



IITA scientists develop multiple stress tolerant maize hybrids with high levels of Pro-Vitamin A

Vitamin A deficiency is a major health problem in sub-Saharan Africa (SSA). *Striga hermonthica* (Giant Witchweed) and drought are two major constraints to maize production in the sub-region.

Development and deployment of multiple stress tolerant maize hybrids with high levels of Pro-Vitamin A (PVA) offers a solution to food insecurity and malnutrition in SSA. The <u>HarvestPlus</u> Challenge Program has established 15 μ g/g as the breeding target for PVA maize hybrids and open-pollinated varieties, however, only a few released PVA maize hybrids have attained this level of PVA.

A team of <u>IITA</u> maize scientists and molecular geneticists coordinated by the IITA early and extra-early Maize Program Lead, <u>Baffour Badu-Apraku</u> have developed extra-early PVA maize inbred lines and hybrids with very high levels of PVA. The chemical analysis carried out in the Food and Nutrition Science Laboratory in IITA-Ibadan has revealed the following results for the extra-early PVA maize inbred lines: TZEEIOR 202 (23.98 μ g/g) and TZEEIOR 205 (22.58 μ g/g).

Furthermore, crosses involving the high PVA maize inbred lines resulted in the development of PVA hybrids TZEEIOR 197 x TZEEIOR 205 (20.1 μ g/g) and TZEEIOR 202 x TZEEIOR 205 (22.7 μ g/g), containing about double the amount of PVA of the commercial PVA hybrid check, TZEE-Y Pop STR C5 x TZEEI 58 (11.4 μ g/g).

Results of multilocation trials under drought, artificial Striga infestation, and optimal environments in Nigeria during the period 2015–2017 have shown outstanding agronomic performance of the PVA maize hybrids. The hybrid



(L-R) Abidemi Talabi and Program Lead, Baffour Badu-Apraku. Cobs of some Pro-Vitamin A maize hybrids.

TZEEIOR 197 x TZEEIOR 205 with PVA level of 20.1 μ g/g yielded 2723 and 4263 kg/ha across stress (Striga and drought) and non-stress environments, respectively. In contrast, TZEEIOR 202 x TZEEIOR 205 with PVA level of 22.7 μ g/g yielded 1637 kg/ha across stress and 4051 kg/ha across non-stress environments.

The new PVA hybrids out-yielded the commercial PVA top-cross hybrid check; TZEE-Y Pop STR C5 x TZEEI 58 had a yield of 1205 across stress environments and 2611 kg/ha across non-stress environments. These interesting results

open a great opportunity for breeding and releasing PVA maize hybrids with 50 percent higher levels of PVA than the target of $15 \mu g/g$ set by the HarvestPlus Challenge Program. Commercialization of these hybrids should contribute to food security and improved nutrition in West and Central Africa.

The collaborators on this research are Principal Scientist/Maize Breeder and Geneticist, Badu-Apraku; Research Administrative Manager, Abidemi O. Talabi; and Molecular Geneticists including <u>Ana Luísa Garcia-Oliveira</u> and <u>Melaku Gedil</u>.



Youth Agripreneur insists beans can be preserved naturally without using Sniper

Bose Idowu graduated from the <u>Federal University of Agriculture, Abeokuta</u> (FUNAAB) with a BSc in Animal Science and an MBA in Agribusiness. She joined the <u>IITA Youth</u> <u>Agripreneurs</u> (IYA) program in 2012 as part of the Cereals and Legumes team, where she was trained in cultivation and farm management on farms in northern Nigeria.

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"We used to plant soybean, maize, and cowpea on 20, 40, and 50 hectares, respectively, on a yearly basis. And I happened to be one of the supervisors," she recalled.

It was at this point she conceived the idea of catering to a local market and, putting together capital of [500,000 which she had saved from the stipends she received from IYA, Bose began her business by purchasing and then reselling cowpea (beans) at the local marketplace.

She continued with the aggregation business model until 2016 when she secured extra funding from IITA and other donors that enabled her to cultivate a 5-hectare farmland of cowpea thus helping her expand her operations to production, processing, and packaging of cowpea.

Further funding came in 2017 with which she was able to rent and set up a factory, equipping it with processing machinery including a pulverizer and bean cleaning machine. Today, Idowu is the CEO of <u>GraceVine Foods</u>, employing four permanent staff along with other temporary farm and factory staff who are hired whenever there is need.

Idowu shared her story with a group of journalists and communication specialists who visited the factory as part of a workshop organized by the Enhancing Capacity to Apply Research Evidence (CARE) in Policy for Youth Engagement in Agribusiness and Rural Economic Activities in Africa project, which is a partnership project of the International Fund for Agricultural Development (IFAD) and IITA. The workshop delegates were taken on a tour of the factory whose production capacity far outweighs current demands. The current product offerings have been expanded and now include clean beans, yam flour, plantain flour, beans flour, and local rice, which is a recent addition.

Following the recent widely publicized scandal of preserving beans using a chemical insecticide popularly known as sniper, Idowu was asked how she tackles storage and preservation from the scourge of weevils.

She pointed out that the value proposition of offering natural products without the use of chemicals for preservation remained at the core of GraceVine operations and insisted that natural preservation is possible. She noted that proper storage starts at the farm and by buying the freshly harvested products straight from the farmers, you are able to transport and then clean the beans in the factory thus ensuring product quality from the onset.

After cleaning, the produce is bagged properly for storage and distribution.

"Once you are able to seal properly in air-tight packaging, for that period you are assured that your beans will be free of weevils," Idowu maintained.

She enjoined other producers and marketers to prioritize the health of consumers and adopt natural storage technologies such as the purpose-made PICS (Purdue Improved Crop Storage) bags which will keep weevils out while preserving the beans in their natural state well beyond 6 months. Idowu however pointed out that the presence of weevils can sometimes be a pointer that the beans are natural and have not be treated with any chemicals.

Speaking about future plans for GraceVine, Idowu stated that applications have been made with the <u>National Agency for Food and Drug</u> <u>Administration and Control</u> (NAFDAC) for proper product certification. Not having certification has limited distribution as the company is unable to supply the bigger supermarket chains, but once certification has been completed, she plans to scale up production and distribution to cater to the out-of-town market with export possibilities also being considered.



Bose Idowu showcases her packaged product.

AWF and IITA proffer sustainability and conservation interventions in DRC

The tropical agricultural research project "Mapping patterns of governance and technological innovations in a tropical forest-agriculture frontier of the Democratic Republic of Congo" was carried out from December 2012 to September 2018, and covered a 2000 km² area in Carré Djolu-Befale (CaDioBe), around Diolu-Lingomo, Lingomo-Mompono, Mompono-Befori, and Befori-Djolu in Tshuapa Province of Democratic Republic of Congo. The 6-year project, sponsored by African Wildlife Foundation (AWF) and IITA, was implemented by triangulating satellite forest cover with ground truthing, household surveys, and farm inventories.

The main objective of this AWF and IITA partnership in the Maringa-Lopori-Wamba (MLW) landscape in the Tshuapa Province was based on the participative forest conservation through a wide program targeting the ecological integrity of the humid forest ecosystem of the Congo Basin.

Before the commencement of the research, relatively little attention was given to the development of a governance model for the innovation and diffusion of productive conservation technologies; and the existing productive conservation processes were complex. Hence, planned interventions to mitigate negative environmental impacts of existing livelihood strategies identified intensification and diversification of agricultural production as key action areas. Some of the IITA researchers on this project included Project Coordinator Nzola-Meso Mahungu, **Regional Scientist on Agricultural** Intensification Kehbila Anderson, and Research Associates Willy Tata-Hangy and Frangoie Antoine.

Several improved cassava, rice, maize, and groundnut varieties as well as six improved cowpea and soybean varieties all underwent adaptive field trials in the landscape.

Researchers discussed how to govern productive conservation, mapping patterns of governance, and technological innovations in a tropical forest in DRC. It was observed that 354 farmers' association with 4525



Figure showing productive-conservation governance dilemma.

members were active while directly participating in activities of the IITA SOIL program. The number of households who received IITA intervention is estimated at 5487 matching an evaluated population with 63,099 inhabitants.

It was also noted that 39 improved varieties were introduced into the MLW landscape in contrast to the usual management practices of six, while 2071 members of active associations (1070 men, 52%) and 1001 women, 48%) were trained on various fields aspects.

Four food crops were identified as strategic crops for the subsistence of majority of the population namely cassava, maize, rice, and groundnut. Two grain legume crops, cowpea and soybean which are rich in protein, were introduced to improve nutrition in the diet.

Finally, to increase crop productivity, high yielding varieties of these strategic crops were introduced in the landscape and evaluated through Participatory Variety Selection (PVS) model with farmers for adaptation and adoption. Through PVS, three to five improved and high yielding cassava varieties (Obama, Nsansi, and Zizila) were among 10 introduced varieties that have been adopted and are widely cultivated by farmers. Two maize varieties (Kasai and Mus), two rice varieties (IRAT 112 and IRAT 216) and two groundnut varieties (JL12 and Sivi) are now used by farmers.



The productive-conservation governance model.

IITA equips scholars with policy brief and scientific writing skills

IITA organized a workshop for the 20 fellows that qualified for the research grant for "Enhancing Capacity to Apply Research Evidence (CARE) in policy for youth engagement in agribusiness and rural economic activities in Africa" funded by the International Fund for Agricultural Development (IFAD), on 19–23 November.

The purpose of the 5-day training was to equip the awardees with knowledge of policy briefs and scientific writing. The workshop, attended by scholars from the IFAD identified priority countries— Benin Republic, Cameroon, DR Congo, Malawi, Nigeria, Senegal, Tanzania, and Zambia provided an opportunity for awardees to develop skills to write clear and interesting research papers and also develop skills to apply principles of effective writing as it pertains to reviewing and publishing peerreviewed papers.

Speaking at the opening ceremony, Victor Manyong, IITA Director for Eastern Africa Hub and Leader of the Social Science and Agribusiness Research Group, welcomed the participants and encouraged them to seize the opportunity to acquire the skills necessary for policy brief and scientific writing. "This training focuses on giving young scholars a range of transferable skills that they can apply in their research. In particular, it will develop the ability of students to undertake independent research projects and assist them in their personal development while improving their ability to become proficient in research," he said.

"I am optimistic that after this training they will be able to write good policy briefs and know some key findings that would have an impact on youth and their partners' capacities (policy makers) to deliver improved policies and investments that are effective at supporting youth in agriculture. A strong involvement of Africa's youth in rural development and agriculture will boost economic growth in the continent," he added.

The major food and agricultural challenges are highly complex and multidimensional, technological, sociocultural, economic, institutional,



Training Consultant Maureen Kilkenny facilitating the training workshop.

and political. Prominent reports have suggested that research priorities should move away from historically wellfunded areas such as the productivity of individual commodities. This implies that empowering youth to become innovators and entrepreneurs in agriculture is key to solving some of the most binding constraints to growth of a prosperous agricultural sector, thriving agribusiness value chains, and improvement of food and nutrition security. However, the training seeks to create new knowledge on challenges as well as to understand the factors of success or failures of young agribusiness entrepreneurs.

The workshop was facilitated by Maureen Kilkenny, Michael Ajayi, and Rodger Obubo and exposed the participants to the theoretical and practical ways of writing scientific papers and policy briefs to help build their knowledge and increase their level of understanding of factors influencing youth engagement in rural economic activities. "This knowledge will contribute to promote innovative, pro-poor policies with the potential to be scaled up for greater impact and to strengthen policy capacities among the awardees," said Kilkenny.

The awardees gave presentations on their reviewed research output under four interrelated components, namely desk review of research and projects on youth in agribusiness and rural economic activities, young scholar's research capacity development, capacity development in production of research evidence for policy-making, and communication, advocacy, and policy dialogue. These components are considered crucial to build a fully functional science-policy interface to support policy-making on youth in agribusiness and rural economic activities.



Group photograph of workshop participants with organizers and facilitator.

Got a story to share?

Please email it with photos and captions every Wednesday to iita-news@cgiar.org or Katherine Lopez (k.lopez@cgiar.org) and Uzoma Agha (u.agha@cgiar.org) for headquarters and Western and Southern Africa, Catherine Njuguna (c.njuguna@cgiar.org) for Eastern Africa, and David Ngome (d.ngome@cgiar.org) for Central Africa.