

## Science-based policies can unlock Africa’s access to genome-edited crop varieties

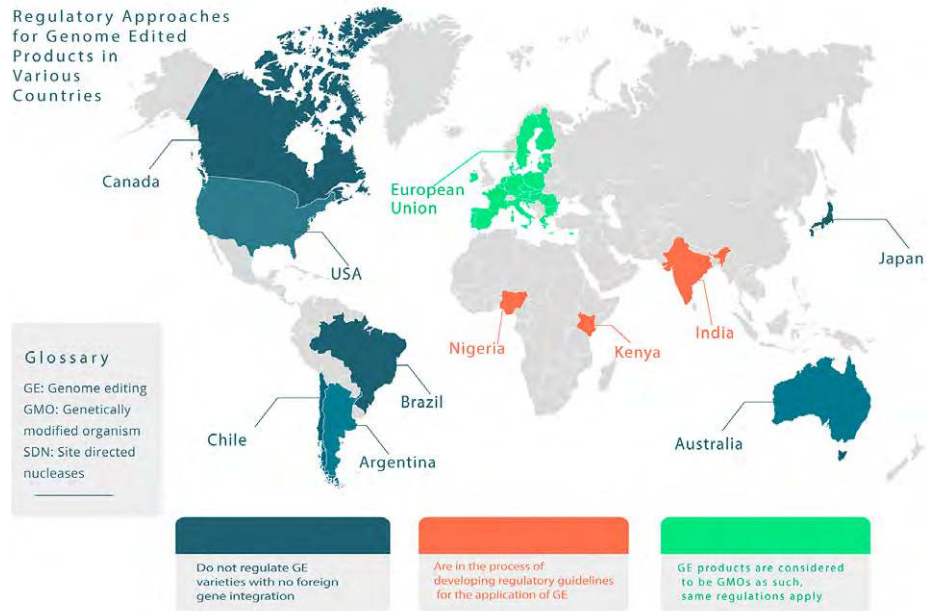
[CGIAR-IITA](#) head of plant biotechnology [Leena Tripathi](#) has made an impassioned plea for genome editing (GE) and its potential. She made the call in a recently published paper titled [CRISPR/Cas9-based genome editing of banana for disease resistance](#). Tripathi and her Kenya-based team are using gene editing to develop disease-resistant banana varieties.

“To boost the use of genome editing in crop improvement, we need to develop science-based guidelines, which will treat the GE varieties as similar to those generated through conventional breeding, particularly where no foreign gene is inserted,” said Tripathi. “It will enhance the adoption of disease-resistant GE varieties, hence contributing to food security, especially in Africa.”

She also said that scientists should use newer tools in breeding or risk a food security crisis. Plant pests and diseases account for 20–40% of yield loss and have, in some instances, wiped out entire crop varieties. For example, fusarium wilt (Race1) wiped out Gros Michel (a dessert banana variety), which was replaced by Cavendish that

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Regulatory Approaches for Genome Edited Products in Various Countries



Global regulatory approaches for genome-edited products.

## IITA plays vital role in Cameroon seed system during COVID-19 crisis

During the COVID-19 pandemic [IITA-Cameroon](#) is providing high-quality seeds of improved crop varieties to smallholder farmers through the Ministry of Agriculture and Rural Development (MINADER). The seed legislation in Cameroon classifies seed into basic seeds, certified seeds, and standard (commercial) seeds. IITA, in collaboration with Cameroon’s Agricultural Research Institute for Development (IRAD), has the responsibility of producing basic seeds for major commodities such as cassava, plantain, maize, soybean, and cowpea, which are the Institute’s



An IITA seed multiplication plot for maize.



A soybean yield trial site in IITA-Cameroon.

mandate crops and staple foods for millions of people.

MINADER has requested to emphasize the introduction of biofortified cassava through its various projects. Introduced varieties undergo preliminary yield and advanced testing in trial fields for two cropping cycles. During these two trials, any variety with low yield or high susceptibility to major pests and diseases get dropped. After this, farmers around the country participate in trials to evaluate the adaptability and resistance of the preselected varieties in contrasting environments.

Basic seed from the final selection are cultivated in multiplication plots, and the resulting seeds are certified by the Department of Regulation and Quality Control of Agricultural Inputs (DRCQ), after at least two inspections. For

commodities like banana and plantain, the IITA tissue culture laboratory produces in vitro plants mainly for MINADER and the private sector.

The coronavirus pandemic has caused much uncertainty for farmers, making it harder to access improved seed. For seed producers, this has created an opportunity to build the food sector and put in place quick recovery measures and a diverse foundation for the food system, beginning with the seeds.

The current food shortages could be a sign of more severe issues in the nearest future. In the context of COVID-19, IITA-Cameroon has been “intervening” in the seed system by introducing cowpea and soybean seeds from Ibadan and establishing small multiplication plots for cassava and maize on the station.

IITA is also helping by building the capacity of the national agricultural research system through a series of workshops organized annually to train seed multipliers and seed inspectors on variety identification, high-quality seed production techniques, integrated pest management (IPM), and integrated soil fertility management (ISFM). As a result, IITA varieties contributed to the first official catalog of plant species and varieties printed in 2020 with 11 cassava varieties (79% of total), three plantain varieties (21%), 19 soybean varieties (100%), and seven maize varieties (28%).

Over 109 cassava multipliers and seed inspectors, of whom 12% are women, have received training in the last two years in cassava seed production and IPM.

## 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](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.



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now accounts for 90% of all banana exports.

In their [journal article](#), the authors further state that the emergence of new threats to banana production, such as Tropical race 4 (TR4), creates an urgency to develop disease-resistant varieties using new breeding tools such as genome editing.

Bananas are affected by multiple pests and diseases that can co-exist. For example, nematodes, weevils, black sigatoka, and bacterial wilt, can all infect a banana field at the same time and are worsened by drought due to climate change. How then does a farmer deal with all problems?

Using pesticides is both costly and detrimental to human and environmental health. With advances in science, researchers have now opted

for breeding disease-resistant varieties. According to Tripathi, "The traditional breeding of banana is challenging, particularly the introduction of multiple fungal, bacterial, and virus-resistant genes, at the same time into the crop as it may cause considerable yield reduction or intensify other undesirable traits because of genetic linkage."

Genome editing can complement conventional breeding by speeding up the crop improvement process. As Tripathi explained in [this video interview](#), newer breeding methods are precise, which avoid incorporating undesirable traits in the improved varieties. Conventionally bred banana varieties have struggled with consumer acceptability due to their altered taste. Genetic modification and CRISPR can address this long-standing challenge with their precise alteration capability.

### Regulatory approaches

Genome editing has shown immense potential for crop improvement, but its regulation is still in the early stages, and countries have differences in the regulation of GE crop varieties. Genome editing technologies can create genotypic and phenotypic plant variations that are indistinguishable from those produced through natural means or conventional mutagenesis methods.

Several countries such as Argentina, Australia, Brazil, Canada, Chile, Japan, and the USA do not regulate GE varieties with no foreign gene integration. Other countries like India, Kenya, and Nigeria are in the process of developing regulatory guidelines for the application of genome editing.

Science-based regulatory guidelines will enhance the adoption of disease-resistant GE varieties, hence contributing to food security.

## IITA economist: COVID-19 strengthens the need for a policy of food self-sufficiency for Africa

The effect of the COVID-19 pandemic on food security has revived the long-standing debate on the pathway to achieving food security in sub-Saharan Africa. There have been two divergent thoughts on how to accomplish this, with one side calling for Africa to become food self-sufficient and the other supporting international trade over self-sufficiency.

Both approaches have merits and demerits with the dependency on international trade being risky and a policy of food self-sufficiency being inefficient or costly. Dr [Shiferaw Feleke](#), an agricultural economist at [IITA](#), argues that the COVID-19 pandemic demonstrates the need for African countries to increase domestic production to meet food consumption requirements by trading off efficiency for sufficiency.

Feleke was speaking at a recent seminar titled "Advancing a policy of food self-sufficiency in post-COVID-19 Africa" delivered at IITA-Eastern Africa offices in Dar es Salaam, Tanzania.

Dependency on international trade, Feleke said, is risky as the international food commodity market is thin with fewer sellers. According to the [IFPRI](#)

[2011 Global Food Policy Report](#), only five countries supply 84% of the world's maize and 85% rice exports and 63% of the world's wheat exports. [For example, in 2009, 7 African countries relied on Thailand for over 96% of their rice imports](#). Therefore, disruptions in the global supply chain, as in the case with COVID-19, can result in price spikes that can significantly impact Africa's food security.

Feleke also noted that the supply and demand for food are also price inelastic, which means that small changes in global demand or supply can cause spikes in the price. The price spike would disproportionately affect consumers in Africa as they spend 60–80% of their income on food.

On the other hand, he said, when it comes to Africa's exports, the structure is undiversified and unsophisticated, with many countries depending on a narrow range of commodities exported raw, to a few destinations and with limited trading partners. This means that in the event of a disruption in global supply, such as in the case of COVID-19 that leads to a drop in Africa's export prices, the continent then has to export a higher quantity



IITA Agricultural Economist, Dr Shiferaw Feleke.

of commodities to purchase the same amount of imports. This shows that a policy of food self-sufficiency would be more advantageous for Africa.

### Tanzania and wheat imports

Tanzania is generally food self-sufficient in most regions of the country and for many commodities with few exceptions, such as wheat.

"[Wheat](#) is Tanzania's fourth most consumed crop after maize, cassava, and rice and the country is a big

importer of wheat grains, accounting for about one-third of the total food import value. According to [data from FAO](#), between 2010 and 2017, Tanzania imported about \$158 to \$415 million worth of wheat, amounting to \$289 million per year," Feleke said.

As its wheat imports are too small to influence the world price of wheat, Tanzania is facing a perfectly price-elastic world demand. So, given its high reliance on international trade, a

slight increase in world wheat price and a small decrease in income (GDP) can result in substantial import reduction with significant implications for food security.

One way to address the potential reduction in wheat imports would be to substitute expensive wheat flour with other cheaper flour sources such as cassava. This approach, for example, requires adopting a policy instrument supporting the blending of

wheat flour with high-quality cassava flour (HQCF) as well as investing in wheat research and irrigation to increase wheat productivity and production.

"Therefore, while it is true that a policy of food self-sufficiency comes at an economic cost due to loss of efficiency, that cost needs to be compared against the risk of going hungry caused by a price hike in the international food market!" he said.

## Integrated Agriculture Activity trains youth as spray service providers in Adamawa and Borno States...

The USAID-funded Feed-the-Future Nigeria Integrated Agriculture Activity (IAA) recently concluded the training of 30 youths as spray service providers (SSPs) in Adamawa and Borno States, in North-Eastern Nigeria. The first sessions of the training, which began in February, and held in Borno had 15 participants. The Adamawa Agriculture Development Investment Limited Farming Skills Acquisition Centre hosted the concluding sessions, with 15 youths in attendance, facilitated by CropLife Nigeria (CLN).

The training aimed to equip participants with the relevant skills to become expert SSPs and provide them with income-generating opportunities through rendering of agrochemical spraying services to farmers in their area. The learning sessions are part of the youth

empowerment program of the IAA project.

The trained SSPs, all male and between 20 and 30 years old, are mostly practicing farmers and graduates of different tertiary institutions. The participants came from seven implementing Local Government Areas (LGAs) in Adamawa and five implementing LGAs in Borno. Because of reproductive health hazards involved in spray services and the heavy weight of the full knapsack sprayer, the training did not involve women.

Participants received training on weed and pest management, pest scouting, types and formulation of pesticides, personal protective equipment (PPE), first aid, record keeping, entrepreneurship, and customer relations.

In his comments during the closing program, the Activity's Deputy Chief of Party (DCoP), Kayode Faleti, congratulated participants on taking part in the training. He urged them to be safety conscious while handling the chemicals and ensure that they make judicious use of the skills and tools they received. Responding to the DCoP, a participant from Hong LGA, Evans Ishaku, thanked IITA and USAID for giving them the training opportunity and empowering them with skills.

The IAA supported the participants with knapsack sprayers and complete PPEs, which included safety caps, protective eyewear, overalls, respirators, hand gloves, rain boots, and logbooks to commence their enterprise activities in the farming season.



Borno State participants and IAA staff at the training in February 2020.



Adamawa State participants with training facilitators.

## ...and holds training on infant and young child feeding

Optimal Infant and Young Child Feeding (IYCF) practices are very crucial to the growth, development, health, and survival of every child. The Nigeria Demographic and Health Survey (NDHS) found that IYCF practices in Nigeria remain unsatisfactory as there is a low rate of timely breastfeeding initiation (38%) and lower rates of exclusive breastfeeding for six months (13%). They also estimate that nearly 60% of all childhood deaths are due to underlying malnutrition, while the outbreak of the COVID-19 pandemic further exacerbates the problem of nutrition deficiency.

In efforts to improve participants' nutritional status, the IAA, in collaboration with Adamawa State Primary Health Care Development Agency, recently conducted a 3-day training workshop on "Infant and young child feeding for Community Development Officers, Nutrition Focal Officers, and Social Workers" in Yola, the Adamawa State capital. The 21 participants (14 female and 7 male) were selected from seven implementing LGAs in the state. Facilitators took turns to explain why IYCF matters, especially with the COVID-19 pandemic and everyday situations that affect infant and young child feeding considering participants' individual experiences and circumstances.

The training featured interactive sessions, such as group discussion

and participation, practical sessions, illustrations, and PowerPoint presentations. The workshop also included role-playing on counseling using case studies, group work, demonstration, gallery, discussion, question and answer sessions, and buzz groups.

Participants learned how to breastfeed with proper positioning through practical demonstration while using a counseling card as a guide throughout the training. Also, the use of Mid-Upper Arm Circumference (MUAC) tape and

its interpretation was demonstrated with IYCF data tools discussed in detail. The trainers also spoke about myths and misconceptions, women's nutrition at different stages of life, feeding a sick child and when to take the child to the hospital, and other topics.

At the end of the workshop, participants developed their action plans to step down the IYCF training to participants in the LGAs they represent and use the knowledge gained themselves. The Activity conducted a post-test to confirm what they learned.



Infant and Young Child Feeding (IYCF) recommendations when COVID-19 infection is suspected or confirmed.