

Novel and effective technique to control Banana *Xanthomonas* wilt found suitable for Rwandan agroecology

Banana is a major commodity in Rwanda, used as both a cash and (staple) food crop; it covers 23% of Rwanda's land and is grown by 90% of households. Rwanda is one of the largest banana producers in East Africa and ranks second in banana consumption globally with an annual per capita consumption of approximately 144 kg.



"Single Diseased Stem Removal" helps to control BXW more efficiently than "Complete Diseased Mat Uprooting".

For the last 10 plus years, the yield and production of this important crop in Rwanda have been severely affected by banana *Xanthomonas* wilt (BXW) disease, affecting Rwandan farmers.

BXW is a bacterial disease that has seriously affected banana production in the East and Central African (ECA)

region, with yield losses of up to 100% reported. The disease was first discovered on Enset (a banana relative,

to page 3

Scientists discuss better ways to protect plant health

Every year, the [Germplasm Health Units](#) (GHUs) of the [CGIAR](#) Centers organize the "Phytosanitary Awareness Week". This year, the event was themed "Phytosanitary safety for the prevention of the transboundary spread of pests and pathogens." It took place from 9 to 13 November to highlight the International Year of Plant Health (IYPH 2020).

The CGIAR Centers set up the GHUs to prevent the outbreak of pests, avert the spread of quarantine pests that can be easily transferred with germplasm, and safeguard biodiversity. This is because

plants and seeds harbor various pests like pathogens, insects, and nematodes, which can spread into new territories along with germplasm. The spread of these pests and germplasm distribution is a concern for the Centers, as they supply germplasm to developing countries and biodiversity hotspots that lack the sufficient phytosanitary capacity to prevent pest entry or respond to pest outbreaks.

The event commenced with a global plenary session where the Centers in Africa, Asia, and Latin America, discussed the activities of the GHUs

in preventing transboundary pests and ensuring the transfer of clean germplasm. Each continent shared the challenges and opportunities their centers have in preventing the transboundary spread of pests and guaranteeing clean germplasm transfer in their region.

Head of [ICRISAT](#) Plant Quarantine Unit and Cereal Pathologist in India, [Dr. Rajan Sharma](#), facilitated the Asia session. He explained that the presentations' focus was on the role of CGIAR and National Plant Production Organizations in preventing the

INTERNATIONAL YEAR OF PLANT HEALTH 2020

CGIAR Genebank Platform CROP TRUST

Phytopathology Awareness Week 9 to 13 November 2020

Phytopathology Safety for Transboundary pest prevention

GHU Webinar Series

Time	Topic	Speaker
01:10 – 01:25	Emerging phytosanitary risks to African agriculture and trade	Dr. Jean-Gerard Mezul MElla, Director, Inter-African Phytosanitary Council (IAPSC), Cameroon
01:25 – 01:40	Bioprotection to African rice germplasm	Dr. Marie-Noelle Ndjondjop, Head of Genebank & In-charge Head, Germplasm Health, AfricaRice, Cote d'Ivoire
01:40 – 01:55	Monitoring banana germplasm health for international transfers	Dr. Massart Sebastien, Head, Germplasm Health, the Alliance Bioversity-CIAT / University of Liege, Belgium
01:55 – 02:10	Protecting African tree germplasm from invasive and native biotic threats	Dr. Alice Mubwandu, Dr. Ines Njuguna
02:10 – 02:25	Forage seed health protection	Dr. Alemayehu Teresa, In-charge Head, Germplasm Health Unit, IIRI, Addis Ababa, Ethiopia
02:25 – 02:40	Procedures for phytosanitary safety of food crop germplasm and the "GreenPass" concept	Dr. Lava Kumar, Head of Germplasm Health & Virology IITA, Ibadan, Nigeria
02:40 – 02:50	Nigerian Agricultural Quarantine Service and CGIAR partnership	Mr. Obaje John, Director, Plant Quarantine, NAQS, Abuja, Nigeria
02:50 – 15:00	Concluding remarks	Dr. Michael Abberton, Head, Genetic Resources Center, IITA, Ibadan, Nigeria

GHU Webinar Series Africa Session
12 Nov 2020, 1 to 3 pm Nigeria time

Keynote speakers for the Africa Session.

introduction and spread of pests. Dr Anitha Kodaru, Head of National Bureau of Plant Genetic Resources (NBPGR), India, spoke on the "Global exchange of crop germplasm: Phytosanitary issues with reference to India." She said that one major phytosanitary issue is banning pesticides due to human and animal health risks. She suggested prioritizing collaborative research across the world for alternatives to the banned pesticides suitable to specific crops and pathogens. Alternatively, she suggested that quarantine stations be exempt from this regulatory ban until other options become available.

During the Latin America session, Dr Jan Krueze, Head of the CIP Health Quarantine Unit in Peru, stated that international germplasm exchanges play a significant role in the diversification and improvement of world agriculture. "However, if not well managed, the exchange can also introduce exotic pests to territories where they did not previously exist," he added. Speaking on the "Phytosanitary measures for safe distribution of maize and wheat germplasm from CIMMYT to the World," Head of Seed Unit at

CIMMYT, Mexico, Dr Amos Alakonya, highlighted the critical role they are playing to ensure that seeds distributed are free from pests and diseases. According to Alakonya, the Institute takes seeds through various levels of control to ensure that their collaborators in developing countries with limited phytosanitary infrastructure get seeds free from quarantined and non-quarantined seed-borne pathogens.

Dr Lava Kumar, Head of IITA Germplasm Health and Virology Unit, led the Africa session. He noted that one of Africa's oldest challenges is the prevalence of several quarantine pests, affecting germplasm distribution activities. Another challenge is that these pests can also move out of the continent if adequate precautions are not taken when distributing planting materials. "On the positive side, the continent is a hub for curbing the most notorious quarantine pests that pose a big challenge to germplasm exchange activities," he said. While speaking on "Nigeria Agricultural Quarantine Service (NAQS) and CGIAR partnership," Director of Plant Quarantine (NAQS), Abuja, John Obaje, highlighted the

objectives of NAQS towards preventing the introduction and spread of transboundary pests into Nigeria and preventing the export of pests existing in Nigeria to other countries. "IITA is one of the CGIAR centers that has been a major collaborator of NAQS in terms of germplasm exchange and pest and disease diagnosis through research and development," he added.

The event ended with a plenary session with conclusions drawn from the presentations of the various sessions. Discussions were made on better ways to achieve the goal of distributing clean seeds free from pathogens. Kumar highlighted some key takeaway points gathered from all the sessions. These include having a harmonized plan and protocol across all GHUs; best guidelines; more research, better protocols and more internal awareness; SMTA-like models of phytosanitary standards for CGIAR exchanges; national capacity development (Genebanks and National Plant Protection Organizations); and more collaboration among the international, regional, and national partners. These points would serve as the way forward.

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.



Novel and effective technique to control Banana *Xanthomonas* wilt found suitable for Rwandan agroecology

Continued from page 1



Xanthomonas wilt of banana can cause yield losses up to 100%.

also called false banana) in Ethiopia in 1967 and spread to the ECA region (Uganda) in 2001. In Rwanda, BXW was officially reported in 2005, reducing banana availability in households and markets and making it a considerable threat to food security and income.

There is no cure for BXW, but scientists have formulated technical recommendations to reduce the probability of infection and to manage and control existing infections.

The Government of Rwanda set up various approaches to address BXW, such as working through Umuganda, a monthly holiday of community service in Rwanda, where people uprooted infected banana mats and buried them in the soil. This practice to control BXW is referred to as "Complete Diseased Mat Uprooting (CDMU)".

In Rwanda, CDMU has been proposed as the only correct measure to control BXW, though it has only been partially effective because it is costly, time-consuming, and severely affects the continuity of bunch harvests.

A novel technique to control BXW in banana, called Single Diseased Stem Removal (SDSR), developed and tested by the Alliance of Bioversity International and CIAT in neighboring countries over the past years, has recently been tested at field sites in Rwanda and showed good results.

SDSR is a disease management practice to control BXW and recover banana

production rapidly. Instead of uprooting the whole sick banana mat, only the stem of a plant showing symptoms of BXW is cut at soil level. Scientists recommend supporting SDSR by sterilizing garden tools used for cutting diseased stems, either by holding the tool in fire for up to a minute or by cleaning it with soap and water or chlorine. Ideally, this work is associated with removing the male floral bud after the formation of the last cluster on the bunch using a forked stick.

The Alliance of Bioversity International and CIAT conducted the study on the SDSR technique in Rwanda, in partnership with the Rwanda Agriculture and Animal Resources Development Board (RAB) and IITA through the CGIAR Research Program on Roots, Tubers and Bananas (RTB) flagship project.

The trials were set in four sites located in Kayonza, Gisagara, Rulindo, and Rubavu districts. The objectives of the study were to assess the potential of both CDMU and SDSR in controlling BXW under Rwandan agroecological conditions, and conduct a cost-benefit analysis for both technologies, measuring the time needed and labor costs to apply the technology and banana bunch harvests/yield.

The results show that in all four sites, both SDSR and CDMU were highly effective in halting the disease. Disease incidence dropped below 1% by the end of the first month. In subsequent months, during which the banana plants were regularly monitored for symptoms of BXW, incidence remained below 2% when either

SDSR or CDMU was applied, respectively, on sick plants or mats. This was a marked difference from the plots with BXW where no techniques were applied to control the disease. In these plots, incidence rapidly increased in the first month at all four sites with an average of 7.5%.

Although disease incidence declines were similar for both BXW control technologies, it is important to note that in the CDMU plots, all plants in a sick banana mat were uprooted, whereas in the SDSR plots, all healthy-looking plants were left in place, leading to continued bunch production. For banana farmers, this makes an enormous difference.

Moreover, the results show that SDSR takes much less time than CDMU. The total time (cutting/uprooting, processing plant debris, and even replanting in the case of CDMU) needed for SDSR is 88% less than for CDMU, averaging 4.3 ± 0.3 minutes treatment time for removing one affected plant, compared to 36.5 ± 4.5 minutes for uprooting one affected whole mat. The labor costs associated with CDMU are much higher.

Scientists recommend the SDSR technique to control BXW to Rwandan banana farmers because it is easy to apply and highly effective in controlling and halting the dissemination of BXW in banana gardens.

Read the research brief here: <https://www.rtb.cgiar.org/publications/a-superior-technology-to-control-banana-xanthomonas-wilt-bxw-in-rwanda/>

IITA trains northeast women in beekeeping and goat rearing

Through the USAID-funded Feed-the-Future Nigeria Integrated Agriculture Activity, [IITA](#) recently trained 28 women in beekeeping to enhance household nutrition and income. The three-day training took place in Marama community in Hawul Local Government Area (LGA) of Borno State on 20-22 October. It covered beehives set-up, colony management, and other skills necessary to set up a beekeeping enterprise to produce honey and other hive products. Honey contains many nutrients that are useful in fortifying foods for children that have just been weaned, and it is a perfect substitute for sugar in adult meals.

They conducted similar learning events for 30 women in Demsa (October 2020) and 29 women in Guyuk (July 2020) LGAs of Adamawa State, bringing the total number of women trained to 87. At the end of the training, participants received the necessary start-up kits such as honey production suits, hives, and other demonstration apiary equipment to commence the beekeeping enterprise, which will improve their household nutrition and livelihood.

In a similar development, 154



Some of the kitted women trainees with modern Beehives during the training in Marama Community, Hawul LGA, Borno State.

women from three LGAs, Gombi (Adamawa), Bayo, and Kwaya-Kusar LGAs (Borno), participated in goat rearing skill-acquisition activities in October 2020. The training was in collaboration with Life Helper Initiatives, which taught the women techniques and methodologies for goat feeding, health, and housing.

The women also learned how to use supplementary feeds to

improve animal productivity and breeding, the importance of goat feeding and nutrition, standard procedures for feed combinations, drug administration, and other basic practices, which will lead to improved productivity and reproduction.

The organizers will extend the training to an additional 400 women in six LGAs across Adamawa and Borno states in the coming months.

New publication tackles the major challenges facing banana production

Burleigh Dodds Science Publishing announces the publication [Achieving sustainable cultivation of bananas – Volume 2: Germplasm and genetic improvement](#). The book offers an authoritative discussion on the progress of identifying and broadening the genetic base for *Musa* species and reviews current conventional and molecular breeding techniques for breeding new varieties.

This new title is edited by world-renowned banana experts, Prof Gert Kema, Wageningen University & Research, The Netherlands and Prof André Drenth, The University of Queensland, Australia.

The book features an [insightful chapter](#) on overcoming the fertility crisis in bananas, written by a team of [IITA](#) scientists: [Delphine Amah](#), Gil Gram, and [Rony Swennen](#).

After an introductory chapter that provides an overview of genetic improvement in bananas, the book is divided into three parts: Part 1: Classification, Part 2: Broadening the genetic base, Part 3: Genetic improvement through breeding

Dr Brian Irish, USDA-ARS PGITRU, USA states that “This comprehensive compilation takes into account the important and diverse factors affecting long-term banana production sustainability. It will be an important resource for the research community but will be of value to producers and consumers as well.”

This new volume aims to be a standard reference and is accompanied by a companion volume of [cultivation techniques](#).



Special Offer: Benefit from 20% off both books if purchased via the [Burleigh Dodds website](#). Enter code BANANA20 at checkout to receive this discount. Discount expires 31 January 2021.

TETFund seeks partnership with IITA for impactful agricultural research

A 3-member delegation from Nigeria's [Tertiary Education Trust Fund](#) (TETFund) Standing Committee on Research and Development Agriculture visited [IITA-Ibadan](#) on 20 November, as part of a new initiative to ensure that research impacts society. The team set out to find existing programs delivering on research for development in the agricultural sector and looked forward to building partnerships with IITA.

The Deputy Coordinator of the TETFund Agricultural thematic group, Prof Charles Aworh, said Nigeria devotes less than 0.1% of its GDP to research generally, which is way too low to fund research for development. He said there needs to be a National Research Foundation enacted by law that will not be subject to government change. Recognizing IITA's impact on developing research outputs for development, he said their mission led them to IITA.

IITA Deputy Director General, Partnerships for Delivery [Kenton Dashiell](#) and Director for Advocacy and Country Alignment [Kwesi Atta-Krah](#) received the TETFund team along with the Director for Development and Delivery, [Alfred Dixon](#). The group visited IITA Youth Agripreneurs (IYA), Aflasafe under the Business Incubation Platform (BIP), YIIFSWA hydroponics, and Genetic Resources Center (GRC).

The Institute's research and delivery programs excited the delegates, especially the IYA's gains and successes so far. They commended the Aflasafe innovation and its reach in solving aflatoxin issues in crops, and the yam hydroponics for addressing yam seed problems. Aworh said IYA had targeted the main constraint to agricultural development, which is the impression that agriculture is for the old and uneducated. He commended the IITA leadership for promoting IYA



Alejandro Ortega-Beltran (left) explaining the Aflasafe technology to the delegation.

because, according to him, engaging and training the youth is one of the best ways to steer Nigeria's economy to development. The visitors agreed that all their visit points align with the Committee's goals.

Dashiell and Atta-Krah assured the delegates that IITA is open to partnerships and collaboration to drive research for sustainable development, especially those involving universities, industries, the government, and research institutes. They assured the

team that donors know that IITA would deliver and that the Institute has made good on this reputation over the years. "IITA is keen to partner with TETFund, especially with regards to working with the Federal and State governments in delivering technological innovations on agriculture to the nation," Dashiell said.

The delegates said they look forward to partnerships and collaboration with IITA in running a National Research Foundation, which is one of the outputs the Committee seeks to deliver.



IITA Senior Management staff with the TETFUND delegation.

Take responsibility! Stop the spread of COVID-19!

Always clean your hands; practice physical and social distancing; wear face masks; avoid crowds and public places; keep a 2-meter distance from the next person; practice general sanitation and hygiene.