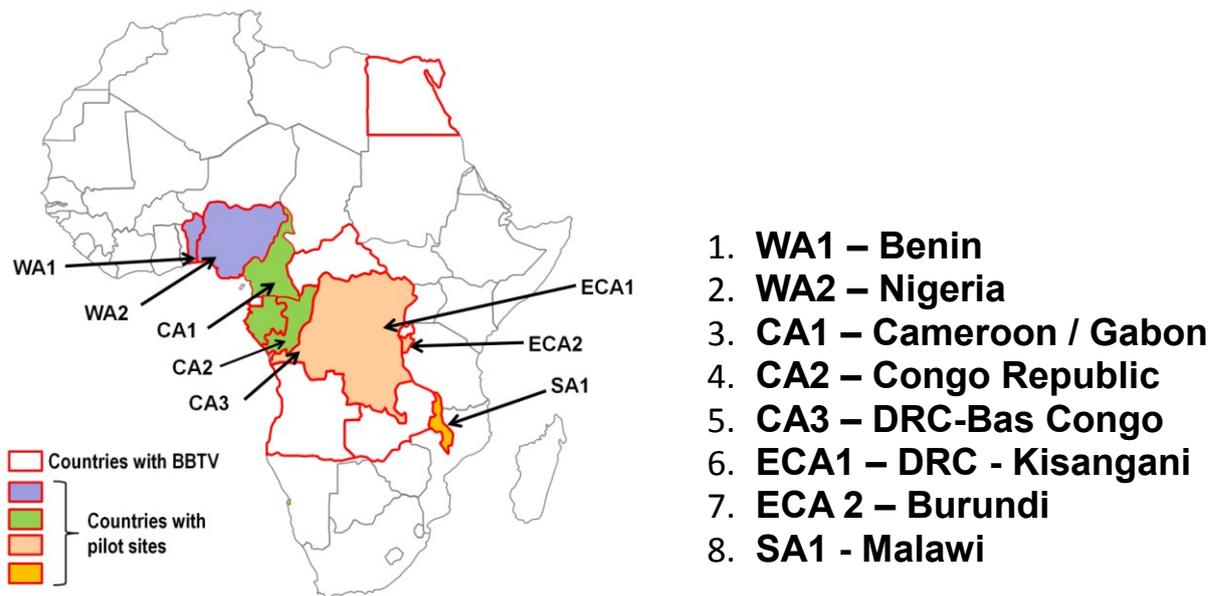


Fig 1. Project pilot sites