

Bacterial Wilt Resistant Banana Project



AFRICAN AGRICULTURAL TECHNOLOGY FOUNDATION
FONDATION AFRICAINE POUR LES TECHNOLOGIES AGRICOLES



Background

Bananas and plantains are an important food source for over 100 million people in Sub-Saharan Africa. In the east African highlands and most of the Great Lakes region, bananas are a major staple food and a source of income for over 50 million smallholder farmers. East Africa produces 16.4 million metric tonnes per year – about 20 percent of the world output. However, many biotic and abiotic factors greatly reduce productivity for banana cultivated under traditional African

farming systems one of them being the banana bacterial wilt disease. The disease broke out in Uganda in 2001. The disease causes the banana fruit to ripen prematurely, the leaves wilt and then the inevitable death of the entire plant. The International Institute of Tropical Agriculture (IITA) estimates economic loss due to diseases in Uganda alone to be at a staggering US\$ 200 million.

16.4 million tonnes... *average bananas produced annually in East Africa – about 20 percent of world output*

50 million... *number of smallholder farmers in East Africa who depend on banana for food and income*

Addressing Africa's wilting banana production

The banana bacterial wilt disease threatens production of the crop in the Great Lakes region and leads to decline in household incomes from banana sales and increase in prices of the commodity

The Banana *Xanthomonas* Wilt (BXW) disease, costs banana farmers millions of dollars in damages every year across East and Central Africa. The pathogen infects all varieties, including East African Highland Banana and the exotic types. The rapid spread of the disease has endangered the livelihoods of millions of farmers who rely on banana for staple food and cash.

Other costs associated with BXW include labour for cutting down and disposing of infected plants, de-budding the male flowers and disinfecting cutting tools. These cultural disease control methods currently in use have not been successful and hence the need for exploring feasible alternatives.

There are presently no commercial chemicals, bio-control agents or resistant varieties that could control the spread of BXW.

Project goal

The goal of the Bacterial Wilt Resistant Banana Project is to develop a *Xanthomonas* wilt-resistant banana from East African preferred germplasm. Prospects of developing varieties with resistance to bacterial wilt through conventional breeding are limited, as no source of germplasm exhibiting resistance against BXW has been identified. Transgenic technologies for banana may provide a timely alternative solution to the BXW pandemic.



Implementing the Bacterial Wilt Resistant Banana Project



The Bacterial Wilt Resistant Banana Project is a public private partnership that AATF is collaborating to develop BXW resistant transgenic bananas from east African preferred germplasm.

A gene isolated from sweet pepper by Academia Sinica in Taiwan has been identified as a possible solution for developing a transgenic banana resistant to BXW. AATF has brokered access to

the gene from Academia Sinica that is currently being used to transform bananas for resistance against BXW. The work on transformation is being carried out by the International Institute of Tropical Agriculture (IITA) and the National Agricultural Research Organisation (NARO) in Uganda and in Kenya by IITA. Current laboratory tests and results from confined field trials on the efficacy of the gene show that it is working.



Our banana harvests could be if we had better methods that could effectively control the banana bacterial wilt disease that has affected banana farming in this country since the year 2000. I would personally be ready to welcome any new technologies that would especially address the BXW disease. I hear there are scientists working on this but nothing has been released as yet.

Lubega Ben, farmer Bugere county, Uganda



Facts and figures on banana and the BXW disease

- East Africa produces 16.4 million tonnes per year – about 20 percent of the world output
- Uganda is the world's second largest producer after India
- Banana is a staple food and income source for over 100 million East Africans
- The disease infects all banana varieties including both East African Highland and the exotic types
- The BXW disease was first reported about 44 years ago in Ethiopia on Ensete (a native plant to Ethiopia) which is closely related to banana
- Outside of Ethiopia the disease was first identified in Uganda in 2001 and then in the Democratic Republic of Congo, Rwanda, Tanzania, Burundi and Kenya



Expected benefits from the Bacterial Wilt Resistant Banana project

- Improved access to food and livelihoods of three million farmers and their families
- Increased research capacity to address other banana production constraints
- New techniques will enable banana farmers access more pest- and disease-free and affordable tissue culture plantlets

“ I feel proud to be part of the solution to the constraints of banana production, as I know that the knowledge I am generating is contributing directly to the production of bananas that are resistant to bacterial wilt. The day such plants will be available to rural farmers will be as much a landmark for me as it will be for them. As an agricultural scientist, I think there is no greater joy than helping improve the food security and the incomes of one’s own people, and I know that bananas which are resistant to bacterial wilt will achieve these two goals for the people of east Africa. ”

Abubaker Muwonge, PhD researcher, IITA, Uganda.



Bacterial Wilt Resistant Banana Project Partnership



- AATF facilitates access to the appropriate proprietary genes and their sub-licensing to partners
- Academia Sinica has donated the plant ferredoxin like protein (*pflp*) gene and hypersensitivity response assisting protein (*hrap*) gene isolated from sweet pepper
- The International Institute of Tropical Agriculture is developing the transgenic banana lines with resistance to the BXW disease
- The National Agricultural Research Organisation, Uganda is conducting confined field trials to test the efficacy of the transgenic banana lines for resistance to BXW disease.
- Public and private tissue culture laboratories in the Great Lakes region of Africa including Burundi, Democratic Republic of Congo, Kenya, Rwanda, Tanzania and Uganda



For more information contact:

African Agricultural Technology Foundation

P O Box 30709-00100, Nairobi, Kenya | Tel: +254 – (0) 20-4223700 | Fax: +254 – (0) 20-4223701
Email: aatf@aatf-africa.org | Website: www.aatf-africa.org