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IITA and partners rename improved cassava varieties for the international market

The Federal Government of Nigeria recently approved new names for 10 improved cassava varieties as part of efforts to brand the root crop for easy identification, cultivation, and marketing of cassava stems.

A farmer proudly displays the TME419 cassava variety.

The renamed varieties comprise six released varieties and four yet-to be-released varieties. The released varieties and their new names are IBA961632 (Farmer's Pride), IBA980581 (Dixon), CR36-5 (Ayaya), IBA070593 (Sunshine), and IBA980505 (Fine Face). TME 419, which is popular among farmers, remained unchanged. The yet-to-be-released varieties include TMS13F1160P0004 (Game Changer), TMS13F1343P0022 (Obasanjo-2), NR130124 (Hope), and TMEB693 (Poundable).

Cassava is a major staple crop grown in about 40 countries across Africa and that feeds millions on the Continent. With about 90% of production taking place in small farms, cassava is mostly grown by smallholder farmers in the rural areas with little access to improved technologies to increase their productivity. Yet, research has been a major contributor to helping

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Genome editing is the future of plant breeding

"Genome editing is the future of plant breeding in terms of being more efficient and getting more genetic gains," said Kingstone Mashingaidze, one of the speakers at the recently held CGIAR webinar on genome editing.

CGIAR centers using genome editing recently started a webinar series that will investigate the practice, benefits, social acceptance, and regulation of genome-edited products. These centers include IITA, ICRISAT, ILRI, IRRI, ICARDA, Alliance of Bioversity International and CIAT, CIP, and CIMMYT. The first webinar was held on 22 September.

Kingstone Mashingaidze, a Senior Research Manager with the Agricultural Research Council based in Pretoria, South Africa, lamented the low agricultural productivity in sub-Saharan Africa compared to the rest of the world. He said, "Although for some people climate change is something for the future, for the farmer, climate change is now and already here. Africa is suffering from poor crop yields due to old and emerging pests and diseases such as maize lethal necrosis in East Africa and Fall armyworm for the rest of the Continent, coupled with nature's vagaries." Mashingaidze sald that breeders could not rely only on conventional breeding, which is slow, costly, has low genetic gain and a slow variety turnover.

Like all other speakers, he made a case for adding newer tools to the breeding toolkit, genome editing being one of them. Mashingaidze said that modern techniques such as genome editing allow for quick, efficient, and effective modification of crops.

Now that it was no longer contested whether genome editing adds value or not, the next point of discussion was its regulation and social acceptance.

Neal Gutterson, the Chief Technology Officer from Corteva Agriscience, reminded participants that social acceptance, although paramount to adoption, is still uncertain. The speakers recommended partnerships with the private sector as the only way to move new technologies faster to farmers.

As it is, most of Africa is struggling with putting in place genetic engineering (GMO) regulations, so it goes without saying that there are going to be challenges with enacting policies for genome editing and its products.

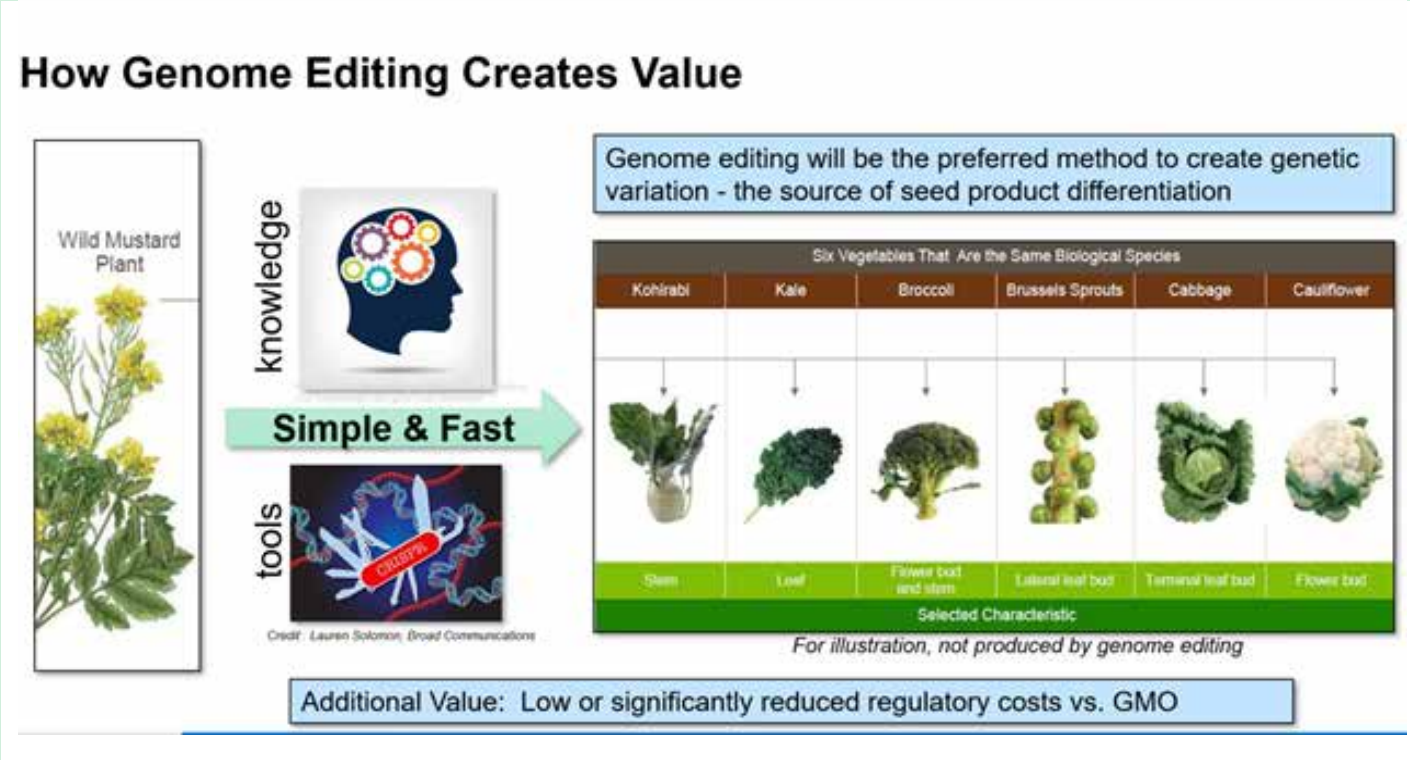
All the webinar speakers had a consensus: "Genome-edited crops are different from GMOs and should be regulated differently."

Genome editing is a group of technologies that give scientists the ability to change an organism's DNA. These technologies "allow genetic material to be added, removed, or altered at particular locations in the genome."

To take part in this 5-week webinar series Register at: http://icrisat.bmetrack.com/c/l?u=ACA41B2&e=10E1D0A&c=4B007&t=0&l=2A863941&email=9YYc0NIuUivA52C4CqW0DIbyzHNB5Rcr&seq=1

Other webinars will focus on:

1. Genome Editing in Agriculture: Innovations for Sustainable Production and Food Systems, 29 September 2020
2. Applications of Genome Editing in Agriculture: CGIAR Focus on Crop Improvement, 6 October 2020
3. Applications of Genome Editing in Agriculture: CGIAR Focus on Livestock and Aquaculture, 20 October 2020



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the smallholder farmers in Africa increase their productivity and profit, with the release of improved varieties that promote increased yield and are resistant to pests and diseases.

While these improved varieties have code names, research shows that these names are not easy for most farmers to adopt and remember. This led IITA, in collaboration with partners and major stakeholders, to organize an event to rename selected improved varieties.

The virtual event was attended by major stakeholders in the cassava sector within and outside Nigeria.

Speaking at the event, the representative of the Minister for Agriculture in Nigeria, Karima Babangida, Director, Federal Department of Agriculture, said that it was a welcome development since cassava is a major crop in Nigeria. "With the new names, it will make it easier for farmers to pronounce and identify these varieties."

According to IITA Deputy Director General (Partnerships for Delivery), Kenton Dashiell, "The renaming of the varieties will help the cassava sector in a big way."

During his opening remarks, Prof Ukpabi C. Ukpabi, Executive Director of the National Root Crops Research Institute (NRCRI), Umudike said, "The renaming of improved varieties will change the game in the seed system of root and tuber crops in Nigeria and also serve as a model for other African countries."

Most end-users find it difficult to remember code names of improved cassava varieties, which can lead to a mix-up during sourcing, so substituting them with brand names will make it easier for people to identify them. The renaming also targets promoting the adoption of the varieties among farmers. Major stakeholders like farmers, "seedpreneurs," and scientists participated in the naming process.

Chiedozie Egesi, Project Manager for the NextGen Cassava Breeding (NextGen Cassava) project, during the ceremony, said, "We know that cassava production has evolved from subsistence to industrial, with cassava becoming an economic crop. This is changing the lives of farmers, seed entrepreneurs, and processors at an industrial scale. Substituting the official names of the varieties with simpler or more relatable brand names will make farmers more familiar and closer to the varieties."

Further reiterating the significance of the event, Lateef Sanni, Project Manager of Building an Economically Sustainable, Integrated and Economically Sustainable Cassava Seed System, Phase 2 (BASICS-II), said, "Cassava is an engine for creating wealth and farmers need to have marketable names to be able to sell to the international market."

From the BASICS-II project, two early generation seed companies, IITA GoSeed and Umudike Seeds, have been set up to ensure the production and commercialization of breeder and foundation seeds in a sustainable manner to ensure constant access to quality planting material of improved varieties," Sanni explained.

The naming of the varieties was facilitated by BASICS-II that is being led by IITA and NextGen Cassava in partnership with NRCRI.

Women traders in a cassava market in Southwest Nigeria.

Scaling readiness: An approach to enhance R4D impact

Research to improve society can go to waste if these interventions are not made available to the beneficiaries. Murat Sartas, Marc Schut, Claudio Prioietti, Graham Thiele, and Cees Leeuwi—in a published journal paper titled Scaling readiness: Science and practice of an approach to enhance impact of research for development—charged researchers who aim to implement R4D interventions to incorporate scaling readiness factors right from the conceptualization phase of their innovation interventions.

Marc Schut

Scaling is how new technologies, products, services, and improved practices receive acceptance and become part of our daily lives.

The success of an intervention depends on the availability and success of other core and subsidiary interventions related to it. For example, introducing a new cassava variety will depend simultaneously on upscaling complementary practices such as weeding, farm inputs, pesticides, and credit. And on a broader scale, an intervention in the agricultural sector may impact the health sector. Considering this interdependence, a tool to guide decisions on scaling interventions is necessary.

The authors developed a scaling readiness tool for innovation-based interventions. The tool assesses the readiness of innovations to achieve their intended impact and provides monitoring and evaluation strategies. The scaling readiness tool can also be used by donors to make informed decisions on which projects to invest.

The authors propose five key concepts relevant to scaling readiness. The first is content specific. This means an innovation is scalable in the specific context of its designed use, a one-size-fit-all approach will usually not work.

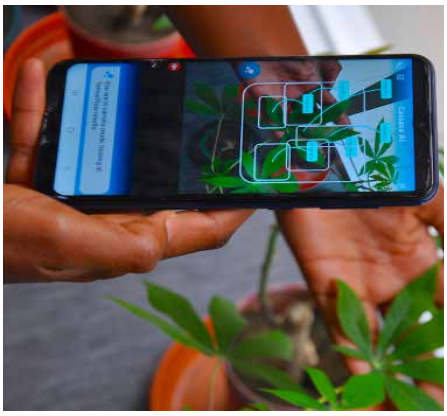
The second compares the current innovation with other related innovations, implying that innovations cannot be usefully scaled in isolation but should be seen as part of an innovation package. This package then becomes the unit of analysis for assessing scaling readiness. The third involves identifying the bottlenecks that could militate against the success of the intended intervention. The fourth identifies stakeholders who would work together with the team. And the fifth is monitoring and evaluation and making necessary adjustments.

In their scaling readiness tool, Schut and team transformed the technology readiness index developed by NASA (Parasuraman 2000; Sauser et al. 2008) and adopted by the Horizon 2020 Programme of the European Union (European Commission 2014) into a scale for assessing the readiness of all types of R4D innovations. Based on these identified concepts, they proposed the five-cycle steps for scaling readiness indicated in the diagram below.

Teamwork delivers results in addressing cassava virus diseases!

"If you want to go quickly, go alone, if you want to go far, go together." The meaning of this African proverb is well manifested by the Virus Vector Ecology Group (VVEG) team at IITA's Eastern Africa Hub as James Legg, IITA Plant Health Scientist and team lead, shared on its progress and successes towards addressing the viral disease challenge facing cassava in Africa and even Asia.

The VVEG team is divided into several subteams working on different angles to find innovative solutions to control the spread of the two major virus diseases, cassava mosaic disease (CMD) and cassava brown streak disease (CBSD), to improve cassava productivity in Africa and Asia. Legg highlighted some of the notable outcomes of the teams at a virtual seminar titled "Teams, Whiteflies, Viruses, and More", held at IITA Eastern Africa Hub, Dar es Salaam, Tanzania, on 17 September.



Left: Eveline Wosula of the VVEG counting whitefly eggs on cassava leaves in the laboratory. Right: NuruAI app scanning leaves of a cassava plant to detect diseases and pests.

The whitefly team

Cassava whitefly, *Bemisia tabaci,* is the vector that transmits the viruses that cause CMD and CBSD. Efforts to control the diseases start with proper identification of the vector. The Whitefly team is therefore working on developing simpler but sensitive diagnostic tools geared towards identifying the various subgroups of the cassava whitefly and their distribution in the region. One such technology is the use of Kompetitive Allele-Specific PCR (KASP). Using this in-house technology, the team identified and characterized the whitefly population in Eastern and Central Africa and found evidence for hybridization between genotypes of cassava *Bemisia tabaci* in Eastern Democratic Republic of Congo (DRC).

The team is also working on innovations to effectively control the whitefly pest, including the use of essential botanical oils, soft chemistry pesticides, and entomopathogenic fungi. Legg particularly noted that excellent results have been obtained from the lab trials on the effectiveness of some essential oils such as Patchouli in reducing whitefly populations and also Flupyradifurone, a soft chemistry pesticide developed by Bayer which was found to be significantly more effective than Imidacloprid—the currently most-widely used pesticide. Flupyradifurone also had fewer nontarget effects.

Cassava virus team

The virus team is working on understanding developing diagnostics to detect viruses in cassava plants. This is important as part of efforts to control the disease spread by ensuring clean and disease-free seed. The team has developed a modified Loop Mediated Isothermal Amplification (LAMP) protocol for detecting cassava brown streak viruses. This method can be cheaper, quicker, and more portable than the currently used real-time polymerase chain reaction-based method. The new LAMP technique will be extremely useful to the Tanzania Official Seed Certification Institute (TOSCI) for certification testing that needs to be done in the cassava as well as other seed systems.

The team is also conducting surveillance to monitor the spread of CBSD to new areas. Recent surveys implemented together with national research systems in Tanzania, eastern DRC, and Zambia have revealed that the disease is spreading eastwards and southwards through south-eastern DRC, northern Zambia as well as the western part of Tanzania along the shores of Lake Tanganyika.

Cassava Seed systems team

Previously farmers replanted their old cassava stock or borrowed from neighbors because of a lack of cassava seed systems, contributing to the spread of both CMD and CBSD.

The cassava seed team is working together with TOSCI, TARI, MEDA, and other partners in Tanzania to modernize cassava seed systems. This includes putting in place protocols and systems of quality assurance for disease-free seed. The quality control certification guidelines have been developed and adopted as law in Tanzania, Rwanda, and Burundi to guide production and supply of cassava quality seed. The team has also rolled out the use of SeedTracker, an ICT system facilitating real-time e-certification of clean seed in Tanzania; currently, more than 100 seed producers are registered on the platform.

Nuru team

To tackle the challenge of diagnosing plants affected by the viral diseases, IITA and Pennsylvania State University, USA, have collaborated to launch Nuru (Swahili for light), an artificial intelligence, phone-based disease diagnostic application. It recognizes leaves damaged by CMD and CBSD but also damage by green and red mites.

The team has made many improvements in the performance and accuracy of NuruAI in detecting diseases and pests. In this regard, NuruAI has been found to outperform trained extension officers in diagnosing cassava diseases. NuruAI has been used to monitor cassava diseases in 19 African countries with Tanzania, Kenya, and Ivory Coast as use hotspots.

"Life is what happens to us while we are making other plans," says another saying. All the outcomes have boosted the team's morale to take on new challenges. The plans for the next three years (2020/2023) shared by Legg include continuing to control the spread of the cassava viruses through clean seed systems and the development of better, faster, cheaper, and more effective diagnostics. With good collaboration, the team is excited to embark on a new journey of R4D and P4D adventures.