

# Increasing capacity FOR PLANT HEALTHCARE



Bunchy top virus-affected banana in Ruzisi Valley, Democratic Republic of Congo, Rwanda, and Burundi. Photo by IITA

Plants, like people, need healthcare. But in Africa, where agriculture is dominated by smallholders, farmers do not have access to reliable plant health advice and management services. The first crucial step in controlling a disease is to identify the cause (disease diagnosis).

Many farmers rely on extension workers and researchers from national and international organizations for such needs. And such help is not always readily or quickly available.

This is why IITA and its partners are developing the capacity of national agricultural research and extension systems (NARES) in research, disease surveillance, diagnostics, and deployment of control options. A good example is in banana: when national partners at the L'Institut des Sciences Agronomiques du Burundi (ISABU) in Central Africa needed help in diagnosing and culturing the pathogen that was attacking banana, they turned to IITA for assistance. ISABU wanted to develop local capacity

to independently make diagnoses, culture Banana *Xanthomonas* Wilt (BXW) from diseased banana plant samples, and provide treatment advice.

At that time, IITA was already working on BXW in Burundi under the Crop Crisis Control Project (C3P), managed by the Catholic Relief Service (CRS). IITA and CRS liaised closely to develop a regional training course, for national partners from Burundi, Rwanda, and Democratic Republic of Congo (DRC) to learn new techniques, while

encouraging greater collaboration among scientists.

Thus, IITA and partners that include CABI UK, Central Science Laboratory (CSL), CRS, and the Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) conducted a Training Course on Surveillance and Vigilance for Plant Diseases in Burundi early this year. It is a pilot effort to kick-start a series of capacity building initiatives in the banana-growing countries in the region.

The training was attended by participants from extension and research, universities, and a regional organization. Trainers

came from IITA, CABI and Global Plant Clinic (GPC, see box), and Central Science Laboratory (CSL).

Training covered new methods for surveillance and vigilance of all banana diseases. Feedback from the participants highlighted the need for sustained training and the importance of introducing a system of mobile plant clinics to effectively link farmers and transfer knowledge.

The mobile plant clinics initiative was developed by CABI UK as part of GPC, led by Eric Boa and has been tried and tested across the world. Under the umbrella of Mobile Plant Clinics and GPC, IITA had collaborated on

initiating clinics in Rwanda, Cameroon, Sierra Leone, and Benin and providing training in diagnostics and surveillance in Uganda, DRC, and Burundi.

“Training, however, is just the tip of the iceberg. It is important to consolidate capacity building in diagnostic techniques and to ensure that people adopt new methods with confidence and then use them regularly,” said Fen Beed, IITA’s plant pathologist based in Uganda. “Isolating and identifying plant bacteria require practice as does the conduct of participatory disease surveys. When such methods are reliably deployed, the national programs could significantly improve



Training participants looking at banana *Xanthomonas* wilt chart. Photo by IITA

the reliable detection of BXW and other disease outbreaks.”

Knowing where a disease occurs allows extension staff to target particular areas and plan control programs. This requires careful organization and marshalling of resources. Although IITA already has effective recommendations for managing BXW, it lacks mechanisms for presenting them to farmers and monitoring their uptake. Further effort is needed to implement training that emphasizes direct action to help farmers.

In their after-training report, Beed and colleagues said that “Effective extension depends on sound intelligence about disease distribution and the damage it causes. National governments need to understand the risks posed to new areas and the actions required to control disease through sound research planning and identification of best management strategies.”

Beed and colleagues forwarded this blueprint for managing risk and reducing banana disease losses to ensure success of a plant healthcare service managed by national programs.

### **Surveillance**

It is important to undertake systematic and comprehensive surveys of banana growing areas

to get an update on the distribution of BXW and control strategies being used by growers. The surveys provide the opportunity to determine spread and identify reasons why control strategies may not have been adopted. Where control methods have been deployed their socioeconomic impact can be quantified.

The extensive surveys will assess incidence and severity of BXW and other banana pests and diseases.

Systematic and quantitative surveillance of banana-growing areas begin with participatory surveys, a promising technique for assessing large numbers of growers quickly. Survey results can identify sites where permanent sample plots (PSP) would be established for more intensive assessments. PSP sites should be regularly monitored for disease incidence, severity, and efficacy of control methods. Data produced can determine disease spread and help to evaluate socioeconomic impact and deployment of control options.

The C3P project made huge strides towards developing databases on the spread of BXW and the influence of farmers' practices to control this disease. These databases can be further updated

with information from the surveys and with data generated from pilot sites.

The databases could be linked to regional databases of climate, growing conditions, topography, farmer demographics, and agricultural practices (e.g., produced by the CIALCA project and many others). This allows use of the databases for predicting spread and risk due to disease at various geographic scales.

### **Vigilance**

The next step is to establish and operate an extensive system of mobile plant clinics in targeted areas. Training courses for plant doctors are available and both DR Congo and Rwanda already have some experience in running clinics. The clinics concentrate on giving advice and gathering "intelligence" about banana problems, providing information on disease control, and offering services for other crops and diseases. This is important since farmers rarely grow bananas in isolation of other crops.

Once clinics are established and their benefits realized they can be self-sustaining and can provide a routine service to farmers and extension officers.

### **Upgrading facilities**

There is a need to ensure that participating



Banana field trials in Rwanda. Photo by IITA

laboratories can isolate and confirm the presence of pathogens that cause BXW and other diseases of banana. Field staff should learn how to collect diseased plant samples for sending to diagnostic centers. Diagnostic centers will be established in the region and linkages developed with advanced research institutes (ARI) to provide technical backstopping for disease diagnostics using, for example, molecular techniques.

In addition, for BXW, rapid diagnostic field-based kits will be fully tested for accuracy to confirm the presence of the disease. Standard operating procedures for laboratory methods should be introduced to ensure consistent results and interpretation of results. The responsibilities of staff from national, regional,

and ARI laboratories should be identified and links among them strengthened to create and nurture a network of expertise available to all.

#### **Awareness raising**

Data produced from the three activities can be used to publish new disease reports and develop pest risk analysis (PRA) documents for each banana disease in the region. PRA documents are crucial as they summarize all current information and increase awareness of disease recognition, distribution, control and risks. They must be routinely updated with new information and shared across the region to alert stakeholders of potential risks. This can lead to the deployment of preemptive disease control strategies before a disease epidemic breaks out.

#### **Monitoring and evaluation**

Detailed assessment of the progress and linkages should be undertaken. The increased capacity in laboratory and field techniques should be shared by project members through training. The support of IITA and the GPC in diagnostics, surveillance, and vigilance techniques encourages national and regional cooperation and use of new methodologies. Empowering scientists and extension staff and making them accountable for their actions is a powerful way to encourage sustainable development and to promote trade.

#### **Linkages**

The benefit of creating a knowledge network for banana diseases in the region is clear. This network can be expanded through linkages with

scientists and the private sector and key extension, research, and government staff from Burundi, DRC, Rwanda, and regional organizations.

The International Plant Diagnostic Network (IPDN) was set up in response to NARES' surveys that highlighted the lack of diagnostic capacity in much of Africa and in recognition that this directly hindered the adoption of appropriate and effective integrated pest management programs and therefore international trade. IPDN has been established in collaboration with IITA in East and West Africa to increase communication and data sharing. Software for digital imaging and diagnosis, information management, and access to disease management recommendations provides a platform for enhanced diagnosis and communication between laboratory staff and

experts across the world. Improved diagnostics tools and protocols have been developed and tested. This has been combined with training programs to enhance technical capacity and increase networking among diagnosticians in East and West Africa.

Initiatives such as IPDN can benefit by collaboration with similar internet-based initiatives in Africa such as the East Africa Phytosanitary Information Committee (EAPIC). EAPIC is linked to FAO's International Plant Portal to provide posting of plant pests for each respective country, which now includes Kenya, Tanzania, Uganda, and Zambia. The plant pest list helps in developing harmonized border inspection protocols, which support capacity building efforts in plant pest survey, identification, and communication systems, such as IPDN.

A follow-on project with these components that combines good science, effective surveillance, and proven advisory services could strengthen the contribution of extension and research to increase food security, income generation, and improved trade in Africa. It also highlights support required from national and regional organizations, governments, and donors. These include local training for diagnostic techniques and expansion of participatory disease surveys and strengthening of disease vigilance through the establishment of mobile plant clinics.

"Addressing all these considerations will contribute significantly towards providing a service to support farmers and trade that would move away from the current scenario of 'fire-fighting' diseases to providing preemptive control (see Figure 1)," concluded Beed.

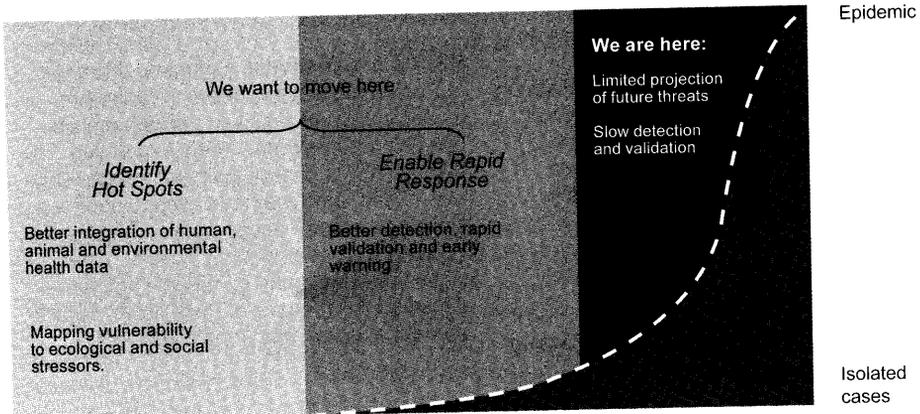


Figure 1. Scenario on managing diseases (fire fighting vs. preemptive control).