

# Adding Value: Making a Difference



Annual Report 2014



AFRICAN AGRICULTURAL TECHNOLOGY FOUNDATION  
FONDATION AFRICAINE POUR LES TECHNOLOGIES AGRICOLES

*Better tools, better harvests, better lives*



*Maasai woman feeding a baby with a traditional calabash milk bottle, Tanzania.  
Photo credit: Ariadne Van Zandbergen*

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**Adding Value: Making a Difference**



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*better tools, better harvests, better lives* *mieux s'outiller pour récolter plus et vivre mieux*

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*Cover:* Farmers with first ever harvest of WEMA DroughtTEGO hybrid maize variety in western Kenya (AATF)

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*A brewer samples beer fermented  
from bananas in a calabash mug,  
Near Mbale, Uganda.  
Photo credit: Howard Lafay*



AATF staff during the 2014 work planning meeting

## Who we are

# African Agricultural Technology Foundation

The African Agricultural Technology Foundation (AATF) is a not-for-profit organisation that facilitates public-private partnerships to access and deliver appropriate agricultural technologies for use by resource-poor smallholder farmers in Sub-Saharan Africa.

AATF provides expertise in identifying, accessing, developing, delivering and using agricultural technologies. AATF also contributes to capacity building in Africa by engaging institutions in the diverse partnerships through which it executes its mandate. AATF is a registered charity under the laws of England and Wales and has been given tax-exempt status in the USA. It is incorporated in Kenya and in the UK and has been granted host country status by the Government of Kenya where it is headquartered and is registered as a charity in Nigeria.

### **Vision** – what we want for Africa's farmers

A prosperous and a food secure Africa.

### **Mission** – what we do for Africa's farmers

To access, develop, adapt and deliver appropriate agricultural technologies for sustainable use by resource-constrained farmers in Sub-Saharan Africa (SSA), through innovative partnerships and effective stewardship along the entire value chain.

### **Core Values** – what keeps us strong

The Foundation strives to uphold three enduring core values: **Integrity**, **Dedication** and **Accessibility**. These values guide the decisions, actions and relationships as AATF works towards fulfilling its mission.

## Our Strategy

The Foundation's niche is an innovative response to the challenges presented by low productivity in the agriculture sector in SSA. Three strategic goals guide the organisation:

- Access to appropriate technologies;
- Develop and adapt technologies; and
- Deploy and commercialise technologies for impact.

These goals are anchored on strong and effective institutional programming and a conducive environment.

## Our Roots

The AATF model was arrived at after two years of consultations between the Rockefeller Foundation and the Meridian Institute and stakeholders from Africa, North America and Europe.

The sessions, also referred to as 'Biotechnology Dialogues', were held to determine how the growing gap between agricultural science which is controlled by developed countries and the needs of smallholder farmers in the developing regions of Sub-Saharan Africa (SSA) can be narrowed. The involvement of stakeholders in these deliberations was facilitated by a Design Advisory Committee (DAC) comprising representatives from African national agricultural research systems (NARS), the Consultative Group on International Agricultural Research (CGIAR) centres, African seed and biotech companies, the Organisation for Economic Co-operation and Development, crop science corporations and donor organisations. The DAC, the AATF architect, was charged with defining the main underlying principles and operational models the Foundation needed to address food security and poverty reduction challenges. The Committee also elucidated the core rationale for AATF and its fundamental principles, mission and business model.

## Governance

AATF is a flexible organisation that is designed to respond to the changing needs of its stakeholders. The Board of Trustees charts the course by deciding which interventions hold the greatest promise for reducing poverty and increasing food security. This creates a healthy separation between the setting of priorities and monitoring of progress on the one hand, and the day-to-day management and operations on the other. AATF's Board members are distinguished individuals from around the world, while the Foundation's staff are nationals of countries in SSA.

## Partners

- African governments
- Agricultural producers and consumers
- National and regional institutions and agencies: NARs, Sub-Regional Organisations








(SROs), Regional Economic Communities (RECs), Economic Communities in Africa (ECA), Forum for Agricultural Research in Africa (FARA), Africa Union/New Partnership for Africa's Development (AU/NEPAD)

- Farmers and farmer groups
- International institutions and agencies such as the CGIAR and Agricultural Research Institutes (ARIs)
- Local and international NGOs
- Agricultural technology intellectual property (IP) holders (Monsanto, Arcadia Biosciences, Academia Sinica, BASF, DowAgro, Pioneer/DuPont, Syngenta)
- African trade and agribusiness organisations

## Investors

The Rockefeller Foundation, United Kingdom Department for International Development (DFID) through UK aid, and the United States Agency for International Development (USAID) were the original funders of AATF. The funding they provided enabled the establishment of the Foundation, initiation and implementation of projects, and building capacity to leverage additional support from other investors for both core and projects. The Bill & Melinda Gates Foundation and PepsiCo have also previously provided core funding for operational support.

	<p>UK aid from the UK government provides core funding that supports the Foundation's operations such as building institutional capacity and strengthening corporate governance. It partially supports some projects, complementing project funding from other investors and wholly funds others.</p>
	<p>USAID supports the Nitrogen-Use Efficient, Water-Use Efficient, and Salt-Tolerant Rice Project; Pod-Borer Resistant Cowpea Project; and the Water Efficient Maize for Africa (WEMA) project. It also supports the <i>Striga</i> Control in Maize project under Feed the Future Partnering for Innovation.</p>
	<p>The Bill &amp; Melinda Gates Foundation supports the WEMA, Open Forum on Agricultural Biotechnology in Africa and the Hybrid Rice: Breeding by Design projects.</p>
	<p>Howard G. Buffet Foundation supports the WEMA project.</p>
	<p>Syngenta Foundation for Sustainable Agriculture supports the Seeds2B project.</p>



*Calabashes at a market in  
Korhogo, Ivory Coast  
Photo credit: Doelan Yann*

# 2014 Highlights

## January

- Farmers in Kenya harvest the first DroughtTEGO maize crop that recorded average yields of 4.5 tonnes per hectare (50 bags of 90kg each), compared to the 1-2 tonnes per hectare (22 bags of 90kg each) that they used to harvest.

## February

- Three-year partnership is launched between AATF and Feed the Future Partnering for Innovation through Fintrac, a programme funded by the US Agency for International Development (USAID). The US\$3.28 million will facilitate upscaling of commercialisation of StrigAway for improved maize production in *Striga*-infested regions of Kenya, Uganda and Tanzania.
- First batch of mechanisation equipment under Cassava Mechanisation and Agro-Processing Project (CAMAP), comprising a tractor, a disk plough, and a set of two disc harrows, is delivered to Uganda's National Cereal Crops Research Institute, marking the start of the project's activities in the country. The second batch, including three cassava planters, three cassava root diggers and three boom sprayers cum cultivators, is delivered in May.



*Farmers who planted the new WEMA maize variety DroughtTEGO hybrid WE1101 in western Kenya with their harvest in January 2014*

- WEMA Project holds its 6<sup>th</sup> annual planning and review meeting in Entebbe, Uganda, attended by partners from all the countries and investors.

## March

- Ghana plants its third Nitrogen Use Efficient (NUE) rice CFT to evaluate the transgenic materials.
- Hybrid Rice Breeding by Design Project holds a breeding training to build capacity of seed companies and project partners in hybrid seed production.



Participants, drawn from both national agricultural research institutes and private seed companies from Kenya and Tanzania, were trained on the use of the Thermo-sensitive Genetic Male

Sterility (TGMS) lines to develop 2-line rice hybrids, seed production, planting and management techniques for hybrid yield trials, data collection on traits of interest and seed processing and storage.

- AATF participates at the 14<sup>th</sup> Africa Seed Trade Association (AFSTA) annual congress held in Tunis, Tunisia where the Executive Director, Denis T. Kyetere addressed participants.

### April

- AATF signs a memorandum of understanding (MoU) with Nigeria's Federal Ministry of Agriculture and Rural Development at an event held at the Ministry's headquarters in Abuja, Nigeria. Akin Adesina, the Minister for Agriculture and Rural Development, Nigeria and Denis T. Kyetere, the Executive Director, AATF signed on behalf of the parties. The partnership opens avenues for collaboration to jointly identify and transfer appropriate technologies that meet the needs of farmers in Nigeria.
- The AATF Board of Trustees holds its 23<sup>rd</sup> Board meeting in Nairobi, Kenya during which it commended management for comprehensive implementation of recommendations made during the 22<sup>nd</sup> meeting held in November 2013. The Trustees also visited the MLN disease trial site at the Kenya Agricultural and Livestock Research Organisation (KALRO) institute in Naivasha.
- The Pod-borer Resistant (PBR) Cowpea and Nitrogen-Use Efficient, Water-Use Efficient and Salt-tolerant (NEWEST) projects hold their 2014 annual review and planning meetings during the



*Denis T. Kyetere, the Executive Director AATF addresses participants during the 14<sup>th</sup> AFSTA congress held in Tunis, Tunisia in March 2014*



*Akin Adesina and Denis T. Kyetere sign the memorandum of understanding document at the Ministry of Agriculture offices in Abuja, Nigeria as Asabe Asmau Ahmed, Nigeria's Minister of State, looks on*



*Board members and staff during a visit to the Maize Lethal Necrosis disease trial site at KALRO, Naivasha*

same week in Accra, Ghana. The two projects reported good progress with the PBR Project having successfully incorporated the insect-resistant trait into farmers' varieties in Nigeria, Burkina Faso and Ghana while the NEWEST Project had identified four lines that had performed better than the checks and NERICA 4 under low nitrogen input.

- The Hybrid Rice Project, holds its inaugural planning and review meeting in Malindi, Kenya, with the report that the first set of 100 hybrid lines had been developed in readiness for testing by partners in 2014.
- All the OFAB chapters meet in Abuja, Nigeria for the annual planning and review meeting during which decision was taken to focus attention on mobilising grassroots support for biotech to give policy makers the confidence they need to pass science-based biosafety regulations that would support the development and

deployment of biotech products for use by farmers.

- AATF and AfricaBio organise a tour of biotech farmers' fields and labs in South Africa for policy makers, media and legislators from Kenya, Uganda, Tanzania and Ghana to expose them to the country's biosafety and biotechnology regulatory experiences.
- AATF Executive Director Denis T. Kyetere pays a courtesy call on the Forum for Agricultural Research in Africa (FARA) Executive Director Yemi Akinbamijo in Accra, Ghana, while attending the PBR and NEWEST planning and review meetings.
- Seeds2B partners – AATF and Syngenta Foundation for Sustainable Agriculture – hold a project review meeting at AATF offices, Nairobi.

### May

- Imazapyr herbicide is registered in Uganda as a chemical for seed coating thus allowing for production and sale



of StrigAway maize seed in Uganda. Following registration, Nalweyo Seed Company (NASECO) was able to avail 30 tonnes of StrigAway maize seed to farmers.

- CAMAP begins harvests of the first cassava crop planted under the project in Nigeria and Zambia. Farmers got a bumper harvest of between 28 and 33 tonnes per hectare, up from an average of 7 tonnes per hectare.



*Munyaradzi Jonga demonstrates how to detassel maize during the training in Uganda in May*



*Daniel Otunge and Nancy Muchiri with GM maize farmer Ryan Lising (centre) of Magalang, Pampanga, Philippines during OFAB's lesson sharing visit to The Philippines in May*

- WEMA Project trains seed companies in Uganda on effective hybrid maize seed detasseling to prevent self-pollination and ensure hybrid vigour and genetic purity of the harvested seed. The training was hosted at the Victoria Seeds hybrid seed production farm and attended by 19 field/technical staff representing ten seed companies in Uganda. The project held follow-up trainings on methods and procedures for harvesting and processing seed maize in order to achieve stipulated certified seed quality standards in July.
- OFAB visits like-minded organisations in United Kingdom (UK), Belgium and The Philippines to extend partnership, collaboration and lesson sharing in biotech knowledge sharing and awareness.

### June

- Nigeria's National Biosafety Committee (NBC) approves the NEWEST Rice CFT site at National Cereal Research Institute (NCRI) in Badeggi. This will be the first time that NCRI carries out genetically modified trials and the first NEWEST rice CFT in Nigeria.
- OFAB launches its eighth chapter in Addis Ababa, Ethiopia as a collaboration between AATF and the Ethiopian Institute of Agricultural Research (EIAR). The launch was officiated by Fetahun Mengistu, the Director General, EIAR and Emmanuel Okogbenin, the AATF Director of Technical Operations.
- AATF participates at the CORAF/WECARD Science Week in Niamey and hold meetings with key government officials from the country's ministries

of agriculture, environment, education, research and innovation and the Institut National de la Recherche Agronomique du Niger, to discuss possible areas of collaboration.

- The 18<sup>th</sup> International Consortium on Applied Bioeconomy Research (ICABR) conference is held in Nairobi, Kenya, organised by AATF in partnership with more than 10 organisations including the University of Cape Town, University of Rome “Tor Vergata” and Rutgers University. The ICABR conference is an international consortium of people interested in the bioeconomy, agricultural biotechnology, rural development and bio-based economy research.
- AATF and MSU hold discussions in Nairobi on possible collaboration on biotech communication, regulatory capacity building and molecular breeding.
- The Director of African Women in Agricultural Research and Development (AWARD), Wanjiru Kamau-Rutenberg, pays a courtesy call on AATF for discussion on possible collaboration between the two institutions.

## July

- NEWEST and PBR projects hold CFT compliance training in Abuja, Nigeria on transport and storage of experimental transgenic plant materials, and management of trial sites, including harvest and post-harvest compliance.
- WEMA South Africa presents its application for environmental release of transgenic drought tolerant maize (MON87469) to the regulatory agency through Monsanto on behalf of the



*Emmanuel Okogbenin, AATF Technical Director, Nancy Muchiri, AATF Senior Communications and Partnerships Manager, and Fentahun Mengistu, Director General, Ethiopian Institute of Agricultural Research, cutting the cake to mark the official launch of OFAB Ethiopia, in Addis Ababa*



*Denis T. Kyetere and Moussa Elhadj Adam accompanied by Mariame Maiga, an AATF Board of Trustees member, give a media interview at the AATF exhibition stand during the CORAF/WECARD Science Week held in Niger, Niamey in June 2014*



*Cholani Weebadde (second left) from Michigan State University during a meeting with AATF staff on biotech communication, regulatory capacity building and molecular breeding*



*Participants to the CFT compliance training held in Abuja for NEWEST and PBR projects*



*Denis T. Kyetere (third left), Francis Nang'ayo (fifth left), the Minister for Finance and Planning Hon Matia Kasaija (fourth right), Nompumelelo Obokoh (third right) and Daniel Otunge (second right) during the meeting with the Deputy Speaker of Uganda's Parliament Hon Jacob Oulanya (fourth left) in July 2014*





*George Marechera and Edgar Wavomba (third and fifth right) with staff from the China National Seed Group Company Limited during one of the meetings held in China*

also participants in the second National Agriculture Stakeholders Meeting where biotechnology was discussed. This participation was through invitation extended by the Chair of the committee Hon Mathias Kasamba

- Seeds2B Project visits China on a technology scouting mission where they met with potential providers including the China National Seed Group Company Limited, Ministry of Agriculture and five seed companies.

## August

- StrigAway's first hybrid maize, H528, produced by Kenya Seed Company, is availed to farmers in Kenya. An external review panel appointed

to review AATF's programmes and management to provide stakeholders with an independent assessment of the Foundation's health begins work. The Panel returned a 'strongly positive' verdict, concluding that AATF is well prepared for the future.

## September



*A display of the H528 StrigAway IR maize hybrid from Kenya Seed Company*



AATF staff meet with the external panel of reviewers in August 2014

- Nigeria's NBC approves NCRI Badeggi's first application to conduct CFTs of NEWEST rice.
- The *Striga* Control in Maize Project acquires two new seed treaters for Freshco Seed Company in Kenya and Tanseed International Ltd in Tanzania. The treaters would help reduce time taken to coat the seed, increase accuracy, uniformity and drying, factors that enhance the effectiveness of the herbicide-coated maize seed to control *Striga*.
- Hybrid Rice Project holds stakeholder meeting in Mozambique as a step towards outscaling the project. The meeting was attended by 14 participants from private seed companies, the Agricultural Research Institute of Mozambique (IIAM), HEAL and AATF.



AATF's Gospel Omanyara (right) and Tanseed's Isaka Mashauri talk to media during the commissioning of the seed treater in Tanzania



- WEMA South Africa is granted approval for release of two conventional drought-tolerant maize hybrids in South Africa following application by the Agricultural Research Council of South Africa for Variety Listing submitted in late 2013.
- AATF participates at the Alliance for a Green Revolution in Africa (AGRA) Forum in Addis Ababa, Ethiopia.
- OFAB participates at the launch of the Cornell Alliance for Science, a new global partnership platform that brings together partners from across the globe to help depolarise the charged debate around agricultural biotechnology through an online information portal. The Alliance also provides training programmes to help researchers and stakeholders effectively communicate the potential benefits of agricultural technology.
- UK DFID commissions an institutional review of AATF to inform its decision on grant extension.



Right to left: Sylvester Oikeh, the WEMA Project Manager at AATF, Kingstone Mashingaidze, the WEMA South Africa country coordinator and Molatsi Musi, a farmer in South Africa, admire one of the new maize hybrids approved in September 2014



Denis T. Kyetere, AATF Executive Director, talks to participants who visited the AATF exhibition stand at the AGRA Forum held in September 2014 in Addis Ababa, Ethiopia



Nancy Muchiri (first left) and Daniel Otunge (front row standing center) with participants of a meeting held in February 2014 at Cornell University to discuss the formation of the Alliance for Science



*Eugene R. Terry, the AATF Implementing Director*



*Three Kenyan members of parliament in discussion during a visit to the WEMA confined field trial site in Kiboko, Kenya in October 2014 as Francis Nang'ayo (back row extreme right), Senior Manager, Regulatory Affairs at AATF and other participants look on*



*Some members of The AATF Board of Trustees during a visit to the Agricultural Research Council (ARC) facilities in Potchefstroom, South Africa. ARC is a partner in the WEMA project*

## October

- AATF and the Media for Environment, Science, Health and Agriculture (MESHA) host a media training to enhance science journalists' skills in investigating, interpreting and reporting on agriculture and biotechnology attended by 19 journalists from Kenya, Uganda, Tanzania, South Africa, Mozambique, Nigeria, Ethiopia, Zimbabwe, Ghana and Burkina Faso.
- Eugene R. Terry, the AATF Implementing Director, is cited as an agricultural role model by the Modernizing African Food System Consortium (MAFS) on their website [http://www.mafs-africa.org/eugene\\_r.\\_terry](http://www.mafs-africa.org/eugene_r._terry)
- Members of Parliament from Kenya visit the WEMA CFT site in Kiboko, Kenya during which a presentation on biotechnology and its management was made.

## November

- The AATF Board of Trustees holds its 24<sup>th</sup> meeting in South Africa.
- AATF participates at FARA's 15<sup>th</sup> anniversary celebrations held in Johannesburg, South Africa through various presentations and an exhibition and also holds consultations on actualisation of the AATF/FARA MoU signed in 2012.
- AATF attends the commissioning of the Mycotoxin laboratory and ground breaking of the aflasafe™ modular manufacturing plant at the Kenya Agricultural Livestock Research Organisation (KALRO) research station in Katumani, Machakos.



*Fatuma Wario, AATF's Administrative Assistant and Event Coordinator, attends to visitors at the AATF exhibition stand at FARA's 15th anniversary celebrations in November*

- Members of the Uganda Parliamentary Committee on Agriculture visit AATF to learn about its work and how the Committee and the Foundation can work together.

## December

- WEMA plants the first stacked hybrids of transgenic drought tolerance with insect protection in CFTs in South Africa. Eight stacked hybrids that have been included in the trials to be used as proof of concept for the stacks.
- Uganda plants its second NEWEST CFT after levelling of the land to manage nitrogen deposits.



*Denis T. Kyetere welcomes Felix Koskei, Kenya's Cabinet Secretary, Ministry of Agriculture, Livestock and Fisheries to the AATF exhibition stand during the commissioning of the mycotoxin laboratory and ground breaking of the Aflasafe modular manufacturing plant at KALRO's research station in Katumani, Machakos in November 2014*



*Uganda Parliamentary Committee on Agriculture with AATF staff during the committee's visit to AATF in November – Francis Nang'ayo, Senior Manager, Regulatory Affairs (standing extreme right), Abed Mathagu, Programme Officer, Regulatory Affairs (standing third right), David Tarus, Programme Assistant (standing extreme left) and Kayode Sanni, Rice Project Manager (standing third left)*





*A calabash is used during a traditional ritual ceremony in Accra, Ghana.  
Photo credit: Danita Delimont*

## Message from the Board Chair and Executive Director



**Idah Sithole-Niang**  
*Chair, Board of Trustees*



**Denis T. Kyetere**  
*Executive Director*

**F**or AATF, 2014 was yet another year of outstanding programmatic and financial performance. This remarkably improved performance is testament to the great potential that AATF has and emphatically underscores continued growth in our various portfolios.

We have continued to cultivate partnerships with governments and the private sector and realised invaluable results. During the year we signed a Memorandum of Understanding with Nigeria's Federal Ministry of Agriculture and Rural Development to boost scientific exchanges and open avenues for joint identification and transfer of appropriate technologies that meet the needs of farmers in Nigeria. We also entered into an agreement with the Pan African NGOs Consortium on Agricultural Research (PANGOC) to support policy dialogue for formulation of sound policies for agricultural development in Sub-Saharan Africa and technology adoption and dissemination, especially ensuring farmer participation and education on new technologies that will complement extension services.

We also held discussions and agreed on areas of collaboration with a number of other like-minded organisations such as the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), the African Women in Agricultural Research and Development (AWARD) and the Common Markets for Eastern and Southern Africa (COMESA), with whom we hope to grow our level of civil society engagement on matters of science and agriculture.

Outside Africa, we continued working closely with a number of organisations on science advocacy including Cornell University's Alliance for Science Program in the United States, Science Media Center and Sense About Science both in United Kingdom (UK), and EuropaBio in Belgium. The area of biotechnology and uptake of related products continued to be an area of concern and we continued to work with various partners to promote knowledge sharing to support decision-making. We are happy to report that we witnessed greater involvement and support by governments in awareness and education efforts not to mention greater involvement and interest by other partners in Africa including the African Union Commission (AUC), Forum on Agricultural Research in Africa (FARA) and COMESA.

AATF continued to deliver on its important commitments through ongoing and strengthened support of its partners and donors. During the year, significant resources were mobilised to support



various projects. USAID extended its investment through a grant of US\$21,368,028 for the Pod Borer Resistant (PBR) Cowpea, Nitrogen-Use Efficient, Water-Use Efficient and Salt-Tolerant (NEWEST) Rice and Water Efficient Maize for Africa (WEMA) II for the next five years. It also awarded us an additional US\$250,000 through its mission in Malawi to support introduction of the PBR Cowpea project in that country for three years. Further, the US Government's Feed the Future Partnering for Innovation programme awarded us a three-year grant of US\$ 3.28 million to support promotional activities towards commercialisation of the StrigAway products in Kenya, Uganda and Tanzania.

We ended the year on a good note, with positive indications of funding extension by the United Kingdom's Department for International Development (UK-DFID) to support various projects and core activities. There were also indications that the Bill and Melinda Gates Foundation would re-invest in the OFAB project on expiry of the current grant.

Drawing on lessons learnt during the past slightly over 10 years, AATF finalised a new business strategy during the year for the period 2014–2018, which explains how we will transform into business-oriented partnerships to ensure commercial viability. The strategy intends, through organisational restructuring, to inject entrepreneurial and commercial culture in AATF to fit with the need to ensure successful deployment of technologies. The strategy will also support the growth of the organisation through opening new markets, enhancing outreach and introducing new projects and technologies. It informs exit planning and sustainability through partnership with private sector, supporting seed companies in uptake of technologies and strengthening capacity of national institutions. This new approach has the potential to significantly influence AATF's work and expand its impact on food security.

Striving to always realise maximum impact, we commissioned an external panel to review our programmes and management to provide stakeholders with an independent assessment of the Foundation's health and contribute to attainment of our overall goal. The panel returned a 'strongly positive' verdict, concluding that AATF is well prepared for the future, noting that the tripartite strategy of acquiring relevant technologies, partnering and managing information gathering, evaluation and dissemination is appropriate and robust and that positioning as '... a Centre of Excellence in agricultural technology access, development and deployment ...' is correct for the present and the foreseeable future. Recommendations made for further improvement will be taken on board during 2015.

A solid set of project growths highlighted the value of our partnerships concretely and pointed the way forward to a future that is ready to embrace new technologies for agriculture in Sub-Saharan Africa. Below is a highlight of this progress.

The Pod Borer Resistant Cowpea Project is making good progress towards commercialisation of the product, with completion of introgression of the *Bt* gene into farmer-preferred varieties, multi-location trials to determine the varieties' efficacy in controlling *Maruca* and their agronomic performance and establishment of environmental risk assessment trials. The project also expanded into Malawi and is awaiting commencement of confined field trials.

The Nitrogen Use Efficient, Water Use Efficient and Salt-Tolerant (NEWEST) Rice Project expanded into Nigeria following the signing of a sub-grant agreement with the National Cereal Research Institute (NCRI). In September, the Nigeria National Biosafety Committee gave approval to conduct the first NEWEST rice CFTs in Nigeria. The Hybrid Rice Project tested its first hybrids in 30 locations across Kenya and Tanzania through private seed companies and national partners.

Aflasafe™ was granted provisional registration by the pesticide registration authority in Kenya, the Pest Control Products Board, allowing mass production, packaging and sales of the product while waiting for full registration under the Aflatoxin Bio-Control Project.

Transgenic Uganda banana cultivars transformed and evaluated at the CFT showed good resistance to Banana *Xanthomonas* Wilt (BXW) under the Banana Bacterial Wilt-Resistant Project. The activity of genetic transformation for the development of more transgenic lines for farmer-preferred cultivars continued.

The WEMA Project launched two conventional hybrids in South Africa in December 2014. The Project's breeding programme had cumulatively released 36 *DroughtTEGO™* hybrids in four countries. Plans to revive the stalled CFT activities in Mozambique were put in place in October following the revisions to the country's Biosafety Decree that would allow for testing and uptake of biotech crops.

Three new StrigAway IR maize varieties were entered into the market by Freshco and Kenya Seed Company in Kenya and Nalweyo Seed Company in Uganda under the *Striga* Control in Maize Project. Consequently, a total of 166 tonnes of certified StrigAway (IR) maize seed was produced in 2014 with more field production on-going at various sites.

The Cassava Mechanisation and Agro-Processing Project (CAMAP) harvested its first crop in Nigeria and Zambia with farmers recording harvests of 28–33 tonnes per hectare, up to four times their usual yield of 5–7 tonnes. Farmers in Nigeria were also able to realise higher prices for their crop at USD 88 per tonne which is an improvement from the USD 62 they were previously getting. The improved prices were largely attributed to more efficient farming processes and market linkages with processors.

Identification of technologies got underway under the Seeds2B Project with a number of technology owners from India, China, Brazil and Africa showing interest. On-station trials were established in Malawi and Zimbabwe by the end of the year to assess adaptability and market acceptance of a number of new improved seed of tomato varieties sourced from breeders in India and China.

The Open Forum on Agricultural Biotechnology in Africa (OFAB) continued to grow during the period with entry into Ethiopia in June in partnership with the Ethiopian Institute of Agricultural Research. It also expanded its working partnerships to include alliances in Africa and at the global level, which are being leveraged in tackling challenging global biotech perception issues that have local ramifications, such as trade with the European Union.

We also had some developments at the Board level. McLean Sibanda was appointed as a Trustee on 1 January 2014 to replace Adrienne Massey on the expiry of her term. We congratulate McLean on the appointment and thank him for accepting this important responsibility. We would also like to express our sincerest gratitude to Adrienne for her dedicated and selfless service to AATF.

We would like to express our gratitude to our investors and partners, and the researchers and other professionals who work with us to deliver on our promise to the smallholder farmer. Our deepest thanks go to the dedicated AATF team for ensuring that we meet the expectations placed on us and achieve all that we do to ensure a food secure Africa and to the Board of Trustees for substantive guidance, which has enabled us to fulfill our ambitious plan during the year.



*A Mtaita, Kenya, musician wearing glasses made from the tips of calabashes. His ear ornaments are also made of calabashes or gourds.  
Photo credit: Nigel Pavitt*



## Striga Weed Control in Maize Project

### New partnerships, first hybrid and new varieties re-energise the Project and boost commercialisation of StrigAway maize seed

**C**ommercialisation of StrigAway maize seed received a boost early in the year with the launch of a three-year partnership between AATF and Feed the Future Partnership for Innovation.

The partnership was facilitated by Fintrac through a grant of US\$ 3.28 million, which was the largest grant by Feed the Future Partnership for Innovation. Under the partnership, 20,000 farmers affected by *Striga* weed in East Africa would have access to the maize seed. This partnership addresses the key challenge of quality seed treatment and the marketing capacity of seed companies. It aims at scaling commercialisation of Imazapyr Resistant (IR) maize seed in Kenya, Tanzania, and Uganda. The seed will be produced, distributed, and marketed to smallholder producers by private seed company partners. AATF and the other Project partners (BASF and the International Maize and Wheat Improvement Center (CIMMYT)) will support market development, farmer training, and technology stewardship.

#### Seed production and sales

A major milestone made during the year was acquisition of new seed treaters for two seed companies, Freshco Seed Company in Kenya and Tanseed International Ltd in Tanzania.



Staff from Freshco Seeds and Bayer during the commissioning of the seed treater in Kenya



*Farmer Enos Owino displays a StrigAway maize cob that is ready for harvest at a demonstration plot in Kanyabala, Homa Bay county, Kenya during one of the farmer field days*

The treaters were a timely intervention that addressed one of the key challenges to producing StrigAway seed – the requirement for a separate seed treater to protect non-IR seeds. The treaters helped increase the efficiency of coating the seeds with Imazapyr by reducing the time taken coating the seed and increasing precision in the herbicide rates applied, coating uniformity and drying time. These factors enhanced production of high quality herbicide-coated maize seed for the effective control of *Striga*. Previously the two companies used fabricated and manually operated treaters that turned seed coating into a time-consuming process that

resulted in uneven coating of the seed. The current seed treaters can coat three tonnes of seed per hour compared to the fabricated and manually driven treater which used to take a day to coat about one tonne of seed.

The Project scored a first during the year with the release of the first IR hybrid maize seed, H528 produced by Kenya Seed Company. During the 2014 short rain season, the Kenya Seed Company availed 54 tonnes of H528 to farmers amidst high expectations for better yields. During farm trials carried out by AATF with farmers, the hybrid was shown to produce almost twice the farmer-preferred varieties under *Striga*-infested conditions.

The Project expanded its partnership to boost certified seed production as four more seed companies joined the initiative. The four are expected to contribute their production and distribution networks in the region. Kenya Seed Company was one of these companies in Kenya, the other being Freshco Seed Company that produced 67 tonnes of its StrigAway variety, FRC-425IR. Freshco has planted another 100 tonnes of seed within the year. In Tanzania, Farm Africa Ltd and Meru Agro Seed Company joined the fight against the *Striga* weed. Farm Africa planted its seed in September while Meru Agro began testing four new IR maize hybrids produced by CIMMYT.

Nalweyo Seed Company (NASECO) in Uganda and Tanseed International in Tanzania continued their contribution to the Project. NASECO sold 38.4 tonnes of Longe 7HIR in Uganda and planted another 100 tonnes of seed for the 2015 season while Tanseed sold 10 tonnes.

Another milestone for the Project was the opening up of the StrigAway market



in Uganda and getting the seed into the hands of farmers following registration of the Imazapyr herbicide as a chemical for seed coating. Registration efforts for the chemical had been on-going for a number of years and the delay had stalled efforts by the Project to commercially avail the StrigAway seed to farmers. NASECO was able to sell its seed following this registration.

By close of the year, the Project had produced 181 tonnes of certified StrigAway maize seed and sold 135 tonnes (Kenya 87; Uganda 38; and Tanzania 10). With these sales, close to 30,000 smallholder farmers had the opportunity to plant IR maize on an estimated farm land area of about 5,400 ha assuming farmers purchase 4kg of IR seed and 25kg is used to plant one hectare.

### Product promotion

The Project used a mix of awareness and education approaches to promote the

product and ensure proper use. A total of 926 demonstration sites were set up in Kenya (512), Tanzania (300) and Uganda (114). The demo sites were used to showcase the technology to farmers and as a base for training farmers and extension service providers on the *Striga* problem, safety and management of the technology and how to share knowledge on the problem and available solutions. These popular events attracted 8,524 people (Kenya 7,590; Uganda 739; and Tanzania 195).

To support targeted product promotion activities, the Project carried out a market assessment survey for StrigAway maize in the three countries. The survey results formed the basis of the year's workplan that included participation in a farm makeover television reality show, *Shamba Shape Up*, that helped increase awareness and engagement by farmers on the technology in Kenya. In addition, the product was



*Antonina Ouma, one of the farmers who established a StrigAway IR demonstration plot in Mbita, Homa Bay county, Kenya during the 2014 long rains season*

advertised through eight talk shows on two vernacular radio stations in Kenya. Staff participating in the talk shows as resource persons received an average of 100 short text messages per show from interested farmers who wanted to know where to buy the seed and the agronomic requirements. These talk shows were complemented with seed company advertisements through other radio stations to enable larger coverage by the Project.

Multi-site and multi-season field trials results have shown that Imazapyr-coated maize seed effectively controls *Striga* leading to significant yield increases in target regions. Emerged *Striga* counts were low in most of the farmer plots planted with IR maize compared to those planted with non-IR maize. Results also showed that the StrigAway maize variety was more effective and had a strong grain yield advantage in *Striga*-infested areas. However, in areas

where the *Striga* weed infestation is low, other maize hybrids performed better. This result underscores the highly negative effects *Striga* weeds have on performance of maize where *Striga* infestation is high.

### Project overview

*Striga* is a major parasitic weed that infests about 20 million hectares of arable land in Sub-Saharan Africa (SSA). Serious infestation by the weed often results in total crop loss and even abandonment of some arable land, leading to increased food insecurity and rural poverty among smallholder farmers and their families. By controlling *Striga* weed infestation, the Project aims to increase maize grain yields as a contribution to food security. To accomplish this, the Project is facilitating access to and delivery of Imazapyr Resistance (IR) maize technology, which is also referred to by its trade name, StrigAway® maize. The technology



Farmer Monica Akinyi shows a good maize cob on her farm that was previously striga-infested

comprises use of herbicide-resistant maize seed and innovative seed coating with Imazapyr herbicide. Imazapyr-coated maize seed imbibe the Imazapyr herbicide upon germination. When the *Striga* seedling attaches to the maize roots, it takes in water, nutrients and the herbicide, which is fatal to the parasitic weed but not to the crop.

The Project partnership involves CIMMYT, BASF, seed companies, NGOs, and government extension services in the three countries of Kenya, Uganda and Tanzania. In addition, the Project partnership is a member

of the Integrated *Striga* Management in Africa (ISMA) Project coordinated by IITA to test and promote various *Striga*-control in maize technologies.

### Way forward

'The Project finds it is commercially advisable to convert more popular high performing commercial maize hybrids into IR hybrids to boost their yield advantage consistently and increase adoption under both high and low *Striga* infestation zones.' Gospel Omanyia, Senior Manager, Seed Systems, AATF.







*A smiling preteen boy sitting on a calabash with his feet on other calabashes in a field.  
Photo credit: commerceandculturestock*





## Gearing to deliver pod-borer resistant cowpea to farmers

**A**fter almost ten years of laboratory and confined research, the Pod-Borer Resistant (PBR) Cowpea Project made tremendous progress towards preparations for release of the product to farmers in the three countries of Nigeria, Burkina Faso and Ghana. Being a transgenic product this cowpea's commercialisation pathway will require regulatory approvals for food, feed and environmental safety before the seed can go through product registration, certification and variety release. This process will commence by preparation of a regulatory dossier for deregulation and commercial release that should be backed by relevant data. Deregulation of a transgenic food crop has not been carried out by any of the three countries and the Project will be the first to undergo such a process.

The Project conducted multi-location trials to evaluate the efficacy of the transgenic cowpea lines in controlling *Maruca* under different environmental conditions. The cowpea plants were subjected to artificial infestation with *Maruca* to augment natural *Maruca* infestation. The agronomic

performance of the transgenic varieties, including plant growth, days to flower, phenotype, and grain yield, compared to the non-transgenics were evaluated in the confined field trials (CFTs).

Nigeria's Institute for Agricultural Research (IAR) planted its second multi-location trials in three sites in Zaria, Kano and Zamfara to continue evaluation of efficacy of the cowpea lines. In addition, trials for Distinctiveness, Uniformity and Stability (DUS) of the transgenic farmer varieties were established in the three locations to collect data for registration and variety release in Nigeria.

Ghana tested the transgenic farmer preferred variety IT97KT generated from Nigeria to determine the efficacy of the gene in a different agro-ecological zone at Tamale. The trials in both Ghana and Nigeria showed efficacy of the gene to control *Maruca* in different ecological zones. The transgenic farmer-preferred variety outperformed the conventional variety for yield across all locations – with yield increasing by 47% on average for the transgenic.

## Regulatory compliance and environmental safety assessments

The Project carried out training for its team members to ensure compliance with country regulations in management of multi-location trials and also in generating data in accordance with national and international regulatory standards, protocols for the various studies, requirements for biosafety compliance and other relevant issues on regulatory science.

Conduct of environmental safety assessment is a regulatory requirement and conforms to global best practice on biosafety. Burkina Faso and Ghana began carrying out environmental safety assessments on the effect of Bt on non-target organisms (NTOs) and seed density increase of wild cowpea with the propensity to become weed as a result of gene flow. Nigeria continued with the studies that commenced in 2013.

The trials on NTOs were used to study the relative abundance of NTOs on transgenic PBR cowpea, non-transgenic cowpea

and wild cowpea (*Vigna unguiculata unguiculata* var *dekindtiana* or *spontanea*) under sprayed and unsprayed regimes. Sticky traps were used to catch the insects for identification. The results showed that the abundance of each non-target insect type, such as ladybird beetle and bees was similar on transgenic, non-transgenic and wild cowpea in the three countries, indicating that the transgenic line has no effect on non-target insect types that were sampled from the trials. As expected, the abundance of the insects was lower in the sprayed plots compared to the unsprayed plots for the varieties tested.

The trials on seed density increase sought to find out whether if gene flow occurred between transgenic and wild cowpea it would result in the latter increasing its seed production; and if so if the wild cowpea would become a weed in the environment. Three different densities of 375, 750 and 1,500 seed of wild cowpea simulating increase in seed production as a result of gene flow were planted on 9.0 m<sup>2</sup> plots and replicated 12 times for each seed treatment. The study will be continued for two years without weeding, fertilisation, spraying, etc. just as it occurs in the environment. The data collected will be analysed for final conclusion at the end of the study.

## Information sharing

The Project continued to utilise a mix of approaches including media engagement to disseminate information and educate stakeholders on the Project and product. A Twitter account was created during the period to encourage participation of a younger and international community.



AATF and IAR staff harvesting agronomic trials at IAR site in Zamfara, Nigeria

## Project overview

*Maruca* is a major insect pest in West Africa. It is responsible for more than 80 percent yield loss in the cowpea crop. The Project is developing cowpea varieties with genetically-enhanced insect protection using gene transfer technology to control the infestation of the *Maruca* pod-borer in the crop. With the *Bt* gene which confers resistance to the pod-borer transferred into improved cowpea varieties, the need for insecticidal sprays to control the pod-borer will be reduced and smallholder farmers will be able to increase their yields by over 20 percent. This will greatly enhance household and national food security and economic status. The Project's goal, therefore, is to develop and disseminate farmer-preferred and locally adapted *Maruca*-resistant cowpea varieties in Sub-Saharan Africa.

Partners in this project include AATF, Commonwealth of Scientific and Industrial Research Organisation (CSIRO), Australia, Institute of Agricultural Research, Nigeria, Council for Scientific and Industrial Research, Ghana, Institut de l'Environnement et de Recherches Agricoles, Burkina Faso and Bunda College, Malawi.

## Looking forward

'As the project gets closer to delivery of the product to farmers, insect resistance management is an issue that needs to

be addressed. The project has acquired a second insect resistant gene *Cry2Ab* from Monsanto on royalty free basis to provide a higher dosage for longer-term insect resistance management. The new gene will be transformed into the cowpea'. Prince Addae, Cowpea Project Manager, AATF.



*"I am so happy that a new seed that will help fight Maruca will soon be available. I have sprayed my farm 8 times this season already for it to look this good."* Bashir Suleiman







*Market-bound women balance enormous calabash gourds on their heads in Ibadan, Nigeria.  
Photo credit: W. Robert Moore*



## DroughtTEGO gains higher demand – even as MLN devastates the maize market

**H**igh farmer demand for *DroughtTEGO™* (TEGO) hybrids continued during the year following healthy harvests in January by farmers who planted the first TEGO during the 2013 short rains season. With an average harvest of 4.5 tonnes per hectare (50 bags of 90kg each), compared to the 1 to 2 tonnes per hectare (22 bags of 90kg each) that they used to harvest, these farmers saw the potential and went on to buy the TEGO maize seed during the year. By end of the year, 114.5 tonnes had been sold in Kenya (47 tonnes during 2013). Farmer interest in the product resulted in increased demand for the product and greater interest by more seed companies to produce and sell the TEGO varieties in East Africa. As a result, the number of companies licensed to produce and sell TEGO rose from 7 to 23 by end of year across the project countries.

Commercialisation efforts were supported through training workshops for seed companies in pre-planting, detasseling, seed production research, seed harvesting and seed quality assurance/control as

part of product stewardship efforts. In addition, product promotion and education continued through on-farm demonstrations, field days and use of various media, especially radio. The efforts were carried out with partners including seed companies, relevant government ministries, regulatory authorities, seed trade associations, non-governmental and community based organisations.



*A family in western Kenya prepares for cooking maize from the first WEMA hybrid (DroughtTEGO WE1101) harvest*

## Hybrid release and evaluation

The year closed with a cumulative total of 36 hybrids approved for commercial release in Kenya (21), Uganda (6), Tanzania (7), and South Africa (2). Another 101 hybrids were evaluated at different stages in the National Performance Trials (NPTs) and Distinctness, Uniformity and Stability (DUS) observations in Kenya, Uganda and Tanzania. Also, in Southern Africa, 10 hybrids were nominated for 2015 Variety Listing or Registration in South Africa, and five hybrids were entered into Value for Cultivation and Use (VCU)/DUS in Mozambique.

Encouraging results were received from evaluation of 100 sets of new hybrids comprising early- and medium-maturity hybrids in Kenya, Tanzania and Uganda as the WEMA products were shown to be performing better than checks in most instances. The top 10 early-maturity hybrids out-yielded the best check by 36–45% under optimum-moisture condition. Under managed drought-stress across 10 locations, the top 10 hybrids gave 21–41% yield advantage over the best check. Also, combined across 22 optimum-moisture locations, the top 10 medium-maturity hybrids gave 14–19% higher yields than the best commercial check, while combined across six drought-stress locations, the top 10 hybrids gave 4–23% higher grain yield than the best commercial check. The hybrids that performed best under both optimum and drought-stressed conditions will be entered into the National Performance Trials (NPTs) in 2015.

## Conventional breeding

The Project continues to accelerate breeding and to train its partners in the development and use of Doubled Haploids (DH) lines. During 2014, 16,724 DH lines

were generated in Kenya and entered into the breeding and testing pipeline. After extensive screening under intense disease pressure, hybrids from 2,752 of these lines were selected and entered into early testing trials. NARS breeding programmes advanced as evidenced by increased number of testcrosses in all countries and submission of six hybrids from WEMA-South Africa for 2015 Variety Listing or Registration for commercialisation.

## Molecular breeding

The WEMA Project has been using molecular markers extensively for germplasm characterisation, quality control (QC) analysis, quantitative trait loci (QTL) mapping, and molecular breeding for both relatively simple and very complex traits influencing stress tolerance of maize in the tropics. Results from across five optimum-moisture environments showed that the best 10 hybrids developed from Cycle 3 MARS gave yield advantage of 3–56% over the mean of the commercial checks, and 6–22% over the mean of hybrids developed through the traditional phenotypic pedigree selection.

In WEMA Phase I, the Project adopted several approaches for breeding for drought-stress tolerance including MARS, Genomic selection (GS), and pedigree selection. To identify which of these approaches gives the best value-for-money, comparative studies on these different approaches were undertaken across 8 to 10 bi-parental populations. Hybrids derived from C3 lines produced 7% higher grain yield than those developed through the traditional pedigree breeding method. Also, hybrids involving C3-derived lines produced significantly greater (~10%) grain yield than testcrosses

of the respective initial parents used for developing the C0 populations, and 19% greater than the commercial checks.

The Project established for the first time, the superiority of MARS and GS over the traditional pedigree selection in developing superior drought-tolerant maize germplasm for SSA without significantly affecting maturity duration and plant height. Thus, WEMA Project, in addition to developing drought-tolerant maize, is contributing to the generation of international public goods in tropical maize improvement.

### Transgenic breeding – drought tolerance

Results of the South Africa transgenic drought tolerance trials planted end of 2013 and harvested beginning of 2014 showed five traited hybrids with benefit of MON87460 drought tolerant trait under

high drought-stress ranging from 10–39% compared with the non-traited versions. The gene thus adds value to the level of drought tolerance in African germplasm.

### Transgenic breeding – insect pest protection

Encouraging results were recorded following the second and third confined field trials (CFTs) in Kenya and Uganda on the efficacy of *Bt* insect-pest protection gene in controlling *Chilo partellus* on the field and *Busseola fusca* in the lab in maize. Kenya carried out its second trials and results indicated that 75 percent of the hybrids evaluated had significantly greater yield ranging from 26–113% with the *Bt* trait than without the trait. In Uganda, results showed that all the hybrids evaluated had significantly greater yield of 49–201% due to the *Bt* trait compared with the non-*Bt* hybrids.



C.K. Ariithi of KALRO Katumani discusses with farmers the hybrids demonstrated at a field day in Mukuyuni, Makueni County, Kenya in March 2014



### Study on non-target organisms

The study on the assessment of *Bt* insect-pest protection on non-target arthropods at Kiboko CFT, Kenya, that started in 2013 continued. The objective was to determine arthropods abundance and diversity in *Bt* maize plots and non-*Bt* maize plots. Results showed no significant differences in arthropods abundance and diversity between *Bt* maize plots and non-*Bt* maize plots, thus confirming previous studies that reported the *Bt* gene only controls the target arthropods. A similar study will be carried out in Uganda.



*A promising pre-release CIMMYT hybrid versus an MLN-susceptible commercial check*

### *Stacked drought-tolerant MON87460 and Bt insect-pest protection trials*

For the first time, stacked hybrids of transgenic drought tolerance with insect-pest protection were planted in CFTs in South Africa. The results were promising. Similar trials will commence in Kenya and Uganda as from 2015.

### *Planned commercial release of MON810 in Kenya and MON87469 in South Africa*

Dossiers for commercial release of *Bt* maize in Kenya and transgenic drought tolerant maize (MON87469) in South Africa were generated in readiness for submission to the regulatory authorities in the two countries. The South African dossier was presented to the regulatory agency by Monsanto on behalf of the company and the WEMA Project in July 2014. The Kenyan application is expected to be submitted in early 2015.

### *WEMA germplasm reaction to Maize Lethal Necrosis disease*

The Maize Lethal Necrosis (MLN) disease continues to wreak havoc on the Project and specifically seed production and movement. The Project is, therefore, actively involved in seeking ways of controlling the disease. Through partnership with the Kenya Agricultural and Livestock Research Organisation (KALRO) and the International Maize and Wheat Improvement Center (CIMMYT), the Project screened over 3,000 pre-commercial hybrids and lines for reaction to MLN under artificial inoculation at two sites in Kenya. The germplasm included: i) hybrids currently in NPT in WEMA countries; ii) elite pre-commercial hybrids; iii) elite single-crosses widely used in Eastern and Southern Africa; iv)



commercial varieties; v) New materials used in WEMA-wide trials (WWT); and vi) bi-parental mapping populations and inbred lines. Results showed some promising pre-commercial hybrids, single crosses and DH lines with good levels of tolerance to MLN. The tolerant lines are being used in pedigree starts and hybrid make-up in the various breeding programmes within WEMA.

### Project overview

Maize is the most widely grown food crop in Africa and it is the main food source for more than 300 million people on the continent. Its production is severely affected by drought and insect pests, which negatively impact yields leading to hunger and poverty. The Project is developing maize hybrids that are suitable for moderate drought conditions and are resistant to insect pests, using a combination of conventional, marker-assisted breeding and advanced biotechnology techniques. The partnership includes AATF as the Project coordinator, the national agricultural research systems (NARS) in five countries (Kenya Agricultural

and Livestock Research Organisation (KALRO), National Agricultural Research Organisation (NARO), Uganda, Institute of Agricultural Research (IIAM), Mozambique, Tanzania Commission for Science and Technology (COSTECH) and Agricultural Research Council (ARC) of South Africa), the International Maize and Wheat Improvement Center (CIMMYT), and Monsanto Company.

### Looking forward

'The Project will continue with the drought tolerance and *Bt* insect-pest resistance breeding, trait integration and trials in 2015. As we await approval for environmental release of transgenic drought tolerance maize in South Africa, we will prepare to present an application to Kenya's regulatory authorities for the *Bt* insect-protection maize. We will also be looking forward to more seed companies accessing the WEMA drought-tolerant conventional varieties and producing certified hybrid seed for more farmers to plant in the project countries,' said Sylvester Oikeh, the WEMA Project Manager, AATF.





*Every elder at the Pokot, Kenya, initiation ceremony for young people into adulthood is presented with a gourd of milk  
Photo credit: Nigel Pavitt*

## NEWEST Rice Project ushers in Phase II as Nigeria joins the Project

The Project began the year with two key developments: Phase II of the Project was commenced following grant extension by the United States Agency for International Development (USAID) and activities were expanded to a third country, Nigeria.

USAID approved Phase II of the NEWEST Project by granting the Project US\$ 5,885,103 for the next five years (April 2014–March 2019). Activities will be expanded during this phase to include Nigeria and also to commence putting the genes into farmer-preferred varieties in preparation for final product development and deployment. It is expected that by end of the five years, lead events will have been identified and genes made available in the farmer-preferred varieties. The new grant will also support the improvement of facilities available for CFTs and the purchase of the much needed rainout shelter for effective evaluation of water-use efficient traits under a standard international condition.

With the onset of Phase II of the Project, activities were scaled up to include Nigeria, making it the third project country after

Ghana and Uganda. AATF and Nigeria's National Cereal Research Institute (NCRI) signed a project partnership agreement early in the year following which a confined field trial (CFT) site at NCRI in Badeggi was identified, inspected by the country's National Biosafety Committee (NBC) in June 2014 and approval granted for four years. The institute's first application to conduct confined field trials (CFTs) of NEWEST rice was approved in September.



*Members of the National Biosafety Committee of Nigeria inspecting the proposed CFT site at NCRI, Badeggi in June 2014*



## Product development

Transformation work to develop triple stacked rice lines with nitrogen-use efficient, water-use efficient and salt tolerant traits was completed by Arcadia Biosciences with harvesting of the seeds in July. The 19 triple stacked lines developed were shipped to the partners in Ghana and Uganda. Lines for the International Center for Tropical Agriculture (CIAT) in Columbia and NCRI in Nigeria will be shipped in 2015.

Ghana planted its third Nitrogen Use Efficient (NUE) rice CFT in March. The trials comprised 15 NUE events under treatments of 30, 60 and 90 N kg/ha, with four replications per treatment. The trial was harvested in July. The yield data showed that most of the transgenic NUE rice lines performed better than the NERICA 4 in lower nitrogen levels (30 kg N/ha and 60 kg N/ha compared to 90 kg N/ha). Most of the transgenic NUE lines yielded better than the NERICA with a yield advantage of at least

10% above NERICA at different N levels. Agronomy data showed that the height of most of the transgenic NUE rice is not significantly different from that of NERICA 4. A number of NUE events produced more tillers and panicles than the NERICA 4. Eight of the 15 NUE lines flowered and matured later than the NERICA 4. The panicle length and 100 grain weight of the transgenic NUE rice are generally not statistically different from NERICA 4. This implies that the NUE rice is not phenotypically different from NERICA apart from the yield parameters. A summary of the combination of the yield data for the three CFTs conducted in Ghana indicate three potential lead events that perform better than NERICA 4 under all three nitrogen levels.

Uganda planted its second CFT in December after levelling of the land to properly manage nitrogen deposits.

CIAT conducted a hydroponic experiment using cultures of two concentrations of  $\text{NH}_4^+$  (50  $\mu\text{M}$  and 500  $\mu\text{M}$ ) to evaluate root phenotype of the two most promising lines (and their respective nulls and the wild type NERICA) selected from the previous CFTs. The aim was to measure Nitrogen (N) uptake of the lines under different conditions. At the end of the experiment, maximum root length, total root length, dry root biomass, total root number, shoot height, dry shoot biomass, ratio of deeper root (RDR) and the N content of each root and shoot were measured. To obtain the evidence of increased N uptake of transgenic lines, the total N content in dried shoot and root biomass were calculated. Significant variation was observed between NERICA 4 and promising transgenic lines. The NUE lines produced more branched roots than NERICA 4 in the experiment and were taller



*Harvesting of the third NUE CFT at Nobewam, Ghana*



with more shoot biomass and root dry weight. By comparing the total N content from the transgenic plants with NERICA, the increased N uptake efficiency by NUE was higher than NERICA by 16.3, 23.1 and 86.2 percent under different concentrations.

### Regulatory compliance

The project continues to ensure and facilitate compliance with regulatory requirements and to date no case of compliance infraction has been reported. In this regard, a CFT compliance training workshop attended by 25 participants was held for the project team in Nigeria in July 2014 to emphasise the significance of ensuring genetic and material compliance during CFTs. In-country teams in Ghana also carried out compliance audits during the course of field trials.

### Project overview

Rice demand in Sub-Saharan Africa exceeds production and large quantities of the grain continue to be imported to meet domestic demand. Several abiotic factors account for the low rice production, but nitrogen deficiency and drought have been cited as the leading constraints to upland rice production, while high salinity

is increasingly becoming a major problem in many rice growing areas of Africa. The Project is developing farmer-preferred and locally adapted rice varieties with enhanced nitrogen-use efficiency, water-use efficiency and salt tolerance. The partnership includes AATF as the Project coordinator, the national agricultural research systems (NARS) in three countries (National Agricultural Research Organisation, Uganda, Crop Research Institute, Ghana, and National Cereal Research Institute, Nigeria), Arcadia Biosciences, the Public Intellectual Property Resource for Agriculture (PIPRA), and the International Centre for Tropical Agriculture (CIAT).

### Looking forward

'The results from Ghana, Uganda and CIAT are promising. We expect that Nigeria will also plant its first CFT on completion of the CFT facility to the satisfaction of the NBC and that a rainout shelter will be installed at the CFTs to shut out water when not needed during testing of the triple stacked NEWEST rice, to enhance evaluation for water-use efficiency.' Kayode Sanni, Project Manager, Rice, AATF





*A group of women cooking food for celebrations of initiation and transition from age class, Futa Jallong, Senegal. The calabashes on the side will be used for serving.  
Photo credit: Doelan Yann*



## Higher yields and better prices for cassava farmers under CAMAP

Mechanisation pays – as cassava farmers in Nigeria and Zambia witnessed during the year. The first cassava crop planted under the project was harvested in May and July in the two countries recording encouraging results. Farmers who previously harvested an average of 7 tonnes per ha were pleasantly surprised to get a bumper harvest of between 28 and 33 tonnes per hectare which compares favourably with the world's average of about 26 tonnes per hectare. Further, these farmers pocketed higher profits with prices of US\$ 88 per tonne instead of the usual US\$ 62 per tonne. More importantly, the product's time-to-market was also reduced considerably as the project linked farmers with processors, ensuring the tubers were collected from the farm and transported to processors such as Allied Atlantic Distillers Ltd. The reduction of the duration of time to market is key to preserving the quality of the tubers and ensuring it is processed within 12 hours of harvest.

These exciting results present proof of concept that Africa can do better in cassava

production and improve livelihoods at the most critical level – that of the farmer.

The remarkable performance saw many more farmers showing interest in participating in the project, which increased the number from 350 in 2013 to 1,650 in 2014. In addition, more farmers are now willing to pay for Cassava Mechanisation and Agro-processing Project (CAMAP) services



*Mechanised cassava planting in Nwoya, Uganda*



and to also contribute 60 percent of their stems back to the project under the plough-back scheme.

Land under CAMAP also expanded during the year, with just over 2,000 hectares cultivated, up from 478 during 2013. Farmers in the project indicated interest to expand acreage under the project and began clearing more land for integration into CAMAP.

To support the expanding work and interest, the Project acquired additional equipment – 12 planters, 12 harvesters, 12 cultivators, 4 boom sprayers, 1 trailer and 1 tractor. These were allocated to the three project countries – Nigeria, Zambia and Uganda, with Nigeria receiving the bulk due to the level of activities and progress in the country.

Farmers continued to work with the Project on integrating mechanisation and processing with access to and use of high quality, high yielding, disease-resistant planting materials; good agronomy; and market linkages. Farmers adhered to timely

planting, use of herbicides, and timely weeding which resulted in accelerated growth and a high quality crop.

In Nigeria, CAMAP is collaborating with the National Centre for Agricultural Mechanisation (NCAM) and Nigeria's Federal Ministry of Agriculture and Rural Development. During the year, another four states – Delta, Nassarawa, Benue, and Ekiti – joined the Project under the collaboration with NCAM, increasing the number to eight states in Nigeria. The four new states committed an additional 5,000 hectares to CAMAP. Encouragingly, some of the state governments made contributions to the project in the form of 50 percent subsidy on fertiliser and herbicides (Kogi State) and budgetary allocation for land clearing (Kwara). The private sector was represented in the project by five agro-processing companies. Some private commercial farms indicated interest to partner with CAMAP and were willing to pay for use of the Project machinery.



*A cassava farmer in Ogun, Nigeria, one of the CAMAP beneficiaries, ready to take the tubers to the market*



*A 30-tonne truck collecting tubers from farmers in Ogun, Nigeria for delivery to the processing plant*

In Zambia, the fields planted in 2012/13 were harvested in November and December and will continue into 2015. Zambia has a short rain season that necessitates a long growth cycle for the commercial cassava varieties grown by farmers which are often harvested after 18 months compared to 12 months in Nigeria. Another challenge was water logging during the rainy season that affects land preparation. The Project therefore adopted winter ploughing to ensure that land preparation was done prior to the rainy season. In this way, the Project managed to plough 100 hectares that were planted in November.



*A 2013-14 season cassava field in Nsonga, Mansa, Zambia*



*A 2013-14 cassava field in Kale, Mansa, Zambia*

Uganda received its machinery in February and May. These included a tractor, a disk plough, a set of two disc harrows, three cassava planters, three cassava root diggers and three boom sprayers cum cultivators. The Project trained project partners in use and maintenance of the machinery prior to commencement of the activities. Activities began in May in Apac and Nwoya districts during the short rains. Apac is about 300km from Kampala and is the leading cassava producer in Uganda with an active farmers' group whose members have a combined acreage of 1,800 acres under cassava and would benefit from mechanisation of the crop's production processes.

The land in the two districts is well stumped and flat and therefore easy to mechanise. Farmer identification and profiling was carried out and 800 farmers are currently participating in CAMAP

activities in Uganda (350 in Apac and 450 in Nwoya). Ploughing, disking and planting was done on 76 hectares. AATF partners in Uganda are the National Cereal Crops Research Institute, farmer organisations and a private company, PAMRONE Investment Limited. The company has supported land preparation while CAMAP has contributed supply of herbicides, fertiliser and quality stems.

### Project overview

Africa is the world's largest cassava producing region, accounting for nearly 55 percent of the world's output. However yields per unit area on the continent are the lowest in the world (10 tonnes per hectare compared to 26 tonnes per hectare in India). CAMAP aims at transforming the cassava sector in Sub-Saharan Africa by enhancing commercial production, processing and market linkages



based on business models that engender sustainability. It also aims to address key constraints to cassava production in Africa, related to limited use of improved varieties, poor agronomy, and lack of mechanisation and processing. The partnership consists of the Zambia Agricultural Research Institute (ZARI); National Centre for Agricultural Mechanisation (NCAM) and the National Root Crops Research Institute (NRCRI), both in Nigeria, Governments of Osun, Ogun, Kogi and Kwara States, Nigeria; and the National Crops Resources Research Institute (NCRI), Uganda.

### Way forward

'The project will continue with market linkages in both Zambia and Nigeria to facilitate demand and sales as it continues engagement of other private players in Nigeria and procurement of additional equipment. Funding allowing, Project out-scaling into other countries will be undertaken to expand the benefits of mechanisation. The Project will also consider the recruitment of a project officer to oversee the day-to-day activities of the Project to support coordination of expanding project activities.' George Marechera, Business Development Manager, AATF.





*Tonga Women from Batonka tribe, Mola Village, Zimbabwe smoking pipes.  
Photo credit: Roger de la Harpe*



## Hybrid Rice: Breeding by Design Project

### First hybrid rice developed

The project had an exciting year as it made remarkable progress in product development. Seeds of the first set of 140 hybrid lines – also a first for Africa – were successfully produced and processed in Malindi, Kenya. The hybrids are being tested by eight private seed companies and two public organisations in 30 locations in Tanzania and Kenya. In addition, over 4,700 selections were made from 607 selected rows of  $F_4$  female parental lines (S-lines) by Hybrid East Africa Ltd (HEAL), the product development partner in the project. These selections were made available to project partners for development of their own fixed S-lines as the project continues further advancement to  $F_5$ . Once ready, the  $F_5$  lines will be bulked and made available to partners for use in carrying out test crossing and development of hybrids. Also, the  $F_3$  male lines (P-lines) have been planted to produce seeds of  $F_4$  which will be made available to seed companies interested to further advance them after harvest in January 2015.

#### Development of IT tools

Throughout 2014, aWhere, the information technology partner in the project, continued to collect daily observed data, quality check the data, and create the weather surfaces for use by the project. A large collection of satellite observed data to better capture precipitation across the region was incorporated in the database. The project also updated the 33 years of daily temperature data for the region that it has captured. This database of weather surfaces provides users with the ability to identify the best location for seed multiplication and understand hybrid rice development.



*A hybrid seed production field in Malindi, Kenya*





*Harvested seeds at HEAL's store in Malindi ready for distribution to partners for testing*

Users of the data across Africa increased with a total of 228 logins recorded by 23 people. A total of 152 location analyses were created for five countries – Kenya (77), Uganda (6), Rwanda (2), Tanzania (57) and Mozambique (10).

### Project out scaling

A stakeholder meeting was held in Mozambique in September, 2014, as a step towards out scaling the hybrid rice project. The meeting was attended by 14 participants from private seed companies, the Institute of Agricultural Research of Mozambique (IIAM), HEAL and AATF. Participants expressed interest in the project's hybrid rice testing activities and requested IIAM to handle the testing on their behalf. As a result of this meeting, three participants from Mozambique attended training in Malindi, Kenya in October 2014. Additional consultations were carried out between HEAL and SEMOC Seed Company in Chimoio. The company has a large seed treatment and packaging facility with capacity to handle treatment and bagging of seeds for a number of other seed companies.

The company nominated two people to participate in the October training and volunteered to facilitate the importation of seeds and its distribution on behalf of the project for testing in the country.

### Capacity building in breeding and seed production

Two training sessions were held in 2014. The first, on seed production, was held during the first week of March, at peak flowering of the first planting of seed production. The nine participants, from Tanzania and Kenya, were seed production specialists drawn from five private seed companies, one national research system and three government parastatals that are producing and commercialising seeds. The second, on breeding and developing 2-line hybrids, was held in October and was attended by six participants, from Tanzania, Kenya and Mozambique, drawn from two private seed companies, one national research system and one government parastatal.

### Project overview

The project aims to develop 2-line hybrid and parental lines rice germplasm in selected African countries and ensure that, through private companies and public institutions in Africa, the technology reaches farmers and increases their rice yields and income streams. The 2-line hybrid system relies on temperature to switch from fertile to females with male sterility making the understanding of breeding and seed production environments critical. The project is also developing an IT tool with interpolated weather data to predict temperature regimes and making the choice of production environment for 2-line hybrid rice.

Thermo-sensitive Genic Male Sterility (TGMS) lines or 2-line rice hybrid system (only 2- breeding lines) are being used to develop rice hybrids. This is based on a single gene recessive mutation which causes TGMS recessive plants to become sterile in high temperatures, but remain fertile in cool temperatures. The female line uses the temperature modulated single gene system which is easy to breed, but requires significant skill and experience to get to the level of hybrid seed production. The male in this system can be any other line and this opens up significant opportunities to develop better plants than using both parents (heterosis) through genetic diversity.

The Project partnership is composed of AATF that is charged with the project

management, Hybrid East Africa Ltd who are responsible for germplasm development and training, aWhere who are developing the necessary IT tools to support germplasm development, and the National Agricultural Research Systems (NARS) who are providing technical backstopping services, testing and developing germplasm.

### Way forward

'The project will avail to interested companies  $F_5$  and  $F_4$  seeds of the S-lines and P-lines respectively. The parental lines (P- and S-lines) used in the development of the hybrids will also be made available on demand for seed production by partners. We will also test germplasm for biotic stresses.' Sanni Kayode, Rice Project Manager, AATF.

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aWhere





*Mother feeding baby from  
traditional calabash near  
Tzaneen town, South Africa  
Photo credit: Eric Nathan*





OPEN FORUM ON AGRICULTURAL  
BIOTECHNOLOGY IN AFRICA

## OFAB opts for high-impact grassroots outreach

Consensus is emerging among biotechnology stakeholders in Africa that three things must happen to spike the graph of biotech crops adoption in Sub-Saharan Africa: a strong commitment to evidence-based biotech policy decisions by high-level policy makers; injection of a global approach towards pro-biotech advocacy, communication and issues management; and increased demand for biotech crops by farming communities. It is a renaissance of sorts, reminiscent of the revolutions in the 50s and 60s that shaped modern theories of development communication.

Catalysed by this new thinking, the OFAB Project started laying major groundwork to mainstream the three approaches into its advocacy strategies during the year. At its Annual Review and Planning Meeting in Abuja, Nigeria, the Project's new vision, strategic thinking and roadmap for achieving the three pillars of mobilising grassroots support, impacting high-level policy makers and building a global coalition, was presented to the over 40 stakeholders in attendance. This new thinking was supported by advice

from experts on grassroots campaigns and biotech issues management in addition to experiences gained by the OFAB family and its partners over the years.

The OFAB Project started testing its community dynamic grassroots model in Tanzania in the last quarter of 2013 and the significant impacts gained by the following year were shared during the April Annual Review and Planning Meeting. The model involves holding discussions with farmers and community leaders in their localities



*OFAB Project Community Mobilization Dynamic Model in Mtwara, Southern, Tanzania*

about the challenges encountered in the production of their key staple crops, such as bananas, maize, cassava and sorghum. The experts would then explain the causes to the community members and the media and provide available solutions to the challenges. As a follow-up, farmers would of their own choice petition relevant authorities for access to seeds that are better equipped against abiotic and biotic stresses.

To help improve biotech policy environment, OFAB implemented a series of activities aimed at gaining high-level commitment of policymakers to science-based policy making. For instance, in April 2014, the Project organised a high-impact seeing-is-believing tour to South Africa for high-level policy makers from Kenya, Uganda, Tanzania and Nigeria. The main purpose of the visit was to expose the policy makers to architectures of evidence-based policies and the practical benefits of genetically modified crops.

In Uganda, the OFAB team organised and joined experts from Uganda's National Agricultural Research Organization, AATF and AfricaBio in briefing the Uganda parliamentary committee on agriculture on the benefits of biotech crops and their role in agricultural development in July. The team also participated in the second National Agriculture Stakeholders Meeting where biotechnology was also discussed.

In Tanzania, conversations and calls for review of the strict liability clause to allow field trials of biotech crops continued during the year, backed by written recommendations to cabinet and parliament.

In Kenya, an advisory paper was presented to the government, calling for lifting of the ban on GM imports. There were

encouraging positive public statements on biotech by the president and his deputy, offering hope that the much-awaited lifting of the ban could be in the offing. To build on this momentum, OFAB partnered with university lecturers and other stakeholders in calling for the ban to be lifted. These outreach activities contributed to a chorus of calls from scientists, legislators, ministers, entrepreneurs and media on cabinet to lift the ban.

Finally in Ghana, statements of support for biotechnology that also denounced left-leaning anti-biotech lobby groups were received from high ranking government officials that lent support to level-headed discussions of biotechnology and the plant breeders' bill.

One of the OFAB Project's key mantra in 2014 was 'think global, act local'. This was championed to help build strong regional and global networks of partners to help in dealing with the complicated scenarios around biotechnology. OFAB therefore undertook an exchange mission to the UK, Belgium and The Philippines and forged useful strategic alliances that were leveraged to optimise its impacts at the global level as it continued to grow local support.

Another development for OFAB during the year was involvement in designing the Cornell Alliance for Science (AFS) program. AFS's main goal is to train biotech stakeholders on effective biotechnology advocacy, communication and leadership. A number of OFAB and AATF staff and partners benefited from the first training on grassroots campaign and effective biotech advocacy held from 10–12 September 2014 in London.

The launch of the eighth chapter in Ethiopia, in June 2014 was another key

achievement during the period. The launch was attended by over 50 people, representing government, research institutions, universities, the media, industry, farmer organisations and regulatory bodies. The launching of OFAB Ethiopia was significant as it marked the forum's entry into a city which is essentially the 'capital of Africa' – being the host of the African Union headquarters.

### Project overview

To further support its core mandate of enhancing productivity of African smallholder farmers, AATF established the Open Forum on Agricultural Biotechnology in Africa (OFAB) in 2006 to facilitate the flow of credible biotech information from the scientific community to policy makers and the general public. While science plays an important role in reversing wrong perceptions, misinformation often thrives in an environment where the evidence-base is poorly understood, leading to weak political and public support for the science. The aim of the Forum is to share knowledge and facilitate constructive conversations among stakeholders, such as farmers, scientists, journalists, the civil society, industrialists, lawmakers and policy makers, among others, to create a better enabling environment for the deployment of biotech crops in Sub-Saharan Africa (SSA).

OFAB currently operates in eight countries and the project partnerships includes AATF that provides coordination across Africa and National Chapters that are coordinated by Institut de l'Environnement et de Recherches Agricoles, Burkina Faso; Ethiopian Institute for Agricultural Research, Ethiopia; Council for Scientific and Industrial Research, Ghana; International Service for the Acquisition of Agri-biotech Applications, Kenya; National Biotechnology Development Agency of Nigeria, Nigeria; Tanzania Commission for Science and Technology, Tanzania; Uganda National Council of Science and Technology, Uganda; and National Biotechnology Authority, Zimbabwe.

### Way forward

'Following logically from the above, the way forward for OFAB is threefold: to intensify biotech grassroots advocacy and communication campaigns to mobilise community support for the potentially life-changing technologies; to enhance high-level biotech policy outreach aimed at mainstreaming evidence-based policy decisions; and to build the OFAB brand regionally and globally in order to attract significant support from development partners and like-minded organisations,' says Daniel Otunge, OFAB Coordinator at AATF.

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AfricaBio







*A woman from Burkina Faso prepares a bunch of leaves of Lannea Microcarpa, traditionally used for skincare in Africa.  
Photo credit: Francis Demange*

## The Seeds2B Project rolls off its workplan with technology needs assessment and scouting

The first year of project implementation progressed well with completion of technology needs assessments in the two project pilot countries of Malawi and Zimbabwe that designated potato, tomato, maize, wheat, sorghum, millet, pigeon pea, cowpea, beans and groundnut as high potential target crops. Crop profiles based on climate data, technology needs and market preferences were developed to facilitate scouting for appropriate improved crop varieties.

### Technology scouting and trialing

The Project successfully scouted for and identified potential providers of improved seed in Asia. Two seed companies from China and three from India have so far been engaged to provide high yielding tomato hybrids for performance and adaptation trials in the pilot countries. The relevant material transfer and evaluation agreements were developed to enable the access of seed-based technologies from seed companies

in and outside Africa. Activities continue to identify and engage more providers with adaptable improved varieties.

The Project's first on-station trials of improved tomato varieties from India and China were installed in December in partnership with the Zimbabwe Department of Research and Specialist Services (DR&SS) and the Malawi Department of Agricultural Research Services (DARS). The trial was set up as a randomised complete block design with 4 replicates of 15 treatments (13 test and 2 check varieties). Trial results will be assessed in 2015. To guide partners in managing the activities of the project, research notebooks, intellectual property and confidentiality policies were prepared.

### Business plan development

The Project completed the feasibility study that will inform development of a business plan. The feasibility study covered technical, economic, legal, operational and social feasibility of testing and deployment of



*Research technicians at the Horticulture Research Station, Marondera, Zimbabwe, preparing to sow hybrid tomato seeds in seedling trays*

seed-based technologies accessed through the project in Zimbabwe and Malawi. Preliminary results confirm the Project has potential to sustainably achieve rapid enhancement of smallholder productivity across a range of crops and offer new business opportunities for local small-medium sized seed enterprises. Development of a business plan will outline a sustainable market-led strategy for the implementation of the Project to attain its potential.

### **Regulatory compliance**

The Project finalised a review and assessment of policies and regulations for variety evaluation, varietal release and registration, and seed trade in Malawi and Zimbabwe. Crop specific requirements for testing, bulking and trade of seed-based technologies sourced from foreign suppliers has also been documented to help ensure

that the Project operates within prevailing seed regulations of Malawi and Zimbabwe. In addition, a checklist for management of compliance in variety testing and release has been developed and is currently under application with the purpose of facilitating regulated cross-boundary movement of seed to Malawi and Zimbabwe for performance and adaptation trials.

### **Project overview**

The Seeds2B Project fosters the development of 'seed bridges' that link crop breeding initiatives to Sub-Saharan Africa's (SSA) seed systems. The Project facilitates the transfer of better-performing, locally adapted and market-appropriate crop varieties developed by public and private breeders based in and out of Africa to smallholders in SSA through local seed producers and distributors. By adding new commercially viable products



to the portfolios of local seed enterprises, the Seeds2B Project helps smallholders in the region serve new markets with the best of locally grown produce. Through its operational models, the Project offers innovative market-oriented solutions that contribute towards addressing a range of seed system related constraints that impact improved agricultural productivity in SSA. The ultimate goal of the Seeds2B Project is to contribute towards building the capacity of SSA's commercial seed sector and enhancement of food security in the region.

The partnership includes AATF as the Project coordinator, public and private breeders who submit appropriate improved crop varieties for assessment, and organisations that facilitate trials comprising the Department of Agricultural Research Services, Malawi, the Department of Research and Specialists Services,

Zimbabwe, and SNV, Zimbabwe. Local seed enterprises will produce and market seed of selected varieties.

### Way forward

'The Project will continue technology scouting and carrying out adaptation and performance trials of accessed technologies both in research stations and on farmers' fields to inform on the potential of accessed varieties to enhance agricultural productivity in Malawi and Zimbabwe. A business plan will be developed to guide the Project towards achievement of its objectives. We also hope to establish new partnerships along target value chains to ensure all key stakeholders are engaged in variety evaluation trials and facilitate engagement of competent commercial partners.' Edgar Wavomba, Seeds2B Project Coordinator, AATF





*Unidentified Karo child at a ceremony in South Omo, Ethiopia.  
Photo credit: Dietmar Temps*



# Bacterial Wilt-Resistant **BANANA**

## Expanding the horizon of possibilities – producing and testing transgenic lines with stacked genes

**T**he second confined field trial, planted in 2013 at Kawanda, Uganda, was successfully concluded indicating all transgenic lines had good resistance to Banana *Xanthomonas* wilt (BXW) disease and were phenotypically similar to the non-transgenic plants under field conditions. The trial had 12 replicates of 10 promising transgenic lines planted along with non-transgenic control plants of Sukali Ndiizi and Nakinyika. The plants of transgenic lines and non-transgenic control were artificially inoculated with the BXW disease to test for resistance. The inoculated plants were assessed daily and while the majority of the non-transgenic plants started showing symptoms in 10–24 days the transgenic plants did not show any symptoms.

The Project recorded great progress towards development of additional stacked gene constructs containing plant ferredoxin-like protein (*Pflp*) and hypersensitivity response assisting protein (*Hrap*). A key milestone was selection of promising lines

with stacked genes for Gros Michel and Cavendish Williams, showing complete resistance against BXW. Researchers at the International Institute of Tropical Agriculture (IITA) successfully developed 162 banana lines (desert bananas Gros Michel and Cavendish Williams) using stacked genes. Twenty (20) lines each of the desert bananas were tested in glasshouse for disease resistance evaluation and compared with single gene transgenics of the same cultivars. Three replicates of each line were then artificially inoculated and monitored for 60 days post inoculation for BXW symptoms.

A further development for the project during the year was commencement of the initiative to use the *Pflp* gene with signal peptide (*Es-Pflp*) to test for combined BXW and *Fusarium* wilt resistance in two banana cultivars (Sukali Ndiizi and Gros Michel). Both cultivars are highly susceptible to both BXW and *Fusarium* wilt. Glasshouse screening is done in step-wise procedure starting with screening for BXW, then evaluating for





Banana transgenic plants being multiplied in Uganda for second CFT

*Fusarium* wilt resistance. Three replicates, each of 18 lines of Sukali Ndiizi and 30 lines of Gros Michel, were artificially inoculated with the pathogen *Xanthomonas campestris* pv. *musacearum* (Xcm) and monitored for 60 days. Observations showed that the control non-transgenic plants developed symptoms and completely wilted within 60 days of post inoculation whereas 12 independent lines (6 lines of each cultivar) were found to have no symptoms for BXW. An additional 25 lines of Gros Michel have been further weaned in the glasshouse for evaluation. The transgenic lines showing resistance to BXW will be further evaluated for resistance to *Fusarium* wilt.

### Analysis of allergenicity and toxicity of *Pflp* and *Hrap* proteins

A study to evaluate the potential allergenicity and toxicity of the two expressed proteins,

*Pflp* and *Hrap*, was carried out by IITA. The assessment followed the guidance of the Codex Alimentarius Commission for safety evaluation of genetically modified plants. While peppers are commonly consumed with rare cases of allergic reactions and no reports of toxicity, the abundance of the two proteins in peppers is not known. However, the bioinformatics comparisons did not identify any significant identity matches to known or suspected allergens or toxins. In addition, there are no reports that either protein is an enzyme that would express a toxic metabolite. The assessment did not indicate need to carry out any other evaluations the conclusion being that the risk of potential allergenicity and toxicity is quite low or negligible for these proteins.

### Project overview

East Africa produces and consumes the highest amount of bananas in Africa and

Uganda is the world's second largest banana producer after India. Banana farmers in Uganda are currently battling with the Banana *Xanthomonas* Wilt (BXW) disease caused by the pathogen *Xanthomonas campestris* pv. *musacearum* (Xcm). The disease costs farmers millions of dollars in damages every year in East and Central Africa. The rapid spread of the disease has endangered the livelihoods of millions of farmers for whom banana is a staple and also a cash crop. The project is using the *Pflp* and the *Hrap* genes that were isolated from sweet pepper (*Capsicum annum*) to develop a transgenic banana that is resistant to BXW. The mechanism of this resistance is such that it rapidly kills plant cells at the point of attempted invasion by the pathogen and forms a physical barrier to prevent further infection. In addition, it also activates the defences of surrounding and even distant uninfected parts of banana plants leading to a systemic acquired resistance.

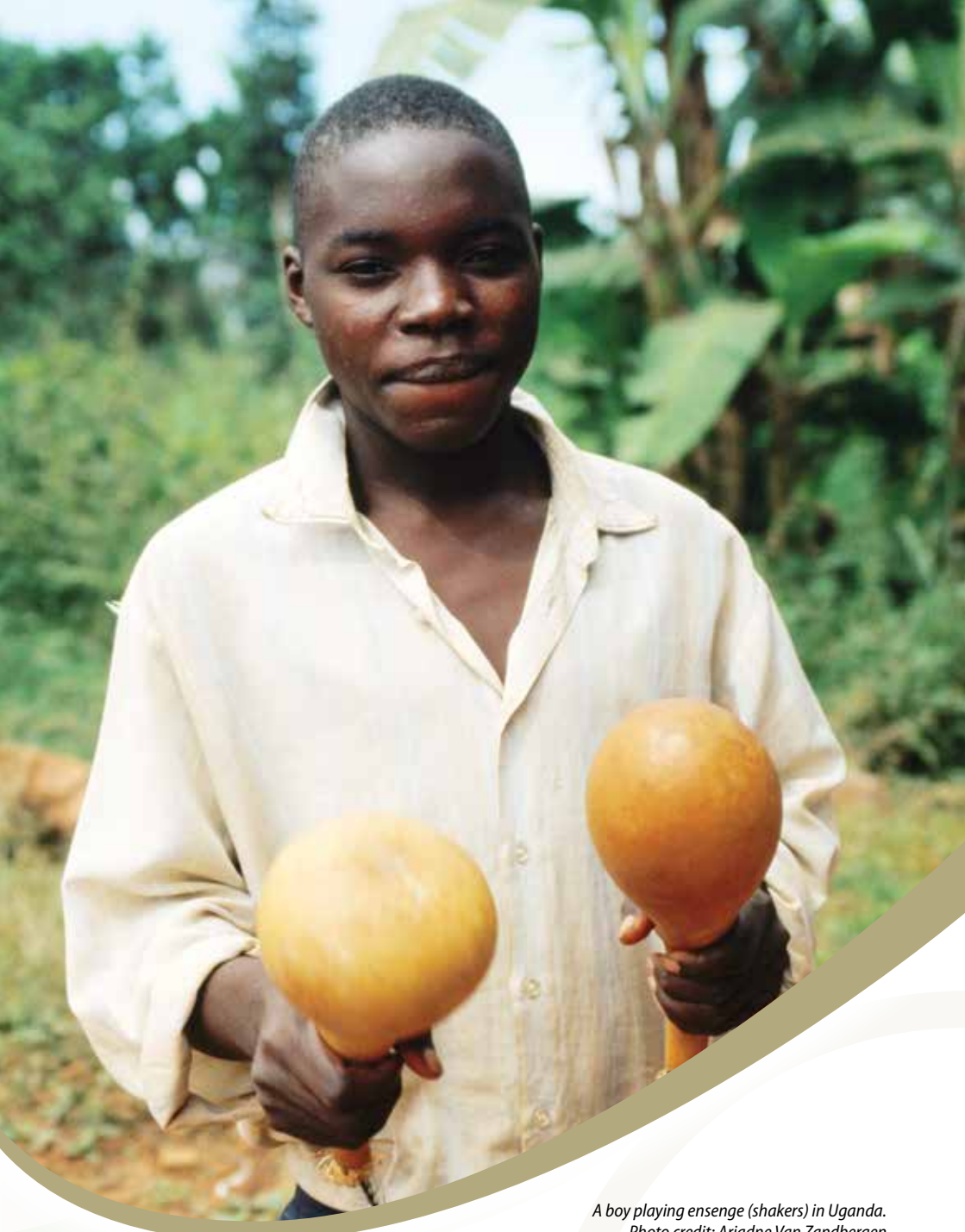
The project is led by IITA in partnership with the National Agricultural Research Organisation (NARO), Uganda, and AATF. AATF brokered access to the genes from Academia Sinica which donated the plant ferredoxin like protein (*Pflp*) gene and

hypersensitivity response assisting protein (*Hrap*) gene isolated from sweet pepper; IITA is leading product development and biosafety research and developing transgenic lines using varieties preferred in Kenya; NARO is developing transgenic lines using varieties preferred in Uganda and NARO and IITA are conducting confined field trials in Uganda; Kenya Agricultural and Livestock Research Organisation (KALRO) will also conduct confined field trials in collaboration with IITA. Other stakeholders include public and private tissue-culture laboratories in the Great Lakes region of Africa (Burundi, Democratic Republic of Congo, Kenya, Rwanda, Tanzania and Uganda).

### Way forward

'The Project will collect data on disease resistance and agronomic performance from transgenic lines planted in the second CFT in Uganda and continue glasshouse evaluation of transgenic lines of cultivar Cavendish and Gros Michel with modified stacked gene constructs. We also look forward to establishing a CFT in Kenya in 2015.' Leena Tripathi, Project Principal Investigator, IITA





*A boy playing ensenge (shakers) in Uganda.  
Photo credit: Ariadne Van Zandbergen*



# Special Projects

## Commercial Products II (COMPRO II) Project

### Overview

The COMPRO II Project was launched in 2012 to ensure effectiveness, safety and quality assurance of bio-based products on the market due to the current insufficiency in evaluating these products for quality and efficacy. The COMPRO II Project is being implemented in six Sub-Saharan African countries – Kenya, Uganda, Tanzania, Ethiopia, Ghana and Nigeria. It is coordinated by the International Institute for Tropical Agriculture (IITA) and is targeted towards creating an enabling policy atmosphere for testing, registration and dissemination of promising candidate bio-fertilisers, bio-pesticides and chemical agro-inputs to increase crop yields.

Based on the AATF experience in managing regulatory affairs including compliance, the Foundation was tasked with facilitating establishment and institutionalisation of quality control and regulatory mechanisms for bio-fertilisers and bio-pesticides in the six project countries. This entails engaging regulators and policy makers to catalyse processes leading to emergence of a conducive regulatory

environment for testing and registration of bio-fertilisers and bio-pesticides in Sub-Saharan Africa.

### Progress

During 2014, AATF facilitated development of registration guidelines and standard operating procedures (SOPs) for testing bio-fertilisers in Ghana, Kenya and Tanzania which are undergoing approval processes in the three countries. Once approved, the guidelines and SOPs will underpin key considerations on quality, efficacy and standards for assessment and registration of bio-fertiliser products in the respective countries. As standards and other quality assurance procedures take root in the COMPRO II Project countries, AATF is considering eventual harmonisation of systems across regions. Towards this end, the Foundation convened a consultative meeting with officials of the Common Markets for East and Southern Africa (COMESA) to initiate regional harmonisation of protocols and procedures for registration of bio-fertilisers.

## Way forward

‘Policy formulation and implementation is the primary business of government agencies and AATF will continue close engagement and liaison with national regulatory agencies in partner countries to ensure finalisation of the guidelines and SOPs and their implementation.

AATF is also planning to follow up with national regulators and COMESA officials to dialogue on modalities and protocols for harmonisation of testing and registration procedures for bio-fertilisers in the region’. Francis Nang’ayo, Senior Manager, Regulatory Affairs, AATF

# USDA-FAS initiative for bio-pesticide registration guidance for Sub-Saharan Africa

## Overview

AATF and the United States Agency for International Development-Foreign Agricultural Service (USDA-FAS) commenced collaboration in 2012 to facilitate the use of bio-control products in SSA. Based on experience gained by working with regulators and policy makers, AATF liaises with national governments to identify testing and registration requirements for efficacious bio-pesticides. The requirements are mostly poorly developed and tend to vary on a country-by-country basis. AATF thus works through the subtleties surrounding bio-control registration, use, and acceptance in SSA collaboratively with regulatory officials by building an understanding of the science behind biological control to ensure product acceptance and help to establish harmonised registration protocols. This initiative will contribute towards supporting the development and registration of bio-pesticides under the Aflatoxin Control in Maize and Peanuts Project. Support from

USDA-FAS will therefore enable AATF to facilitate the development of a regionally targeted bio-pesticide regulatory framework for Africa that will guide registration processes of aflasafe™, a product mitigating aflatoxin contamination in maize and peanuts in SSA.

## Progress

The partnership developed a bio-pesticide registration guidance document, ‘Guidance Document on Regulatory Frameworks for Microbial Pesticides in Sub-Saharan Africa’, in 2013. The document was discussed and adopted by stakeholders from Malawi, Zambia and Mozambique in 2013 while the Southern African Development Cooperation (SADC) and COMESA committed to initiate wider adoption within their member countries.

During 2014, the guidance document was presented to industry, governments and other partners involved in aflatoxin control at a Partnership for Aflatoxin

Control in Africa (PACA) workshop held in April. PACA appreciated the document and some partners have recommended it to their governments for adoption. The guidance document provides regulatory officials with a simplified framework for consideration in evaluation and registration of bio-pesticides, an area that has hitherto only been well developed for chemical pesticide products. This means that adopting African countries now stand to benefit from integrating the use of chemical pesticides and biological pesticides in addressing pest control challenges.

### Way forward

'AATF will continue to follow up on actions initiated within COMESA, SADC and reach out to EAC and ECOWAS to sustain engagement on modalities and protocols for harmonisation of registration procedures for bio-pesticides in the regional economic blocks. The Foundation will also facilitate translation of the "Guidance Document" into French and Portuguese to ease adoption of the document by other countries and regional economic communities (RECs) in Africa.' Francis Nang'ayo, Senior Manager, Regulatory Affairs, AATF

## Control of aflatoxin contamination in maize and peanuts in Sub-Saharan Africa

### Overview

Aflatoxin is a potent poison and carcinogen produced by naturally occurring fungi, which are commonly found in soils in tropical and semi-tropical climates. It is impossible to establish contamination without laboratory testing. Biological control using non-toxin producing fungal strains largely controls aflatoxin contamination of commodities in the United States and efforts led by the International Institute of Tropical Agriculture (IITA) and the United States Department of Agriculture's Agricultural Research Service (USDA-ARS) to address the aflatoxin menace are adapting the same method to African contexts, where aflatoxin is found in a large proportion of maize, peanuts, and even in the milk of grain-fed cows. The aflasafe™ biocontrol technology developed by IITA and partners has been tested and it works.

AATF was instrumental in facilitating the provisional registration of aflasafe™ in Kenya and Nigeria. Aflasafe™ is now manufactured by IITA on a large scale in a factory in Ibadan, Nigeria for use by farmers.

### Progress

During the current reporting period, the project was awarded a one-year provisional registration on aflasafe™ by the Pest Control Products Board (PCPB) of Kenya as it addresses data gaps in the product profile for full registration. The provisional registration was granted to the Kenya Agricultural and Livestock Research Organisation (KALRO) as registrant. This was a milestone that allows for mass production, packaging, labelling and sale of aflasafe™ in Kenya for use by smallholder farmers. AATF worked with IITA and KALRO for negotiation of the



registration during which they presented published literature on AflaGuard™ and aflasafe™ and also additional efficacy data on aflasafe™ in Kenya and Nigeria to inform decision making.

### Way forward

'As the project enters the commercial production phase, AATF will work with IITA and KALRO to prepare and submit a

compelling justification to the Pest Control Products Board (PCPB) in pursuit of full registration and commercialisation of aflasafe™ in Kenya. Based on experience gained on other projects, AATF will facilitate identification and sub-licensing of private sector partners that will undertake commercial production, sale and distribution of the product in Kenya' Francis Nang'ayo, Senior Manager, Regulatory Affairs, AATF.



# Financial Report 2014

These audited financial statements cover the period from January through December 2014 and provide comparative data for 2013 – the previous accounting period.

## Funding overview

AATF investors for 2014 were:

- Bill & Melinda Gates Foundation
- Howard G. Buffett Foundation
- United Kingdom's Department for International Development (DFID)
- United States Agency for International Development (USAID)
- Syngenta Foundation for Sustainable Agriculture (SFSA)
- Alliance for a Green Revolution in Africa (AGRA)
- Fintrac

AATF has continued to use sub-grants received earlier from:

- International Maize and Wheat Improvement Center (CIMMYT)
- International Institute of Tropical Agriculture (IITA)

The funds from CIMMYT and IITA are from the Bill & Melinda Gates Foundation grants for the Integrated Striga Management for Africa (ISMA), Aflatoxin Control in Maize and Peanuts and the Commercial Projects II (COMPRO II) projects for the execution of project specific tasks.

AATF is grateful to all its investors for their continued support that ensures that its commitment towards assisting resource-constrained farmers in accessing affordable agricultural technology to improve their lives is achieved.

## Statement of financial position

As at 31 December 2014 (US\$)

ASSETS	2014	2013
<b>Non-current assets</b>		
Equipment and motor vehicles	140,419	203,523
Intangible assets	1,333	-
	<b>141,752</b>	<b>203,523</b>
<b>Current assets</b>		
Grants receivable	4,974,996	1,378,297
Other receivables	889,518	397,534
Bank deposits	3,071,406	5,108,561
Bank and cash balances	601,238	1,244,207
	<b>9,537,158</b>	<b>8,128,599</b>
<b>Total assets</b>	<b>9,678,910</b>	<b>8,332,122</b>
<b>EQUITY AND LIABILITIES</b>		
<b>Current liabilities</b>		
Unexpended grant payable	2,156,187	2,530,781
Deferred income	4,120	51,036
Payables and accruals	1,273,681	678,307
	<b>3,433,988</b>	<b>3,260,124</b>
<b>Fund balances</b>	<b>6,244,922</b>	<b>5,071,998</b>
<b>Total liabilities and fund balances</b>	<b>9,678,910</b>	<b>8,332,122</b>



## Statement of comprehensive income (abridged version in US\$)

For the year ended 31 December 2014

INCOME	2014	2013
Grant income	24,584,723	18,920,458
Other income	1,309,338	1,090,428
<b>Total income</b>	<b>25,894,061</b>	<b>20,010,886</b>
<b>Expenditure</b>		
Project related expenses	22,725,374	17,695,234
Management and general expenses	1,995,763	1,742,188
Total expenditure	24,721,137	19,437,422
Surplus for the period	1,172,924	573,464
Percentage of management and general expenses to the total operating expenses	8.07%	8.96%
Percentage of project related expenses to the total operating expenses	91.93%	91.04%
	100%	100%

### Financial status

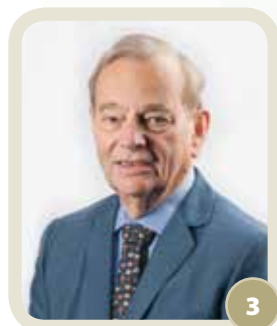
The funding received/available income as at 31 December 2014 was adequate for the Foundation's needs for the year as all expenditures were fully catered for. The Foundation's finance is healthy both in terms of expenditures/income and project expenditures/general operating expenses ratio. The expenditure in 2014 increased by about 27 percent compared to 2013. This is mainly attributable to an increase in project activities and related expenditure.

The Foundation continues to receive unqualified audit opinion from external auditors. The independent auditors' opinion for the year was that the financial statements presented fairly, in all material

aspects, the financial position of the Foundation as at 31 December 2014 and its financial performance and cash flows for the year then ended in accordance with International Financial Reporting Standards and the requirements of Kenya's Companies Act.

The future is promising with AATF's main donors continuing to support the Foundation. DFID funding came to an end on 31 December 2014 and extension is expected before end 2015. Funding for the Open Forum for Agricultural Biotechnology (OFAB) Project will come to an end in early 2015 and discussions with the Bill and Melinda Gates Foundation for reinvestment are at an advanced stage.

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# AATF Staff 2014

## Executive Director's Office

**Denis Tumwesigye Kyetere**, Executive Director  
**Alhaji Tejan-Cole**, Director of Legal Affairs  
**Nancy Muchiri**, Senior Manager, Communications and Partnerships  
**Peter Werehire**, Documentation and Websites Officer  
**Grace Wachoro**, Corporate Communications Officer  
**Abu Joseph Umaru**, Administration & Communications Officer, Abuja-Nigeria

**Olivia Okech**, Project Communications Officer  
**Jacquine Kinyua**, Executive Assistant to the Executive Director  
**Jane Achando**, Associate Legal Officer  
**Daniel Otunge**, OFAB Coordinator  
**Jotham Maroa**, Head Human Resources  
**John Makokha**, Resource Mobilisation Officer  
**Frank Chege**, Monitoring and Evaluation Officer

## Technical Operations Department

**Emmanuel Okogbenin**, Director Technical Operations  
**Francis Nang'ayo**, Senior Manager, Regulatory Matters  
**Gospel Omanyia**, Senior Manager, Projects Management and Deployment  
**George Marechera**, Business Development Manager  
**Prince Addae**, Project Manager, Cowpea  
**Sylvester Oikeh**, Project Manager, WEMA  
**James Okeno**, Product Stewardship Manager  
**Kayode Sanni**, Rice Project Manager  
**Jonga Munyaradzi**, Seeds Production Manager  
**Caroline Thande**, Administrative Assistant  
**Peter Musyoka**, Programme Officer – Seed Systems  
**Joseph Ndwigwa**, Program Officer – Agribusiness (left 2014)  
**Francis Onyekachi Nwankwo**, Programme Officer - West Africa

**Caleb Obunyali**, Programme Officer - WEMA  
**David Tarus**, Programme Assistant  
**Edgar Wavomba**, Project Coordinator – Seeds2B  
**William Omoro**, Project Assistant, WEMA  
**Regina Nderitu**, Project Assistant, WEMA  
**Abed Mathagu**, Programme Officer - Regulatory Affairs  
**Boniface Okute**, Project Assistant  
**Caleb Adede**, Project Officer – FINTRAC  
**Grace Muinga**, Programme Officer – Business Development  
**Oluseun Bolarinwa**, Programme Officer – Seeds  
**Emily Injete Amondo**, Project Assistant, WEMA  
**Jovita Joachim Nsumilinda**, Project Officer  
**Apollo Tugeineyo**, Project Officer  
**Stella Simiyu-Wafukho**, Program Officer - Regulatory Affairs (left 2014)

## Administration & Finance Department

**Moussa Elhadj Adam**, Director Finance & Administration  
**Nancy A. Okita**, Senior Administrative Assistant  
**Amos Kimebur**, Accounting Officer  
**Maurice Ojow**, Project Accountant  
**Paul Oni**, Finance and Administrative Assistant

**Fatuma Wario**, Administrative Assistant/Events Coordinator  
**George Njogu**, Driver  
**Gordon Ogutu**, Protocol/Liaison Assistant  
**Simeon Eze**, Driver, Abuja Office

# Acronyms

AATF	African Agricultural Technology Foundation	MLN	Maize Lethal Necrosis
AFS	Cornell Alliance for Science	MoU	Memorandum of understanding
ARC	Agricultural Research Council	NARO	National Agricultural Research Organisation, Uganda
AUC	African Union Commission	NASECO	Nalweyo Seed Company
AWARD	African Women in Agricultural Research and Development	NBC	National Biosafety Committee
CAMAP	Cassava Mechanisation and Agro-Processing Project	NCAM	National Centre for Agricultural Mechanisation, Nigeria
CCARDESA	Centre for Coordination of Agricultural Research and Development for Southern Africa	NCRI	National Cereal Research Institute, Nigeria
CFTs	Confined field trials	NCRRI	National Crops Resources Research Institute
CIAT	International Center for Tropical Agriculture	NPT	National Performance Trials
CIMMYT	International Maize and Wheat Improvement Center	NRCRI	National Root Crops Research Institute
COMESA	Common Markets for Eastern and Southern Africa	NTOs	non-target organisms
DARS	Malawi Department of Agricultural Research Services	OFAB	Open Forum on Agricultural Biotechnology in Africa
DH	Doubled Haploids	PACA	Partnership for Aflatoxin Control in Africa
DR&SS	Zimbabwe Department of Research and Specialist Services	PANGOC	Pan African NGOs Consortium on Agricultural Research
DUS	Distinctness, Uniformity and Stability	PCPB	Pest Control Products Board
EIAR	Ethiopian Institute of Agricultural Research	PIPRA	Public Intellectual Property Resource for Agriculture
FARA	Forum on Agricultural Research in Africa	RECs	Regional economic communities
HEAL	Hybrid East Africa Ltd	SADC	Southern African Development Cooperation
ICABR	International Consortium on Applied Bioeconomy Research	SOPs	Standard operating procedures
IIAM	Institute of Agricultural Research	SSA	Sub-Saharan Africa
IITA	International Institute of Tropical Agriculture	TGMS	Thermo-sensitive Genetic Male Sterility
ISMA	Integrated Striga Management for Africa	USAID	United States Agency for International Development
KALRO	Kenya Agricultural and Livestock Research Organisation	USDA-ARS	United States Department of Agriculture's Agricultural Research Service (USDA-ARS)
MAFS	Modernizing African Food System Consortium	USDA-FAS	United States Agency for International Development – Foreign Agricultural Service
MESHA	Media for Environment, Science, Health and Agriculture	VCU	Value for Cultivation and Use
		WWT	WEMA-wide trials
		ZARI	Zambia Agricultural Research Institute



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