

IITA joins call for global surveillance system to detect and halt the spread of crop diseases

A team of international scientists is calling for the creation of a [Global Surveillance System \(GSS\)](#) to improve and interconnect crop biosecurity systems and enhance global food security. In a paper published in the [28 June edition of Science](#), the researchers argued that as nations collaborate to detect and stop human pandemics, there is need for a GSS for crop diseases to safeguard agricultural trade and food security.

Since 2004, millions of cassava farmers in the Great Lakes Region of East and Central Africa have been hit by the devastating pandemic of cassava brown streak disease (CBSD). This came just as they were recovering from crop losses caused by another catastrophic viral plague—cassava mosaic disease (CMD).

This almost set back to zero the concerted efforts by scientists from national and international research programs to develop and distribute improved disease-resistant varieties. Scientists had to go back to the drawing board, and only in the last few years have farmers begun to see the light at the end of the “cassava tunnel”, as new varieties resistant to both diseases have been identified and disseminated through high-quality seed systems.

Plant viruses and other pathogens are transferred from place to place through casual uncontrolled movements of infected cuttings, stems, and plantlets that are used to establish new crops in new locations. It is believed that this is how Asian CMD “jumped” tens of thousands of kilometers from India or Sri Lanka in South Asia to Southeast Asia, where a small outbreak in northeastern Cambodia kicked off a brand-new pandemic of CMD. In no time, new reports of CMD were received from Vietnam and Thailand. Within four years, it spread to affect 10% of cassava cultivation in the region, threatening millions of smallholder farmers and

exports of cassava starch worth US\$4 billion annually.

The cassava examples are just one of many cases of the dangers that pests and diseases pose to global agriculture. Their spread to new areas is currently among the top threats to efforts to increase global agricultural productivity.

To counter these threats, the team proposes that the GSS prioritize six major food crops—maize, potato, cassava, rice, beans, and wheat—as well as other important food and cash crops that are traded across borders.

The GSS proposal is the result of a scientific meeting convened by the [International Center for Tropical Agriculture \(CIAT\)](#) in 2018 at the Rockefeller Foundation’s Bellagio Center in Italy. [James Legg](#), a Principal Scientist and plant virologist at [IITA](#) who has worked for more than 25 years on cassava diseases, is among the team of international scientists behind these efforts.

“We have seen the destructive impacts that cassava disease epidemics have on the food and income security of farmers

Continued on page 2



Above: Cassava plant infected with the Cassava Mosaic Disease. Below: CMD symptoms on a cassava leaf.



Above: Harvested roots showing the effects of Cassava Brown Streak Disease. Below: CBSD-infected root.



in East and Central Africa and the time and effort required to control these diseases. IITA has been working with governments and other partners in the region for over 20 years to bring these diseases under control.

“Great progress is now being achieved but experience has shown that we can control pest/disease outbreaks much more effectively by responding with greater speed and coordination,” says Legg.

Though national and regional plant protection organizations (NPPOs and RPPOs) work to monitor and contain crop disease outbreaks, many countries,

particularly low-income countries (LICs), do not efficiently exchange information, leading to delays in coordinated responses that are required to prevent disease establishment and spread.

Lead author and CIAT researcher Mónica Carvajal says that a GSS would help expedite action for future outbreaks. “The question I asked was why does it take so long to respond to crop diseases in some cases?” said Carvajal. “What is the limitation to responding faster from the outset?”

The GSS proposes to focus on tightening networks of “active surveillance” and “passive surveillance” personnel who are

on the front lines of disease outbreaks. The GSS would tap into cutting-edge technology for rapid disease diagnostics and take advantage of communication networks, including social media, to rapidly share information.

The proposed GSS aims to bring together the more than 180-member nations of the International Plant Protection Convention (IPPC), with a focus on countries that have high risk relative to ability to respond.

The proposed GSS framework is especially important as 2020 has been designated the [International Year of Plant Health by the United Nations](#).

Akilimo decision support system for cassava farmers promoted

The [African Cassava Agronomy Initiative](#) (ACAI) has released its first field test version of the Akilimo decision support system in paper and application format. Extension agents will use these to help cassava farmers in Nigeria and Tanzania optimize their productivity and income from growing cassava.

The name Akilimo is coined from a combination of two Swahili words, *akili* meaning smart/intelligent and *kilimo* meaning agriculture, which loosely translates to smart agriculture. Akilimo is an ingenious system developed over the course of a three- to four-year research and development process to provide site-specific recommendations depending on the farmers’ needs and cropping objectives.

The Akilimo decision support system encompasses the infrastructure supporting the data curating, data analysis, and information output.

Akilimo uses a series of information input by a farmer or extension agent to provide advice on fertilizer application depending on location and cropping system, the best planting practices and weed control, and intercropping. It also advises on improving the quality of cassava root starch and maintaining a constant supply of cassava root to processing industries throughout the year.

Reflecting on the progress made in the development of the tool, ACAI Project Leader [Pieter Pypers](#) lauded the ACAI team of researchers who have worked



ACAI project leader Pieter Pypers introducing the Akilimo tool to project partners in Tanzania. Photo: ACAI.

tirelessly to create such a versatile tool that is accessible in various forms. He also commended the development partners for their invaluable input through field trials, data collection, and feedback during the development of the Akilimo decision support system.

“We have a data-intensive prediction engine in the background co-relating a number of variables that influence crop performance, which then gives recommendation with high accuracy on sophisticated apps as well as simple printed paper,” said Pypers.

Farmers will receive Akilimo recommendations through a smartphone app, printed maps, and recommendation tables (paper-based tools), Unstructured Supplementary Service Data (USSD), and Interactive Voice Response (IVR) format. The initial field test version released only features the mobile application and the paper-based tool while the prediction engine is being calibrated for other formats.

At the heart of the Akilimo prediction engine is the culmination of the precision research examining several factors that determine the cassava crop nutrient uptake, growth, root yield, and the quality of the starch in the roots. To set up the prediction engine, ACAI integrates results from field trials with various crop models to evaluate cassava response under varying environmental conditions as well as nutrient supply.

Besides the tailored fertilizer

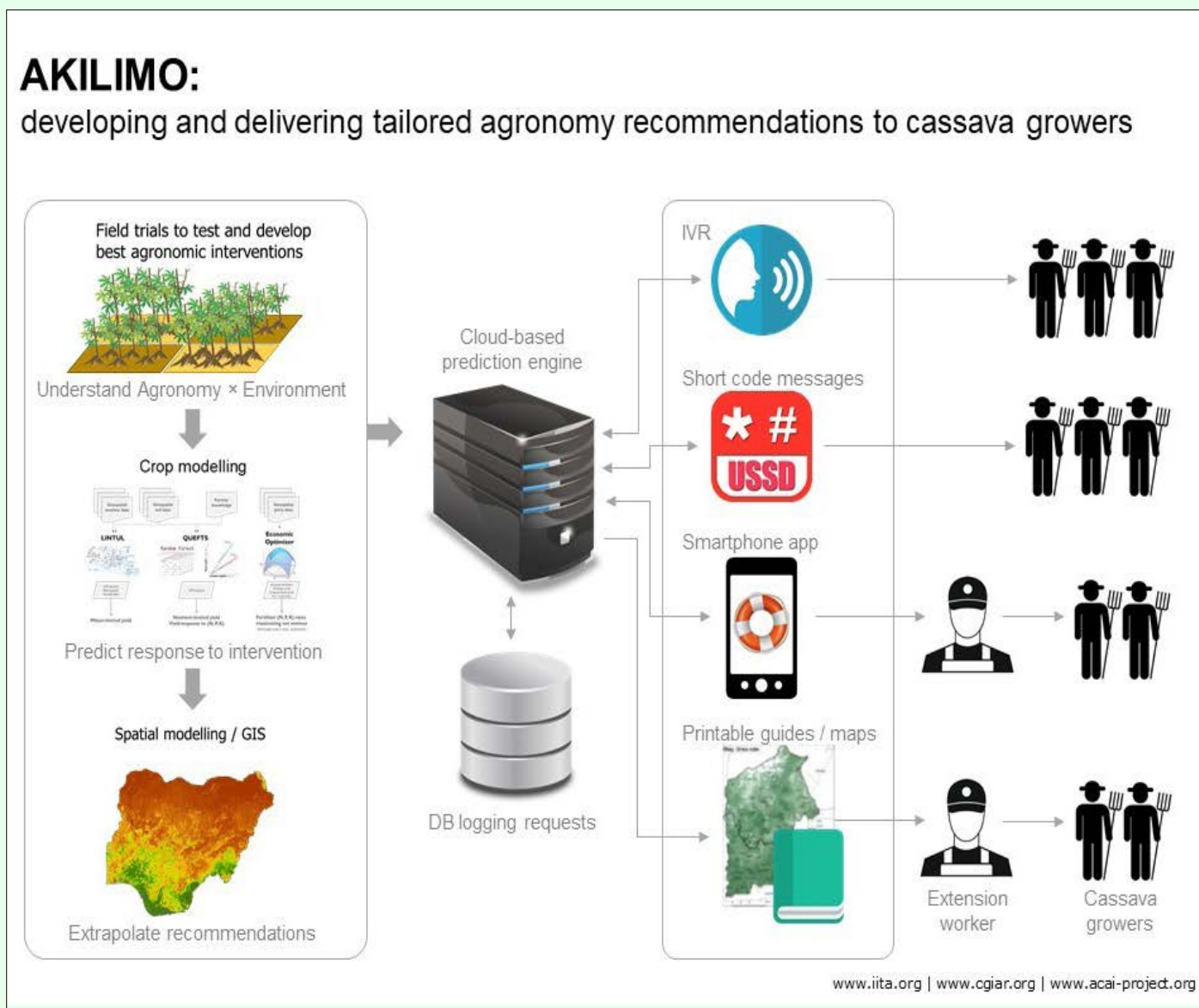
recommendation, the tool will also be used to advise farmers on land preparation methods, weed management, planting densities, and fertilizer application for intercropped cassava fields as well as planting and harvest dates for high cassava root starch quality and sustainable raw material supply.

Akilimo is highly interactive, requiring the user to provide information to improve the accuracy of the recommendations. The user, in this case, a farmer, will be required to give their accurate GPS location, cropping system, current yield, and investment capacity. Akilimo will predict the yield of cassava root and compare with the net income for the farmer from the sale of the roots to provide recommendations that help the farmer optimize their income.

The development of Akilimo was a collaboration between IITA scientists and partners from various sectors

of the cassava value chain in Nigeria and Tanzania. At the research level, IITA collaborated with the [International Center for Tropical Agriculture \(CIAT\)](#), [CAB International \(CABI\)](#), [World Agroforestry \(ICRAF\)](#), Wageningen University, University of Florida, the Federal University of Agriculture in Abeokuta, Nigeria, [Tanzania Agricultural Research Institute](#), National Root Crops Research Institute Nigeria, and the Katholik University of Leuven.

The objectives of ACAI are to address the needs expressed by key players in the cassava value chain in Nigeria and Tanzania. In Nigeria, ACAI is partnering with SASAKAWA Global 2000, Notore Chemicals Limited, Psaltry International, Oyo State Cassava Growers Association (OYSCGA), CAVA II project, and 2Scale project. In Tanzania, ACAI partners with Minjingu Fertilizer, FJS Africa Starch, Best Cassava Project by MEDA, Farm Concern International, and Yara.



Prediction Engine diagram showing the process of generating recommendations in the Akilimo Cassava agronomy advice tool back end. Photo: ACAI

NITAD to partner with IITA in capacity building

The [Nigerian Institute of Training and Development](#) (NITAD) in Oyo State, led by Chairman Akin Akinpelu, visited IITA, Ibadan, with his team on 3 July. The visit aims to seek collaboration with [IITA](#) in the area of training and development. Representatives from IITA's Capacity Development Office (CDO), Human Resource Management, and Communication Unit received the delegation at the Agriserve building.

NITAD, an associate of [International Federation Training and Development Organisation](#) (IFTDO), is a training institute with the vision to become a world-class training and development institution. One of its objectives is to collaborate with international institutions such as IITA, which is not only a research institute but is also involved in capacity building.

The areas of focus in this partnership are graduate employability in Nigeria, skill acquisition and development, and capacity building at technical and non-technical levels. Nonetheless, as an institute with the mandate to regulate the activities of learning and development in Nigeria, NITAD encouraged IITA to register with them to become a certified training institute.

Akinpelu made it clear that individual trainers can also become certified and be given practicing licences, as there are two membership routes—individual and corporate membership routes.

“We would like to extend this opportunity to IITA members who play a role in capacity development as membership is open to anyone involved in capacity development.” he said.

Head of CDO, Zainatou Sougrynoma Sore, noted that IITA is open to all kinds of training requests where it can team up with and provide the skills needed for such partners. “IITA has a longstanding history in collaborating with the national agricultural research system (NARS) to bring about technologies and double the impact of the innovations of IITA and to train technicians and researchers in the national system,” she said.

With ideas for possible collaboration, both parties agreed to further examine those areas with the plan to have a follow-up meeting where decisions would be finalized.



Katherine Lopez, Head of Communication, welcoming the NITAD team.



Akin Akinpelu, Oyo State NITAD chairman, presents NITAD's brochure and journal to Zainatou Sore, Head of IITA Capacity Development Office, at the end of the meeting.



IITA staff with the NITAD team.

Aquaculture assessment and value chain pilots for improving fish supply, employment, and nutrition in DR Congo and Angola project come of age

Four modern hatcheries have been built and are now operational in Kalambo and Kinshasa, with a combined output of 2 million fingerlings (larvae and juveniles) of both tilapia (*Oreochromis niloticus*) and catfish (*Clarias gariepinus*). [Dr Kande Matungulu](#), Project Manager of the aquaculture assessments, announced this as he took stock of the evolution of the project.

Several fish producer associations have been assisted with targeted capacity building, which included the proper establishment of earth ponds in the Ruzizi plains and Kinshasa hinterlands. Limited hand tools and some inputs were also provided.

Matungulu explained that a fish feed scoping study was carried out to develop locally produced fish feed to reduce fish feed imports and put value to the abundant, locally produced fish feed ingredients. An experiment to test the performance of the locally developed fish feed formula is in the offing.

A mix of soybean, maize, cassava flour, fishmeal, minerals, and vitamins added to dried cow blood has yielded a noticeable weight increment, with tilapia growing to 300–500 g and catfish to between 1 and 2.5 kg in six months at the Malweka fish farm in Kinshasa. The improved tilapia strain “Gift” from WorldFish reached 0.5 kg in just 6 months.

Matungulu said that the next steps will comprise:

1. A continuation of the small-scale fresh water fish farm extension in both Kinshasa and South Kivu.
2. Confirmation of the true genetic identity of the Tilapia “Gift” species being widely used in Kinshasa.
3. Testing of fish performance using locally produced fish feed and ingredients.
4. The sampling and safety control of several fish to identify or

characterize mold, maggots, aflatoxin infestation, etc. known to infest a number of stored fish due to poor hygiene and storage conditions. The latter is a collaborative study between IITA, WorldFish-Zambia, and the University of Zambia.

5. Application for any open calls that could allow continuation of the project under the new umbrella of “Integrated food crop and fish

farming for smallholder rural areas around Kinshasa and Bukavu.”

6. Intensifying contacts with prospective projects that work in the regions (e.g., PICAGEL in South Kivu).

The aquaculture project is an IITA-WorldFish partnership funded by [International Fund for Agricultural Development](#) (IFAD) and has been operational in the DRC since 2017.



Hatching vessels inside the IITA Kalambo hatchery in South Kivu.



One of the beneficiaries of the fish multiplication training, Doline Matempa, showing off a catfish.

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.agha@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.