

New study offers first-ever insight on resistance mechanism of a wild banana relative

The Banana *Xanthomonas* wilt (BXW) disease, caused by a bacterium, *Xanthomonas campestris* pv. *musacearum* (Xcm), is one of the most devastating diseases endangering the livelihood of millions of farmers in East Africa, the largest banana-producing and -consuming region in Africa.

It affects all banana cultivars grown in East Africa and only a wild type of banana native to Asia and one of the parents of modern cultivated bananas, *Musa balbisiana*, has been found to be resistant. However, very little is known about the molecular basis of susceptibility and resistance of banana to the bacterium.

Therefore, to better understand the molecular basis of resistance and susceptibility to the disease, scientists from [IITA-Kenya](#) compared the transcriptome-wide differential gene expression of the BXW-resistant genotype *Musa balbisiana* and BXW-susceptible genotype *Pisang Awak* during early bacterial infection. The transcriptome profiling was performed through RNA sequencing in collaboration with [New York University](#) (NYU). The differentially expressed transcripts were further mapped to biotic stress pathways to identify genes associated with defense mechanisms. This study suggested activation of both PAMP-triggered basal defense and disease resistance (R) protein-mediated defense in *Musa balbisiana* as an early response to bacterial infection.

The results of this research have been published in the international journal *Scientific Reports* (<https://doi.org/10.1038/s41598-019-43421-1>), and provide insights



A) *Musa balbisiana*, wild type banana, resistant to *Xanthomonas* wilt disease.



B) Cultivated banana showing *Xanthomonas* wilt disease symptoms.

on the resistance mechanism in *Musa balbisiana* to the most damaging pathogen Xcm. This study reports the first comparative transcriptome profile of the susceptible and resistant genotype of banana during early bacterial infection.

One of the scientists leading these efforts [Leena Tripathi](#), Principal Scientist in Plant Biotechnology at IITA, Kenya. “This new, important knowledge can be used in crop improvement programs to transfer the disease resistance trait from wild type banana to farmer-preferred banana cultivars commonly grown in Africa or editing of genes related to susceptibility and/or negative regulation of plant immunity,” said Tripathi.

The BXW disease causes wilting of plants, premature ripening of the fruits, and eventually, death of the whole plant. Unlike other banana diseases, which

cause incremental losses over years, the impacts of BXW disease are both rapid and extreme. The disease has caused estimated economic losses of about \$2.8 billion over the last decade and significant reductions in production have resulted in major price increases.

Banana is the world’s fourth most important food crop and is critical to the food security and income generation of more than 70 million Africans. This study is, therefore, a foundation for further research that would lift millions of smallholder banana farmers out of poverty while helping to alleviate hunger and poverty in Africa through improved production and reducing crop management costs in banana farming. Banana is a major food and income source for smallholder farmers in countries like Burundi, Kenya, Rwanda, Tanzania, Uganda, and eastern parts of the Democratic Republic of Congo.

Multidisciplinary team from NCRI visits IITA Ibadan

A multidisciplinary team from [National Cereals Research Institute](#) (NCRI) visited [IITA](#) Ibadan, on 7 May. The purpose of the visit was to strengthen the collaborative bond between the institutions, which weakened over the years. The team led by Dr Aliyu Umar, Executive Director of NCRI Badeggi, included Dr Bakare Samuel, Head of Research Operations; Dr A.B. Umaru, Head of Soybean Program, and Shaahu Aondover, Soybean Breeder. Dr Uwala Ayodele, President of Nigeria Soybean Association, was also present.

NCRI is strategic to the Nigerian economy because of its mandate crops, such as rice, sugarcane, soybean, and castor seed, and the farming system within the central local zone of Nigeria. Due to the prominence the Federal Government accords agriculture in Nigeria, there is high expectation on NCRI, majorly because of these mandate crops. The Institute believes very strongly in partnership and networking, since research is not done in isolation.

Dr Umar noted that NCRI wishes to consolidate its link with IITA as national research centers always look up to international partners for assistance especially in the area of capacity building. He said, "We hope to explore the possibilities of getting NCRI staff trained in IITA, majorly in research and production." The present leadership of NCRI believes that being more focused will help the Institute meet up with the high expectation on them and as a result, decided to reach out to its collaborators both at the national and international levels.

[Michael Abberton](#), Head of the Genetic Resources Centre IITA, representing [Dr Sanginga Ntyeranya](#), Director General of IITA, said the facilities of IITA are open to its partners as the Institute believes in partnership and networking. He made it clear that there would not be any problem or restrictions about getting materials but there might be limitations in terms of quantity especially from the gene bank. He further said that IITA's Capacity Development Office does not have as much funds as they use to but still, a lot of effort is put in to connect with national programs and engage in capacity development trainings. However, training will not be totally free



NCRI Executive Director, Dr Aliyu Umar, stating the reason for the visit.



A group photograph of IITA management staff and NCRI multi-disciplinary team.



NCRI Executive Director, Dr Aliyu Umar, stating the reason for the visit.

due to restraints on IITA resources, but the cost can be minimized.

"NCRI is very secure and always open to assist IITA in the evaluation of multilocational varieties," noted Dr Umar. In relation to this, Abberton said, "Some of the varieties IITA plans to promote are those developed in

collaboration with NCRI. These varieties are available but not pure, consequently, the Institute looks forward to improving on them with NCRI's cooperation."

Concluding, [Christian Fatokun](#) noted, "When opportunity presents itself, IITA is open to all forms of collaboration."

Yara Tanzania to partner with ACAI on dissemination of agronomy advice tools



NCRI Executive Director, Dr Aliyu Umar, stating the reason for the visit.

[Yara Tanzania](#), a subsidiary of the global fertilizer conglomerate [Yara International ASA](#) has agreed to partner with the [African Cassava Agronomy Initiative](#) (ACAI) in the dissemination of its cassava agronomy decision support tools (DSTs). ACAI has been doing research to develop a suite of agronomy advice tools to help improve cassava intensification, productivity, and production targeting smallholder farmers through cassava value chain actors.

ACAI project activities coordinator for East Africa, [Veronica NE Uzokwe](#) and ACAI colleagues met with Yara Tanzania Head of Agronomy Mr Peter Assey on 21 May to review potential areas where Yara can intervene specifically for validation and dissemination activities of the ACAI project.

The ACAI team provided Yara with background information on potential areas for engagement with the ACAI project. They highlighted the importance of encouraging cassava growers to use fertilizers for cassava

production to increase productivity and household income.

The discussions were a follow up on the initial meeting between the two teams in April in which the partnership was agreed. ACAI project Leader, [Pieter Pypers](#) who led the previous meeting said the partnership with Yara is a great opportunity to diversify and tailor the ACAI DSTs to meet the needs of the farmers at the grassroots level. ACAI monitoring and evaluation specialist Theresa Ampadu-Boakye was also participated in the discussions.

In a letter expressing interest to be part of the project dissemination activities, Mr Assey said the company will incorporate ACAI recommendations in their short code messaging services.

“We are confident that the project will contribute to strengthening cassava production in Tanzania,” wrote Mr Assey.

The partnership will enhance to the reach and impact of the ACAI agronomy advice tools in the areas that Yara

already has operation networks beyond the project areas of intervention. ACAI, on the other hand, will provide tailored recommendations for fertilizer blends for specific locations to improve the effectiveness of the fertilizer sold by Yara in Tanzania for cassava growers.

Uzokwe termed the partnership between ACAI and Yara a masterstroke at combining precision research with wide dissemination platforms for the benefit of smallholder farmers.

“We shall achieve the expectations of the cassava growers for site-specific recommendations and promote the relevant and appropriate use in cassava farming through this partnership,” said Uzokwe.

ACAI will share with Yara the planned activities for the validation of the DSTs and dissemination of the tools at grassroots level later in the year. Yara will incorporate ACAI DSTs, especially the Fertilizer Recommendation (FR) and Fertilizer Blending (FB) tools.

IITA and CIRAD sign MoU for building sustainable farming systems

During the visit of His Excellency Mr Jerome Pasquier, Ambassador of France to Nigeria on 14 May, IITA signed a Memorandum of Understanding (MoU) with [Centre de Coopération Internationale en Recherche Agronomique pour le Développement](#) (CIRAD), as both institutes share commonalities in working for the sustainable development of tropical regions.

IITA Deputy Director General, Corporate Services (DDG-CS), [Hilde Koper-Limbourg](#) along with other management staff, received the Ambassador and CIRAD representatives. Koper-Limbourg expressed delight at the visit and described IITA as “a whole mix of research and partnerships channeled towards development.”

The MoU sees a shift in research activities from crop-based to issue-driven and the need to blur the line between Francophone and Anglophone frontiers of research. Tancrede Voitouriez, Senior Economist representing the Regional Director of CIRAD, Dr Patrice Grimaud described the partnership as “timely” and said, “If we want to be useful at scale, we have to move beyond our comfort zones. It is good to team up with partners who can challenge us. This partnership does not only help increase knowledge, but it is a way of ensuring impact through consistency.”

CIRAD has the objective of building sustainable farming systems capable of feeding ten billion human beings by 2050 while preserving the environment. [Robert Asiedu](#), IITA Director of Research for Development, West Africa, enumerated IITA’s activities in West Africa as well as existing partnerships between IITA and CIRAD. “IITA and CIRAD are currently collaborating on projects such as [Africa Yam](#), [Biorisk Management Facility](#) (BIMAF), [Breeding Roots, Tubers and Bananas](#) (RTB), and [Design of agro-ecological systems based on pest management and organic waste use](#) (DIVECOSYS),” he concluded.

Ambassador Pasquier signed the MoU on behalf of CIRAD and expressed optimism that both parties would benefit from it. Afterwards, the delegates embarked on a tour of IITA’s facilities.



H.E. Pasquier and Koper-Limbourg signing the MoU.



H.E. Pasquier and Koper-Limbourg shake hands after signing the MoU.



The CIRAD delegates with some IITA management staff.

DG Sanginga honors passionate student in IITA Malawi

In April, DG [Nteranya Sanginga](#) visited [IITA Malawi](#), for the handover ceremony of the Aflatoxin laboratory as well as opening of the renovated offices of IITA Malawi. This visit birthed a great opportunity for a young and passionate research technician, Madalitso Mhango, who is also a fourth-year student of Journalism and Mass Communication at the Pentecostal Life University, Malawi.



Mhango and DG Sanginga in a group photo with Mhango's hosts at Aflasafe and Communication Unit.

Mhango works in the Aflasafe laboratory, IITA Malawi, to sponsor herself through university education, due to her parents having challenges with paying her tuition. She said, "My father is a driver who earns so little, and my mother is a housewife. Both of them cannot afford my tuition. I started working with IITA so that I can pay."

DG Sanginga chose Mhango because of her passion and invited her on a motivation trip to IITA Ibadan. She is

the youngest among her colleagues in Malawi.

Her two-week visit to IITA Ibadan comprised a week-long visit to the Aflasafe factory and a five-day training course on "Science communication skills enhancement", organized by the IITA Communication Unit. As a student of communication, Mhango is passionate about reporting science news and hopes that she can begin to practice those things she has learnt in

IITA. "I have learnt a lot from IITA and the Communication unit. I would like to thank DG Sanginga for inviting me here; I don't take this for granted."

While presenting her with a Certificate of Training, DG Sanginga expressed his pleasure at Mhango's trip to Ibadan. He said, "You are not just a communicator, but you will also be a scientist." At the end, Mhango was grateful for the opportunity, and considered it a great boost to her education and career.

Got a story to share?

Please send your story with photos and captions every Tuesday to iita-news@cgiar.org or Katherine Lopez (k.lopez@cgiar.org) and Uzoma Agha (u.gha@cgiar.org) for headquarters and Western Africa, Catherine Njuguna (c.njuguna@cgiar.org) for Eastern and Southern Africa, and David Ngome (d.ngome@cgiar.org) for Central Africa.

Biodiversity focus: International Day for Biological Diversity

Celebrated every 22 May, the International Day for Biological Diversity aims to raise public awareness about the need to conserve biodiversity for the sustenance of life on earth. Entitled “Our Biodiversity, Our Food, Our Health”, the 2019 event showcased the importance of biodiversity to humans, in the provision of food and health living.

António Guterres, the [United Nations Secretary-General](#) put it so well when he said, “From individual species through entire ecosystems, biological diversity is vital for human health and well-being. The quality of the water we drink, the food we eat, and the air we breathe all depend on keeping the natural world in good health.”

[IITA](#) joined the rest of the world to appreciate the roles of biological diversity in environmental sustenance and raise public awareness about it. Following the recently established tradition, the Institute organized a 2.5 km “Walk for Purpose” to highlight biodiversity to IITA staff. In view of this, the walk incorporated a route from the [IITA Forest Center](#), Ibadan to the Botanical Nursery, where food resources

provided by biodiversity were exhibited.

Featured here is our Biodiversity focus for this week, the West African Honey Bee (*Apis mellifera adansonii*). This is a food producer that does not pollute the environment. The particular bee pictured here was sucking nectar from Waterleaf (*Talinum triangulare*), and may also pollinate the plant in the process.



The West African Honey Bee forages on Waterleaf in the IITA Tree Heritage Park, Ibadan. Photo: O. Olubodun.