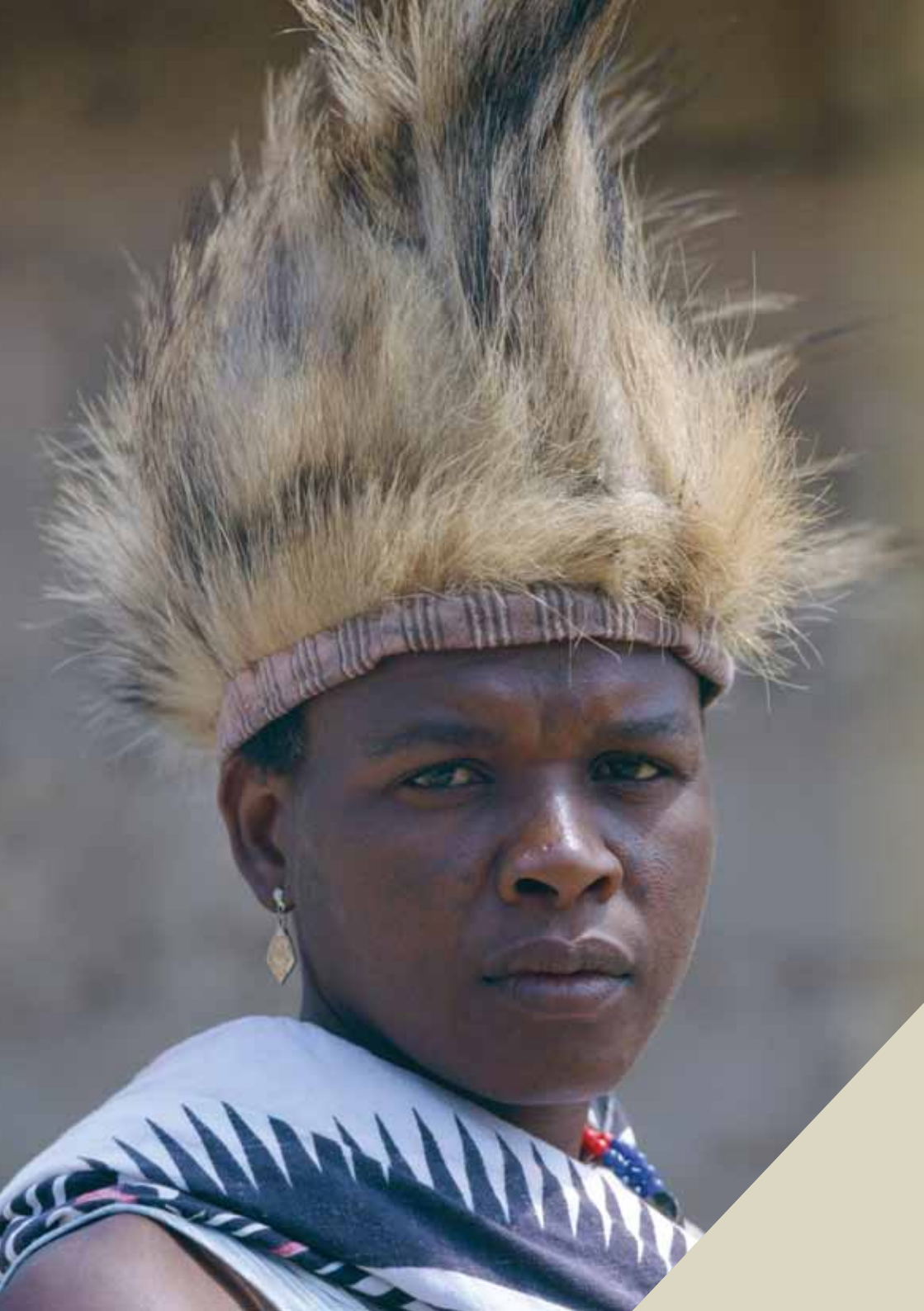
AFRICAN AGRICULTURAL TECHNOLOGY FOUNDATION
FONDATION AFRICAINE POUR LES TECHNOLOGIES AGRICOLES

Annual Report 2013

Effective partnerships for accessing and developing technologies for farmers

Better tools, better harvests, better lives



Annual Report 2013

Effective partnerships for accessing and developing technologies for farmers

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

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Cover: A Zulu woman in a traditional head gear in South Africa

Inside front cover: An unidentified woman in a traditional head gear

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An Intore dancer in Butare, Rwanda wearing a beaded head band

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.

AATF Staff, 2013

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 below guide the organisation. These are:

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

These goals are anchored on a 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 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.

Financial investors

- The United States Agency for International Development (USAID): provides economic, development and humanitarian assistance around the world in support of the United States' foreign policy goals.
- The United Kingdom's Department for International Development (DFID): is a department of the British Government that is at the forefront in Britain's fight against global poverty, delivering UK aid around the world.
- The Bill and Melinda Gates Foundation BMGF): guided by the belief that every life has equal value, the BMGF works to help people lead healthy, productive lives. In developing countries, it focuses on improving health and giving people the chance to lift themselves out of hunger and extreme poverty.
- The Howard G. Buffett Foundation (HGBF): is a private family foundation that works to improve the living standards and quality of life of the world's most impoverished and marginalised populations. The HGBF's primary funding areas are agricultural resource development for smallholder and subsistence farmers and clean water delivery to vulnerable communities in Africa and Central America.
- Pepsico: is a global food and beverage company that supports and invests in local communities in the company's areas of operation and this involves partnering with local farmers, governments and community groups.
- Syngenta Foundation for Sustainable Agriculture: Creates value for resource-poor small farmers in developing countries through innovation in sustainable agriculture and the activation of value chains.

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 Parternship 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

A Naro bush woman in Kalahari, Botswana wearing a traditional head scarf

2013 Highlights

January

- The Water Efficient Maize for Africa (WEMA) project holds a product development workshop in Johannesburg, South Africa to review progress in breeding maize varieties with drought tolerance and insect pest-protection.
- The Open Forum on Agricultural Biotechnology (OFAB) holds netmapping workshops in Tanzania and Nigeria aimed at identifying key stakeholders to work with in the countries to enhance biotechnology information sharing and education.
- AATF and Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles/West and Central African Council for Agricultural Research and Development (CORAF/WECARD) staff meet in Nairobi to review and finalise a Memorandum of Understanding (MOU) between the two organisations that will see them collaborate on activities of mutual interest.

February

- The WEMA Project holds its fifth annual review and planning meeting from 4–8 February in Nairobi, Kenya. The meeting was attended by over 60 participants with each project team presenting their 2012 activities and plans for 2013.
- AATF OFAB staff hold consultative meetings with various stakeholders including the biotechnology regulatory authorities, research institutions and universities in Harare, Zimbabwe to discuss the launching of an OFAB chapter in the country.

AATF staff and Dr Abdrahmane Sangare (second left) of CORAF/WECARD discuss the provision of the AATF-CORAF MOU at AATF offices in January 2013

March

- AATF participates in the Africa Seed Traders Association annual congress in Port Louis, Mauritius and wins the best exhibition stand.
- The Pod-borer Resistant Cowpea Project holds its planning and review meeting in Accra, Ghana from 11–12 March, where it reviews progress made in the three project countries of Nigeria, Ghana and Burkina Faso in 2012 and develops the 2013 work plan.
- AATF and the International Institute for Tropical Agriculture (IITA) hold a consultative meeting in Ibadan, Nigeria on how to enhance their collaboration.

April

- The AATF Board of Trustees holds its 20th Board meeting in Arusha, Tanzania from 11–12 April where members review AATF activity implementation progress and budgets and also receive other management reports.
- The new Forum on Agricultural Research in Africa Executive Director Dr Yemi Akinbamijo pays a courtesy call on AATF and meets with staff to discuss possible areas of collaboration.

WEMA annual review and planning meeting participants at a maize display at the CIMMYT trial site in Kiboko, Kenya in February 2013

Denis T. Kyetere, Executive Director AATF viewing an exhibition of various improved cassava stems at the National Centre for Agricultural Mechanisation in Nigeria during the launch of the cassava project

May

- OFAB holds its fourth annual review and planning meeting in Dar es Salaam, Tanzania that brings together representatives from the six chapter countries of Kenya, Uganda, Nigeria, Tanzania, Ghana and Burkina Faso, including potential new chapter representatives of Zimbabwe and Ethiopia.
- AATF hosts four Ugandan Members of Parliament to discuss biotechnology development and how lessons and knowledge gathered can be applied in their country.

June

- The Cassava Mechanisation and Agro-processing Project (CAMAP) holds its first field days in Mansa and Samfya districts of Zambia where more than 200 farmers and agricultural extension staff have opportunity to see a demonstration of cassava production equipment at work.

July

- AATF launches its 10th anniversary celebrations through activities in Abuja, Nigeria that include a dinner and cocktail for key stakeholders and partners.
- The CAMAP holds it project launch event on 4 July in Kwara, Nigeria officiated by Hon Ibusun Odusote, the Permanent Secretary, Ministry of Agriculture and Rural Development and attended by Kwara and Osun states' leadership, AATF management, farmers and representatives from the National Centre for Agricultural Mechanisation and the National Root Crops Research Institute, the project partners in the country.
- AATF participates in the 6th FARA Science Week in Accra, Ghana and hosts a side event titled 'Partnerships for Delivering Agricultural Technologies and Innovations to Smallholder Farmers in Africa' and also hosts a cocktail to celebrate its 10th anniversary.

September

- The Bacterial Wilt Resistant Banana Project partners meet in Kampala, Uganda on 19 September to review project progress and plan for 2014 activities.

October

- AATF exhibits and hosts a side event on the Striga Control in Maize Project where various papers are presented on available Striga control technologies being promoted in the region at the 11th Africa Crop Science Society Congress in Entebbe, Uganda.

Prince Addae, the Cowpea Project Manager, briefs Cameroon's Minister for Scientific Research and Innovation when she visited the AATF exhibition stand during the AfricaRice Congress held in October 2013

Members of Parliament from Uganda with staff from Kenya's National Biosafety Authority and AATF during a meeting held at AATF to discuss biotechnology development and how it can be applied in Uganda

- AATF exhibits and presents a paper on the Nitrogen-Use Efficient, Water-Use Efficient and Salt Tolerant rice project at the 3rd Africa Rice Congress in Yaounde, Cameroon.

November

- The AATF Board of Trustees holds its 22nd Board meeting in Nairobi, Kenya from 6-7 November to review the organisation's progress.
- AATF holds its 10th anniversary climax celebration event in Nairobi, Kenya on 8 November that is attended by about 200 partners and stakeholders.

December

- OFAB launches its seventh chapter in Harare, Zimbabwe on 5 December2013 at an event attended by over 50 participants including representatives from government. This is the first OFAB chapter in southern Africa and is a collaboration between AATF, AfricaBio of South Africa and the National Biosafety Authority, Zimbabwe.

10th anniversary celebration pictorial

1. *AATF partners in Nigeria during the celebrations held in Abuja, Nigeria in July 2013*
2. *OFAB Uganda chapter participants at the celebrations held in in Kampala Uganda in September 2013*
3. *HE Rhoda Tumusiime (centre), the Africa Union Commissioner for Agriculture and Rural Development is introduced to Rory Radding, AATF Board member by Idah Sithole-Niang, AATF Board Chair (2nd right) as Denis T. Kyetere (1st left) AATF Executive Director and Julius Singoma of the AU look on*
4. *Denis T. Kyetere addresses guests during the celebrations*
5. *Leena Tripathi, the Principal Investigator of the Bacterial Wilt Resistant Banana project explains the project partnership between IITA and AATF*
6. *Betty Kibaara of the Rockefeller Foundation*

7. *Gospel Omanya, Seeds Systems Manager AATF talks to Nick Waitathu a journalist at the Standard Media Group, Kenya*
8. *AATF Board members Adrianne Massey, Justin Rakatoarisaona and Jikun Huang*
9. *Hon Khadija Kasochon, the Permanent Secretary, Livestock at Kenya's State Deparment of Agriculture and the guest of honor of the day signs the visitors book at AATF office*
10. *Hon Khadija Kasochon, Denis T. Kyetere and Idah Sithole-Niang after the unveiling of the 10th anniversary plaque*
11. *Hon Rhoda Tumusiime of the AU, Charles Mugoya of ASARECA and James Nyoro Adviser to Kenya's Presidency on Agriculture participate in a discussion session moderated by Francis Nang'ayo, Regulatory Affairs Manager, AATF*
12. *Gordon Conway, Idah Sithole-Niang, Hon Khadija Kasochon, Hon Rhoda Tumusiime and Denis T Kyetere during the cake cutting session*

An Intore dancer in Butare, Rwanda wearing a traditional dance head gear

Message from the
Board Chair & Executive Director

Prof Idah Sithole-Niang
Chair, AATF Board of Trustees

Dr Denis T Kyetere
Executive Director

The year 2013 was significant and very exciting for AATF. The year marked a productive 10 years of operation under the theme '10 Years, 10 Countries, 10 Projects'. It also marked a new way of doing things for the organisation as it embarked on the implementation of its newly refreshed strategy that maps out the Foundation's path towards a more impactful organisation. Together with our partners, we took time to reflect on the past and the desired future and we were encouraged by the progress made thus far towards achieving our vision of a 'food secure Africa'.

We have learnt a lot over the last 10 years since the establishment of the Foundation. A key lesson is that the success we point to now is attributed to the support and collaboration of many - through the Rockefeller Foundation, the United States Agency for International Development (USAID) and United Kingdom's Department for International Development (DFID) who put in their financial resources to help establish AATF and have continued to fund its activities. In addition, support from the Bill & Melinda Gates Foundation (BMGF), Howard G. Buffet Foundation, Pepsico and Syngenta Foundation for Sustainable Agriculture (SFSA) has made it possible for AATF to grow and participate in 10 partnership projects in 10 countries over the last 10 years.

The 10 public private partnership projects that we are participating in through partnering with 86 organisations, focus on six priority problem areas that are critical to our farmers in Sub-Saharan Africa (SSA). These are; the impact of climate change on agriculture; pest management; soil management; nutrient enhancement in foods; improved breeding methods and mechanisation.

We have benefited tremendously from government-backed support in moving these projects forward. The Foundation has been able to establish and conduct confined field trials (CFTs) in Kenya, Nigeria, South Africa, Uganda, Ghana and Burkina Faso. The involvement of the national agricultural research systems has been instrumental in the progress we have made. It has provided the opportunity for knowledge sharing and growth in the wealth of experience in technology development, partnership management and dissemination of technologies to smallholder farmers.

Significant achievements in 2013 included the carrying out of a functional analysis to provide an effective and efficient organisational structure to enable the Foundation respond to the dynamic environment and especially the development/evolution of an impact-driven and results-based organisation. The outcome included the establishment of a commercialisation directorate that will contribute towards the injection of an entrepreneurial and commercial culture into the organisation to spearhead the business orientation strategy of the Foundation.

A new exciting project – Seeds2B – was launched during the year. The project, a partnership with the SFSA, aims at providing a unique business model that will enable the direct licensing of products between technology owners and seed companies in Africa to ensure that seeds are available at the right time, place and price.

During the year, we were also able to enhance our partnerships with other like-minded partners. Memoranda of understanding were entered into with AfricaBio, One Acre Fund, Food, Agriculture and Natural Resources Policy Analysis Network and the Michigan State University. These partnerships will help enhance advocacy activities, seed production and marketing, policy discussions and research, technology transfer and education.

We also recorded impressive progress in other projects the details of which are included in this report. Below is a summary of the same.

The Pod Borer Resistant Cowpea Project installed its first CFT in Ghana in September 2013 making it the third country in SSA to do so. In Nigeria, the project planted three multi-location trials and successfully incorporated the *Cry1Ab* gene into two farmer preferred varieties. Preliminary results indicate that the transgenic farmer varieties showed efficacy to control *Maruca* in both the pods and seeds better than their non-transgenic varieties. In Burkina Faso, the *Maruca* resistant trait was incorporated in four farmer varieties through conventional breeding and the use of two lead lines as donor parents.

The Nitrogen Efficient, Water Use Efficient, and Salt-tolerant (NEWEST) Rice Project closed the year with the conclusion of CFTs for the first set of nitrogen use efficient (NUE) rice in Ghana and Uganda. The two CFTs identified three lines with comparative better performance than checks and NERICA varieties under low nitrogen input.

The Hybrid Rice Project held its first stakeholder's meeting in July 2013 in Nairobi, Kenya and conducted training for breeders and seed producers. Hybrid rice testing under the project is expected to commence in March 2014.

On-farm trials in Kenya that evaluated the efficacy of Aflasafe as a biocontrol agent under the Aflatoxin Bio-Control Project, were completed during the year and the analysis of data from the soil and maize grain samples collected, commenced. The results will be

included in a regulatory dossier that is being assembled to support the application for Aflasafe registration in Kenya in 2014.

Product development work under the Banana Bacterial Wilt-Resistant Project progressed with the installation of the second CFT in Uganda. In October 2013, AATF secured the license renewal for *hrap* and *pflp* genes for banana bacterial wilt resistance from Academia Sinica for a further seven years.

The WEMA Project commercialised its first conventional drought-tolerant variety under the brand name DroughtTEGO™ in Kenya. Seventy-four (74.625) tonnes of the certified WE1101 seed was distributed to six seed companies for sale to farmers during the short rains season. The project also recorded significant advances in breeding and testing through the evaluation of early and medium-maturity hybrids in the various project countries.

Increased seed production under the Striga Control in Maize Project in Kenya and Tanzania continued to ensure access by many farmers while in Uganda, the Imazapyr herbicide registration process neared completion and is expected to be finalised in 2014 to enable farmers in the country access the seed commercially.

The Cassava Mechanisation and Agro-Processing Project expanded into Nigeria and Uganda. The official launch in Nigeria in July 2013 elicited a lot of interest and resulted in the expansion of the project's activities from the initial two states to four states. In Zambia activities continued as per schedule.

AATF facilitated national consultative workshops in six partner countries to engage policy makers and regulators on the urgent need for broadening existing policy and legislation on fertilisers and pesticides to incorporate bio-fertilisers and bio-pesticides under the Commercial Products (COMPRO II) Project. The Project is a partnership with the International Institute for Tropical Agriculture (IITA).

The Open Forum on Agricultural Biotechnology in Africa (OFAB) expanded country coverage with the official launching of the seventh chapter in Harare, Zimbabwe. The chapter is hosted by the country's National Biotechnology Authority (NBA) through a collaborative agreement between AATF and AfricaBio of South Africa.

Our resource mobilisation endeavours during the year raised $4.8M from new and existing investors. In addition, three new investors joined in thus diversifying the donor base. The funds came from USAID/Fintrac, SFSA, BMGF and the Alliance for a Green Revolution in Africa through its Program for Africa's Seed Systems.

To support future agricultural growth, we will continue to access technologies that are quick and widely adaptable by farmers; ensure the scalability of the technologies for faster and wider implementation; and leverage a strong, clear geographic and crop focus.

We express our extreme gratitude to our investors, partners and staff at AATF - not only for their support in 2013 - but also for the last 10 years. Their support and contribution is changing the lives of smallholder farmers in SSA as is evident in the progress illustrated above.

Prof Idah Sithole-Niang
Chair, AATF Board of Trustees

Dr Denis T Kyetere
Executive Director

A Zulu woman in a traditional head gear in KwaZulu-Natal, South Africa

Efforts intensified towards enhancing production and access to *Striga* control in maize seed in East Africa

Production of certified Imazapyr Resistant (IR) maize seed also known by its brand name Strigaway increased during the year. The seed increase efforts were complemented by information dissemination and capacity building for agro-dealers and farmers in the three countries; and supporting the registration of the Imazapyr herbicide in Uganda.

In Uganda, three IR maize hybrids are being considered for registration and commercialisation for allocation to interested seed companies for bulking and sale to farmers. In preparation for commercialisation of the IR hybrids in the country AATF worked with Africa 2000 Network to install 1,500 demonstration trials. This was enhanced with farmer sensitisation workshops and field days that reached 1,300 farmers.

Isaka Mashauri of Tanseed International (right) with the manager of Kalembwa 'Jeshi Kuu la Tanzania' farm in Kigoma, Tanzania examine maize cobs from a contracted Striga maize seed production field

Training on handling and use of IR maize technology was carried out for 28 agro-dealers in Tororo in November 2013 that equipped them with skills and knowledge to train farmers prior to commercialisation.

BASF submitted a regulatory dossier to the Pesticides Registration Office of Uganda in support of registration of Imazapyr herbicide as a pest control product in the country. BASF is the provider of the herbicide in the project partnership. Registration of Imazapyr will allow for coating of the IR Longe hybrid with the herbicide for use by farmers to effectively control Striga.

In Tanzania, four one acre demonstration fields to showcase the effectiveness of IR maize seed to control Striga were established in Tanga region and a national field day held during the long rains of 2013. Tanseed International Ltd, established seed production fields in Kigoma, from which a harvest of about 10 tonnes of certified IR maize seed was realised.

In Kenya, 300 tonnes of IR breeder and certified maize seed was produced and awaits certification. Seven new IR maize hybrids were entered into the second national performance trials (NPTs) in Kenya. These high yielding hybrids are expected to be commercially released after NPTs and distinct uniformity stability tests and will provide better performance under Striga weed infestation.

A training of trainers programme was implemented for 100 farmers on the Striga problem, how to establish IR maize plots and how to manage the crop for best results.

Fred Kanampiu, an Agronomist at the International Maize and Wheat Improvement Center demonstrates to journalists how the Striga weed attaches to the maize host plant during a field visit in western Kenya

Nicolai Rodeyns (right) of Nalweyo Seed Company, Uganda and Peter Musyoka of AATF at the seed company's Striga maize seed production field in Hoima, western Uganda

Sample kits comprising seed and fertilizer were distributed to 2,500 farmers in western Kenya to establish small demonstration plots on their farms to test the technology. In addition, seed companies also established their own 50 demonstration plots in Striga infested areas. The trials managed by farmers and seed companies contributed to information gathering, learning and experience sharing on the technology performance.

Awareness creation

In September, a road show was organised in Striga infested areas of western Kenya to create awareness and excitement on the IR maize technology in an effort to upscale seed uptake. The road show vehicle toured major market centres (on designated market days) broadcasting information on the IR maize seed including cost, attributes and where to buy it. It also served to educate market goers on the importance of managing the Striga weed menace. Market goers were entertained by a radio personality who also engaged them in a question and answer session on the Striga weed problem and management. Participants and winners were rewarded with IR maize seed packs and branded promotional items such as t-shirts and caps.

A media workshop and field visit to Striga infested farming areas in western Kenya was organised for journalists in June 2013. The objective of the workshop was to give

the media and the Project staff including scientists an opportunity to interact for better understanding of the issue to improve the quality and quantity of stories on the project. It also gave scientists an opportunity to understand what type of news sets the agenda in the newsroom and how to effectively engage with media.

In Uganda, radio talk shows on the Striga problem and the IR maize technology were aired to increase awareness in readiness for commercialisation of the maize varieties expected in 2014.

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 through a public-private project involving CIMMYT, BASF, seed companies, NGO's, government extension

Participants engage with the facilitator during a road show held in Ahero market in Kisumu, Kenya in September 2013

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. The technology 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 and not the crop.

Looking forward

"During 2014, efforts to increase IR seed production and consequent access by farmers will continue especially in Kenya and Tanzania" said Dr Gospel Omanya, the Seed Systems Manager at AATF. "In Uganda, efforts will be concentrated on supporting the registration of the Imazapyr herbicide so that farmers in Striga infested areas of the country who have already tried the technology during on-farm trials and found it effective in controlling the weed can start reaping the benefits of the IR varieties" he said.

A Maasai warrior in traditional war head gear in Maasai Mara, Kenya

Ghana conducts first trials for pod-borer resistant cowpea as Nigeria progresses into multi-location trials

The first confined field trials (CFTs) for the Pod-borer Resistant Cowpea Project were conducted in Ghana, making it the third West African country to carry out the trials after Nigeria and Burkina Faso. In Nigeria, the *Maruca* resistant trait was incorporated into farmer varieties and tested in multi-location trials (MLTs) while in Burkina Faso it was incorporated in four farmer varieties through conventional breeding and the use of two lead lines as donor parents.

First confined field trial planted in Ghana

Six transgenic lines and the non-transgenic controls were planted in a replicated trial at the Savanna Agricultural Research Institute (SARI) in Tamale, Ghana in September 2013. The results indicated that the two lead events lines 709A and 252D and other transgenic lines controlled the *Maruca* insect pest effectively compared to the non-transgenic control. The results confirmed the proof of concept obtained from the CFTs conducted in Nigeria and Burkina Faso in 2011 and 2012. The line 709A will be used as donor parent to incorporate the gene into farmer's varieties in 2014.

Harvesting of the first multi-locational trial in Zaria, Nigeria

Planting of the first confined field trial in Tamale, Ghana

Multi-location confined field trials in Nigeria

The *Maruca* resistant trait was incorporated successfully into two farmer varieties, SAMPE10 and IT93K-693-2 through breeding and by using one of the lines as the gene's donor parent. These two transgenic farmer's varieties were tested in multi-location CFTs in Nigeria. The two transgenic farmer's lines were planted together with their non-transgenic varieties at three sites in Zaria, Kano and Zamfara that are located in the Guinea, Sudan and Sahel agro-ecological zones respectively where cowpea is mostly grown in West Africa. The plants in the trial were not sprayed. Instead, they were artificially infested with 20 *Maruca* larvae per plant on three occasions to augment the natural infestation in the field. The two transgenic farmer's varieties controlled *Maruca* more effectively than the non-transgenic lines. The efficacy of the gene to control *Maruca* in two farmer's varieties was comparable to the lead line 709A that was transformed originally with the gene. The CFT will be repeated at the three sites in 2014.

Environmental risk assessments

A trial was conducted in Nigeria to determine the effect of the *Bt* gene on non-target organisms. The trial comprised two transgenic lines and two conventional varieties. The results showed that the distribution of the non-target insects - ladybirds, syrphids, assassin bugs, grasshoppers, bees and thrips - was similar on both the transgenic and the

conventional lines indicating there is no apparent negative impact of the *Bt* gene on non-target organisms. This trial will be repeated in the three project countries in 2014.

Introgression in Burkina Faso

The *Maruca* resistant trait was incorporated into four farmer varieties, Komcalle, Gourgou, Nafi and IT98K-205- 8, through breeding by using the lead line 709A as donor parent. The transgenic plants were also screened for Striga resistance using marker assisted selection so that farmers will have seeds that are resistant to both *Maruca* and *Striga* when they are commercialised. The transgenic farmer's varieties will be tested for efficacy in multi-location trials in 2014.

Technology development

The Project successfully negotiated for the protein of the second insect resistant gene *Cry 2Ab* from Monsanto as a pre-requisite for access to the gene. Access to this gene by AATF will allow Commonwealth of Scientific and Industrial Research Organisation (CSIRO), the Project's product development partner, to stack the two genes, cry1Ab and cry2Ab into cowpea for long term insect-resistance management.

Harvesting of the CFT at Kano, Nigeria in November 2013

Regulatory compliance

The Project successfully submitted notifications and applications to conduct trials in the three project countries to the national biosafety institutions. In Nigeria, approval to conduct MLTs was granted while in Ghana a plant import permit for the *Bt* cowpea seed from CSIRO, Australia for the CFTs was issued. Inspection and approval of trial sites by the biosafety authorities to ensure compliance was also carried out successfully. Additionally, project teams were trained in CFT compliance in the three countries. The project also started the generation of the pre-requisite biosafety data that is critical for deregulation and eventual release of the *Bt* cowpea in the countries.

Awareness creation

Stakeholder meetings were organised and information materials including topical policy briefs distributed to promote awareness and education. Ghana held a stakeholder meeting at SARI prior to planting its first trials to inform the community on the Project goals and objectives. Over 200 people attended the meeting including the local chief, farmers,

Stakeholders at the CFT community sensitisation meeting in Tamale, Ghana in September 2013

scientists, students and the media. In Nigeria, briefings on progress for key stakeholders including farmers and seed companies continued in November and December 2013 at the Zaria and Kano multi-location trial sites and in Abuja, 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 per cent. 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; CSIRO, Australia; Institute of Agricultural Research, Nigeria; Council for Scientific and Industrial Research, Ghana and Institut de l'Environnement et de Recherches Agricoles, Burkina Faso.

Looking forward

"As the Project progresses into the final stages of product development, efforts will be intensified towards obtaining relevant information on food, feed safety and environment risk assessments for regulatory approvals of the product as well as seed production for deployment. We will also work towards stacking of the second gene cry2Ab into the transgenic lines which will provide a longer term insect resistance management" stated Dr Prince Addae, the Cowpea Project Manager at AATF.

A young woman in traditional head gear in Albreda, The Gambia

Second confined field trial for Bacterial Wilt Resistance Banana established in Uganda

Following the successful conduct of the first confined field trial (CFT) for the Bacterial Wilt Resistance banana in 2012 in Uganda, the best 10 lines were further planted with more replicates in a second trial in 2013 through support of the United States Agency for International Development's Agricultural Biotechnology Support Programme (USAID-ABSPII).

Progress on transformation work

Following the progress made in 2012 that provided the proof of concept for the control of Banana *Xanthomonas* Wilt (BXW) through hypersensitivity response assisting protein (*Hrap*) and plant ferredoxin-like protein (*Pflp)*-mediated resistance under CFT in Uganda using two banana cultivars, *Sukali ndiizi* popularly known as *apple banana* and the East African Highland banana (EAHB) cultivar 'Nakinyika', significant progress was made in 2013 in the genetic modification of additional cultivar.

About 300 transgenic lines of plantain cultivar 'Gonja manjaya' were generated and tested. The promising lines were maintained in *in vitro* culture.

The embryogenic cell suspensions of dessert cultivar 'Gros Michel' were transformed and 227 independent transgenic shoots were regenerated on selective media. All these lines were maintained and multiplied for glasshouse screening.

Some of the banana plantlets in the green house at the ILRI BecA facliity in Nairobi Kenya

The embryogenic cell suspensions of banana cultivar 'Cavendish William' were also transformed. In total, 76 transgenic shoots with the *Pflp* gene, 50 transgenic lines with the *Hrap* gene and 110 transgenic lines with stacked *Hrap-Pflp* were obtained. The *Hrap* and *Pflp* lines were multiplied for glasshouse screening.

An additional stacked construct was developed containing *Pflp* and *Hrap,* the two genes used in this project. This construct contains the *Pflp* gene expression under the maize ubiquitin promoter while the *Hrap* expression is driven by the CaMV35S promoter. The vector (pBI-35S:Hrap::Ubi:Pflp) was validated through restriction digest, PCR analysis and sequencing. The stacked-gene transformation work on the Cavendish banana began at IITA-Kenya. Hundreds of transgenic lines with *Pflp* and *Hrap* genes stacks were generated and transferred to the greenhouse for evaluation against the pathogen *Xanthomonas campestris pv.musacearum* (Xcm).

Evaluation of transgenic banana plants in screen house

During the period, 158 transgenic lines were multiplied, rooted and transferred to soil. The plants were artificially inoculated with the pathogen Xcm and assessed for disease resistance and about 15 *Pflp* lines, 18 *Hrap* lines and 22 lines with stacked genes showed resistance to Xcm.

Second CFT in Uganda

The second CFT was installed in September 2013 at the Kawanda Agricultural Research Institute in Uganda following approval by the NBC. Regulatory compliance was assured through training of the CFT team.

The CFT site in Kawanda, Uganda

Licence agreement renewed

AATF and Academia Sinica, the technology donor, renewed the the *pflp* and the *hrap* genes license agreement a further seven years from August 2013. The renewal will allow the Project continue with its product development work.

Project overview

East Africa produces and consumes the most bananas in Africa and Uganda is the world's second largest banana producer after India. Banana farmers in Uganda are currently battling with the BXW disease caused by the pathogen 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* gene and the *Hrap* gene that were isolated from sweet pepper (Capsicum) 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. AATF brokered access to these genes from Academia Sinica and is working with partners - IITA and the National Agricultural Research Organisation Uganda - to develop a Xanthomonas wilt-resistant banana from East African preferred germplasm.

Looking forward

"As the Project prepares to deploy banana varieties with resistance to the BXW disease in 2020, activities to streamline the necessary process to ensure success will start," said Dr Leena Tripathi, the Project's Principal Investigator at IITA. "These include refining the banana value chain analysis, reviewing the product deployment strategy and together with the regulatory authorities, devising measures to regulate tissue culture production to ensure the project gains against the BXW disease are sustained," she added.

A Karo man in traditional head gear in Omo Valley, Ethiopia

The first conventional drought-tolerant maize varieties commercialised in Kenya

The year 2013 saw the culmination of five years of product development efforts in the Water Efficient Maize for Africa (WEMA) Project with the commercialisation of the first conventional drought-tolerant maize hybrid in Kenya in September 2013. The project also recorded good progress in insect-pest resistance, breeding work and testing transgenic traits for drought tolerance.

First *Bt* maize trials conducted

The first *Bt* maize confined field trials (CFTs) were carried out in Kenya and Uganda. Kenya was also able to instal a second trial during the year. The trials tested the efficacy of the *Bt* insect-pest protection gene in controlling two common stem borers that infest maize - the *Chilo partellus* and *Busseola fusca*. Results of the first season trials indicated that the gene had a positive and significant effect on the traits evaluated including number of exit holes, tunnel length, larvae survival, and leaf area consumed by the two stem borers. Results of the second season trials showed that 75 percent of the hybrids evaluated had significantly greater yield ranging from 26 to 113 percent with the *Bt* trait than without.

Regina Tende, a scientist at KARI examines a maize stalk for stem-borer infestation during the harvest of the first Bt maize confined field trial in Kiboko, Kenya

Transgenic drought tolerant trials

The transgenic drought tolerant trials conducted in Kenya, Uganda and South Africa during the year, showed that the drought-tolerant trait had positive and significant effects under drought conditions in two of the hybrids tested. In all the three countries, the hybrids tested had a yield advantage of between 17-37 percent. Most of these traited hybrids did not show significant yield penalty under optimum-moisture (well-watered) conditions. Analyses of CFT data on the drought tolerant trait using 34 hybrids with same base genetics evaluated in South Africa, Kenya and Uganda for three or more years indicated that five traited hybrids gave 8–14 percent greater yield than the non-traited versions. This result indicates a strong positive gene effect with ample scope for selection and breeding in germplasm of a similar genetic background as these hybrids.

Mark Edge, a WEMA-Monsanto scientist shows off a maize cob at one of the WEMA trial sites in Uganda during a field visit

Project partners during a visit to the WEMA-South Africa CFT site in Lutzville, South Africa in February 2013

Progress in conventional breeding

A total of 16 WEMA hybrids (11 in Kenya; three in Tanzania; and two in Uganda) were released in East Africa for commercial production and two others were nominated for Registration or Variety Listing in South Africa. Alongside this development, over 99 hybrids progressed into different stages in the variety release process such as first and second season National Performance Trials (NPT1)/ Distinctiveness, Uniformity and Stability (DUS) observations and Value for Cultivation and Use (VCU).

Hybrid evaluation in WEMA-wide trials

The project evaluated 120 sets of WEMA wide trials comprising early and medium-maturity hybrids in the various project countries. The results from these trials were significant as they showed that across 16 optimum sites - among the early-maturity group - the top 10 hybrids yielded 38–54 percent higher than the best commercial check, while across eight drought-stress sites, the top 10 hybrids produced 18–44 percent higher grain yield than the best commercial check. Across 13 optimum-rainfed sites, the top 10 hybrids produced 36–44 percent higher grain yield than the best commercial check; and across 10 drought-stress sites the same hybrids produced 3–24 percent higher grain yield than the mean of the best commercial checks. These hybrids will be nominated for advancement into 2014 NPT.

Screening WEMA germplasm for reaction to Maize Lethal Necrosis disease

Maize production especially in East Africa is under threat from the maize lethal necrosis disease (MLN). To address this threat and ensure that hybrids and inbred lines coming out of the Project are able to tolerate the emerging disease, - the Kenya Agricultural Research Institute (KARI) and the International Maize and Wheat Improvement Center (CIMMYT) - screened over 3,000 pre-commercial hybrids and lines for reaction to MLN under artificial inoculation at two sites in Kenya. Results indicated that there were some promising pre-commercial hybrids with a good level of tolerance to MLN.

Release of WEMA hybrids

The first WEMA hybrid (WE1101) was officially released in Kenya in June 2013 under the trademark *DroughtTEGO™*. Seventy-four tonnes of certified seed of the WE1101 hybrid were produced and 72 tonnes were allocated to partner seed companies from September 2013 for establishing field demonstration plots and for sale to farmers. This allocation enabled the establishment of 290 demonstration field plots, and the promotion and commercial sale of the seed to farmers to facilitate planting during the 2014 long rains season in Kenya.

Drought™
TEGO
Innovation and protection for a better harvest

To ensure a continuous availability and supply of the seed to farmers, the production of basic and certified seed commenced during the year. The Project developed seed grower and production guidelines for use by seed companies to increase basic and certified *DroughtTEGO™* hybrid seeds. A farmer cultivation guide was also developed and the project is in the process of developing standard operating procedures to guide quality *DroughtTEGO™* seed production.

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 in Africa. Its production is severely affected by drought and insect-pests, which negatively impact yields leading to crop failure, 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 the Project coordinator, the national agricultural research systems (NARS) in five countries – KARI, 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, 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 2014. We will also be looking forward to more farmers accessing the WEMA drought-tolerant conventional varieties in the project countries," said Dr Sylvester Oikeh, the WEMA Project Manager at AATF.

A Zulu woman in a traditional head gear in South Africa

First NEWEST rice field trials established in Uganda and Ghana

The Nitrogen-Use Efficient, Water-Use Efficient and Salt-tolerant (NEWEST) rice Project marked a milestone in 2013 with the establishment of the first confined field trials (CFTs) in Uganda and Ghana. Preliminary results from the trials indicated that the nitrogen use efficiency (NUE) trait, which was the first to be tested in confinement, was working. Genetically improved rice lines with triple stacked traits – the NUE, water-use efficient (WUE) and salt-tolerance (ST) will be tested in subsequent trials.

CFTs in Ghana and Uganda

The first and second CFTs in Ghana were planted in April and August 2013 at the Crops Research Institute in Nobewam, Kumasi. The grain was harvested and data analysed with promising results. The lines in the trials which consisted of NUE, nulls and wild types were planted under three levels of nitrogen 30, 60 and 90 kg/ha, with four replications per nitrogen level. Results showed that there were differences in plant growth between the three levels of nitrogen. From the first CFT, one out of six of the transgenic NUE lines stood out and had the highest yield over the best NERICA4 at the same nitrogen level while three out of eight lines in the second CFT yielded better than the best NERICA at different nitrogen

Partners in Uganda at the first CFT that was planted in Uganda in April 2013

Dr Kofi Dartey, the Principal Investigator of the NEWEST Rice project in Ghana at the CFT site in Kumasi in October 2013

levels. These promising transgenic NUE lines that exhibited higher nitrogen use efficiency than NERICA4 and other checks will be tested again in 2014 to validate the results.

The CFT in Uganda was also installed in April 2013 at the National Crops Resources Research Institute (NaCRRI) in Namulonge consisting of eight transgenic NUE lines, eight nulls and one wild type. The trials was planted under three levels of nitrogen - 30, 60 and 90 kg/ha - with four replications per nitrogen level. The grain was harvested in August and the results showed one line that yielded better than NERICA4 at different nitrogen levels.

The yield of one line that performed better than NERICA4 in the two CFTs in Ghana, and Uganda were similar, indicating that it has a better stability potential. The trials that will be conducted in 2014 will be used to confirm this observation in the two locations.

The establishment of the CFTs in the two countries generated a lot of interest from various groups. The Uganda CFT site hosted policymakers, farmers, the media and other stakeholders who were interested in learning more about biotechnology so as to inform the biosafety policy debate in the country. Biosafety inspectors in Ghana visited the CFT at Kumasi as part of their training that was facilitated by the African Biosafety Network of Expertise. The visit provided an opportunity for the regulators to get acquainted with the on-going CFT.

Field testing of lines

Field testing activities at the International Center for Tropical Agriculture (CIAT), Columbia, also progressed well during the year. These included the planting of transgenic and non-transgenic NERICA4 lines to evaluate their agronomic and physiological performances under different nitrogen applications in lowland conditions. The transgenic lines outperformed the wild type NERICA4 in grain yield at 0, 90 and 180 kg N/ha fertiliser applications. Agronomic and physiological performance will be used to select the best performing lines under lowland conditions.

Transformation activities

Arcadia Biosciences, the product development partner in the project continued the transformation of NERICA4 rice with the NUE, WUE and ST traits that saw the generation of 15 NUE-NERICA4 lines and their nulls. The development of the triple stacked NEWEST transgenic lines was also finalised and seeds of 16 of the lines will be shipped to Uganda, Ghana, Nigeria and CIAT, Columbia for testing CFT in 2014.

Regulatory compliance

The project successfully facilitated the compilation and submission of regulatory dossiers to obtain permit approvals for field testing in the two pilot countries. These included the request for plant import permits to allow for the importation of transgenic seed from Arcadia Biosciences and CIAT.

In-country teams in Uganda and Ghana were trained on CFT compliance. Regulatory compliance audits were also carried out during the course of field trials and no infraction was reported at the CFT sites in both countries.

Project overview

Rice is an important staple food and a commodity of strategic significance across much of Africa. Consumption of the grain in SSA has increased by 5.6 percent per annum over the years, more than double the rate of population growth. However, the area under rice production in SSA has stagnated at about 8 million hectares producing about 14.5 million tonnes per year against an annual consumption of 21 million tonnes. These production and consumption trends imply a production deficit of about 6.5 million tonnes per year valued at US$ 1.7 billion that is imported annually. The slow growth in domestic rice production has been attributed to the very low yield being achieved by rice farmers. 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 partnership composed of AATF, Arcadia Biosciences, Public Intellectual Property Resource for Agriculture, CIAT, Council for Scientific and Industrial Research-Crops Research Institute, Ghana and National Agricultural Research Organisation (NARO) Uganda is developing genetically improved rice varieties with NUE, WUE and ST traits for use by smallholder farmers in SSA.

Looking forward

"Following the successful initiation of CFTs in Uganda and Ghana, activities will be up scaled in 2014 to include the shipping of 16 triple stacked transgenic rice lines (NEWEST) to Ghana and Uganda for testing" said Dr Kayode Sanni, the Rice Project Manager at AATF. "The Project will also seek approval to conduct similar trials in Nigeria," he said.

A man in traditional head dress in Dogon, Mali

Aflasafe biocontrol commercialisation efforts intensified in Kenya and Senegal

During the year, efforts of the Aflatoxin Control in Maize and Peanuts Project focused on getting Aflasafe biocontrol products registered in Kenya and Senegal to facilitate commercialisation and use by farmers to control aflatoxin contamination in maize and peanuts. Project partners worked to develop the necessary documentation to aid the submission of a complete regulatory dossier for Aflasafe KE01™ registration in Kenya, while efforts in Senegal were concentrated on completing Aflasafe SN01 product registration forms for submission to the regional pesticide registration body *Comité permanent inter-État de lutte contre la sécheresse au Sahel* (CILSS).

In Kenya, an interim application for Aflasafe registration was submitted to the Pest Control Products Board (PCPB) following consultations with the PCPB. This included the submission of documentation (on efficacy and supporting data for toxicological and ecotoxicological studies) to the Board for Aflasafe KE01. Full registration of the Aflasafe biocontrol products in Kenya will allow for commercialisation and use by farmers.

A farmer in Nigeria with a tub of the Aflasafe biocontrol product

Anticipating the deployment of Aflasafe in Kenya once the registration was received from the PCPB, a study on farmers' perception of aflatoxin contamination and control technologies with specific reference to the use of Aflasafe was finalised. The study covered 12 test districts within four counties of eastern Kenya namely, Embu, Machakos, Kitui and Makueni. It found that farmers were willing to adopt the Aflasafe biocontrol technology to reduce incidences of illnesses and fatalities associated with aflatoxin contamination in maize. Information generated by the study will be critical when engaging private sector partners to help deploy Aflasafe for control of aflatoxin in Kenya.

In Senegal, the Project was also able to commence the drafting of an application for Aflasafe SN01 registration which is set to be finalised in readiness for submission in 2014.

Project overview

In many parts of Africa, dietary exposure to aflatoxin contaminated maize-based products has been linked to various human health-related conditions including the high incidence of liver cancer, growth retardation in children, reproduction impairment and the suppression of cell-mediated immune responses. In extreme cases, maize grains contaminated with aflatoxin have resulted in incidences of food-poisoning commonly referred to as aflatoxicoses that have been known to claim human lives.

Farmers in Matungulu in eastern Kenya broadcast the Aflasafe biocontrol product

The Project partnership composed of AATF, the International Institute of Tropical Agriculture, the United States Department of Agriculture-Agricultural Research Service; Kenya Agricultural Research Institute and the Direction de la Protection des Vegetaux, Senegal (Department of Plant Protection, Senegal) and ACDI-VOCA Kenya, are working together to reduce aflatoxin contamination in maize grain by introducing Aflasafe biocontrol products. This will greatly improve food and nutrition security for smallholder farmers and their families who subsist on maize and peanut based diets. By addressing this grievous food safety issue, significant benefits will accrue along the maize and peanut production, processing and marketing value chain.

Looking forward

"To ensure commercialisation of Aflasafe in both Kenya and Senegal, efforts in 2014 will be focused on making available all the necessary information that may be required by PCPB for consideration during product registration in Kenya, completion and submission of application for Aflasafe registration in Senegal; and the development of a strategy and plans for wide scale deployment of Aflasafe in Kenya and Senegal," explained Dr Francis Nang'ayo, the Regulatory Affairs Manager at AATF.

A Fulani Woodabe man in a traditional hat in InGall, Niger

Cassava project expands in Nigeria as Uganda gets on board

The Cassava Mechanisation and Agro-processing Project (CAMAP) experienced an unprecedented expansion during the year with acreage under project trials in Nigeria increasing to 424 hectares by the end of 2013 from the initial target of 200 hectares. This also saw an increase in the number of farmers participating in the project from 150 to 350. The project also expanded to a third country, Uganda, during the year.

The Project was officially launched in Kwara, Nigeria, on 4 July 2013 at a ceremony officiated by Hon Ibukun Odusote, Nigeria's Permanent Secretary in the Ministry of Agriculture and Rural Development. CAMAP activities began in Nigeria in April 2013 in the states of Kwara and Osun. By the end of the year, two addition states, Ogun and Kogi had joined the project, bringing the total hectarage under cassava in the four states to 424 hectares. The project, which began as a cost sharing initiative with farmers, saw the number of beneficiaries willing to pay for field operations increase.

A farmer in Mansa, Zambia demonstrates how she planted cassava tubers to other farmers during a field day at her farm in June 2013

Two field days were held in Osun state in August 2013 that brought together farmers from Osun and Kwara. During the field days, the new cassava production technologies being promoted by the project were showcased to more than 260 farmers. In addition, the best agronomic practices for cassava production were discussed.

One of the project objectives is linking farmers to cassava processors. To support this, discussions were held with the Nigeria Starch Mills and several other flour millers.

Activities in Zambia continued and focused on the maintenance of the 54.5 hectares of cassava that were planted in 2012 and early 2013 in the cassava growing districts of Mansa and Samfya.

Two field days were held in the two districts in June 2013 attracting a total of 300 participants some of whom expressed interest in participating in the 2014 season's activities that target to establish an additional 200 hectares of cassava.

Embracing improved cassava production methods

Farmers participating in the project have shown great interest in improved methods of cassava production. These include the application of fertiliser prior to planting and the use of clean planting materials. The use of herbicides to suppress weed emergence and mid-season weeding has also picked up among these farmers who no longer leave the crop to grow under weed infestation. The use of tractors and harrow to prepare the land as opposed to the use of manual labour also enabled farmers to put more acreage under the crop. These new methods of cassava production have also improved crop establishment and accelerated growth and this is expected to translate to improved yields, availability of more food and income for farmers and their families.

Field day participants in Samfya Zambia follow a demonstration on how the cassava planter works

Leaders in the various states in Nigeria have supported the project and have pledged to provide fertilizer subsidies to farmers, procure herbicides and offer assistance in the clearing of land in readiness for planting. Farmers, in return, have pledged to contribute 60 percent of their stems for planting under the 'plough back' scheme as opposed to the project providing all the stems required. The scheme entails CAMAP providing the initial stems to farmers for planting who in return give back some of the stems they harvest for new planting by themselves and other farmers.

Mechanised harvesting of the cassava crop which takes between 12 and 18 months to mature in the two countries is scheduled for 2014. The process is expected to reduce harvest time and consequently improve the quality of the crop taken to market.

Expansion into Uganda

CAMAP activities in Uganda are expected to kick off in the country during the 2014 short rains season following expression of interest and invitation by the country. AATF will partner with National Crops Resources Research Institute (NaCRRI) in Namulonge to implement project activities in the districts of Apac and Moyo first before it is out-scaled to other areas. Apac district, which is about 300km from Kampala, is the leading cassava producer in Uganda.

Project overview

Africa is the world's largest cassava producer, and accounts for nearly 55 percent of the world's output despite the fact that yields on the continent are the lowest in the world (10 tonnes per hectare compared to 26 tonnes per hectare in India). Currently in its initial implementation phase in Nigeria, Zambia and Uganda, CAMAP is addressing one of the key constraints to cassava production in Africa, the lack of mechanisation or appropriate production and processing tools. The project objective is to negotiate access to cassava mechanisation equipment for distribution to smallholder farmers to increase mechanisation and production along the value chain and reduce post-harvest losses. 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 NaCRRI, Uganda.

Looking forward

"We are looking forward to harvesting the crop in Nigeria and Zambia in 2014 using root diggers and harvesters we have accessed," said Mr George Marechera, the Business Development Manager at AATF. "We will, as a follow up, continue to establish market linkages in the two countries in readiness for the harvest," he added.

Young men from the Ngoni tribe of eastern Zambia in a ceremonial head gear

Hybrid Rice Project develops first set of hybrids for field testing in 2014

In 2013, the Hybrid Rice Project was able to develop over 100 hybrids for testing by both private seed companies and public organisations in 2014. The project also developed information technology (IT) tools, training and user manuals to make it possible for project partners to successfully predict where and when to breed and produce rice seed.

The Project held its first consultative meeting with stakeholders in July 2013 in Nairobi, Kenya, to introduce the project. The meeting was attended by 28 participants including seed company representatives and regulators from NARS in Kenya and Tanzania. At the meeting, participants discussed the status of rice breeding in Kenya and Tanzania and the regulatory requirements for testing and registration of new varieties. They also developed a work plan for project activity implementation and the modalities for providing training on the 2-line hybrid rice technology for breeders and seed producers to enable them test the new lines from the project.

Breeders during the training held in Malindi, Kenya in September 2013

Breeders training

Given that the 2-line hybrid rice technology has not been used in Africa before, the Project organised a breeders training in September 2013 in Malindi, Kenya. The training was attended by participants from seed companies in Kenya and Tanzania who were introduced to the techniques for field selection including sterility, female outcrossing traits and critical temperature, the IT tools being developed for use in the project and how to identify suitable locations for rice seed multiplication and production. Other trainings on capacity building in the areas of breeding and seed production will be held from 2014 going forward.

Product development

Good progress was recorded with the development of 176 crosses that were used to produce seeds of over 1,000 female parental lines. In addition, over 150 crosses were made and the first set of the project's pollinators (P line) F_1 materials were harvested in November, 2013. These lines will be advanced in a standard pedigree system in the next two years. Seed production for the first set of 100 hybrid lines that will be tested in the project commenced during the period.

Development of IT tools

One of the project's objectives is to develop an environmental assessment tool to be used by partners in determining the ideal locations for testing and producing rice. Significant progress was made in this area during the period with aWhere, the partner responsible for leading the development of these IT tools able to sort all available, documented weather

Participants at the first stakeholder meeting held in July 2013 in Nairobi Kenya

records in areas of interest dating back to 1980. In the process, aWhere developed a temperature history covering eastern, southern and west Africa which was built into a 30-year daily minimum and maximum temperature database. In addition, a detailed manual was completed that formed the basis for version 1 of the risk assessment tool.

An additional analysis output known as spatial characterisation of hybrid rice seed and multiplication environments across East Africa, was also created. A training guide for both the risk assessment tool and spatial characterisation work were developed for use in training the users.

Project overview

The project aims to develop 2-line hybrid 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 therefore also developing an IT tool with interpolated weather data to predict temperature regimes and manage the production environment of the 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.

Looking forward

"Product development activities will intensify in 2014 to avail the first batch of hybrid lines to private seed companies and public organisations for testing," stated Dr Kayode Sanni the Rice Project Manager at AATF. "Additionally, training in breeding and seed production will continue including in the area of yield testing technology for all partners to ensure uniformity in the conduct of trials and consistent data collection and reporting methodologies," he added.

A Karo girl in traditional head gear in Omo Valley, Ethiopia

Growing interest in OFAB prompts launch of a new chapter in Zimbabwe

The Open Forum on Agricultural Biotechnology in Africa (OFAB) ended the year with the launch of its seventh chapter in Zimbabwe - the first in southern Africa - and the finalisation of modalities towards the launch of the eighth chapter in Ethiopia in 2014. The other six operational country chapters experienced growing demand for the Forum to expand activities within the countries during the year.

Launch of OFAB-Zimbabwe

The OFAB-Zimbabwe chapter was launched in December 2013 and is a collaboration between AATF, AfricaBio of South Africa and the National Biosafety Authority (NBA) of Zimbabwe. The launch took place in Harare and was attended by over 50 participants representing government, research institutions, universities, media, industry, farmer organisations and regulatory bodies. The Forum's launch was a result of invitation by the Zimbabwe NBA for OFAB to help support its awareness efforts. The Chapter will be managed through a programming committee made up of representatives from key stakeholders in biotechnology including Community Technology Development Trust; Ministry of Higher and

The guest of honour Mrs S Madzinga from the Ministry of Higher and Tertiary Education, Science and Technology Development addressing guests during the launch of the OFAB-Zimbabwe Chapter

Tertiary Education, Science and Technology Development; Seed Services Institute; University of Zimbabwe; Ministry of Environment & Natural Resources Management; United Nations Development Programme, Zimbabwe; Department of Research and Specialist Services, Quton Seeds, and The Herald.

Meeting the demand for OFAB forums

Demand for increased OFAB activities in the other six country chapters (Kenya, Uganda, Tanzania, Ghana, Burkina Faso and Nigeria) continued during the year with requests from leaders at various levels. In Nigeria, for example, each of the 36 states in the country expressed interest in hosting special OFAB sessions and in response, the chapter conducted an OFAB event in each of the agro-ecological zones. Similarly, OFAB Ghana also received numerous requests from traditional chiefs to hold special OFAB sessions in their regions and the chapter held two OFAB meetings in Kumasi and Koforidua. In Kenya, the Chapter launched county editions in response to the promulgation of the new constitution in Kenya in 2011, which gave county governors powers to oversee agricultural development in their areas.

AATF engaged various institutions in Ethiopia in preparation for launching of OFAB in that country. Discussions were held with the University of Addis Ababa; Ministry of

Some of the journalists who attended a media training sponsored by OFAB in Tanzania during a field visit in Arusha

A section of participants during the OFAB 4th annual review and planning meeting held in Dar es Salaam, Tanzania in May 2013

Science and Technology, Ministry of Agriculture; Ethiopian Institute for Agricultural Research; The Ethiopian Academy of Sciences; and the Agricultural Transformation Agency, who all indicated interest in the Forum and desire to participate in its activities.

Annual review and planning meeting

OFAB partners held the Forum's third annual review and planning meeting in Dar es Salaam, Tanzania in May 2013 hosted by OFAB-Tanzania. Each chapter presented progress made in 2012 and plans for 2013. Participants were also trained on development of message maps for effective science and biotech communication and advocacy.

Enhanced media engagement

Engagement of journalists in the chapter countries intensified to ensure reports on biotechnology were balanced and factual. Activities included training and discussions in science reporting to build capacity. In Uganda, meetings were facilitated between journalists, editors and representatives of the Uganda Science Journalists Association. In Tanzania, meetings were held with senior agriculture reporters and editors in addition to training 25 journalists drawn from the Kiswahili media on effective science reporting. This training resulted in a number of stories by the journalists and a rise in interest in biotechnology.

The OFAB coordination office at AATF partnered with Biosciences for Farming in Africa in the training of 80 journalists in Ghana, Nigeria, Tanzania and Uganda. It also collaborated with the Kenya National Council for Science and Technology and the African Academy of Sciences in training 20 scientists from Kenya and Uganda on effective policy advocacy strategies in Nairobi in February 2013. OFAB Ghana trained 29 Science journalists on effective reporting of biotechnology and biosafety in February 2013. In March 2013, OFAB Uganda conducted a one-day workshop to sensitise the media on the content of the biosafety bill to enable them report about it accurately.

Monthly and special meetings

The chapters held 55 monthly meetings during the year where 10 broad topics were discussed including regulations, safety, benefits, biotech perceptions, trade, biotech and climate change, GMO and health and crops research. On-going biotech research in the region on crops such as maize, cowpea, cassava, rice, sorghum, and cotton were among the most frequently discussed topics, followed by biotech benefits, commercialisation and trade and the safety of biotech products. Special meetings targeting specific groups were also held.

Dr Denis T. Kyetere, AATF and Dr Adugna Wakjira, Deputy Director General of EIAR during the meeting in Addis Ababa to discuss the launch of a new chapter in the country

Discussions on the biosafety bill dominated the meetings in Nigeria and Uganda, whereas in Kenya, the focus was on the GMO import ban. Tanzania focused on diseases affecting crops like cassava and banana while Ghana and Burkina Faso highlighted the benefits of biotechnology to farmers and consumers.

The OFAB-Burkina Faso chapter partnered with AATF and ISAAA to organise a seeing-is-believing tour of the country's *Bt* cotton fields for participants from Kenya, Tanzania, Zimbabwe, Uganda, Ethiopia, Malawi and Burkina Faso.

The project overview

OFAB aims to enhance knowledge-sharing and create awareness on agricultural biotechnology among key stakeholders such as policy makers, legislators, scientists, farmers, regulators and the media. OFAB sessions provide opportunities for participants to raise issues of concern and have them addressed by various experts through detailed presentations and discussion sessions that include the opportunity for questions and answers regarding biotechnology. These issues could include safety, health, trade, ethics, intellectual property and environmental safety. Each country's OFAB partnership is a collaboration between AATF and a like-minded partner who is interested in creating awareness on the benefits of agricultural biotechnology. AATF partners with the International Service for the Acquisition of Agri-biotech Applications in Kenya, the Uganda National Council of Science and Technology, the Tanzania Commission for Science and Technology, Ghana's Council for Scientific and Industrial Research, Nigeria's National Biotechnology Development Agency, Burkina Faso's Institut de l'Environnement et de Recherches Agricoles and the National Biotechnology Authority of Zimbabwe.

Looking forward

"After several years of concentrated efforts in supporting awareness and education on biotechnology in the capital cities of countries where OFAB is hosted/domiciled, OFAB will, from 2014, intensify outreach at the grassroots targeting farmer groups and community-based organisations," revealed Mr Daniel Otunge, the OFAB Coordinator at AATF. "We will also, in 2014, develop a comprehensive OFAB Strategic and Advocacy plan covering the period 2014- 2018".

A Fulani Wodaabe man in a traditional hat in InGall, Niger

New project to address access to quality seed in Sub-Saharan Africa formed

AATF and the Syngenta Foundation for Sustainable Agriculture (SFSA) signed an agreement in November 2013 to kick-off the Seeds2B project to facilitate access to seed technology innovations to commercial partners either for further development or for dissemination through available market channels. The formation of this new public-private partnership project is the culmination of year-long discussions between AATF and SFSA. The project will link readily available seeds from national, regional and international technology owners (public and private) with seed companies in Sub-Saharan Africa through mechanisms involving royalty payment to guarantee African farmers' access to high quality seeds and traits.

Prof Idah Sithole-Niang, AATF Board Chair, Dr Eugene Terry, Board member of SFSA, Dr Ian Barker, Director for Agricultural Partnerships, SFSA and Dr Denis T. Kyetere, Executive Director AATF look on as Mr George Marechera, AATF's Business Development Manager signs the agreement in November 2013

Project overview

The Seeds2B project's goal is to provide a unique business model that will enable the licensing of products between seed technology owners and seed companies in Africa to ensure that seeds are available at the right time, right place, and right price.

The project will develop and apply a hybrid business model for seed dissemination with attributes from both for-profit and not-for-profit models taking into consideration market, legal, political, and social factors.

AATF will work with NARS and private breeding programmes to develop mechanisms for transferring the seed to local institutions, while enabling the seed technology developers to recover their investments through royalties.

The project will focus on technologies related to sorghum, millet, rice, cassava, vegetables and the Irish potato which have largely been neglected by existing seed systems. This will also include high-value crops such as sesame, sunflower and groundnut.

Looking forward

"Activity implementation in 2014 will concentrate on identifying the pilot countries, assessing their technology needs and regulatory requirements to facilitate trials and identify project partners and seed companies in the countries," stated Dr Emmanuel Okogbenin, AATF's Technical Operations Director. He added, "this will be followed by the identification and negotiation for technologies to match each country's identified needs and to conduct trials."

George Marechera (right), Business Development Manager AATF during a technology scouting mission in India in November 2013

Financial Report

These audited financial statements cover the period from January 2013 through December 2013 and provide comparative data for 2012 - the previous accounting period.

Funding overview

AATF investors for the year 2013 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), the Aflatoxin Control in Maize and Peanuts and the Commercial Projects (COMPRO) II projects for the execution of project specific tasks. We also received a grant from Fintrac, a US-based consulting company that develops agricultural solutions to end hunger and poverty. The funds grant received from Fintrac is from USAID.

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

Statement of financial position

As at 31 December 2013 (US$)

	2013	2012
ASSETS		
Non-current assets		
Equipment and motor vehicles	203,523	174,021
Intangible assets	-	4383
	203,523	**178,404**
Current assets		
Grants receivable	1,378,297	729,801
Other receivables	397,534	457,502
Bank deposits	5,108,561	14,268,012
Bank and cash balances	1,244,207	1,241,944
	8,128,599	**16,697,259**
Total assets	**8,332,122**	**16,875,663**
EQUITY AND LIABILITIES		
Current liabilities		
Unexpended grant payable	2,530,781	11,760,374
Deferred income	51,036	11,979
Payables and accruals	678,307	604,776
	3,260,124	**12,377,129**
Fund balances	**5,071,998**	**4,498,534**
Total liabilities and fund balances	**8,332,122**	**16,875,663**

Statement of comprehensive income (abridged version in US$)

For the year ended 31 December 2013

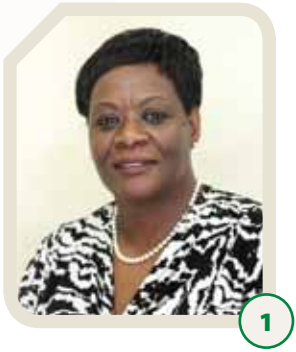
	2013	2012
INCOME		
Grant income	18,920,458	17,937,102
Other income	1,090,428	289,085
TOTAL INCOME	**20,010,886**	**18,226,187**
EXPENDITURE		
Project related expenses	17,695,234	15,518,990
Management and general expenses	1,742,188	1,425,485
TOTAL EXPENDITURE	**19,437,422**	**16,944,475**
SURPLUS FOR THE PERIOD	**573,464**	**1,281,712**
Percentage of management and general expenses to the total operating expenses	8.96%	8.41%
Percentage of project related expenses to the total operating expenses	91.04%	91.59%
	100%	100%

Financial status

The funding received/available income as at 31 December 2013 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 Foundation continues to receive unqualified opinion from external auditors. The current year independent auditors' opinion was that the financial statements present fairly, in all material aspects, the financial position of the Foundation as at 31 December 2012 and its financial performance and cash flows for the year then ended in accordance with International Financial Reporting Standards and the requirements of the Kenya's Companies Act.

Board of Trustees 2013



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2. **Stanford Blade** (Vice Board Chair), Dean of the Faculty of Agricultural, Life and Environmental Sciences at the University of Alberta, Canada
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4. **Rory Radding**, Partner, Edwards Wildman's Intellectual Property Group, New York, USA
5. **Jikun Huang**, Director, Center for Chinese Agricultural Policy, Beijing, China
6. **Gordon Conway**, Professor of International Development, Centre for Environmental Policy, Imperial College, London, UK
7. **Mariame Maiga**, Rural Development Sociologist, Development Policy and Project Analyst, Gender Specialist, Dakar, Senegal


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12. **Johnson Irungu Waithaka**, Director of Agriculture, Crop Management Directorate, Ministry of Agriculture, Livestock and Fisheries, Nairobi, Kenya
13. **Jennifer Anne Thomson**, Board Chair Emeritus, University of Cape Town, South Africa

AATF Staff 2013

Executive Director's Office

Denis T. Kyetere, Executive Director
Alhaji Tejan-Cole, Director of Legal Affairs
Nancy Muchiri, Communications and Partnerships Manager
John Makokha, Resource Mobilisation Officer
Peter Werehire, Documentation & Websites Officer
Grace Wachoro, Corporate Communications Officer
Rosemary Nzuki, Project Communications Officer, WEMA *(left April 2013)*
Olivia Okech, Project Communications Officer, WEMA *(joined December 2013)*
Umaru Abu, Communications/Administration Officer, Abuja Office
Daniel Otunge, Coordinator, Open Forum for Agricultural Biotechnology in Africa
Jane Achando, Associate Legal Officer
Jacquine Kinyua, Executive Assistant to the Executive Director

Technical Operations Department

Hodeba Jacob D Mignouna, Director, Technical Operations *(left March 2013)*
Emmanuel Okogbenin, Director, Technical Operations *(joined November 2013)*
Francis Nang'ayo, Regulatory Affairs Manager
Gospel Omanya, Seed Systems Manager
Prince Addae, Project Manager, Cowpea
George Marechera, Business Development Manager
Sylvester Oikeh, Project Manager, WEMA
Kayode Sanni, Project Manager, Rice
Munyaradzi Jonga, Seed Production Manager
James Okeno, Stewardship Manager
Francis Onyekachi, Programme Officer, Abuja Office
Joseph Ndwiga, Programme Officer, Agri-Business
Caleb Obunyali, Programme Officer, WEMA
Peter Musyoka, Programme Officer, Seed Systems
Stella Simiyu-Wafukho, Programme Officer, Regulatory Affairs
David Tarus, Programme Assistant
Caroline Thande, Administrative Assistant, WEMA

Administration & Finance Department

Moussa Elhadj Adam, Director, Finance and Administration
Nancy A Okita, Administrative/Human Resource Associate
Amos Kimebur, Accounting Officer
Maurice Ojow, Project Accountant
Fatuma Wario, Administrative Assistant/Events Coordinator
Gordon Ogutu, Protocol/Liaison Assistant
George Njogu, Driver
Simeon Eze, Driver, Abuja Office

AFRICAN AGRICULTURAL TECHNOLOGY FOUNDATION
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