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Transforming African Agriculture
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Genome editing: New breeding tool with potential to sustain agriculture in Africa

Climate change affects the environment extensively in socioeconomic and related sectors, including agriculture and food and nutritional security for the growing global population.

Gene-edited banana in a greenhouse. Photo credit: Jaindra Tripathi/IITA

To address this urgent need, Africa needs to adopt sustainable intensification of agriculture to close the yield gap in staple crops, where tools, including biotechnology and traditional approaches, are recommended for crop improvement. to page 3

IITA and Ogun State Ministry of Agriculture, Nigeria, to co-develop a digital agriculture platform

IITA and the Ogun Ministry of Agriculture met recently to discuss a #digital agriculture project that involves co-creating a digital agricultural information system platform, registering about 100,000 smallholder farmers, and undertaking a baseline survey among farmers.

Commissioner for Agriculture, Dr Adeola Odedina (second right), discussing digital agriculture with the IITA delegation.

An IITA delegation from the Digital Delivery Working Group led by Lava Kumar, Head of the Germplasm Health Unit & Virology and co-lead of the Working Group, with Alfred Dixon, Director of the Development and Delivery Office, visited the Ogun State Ministry of Agriculture to discuss details of the project.

Ogun State Commissioner for Agriculture, Honorable Dr Adeola Odedina, and his counterpart team received the IITA contingent in his office in Abeokuta, Ogun State, to sign the contract on the engagement, meet the team members, and discuss project details.

The joint digital agriculture initiative is part of the Ogun State Economic Transformation Project (OGSTEP) funded by the World Bank.

Agriculture plays a major economic role in Ogun State and provides income and employment for about 70% of the labor force while contributing 30% of the State's GDP. To further increase productivity, improve competitiveness, and meet the growing demand from the agri-food sector, OGSTEP will support smallholder farmers by improving production efficiency and performance of the value chains concerning food crops, horticulture, and livestock.

OGSTEP, in line with the Ogun State Development Plan 2017–2030 (SDP), planned to accelerate strategic reforms and foster public investments to enable greater private sector participation in the State's economy. To support this mission, the Ogun State Ministry of Agriculture planned the development of the "Ogun State Farmers Information Management System (OGFIMS)" as a comprehensive digital system to register farms and farmers for designing and implementing various intervention programs in the State.

Odedina emphasized the importance of the digital platform for the agricultural transformation agenda. The Ogun State team, including OGSTEP Project Coordinator Dr Mosun Owo-Odusi, OGSTEP Project Manager Dr Oluseyi Olugbire, Chairman of the Agricultural Commissioner's Advisory Board Prof. Kolawole Adebayo, Permanent Secretary at the Ministry of Agriculture Mr Dotun Shoronke, and Director of Planning Research and Statistics Mr Siraj Fashola, discussed the development and sustainable operation of the OGFIMS to support the State's mission. They were joined by the M&E team, Dr Abiodun Adeeko and Mr Opeyemi Adejuwon.

IITA has been appointed the lead partner to assist the Ministry of Agriculture in developing OGFIMS. Through this support, IITA will field a multidisciplinary team comprising software and hardware developers, data management experts, GIS, and a communication specialist to co-develop OGFIMS, including its establishment, developing protocols for registration of at least 100,000 farmers in OGFIMS, technology transfer, and capacity development for sustainable operation of OGFIMS by the Ministry.

Kumar stated that IITA brings in the unique experience of working with agricultural value chains to establish a fit-for-purpose digital platform that meets the requirements of all the stakeholders and serves as a one-stop place for vital information necessary for planning and implementation of development programs.

Head of IITA-Abuja Station and Leader of the BASICS-II program, Prof. Lateef Sanni, indicated that locally recruited teams would majorly participate in farmer registration using the OGFIMS tools.

The OGFIMS is expected to operate in the third quarter of 2022.

The IITA delegation included Head of Communication Katherine Lopez, Head of Project Development and Administration Unit Kayode Awobajo, GIS Support Services Manager Tunrayo Alabi, Institutional Data Manager Olatunbosun Obileye, Web Lead and Developer Tunde Ajayi, and IT Specialist Busayo Ogunya.

Contributed by Katherine Lopez

Top left: Both teams presenting the signed engagement contract. Bottom: The IITA delegation, led by Dr Lava Kumar, with the Honorable Commissioner and his team.

Genome editing: New breeding tool with potential to sustain agriculture

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The recent study titled "Genome Editing for Sustainable Agriculture in Africa" published in the journal Frontiers in Genome Editing revealed the need and efficiency of exploring genome editing as an addition to conventional technologies for developing improved crop varieties.

The study noted that CRISPR-based genome editing has rapidly become the most prevalent genetic engineering approach for developing improved crop varieties because of its simplicity, efficiency, specificity, and ease of use. Genome editing technologies allow targeted manipulation of the plant genomes, accelerating breeding efforts to develop improved crop varieties. It can also reduce inputs such as fertilizers and pesticides, increase yields, improve nutrition, and develop climate-resilient crops.

The study, led by Leena Tripathi, Research Director at the IITA, with her team, Valentine Ntui, Easter Syombua, Samwel Muiruri, and Jaindra N. Tripathi, in collaboration with Kanwarpal Dhugga and Zhengyu Wen from the International Maize and Wheat Improvement Center (CIMMYT), Mexico and Steven Runo from the Kenyatta University, Kenya, explores the recent advances and progress in the CRISPR/Cas9-based genome editing efforts with major staple food crops grown in several countries in Africa.

The researchers in Africa use genome editing tools to improve African staple crops for biotic and abiotic stress resistance and improved nutritional quality. The crops under development include disease-resistant banana, maize resistant to lethal necrosis, and sorghum resistant to the parasitic plant Striga and enhanced quality for African farmers.

"The genome-editing tool is one of the powerful technologies available in the crop improvement toolbox, which can be used along with other tools for improving agriculture to feed the world's rapidly growing population. It can develop improved crop varieties with no foreign gene integration like those created through conventional breeding," explained Tripathi. She added that genome-edited products are not regulated as GMOs in several countries, including two countries in Africa: Kenya and Nigeria.

Tripathi also added that although many researchers are exploring the potential of genome editing in developing crop varieties for better and more sustainable African agriculture, there is a need for adequate funding and enabling policies to release genome editing products.

As the global landscape of regulatory developments for genome-edited crops is quickly changing, the future looks bright for African agriculture. The continent is progressing in creating the enabling environment for commercializing genome-edited crop varieties by countries having clear genome-editing regulatory frameworks and biosafety guidelines.*Contributed by Gloriana Ndibalema*

Partnerships: IITA visits NIHORT to strengthen collaboration

As part of IITA's activities to ensure excellent collaboration with partners, Kenton Dashiell, IITA Deputy Director General, Partnerships for Delivery, and his team visited the National Horticultural Research Institute (NIHORT) on 19 May. The visit aimed to strengthen collaboration with the Institute.

The Executive Director, NIHORT, Dr Lawal Attanda, appreciated IITA's team for the visit. He mentioned that NIHORT has been putting up commendable efforts to meet up with IITA to ensure the sustainability of humanity. Therefore, "we are setting a higher level of partnership between both institutes

Left: Dr Lawal Attanda appreciating IITA for supporting NIHORT. Right: Dr Kenton Dashiell encouraging NIHORT to keep contributing to agricultural development.

to give easy access to knowledge transfer and expand the scope of the Institute," Attanda stated. In addition, he acknowledged IITA's scientists for the support they get from them.

Dashiell excitedly commended NIHORT on its great effort to improve the well-being of society in areas such as the recycling of waste. He also encouraged NIHORT to keep its head high and scale up its products.

The team went on a tour of the Institute to check on the areas of partnership, including the plantain and banana fields, old and new biotechnology laboratory, mushroom house, and NIHORT workshop.

Wrapping up the event, Attanda summarized the major areas of collaboration with IITA: adopting procedures, maintaining equipment, capacity building, and technical intervention. He added that the team would do their best to ensure the success of the collaboration.

In response, Dashiell said, "we would give our full commitment to working with you in the areas identified." In addition, he appreciated the NIHORT team for organizing the event. *Contributed by Anita Akinyomade*

Top: IITA management team with the NIHORT team. Bottom: The participants touring the plantain and banana plantation.

Take responsibility! Stop the spread of COVID-19!

Always clean your hands; practice physical and social distancing; wear face masks properly; avoid crowds and public places; keep a 2-meter distance from the next person; and practice general sanitation and hygiene.

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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).

Radio IITA
Knowledge 4 Farmers

IITA and partners launch Postharvest Reduction Project

IITA recently launched a project on reducing postharvest losses across the Vitamin A cassava (VAC) and Vitamin A maize (VAM) value chains. The project, being implemented in partnership with HarvestPlus and Harvestfield, was launched virtually across Anambra, Cross River, Imo, Kaduna, Kano, Niger Osun, and Oyo states in Nigeria. The project aims to improve the adoption of postharvest loss reduction practices in Nigeria.

IITA Abuja Station Head Prof Lateef Sanni addressing participants.

Giving the opening remarks, Development and Delivery Office Director Alfred Dixon revealed that the project launch serves as an opportunity to address the problems of delay in harvesting, poor processing techniques, and inadequate storage and distribution methods of cassava and maize in Nigeria.

"The vision for this project is to see that there will be an improvement in the adoption of postharvest loss reduction practices across VAC and VAM value chains in these eight states," said Dixon.

Head of IITA Abuja Station and BASICS II Project Manager, Lateef Sanni, said the retention of carotene in biofortified crops like Vitamin A cassava and maize makes it imperative that attention is given to these crops postharvest. He highlighted the importance of nutrition quality retention during packaging, storage, and meal preparation.

"We are experiencing 25 to 40% of postharvest losses in Nigeria, and key stakeholders recognize the solutions available at IITA," he said.

According to Sanni, the essence of the project is to explore how best the various actors in the Vitamin A cassava and Vitamin A maize value chain can leverage postharvest solutions to make sure that they benefit in their enterprise.

GAIN Country Director Dr Micheal Ojo revealed that the program is designed to scale commercial activities for nutrient-enriched food products. It also seeks to improve nutritional status and livelihoods, especially in rural communities and settlements with less diverse diets, through VAC and VAM, staples for over 100 million Nigerians.

"I am really excited with the teams on this project and the variety of stakeholders at this launch. I look forward to this engagement scaling up commercial activities and making significant changes in how we address aflatoxin control and reduce postharvest losses across Vitamin A cassava and Vitamin A maize value chains", Ojo added.

In his remarks, Acting Country Manager, HarvestPlus Nigeria, Dr Yusuf Dollah, noted that value chains thrive better with strong partnerships. "The collaboration between IITA and HarvestPlus will ensure the overall objective of the project to improve the adoption of postharvest loss reduction practices across the VAC and VAN value chains in Nigeria is achieved," he added.

The project, sponsored by the Global Alliance for Improved Nutrition (GAIN), will improve the adoption of postharvest loss reduction practices across the VAC and VAM value chains in Nigeria, with further emphasis on aflatoxin awareness and mitigation strategies for VAM, amongst key value chain actors such as smallholder farmers, input dealers, aggregators, transporters, and food processors in the eight states across Nigeria.*Contributed by Timilehin Osunde and Terngu Abur*

National President of the Nigerian Institute of Food Science and Technology (NIFST), Prof. Madu O. Iwe, speaking with GAIN Nigeria Country Director Dr Michael Ojo.