

IITA identifies opportunities to make a difference amidst COVID-19 spread across Africa

As COVID-19 or coronavirus gets closer to home—Africa, IITA has announced some opportunities for the Institute to undertake some quick-win projects that would help the continent address food security and poverty alleviation goals.

IITA Director-General Nteranya Sanginga announced these and health and safety measures to prevent the spread of the virus among staff members and their

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IITA Director General Nteranya Sanginga talks about health and safety measures to staff.

IITA and DG Sanginga recognized for entrepreneurial activities in DRC

CGIAR-IITA has been honored with an excellence award for having the best entrepreneurial activities in the Democratic Republic of Congo (DRC). The award ceremony was part of a conference organized by the Fédération des Entreprises du Congo (FEC) and the government of DRC, which took place in Kinshasa, 11-12 March. IITA was cited in the annual Enterprise Challenge Forum of the FEC for distinguishing itself during the year.

Following the inauguration of the President Olusegun Obasanjo Research Campus by DRC President Felix Tshisekedi in Bukavu last October 2019, FEC officials visited the campus and cited the excellence of the facilities and scientific activities. In addition, they noted IITA's contribution to the community, being the third largest



IITA Director General Nteranya Sanginga receiving the award on behalf of IITA.

employer in the city of Bukavu, where it is located.

IITA Director General Nteranya Sanginga represented the Institute and served as a keynote speaker and panelist. In his address, DG Sanginga spoke about the objectives of IITA to support the Congolese government in their aim to become self-sufficient and reduce their importation bill. He also highlighted the activities of the IITA Business Incubation Platform (BIP), particularly on seed production and distribution, as well as the impact of the IITA Youth Agripreneurs.

An important part of the conference was the presentation of awards to 10 different recipients in recognition of their excellent entrepreneurial

activities in DRC. Example categories for the awards included best female entrepreneur, best youth entrepreneur, and best entrepreneurial activities of an institute, for which IITA was recognized.

During a formal ceremony, the award recipients were each presented with a celebratory statue designed by famous Congolese artists. In addition, the government bestowed on Dr Sanginga and the other recipients the National Medal for Civic Merit (Medaille Nationale de merite civique). The honorees also received diplomatic passports from the government of DRC, which gives them the privilege to represent the country as entrepreneurs internationally, on an individual basis, or as part of government missions.

This conference is an annual event, which the government and the FEC organize to celebrate and stimulate entrepreneurship in DRC. This year, Prime Minister Sylvestre Ilunga attended the conference as the government continues its push to create the “backbone” for a sustainable economy through entrepreneurship. The government is seeking to achieve this by bringing about more local production and relying less on importation.

Dr Sanginga was accompanied by wife Charlotte Sanginga, representing the IITA Women’s Group, IITA Country Representative in DR Congo Zoumana Bamba, Head of the TAAT Clearinghouse Mpoko Bokanga, and IITA-BIP CEO Frederick Schreurs.



Left: IITA-BIP CEO, Frederick Schreurs and DG Sanginga, who was honored with the National Medal for Civic Merit with other awardees (right).

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families during a virtual meeting held at the Institute’s headquarters in Ibadan, Nigeria. Top of these measures is a partial lockdown of all its offices across Africa starting 30 March.

Sanginga said, “During this time, essential services and activities will continue with only a few critical persons coming to work. This precaution is necessary if we are to avoid a crisis. Our priority right now is to protect our people.” However, he called upon the staff to remain calm. Sanginga said the crisis presents an opportunity for IITA and the entire CGIAR system to continue making a difference in sub-Saharan African food systems. One way of doing this is by monitoring food prices and strengthening market supervision.

The partial lockdown applies to all IITA offices spread across 29 African countries. Unit heads were asked to continuously provide staff with information about COVID-19 and the good practices which can halt its spread

such as frequent handwashing and physical distancing, which is essential in reducing the spread of the virus. In day-to-day living physical distancing means staying away from public places such as schools, churches, bars, or restaurants.

Dr Samson Adeleke, Head of IITA Clinic cautioned about stigmatization saying, “Be careful about stigmatization. If someone coughs or sneezes, it does not mean they have the virus. Stigmatization will stop people from voluntary testing.” He reminded the over 500 staff who attended the virtual meeting that most COVID-19 cases recover. “As much as we should not panic, we should also guard against a carefree attitude. Prevention is cheaper, better, and safer than cure,” he added.

Lava Kumar, who heads IITA’s Virology and germplasm health unit, urged staff members to keep a positive attitude. “Vaccines and therapeutics will soon be available,” he encouraged the staff members. He likened this outbreak to

various disease and pest outbreaks in agriculture to which researchers have found solutions. “COVID-19 will not disappear, but we shall find a way of keeping it in check,” Kumar said.

Kenton Dashiell, the Deputy Director-General of Partnerships for Delivery, reiterated the message that IITA is not closing and is still available to work with governments and partners to ensure the resilience of Africa’s farming systems. “We are ready to help farmers quickly resume and improve their production while we take all the needed precautions not to contract or spread COVID-19,” he said.

While continuing to take precautions against the spread of this virus, IITA remains committed to the reduction of poverty, and food and nutrition insecurity in Africa.

To get daily COVID19 updates, visit the WHO website.

Unlocking the diversity of microorganisms around banana roots

The human body hosts trillions of microorganisms both inside and on the skin. Many of them are beneficial and help in the digestion of food, making vitamins, and boosting the body's immune systems, among other things. Similarly, for plants, the soils around the roots host diverse microorganisms, some of which are beneficial to the plants, including strengthening their resistance to diseases and pests.

A team at IITA is unraveling the diversity of microorganisms found in the soils and around the roots of banana plants that are healthy and infected with the deadly *Fusarium* wilt of banana, also called Panama disease.

This study is part of efforts to tap into the beneficial microorganisms to aid in controlling this deadly disease threatening banana production in sub-Saharan Africa (SSA) and, in turn, the food security and income of millions of farmers.

Panama disease is caused by the soil-borne fungus *Fusarium oxysporum* f. sp. *cubense* (Foc). There are four strains of the disease, Foc races 1–4. Soil-borne race 1 is present everywhere in sub-

Saharan Africa, whereas the deadlier Foc race 4 (TR4) is present only in Mozambique. There are fears that it will spread to other parts of the continent with devastating consequences. Foc race 1 kills some dessert bananas like Sukali Ndizi, Silk, and Gros Michel, while TR4 kills the Cavendish banana as well. There are no effective fungicides or other chemicals for its control.

The research team found that bacterial and fungal communities present in roots and corms were colonized from the rhizosphere—the thin soil layer adhering to the roots. Also, banana plants selectively promote colonization or establishment by specific bacterial and fungal communities from the rhizosphere.

The team identified 129 bacterial and 37 fungal genera of known taxa, including some well-known beneficial strains. These included Actinomycetales, which are known to produce various metabolic compounds that help to suppress various plant and soil-borne pathogens. Others were Pseudomonadales, well known to be responsible for beneficial plant-microbe interactions, and Streptomycetaceae, which are known to produce antagonistic compounds against various plant pathogens.

This is the first study to describe an inventory of bacterial and fungal communities associated with the components of asymptomatic and symptomatic banana plants infected by Foc race 1. The findings were published in the paper *Unlocking the Microbiome Communities of Banana (Musa spp.) under Disease Stressed (Fusarium wilt) and Non-Stressed Conditions in Plant Microorganisms* MDPI (<https://doi.org/10.3390/microorganisms8030443>) on 20 March 2020.

This study demonstrates the complexity of bacterial and fungal communities, which possibly interact among themselves (microbe–microbe) and with the banana (host–microbe interactions).

“These cross talks may affect banana plant growth, but they may also result



Stump of infected banana tree. Source: Viljoen, 2018.

in induced resistance. It is, therefore, useful to study the banana microbiome in commercial plantations where banana plants are treated with inorganic fertilizers and pesticides and compare these communities with our findings to reduce *Fusarium* infection in commercial plantations,” says Manoj Kaushal, a CGIAR Systems Agronomist with IITA-Tanzania.

The study builds on an earlier one by the same team that was able to establish a correlation between the level of microbiome diversity with the resistance to pathogen invasions in banana roots published in *Plants* (<https://doi.org/10.3390/plants9020263>) on 18 February 2020.

The IITA banana research program aims to improve soil health and increase the yields of the East African Highland bananas in a more sustainable way. The work is supported by the CGIAR Fund and, in particular, the CGIAR Research Program on Roots, Tubers, and Bananas (CRP-RTB) and the EU under the MUSA2020 project grant agreement (GA) 727624.



Discolored leaves of infected banana tree. Source: Viljoen, 2018.

IITA Business Incubation Platform works at increasing soybean yield in Nigeria

Soybean is among the major industrial food crops grown in every continent. The crop can be successfully grown in many states in Nigeria using low agricultural input. Soybean cultivation in Nigeria has expanded as a result of its nutritive and economic importance and diverse domestic usage. It has an average protein content of 40% and is more protein-rich than any of the common vegetable or animal food sources found in Nigeria. The seeds contain about 20% oil on a dry matter basis, and this is 85% unsaturated and cholesterol-free.

Soybean is believed to have been introduced into Africa in the 19th century by Chinese traders along the east coast of Africa. The rapid growth in the poultry sector in the past few years has also increased demand for soybean meal in Nigeria. Africa consumes about 618,000 tons of soybean annually with Nigeria being the major consumer and importer. Malnutrition, particularly protein deficiency, is prevalent in many parts of Africa as animal protein is too expensive for most populations. Soybean provides an inexpensive and high-quality source of protein comparable to meat, poultry, and eggs. This has led to the increase in demand for soybean in Nigeria, which cannot be met locally due to low yield.

To help solve this challenge, the Business Incubation Platform (BIP) of CGIAR-IITA partnered with Seed Co. Pty Ltd., United Phosphorous Limited (UPL), and Nigeria Soybean Association (NSA) to embark on trials that aim to achieve better yield and income for farmers. The current average yields from the developed varieties are quite low—between 0.8 and 1.2 t/ha, with demand far higher than the supply. The project

is therefore looking at how yield can be increased to 2 t/ha in 2019, 3 t/ha in 2020, and 4 t/ha by 2021. This will help reduce the rate of soybean importation in Nigeria and make it readily available for both individual consumption and industrial use. The varieties used for the trials yielded 2.0–2.5 t/ha and 3.5 t/ha on average, for IITA-developed (TX 1448-2E) and SeedCo varieties, respectively.

The trials were carried out in Niger State (Mokwa and Badeggi), Benue State (Yandev, Zomon village, and Wannue), and Ibadan, Oyo State. The team achieved 1.5, 0.7, 1.8, 2.0, 1.9, and 2.8 t/ha at Mokwa, Badeggi, Yandev, Zomon village, Wannue, and Ibadan, respectively.

The team leading the trials in the different locations included Prof A.C. Uwala, President, Nigeria Soybean Association; Dr S.A. Tiamiyu, Head, National Cereals Research Institute (NCRI) Mokwa; Nuratu Olumo, Soybean technician, NCRI Badeggi; Timothy Ayedogbon, IITA GoSeed Soybean technician; and Samuel Inalegue in Yandev, among others.

Abebe Abush, IITA Soybean breeder, who is developing varieties that will increase farmers' yield, was part of the team, and ensured that good agronomic practices were followed. Friday Ekeleme, renowned weed management scientist, IITA Weed Management Unit, was instrumental in recommending the right application of IRIS herbicide by UPL.

The planting commenced in July 2019 across the different locations and treatment was done with Nodumax, an IITA innovation and inoculant that increases the yield of soybean by more than 30%. The crops were also treated



The pod development stage.

with Simple Super Phosphate (SSP) and NPK fertilizer. The planting population was 400,000 plantlets/ha and a post-emergent herbicide known as IRIS was applied on the 19th day after planting to eradicate weeds on the field.

The team carried out separate demonstration trials at IITA, some with Nodumax treatment and others without. They discovered that those treated with Nodumax had far better yields than those without.

They also studied factors affecting yield disparity across different locations and found that environmental variations contributed to this disparity. In Ibadan, the highest average yield of 2.8 t/ha was achieved due to adequate water availability via irrigation despite low rainfall for three weeks after planting. This shows that availability of water can contribute significantly to the growth performance of soybean. Quality seeds, right fertilizer application, proper weed management, and application of an inoculant (Nodumax) are key ingredients contributing to achieving better results. Some of the stages such as planting, germination, pod development, yellow coloration stage, brownish coloration stage, harvesting, and threshing need to be monitored properly and activities in each of these stages managed effectively for good output.

The IITA-BIP team led by Frederick Schreurs believes that at least 4 t/ha can be achieved by 2021. The BIP team is open to collaboration on projects that involve commercial soybean production and can leverage on outgrowers' model to increase farmers' yield and income. BIP also has quality breeder and foundation seeds, which seed companies can obtain from IITA-GoSeed. BIP contacts: Victor Saleh (victorsaleh@iitagoseed.com and +2348038936889) or Frederick Schreurs (f.schreurs@cgiar.org and +234 803 978 4212).



One of the trial sites at IITA, Ibadan.

The Drip irrigation system: The way to efficient farming

The IITA Farm Office experimented on an irrigation system, a project supported and funded by IITA management to minimize inputs and maximize output.

Drip irrigation is a micro-irrigation system that is efficient in saving water and nutrients by allowing water to drip slowly to the roots of plants from above the soil surface or buried below the surface. The purpose is to place water directly into the root zone and minimize evaporation and run-off.

According to Wilson Igbaifua, the Farm Office manager, drip irrigation has many benefits compared with other types of irrigation. "In terms of water usage, drip irrigation is highly efficient and economical as each dripper drops 1 liter of water per hour, which is enough to sustain any crop," He further explained that pests and diseases, weeds, as well as water usage, will be minimized—a win-win situation for farmers.

Igbaifua explained that the drip irrigation system is good for all crops as it can be adjusted to suit the planting spacing of IITA mandate crops. "It is a mechanism we intend to replicate wherever we have an IITA presence as this will help scientists to carry out their experiments throughout the year," he said.

Peter Kulakow, Head of Breeding Unit in IITA stated, "It is excellent that we have this new initiative. Irrigation capacity is very important to our research, especially when we are dealing with small plants. This is an opportunity to have a technology that uses less water, and in the long run, will be much less expensive than the sprinkler irrigation that we have been using; it is an important development that we are happy to see coming to IITA."

Sharing her excitement on the new irrigation system, IITA Cassava seed system specialist Diebiru Elo-Mercy said, "This system concentrates on the plants and therefore reduces the growth of weeds. This is going to make seed production very efficient, and it is good to know it is at a lower cost."



Drip irrigation trial site.
Inset: Wilson Igbaifua, the farm Unit manager explaining the mechanism of drip irrigation.

Got a story to share?

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