ICT4BXW

Combatting Banana Disease Through Digital Innovation

EMBRACING DIGITAL INNOVATION FOR SUSTAINABLE BANANA PRODUCTION

ICT4BXW-II Newsletter: August 2022

RAB Rwanda

IITA Transforming African Agriculture

viamo

iamo Leibniz Institute of Agricultural Development in Transition Economies

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Introduction

Banana is an important food and cash crop in Rwanda, covering 23% of the total cultivated land and is grown by 90% of households. It is playing a crucial role for food security, nutritional health and sustainable agricultural growth in Rwanda. It is one of highly consumed staple crops in the country.

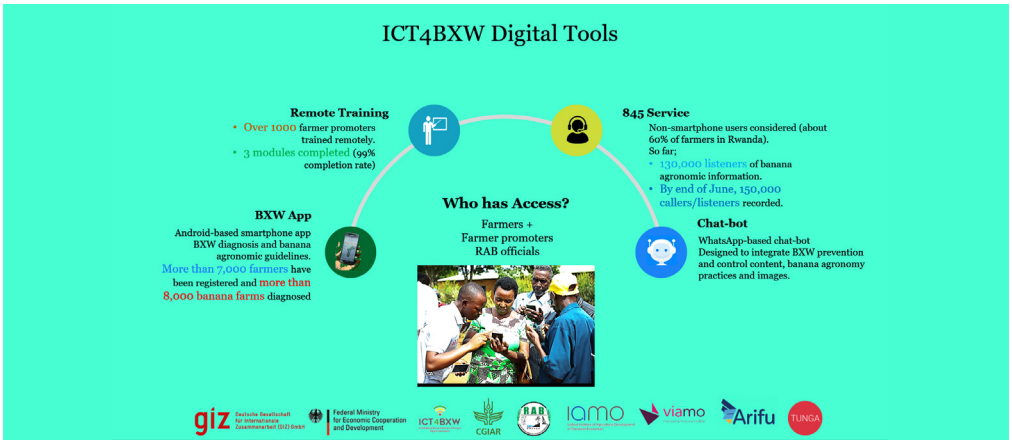
In the past, banana has been a highly sustainable crop in Rwanda, but with the emergence of various diseases and pests in the past 25 years, production has declined by over 40%.

Banana farmers have been facing reduced productivity due to diseases such as the destructive Banana Xanthomonas Wilt (locally known as 'Kirabiranya') and pests; and farmers have limited knowledge and ability to detect and manage these pests and diseases.

Digital agricultural tools are gradually improving the reality of farmers, supporting them in better management of their banana plantation for sustainable production.

Futhermore, Rwanda Agriculture and Animal Resources Development Board (RAB), in partnership with the International Institute of Tropical Agriculture (IITA) and other partners, are collaborating to implement the ICT4BXW project that uses digital technologies to enhance the fight against one of the most serious banana diseases in Rwanda, Banana Xanthomonas Wilt (BXW).

Banana Infected with the BXW disease



Array of digital tools that are being deployed for BXW Surveillance, control and prevention in Rwanda

FOUR DIGITAL TOOLS have been developed, and are playing a crucial role in combatting BXW disease and providing general banana agronomic information to increase production. The developed tools include:

Remote training

The project used Interactive Voice Response (IVR) to remotely train over 1000 Farmer Promoters on best banana agronomic practices, digital extension delivery, and BXW control.

Surveillance dashboard for National Agriculture System

This dashboard is a tool that provides near-real-time access to all the data collected through BXW-App, with summary insights, to inform RAB and Ministry of Agriculture (MINAGRI) on BXW incidence status and dynamics across the country.

BXW App

It is an android-based smartphone application that is available and accessible for download in google play store. The App provides well-illustrated content (Including pictures, texts, audios and videos) that guides users to prevent and control BXW, identify BXW-infected banana plants, and access proven agronomic information for banana farming. So far, Farmer Promoters register up to 7000 farmers by using BXW App, and 8000 banana farms have been diagnosed.

845 service

This is a system that provides banana agronomic advices for farmers (through 8-4-5 service platform (*845# or dial 845_yes). Any farmer, notwithstanding the type of their phones, can dial 845_yes and *845# and follow the steps that provide agronomic information on best banana agronomy.

"These tools are promising as the country promotes the use of ICT for a modernized agriculture. We will work together with Rwanda Agriculture Board to harmonize these digital tools and their integration in the existing agricultural extension delivery system." - Martine Nezerwa, Chief Digital Officer at the Ministry of Agriculture

Farmer Promoters as Scaling Champions and Enablers

The project team is empowering Farmer Promoters as Scaling Champions and Enablers to support banana farmers across their respective villages.

Farmer Promoters are volunteer community leaders who receive technical trainings by RAB and Local Government to serve as farmer-to-farmer extension agents in their own villages. There is one Farmer Promoter in every village in Rwanda, with over 14,000 Farmer Promoters nationwide

Farmer Promoters play an important role in delivering relevant information to banana farmers around the country, and ensures that banana farmers acquire relevant crop management skills, especially for banana disease management and best farming practices to increase productivity.

14,000
FARMER PROMOTERS

THERE IS ONE FARMER PROMOTER IN EVERY VILLAGE IN RWANDA, WITH OVER 14,000 FARMER PROMOTERS NATIONWIDE

"I was happy to receive the training. It increased my knowledge on the best banana agricultural practices, such as mulching, the best way to do the Single Diseased-Stem Removal, and various key information for better management of my banana field."

Musabyimana Augustin, from Remera, Gatsibo District

Digital e-Extension New Way for Training Farmer Promoters

The project team collaborated with Viamo to deliver remote training through Interactive Voice Response (IVR) with a focus on the (BXW) disease and best practices for banana agronomy. The cohort of Scaling Champions (SCs) and Scaling Enablers (SEs)» were invited to the modules, with an initial pre-test administered. Over a period of three months, a total of 1094 SCs and SEs completed the training with major outcomes indicating successful capacity development for digital extension delivery

The training was conducted through their mobile phones, using pre-recorded audio lessons. The goal is to reach banana farmers and Farmer Promoters across the country, covering all the 30 districts, to foster timely surveillance and control of BXW disease in their farm fields (and villages) while providing access to agronomic information for better management of banana farms.

"It was an interesting experience. It was my first time to attend an online training of the kind. The lessons were very interesting, I couldn't miss any lesson, because they contained the information on banana agronomy that I needed to increase banana production and prevent BXW disease in my field."

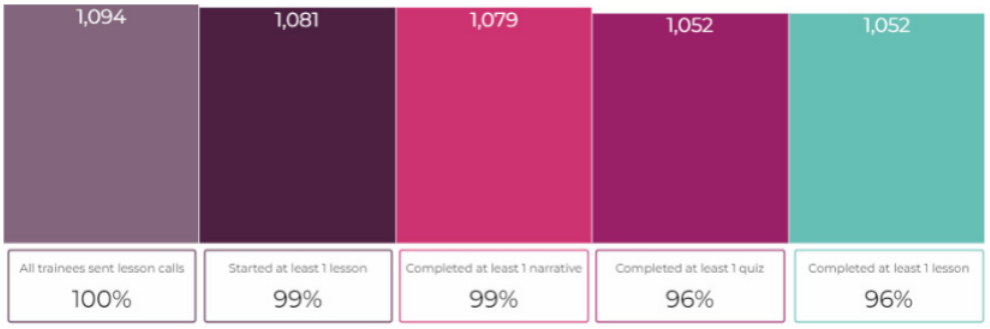
Mukashema Marie Louise, from Cyanzarwe, Rubavu District, attended the remote training

Content was co-created during a workshop in Kigali, Rwanda. Training content consisted of 3 modules, with a total of 16 lessons developed by Viamo in collaboration with RAB staff and IITA staff , and adapting content to be mobile-friendly. Each lesson consisted of an introduction, lesson outcome, narrative, quiz and conclusion.

The lessons were made available free of charge to the all participants via inbound and outbound campaigns. A pre-SMS was sent to participants and a summary post-SMS immediately after listening to the lesson.

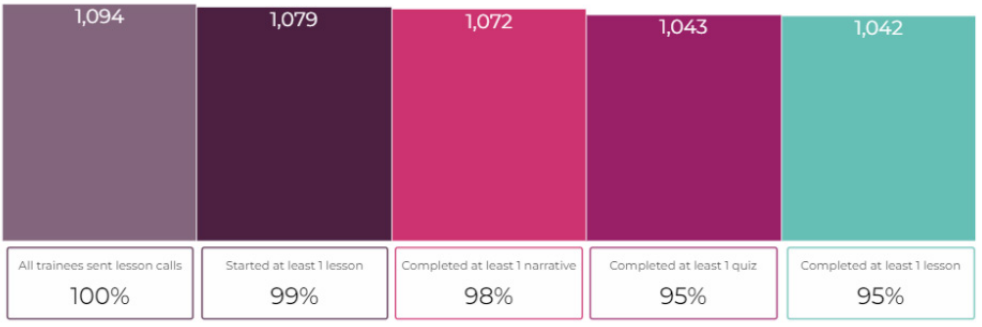
Below graphs demonstrates the completion rates for all the three modules.

Module 1: Digital Extension Delivery Capacity



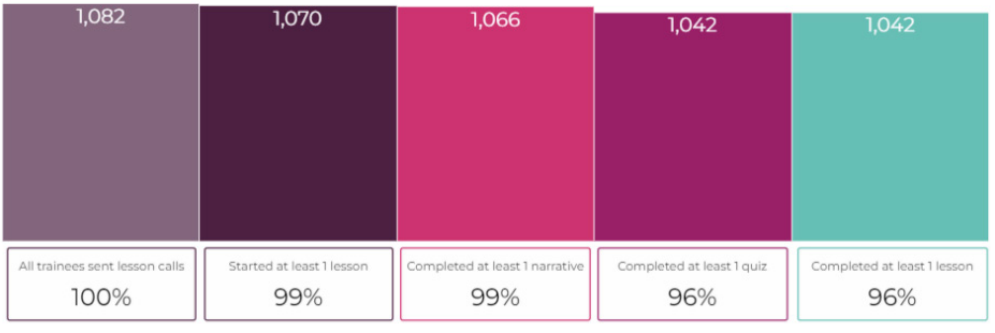
All the 1094 SCs and SEs started Module 1 out of which 1081 started at least one lesson, 1079 completed at least one narrative and 1052 completed at least one lesson.

Module 2: Banana Agronomy



The lesson was sent to all 1094 SCs and SEs, out of which 1079 started at least one lesson, 1072 completed at least one narrative, 1043 complete at least one quiz and 1042 completed at least one lesson.

Module 3: BXW Prevention and Control



1082 started Module 3 out of which 1070 started at least one lesson, 1066 completed at least one narrative, and 1042 complete at least one quiz and one lesson.

The current status of BXW

Summary of diagnosis as of July 2022

Total Diagnosis

6,412

The total number of BXW disease diagnosis made by the Farmer Promoters using the BXW App (both positive and negative diagnosis)

BXW Occurrence

1,187

Total positive BXW disease diagnosis reported by Farmer Promoters using BXW App.

Users Reached

3,355

(total unique users) Unique farmers reached through the BXW App.

Spatial distribution of BXW occurrence across Rwanda

The map shows the BXW occurrence distribution for the selected administrative region over the selected time period.

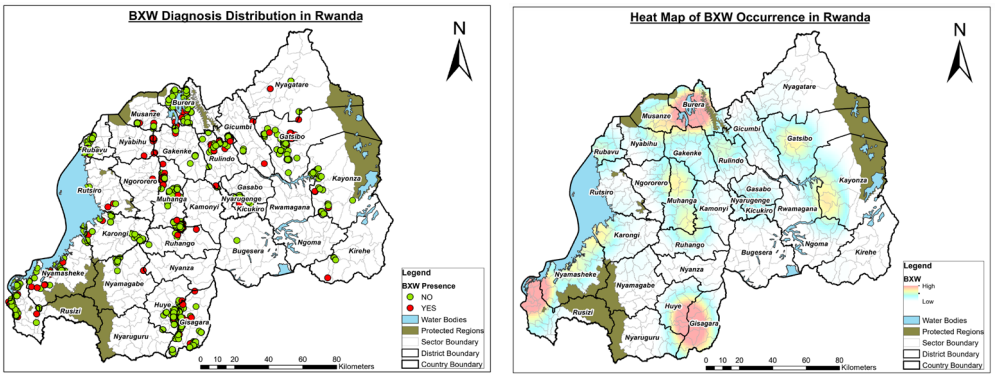


Figure 2: BXW occurrence distribution with a heat map showing the most vulnerable regions. (YES-presence and NO-absence of BXW).

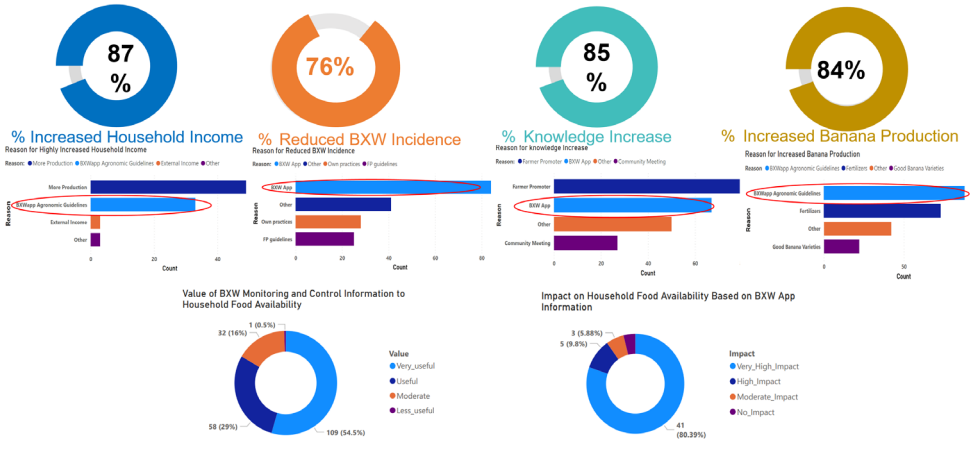
How far have we reached in the past two years through BXW App and 845 service?

BXW APP

The project conducted an impact survey for the past 2 years. The total number of respondents was 200 (150 Farmers and 50 Farmer Promoters).

Results show that 85% of respondents increased knowledge on banana production, BXW control, and agronomic guidelines. Furthermore, Up to 76% confirmed that the BXW App helped to reduce BXW incidence in their fields. An increase in banana production was also reported by 4 out of every 5 farmers who accessed the BXW agronomic guidelines.

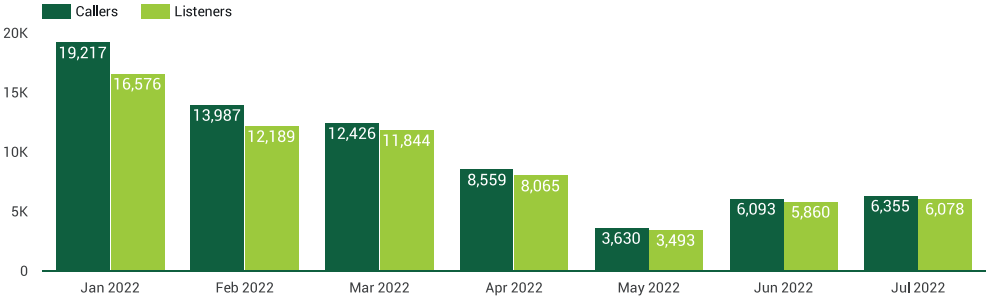
FARMER PERCEPTION ON IMPACT OF BXW APP USE IN THE PAST 2 YEARS



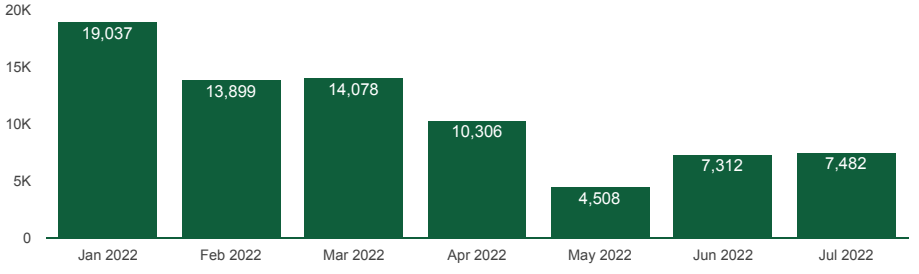
845 service

The 8-4-5 Service is a toll-free, automated hotline that was created in partnership with MTN Rwanda. It delivers information on a wide range of development topics in Kinyarwanda on even the simplest of phones in Rwanda, using interactive voice response (IVR) and USSD. Each month, eight calls are available free of charge on IVR and unlimited free interactions on USSD (*845#). It is an on-demand service, which means that callers can dial 845 at their convenience. Once they call, a series of 'listen and choose' steps identify the information they need - for example: «Welcome to the 8-4-5 Service. For legal aid press 1, for health press 2. For Agriculture press 3.» As of the month of April, more than 50,000 farmers across the country have accessed information through the 845 service as shown the below graphs generated from the system's dashboard.

Callers and listeners



Key Messages (KMs) Listened per Month



Key Messages (KMs) Listened per Month

Month	Times content was reached	Unique Callers	Unique Listeners	Caller to Listener Conversion (%)	Listeners (Female)	Listeners (Male)	KMs Listened	Avg KMs per Listener	Total Minutes Listened to KMs
Jan 2022	21,851	19,217	16,576	86%	5,329	7,283	19,037	1.1	25,366
Feb 2022	15,815	13,987	12,189	87%	3,676	5,179	13,899	1.1	18,453
Mar 2022	14,704	12,426	11,844	95%	2,671	4,698	14,078	1.2	8,935
Apr 2022	10,836	8,559	8,065	94%	2,193	3,501	10,306	1.3	7,736
May 2022	4,663	3,630	3,493	96%	976	1,806	4,508	1.3	3,546
Jun 2022	7,585	6,093	5,860	96%	1,622	3,155	7,312	1.2	6,250
Jul 2022	7,790	6,355	6,078	96%	1,6943	,105	7,482	1.2	6,880

Strengthening the sustainability of digital innovations:
Engage beneficiaries and decision makers

Technical workshop with policy makers for tools' sustainability

Thursday 24 March 2022, Stakeholders from the MINAGRI , Rwanda Information Society Authority (RISA) and RAB held a technical workshop with ICT4BXW project team including Viamo, ARIFU, TUNGA and IITA. The workshop was convened to foster in-depth conversation about the digital and non-digital tools that have been developed under the framework of the ICT4BXW project, and to discuss plans for broader scaling and sustainability, beyond the project implementation timeframe.

Photo: on 24 March 2022: IITA, digital tools developers and Rwanda Agriculture Board held a technical workshop with national partners from the Ministry of Agriculture and Rwanda Information Society Authority to discuss the sustainability of the developed digital tools.

In her welcome remarks, Martine Nezerwa, Chief Digital Officer at MINAGRI, highlighted the essence of the workshop.

"This is an opportunity for all key stakeholders in the project, to meet, discuss, and understand what has been done, the remaining tasks, the technical and financial requirement for the ownership and sustainability of the tools, and finally how the developed tools can be improved to broaden their use to other crops, other diseases…" Martine noticed.

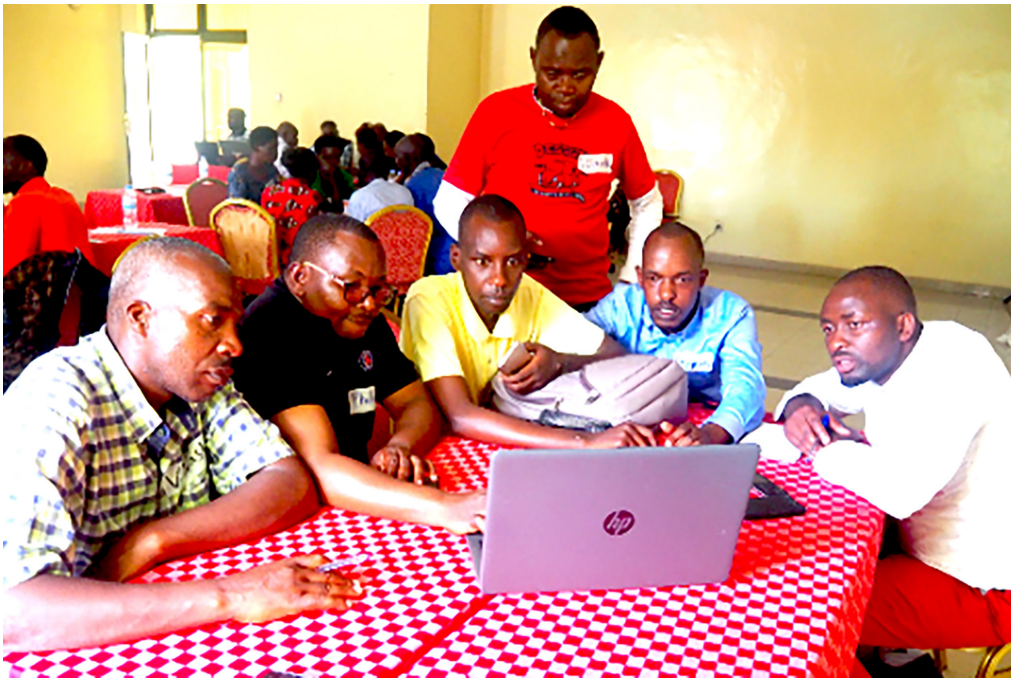
After very active discussions, the team concluded that the discussions will continue internally to see how the digital and non-digital tools developed can be taken further to the end-users, and later assess their impact to farmers.

District and Sector Agronomists trained on digital extension tools for banana agronomy

IITA and RAB trained all District and Sector Agronomists across Rwanda, on the use of digital tools to diagnose and control Banana Xanthomonas Wilt (BXW) disease in farmers' fields.

The main purpose of that training was to support them on the control and surveillance of the BXW disease, and to implement best banana management practices using digital tools mainly the BXWApp (Android application) and different tools (USSD/IVR/SMS/chaot-boot). They will use the acquired knowledge to follow up and provide agronomic advisory to banana farmers in their areas of intervention, in close collaboration with Farmer Promoters and RAB staff.

During the training, all Agronomists had a time to install BXW App as well as using 845 service (both typing and dialing to ensure that the information given and functionalities of those two digital tools were well captured and the expected support will be provided.



Why is it important to use both analogue and digital approaches for scaling innovation?

The ICT4BXW project is scaling various digital innovations for BXW diagnosis and prevention to increase banana production across all districts of Rwanda. Scaling is not a one-size fits all approach. It includes various aspects that help to channel intended message to a wide range of audience depending on the medium that reach them effectively.

The project has been mainly focusing on development, testing and dissemination of digital tools including BXW App, Remote Training, chatbot that are being used by Farmer Promoters to educate farmers in their respective villages, and to train them on how to effectively manage their banana plantation, furthermore fight against the BXW disease in their banana plantation.

On the other hand, 60% of farmers are not capable of accessing the digital information due to various constraints mainly internet and lack of digital tools at their hands such as phones.The project introduced the non-digital materials, which are easily accessed by both Farmer Promoters and Farmers in various districts of Rwanda. Those materials include booklets, brochures, and posters that portray banana agronomic advices and how to prevent BXW in fields.

IITA and RAB developed and disseminated the analogue materials across the country to scaling champions (Farmer Promoters), to help them deliver information on banana agronomy with visible and tangible examples as displayed on posters and booklets. Murekatete Claudine is a Famer Promoter in Muhanga district, Southern Province. She was trained on how to use booklet and poster information in order to diffuse banana agronomic information and BXW prevention and control measures to her fellow Farmer Promoter and farmers in her community.

These materials will help me to prevent BXW and protect my banana farm. Furthermore, these materials will serve as fact check while delivering BXW control message to farmers, and we will place them at public centers, so that farmers can be able to access them and get all the information on banana agronomy and disease prevention, all the time." Murekatete added.

"These materials will help me to prevent BXW and protect my banana farm. Furthermore, these materials will serve as fact check while delivering BXW control message to farmers, and we will place them at public centers, so that farmers can be able to access them and get all the information on banana agronomy and disease prevention, all the time." Murekatete added.

Photo: Farmer Promoters from Muhanga District received posters, booklets and training on banana agronomy

Niyombaza Alfred, Farmer Promoter in Ruhango district, also received the materials. He commends them as an additional input for skill transfer to farmers.

"These materials will help us a lot. They will enable us to have a basis for training fellow farmers, by referring to them to provide factual information on BXW disease prevention and banana agronomy in general" said Niyombaza.

The project has so far donated smartphones to more than 209 Farmer Promoters from 2018 (69 smartphones during phase-I "2018-2020" and 140 smartphones during phase-II (2021-2023); remotely trained 134 Scaling Champions and 935 Scaling Enablers.

To date, more than 7,800 farmers have been registered and assisted in using BXW App, and more than 378,700 farmers accessed information on banana agronomy and BXW management.

The project is working with various partners including RAB, VIAMO, ARIFU and LinkingPin Africa to scale up information on banana agronomy and disease prevention for banana farmers across Rwanda.

Posters have been placed at public spaces across sectors to serve banana farmers in the villages

Farmers will use the materials as guide for best practice for banana agronomy

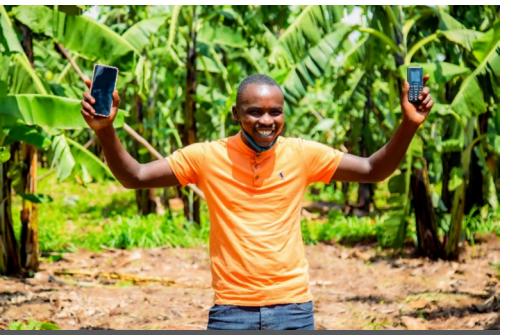
Voices of Rwandan Farmers and Extension Agents

Digital tools to fight BXW disease

Farmers and Farmer Promoters (local extension agents) in Rwanda have expressed very positive sentiments about digital tools that have been deployed to support banana production in the Country.

We visited Farmer Promoters and Farmers from the project's intervention sites, and highlighted their perceptions about the digital tools performance at a farmer level.

User experience: Testimony from Farmer Promoters and farmers



Muvunyi Jean Nepomuscene,
Farmer Promoter from Gitoki Sector, Gatsibo District, and Western Province of Rwanda

Muvunyi Jean Nepomuscene, Farmer Promoter from Gitoki Sector, Gatsibo District, Western Province of Rwanda: "I consider these digital tools as my mobile farming advisory. These are great inputs to effectively deliver agricultural extension services to farmers in my village and its neighboring areas. Thanks to these digital tools, I am currently applying the new and effective practice, the Single Diseased-Stem Removal (SDSR) technique, to fight BXW, hence experiencing a production increase."

Patrice Muhimbabwenge,
a farmer from Kinihira Sector, Rulindo District, Northern Province of Rwanda

Patrice Muhimbabwenge, a farmer from Kinihira Sector, Rulindo District, Northern Province of Rwanda said, "Thanks to agronomic advice from these tools, I have applied the Single Diseased-Stem Removal technique in my field, and it helped to eradicate the Banana Xanthomonas Wilt disease in my farm. I would have lost all my banana plants, but now I can save some of them, therefore increase production, and be able to afford my family's needs including paying health insurance and school fees for my children. I conclude by requesting more trainings for us farmers to deepen our knowledge and adequately navigate through these digital tools

Uwingabire Florence,
a farmer from Gitoki Sector, Gatsibo District, Eastern Province of Rwanda

Uwingabire Florence, a farmer from Gitoki Sector, Gatsibo District, Eastern Province of Rwanda : "Through BXW App. I learned best farming practices from this App such as desuckering, and that the banana mat should only have three plants to give it enough space to grow better and yield more, hence produce healthy bunches. Furthermore, I am now aware that we should disinfect tools used in banana farm (machetes, hoes, knives etc..) in fire to avoid spread diseases. Furthermore, thanks to the App, we are now applying the Single Diseased-Stem

Removal technique for best banana agronomy and increase production.

Moreover, I learned that through 845 service, I am able to access the banana agronomic information. I did not know of that service. I used to dial this line to listen to other programs such as reproductive health, folk drama etc... I will also be looking for banana information."

Mutuyimana Elisabeth,
a farmer from Kinihira Sector, Rulindo District, Northern Province of Rwanda

Mutuyimana Elisabeth, Farmer Promoter from Kinihira Sector, Rulindo district, Northern Province of Rwanda. "The project offered me a smartphone, in which I have installed and navigate BXW App. After the training, I have skills on how to fight the BXW disease in field by using clean/disinfected tools. In addition, I am sharing all the skills gained with my neighboring farmers»

What's Next

The project Team will continue engaging stakeholders, partners, and end-users to broaden access and use of the deployed digital tools. Further, mid-line and end-line survey will be conducted to assess knowledge among farmers and perception of impact over banana production.

Paper/News articles published

- Rwandan Farmers and Extension Agents commend IITA's digital tools for sustainable banana production – IITA Blogs
- COVID-19 and Global Food Security: 2 Years Later (ifpri.org)
- RTB-Book_Chapter_Kreuze_et_al_2022.pdf (dropbox.com)
- Rwanda: Digital Tool to Control A Major Banana Disease Is Here – KT PRESS
- 150 Farmer Promoters trained and empowered with a digital tool for BXW surveillance and control in Rwanda (iita.org)