ICT4BXW

Citizen science and ICT for advancing the prevention and control of Banana Xanthomonas Wilt

UPCOMING EVENTS

SEPTEMBER 2020
Documentary on Single Disease Stem Removal (SDSR) Trials

OCTOBER 2020
End line survey on Banana Farmers and Farmer Promoters

NOVEMBER 2020
Final project meeting – Phase I

NOVEMBER 2020
Planning Meeting for Phase II

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NEWSLETTER #5

ICT4BXW

LED BY

IITA Transforming African Agriculture

Bioversity International

iamo Leibniz-Institut für Agrarentwicklung in Transformationsökonomien

Rwanda RAB Agriculture Board

Banana farmers in Rwanda exchanging information about the value of phone-based extension delivery

Are [Rwandan Banana] Farmers ready to adopt digital technologies for BXW Control?

Ready or Not – Prelude to Scaling

The participatory co-development of digital surveillance tool for banana xanthomas wilt (BXW) in Rwanda was implemented based on the notion that digital technologies (especially mobile phones) are becoming more accessible in Sub-Saharan Africa, and with a consideration that the agricultural sector is increasingly embracing the potential of ICT/digital tools to improve efficiency of extension delivery. Typically, interventions that are focused on digital tool development and adoption among farmers often promise unprecedented outcomes and impact. Yet, knowledge about farmers' readiness to adopt digital innovations is mostly grey, at best, and unavailable under most circumstances. As ICT4BXW project considers scaling the co-developed tools/products, the team is keen to hone the understanding of user readiness as a critical ingredient for sustained adoption and behavioral change among the next- and end-users.

ICT4BXW Baseline Data – A case for quantifying readiness

Under the ICT4BXW project, an initial baseline survey was conducted to understand the nuances of these behavioral change factors and objectively assess the potential for citizen-driven control of Banana Xanthomonas Wilt (BXW) disease through ICT-based surveillance and management advisory. The survey was conducted among banana farming households (n=690) in 8 districts (Kayonza, Gatsibo, Rulindo, Burera, Rubavu, Karongi, Muhanga, Gisagara), across four provinces (Eastern, Northern, Western, Southern) in Rwanda (Figure 1), with coverage of all agro-ecological zones where banana is produced. A segment of the survey instrument included a broad range of topics related to household characteristics, agricultural extension and communication, and use of ICT-devices, including mobile-based technology and services. Since it was envisioned that the surveillance and advisory tool will be deployed on mobile phone, respondent farmers were asked several questions related to their possession of phones, access to phones, connectivity to mobile network, perception, willingness to pay etc. Under the ICT-focused section of the baseline survey, 83 unique variables were defined by the questions that were presented to the farmers, with the responses quantitatively scored based on Likert scale and binary-code. By assigning scores to each variable (per respondent), the dataset provides a unique opportunity to conduct further in-depth and quantitative analysis about the readiness of farmers, as end-users of the envisioned technology (i.e. mobile-based digital tool).

A framework for assessing readiness

ICT4BXW Researchers are developing a workflow to assess Technology User Readiness (TUR) based on a conceptual framework for behavioral change which is focused on the 3 core components, namely – the capacity, opportunity, and motivation. These 3 components are further disaggregated into elements (Figure 2) and mapped to the various questions that had been asked during the farmers' baseline survey. The workflow does not prioritize each of the components, the associated elements, or the relevant factors that may control the overall behavior of the target population/end-users (i.e. banana farmer). In essence, TUR is a derived composite index derived from various extrinsic and intrinsic factors that can influence the sustainability of the deployed tool because it indicates the potential of the target end-users to adopt.

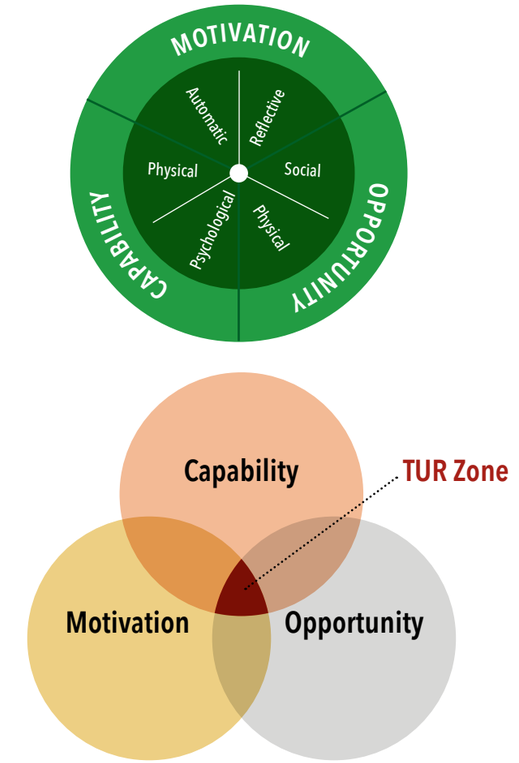
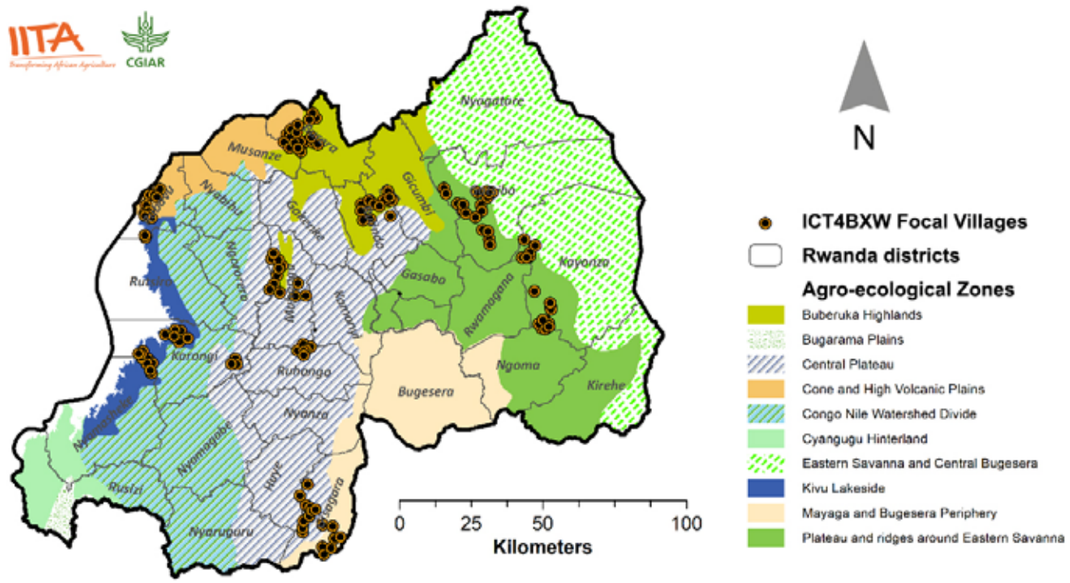


Figure 2: Illustration of the Technology User Readiness (TUR) Zone (lower image), based on the 'COM-B' system defined by Michie et al, 2011 (upper image).

Figure 1: Map of Rwanda showing the distribution of Focal Villages for the co-development and co-validation of digital tools to combat Banana Xanthomonas Wilt (BXW) disease.



Beyond the Phones - [Banana] farmers' readiness in Rwanda

The baseline survey indicates that 3 out of every 4 respondent banana farmers possess a mobile phone, but the sheer penetration of [basic] mobile phones should not be misconstrued as an indication of readiness for deployment and adoption of mobile-based ICT tools among farmers. Most respondent farmers scored below average TUR index (Figure 3; Average TUR = 44.7%). The disaggregation of TUR components relative to gender, education status, and location shows that the farmers have high 'automatic motivation' and 'social opportunity', yet they are generally limited by 'psychological capability', physical capability' and 'physical opportunity' (Figure 4 a-c). It was revealing, but expected, that the average readiness decreased as respondent age increased. The average TUR of respondents between 20-30 years age (TUR Index = 48%) was higher than that of respondents who are older than 70 years old (TUR Index = 38%). Contrary to the expectation of gender-driven disparity in TUR index, both male and female farmers were equally comparable in their technology readiness (TUR Index =44.9 vs. 44.4%, respectively), and both genders were similarly limited by the same TUR components (Figure 4a).

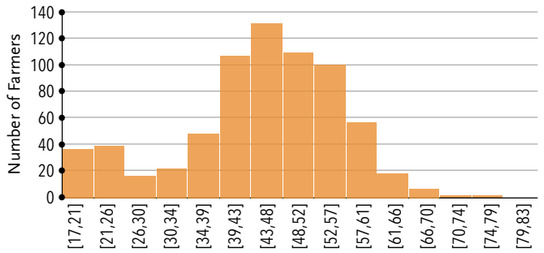


Figure 3: Technology user readiness (TUR) index among surveyed banana farmers in Rwanda.

Implication for scaling BXW Control Tool/ Products

The TUR index can guide quick evaluation of the major opportunities and challenges for scaling of co-developed tools and products by reflecting multi-dimensional realities of farmers which may impact their adoption of the tool and overall impact. Generally, TUR index <25% can be interpreted as poor or no readiness, 20-50% can be considered as promising readiness (with opportunity to improve if one or more components improve), 50-75% can be interpreted as high-readiness, while 75-100% may be rarely attainable (due to interaction of components). Since most of the surveyed farmers were almost average in their technology use readiness (modal TUR index = 40-58%), aspirations for BXW tool adoption (and scaling) should be matched with considerations of infrastructure access and skill development needs. Emerging findings from this TUR assessment may have broader implication(s) for the adoption of mobile-based innovations/services that are emerging as agricultural decision-support tools. Further application of this approach should be guided by the need to evaluate relevant factors that will sufficiently account for each TUR [sub]component.

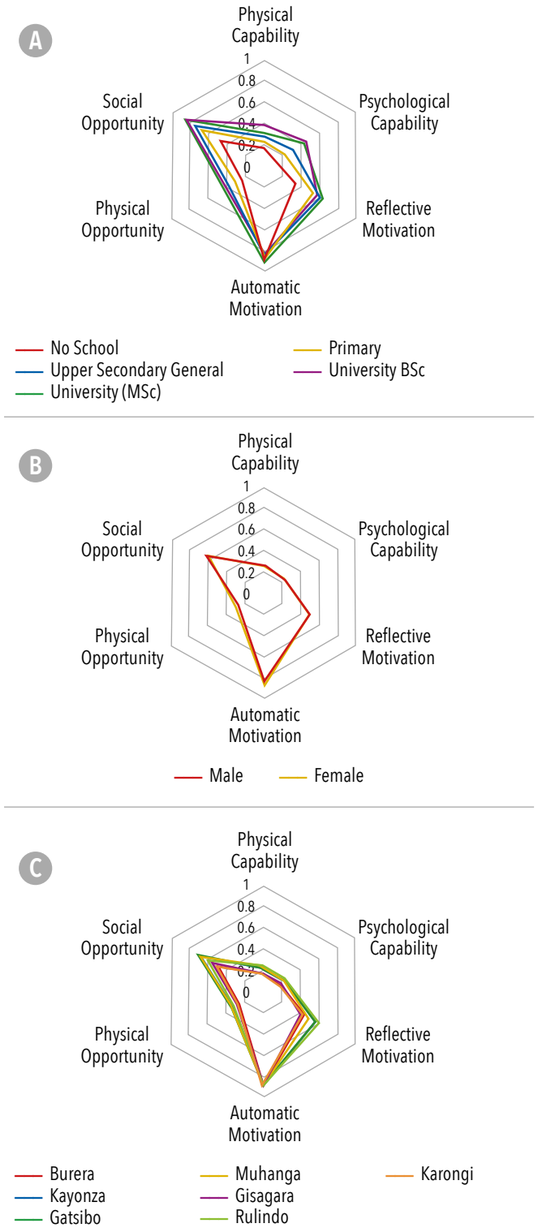


Figure 4: Disaggregated Technology User Readiness (TUR) Index Components, relative to gender (a), education (b), and location (c) of respondent banana farmers in Rwanda.

Supporting Banana Production in Rwanda with Free Information on Agronomic Best Practices

Leveraging the 8-4-5 Service for partnership

In the third quarter of 2019, Viamo partnered with IITA on the ICT4BXW project to develop banana information that can be accessed by farmers, and the general public, through the 8-4-5 Service. Viamo's flagship service, known globally as the 3-2-1 Service, was developed to increase awareness on critical issues and drive behavior change. By providing expert-validated, relevant, and engaging messages to users at a national scale through mobile phones, the 3-2-1 Service increases access to and understanding of necessary information. This additional knowledge leads to actions that improve development outcomes. The 3-2-1 Service is hosted by a local Mobile Network Operator (MNO), whose customers are provided with access to pre-recorded audio messages in local languages using Interactive Voice Response (IVR) technology. The Service represents a shift in the development paradigm as project beneficiaries no longer have to wait for the information that they need. Instead, they can proactively access information through any type of mobile phone.

In Rwanda, users can dial the shortcode '845' to access information on various sectors and topics, including agriculture, family planning, healthcare, legal aid, GBV, WASH, financial literacy, weather forecasts, daily news, and more. Since launch in Rwanda, Viamo has recorded over 2.1 million unique callers on the 8-4-5 Service, which represent 45% of the MNO's subscriber base and 17% of the national population. In 2019, the 8-4-5 Service was accessed by more than 850,000 unique listeners, and in the first five months of this year, 550,000 unique listeners have already accessed the Service.

User-centered content

IITA believes that farmers' access to expert-validated messages on banana farming is important for Rwanda's food security. IITA led the content creation and scripting of ten messages about banana agronomy, outlining the best practices for banana planting, fertilization, and harvesting in order to educate farmers and drive adoption of these practices. The messages were pre-tested in focus group discussions with farmers in the Rubavu and Ngororero Districts, in the Western part of Rwanda, to ensure that they were understandable and clear to the target audience. The field tests focused on the style of the messages, the translation, the relevance, and the actionability of the content. Feedback from the farmers was incorporated before the messages were finalized.

A banana farmer in East Africa listening to banana content on the 3-2-1 Service.

The impact of the banana messages

The ICT4BXW banana content was launched on the 8-4-5 Service in June 2019 and there have been a total of 79,254 calls to access the content, with 54,286 unique listeners and 75,960 key messages listened to. Listeners of this content were more likely to be young men, based on the demographics of the profiled callers. Out of the total registered unique listeners, 63% were male and 37% were female, compared to 56% and 44% respectively for the Service overall, and 70% of the registered unique listeners were between the ages of 18 to 35. The banana content was mostly accessed in August and November, corresponding to the main harvesting season during the dry season as well as the short rainy season when the remaining bananas are harvested.

Viamo conducted calls with several farmers to hear their feedback about the content. One farmer remarked on how he put the information to use saying, *'I learnt more on the importance of desucking and deleafing. Mainly desucking – knowing what to remove and what to keep and it has helped a lot. I am now doing the desucking differently from how I was doing it before.'* He also has recommended the content on the 8-4-5 Service to other banana farmers that are part of the same cooperative as him, as well as members of his Savings Group, ensuring the learnings are shared. The majority of the farmers surveyed by Viamo said that listening to the information has led to them using different techniques, and that they had recommended the content to their friends, family, and other farmers.

How do we build on this success?

Viamo considers this partnership on the ICT4BXW project very valuable because it demonstrates the opportunity to rapidly scale information on agronomic technologies and tools for actionable support at the farm level.
To further support farmers in Rwanda, both IITA and Viamo will continue to improve the existing understanding of farmers' needs, as well as the user experience of the 8-4-5 Service for this project. At the same time, there is potential to capitalize on a range of other mobile technology solutions that could enhance the farmers' knowledge and capabilities. Drawing upon the experience from ICT4BXW and Viamo's global experience of supporting smallholder farmers, IITA and Viamo are discussing how additional mobile solutions can be introduced for farmers in Rwanda.

Together we've identified five innovations that could lead to even greater impact:

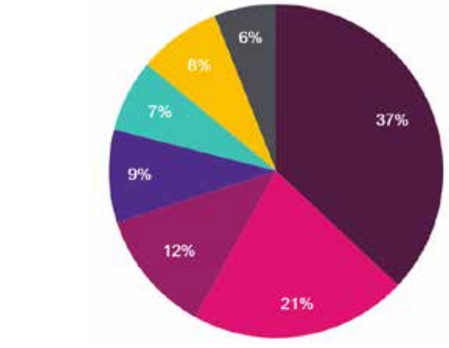
1. **Farmer Crop Calendars**
   This solution would provide timely and relevant weather information, climate forecasts, and growing predictions to farmers based on the crops being cultivated and the time of year. This information could be made available both on the 8-4-5 Service and through pre-recorded audio calls sent directly to the farmers.
2. **Remote Training of Field Extension Officers**
   Remote training could overcome constraints to traditional trainings for field extension officers by providing highly localized, on-demand information to farming communities. It would enable field extension officers and/or farmers to proactively retrieve information about planting, harvesting, seed selection, pest prevention, and food security advice, from any mobile phone, in any language.
3. **Market Linkages**
   Mobile market linkages would improve agricultural supply chains and facilitate direct links between farmers, suppliers, and buyers. This solution would empower farmers to secure a fair price for their crops by receiving up-to-date market prices and would utilise IVR technology rather than web-based apps, given that few farmers have smartphones and internet access.

Interactive Audio Games
This solution would provide gamified content, allowing the farmers to learn by making decisions in a 'listen-then-choose' interactive audio game focused on real-life scenarios. These audio games are already hosted on Viamo's 3-2-1 Service in several other countries, and are effective at increasing knowledge and impact.

4. **Pest and Disease Surveillance Using Farmers**
   This solution would improve the surveillance and mapping of pest and disease outbreaks by enabling farmers to identify, record, and report them via mobile. If farmers report outbreaks, other farmers in the area would be notified so they could take quick action.

As we collaboratively explore pathways to add value to Rwanda's agricultural systems, the banana information on the 8-4-5 Service will help farmers reduce their production risks, increase their profitability, and enhance outcomes for their livelihoods.

Popularity of Banana Content Topic Menus



Digital Tool Co-validation and COVID-19: *Pivoting for Delivery*

Similar to other countries, Rwanda is one of the African countries where COVID-19 disrupted activities and everyday life for all citizens, including farmers. Yet, the agriculture sector is considered essential, so concessions were made to ensure continued food production activities and supply within the Country.

The onset of COVID-19 wave coincides with the period of tool co-validation in ICT4BXW project, a stage where the project team is providing support to farmer promoters (FPs) who are using BXW App as a surveillance and control tool against Banana Xanthomonas Wilt (BXW). Institutionally, both International Institute of Tropical Agriculture (IITA) and Rwanda Agriculture and Animal Resources Development Board (RAB) maintained closed offices, so the staff/researchers had to work from home. Also, travel restrictions were imposed nationally. Therefore, support to FPs was mainly offered through phone calls, SMS, or by using social media messaging platform (e.g. WhatsApp). This inevitable modality of remote working changed the dynamics of interaction with the next- and end-users of the developed tool and has generated interesting perspectives that may guide scaling efforts among FPs and the farmers that they serve.

ICT4BXW project officer monitor FPs' data upload on the surveillance dashboard at home

Socially distant – Finding new way(s) to connect

As it became more apparent that the restrictions may last longer than anticipated, with no end in sight, an interactive social media group was created on Whatsapp to foster a sense of community and ease of information exchange. The platform turned out to become a means to improve FP's smartphone usage competency, which is a critical requirement for optimal user experience with BXW App. Currently, the group has 59 participants, including project leader, project officer, RAB Scientist/Head of banana program, 2 RAB technicians, 27 sector agronomists (SAs) and 27 FPs. Beyond exchange of relevant information on field-level experience with farmers, the Whatsapp group enabled [near-] real-time remote troubleshooting and resolving of technical difficulty faced by FPs while using BXW App. It also helped to keep SAs engaged with updates on transfer of internet voucher to their mobile phones so they can support FPs to ensure prompt data upload. Similarly, data is periodically shared within the group to inform SAs and FPs of status (and to validate the data tally) because they do not have access to server. Finally, the group became very useful to share updates related to government regulation against COVID-19 and to promote COVID-related health tips and how to stay safe while using BXW App. For example, FPs in Rubavu district were advised to pause field activities or interaction with farmers because COVID-19 incidence was reportedly high in the district. Considering this positive experience, more FPs are expected to learn how to use WhatsApp to stay engaged and connected to information or support as they carry out activities within their communities to control and monitor BXW with the digital tool.

Impact on User engagement and Data flow

Initially, after restrictive measures were rolled out to curb further spread of COVID-19, there was a substantial decline in data submission/flow, from the app, into the surveillance platform. The number of reported data reduced from March to April by ~70%, and the decline

was synchronous with reduction in the percentage of actively engaged FPs during the period. Although the wave of restrictions rippled across the country and crippled all planned follow-up activities with FPs, efforts were made to remedy the situation by pivoting into virtual-mode support for FPs. The move was a tough bet because most of the FPs (and farmers) are still evolving in their competence with digital communications and usual challenges require hands-on support. Surprisingly, the switch to virtual support encouraged FPs to resume field-level surveillance with BXW App for controlling and monitoring BXW in their villages, with adherence to extant government advisory and regulations on COVID. As shown by the graph (below), data flow increased from May to June, and it is likely that the restoration of movement may have encouraged FPs to visit farmers as well.

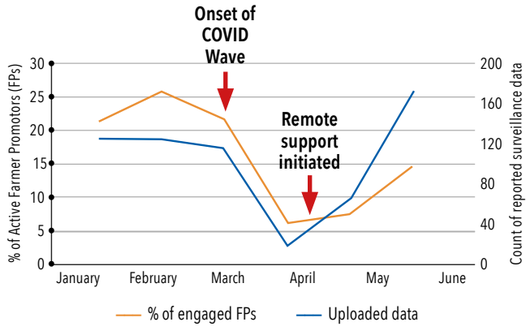


Figure 5: Significant effect of COVID-19 on farmer promoters' engagement and data reporting (on BXW diagnosis in banana farms).

Some Farmers' reflection on COVID

#1 **Habyarimana Dominique** is farmer promotor from Buhembe village, Mariba Cell, Gitovu sector, Burera district, in the Northern Province of Rwanda. He is 71 years old and he is struggling with the reality of COVID because most of the farmers from Buhembe village depend on banana beer making for income, as 80% of the land is cultivated with beer banana plantation. Under lockdown, customers who buy banana beer reduced drastically because all bars are closed, and it has become difficult for Dominique to meet basic daily need for food. As a FP who is expected to actively engage other farmers, Dominique noted that *'this time [has] affected himself too and he must find other ways to feed his family, so he is unable to commit time towards facilitating farmers for BXW control'*.

Dominique diagnosing BXW using BXW App.

#2 **Hakizimana Etienne** is a farmer promoter from Kubutare village, Kigarama Cell, Gishyita sector, Karongi district, Western Province of Rwanda. He has registered all banana farmers in Kubutare village. He plans to continue visiting farmers' field and collecting data on BXW by following the diagnostic procedure in the BXW App. According to Etienne, he will conduct a repeat visit to farmers' fields to assess if BXW is decreasing, increasing or no longer a threat. Karongi district has few COVID cases, so he has been able to continue interaction with Farmers.

Hakizimana diagnosing BXW using BXW APP while applying social distancing under this lockdown.

Kambanda and his wife are good modal farmers of Kamajigija village, they have good banana plantation.

#3 **Kambanda Jean Bosco** is a farmer promoter from Kamajigija village, Rukara Cell, Rukara sector, Kayonza district, Eastern Province of Rwanda. He explained that there is no BXW found in Kamajigija village because farmers have applied all advised measures for control and prevention. Ideally, BXW incidence rate is often reduced in Season C (July-September). However, if farmers continue to practice the recommended control measures, they can sustain the zero-incidence status for BXW and protect their source of livelihood. Kambanda explained that *'the use of BXW App increases his confidence as a FP because it provides clear-cut banana management and BXW control guidelines that he can easily communicate to farmers'*. He further emphasized that BXW App has become 'an electronic booklet guide' for FPs, and cited a success story about a farmer from his village who attained high banana productivity by following guidelines provided through BXW App.

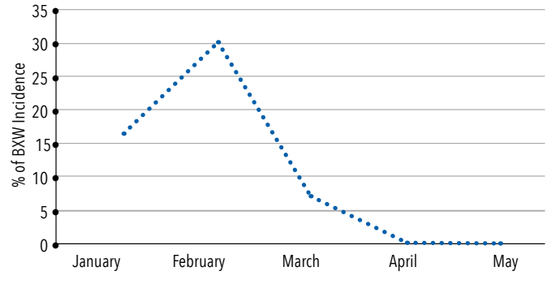


Figure 6: Chart showing low/no reported incidence of BXW in Kamajigija village after consistent adherence to BXW control and prevention measures.

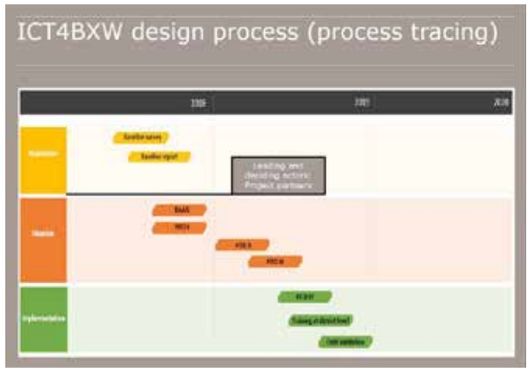
ICT4BXW organized special session during global IAMO Forum 2020

The ICT4BXW project organized a special session during a 3-day virtual global forum which was organized by the Leibniz Institute for Agricultural Development in Transition Economies (IAMO). The IAMO Forum is the annual conference organized by IAMO to set up a dialogue among researchers and other the stakeholders of IAMO from (agro)business, politics and society, with a special focus on transition economies of Central and Eastern Europe, the Former Soviet Union, China and Vietnam.

ICT4BXW project goals and scientific outputs align strongly with the year 2020 theme of the forum – 'Digital transformation towards sustainable food value chains in Eurasia'. The sessions were migrated to virtual mode because of the COVID-19 crisis, and the forum organizers noted that the global audience learn and gain salient insights from ICT4BXW project, as implemented in Rwanda.

Scope of Presentations

The special session was hosted by IAMO Scientist, Frans Hermans, who is also the IAMO-designated collaborator on ICT4BXW project. The session features four (4) presentations from ICT4BXW project team members and researchers, including project lead, intern, and doctoral researchers. In the first, presentation, Julius Adewopo presented the digital-tool development process which is based on human-centered design (HCD) principles and highlighted how mixed-method approach that was adopted in the project was translated to 'technology-user readiness' assessment for the co-developed tool. The newly developed quantitative assessment approach provides an objective basis to understand the contextual realities of farmers, as end-users of digital tools, and suggests that the aspirations for digital tool scaling must be matched with considerations of infrastructure and skill development needs. The second presentation from Mariette McCampbell and Frenske Blom (PhD and MSc researchers, respectively, from Wageningen University) showcases detailed evidence-driven perspectives on how digital interventions in agricultural systems can transform rural communication. Specifically, they identified key levers for agile delivery of digital tools and suggested that the process of developing a (digital) technology is often skewed because hierarchy of roles and responsibilities has influence on the design.



In the third presentation, Michel Kabirigi (PhD Researcher at IAMO) highlighted critical need to map typologies of banana farmers a s an entry point for tool targeting and sustainable adoption. Michel showed that the early warning system which has been developed for BXW surveillance can be linked to the understanding of farm typologies to optimize resource allocation for extension support, while providing incentives for farmer promoters for efficient data flow and continuous monitoring and learning. In the final presentation, Regina Kilwenge (ICT4BXW Intern) shared results on rapid classification of banana farmlands by using unmanned aerial vehicles (UAV/drone), in combination with machine learning (ML) algorithms. By developing and implementing a rapid digital mapping workflow, a village-level mapping of banana lands was achieved with a high accuracy (>95%) across all ML classifiers.

Relevance beyond the focal geography

Beyond focus on Rwanda, these presentations were contextually relevant to economies in transition because they provide data-driven insights about the opportunities, challenges, and practical consideration for advancing digital innovation for agricultural development under conditions where users have limited access to infrastructure and technical competency for adoption. For instance, by quantifying user-readiness based on array of relevant factors, the specific limiting conditions for target users can be identified and progressively evaluated to inform decision on specific actions that can optimize user-experience and enhance adoption at scale. Also, by understudying the pros and cons of power interplay during user-centered design process, new initiatives can address some of the nuanced dimensions by adapting structure and strategy for balanced co-development and equitable participatory design process. Finally, similar to other emerging innovations, one size may not fit all, and analytical approached for differentiating unique niches of farmers within cropping systems (rice, maize, soybeans etc) may be instructive to ensure that recommendations for threat mitigation at farm-level (e.g. disease and pests) is at par with farmers' objectives and aspiration, to maximize impact.

Rapid Assessment of Banana Land Area with Drone Imagery

Insights for Targeting BXW Control

Timely and reliable crop maps are vital for monitoring agricultural production and assessment/mitigation of risks/threats associated with pests, diseases, and extreme weather events. In Rwanda, national annual assessment of cropland is mainly based on ground surveys and reporting, often expensive, and cover a sample of the crop farms, including banana farms. However, such cost-intensive assessment does not provide scalable or timely estimate of cropland area. Remotely-sensed data on vegetation, such as those derived from unmanned aerial vehicle (UAV) and satellite-borne sensors, can support rapid crop mapping at varying spatial scales and provide spatially-rich information on clusters of banana farms to support analytical assessment of vulnerability to BXW infection.

Linking UAV imageries and groundtruth data for BXW Control

In recognition of the need to assess/delineate banana land-area at the village-level, a critical step towards prioritizing BXW-related intervention, we acquired high-resolution imageries (0.25m2/px) with UAV-mounted multispectral sensors by conducting several UAV flight missions across four (4) villages within ICT4BXW focal districts in Rwanda, namely, Murambo, Karambo, Rubira and Rusera. Within few weeks of imagery acquisition, 605 georeferenced groundtruth points were also collected with GPS-devices and open data kit (ODK) survey forms. The groundtruth points were enriched with additional training/validation points (>1200) that were manually digitized from the UAV images relative to different landcover classes of interest. The acquired UAV imageries and groundtruth data were used to train machine learning algorithms to achieve a classification of landcover in five (5) categories, namely, banana land, bare land, built up area, water, and other vegetation. The basic logic of the analytical workflow (below) is that it is set-up as multi-classifier system that mines pixel-level spectral information based on ground truth data (so called 'Supervised classification'), to generate output of spatially-explicit map of banana-cultivated lands and other land-cover types at the village-level.

Initial insights and Outlook

Smallholder banana farms are characterized by short-distance transition in the vegetation/crop-type, yet the complexity can be mapped with high resolution imagery if the right model and parameters are applied. The classification process to delineate banana land area, at village level, with UAV imageries produced promising results, with varying accuracy, depending on the ML classifier algorithm applied. The highest accuracy (95-99% in validation) was achieved with 'Random forests' classifier which is based on a model that operates by constructing several 'decision trees' around each class of land cover and minimizes bias related overfitting of the data especially considering nuances of vegetation characteristics. On the other hand, the lowest accuracy (63-75%) was observed with the use of support vector machine which is a model that constructs hyperplanes in multi-dimensional space to classify the target data but can perform poorly when target classes in the data can overlap ('noisiness'), such as disparate shades of green that is characteristic of banana and 'other vegetations' in Rwanda. The estimated area of banana land in Rusera, Rubira, Karambo, and Murambo villages are 133, 123, 51, and 96 hectares respectively.

The output of the landcover classification (including workflow, maps, and metrics) will be useful to guide implementation of national cropland classification using multispectral satellite imageries. In the interim, this initial delineation and estimate of banana land area can set a baseline for progressive monitoring of changes in banana production in the focal villages, and support efforts to control BXW by targeting clusters of farms where connectivity/proximity may increase potential for transmission of the disease either by vectors or interaction between farmers. Generally, by modeling BXW risk areas and overlaying on banana cropland maps, improved targeting of mitigation efforts can be achieved and better planning of resources required for vulnerable bananalands can be achieved.

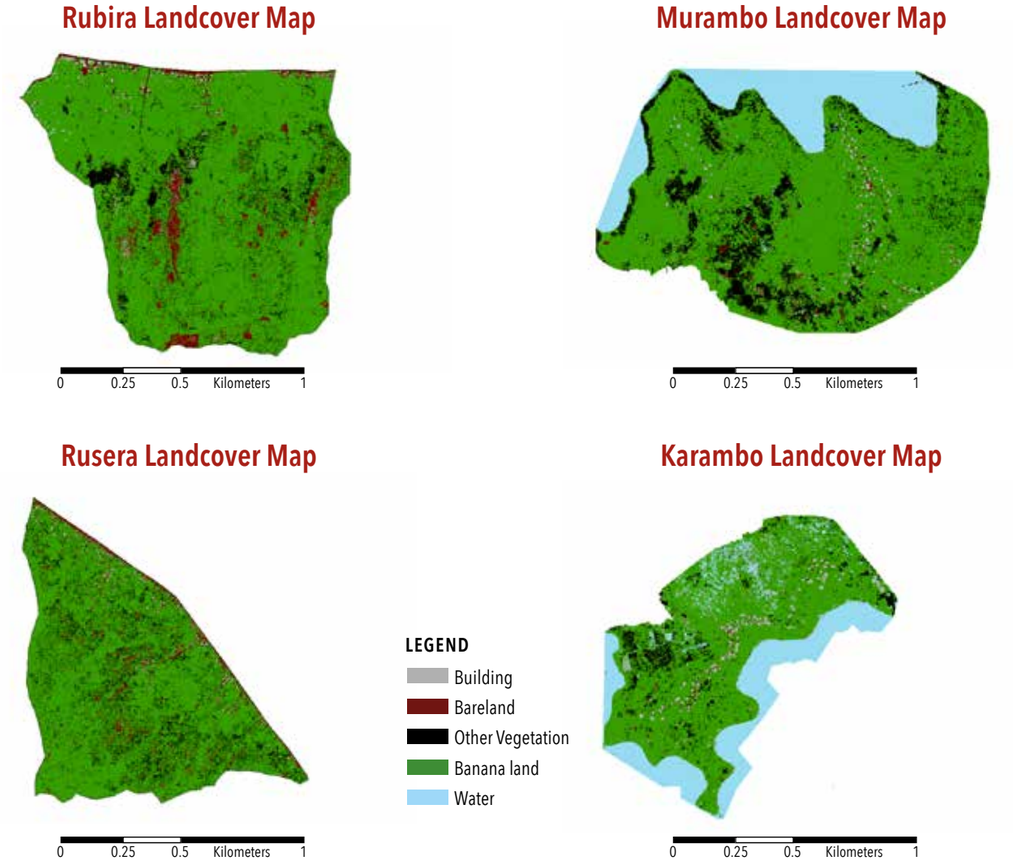


Figure 7: High resolution landcover map generated from drone-acquired imagery in Rubira, Murambo, Rusera, and Karambo Villages of Rwanda.

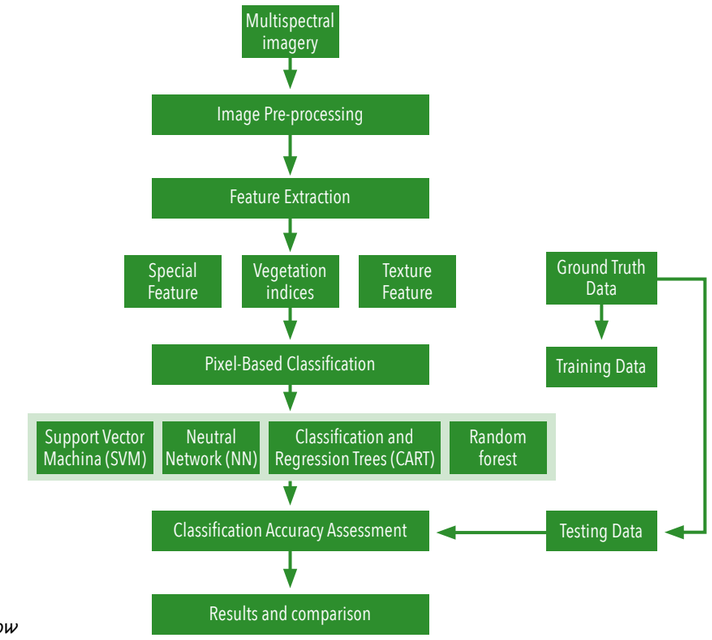


Figure 8: Classification Workflow

OUR TEAM OF EXPERTS

Marc Schut

Dr. Marc Schut is a senior innovation and scaling scientist working with IITA and Wageningen University. Marc is also country representative for IITA in Rwanda and one of the founding fathers of the ICT4BXW project. His ambition is bridge agricultural research and development by making scientific information accessible to and used by governments, public and private sectors. In the ICT4BXW project this means using ICT-tools for crowd-sourcing information about BXW incidence, severity and spread in Rwanda, putting that information in the hands of extension providers, and support them in tailoring their BXW control and management in a targeted and cost-efficient way to farmer promotors and farmers across the country.

Regina Kilwenge

Regina Kilwenge is a Data Consultant at the International Institute of Tropical Agriculture (IITA) in Kigali, Rwanda. She holds a Bachelor of Science in Geospatial Engineering and is currently pursuing Masters in Data Science. She is supporting multiple projects in Rwanda, including ICT4BXW, based on her rich experience in data analytics and geo-information science.

ICT4BXW Essentials

Timeline
2018-2020

Country
Rwanda

Lead organisations
International Institute of Tropical Agriculture (IITA - overall lead)
Bioversity International
Leibniz Institute of Agricultural Development in Transition Economies (IAMO)

Main partner in Rwanda
Rwanda Agricultural and Animal Resources Development Board (RAB)

Implemented under
CGIAR Research Program on Roots Tubers and Bananas (RTB)
www.rtb.cgiar.org

Total Budget
€ 1,200,000

Donor
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