ICT4BXW

Combatting Banana Disease Through Digital Innovation

MAKING PROGRESS AND ACHIEVING IMPACT AT SCALE
FOR HEALTHY BANANA PRODUCTION

ICT4BXW-III Newsletter: February 2023

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Foreword by Banana Program Lead, RAB

By Dr Svetlana Gaidashova, Head of Banana program at Rwanda Agriculture and Animal Resources Development Board (RAB)

The ICT4BXW project is positively changing the status quo for banana crop and disease management in Rwanda. Banana program at Rwanda Agriculture and Animal Resources Development Board (RAB) has benefited, in so many ways, in this project, as it has introduced a wide range of digital and non-digital innovations that help us in fighting the most destructive banana disease: the Banana Xanthomonas Wilt (BXW) disease.

Farmers, in Rwanda, have been facing the BXW disease challenge. At RAB, we tried to develop various solutions, but it was not enough. Then this project emerged and added other sustainable solutions for the well-being of banana crop.

We have furthermore observed a significant improvement in the disease management in areas where Farmer Promoters are using the BXW App to report on the incidence and status of the BXW disease in banana fields. The App is not only helping farmers to diagnose the disease, but also equips them with other best agronomic practices such as banana management, and other pests and diseases.

The non-digital tools developed such as posters, brochures, have really made impact in providing information to banana farmers. Thanks to this project, we surpassed our targeted print materials for the year 2022. We had initially planned to disseminate 2000 information materials to farmers, and now more than 5000 printed materials were disseminated by this project.

The ICT4BXW project has contributed immensely to our research and extension activities.

To sustain the developed tools, RAB has embarked on the process to accommodate all the tools in the existing extension system for proper adoption at national level, by budgeting for it and including it in our annual plan.

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The Project in a Nutshell

DIGITAL TOOLS DEVELOPED BY ICT4BXW PROJECT
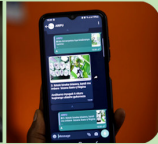FOR SUSTAINABLE BANANA PRODUCTION

BXW APP   845 SERVICES   REMOTE TRAINING   CHATBOT

RAB, in partnership with the International Institute of Tropical Agriculture (IITA), Viamo, IAMO, Linking Pin Africa, and ARIFU, are collaborating to implement the ICT4BXW project that uses digital and non-digital technologies to enhance the fight against one of the most devastating banana diseases in Rwanda: Banana Xanthomonas Wilt (BXW).

The project has developed digital and non-digital tools including the Remote Training, BXW App, Chatbot, and the 845 service monitored under surveillance dashboard for national agriculture system. The digital tools are accessible on both feature phones and smartphones; while non-digital tools such as booklets, posters and brochures have been distributed across the country to provide banana agronomic information and increase production.
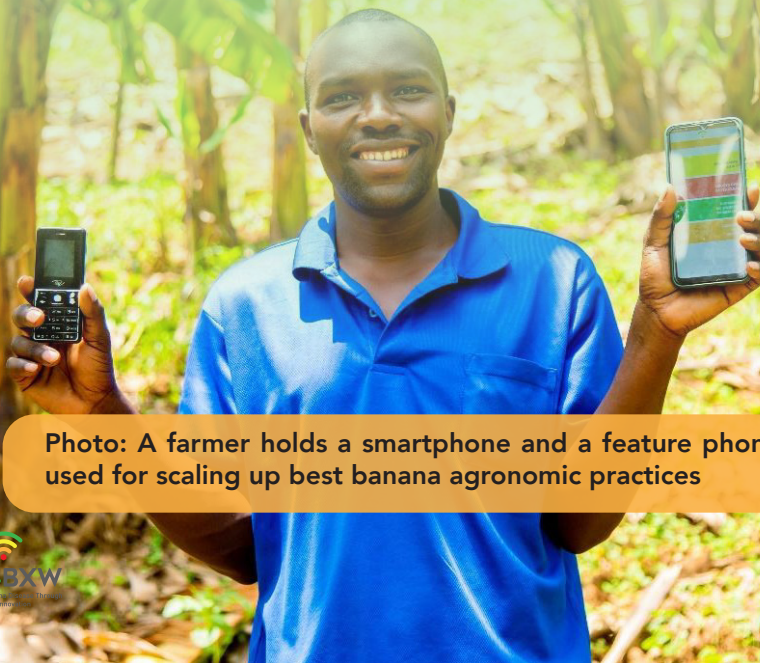
Photo: A farmer holds a smartphone and a feature phone both used for scaling up best banana agronomic practices

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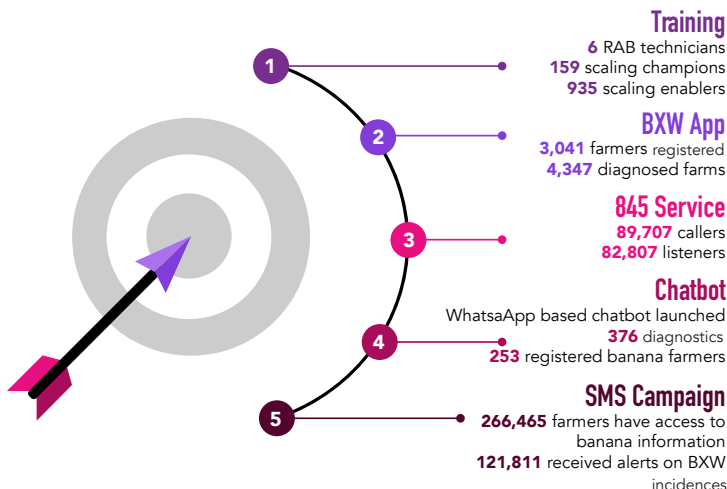# Project Annual Meeting Showcases Progress and Next Direction

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 ensure that banana farmers acquire relevant crop management skills, especially for banana disease management and best farming practices to increase productivity.

Project Achievement (2022)

1 Training
6 RAB technicians
159 scaling champions
935 scaling enablers

2 BXW App
3,041 farmers registered
4,347 diagnosed farms

3 845 Service
89,707 callers
82,807 listeners

4 Chatbot
WhatsaApp based chatbot launched
376 diagnostics
253 registered banana farmers

5 SMS Campaign
266,465 farmers have access to banana information
121,811 received alerts on BXW incidences

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A Tool for Everyone:
WhatApp-based Chatbot

During the fourth quarter of 2022, a WhatApp-based Chatbot Tool was launched for access and use, as an easier and seamless alternative to the Android-based BXW App.

A personalized, interactive WhatsApp chatbot provides Farmer Promoters and Farmers with practical guidance on digitizing BXW disease diagnostic, prevention and management, and equip them with skills for advanced management of their banana plantations.

Content can be accessed by sending the word "Kirabiranya", a Kinyarwanda name for BXW disease, to WhatsApp +250 790 139 375. Content, about the disease management and best practices, immediately starts displaying.

The underlying analytics and dashboard provides access to approve users, monitor data flow and usage of the tool, and evaluate trends of BXW disease incidence.
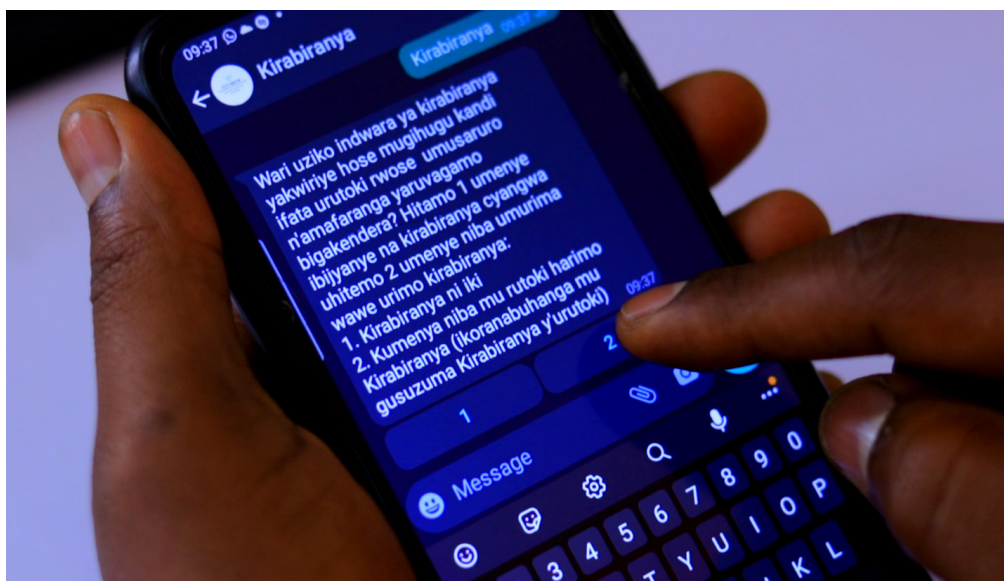
> Are you visiting this farmer for the first time ? Reply with the number showing the right answer
> 1. Yes
> 2. No

The bot stores infomation so registration can be skipped during follow up visits and to compare BXW prevalence over time.

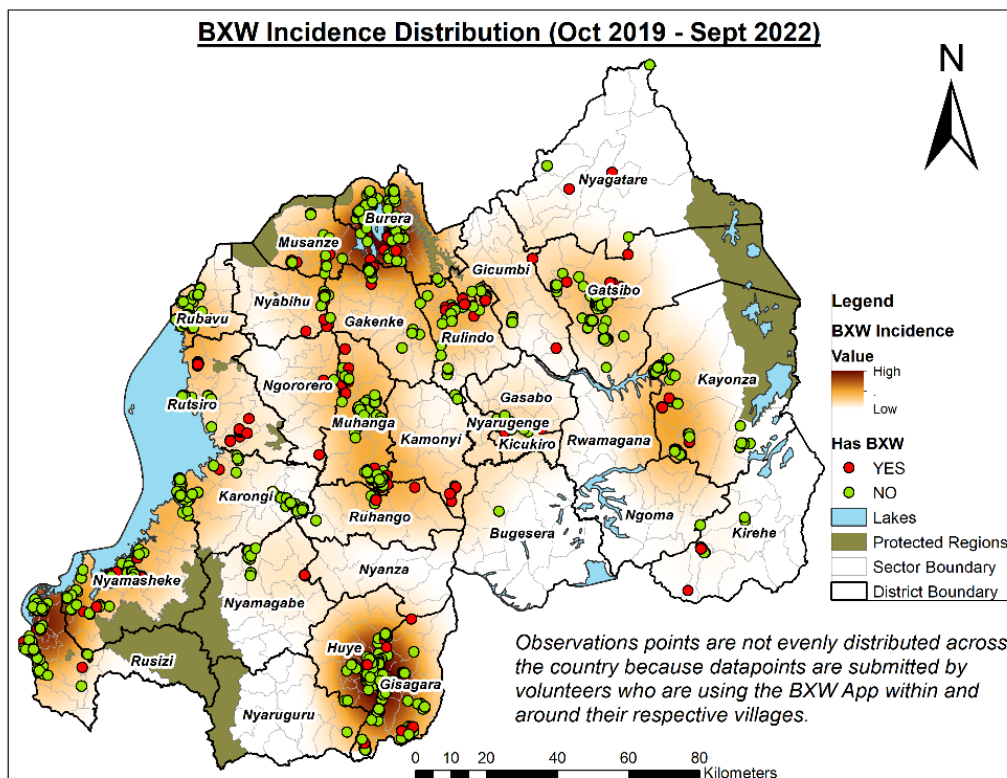> Share your location with Whatsapp. Here's how.

Whatsapp location share provides the precise coordinates of the farm.

> Your banana has BXW
>
> Would you like to get a recommendation on how to control?
> 1. Yes
> 2. No

Diagnosis is paired with learning content on BXW prevention or BXW control.

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Early warning alerts for
proactive BXW Control

BXW Incidence Distribution (Oct 2019 - Sept 2022)

Observations points are not evenly distributed across the country because datapoints are submitted by volunteers who are using the BXW App within and around their respective villages.

The deployment of the BXW App, one of the five digital tools under ICT4BXW, has enabled the delivery of early warning alerts on BXW risk, directly to Farmers' mobile phones. Georeferenced data on the incidence of BXW disease in banana farms are automatically submitted into an analytical system, as farmers and farmer promoters use the tool in their banana farms to diagnose whether the disease infection is present or absent in their farms.

Information/data collected are stored through the dashboard and made available to RAB and MINAGRI for proper decision-making to increase banana production.

Based on quarterly pooling of the data, RAB is duly equipped to assess the severity and occurrence of new BXW disease incidence across various districts of Rwanda. Therefore, RAB has commenced sending of early-warning alert messages to farmers who are located within districts where high incidence rates are reported.

The alerts inform farmers about the severity of BXW disease in their area, provide management and control measures, and best agronomic practices to apply in their banana fields to avoid potential losses, including the adoption of single diseased-stem removal technique (SDSR) which implies to remove only the diseased plant in a whole banana mat, and the remaining plants produce yield therefore increase banana production.

So far, 58,572 banana farmers have received the early warning SMS alerts, and they shared feedback about the usefulness of the alerts for their farm-level decisions through a short impact survey that was conducted by the project Team. As shown in the charts below, at least 9 out of every 10 farmers find the alert useful, for their banana farm management while 87% indicated that they took action after receiving the alerts.

### How useful did you find BXW Alert SMS (N=5651)
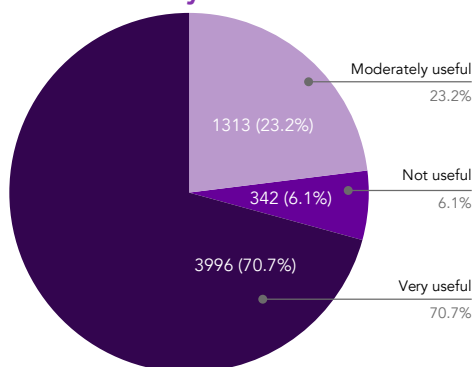
93.9% (5309) of the respondents found the alerts useful, out of which the majority (70.7%) found it very useful

Do you agree that these alerts on BXW disease can support your banana farm management decisions and practices (N=4499)
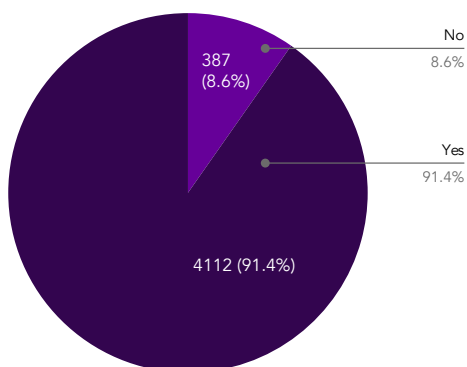
91.4% (4112) of the 4499 respondents agree that the alerts on the BXW can support their banana farm management decisions and practices

Did you take any action after receiving the alert (N=4324)
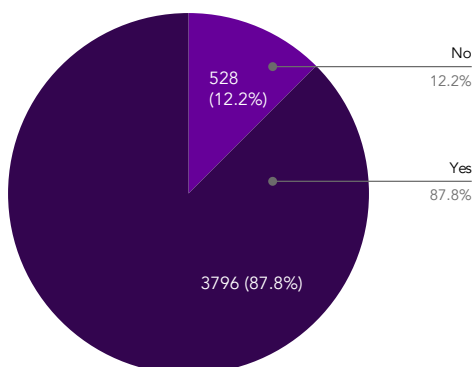
87.8% (3796) of the 4324 respondents said they took action when they received the SMS

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Beyond Digital:
Reaching Banana Farmers with innovative content

Based on the survey that was conducted under ICT4BXW Project, approximately 60% of farmers are unable to access digitally-served information due to various constraints related to low literacy, poor internet connection, electricity, and lack of digital devices such as mobile phones. Therefore, the project introduced non-digital decision-support resources, which can be easily accessed by both Farmer Promoters and Farmers at their convenience. These include infographic booklets, brochures, farmers' calendar and Posters that portray banana agronomic advices, symptoms of BXW, and how to prevent or control BXW in farmers' fields.

So far, 2,500 posters and 6,500 booklets have been printed and distributed nationally, in the local language to meet the need of the target audience who are mostly non-English speakers. A post-distribution survey, six (6) month after dissemination, which documented feedback from 121 Farmers and 118 scaling enablers shows that these booklets are very useful, with 98% of the respondents indicating that they used the materials in their farm fields.

A farmer reading the booklet at home

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Capacity Building:
New Ph.D. shares notes on his journey

Michel Kabirigi completed his PhD research at the Leibniz Institute of Agricultural Development in Transition Economies (IAMO) in Germany, on the diffusion and adoption of crop disease management practices among banana farmers in Rwanda. He conducted his study under the ICT4BXW project. His research concludes that proximity dimensions have a significant role for successful knowledge transmission to control BXW and sustain banana production in Rwanda.

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Notes from Michel:

On 19 December 2022, I successfully defended my Ph.D. thesis, completing the journey that started in April 2018. With this, I received a Doctorate title in Agricultural Sciences (Dr. agr.) awarded from the Faculty of Agricultural and Nutritional Sciences, Geosciences and Computer Science of the Martin-Luther-University Halle-Wittenberg. My Ph.D. research was conducted under the project "Citizen Science and ICT for advancing the prevention and control of Banana Xanthomonas Wilt in East and Central Africa "ICT4BXW". The supervising (host) institution was the Leibniz Institute of Agricultural Development in Transition Economies (IAMO) in Halle (Saale), Germany.

It does feel good to start a journey and arrive at the intended destination. However, the road is not always easy; there are ups and downs, level patches, and death-defying descents along the way. I have enjoyed a nice supervising team composed of my promoter Prof. Dr. Alfons Balmann, and my daily supervisors Dr. Ir. Frans Hermans and Dr. Zhanli Sun.

Furthermore, I enjoyed the teamwork spirit of the project partners where everyone is ready to assist. The main challenge I faced was to handle the conflicting starting time, as set by the project, and the required time to fulfill administrative protocols. Furthermore, at a certain level, I had to decide to use my pocket money to proceed with fieldwork to meet deadlines.

The title of my thesis is "The diffusion and adoption of crop disease management practices among banana farmers in Rwanda: the importance of proximity dimensions". In this research, I acknowledge that although the adoption of agricultural innovations is the foundation of future agricultural development, it has been reported that this is not as effective as it needs to be.

This research intended to contribute to the literature by evaluating alternatives to reach banana farmers and to provide advice that promotes agricultural production in the smallholder farming context of Rwanda. Specifically, the research responds to the following: (i) What are the main variables that distinguish banana growers into different farm types in Rwanda, and how do these influence farmers' decision-making processes in adopting new practices? (ii) What roles do proximity dimensions play in the knowledge diffusion within formal and informal farmer advisory networks?

I applied the exponential random graph model (ERGM) to social network information to unfold underlying forces that drive connections during knowledge transmission regarding the Banana Xanthomonas wilt (BXW) management. Findings show that proximity dimensions and heterogeneity of banana farmers are important determining factors to reach them for successful advisory services. These findings are relevant to the ICT4BXW project for, particularly, the project aims to develop a new communication model between farmers, researchers, and decision-makers.

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