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Global congress unveils huge scientific evidence on root and tuber crops

The World Congress on Root and Tuber Crops (WCRTC), held in Nanning, China, on 18-23 January, provided a wealth of scientific information on roots and tubers—more than has been imagined. More than 540 abstracts were presented, cutting across breeding, value chain, and genomics. Being the first of its kind, the WCRTC brought together more than 560 participants including researchers, policymakers, development partners, industrialists, and farmers, according to Claude Fauquet, Coordinator of the WCRTC.

The First World Congress on Root and Tuber Crops held in Nanning, China, highlighted the enormous amount of work being done by the research community on these important crops.

Peter Kulakow, IITA Cassava Breeder, said the breadth and depth of information shared by researchers at the conference was of immense value to the scientific community.

"I see both African scientists and researchers from other parts of the world benefiting from the knowledge shared here," he said. Kulakow emphasized that the conference provided a great opportunity for young researchers to present their work to a global audience.

Grown mostly in the developing world, root and tuber crops (RTC), including cassava, sweet potato, yam, potato, cocoyam, and other root crops, are important to the agriculture and food security of more than 100 countries. Overall, they are a component of the diet for 2.2 billion people as well as contributing to animal feeds and industry. Attention and in particular funding for research of these important staples are still behind crops such as wheat and maize—a situation that has affected the amount of scientific evidence on the crops.

The WCRTC, however, revealed that much has been achieved especially in the area of genomics with several presentations highlighting the parallels and contrasts from the global south and the rest of the world.

"From the presentations, I have seen a lot of valuable work going on especially on cassava. This conference actually provides us a space to work together," said Graham Thiele, Director of the CGIAR Research Program on Roots, Tubers and Bananas.

The WCRTC was a unique opportunity for exchanging expert and scientific advice on RTCs—in particular for the global South by facilitating the discourse among key root and tuber crops stakeholders such as farmers, end-users, researchers, the private sector, and donor agencies.

It aimed to raise awareness of the importance of RTCs in the world, reviewing recent scientific progress, identifying and setting priorities for new opportunities and challenges as well as charting a course to seek R&D support for areas where it is currently inadequate or lacking.

The First WCRTC was a result of the merger of the 3rd Scientific Conference of the Global Cassava Partnership for the 21st Century (GCP21) and the 17th Symposium of the International Society for Tropical Root Crops (ISTRC).

More than 20 IITA oral presentations and even more posters were featured during the parallel workshops and presentations. IITA also participated in the exhibition, which highlighted the benefits of the Institute's R4D work not only on RTCs, but other important African staples as well.

IITA supports Tanzania, Malawi, and Mozambique in developing Aflasafe to reduce aflatoxin contamination

IITA has produced and dispatched over 10 tons of experimental biological control products (Aflasafe), which will be tested in field trials for their efficacy to reduce aflatoxin contamination in three countries in Eastern and Southern Africa. The production took place at IITA's research facilities in Tanzania.

Women sift sorghum that will be roasted and used as a carrier for the aflasafe.

This is part of the Institute's efforts to develop a sustainable and safe technology to reduce aflatoxin contamination prevalent in two of the most important key staple crops, maize and groundnut. Aflatoxin is a deadly poison produced by certain types of mold and is known to cause cancer and stunting in children, among other health problems.

IITA, in partnership with USDA-ARS and local national institutions, has successfully adapted the biocontrol technology and developed a biocontrol product with the generic name Aflasafe, which reduces aflatoxin contamination of groundnut and maize consistently by >80%. Currently, the product is registered for use in Nigeria and Kenya.

Team at IITA Tanzania preparing the Aflasafe in the laboratory.

The biological control product is made from strains of the mold, *Aspergillus flavus*, that do not produce aflatoxin. These good strains outcompete and displace aflatoxin-producing strains of *Aspergillus*, thus reducing aflatoxin contamination of important food security crops like maize.

For each country two formulations of the biological control product were produced: (i) a country specific product using strains only found in that country, and (ii) a regional product produced from strains from that country, but these strains also occur in other countries. For Malawi these were MW02 and MWMZ01—the former was made from strains that are specific to Malawi while the latter was made from region-specific strains. Similarly in Mozambique MZ02 and MWMZ01 were produced and dispatched. In Tanzania, TZ01 made from region-specific strains and TZ02 made from strains that are specific to Tanzania, were produced.

The experimental biological control products will be validated for efficacy to control aflatoxin in groundnut and maize. Both crops are staples in the three countries and are also highly susceptible to aflatoxin contamination. The biological control products will be tested this growing season and the data collected will go towards identifying the best formulation to control aflatoxins. After more validation tests the products will be registered and made available for wider use.

The atoxigenic strains were identified following rigorous tests and characterization done in IITA's laboratories in Nigeria and USDA-ARS in Arizona, USA. These isolates lack the genes required for aflatoxin production and therefore will not produce aflatoxin in nature. Each product is made up of four atoxigenic strains that are widely distributed in each country and belong to different classes.

To produce the biological control product, atoxigenic strains of *A. flavus* are coated on roasted sorghum, which acts as a carrier of the product. The sorghum is roasted to prevent it from germinating when applied in the field. A polymer to stick the spores of the fungus to the sorghum and a dye, a natural food colorant, are added. The final product looks blue (from the blue dye) and is readily distinguished from untreated sorghum.

"The production of 10 tons of aflasafe was by no means easy as we had to do it manually—it was three weeks of back-breaking work for our staff, partners, and other hired laborers," said George Mahuku, IITA's Plant Pathologist, who led the efforts.

They also received support from IITA staff in Nigeria where IITA already has a plant to produce Aflasafe.

"However, we are very happy and proud of our efforts and the impact it will have in reducing aflatoxins, a major problem in the three countries," Mahuku added. "It made economic sense to produce the Aflasafe in Tanzania as opposed to Nigeria as the shipping costs would be very high." They were shipped by road to the two countries.

Announcement

Training of Trainers (ToT) on ITC's Trade Intelligence Tools
(Market Access Map, Standards Map, Trade Map), 8-11 March 2016, IITA Ibadan
For more enquires, contact info@ieom-ng.org; op.akande@gmail.com; IITA-TrainingUnit@cgiar.org.

Got a story to share? Please email it with photos and captions every Wednesday to Katherine Lopez (k.lopez@cgiar.org), Jeffrey T. Oliver (j.oliver@cgiar.org), Catherine Njuguna (c.njuguna@cgiar.org), or Adaobi Umeokoro (a.umeokoro@cgiar.org).

Study details measures for conserving rainforests in Africa

Reporting on the strategies employed in rehabilitating and conserving four rainforests in Benin and southwestern Nigeria, Deni Bown, Head, IITA Forest Unit; Peter Neuenschwander, IITA Benin; and partners from CREDI-ONG demonstrated that a combination of closed-off reserves, clear and secure land ownership, donor support, education for and engaging with locals as well as strong government involvement and legislation are key to preserving rainforests and reversing biodiversity loss even in highly populated areas.

The report titled "Long-term conservation and rehabilitation of threatened rainforest patches under different human population pressures in West Africa", and published in Nature Conservation covers a time span of 10–30 years of conservation efforts in the 380-ha IITA Forest Reserve, Ibadan, Nigeria, and the 14-ha Sanctuaire des Singes, Drabo Gbo, Benin, as well as the CREDI-ONG-affiliated 1.4 ha Forêt de la Panthère, Zinvié, and the privately owned 50-ha Forêt de Bahazoun, Lanzron in Benin.

Other scientists involved in the study are Georges Hèdégbètan, Centre Régional de Recherche et d'Education Centre Régional de Recherche et d'Education pour un Développement Intégré, Abomey-Calavi, Benin and Aristide Adomou, University of Abomey-Calavi, Cotonou, Benin.

A big male red-belly holds court and protects his female and young, who sit in the trees above the well looking back at the trainees.

In southwestern Nigeria, rainforests are threatened by a dependent population oblivious to the necessity of preserving these natural resources. While in the Republic of Benin—part of the so-called Dahomey Gap—a meager 1% of the country is covered by rainforests which hold within them 64% of critically endangered plant species.

Conservation efforts on all four forests included decades of planting and nurturing thousands of trees and plantlets of different species, propagating native and non-native wildlife forms as well as guarding and restricting access to the reserves.

These measures have brought about an impressive resurgence in levels of biodiversity as well as enhanced protection for endemic and endangered plant and animal species—a very important development given that there are no national parks in southern Benin and southwestern Nigeria.

Hundreds of plant and animal species now flourish in all four forests. The reserve in Ibadan is recognized as a last refuge for endangered species such as the revered Iroko tree (*Milicia excelsa*), the majestic *Pararistolochia goldieana*, and the rare Ibadan malimbe (*Malimbus ibadanensis*); it was designated a globally Important Bird Area (IBA) by Bird Life International in 2002.

The Sanctuaire des Singes (The Monkey Sanctuary) of Drabo Gbo holds 50 out of the 100 species on the Benin Red List of endangered plant species. It also serves as a fertile breeding ground for the aesthetically pleasing, endemic, and critically endangered red-bellied monkey (*Cercopithecus erythrogaster erythrogaster*).

The Zinvié forest has fostered economic benefits for the village and boasts a mini zoo which attracts tourists while the Lanzron forest offers some measure of protection for the endangered Sitatunga.

Ensuring that the forests remain safe from wanton exploitation by locals who are largely poor, welded to traditional beliefs, and have a sense of entitlement to the forest resources is a very challenging and expensive task, said the report.

A combination of perimeter fence (Ibadan), community empowerment schemes (Zinvié), and deals with local religious cults (Drabo Gbo and Lanzron) serves to offer a measure of protection for the forests. But long-term protection will only be assured through education by stakeholders at all levels to foster a change in attitudes, promote appreciation for the benefits of conservation, and make clear the obligations of local populations and religious groups.

IITA Forest Reserve.

IITA-Benin hosts training workshop for the sustainable conservation of endangered primates of Benin and Togo

A workshop was organized at IITA-Benin on 7-14 January to strengthen the research capacities of 14 young researchers already active in nature conservation from universities and NGOs in Benin and Togo. The workshop also aimed to demonstrate the standardized procedures for observing monkeys and empower the participants to launch new projects in national and international cooperation.

Benin and Togo constitute the refuge for three threatened monkeys, namely the critically endangered red-bellied monkey (*Cercopithecus erythrogaster erythrogaster*), the vulnerable Geoffroy's Black-and-white Colobus (*Colobus vellerosus*), and the olive colobus (*Procolobus verus*).

After two days of theoretical training at IITA-Benin, the participants spent a day at the "Sanctuaire des Singes de Drabo Gbo" in the IITA forests of Drabo. The trainers stressed that this was the only place in the world where red-bellied monkeys are used to people and can be observed at ease. In the other sites in Benin and along the border to Nigeria or Togo, where this monkey has been recorded, the animals are hunted and therefore extremely shy. This visit allowed the paticipants to observe this species close up and develop their skills in recording its behavior. The next day they departed for a prolonged visit to the Lama Forest, where they learned how to estimate monkey populations along fixed observation lines in the forest. The last day was spent again at IITA wrapping up the workshop findings.

Participants in front of the gate to the 'Sanctuaire des singes de Drabo Gbo'.

The workshop was coordinated by the local NGO "Organisation pour le Développement Durable et la Biodiversité" (ODDB) with internationally recognized primatologists Reiko Goodwin (Fordham University, New York, USA) and Célestin Kouakou, Centre Suisse de Recherches Scientifiques en Côte dIvoire (CSRS). It was supported by scientists from the Université d'Abomey-Calavi, CENAGREF of the Benin Ministry of Environment, ODDB, and IITA.

The IITA forests of Drabo were officially handed over to IITA last year, and are managed by Peter Neuenschwander. The forests are reserved for research in nature conservation focusing on plant and insect biodiversity, but also involving all sorts of wildlife, including endangered monkeys. This is in view of the continuous effort by IITA and the IITA-Benin station in particular to study the links between biodiversity and sustainable agriculture. The full text of the workshop proceedings are available here.

CRI-Ghana scientists visit YIIFSWA yam aeroponics facility at NRCRI Umudike

Scientists from the Crops Research Institute (CSIR-CRI), Ghana, visited the newly established Aeroponics Facility at the National Root Crop Research Institute (NRCRI) Umudike last December to view some of the progress being made by their Nigerian counterparts on pre-basic and basic seed production.

The scientists, Emmanuel Otoo, Deputy Director, CRI; Braima Haruna, YIIFSWA Country Manager, Ghana; Marian Ouain, Head of Biotechnology Lab; and Joseph Ayamdo, YIIFSWA Seed Officer in Ghana, were accompanied by John Ikeorgu, YIIFSWA country manager, Nigeria.

At Umudike, the team met with NRCRI's Yam Program Coordinator Eke Okoro and his staff who are involved in YIIFSWA healthy seed yam multiplication activities. The Ghanaian team first visited the 1-hectare pre-basic seed multiplication field and was later taken to the aeroponics screenhouse. According to Ikeorgu, "They were amazed at the level of success achieved in mini tuber and vine production from aeroponics, less than 3 months after the commissioning of the facility." The team at NRCRI has successfully generated and harvested mini tubers from the aeroponics system and is generating vines to populate unplanted boxes within the system.


Scientists from CRI Ghana viewing yam plantlets growing at the aeroponics facility at Umudike.

Over the years, the quality of pre-basic and basic seeds within the yam production systems in Ghana and Nigeria was a concern that needed intervention. National agricultural research and extension systems (NARES) were at risk of losing pre-basic and basic seed stocks of improved varieties because they were heavily infested with pathogens. As part of its interventions, the Yam Improvement for Income and Food Security in West Africa (YIIFSWA), generated disease-free seed stocks of popular local and improved varieties and has developed novel technologies for rapid multiplication of these seed tubers. These achievements will aid with bulking of healthy seed stocks for distribution along the seed value chain.

Both NARES (NRCRI and CRI) have been tasked with multiplying and distributing high quality clean pre-basic seed tubers within the yam production system.