

## New insights to help advance cassava breeding worldwide

Researchers at [IITA](#), along with partners from the [NextGen Cassava Breeding Project](#), have uncovered new details about the genetic architecture of cassava, which is one of Africa's most vital crops. The findings will make it easier for breeders to identify traits for crop breeding.

The scientists carried out a genome-wide association study (GWAS) and outlined their findings in a [research article](#) recently published in *Plant Molecular Biology*. They analyzed large breeding populations composed of 5130 clones developed in Nigeria at the IITA Cassava Breeding Program.

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An IITA farm officer, Anetor Omonuwa, holds cassava variety undergoing field testing for high yield potential in IITA's Ikenne research station in Nigeria.

## STEP plans expansion to more schools in Oyo State

From 19 to 20 August, the [IITA](#) Start Them Early Program (STEP) in Nigeria organized an implementation workshop towards the rapid expansion of STEP in six secondary schools across the six geopolitical zones in Oyo State. This is in line with the STEP-Oyo State project initiated after the inauguration of STEP in Fasola Grammar School, Oyo town.



Left: IITA DG Nteranya Sanginga, speaking about the origin of STEP. Right: Dr Adebowale Akande, Executive Advisor to the Oyo State Governor on Agribusiness, speaking about the STEP-Oyo State Project.

STEP is an initiative launched by IITA to advance agribusiness development to secondary schools across Africa. This is because agriculture is a major contributor to economic growth across Africa, but the attraction of secondary school students to careers in agriculture has been very low over the years.

On 23 July, IITA, in collaboration with the Oyo State Government, officially launched STEP in Fasola Grammar School, Oyo town. The successful transition of Fasola School to the STEP model prompted the interest of the Oyo State Government to initiate the STEP-Oyo State project and proposed six schools to adopt the model in 2020 and many more in the future.

During the workshop activity-breakdown session, the facilitator, Jonathan Odhong, said: “We are here to develop the implementation plan for the STEP program. We believe that at the end of the workshop, the Oyo State Government will be proud of us.”

In his opening remarks, IITA Director General Nteranya Sanginga spoke about the origin of STEP while commending the efforts of the team so far. “This is the time to be proud of what these young people have accomplished. Nobody will develop Africa other than Africans, so we are rewriting history for the future. We are building the foundation of Africa’s economic future through the youth,” he said.

During the breakout sessions, the STEP team and key partners of the project came together to share and develop strategies that will drive the implementation of the work plan. Most importantly, they designed and integrated an exclusive work plan for each school.

In his speech, Adebowale Akande, Executive Advisor to the Oyo State Governor on Agribusiness, said: “It is a privilege for Oyo State to participate in the project because this is one of our strategies to create new Small and Medium Enterprises (SMEs) in the State. As a result, the interest and commitment of the Governor in the project are very high.” Akande also advised the youth to make good use of this opportunity as agribusiness is a lucrative field, and the government has good plans for youth in this area.

In an interview with the IITA Communication team and Radio IITA, Bolanle Larinde, Coordinator for the STEP-Oyo State Project, mentioned that one of the expected results for every school in which STEP features would be an upgrade in the school facilities. This would promote better learning and the training of students in agribusiness for independence and value addition to their families and the society at large. “Through STEP in these schools, students should be able to see agriculture as a business and a career path,” she added.



Top: Participants during a workshop breakout session. Bottom: DG Sanginga (wearing black in the middle) with workshop participants.

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*Molecular Geneticist and Plant Breeder Ismail Rabbi*

The 4-year study involved extensive multilocal testing at four IITA field trials in Nigeria. The genome-wide association analysis explored genomic regions most responsible for desirable traits in cassava, which is a food crop that provides the primary source of calories for more than 500 million people worldwide.

The scientists found more than 40 quantitative trait loci (QTL) associated with 14 traits, responsible for characteristics such as disease responses, nutritional quality, and yield. These traits were classified broadly into four categories: biotic stress, root quality, plant agronomy, and agromorphology.

“Our findings provide critical new entries into the catalog of major loci available to cassava breeders,” said [Ismail Rabbi](#), a molecular geneticist and plant breeder at IITA and a member of the NextGen project. “These markers should greatly improve cassava research and provide another powerful tool for the breeders’ toolbox.”

[Chiedozie Egesi](#), a co-author and NextGen Program Director, noted the importance of cassava as both a food and industrial crop, which will be even more so in the future, “as climate change reshapes agriculture everywhere.” As a result, he said it is foundational to have a better understanding of cassava’s complex genome.

“A complete understanding of cassava’s genetic architecture is the critical step needed to accelerate genetic improvement and bring lasting benefits to farmers and consumers who depend on this crop for food and income throughout the world,” said Egesi.

IITA is a key partner of the NextGen Cassava Breeding Project, whose goal is to empower smallholder cassava farmers in sub-Saharan Africa by developing, releasing, and distributing [improved cassava varieties](#).

Researchers from IITA, Cornell, the National Root Crops Research Institute (NRCRI) in Nigeria, the Boyce Thompson Institute, and the US Department of Agriculture-Agriculture Research Service contributed to the study. Along with Rabbi and Egesi, the co-authors are Siraj Ismail Kayondo, Guillaume Bauchet, Muyideen Yusuf, Cynthia Idhigu Aghogho, Kayode Ogunpaimo, Ruth Uwugiaren, Ikpan Andrew Smith, Prasad Peteti, Afolabi Agbona, Elizabeth Parkes, Ezenwaka Lydia, Marnin Wolfe, Jean-Luc Jannink, and Peter Kulakow.

Download the open-access study at <https://link.springer.com/content/pdf/10.1007/s11103-020-01038-3.pdf>. The supporting data for this research is accessible at [www.cassavabase.org](http://www.cassavabase.org). Read more about the study at [Researchers help inform cassava breeding worldwide](#).



### Got a story to share?

Please send your story with photos and captions every Tuesday to [iita-news@cgiar.org](mailto:iita-news@cgiar.org) or Katherine Lopez ([k.lopez@cgiar.org](mailto:k.lopez@cgiar.org)) and Uzoma Agha ([u.gha@cgiar.org](mailto:u.gha@cgiar.org)) for headquarters and Western Africa, Catherine Njuguna ([c.njuguna@cgiar.org](mailto:c.njuguna@cgiar.org)) for Eastern and Southern Africa, and David Ngome ([d.ngome@cgiar.org](mailto:d.ngome@cgiar.org)) for Central Africa.



### **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.

# Undeterred, Africa RISING adapts operations for continuity despite COVID-19-related restrictions

As the COVID-19 pandemic continues globally, the [Africa RISING Program](#) has had to make critical operational adjustments to facilitate continuity of its activities, strategies, and approaches. “This is the ‘new normal’ and we have to adapt,” noted Mohammed Ibrahim, Africa RISING Site Coordinator in Tigray, Ethiopia.

The immediate effect of the pandemic reduced the implementation speed of pre-planned project activities. Franklin Avorny of the [Council for Scientific and Industrial Research](#) (CSIR), an Africa RISING implementing partner in Ghana, noted that the restrictions and lockdowns in Ghana caused delays as partners could no longer visit project sites.

“Firstly, it affected the quality of our deliverables. Secondly, it delayed processes in general because offices were closed and the national postal service, for example, was no longer efficient. Activities that we would hitherto accomplish within a month, now took between 2 and 3 months,” adds Avorny.

Despite the setbacks, Africa RISING staff and partners found various ways to “keep things moving” and ensure that improved agricultural technologies still reached smallholder farmers.

From early March 2020, several Africa RISING staff and partners

resorted to working from home. This new modus operandi, first enforced by the governments of the six countries where the Program implements its activities, soon became a policy adopted by the CGIAR centers leading Africa RISING—IITA, the [International Livestock Research Institute](#) (ILRI), and the [International Food Policy Research Institute](#) (IFPRI).

Many Africa RISING staff were teleworking full-time for the first time and became conversant with the online collaboration tools through a “learning by doing” approach. Despite the steep learning curve, most program staff are now achieving excellence and near-normalcy using these tools.

“Staff in our field offices in Ethiopia have started to use Telegram for frequent research data sharing,” said Ibrahim. “This sharing of data and information is key for us at this stage because we have just commenced activities linked to starter input distribution and planting. We provide mobile data allowances to facilitate our partners’ internet access,” he added.

[Francis Muthoni](#), IITA and Africa RISING GIS Specialist in Eastern and Southern Africa, now relies more on the use of satellites to conduct remote surveys and collect data. “Those of us who work with remote sensing data have an advantage because satellites are still collecting data despite the

pandemic. Because of this, my work can continue. I am implementing some of the activities as planned, unlike colleagues whose sole source of data is from the field,” noted Muthoni.

“But after analyzing the data I have collected, I need to work with my colleagues in the field to validate it. At that point, I anticipate that I will have challenges, but I am now working on a plan to reschedule some of those kinds of activities,” he said.

Speaking at a [planning meeting for Ghana partners](#) on 24–25 June, the Africa RISING West Africa Project Chief Scientist, [Fred Kizito](#), urged partners who could no longer implement field activities/surveys due to COVID-19 restrictions to focus on data analysis and writing publications. Program staff and partners in various countries and locations shared this view as they now had more time on their hands due to limited travel.

Africa RISING Project Coordinator in Mali, Brihanu Zemadim, reiterated this, saying he expects more project publications in 2020 and the coming year.

For more on Africa RISING efforts to adapt in the face of the coronavirus pandemic, read [Undeterred by COVID-19: How Africa RISING is adapting operations for continuity in research and delivery](#).



Africa RISING partners and farmers plant Desho grass in Tigray, Ethiopia, while observing safety protocols (Photo credit: Haimanot Seifu/ILRI).

# New disease-resistant cassava varieties introduced in Rwanda

Rwandan farmers lack improved cassava varieties resistant to the main cassava diseases--Cassava Brown Streak Disease (CBSD) and Cassava Mosaic Disease (CMD). These diseases have affected cassava productivity, threatening the income and food security in the country.

“There are two main diseases that attack cassava in Rwanda and the region, CMD and CBSD. The latter poses a serious threat because once cassava is infected with CBSD, root tubers spoil, leaving almost nothing to be consumed by farmers,” said Charles Bucagu, Deputy Director General of Agriculture, Research and Technology Transfer at the Rwanda Agriculture and Animal Resource Development Board (RAB).

The Government of Rwanda has been working with partners to find clean, safe, and productive cassava seeds.

In partnership with RAB, IITA has been implementing a four-year project since 2017, which introduced new cassava varieties and seed quality management techniques to fight CBSD and CMD.

The CBSD Project implemented various approaches to curb the diseases. The project introduced up to 17 elite clones, with high dual tolerance to CBSD and CMD, each clone with about 200 tissue culture plantlets. Moreover, over 40,841 true cassava seeds were introduced.

“The project introduced both elite clones and biological seed that have directly and positively impacted the genetic diversity for CBSD/CMD dual resistance now and future breeding efforts in Rwanda. Several CBSD/CMD resistant and high-yielding varieties that carry good consumer preference and other end-use traits have been identified for Rwanda,” said Silver Tumwegamire, CBSD Control Project Leader.

The project also considered local varieties. Thirty selected accessions were sent to Kenyan Plant Health Inspectorate Services for virus cleaning; 19 were returned for integration into the seed system. Ten have already been used together with



Top: Dr Athanase Nduwumuremyi from RAB holds a clean seed in a screen house. Bottom: IITA introduced the semi-autotrophic hydroponic (SAH) technology at Rubona station to increase the multiplication rates of tissue culture-derived plantlets.

the newly introduced elite clones to generate new breeding populations. Up to 11,261 biological seeds have equally been produced.

IITA has introduced and built capacity for semi-autotrophic hydroponics at Rubona station in efforts to strengthen quality seed delivery. Two screen houses and five basic seed centers were established.

“Through the project, Rwanda has made gains in terms of resistant elite clones and biological seed, all of which will enable us to identify high-yielding cassava seed and resistant varieties. It has also enabled us to make efforts to streamline the cassava seed value chain in Rwanda. Thanks to this project, we now have cassava

seed standards to ensure seed quality control for cassava in Rwanda,” said Athanase Nduwumuremyi, Head of the Cassava research and technology transfer program at RAB.

Cassava is the second most grown crop and the fourth most consumed staple crop in Rwanda, according to 2018 official data. It is among the priority crops promoted by the government to ensure food security and increased farmer income.

More details about the achievements of the CBSD Control project are available here: CBSD Newsletter, French: <https://bit.ly/2EG3lwM>, English: <https://bit.ly/3jmPvnp>; CASS Newsletter, French: <https://bit.ly/3hCgURZ>, English: <https://bit.ly/2YENNFZ>