

Fighting together: IITA stations respond with innovations

With the outbreak of COVID-19, [CGIAR-IITA](#) has placed a particular focus on working with governments in sub-Saharan Africa to strengthen their food systems to combat and win against the scourge of this pandemic. Aside from this holistic response from the Institute, IITA stations in different localities have come up with various innovative solutions geared towards helping their immediate communities to cope with the fallout of the outbreak.

Fighting COVID-19 in Benin: Street handwashing systems for bike riders and pedestrians

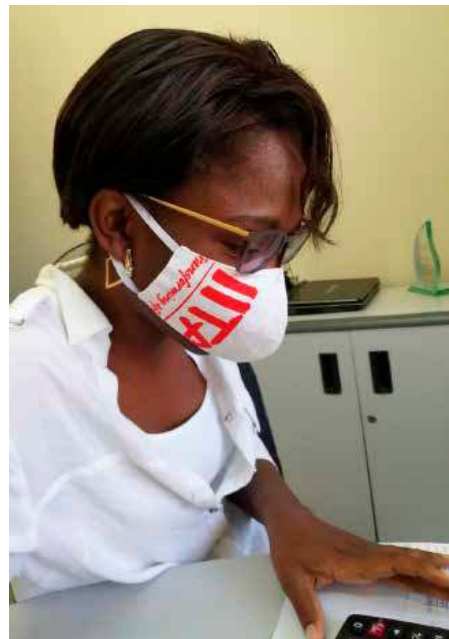
Streets are meeting points for most individuals, as people must move from one end to another for their various activities. Hence, streets could become hotspots for COVID-19 contamination and spread. To limit the spread of this virus in the community, [IITA-Benin](#) on 4 May, launched a street hand washing system in the Calavi neighborhood of Cotonou, Benin. This system is designed for easy and quick hand washing of street users such as bike riders, pedestrians, and even vehicle users.

In the case of Benin, the targets for this prototype installation outside the IITA-Benin fence were primarily taxis well known as “Zemidjan”. The idea of this simple but efficient “drive-in” washing device was spurred by the need for each IITA location to come up with innovative solutions to address the pandemic. IITA Molecular Entomologist and Head of the AgroEcoHealth Platform in Cotonou, [Rousseau Djouaka](#), developed the solution with the technical assistance of the Head of Facilities Management Services (FMS), Gontran Honfoga, and the FMS team.

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A zemidjan rider washing his hands at the inauguration of the initiative.



IITA-Mozambique staff wearing a colorful IITA facemask.

IITA banana research paper in Wiley's Plant Pathology journal among the most downloaded

A paper published by a team led by scientists from IITA was among the top 10% most downloaded of all papers published between January 2018 and December 2019 in Wiley's Plant Pathology journal.



George Mahuku, IITA plant pathologist and lead author of the paper.

The research team received the news in a congratulatory message and an online certificate from the Journal. Part of the message stated: "We are excited to share that your research, published in Plant Pathology, is among the top 10% most downloaded papers! What it means: Among work published between January 2018 and December 2019, yours received some of the most downloads in the 12 months following online publication. Your research generated immediate impact and helped to raise the visibility of Plant Pathology."

The open-source paper, "Sources of resistance in *Musa* to *Xanthomonas campestris* pv. *musacearum*, the causal agent of banana xanthomonas wilt" published on 17 September 2018, announced a breakthrough in the search for banana varieties that are resistant to the lethal bacterial banana wilt disease. It proved wrong the belief that all banana varieties in the Great Lakes region are susceptible to the condition and provided hope in the banana breeding efforts for varieties resistant to the disease—one of the most effective ways to control the disease.

Victor Manyong, the IITA hub director, congratulated the team, noting that this was an indication of the quality of science generated by the team and the potential impact of the work to address the challenges facing agriculture productivity for smallholder banana farmers in the region.

The findings of the paper are significant for smallholder farmers in the Great Lakes region of Africa where banana is an important food and staple crop as its production has been greatly affected by the bacterial banana wilt disease.

The bacterial banana wilt disease, which is regarded as the most devastating disease of banana in the region, is transmitted by insect vectors, contaminated garden tools, and infected planting material. The disease, which causes premature ripening and rotting of the fruits, wilting, and eventually death of the plant, has drastically affected the production of highland cooking banana in the region and the food and income of millions of farmers.

"This is exciting news for the team. We are extremely pleased with the recognition",

says George Mahuku, the IITA plant pathologist based at IITA Tanzania and lead scientist for the work.

"As a follow-up to this work, we are now screening a population made from one of the resistant varieties 'Monyet' and a susceptible variety 'Kokopo' to identify biological markers (quantitative trait loci - QTL) of genes associated with resistance. This information will be used to develop protocols for the rapid transfer of resistance genes to susceptible but farmer-preferred cultivars. We are also continuing with screening other banana types to identify more sources of resistance," Mahuku said.

Other researchers in the team are drawn from the Centre of the Region Haná for Biotechnological and Agricultural Research, Palacký University Olomouc, Czech Republic, the Forestry and Agricultural Biotechnology Institute at the University of Pretoria, South Africa as well as IITA banana researchers based in Uganda and Arusha.

The research was funded by the CGIAR Research Program on Roots, Tubers and Bananas (RTB).

IITA scientist among AAS and the Royal Society recipients of 2020 FLAIR fellowships

The African Academy of Sciences (AAS) and the Royal Society of London, supported by the UK's Global Challenges Research Fund (GCRF), have announced the second cohort of the [Future Leaders – African Independent Research \(FLAIR\) fellowships](#). Thirty outstanding early-career African scientists, whose research focuses on the needs of the continent, will receive support from the FLAIR program to develop independent research careers in African institutions and, ultimately, lead their research groups.

The 2020 cohort of FLAIR-funded scientists were selected from a diverse and competitive pool of more than 400 applicants. The chosen scientists represent 10 African nationalities. Their research projects will focus on a wide range of topics, including new techniques for sustainable agriculture and managing water shortages to mitigate the impacts of climate change.

Fellowship recipients include Kenyan national and incoming IITA scientist Samwel Muiruri, who will be returning to the Institute, having worked with [Leena Tripathi](#) for his PhD. Muiruri notes that pests and challenges of a changing climate are increasingly outstripping cassava adaptations through conventional breeding techniques. For his fellowship project, his research will focus on speeding up the breeding and cultivation process of cassava through genetic manipulation to induce

premature flowering, thereby fast-forwarding the adaptive capacity of the crop.

[A statement](#) announcing the fellowship awards notes that "Africa needs to pay urgent attention to growing and retaining scientific talent to keep improving the continent's scientific input and its sustainable development. The FLAIR partnership with the Royal Society is one of several initiatives through which the AAS is addressing this need."

The Executive Director of the African Academy of Sciences, Professor Nelson Torto, highlighted the importance of postdoctoral programs. "Postdoctoral programs are vital in training and developing early career researchers into research leaders whose scientific leadership will influence policies that

will promote the socioeconomic development of the continent," he said.

FLAIR Fellowships provide opportunities for talented, African, early-career researchers to realize their potential of becoming leaders in their fields. Along with the financial support, these fellowships provide access to a network that will support the recipients to build independent research careers in sub-Saharan African institutions and to undertake cutting-edge scientific research that will address global challenges facing developing countries.

The next round of FLAIR applications is currently open and will close on 27 May 2020. Find more details about eligibility and how to apply [here](#).



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The IITA-Benin Station Administrator, François Tosse, inaugurated the device with the participation of Zemidjan drivers and passers-by.

This system is expected to be expanded to more streets in other African countries for limiting the spread of COVID-19 and other diseases associated with Water and Hygiene Solutions (WaSH).

The masked heroes: Special face masks for IITA-Mozambique workers

As people returned to work in the Republic of Mozambique, the government mandated the use of face masks in public places as part of guidelines to prevent the spread of COVID-19. Within the [IITA-Mozambique](#) station, management was hard at work, ensuring that the Institute complied with these measures, not only among staff but also local partners, including members of the farmers' associations.

IITA is achieving this by producing and making available custom-designed face masks with IITA branding for all staff, as well as farmers' association members during field days. They also ensured the events complied with the guidelines by limiting attendance to a maximum of 10 people per event.

Farmers and research workers are essential to preserving food security in every society, so IITA is trying to keep these heroes safe by educating staff and partners about measures to prevent the infection and spread of COVID-19. Some of the guidelines highlighted during these events include the use of personal protective equipment (PPE), social and physical distancing, and hygienic practices such as frequent hand washing.

IITA Rwanda supports vulnerable families during the lockdown

Due to the lockdown restrictions in Rwanda beginning on 16 March, all non-essential activities shut down, leaving many vulnerable families who depend on small businesses such as fruit stands, restaurants, and bars, without a source of income. This disruption to their finances and the ability to get food made the risk of starvation a possibility.

[IITA-Rwanda](#) applied for and was granted official travel clearance from the police due to the essential nature of agriculture. Having observed the challenges facing these families, on 27 March, IITA-Rwanda general staff and management put together a contribution 500,000 FRw (Rwandan franc) to support them by supplying foodstuffs. This budget helped to purchase various food items for vulnerable communities in the Kacyiru Sector in Kigali City, where IITA-Rwanda offices are located.

Two IITA Rwanda staff delivered the items to the sector's Executive Secretary Gertrude Urujeni, who then gave them to identified most vulnerable families since public gatherings were not allowed as a preventive measure against COVID-19.

"We now count 900 vulnerable families in our sector who are in deep need of food. This is the first support we have received so far. We will start with families having small children and old people," said Urujeni. "Thank you very much for thinking of your neighbors. You have set a good example for other organizations to do the same to their neighboring vulnerable families."

The government subsequently set up a support system to ensure that all vulnerable families across the country received food support, depending on the number of each family, during the lockdown period.



Top: IITA-Rwanda staff delivered the items for vulnerable communities in the Kacyiru Sector in Kigali City.
Bottom: Zemidjan riders outside IITA-Benin, using the street handwashing system.

Introducing West Africa's largest insect collection

Quick facts

- IITA's insect collection is based in Benin
- It is the most extensive insect collection in West Africa
- It has 366,000 insect species
- Museum houses both pests and beneficial insects
- Offers free insect identification services



Georg Georgen, an entomologist and head of IITA's insect museum in Cotonou, Benin.

How do you catch all these insects? How do you know they are here? Do you go into the bushes with a net and wave it in the air? There were so many questions that I kept asking as I stood perplexed.

"Look around you," Georg tells me with a look of amusement on his face. I look, nothing. "Look up," he directs my gaze. I look and spot what looks like a giant spider at whose sight I wince a little. Georg, amused, lets out a loud laugh, "Look again," he encourages me further. This time I let my eyes roam the entire room, which is about 40 by 40 ft; all over the walls are all sorts of enormous insects.

By this time, I was almost screaming until my eyes rest on a colossal grasshopper, and with a little more scrutiny, I realize they are plastic insects—decorations. Georg is laughing, clearly enjoying my scared reaction. "Insects are everywhere; you don't see them because you are not looking for them. That's how it starts; we go out in the natural environment and look for them. First, we see the big ones, but as we look closely, we even see the tinier ones". This is a scene from IITA's [Biodiversity Centre based in Cotonou, Benin](#). It is West Africa's biggest insect museum or "insect collection" as IITA's entomologist and biocontrol specialist, [Goergen Georg](#) prefers to call it.

I am sure you have as many questions as I had. Insect museum? Why collect insects, how does one collect insects, who on earth collects insects? I put all these and more questions to Georg, a jolly man of German descent who grew up in Morocco playing with spiders and scorpions. Georg was called to a life of insect collecting and study from childhood. No wonder he heads

IITA's insect collection. In a lightly air-conditioned room with blue cabinets lie 366,000 insect species. With a playful look and almost permanent smile, Georg, who laughs easily, eagerly shows me one insect collection after another. Some are quite pretty, I must admit. The beetles have a vibrant sapphire green color, and the house flies are not nasty pit latrine hopping creatures; they are a luxurious shimmery blue.

Why collect insects, I ask as Georg pulls out another blue cabinet to reveal beautiful butterflies; in another drawer, I see spiders, and I let out a gasp. We need to stop looking at insects, so I insist on getting my question answered, why? "I'll tell you, be patient," Georg hushes as he pulls out yet more drawers. It's evident he's proud of the work he and his team are doing. "Some are pretty rare," he adds as he pulls out another cabinet. Later, after he's done showing off his impressive collection, he answers my question, why collect insects?

Purpose of the collection

"We exist to offer a free identification service for any insect that is of concern to agriculture or health," Georg says. "Over time, we have developed a reputation that we offer this service, and in return, we are often the first to be informed of new pests in West Africa. This was the case with the Fall Armyworm (FAW). Once our partners proved that they were confronted with a new pest, they sent us samples for identification." Georg and his team

went ahead and identified the FAW as a new and invasive species on the African continent. Read about the fall armyworm and its discovery [here](#).

History

CGIAR-IITA's insect collection emerged from the first biocontrol success in Africa, which was targeted at the cassava mealybug. Scientists studied the cassava mealybug food web intensively as well as its most efficient and effective natural enemy. However, in reviewing the mealybug's natural enemies, the researchers were confronted with the lack of a facility to identify samples locally. "All samples were sent abroad for identification, which was characterized by long delays in both dispatch and response." It is against that background and the regional need to provide an arthropod diagnostic service that IITA decided to open its identification center. What started as a small insect collection at IITA's headquarters in Ibadan, Nigeria, was later moved to Cotonou in Benin at the Institute's biocontrol center. From 1,000 specimens in Ibadan, the insect collection now boasts of 366,000 specimens and more than 6,000 identified species, making it the best insect collection in West Africa with both pests and beneficial insects.

This growth has come mostly from material kept from past projects, as Georg explains: "In the past, when a project ended, the identified materials would be discarded. It was a pity because they were valuable references. The insects are now preserved permanently so that future projects could benefit from them." Permanent preservation is possible due to the

suitable conditions in the museum, such as controlled access. One cannot have direct access to the collection; they must pass through two doors. This prevents unnecessary human movement; also, the room is permanently air-conditioned with back-up generators in case of electricity outages. The windows are not only small to avoid exposure to sunlight, but they are also never opened. Georg explains the rationale, “Insects decay mostly from fungi, attack from fellow insects, and sunlight exposure. If these conditions are minimized, then

permanent preservation is possible.”

There are so many insects of the same species, i.e., several kinds of houseflies, butterflies, bees or beetles, but there is a reason for this. “We collect everything we can get from different regions. It may seem like a waste to the untrained mind, but nothing is never in vain, as Georg explains. “When the opportunity availed itself, we collected aquatic beetles, and everyone wondered whether we had gone bonkers. Then, ten years later, it was discovered that aquatic

beetles appeared to be involved in the transmission of the [Buruli ulcer](#), a locally emerging infectious skin disease. Suddenly everyone was interested in what type of aquatic insects we have in West Africa, and thankfully we had preserved some of them.”

That is why, when Georg or anyone on his team, find themselves in a new environment, they try to collect a sample that is representative of the region’s insects—you never know when you will need them! “The idea is to store them and come back any time by looking into the cabinets, i.e., our museum, because the past helps us to master current problems.” Also, one cannot know if a species is new to the continent or not without any documentation of its existence. In the case of the Fall Armyworm, Georg says they would never have known that it was alien to Africa if they had not collected other moths to which it was compared.

So, there it is—the collection is essential to identify and study new invasive and beneficial insects and find an effective biocontrol solution, i.e., natural enemies that can suppress an insect pest. Over the years, IITA has used natural enemies to control pests such as cassava mealybug. The biocontrol of cassava mealybug delivered the highest return on investment in the history of the CGIAR. A benefit: cost ratio of 149:1, i.e., every \$1 invested in cassava mealybug biocontrol gave a return of \$149. IITA and partners controlled water hyacinth on Lake Victoria using weevils, and the water fern in Congo Brazzaville was entirely controlled by introducing a specific weevil.

To find out more about the use of natural enemies in the control of pests, click [here](#) and [here](#).



Top: Some amazing camouflage insects. Bottom: Beetles in the insect collection.

Take responsibility! Stop the spread of COVID-19!

Wash your hands regularly with soap and water; practice physical and social distancing; wear face masks; avoid crowds and public places; keep a 2-meter distance from the next person; practice general sanitation and hygiene.

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.gha@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.

