

Agriculture: The key to state-level development in Nigeria

IITA Director General Nteranya Sanginga has highlighted the need for state governments in Nigeria to prioritize investment in agriculture to develop and revitalize state economies. He said this in a presentation at the recent PDP Governors' Forum, which took place in Ibadan, Oyo State.

Speaking to the 12 Governors in attendance, DG Sanginga highlighted the recent partnership between Oyo State and IITA as an example. He cited two partnership agreements—the STEP-Oyo project and the OYO-IITA Youth Agribusiness Incubation Center at Awe.

He spoke about how the Oyo State Government has invested in both the STEP project and Awe agribusiness center and how IITA has used both its technical and human resources through existing projects to complement some of these partnership projects.

Governor Seyi Makinde, the host Governor and Chairman of the PDP

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IITA Director General Nteranya Sanginga speaking with the Governors on revitalizing state economies through agriculture.

A machine for making yam mounds?

Yam is the “king of crops” in West Africa and one of the most important energy sources for many African countries. However, cultivating and preparing it is tedious for farmers because yam is planted in mounds (30 to 50 cm high and 1 or 2 m apart).

The advantage of the mound system in yam production includes loose soil conditions for easy tuber penetration, the collection of fertile topsoil, water control, and ease of harvesting. In addition, loose soil holds plenty of water and produces well-shaped yam tubers.



Small tiller demonstration by staff of Honda Manufacturing Nigeria. Photo: IITA/O. Adebayo

Making mounds is tough and particularly labor-intensive in yam cultivation and is one of the difficulties in expanding yam production and reducing costs in West Africa. Other challenges are low seed technology and pest and disease problems.

IITA scientists [Ryo Matsumoto](#) and [Haruki Ishikawa](#) are working on mechanizing land preparation and making yam mounds using a small tiller in collaboration with private sector partner Honda under a project supported by the Ministry of Agriculture, Forestry and Fishery (MAFF) Japan. The simple protocol for land preparation and making mounds using a small tiller (FJ-500 with a New Yellow Ridger) was developed through collaborative activities. The steps include:

1. Plowing well with a small tiller to soften the soil.
2. Using the cross-ridging technique (vertical and horizontal).
3. Making mounds using a hoe.

Using this protocol took two and a half hours from plowing to making 144 mounds with four people, spending less than 200 mL of fuel to prepare an area of 13 m × 13 m.

The staff who tried this protocol said: “The most significant advantage of this process is that the soil becomes very soft. After land preparation with the small tiller, it is very easy to make mounds.”

Ishikawa, the MAFF project leader, said: “When Honda and I discussed yam production, I said it is very difficult (or impossible) to make yam mounds with a machine. Honda disliked the word ‘impossible’ and saw a good opportunity to come up with a solution. However, the technique still needs improvement because part of the process is manual.”

Matsumoto said “This is an entry point for mechanized yam cultivation. I hope that this protocol can help yam farmers in Nigeria. The small tiller can help in land preparation for yam and applied in yam seed tuber production.”

To move the collaboration forward, a team from Honda Manufacturing Nigeria visited IITA on 18 June to exchange views with IITA researchers Matsumoto and Ishikawa on using small tillers in small-scale farms.

In addition, the Institute signed a memorandum of understanding (MoU) with Honda on the use of the small tiller. Under this MoU, a new model of the Honda small tiller in Nigeria, FQ650, which has higher power than the FJ-500, was introduced to IITA. It will be used for research. Furthermore, the collaborators have committed to continuing yam mechanization to reduce the hard work involved in yam production.

The process—from plowing to yam mound making—is documented in the “YamMoundsMakingMachine” (https://www.youtube.com/watch?v=Mol_ugUgbHk) and “Honda FQ650 Furrow attachment” (<https://www.youtube.com/watch?v=bdgBNHLhQwg>) videos.

If you are interested in a small tiller and attachment, contact Honda Manufacturing Nigeria Ltd. (sales.hondamanufacturingnigltd@honda-eu.com). For technical issues on land preparation for yam with the small tiller, contact Ryo Matsumoto (r.matsumoto@agiar.org).



Four people using less than 200 ml of fuel completed 144 mounds in two and a half hours with the Honda FJ500. Photo: IITA/O. Adebayo.

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Governors’ Forum, responded that they would ensure that this approach piloted in Oyo State will be a primary development focus among peer states.

STEP-Oyo and the Awe agribusiness center are engaging schoolchildren and other youth in agriculture, thereby ensuring the State’s present and future

food security. Moreover, successfully implementing these projects will boost the commercial and educational sectors in the State for many years to come.

IITA partners with French Ministry of Foreign Affairs to enhance women's livelihoods

On 11 June, [IITA](#) officially launched the Support to Women Entrepreneurship in the Agrifood Sector in Nigeria (SWEAN) project at its headquarters in Ibadan with the Ambassador of France and the Oyo State Governor. The project was awarded to Nigeria by the French Ministry for Europe and Foreign Affairs (Embassy of France in Nigeria) through IITA, the implementing partner. The project seeks to empower women agripreneurs, improve their skills, and facilitate their inclusion in market networks in Oyo and Kaduna states.



Left: Governor Seyi Makinde flagging off the SWEAN project. Middle: Sonia Darracq highlighting expectations for the next two years, and French Ambassador Jerome Pasquier (right) speaking at the opening, saying that agriculture will “save local currency” by limiting imports and creating employment for women.

During the opening, [Kenton Dashiell](#), IITA Deputy Director General, Partnerships for Delivery, acknowledged partners and the current relationship with Oyo State. “This project fits squarely into the strategic plan of IITA and reflects the Institute’s core beliefs,” he stated.

Jerome Pasquier, Ambassador of France, expressed delight in having one more project with Oyo State, with the support of the Governor and his administration. He said the project, developed in Kaduna and Oyo states, representing Nigeria’s northern and southern geopolitical zones, respectively, is a good response to some big challenges in the country. He congratulated the women’s associations on taking steps to improve women’s daily lives.

Furthermore, he mentioned how agriculture could help save foreign currency by limiting imports and creating employment for women. “We are very pleased that the French ambassador is involved in this program in cooperation with French colleges. I hope that this cooperation will be long term,” the Ambassador said.

Jacob Ojekunle, Commissioner for Agriculture, Oyo State, stated in his remarks that developing agriculture in Nigeria through this project is a good strategy by the French Ministry for

Europe and Foreign Affairs. The women in the agriculture and food sectors who are taking part in the project expressed an interest in food processing and fortification, branding and packaging, and market and export opportunities. These unique areas of intervention will ensure the project’s sustainability. He assured the French ambassador that “the involvement of Oyo State women will continually make you proud.”

Halima Lawal, Commissioner for Agriculture, Kaduna State, reminded attendees that ending hunger and poverty is one of the sustainable development goals. Hence, empowering women in business will certainly stimulate the Nigerian economy. Moreover, she said the project provides a realistic solution to diversify Nigeria’s economy by making women participate in agriculture, thus providing better benefits to the country. She urged the government to extend the scope of the project “to equipment supply, facilitation of market linkages, and shared facilities, to enable the women to add value and get better prices for their products.”

[Adebowale Akande](#), Director General, Oyo State Agribusiness Development Agency, stated in his talk that the priority given to agriculture has dovetailed into many other areas, including Oyo State programs on agribusiness policy and

governance, youth in agribusiness, and regional agribusiness development. SWEAN is one of the projects that cut across these programs.

Sonia Darracq, Regional Agriculture Counsellor, French Embassy, said that the project would be the beginning of expanding women’s empowerment over the next two years.

“We are building training modules to train 300 women, which will be used by technical colleges of agriculture throughout the region,” she stated. “Some of the women trained will become trainers at the federal level,” she added.

[Seyi Makinde](#), Executive Governor of Oyo State, explained that the French ambassador had pinpointed the vast potential of Oyo State in both human and natural resources, which led to the collaboration on developing the agricultural sector between Oyo State and the French government. “When the right people are given the right opportunities, they thrive,” he stated.

“I know that the women beneficiaries chosen were carefully selected and will put in their best to be worthy ambassadors of Oyo and Kaduna states,” he added.

[Zainatou Soré](#), Head, Capacity Development Office, is the coordinator of SWEAN.

IITA research fellows to partner with national research institutes for development

The International Association of Research Scholars and Fellows (IARSAF) at IITA went on a working visit to selected national research institutes (NRIs) in Nigeria on 8-10 June. The educative tour sought to identify challenges, opportunities, and possible innovative solutions to transfer knowledge for national development. The tour also served as an opportunity to meet IITA alumni working in such institutions and get success stories of IITA's impact on their career journey.

The IARSAF team selected five key research institutes in Ibadan that play significant roles in ensuring sustainable food production and that could partner with IITA to achieve the mandate of transforming Africa's agriculture. The institutes were the National Centre for Genetic Resources and Biotechnology (NAGRAB), National Horticulture Research Institute (NIHORT), Forestry Research Institute of Nigeria (FRIN), Cocoa Research Institute of Nigeria (CRIN), and Institute of Agricultural Research and Training (IAR&T).

The institutes warmly received the team, and sessions for constructive deliberations took place. The group visited the institutes to see ongoing activities and identify gaps they could leverage for collaboration with IITA.

At NAGRAB, the team visited the gene bank and the tissue culture and molecular biology laboratories. At NIHORT, the team went on a tour of the mushroom production unit, product development laboratory, citrus nursery and orchard, floriculture, and the soil

laboratory. At FRIN, the team visited the entomology unit, dry and wet laboratory, value addition laboratory, production showroom, sericulture unit, and animal husbandry. The cocoa plantation nursery field, flavor laboratory, cashew farm, and tea fields were visited at CRIN; while at IAR&T, after a brief meeting with the Executive Director, the team visited the seed bank.

The visit revealed that most NRIs need continuous upscaling in staff capacity development and require more funding to fulfill their mandate. During the interactive meetings, the Directors of each institute expressed an interest to partner with IITA in areas that need technical backstopping, such as capacity development.

Dr Anthony Okere, the Deputy Director for Research and Development, NAGRAB, highlighted the need to sign a memorandum of understanding (MoU) to seal a partnership, while Prof Adeshola Adepaju, the Director General of FRIN, and an IARSAF alumnus, emphasized the need for collaboration, after expressing



IARSAF team touring the entomology unit at FRIN.

excitement over the youth's show of interest to explore and practice what they have been learning as early-career scientists. "We need you young people to change the narrative of the country's economy," he said.

IARSAF President Olakunle Sansa said "IARSAF is determined to open doors for the NRIs, particularly through the provision of facilitators and capacity development for NRI staff and initiating research activities." He said this is expected to help improve the activities of the NRIs and foster collaboration with IITA to meet the goals of agricultural transformation in Nigeria and Africa at large.



IARSAF team touring the NAGRAB's seed bank (left) and the cocoa nursery at CRIN (right).

Study sheds light on banana's defense mechanism against the deadly *Fusarium* wilt disease

IITA scientists have identified the defense mechanisms for *Fusarium oxysporum* f. sp. *cubense* (Foc) in resistant and susceptible cultivars with or without biological control agent (BCA) inoculation as part of efforts to identify effective ways to control *Fusarium* wilt of banana.

Fusarium wilt is a disease caused by the soilborne fungus *Fusarium oxysporum* f. sp. *cubense* (Foc). It persists in soil for long periods as chlamydospores (thick-walled resting spores), even in the absence of its host. Once bananas have been infected, the fungus can easily spread through infected planting materials, soil run-off, and farm activities.

Fusarium wilt is currently the most prominent disease that threatens global banana production, which does not have an effective control method. Researchers have been exploring the use of biocontrol agents to enhance plant resistance. *Bacillus* spp. and *Trichoderma* spp. are the two endophytes (fungi that live as parasites within the plants) that have been successfully used as BCAs against *F. oxysporum* in many host plants.

Banana is an important staple food crop for food security and income generation for smallholder farmers in sub-Saharan Africa. However, its production has been negatively impacted by *Fusarium* wilt disease for decades.

[Manoj Kaushal](#), a Systems Agronomist from IITA and the author of the study, noted that the defense mechanisms of resistant and susceptible banana cultivars treated with BCAs were regulated by differentially expressed genes in various categories of defense pathways.

"BCAs reduced the necrotic symptoms in the roots and leaves of the *Fusarium*-susceptible cultivar and lateral root growth were clearly visible in both the susceptible and resistant cultivars under BCA treatments," Manoj explained. This study is the first to perform transcriptome and expression profile sequencing of a *Fusarium* resistant and susceptible cultivar following inoculation with BCAs. Furthermore, the insights gained on disease stress response provide researchers an idea on how to explore the orthologous genes and potential candidates for developing *Fusarium* wilt tolerant banana cultivars.

The study targeted the expression of defense-related genes in tissue-cultured banana plantlets of *Fusarium* resistant and susceptible cultivars after infection with BCAs and *Fusarium* (Foc race 1).

A total of 3034 differentially expressed genes (DEGs)—genes responding to signals or triggers—were identified. The results showed the DEGs involved in complex defense pathways in response to the pathogen.

The findings were published in the paper [Comparative Transcriptome and Expression Profiling of Resistant and Susceptible Banana Cultivars during Infection by *Fusarium oxysporum*](#) in the *International Journal of Molecular Sciences* on 16 March 2021.

This research contributes to work on [Biological Control Agents Against *Fusarium* Wilt of Banana](#) to validate biological control by deepening the knowledge on the most valuable biological control agents and improving their efficacy by setting up effective formulations, application protocols, and integrated strategies.

The research was supported by the [CGIAR Fund](#), in particular to the [CGIAR Research Program Roots, Tubers and Bananas](#) (RTB).



Top: Banana sampling fields (Tanzania-Kilimanjaro region).
Bottom: Treatment of banana suckers with endophytes (BCAs).