



AATF
PROSPERITY THROUGH TECHNOLOGY

Annual Report 2018



**A New Strategy for
Increased Delivery of
Agricultural Technologies**



A New Strategy for Increased Delivery of Agricultural Technologies

Annual Report 2018



Nairobi, Kenya

AATF (2019). A New Strategy for Increased Delivery of Agricultural Technologies. Annual Report 2018. Nairobi, Kenya: AATF

ISSN 1817-5813

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Editors: Nancy Muchiri, Emmanuel Okogbenin, Wandera Ojanji and Peter Werehire

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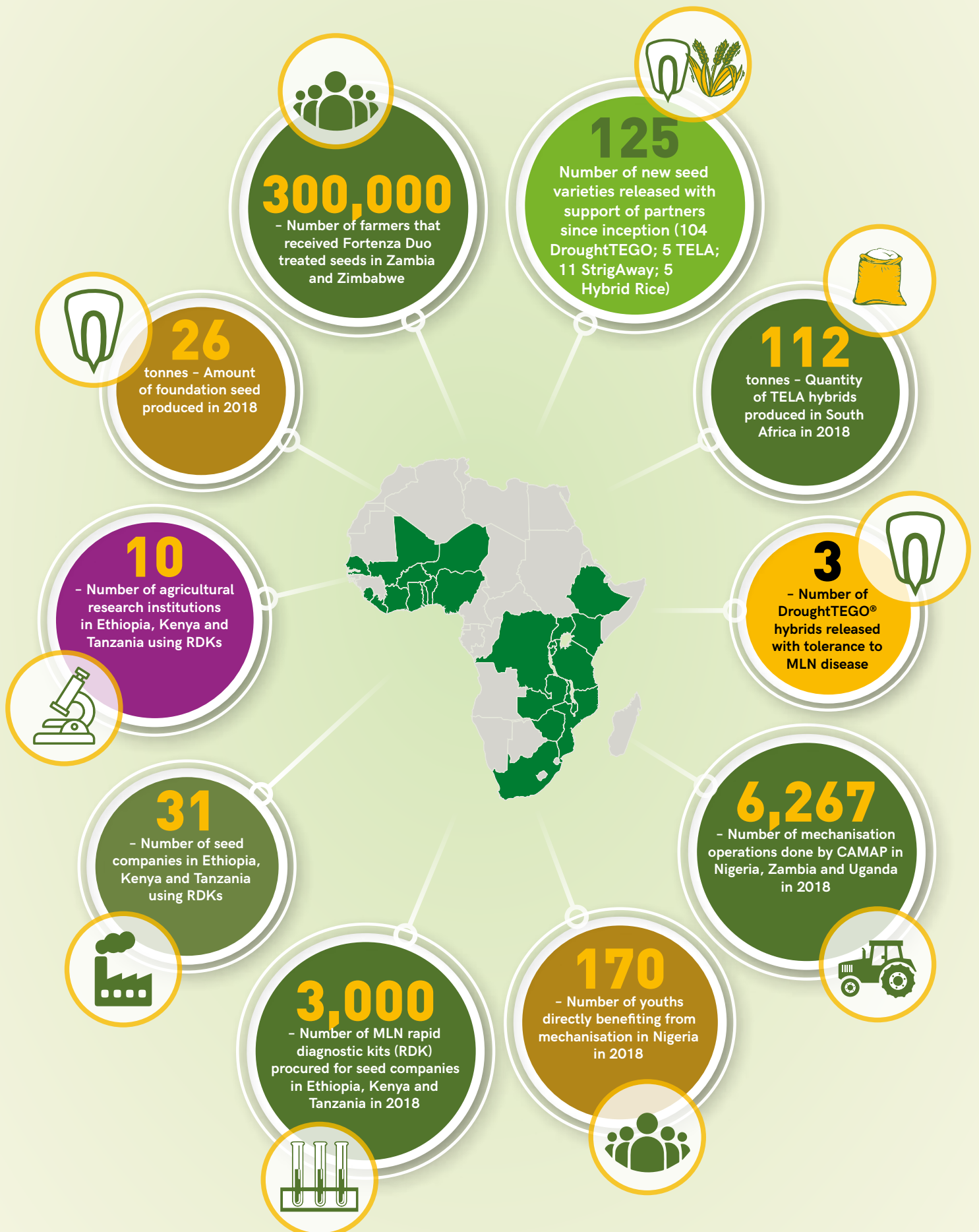
Design and layout: Predon Company Limited, Nairobi, Kenya (info@predoncoltd.co.ke)

Printing: Colourprint Limited

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2018 Achievements at a Glance



Who we are

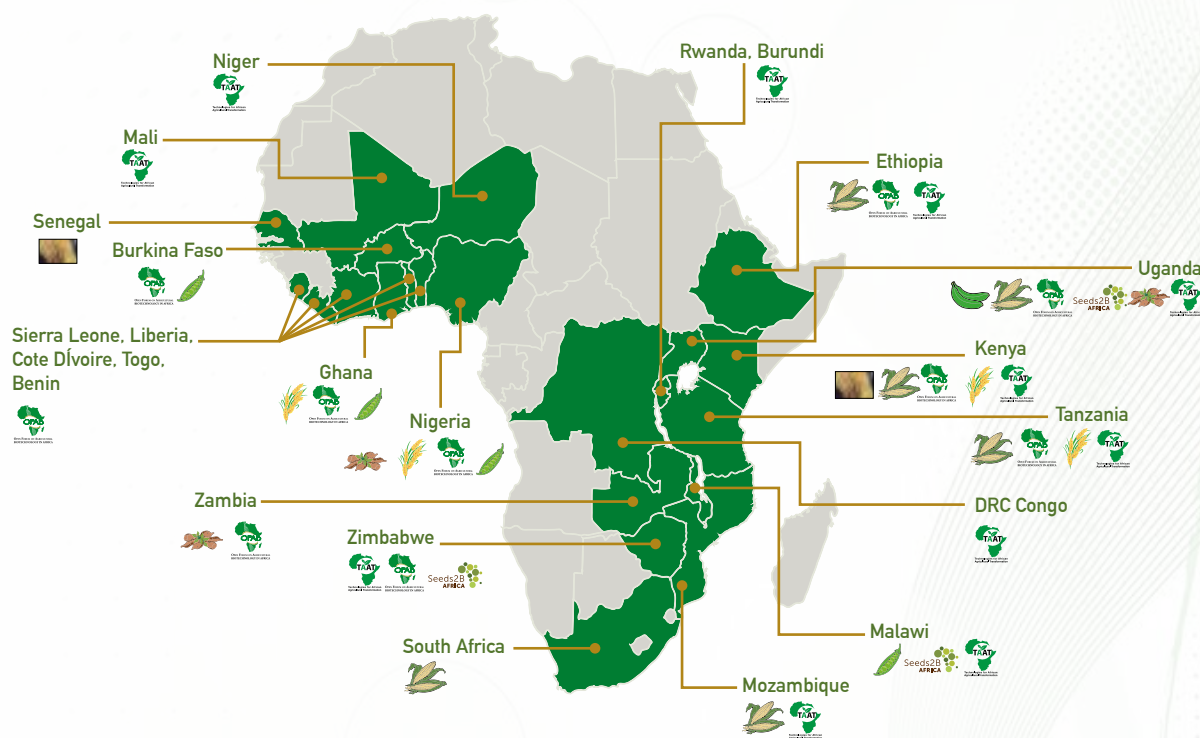
A ATF is driven by the vision of a prosperous and food secure Africa, where the livelihoods of smallholder farmers are transformed by innovation. Founded in 2003, AATF believes that the agricultural sector is the foundation of Africa's economic growth and development. It works towards an African continent where women, men and young farmers have rapid access to state-of-the-art agricultural technologies to help them achieve the desired agricultural transformation that promises food and nutrition security and increased income benefiting all.

The organisation works with its partners to clearly define the real needs of smallholder farmers in Africa, and to identify opportunities to address those needs through the transfer and use of new and existing technologies. It

works with public and private agricultural research and development institutions to develop and adapt appropriate technologies for smallholder farmers and collaborates with private sector organisations in order to create sustainable markets.

AATF focuses on the most important crops for smallholder farmers, including maize, cowpea, banana, rice, potato and cassava, targeting these in order to improve food security at the household and national levels, and to drive improvements in incomes and livelihoods for farmer.

AATF currently has operations in 23 African countries conducted by a staff of 50 based at the organisation's headquarters in Nairobi, Kenya; country office in Abuja, Nigeria; and in field offices around the continent.



AATF projects' portfolio and footprint in Africa

Message from the Board Chair

At the heart of Africa's agricultural transformation is access to and use of improved and modern technologies that accelerate agricultural growth and foster higher agricultural productivity. As we seek to deploy current technologies to reach a growing number of farmers, we cannot lose sight of the need to invest in mastering the technologies of tomorrow. Since its inception, AATF has endeavoured to contribute to the transformation of Africa's agriculture by accessing and making available an array of state-of-the-art agricultural technologies to farmers across the continent. AATF does this by harnessing the science and investing in raising Africa's expertise throughout the food value chain, including in the area of enabling environment. These technologies bring valuable benefits such as enhanced tolerance to drought and extreme weather, resistance to pests and diseases. The results are higher returns to land and labour, wealth creation and a momentum towards a business-oriented agricultural community.

Indeed, millions of small family farms that have adopted these state-of-the-art agricultural technologies and combined them with sustainable agricultural practices have reaped relatively good returns that have seen farmers such as Jane Sabula from Vihiga County, Western Kenya (<https://www.aatf-africa.org/tego-maize-jane-sabula/>), quadruple their maize yields – from less than two to eight 90kg bags from her one-acre farm – after adopting our DroughtTEGO varieties.

Our ambition is to contribute to making agriculture in Africa a big money-making industry, beyond just feeding its people. In this regard, AATF had an excellent and busy 2018 for which the Board wishes to commend management and staff. With the new Strategy 2018–2022, AATF is renewing its commitment and taking bold steps to significantly boost its contribution to agricultural transformation



Ousmane Badiane, AATF Board Chair

Together with 95 partners through 15 projects, AATF has facilitated transfer of over \$400 million worth of technologies since inception, comprising seed and non-seed-based products.

in Africa South of the Sahara (SSA). During this period, AATF will spearhead expanded access, availability and use of innovative technologies to reach 40 percent of SSA countries and also increase the incomes of farmers adopting AATF technologies by 20 percent.

The management also delivered a refreshed brand identity, one that reflects the journey we have travelled working with various stakeholders to expand the boundaries of agriculture in SSA by availing revolutionary innovations to smallholder farmers; and

the future we envision – an Africa where livelihoods are transformed through innovative technologies that bring results. The new brand identity repositions AATF as a major player in technology access and transfer in Africa – a leading brand, a Go-To organisation, in technology acquisition and deployment.

The organisation is making giant steps that position it to do what it needs to do for Africa's smallholder farmer. Our technologies are growing. Recognition for the organisation and its expertise is also growing. We are working hard to help address various challenges bedeviling key staple crops depended on by the over 16 million farmers in 13 countries in SSA. These crops include maize, rice, cassava, cowpeas, bananas and potatoes. Together with 95 partners through 15 projects, AATF has facilitated transfer of over \$400 million worth

of technologies since inception, comprising seed and non-seed-based products. These gains help to position the organisation to contribute to the agricultural transformation in Africa that we all aspire to achieve.

I thank the management and the entire staff for their determination and creativity in making AATF a more cost-effective and thus a more resilient and sustainable institution. We are grateful to our many partners who are working with us to extend the reach to tomorrow's technologies for African farmers today. We thank our donors for the longstanding support in pursuit of our mission to transform livelihoods in SSA through agricultural technologies. We look forward to your friendship throughout 2019 and beyond.

- Ousmane Badiane

Message from the Executive Director

2018 marked the beginning of our new Strategic Framework 2018-2022, a bold and aspirational vision of what AATF plans to achieve over the next five years. The Framework reflects renewed determination to realise our vision of a prosperous and food secure Africa through fast tracking technology development and commercialisation for the good of farmers in Africa. Indeed, we have witnessed increased products emerging from our pipelines while efforts towards commercialisation have been equally intensified to support delivery and uptake.

For the next five years, our efforts will go towards fulfilment of three objectives: Diversifying agricultural technologies for use in Sub-Saharan Africa (SSA); Accelerating commercialisation of agricultural technologies for improved farmers' livelihoods; and Creating an enabling environment for increased uptake and use of agricultural technologies.

Under the new Strategic Framework, we shift focus to deliver on five new programme areas: Productivity and Stress Management; Mechanisation and Digital Agriculture; Market Systems for Commercialisation; Policy Environment and Public Acceptance; and Nutrition, Food Quality and Post-Harvest Management. The previous Strategic Framework 2007-2015 focused on three thrusts: Technology acquisition and transfer; Forging public private partnerships; and Knowledge management and information sharing.

We envision to benefit 16 million smallholder farmers by 2022 through our initiatives and those of our partners. We will also expand access, availability and use of innovative technologies to 40 percent of the countries in SSA and increase incomes of farmers adopting our technologies by 20 percent.

An expanded project portfolio and resource base

We launched five new projects in 2018 with total funding commitment of US\$28.2 million.

Through partnership with the African Development Bank in the implementation of the Technologies for African Agricultural Transformation (TAAT) initiative, two projects – TAAT Maize Compact and TAAT Policy Enabler – were added to our project portfolio providing



Denis T Kyetere, AATF Executive Director

Overall, it was an exciting and very productive year. These achievements would not have been possible without you, our investors, partners, staff and the Board. It is through this collective responsibility that we will realise our dream of a food secure Africa.

opportunities for expansion to an additional 27 countries. The US\$2.4 million TAAT Maize Compact aims to increase uptake and use of high-yielding climate smart maize hybrids while the US\$1.96 million Policy Compact aims at creating an enabling environment for the adoption of TAAT technologies by farmers.

We also teamed up with the Alliance for a Green Revolution in Africa (AGRA) to support African governments to implement national regulatory reforms governing quality seed supply systems. This US\$250,000 seed policy initiative seeks to help governments institute policy and regulatory frameworks that are critical to driving accelerated and sustainable adoption of quality seed technologies for enhanced rural livelihood, incomes and food security in Africa.

In May 2018, the TELA Maize Project was launched thanks to a five-year grant of US\$24.56 million from the Bill and Melinda Gates Foundation (BMGF). TELA is an off-shoot of the Water Efficient

Maize for Africa (WEMA) Project that ended in 2018. TELA is focusing on the deregulation of the transgenic traits and the launch of TELA® maize hybrids in at least four SSA countries.

The fifth initiative of the year was the creation and incorporation of Agridrive Limited, a for-profit social enterprise that will harness and engage in profitable agribusiness opportunities that create social and economic impact for smallholder farmers.

With another very generous grant of US\$4.35 million from the BMGF, we commenced Phase II of the Hybrid Rice: Breeding by Design Project. The Project is strategically planned to transition the two-line hybrid rice technology and project products to private seed companies for continuous breeding and commercialisation for the smallholders.

Accomplishments in product development and commercialisation

We were able to facilitate release of an additional eight new hybrids during the year through two of our projects bringing total number of new seed varieties we have helped release since inception to 125.

Three new DroughtTEGO® hybrids – WE6103, WE6105, and WE6106 – that are Maize Lethal Necrosis (MLN) disease-resistant were released in Kenya bringing number of conventional maize hybrids released to 104.

Five new rice hybrids were released and registered for commercialisation in Kenya marking a turning point in commercialisation of indigenously developed hybrid rice varieties in SSA. The hybrids were adopted by three private seed companies, with exclusive rights for production and commercialisation.

In 2018, Ethiopia planted the first confined field trials (CFT) of stacked transgenic (*Bt*) maize hybrids at Melkassa to evaluate the efficacies of the drought-tolerant (DroughtGard®) trait and insect resistance genes, while Uganda planted the first NUE rice regulatory CFT.

Farming as a business

Farmers continue to sustain the revolving fund that was established by the Cassava Mechanisation

and Agro-processing Project (CAMAP) in 2016 to support access to mechanisation services. Consistent servicing of the fund by farmers, where they pay 70 percent of the cost of service before commencement of work and 30 percent on completion, is a clear demonstration that farmers find mechanisation economically beneficial.

Enabling environment

We continue working with governments in the different countries towards addressing various constraints in the enabling environment arena. We recognise efforts made by various countries towards improving the environment and we appreciate the determination.

During the year, we witnessed progress towards getting innovative technologies to farmers with countries like Nigeria and Ethiopia commercialising *Bt* cotton. In Kenya, the National Biosafety Authority approved the genetic transformation and testing of Shangi potato variety that is resistant to bacterial wilt.

We achieved major advances and successes in terms of sustainability, operational efficiencies, increased farmer investment in equipment, high productivity, increased markets and incomes with CAMAP in Nigeria, Zambia and Uganda. The project revolving funds stood at US\$ 230,113.34 in Nigeria; US\$ 11,540 in Zambia and US\$ 5,714 in Uganda.

Our efforts in the production and distribution of MLN-free seeds were bearing fruit. Over 60 percent of seed companies in target countries used the MLN checklists provided to ensure internal quality control systems. We procured 3,000 MLN diagnostic kits for seed companies.

Renewal of the license agreement with Academia Sinica for the use of the *ESPflp* gene till 2025 further strengthened our facilitation role in the control of bacterial wilt for banana and Ensete and bacterial blight for cassava.

Overall, it was an exciting and very productive year. These achievements would not have been possible without you, our investors, partners, staff and the Board. It is through this collective responsibility that we will realise our dream of a food secure Africa.

- Denis T Kyetere

Since its inception 16 years ago, AATF has endeavoured to transform Africa's agriculture by accessing and making available an array of state-of-the-art agricultural technologies and products to farmers in sub-Saharan Africa (SSA). These state-of-the-art technologies, combined with sustainable agricultural practices, have demonstrated their potential to increase productivity and accelerate growth. They also manage both abiotic and biotic stresses, such as enhanced tolerance to drought and extreme weather and resistance to pests and diseases, and have better capacity to adapt to climate change while creating sustainable landscapes and building momentum towards climate smart food systems.

Raising productivity and accelerating growth are likely to have the greatest impact on agricultural transformation, leading to food and nutrition security and improved livelihoods, since majority of the continent's poor and malnourished population depends largely on farming. Indeed, millions of small family farms that have adopted these state-of-the-art agricultural technologies and products have experienced big changes over the last decade.

However, the food security situation is still worrying. Agricultural productivity is still far below its potential, compounded by the emerging effects of climate change, rapid population growth and rising urbanisation that have increased the pressure on agriculture to deliver more and better food.

AATF sees these challenges also as opportunities for strengthening agricultural productivity through development, access and deployment of state-of-the-art technologies and products. In the new Strategy 2018 – 2022, AATF commits to significantly contributing to agricultural transformation in SSA, in collaboration with an allied cadre of partners in the agricultural value chain,



to benefit a projected 16 million smallholders by 2022. During this period, AATF will spearhead expanded access, availability and the use of innovative technologies to reach 40 percent of the countries in the SSA and to increase the incomes of farmers adopting AATF technologies by 20 percent. AATF will align the technology transfer with emerging market dynamics to ensure its suitability and relevance for the future of farming that is attractive to women and youth.

To effectively address productivity and stress management, AATF is implementing seven projects and initiatives to deliver the state-of-the-art agricultural technologies and products smallholder farmers require to transform their agriculture: The TELA Maize Traits Launch Project (TELA Maize Project) is developing and deploying transgenic maize hybrids that are well adapted to moderate drought conditions and are resistant to the stem borer insect.

With rice production seriously constrained by both biotic and abiotic stresses that are mainly associated with soil nutrient depletion and imbalances (salinity, nutrient deficiencies and toxicities) and water availability (drought and

and Stress Management






excess water), AATF is working with partners to mitigate the effect of these soil nutrient imbalances by developing rice varieties that are Nitrogen-use Efficient, Water-use Efficient and Salt Tolerant (NEWEST Rice).

In recognition of the low rice yields that do not match the increasing rice consumption and imports, AATF, through the Hybrid Rice: Breeding by Design Project is developing new rice hybrids that can dramatically increase the yields of African rice crops, from 3 tonnes per hectare to up to 10 tonnes per hectare, thus improving the livelihoods of farmers and reducing sub-Saharan Africa's dependence on imports.

Using modern gene technology, the Pod Borer Resistant (PBR) Cowpea Project, coordinated by AATF, and implemented in Burkina Faso, Ghana and Nigeria, has developed cowpea lines that are highly resistant to *Maruca vitrata*, one of the most destructive pod borer insect pests of cowpea causing up to 80 percent direct yield losses.

Through the Improving Banana, Ensete and Cassava for Resistance to Major Bacterial Diseases in sub-Saharan Africa Project, AATF

QUICK FIGURES

-  **25%** Agriculture's contribution to Africa's GDP. The sector also makes up more than half of all jobs on the continent.
-  **80%** of farms in Sub-Saharan Africa are smallholdings.
-  **US\$1 trillion** The expected size of Africa's agriculture sector by 2030.

is facilitating transgenic approaches to address major bacterial diseases of bacterial wilt in Ensete and banana as well as bacterial blight in cassava by availing three genes it accessed from Academia Sinica (Taiwan) for product development through genetic transformation.

To stem the spread and yield devastation of Potato Bacterial Wilt Disease, AATF is implementing the Development and Testing of Transgenic Potato with Resistance to Bacterial Wilt using *pflp* and *hrap* Genes Project that aims to modify at least one farmer-preferred variety with sweet pepper *pflp* gene and elongation factor receptor (*EFR*) gene, that have been reported to enhance resistance against *R. solanacearum*. The Potatoes are being transformed in laboratory and tested in greenhouse conditions to see if the genes could indeed confer BW resistance in this crop.

In response to Maize Lethal Necrosis (MLN) disease that is threatening to wipe maize yields in East Africa, AATF is spearheading the Maize Lethal Necrosis (MLN) Management in East Africa project that is focusing on supporting the production of MLN-free seed in Ethiopia, Kenya, Rwanda, Tanzania and Uganda.





TELA

Maize Project

Fast tracking commercialisation and deployment of transgenic maize hybrids to smallholder farmers in Sub-Saharan Africa

The TELA Maize Project was launched in May 2018 to build on and accelerate developments made under the Water Efficient Maize for Africa (WEMA) Project. The Project made strides towards the testing and commercialisation of transgenic drought-tolerant (DroughtGard® trait) and insect-protected (Bt trait) maize hybrids (TELA® maize hybrids) in the target African countries.

Commercialisation and release of hybrids

Efforts towards availing TELA® hybrids to farmers in South Africa were enhanced and a total of 112.68 tonnes were produced for sale to farmers during the 2018/19 cropping season. In readiness for the environmental releases

in the other TELA Maize Project countries, South Africa planted seven hectares of both MON810 and double-stacked (Bt MON810 + DroughtGard®) traited hybrids in October–November 2018 to produce seed to be used for planting demonstration plots and to initiate commercial sales.

104

Total number of DroughtTEGO® hybrids released in 6 years



Planting of the first CFTs on stacked drought-tolerant and Bt insect-protected hybrids in September 2018 at Melkassa, Ethiopia

The Project released another three DroughtTEGO® hybrids with resistance to Maize Lethal Necrosis (MLN) disease that were developed under WEMA Project (WE7117, WE7118 and WE7119). The release in Kenya followed results of National Performance Trials carried out by the seed

certification agency, the Kenya Plant Health Inspectorate Service (KEPHIS), that showed a yield advantage of 8-14 percent over the best commercial hybrid (check). This brings the total number of conventional DroughtTEGO® hybrids approved for commercialisation under the WEMA/TELA Projects in five project countries since 2013 to 104.

112

Tonnes of TELA hybrids produced in SA

Three additional medium-maturity, DroughtTEGO® hybrids (WE6103, WE6105, and WE6106) were recommended for commercial release for the mid-altitude agroecology of Kenya in 2018. Some of the parents of these hybrids will feed the TELA® maize product pipeline. This recommendation resulted from successful evaluations of drought tolerant hybrids in the highlands. Field observations in October 2018 showed some consistently promising DroughtTEGO® hybrids that could replace the popular tall, long duration commercial hybrids that are highly susceptible to lodging.



From right: Dr Sylvester Oikeh, Project Manager, TELA, Dr Yoseph Beyene, Scientist/Maize Breeder at CIMMYT and Mr Alexander Agui, Inspector at KEPHIS Kitale admire the best WEMA Hybrid (WE6105) at a trial site in Kenya on 4 October 2018

3 Hybrids released with tolerance to MLN disease and drought

Testing of hybrids

Ethiopia planted its first confined field trials (CFT I) of the stacked drought-tolerant (DT) and *Bt* insect-protected (stacked DT+Bt) hybrids at Melkassa in September 2018. The trials tested the efficacy of the *Bt* gene to control stem borer and the Fall armyworm (FAW) under natural infestation including efficacy of DT gene under moderate drought condition. A second site was being developed at Bako which is a mid-altitude sub-humid maize agroecology with 1,000–1,250mm annual rainfall.

Ethiopia selected 48 hybrids for further testing and possible conversion into transgenics using *Bt* and DT (DroughtGard®, *CspB*) traits. The selection followed on-going trials for the performance of hybrids and parental lines in Ethiopia that began in 2017. Another 66 hybrids were included in 2018 and planted at the four maize-growing agro-ecologies.

8%-14%

– yield advantage of new MLN tolerant hybrids in Kenya

Tanzania planted trials similar to the Ethiopia ones in August 2018 at Makutupora. Field observations of these trials (CFTIII) showed significant efficacy of the *Bt* gene in controlling both FAW and stem borers in both CFTs.



High performing DroughtTEGO® hybrid (WE6105) at the Kiboko demonstration site in Eastern Kenya - a medium-maturity hybrid recommended for commercial release for the mid-altitude agroecology of Kenya in 2018

Pipeline

There are 90 inbred lines that could theoretically allow the Project to produce 149 potential hybrids once trait(s) deregulation is received. Some other inbred lines of the latest hybrids, particularly those that are MLN tolerant, have been identified for trait integration using the *Bt* MON89034 and the DroughtGard® traits.

Moving forward

Focus will be on working with governments to move forward commercialisation of the TELA products that is currently slowed due to regulatory bottlenecks in some countries. More attention will also go towards the FAW menace that has spread fast and widely in Africa and become a major threat to maize seed and commercial crop production. The Project is also considering expansion to other countries such as Nigeria and decision will be made during 2019.

– Sylvester Oikeh, Project Manager, TELA





Hybrid Rice: Breeding by Design Project

Project delivers the first high yielding indigenous rice hybrids to smallholder farmers

The Hybrid Rice: Breeding by Design Project entered its second phase with funding of US\$4.35 million from the Bill and Melinda Gates Foundation. Phase II started in May and will run for four years with focus on transitioning from research to commercialisation. This phase will also seek to develop improved and superior parental lines and rice hybrids with better performance and market opportunities.

During the kick-off meeting for Phase II, stakeholders made two critical decisions that will guide the Project's operations. To attract and encourage uptake of the technologies and products by seed companies, it was agreed that licensing of hybrids will be on exclusive basis, but for a specified period, while the parental

lines will remain as global public good. On market expansion, stakeholders agreed that although the Project's funded activities will be based in Kenya and Tanzania, the private companies were at liberty to carry out testing and related activities in any country they operate in and, in doing so, would receive technical backstopping. This arrangement was

30% - Expected
yield increase with
NEWEST rice



Participants at the inauguration workshop of Hybrid Rice Breeding by Design II at Ibis Styles Hotel Nairobi on 28 June 2018

necessary to give companies the necessary incentive to invest in further development and marketing of the hybrids.

Release of hybrids and commercialisation

The Project lived up to its promise to deliver indigenous rice hybrids to smallholder farmers in SSA with release and registration of the first five locally developed rice hybrids in Kenya. The hybrids were allocated to three private seed companies – SeedCo, Afritec and Freshco – that participated in the product development process. The seed companies will further engage in seed production, establishment of demonstration sites and marketing of the seeds to farmers for grain production. The Project's breeding pipeline has more than 1,000 promising parental lines at different stages of development, which

will be used for the continuous breeding of hybrid rice varieties for sustainable uptake by farmers.

Capacity enhancement towards sustainability

Training of commercial breeders and seed production specialists is important for the sustainable transition of the hybrid rice technology from research to private companies for efficient delivery to farmers. In the first phase of the Project, a series of short-term trainings – two weeks to three months – were organised. However, it was realised that the training period was too short to deliver the required competency in field management, and other technical/commercialisation aspects of the 2-line hybrid rice technology. Therefore, the training period was increased to two years.

1,000

Number of promising parental lines in the breeding pipeline

5

– Number of indigenous rice hybrids released and registered during 2018



A farmer weeds her 2-line hybrid rice demonstration plot at Ahero Irrigation Scheme, Kisumu County, western Kenya

The new training is in form of hands-on competence strengthening in hybrid rice development and seed production at the Hybrids East Africa Limited (HEAL) station in Malindi. The programme began in August with four candidates, one each from four private seed companies – SeedCo, Meru-Agro, Suba-Agro and Afritec.

The trainees will initiate their own breeding programmes based on their company's business priorities as well as the available germplasm on offer in the Project. They will then return to their respective companies

with the materials they have developed as their own proprietary germplasm which they could continue to work on even after the end of project.

Moving forward

The Project will continue the advancement of the parental lines to their next generations. It will also complete the baseline studies in target countries to provide key information required to guide Project progression.

– **Kayode Sanni, Project Manager, Rice**





NEWEST  Nitrogen & Water Efficient
Salt Tolerant Rice

Renewed funding rekindles hope for NEWEST varieties for smallholder farmers in Sub-Saharan Africa

Efforts towards development of Nitrogen-Use Efficient, Water-Use Efficient and Salt Tolerant (NEWEST) rice received a major boost in 2018 when the United States Agency for International Development (USAID) released funds for 2018 to 2020 activities. Consequently, project activities were fully restored in 2018.

This is excellent news for smallholder rice producers in SSA who are grappling with low productivity due to several abiotic factors including nitrogen deficiency, drought and high salinity. The Project will now concentrate on delivering on its promise – to develop farmer-preferred and locally adapted rice varieties with enhanced nitrogen-use efficiency, water-use efficiency and salt tolerance. The rice is expected to increase

yields by 30 percent while utilising only 50 percent nitrogen fertiliser compared to conventional rice.

The current focus of the Project is to conduct a battery of regulated trials to demonstrate efficacy, agronomic performance and compositional analysis ahead of the planned

50% – Expected
reduction in nitrogen
fertiliser use by NEWEST
rice



Dr Kayode Sanni (second left), Project Manager Rice, AATF leads other scientists on appraisal of the performance of NEWEST rice at the Namulonge CFT, Uganda

deregulation of the product in Africa. The field trial protocol with detailed data collection methodology was fully prepared as were the testing sites in Ghana, Nigeria and Uganda.

A key milestone for the Project was the commencement of production of the seeds of NUE-12, NERICA-4 and NERICA-1 by Arcadia Biosciences in December 2018, which will be used for conducting regulatory trials in 2019.

Moving forward

Having fully prepared the trial sites in Ghana, Nigeria and Uganda, the Project will begin NUE regulatory trials for the selected lead events after seed multiplication is completed and sent by Arcadia Biosciences to the respective project countries.

– **Kayode Sanni, Project Manager, Rice**



Promising results in development of Maruca-resistant Bt Cowpea

Results of confined field trials (CFTs) in Burkina Faso, Ghana and Nigeria confirmed that the Bt genes effectively protect cowpea against Maruca. None of the transgenic Pod Borer Resistant (PBR) cowpea lines suffered Maruca-damage under the efficacy trials. More importantly, all transgenic PBR cowpea lines proved their potential for improved productivity with average grain yield of between 17.3–19.9g/plant. The non-transgenic lines were destroyed by the pest, failing to develop pods or any grain.

The trials done under artificial infestation involved six events – five of the Cry2Ab gene (102F, 104N, 105B, 245F and 250B) and the 709A event of Cry1Ab gene – and a conventional variety IT86D1010 which was the recurrent parent (being improved and used for the development of Cry2Ab lines).

Farmer assessment

The objective of the trials is to create awareness and sensitise farmers on the benefits of PBR cowpea resistance to Maruca and improved yields. In Ghana, farmers planted the trials in the Project confined sites at Nyankapala, Manga and Damango between 25 and 30 July 2018. In Nigeria, farmers participated in the trials that were planted in the last week of July 2018 in three confined sites of the Project at Minjibir, Kano; Bakura, Zamfara; and Zaria, Kaduna.

Reduction of insecticide use

The Project continued studies on insecticide reduction to effectively determine the optimum number of insecticide sprays



Efficacy trial of cowpea event carrying the Cry2Ab gene at FarakoBa CFT, Burkina Faso

that is economically beneficial for PBR cowpea production. The 2018 trials build on work carried out during 2017 in Nigeria and Malawi. In both countries, the repeat trials confirmed previous results – that two insecticide sprays are the optimum number of insecticide applications for PBR cowpea production.

50% – Expected reduction in nitrogen fertiliser use by NEWEST rice

Seed multiplication

Seeds of the transgenic PBR cowpea were tested at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australia and shipped to Ghana and Nigeria for multiplication. This was to ensure there is enough seed for production of foundation seed and for on-farm demonstration trials in preparation for deregulation and commercialisation of the PBR cowpea.

Moving forward

There are very popular cowpea varieties that are widely grown and highly marketed in the project countries. Transforming these varieties will likely expand the adoption of PBR cowpea. The Project will therefore initiate a backcrossing programme to introgress the Cry1Ab gene into other popular varieties in Nigeria and Ghana.

– Issoufou Kollo Abdourhamane, Project Manager, PBR Cowpea



Maize Lethal Necrosis Disease Diagnostic and Management

Taming the MLN disease in eastern Africa

Trainings, diagnosis, education and monitoring were key areas of attention for the Project during the year to ensure internal quality control systems within seed companies and increased capacity of regulators and national agricultural research systems (NARS) on MLN disease detection and early control.

A regional training workshop for 60 participants from seed companies, regulators and NARS from Ethiopia, Kenya, Tanzania and Uganda was held at the Kenya Plant Health Inspectorate Service (KEPHIS) in Nairobi in July. The workshop was organised by AATF in collaboration with the Alliance for a Green Revolution in Africa (AGRA), the International Maize and Wheat Improvement Center (CIMMYT) and KEPHIS. The MLN partnership focused on Ethiopia, Kenya and Tanzania during the year being the countries with highest MLN disease occurrences

according to surveillance information from CIMMYT. The training reviewed guidelines on proper execution of the MLN management including MLN disease scouting, sampling, diagnosis, and knowledge on disease threshold levels that guide certification levels.

3,000 –
Number of MLN rapid diagnostic kits (RDK) procured for seed companies in Ethiopia, Kenya and Tanzania in 2018



AATF staff Samuel Angwenyi (in red T-shirt) and Dennis Olumeh (in black T-shirt) training Western Seed's Daniel Wamache (right) and Farm Research's Augustine Mali (left) on the use of Rapid Diagnostic Kits in Kitale, Kenya in November 2018

Diagnosis

The MLN Management partnership procured 3,000 rapid diagnostic kits that were distributed to 31 seed companies (Kenya – 7, Ethiopia – 15 and Tanzania – 9) and 10 agricultural research institutions in the three countries. The distribution of the kits was accompanied by training on quality assurance and production for key personnel in respective companies. The kits are critical in ensuring internal quality control in seed companies for production of MLN-free seed.

Promotion of MLN tolerant hybrids and farmer engagements

Three field days were held during the year to promote and facilitate access to MLN tolerant maize varieties by seed companies and farmers in MLN hotspots. In Kenya, two field days were organised in collaboration with Cereal Growers Association (CGA). The first was in Longisa, Bomet on 10 July attended by 200 participants and the second in Narok on 21 July that attracted 500 people. Tanzania

held its field day on 8 August 2018 during the Nane Nane Fair. During the field days, TEGO hybrids, DK777, KALRO's KATEH, and Meru Agro-HB607 varieties were planted and showcased. In Tanzania, small packs of already released MLN tolerant products were distributed during the field days.

Monitoring

The status of MLN disease in farmer fields was also monitored in collaboration with seed companies. Over 330 on-farm visits were made in MLN hotspots in Kenya (Bomet, Embu, Kisumu and Narok) and information collected on management practices by farmers who were also trained on best management practices.

10 – Number of agricultural research institutions in Ethiopia, Kenya and Tanzania using RDKs

Moving forward

The initiative, that is supporting commercial seed sector in select countries to produce Maize Chlorotic Mottle Virus (MCMV)-free maize seeds including promotion of use of certified seeds by farmers in the region will develop MLN field handbooks for day-to-day use by seed company personnel. The standard operating procedures, training manuals and tools will also be incorporated in other projects to ensure sustainability and tracking of results once the Project has ended.

- Gospel Omanyia, Senior Manager, Deployment



Bacterial Wilt Potato Project

Good start in the development of transgenic potato with resistance to Bacterial Wilt disease

Despite being an important food and cash crop in Africa, potato production and productivity are constrained by Bacterial Wilt (BW), caused by the soil-borne pathogen *Ralstonia solanacearum*. In Kenya BW is found on 74 percent of the farms and can cause yield losses of up to 100 percent according to the Seed Potato Subsector Master Plan for Kenya.

The aim of the Bacterial Wilt Potato Project is to modify at least one farmer-preferred variety with sweet pepper *pflp* gene and elongation factor receptor (*EFR*) gene, that have been reported to enhance resistance against *R. solanacearum*. The potatoes are being transformed in laboratory and tested in greenhouse conditions to see if the genes could indeed confer BW resistance in this crop.

The Project is using the farmer-preferred Shangi variety that is known and grown by more than 75 percent of potato farmers in Kenya, and also has a good transformation efficiency. Shangi has also spread to neighbouring countries lately.

The Project is developing transgenic events of variety Shangi bearing the *pflp* gene alone, and *pflp* + *EFR* genes to test resistance to the

74% –
Prevalence of BW in
Kenya's farms



Ms Ethel Webi, Research Associate at CIP, preparing bacterial wilt-resistant potato plantlets for tissue culture propagation at BeCA labs

disease. So far, the Project has successfully produced and identified 94 transgenic events that were confirmed to have the *pflp* gene, surpassing the Project minimum target of 30 transgenic events. Mock bioassays have been conducted using the non-transgenic controls (Shangi as the susceptible control and Cruza-148 as moderately resistant control) to test disease response under inoculation (using the *Ralstonia solanacearum* potato strain phylotype II sequevar II).

100% –
Severity of BW damage
on potato farms if not
checked

75% – Popularity
of Shangi variety among
potato farmers in Kenya

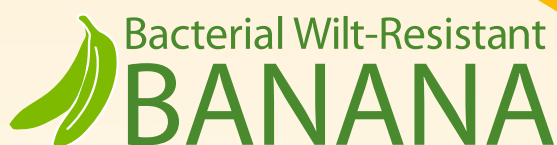
Preliminary results on 18 transgenic events indicate different levels of *pflp* gene expression. This result, if confirmed, will be applied in classifying the other 76 events; and then determine the number of events per expression class (based on the 94 transgenic events).

94 – Number of
shangi transgenic events
confirmed to have the
pflp gene

Moving forward

The next steps are to identify high/medium/low expresser of the *pflp* gene – generally due to the position of the transgene in the genome. Three transgenic events in each class will be selected and transferred to the greenhouse for tuber generation in preparation for the main bioassay to test resistance to bacterial wilt. Transgenic events showing bacterial wilt resistance that is equal or higher than that of Cruza-148 (moderately resistant control) will be selected as candidate events.

– Emmanuel Okogbenin – Director Technical Operations



Overcoming challenges in improving banana and Ensete to major bacterial diseases

Improving Banana, Ensete and Cassava for Resistance to Major Bacterial Diseases in Sub-Saharan Africa Project continued in 2018 with some activities on banana, Ensete and cassava transformation conducted by project research partners with stewardship support and intellectual property management of the transgenes (*Pflp*, *Es-Pflp* and *Hrap*) from AATF.

In Kenya, the International Institute of Tropical Agriculture (IITA) evaluated Ensete transformed lines in the greenhouse at Biosciences eastern and central Africa (BecA) in partnership with the Ethiopian Institute of Agricultural Research (EIAR) technical staff attached to IITA/BecA.

In Ethiopia, EIAR continued with capacity building of staff in genetic transformation

and tissue culture while AATF conducted an intellectual property sensitisation training for the EIAR scientists in April 2018. These activities were geared towards getting EIAR technically competent to work with transformed Ensete lines at its Biotechnology Station at Holeta for continuation of evaluation and product development initiative.

Activities relating to the development of banana resistant to *Xanthomonas* wilt disease in Uganda are at the CFT stage for the testing of lead events of two popular banana varieties, Matoke Hybrid M9 and Nakitembe, while in Kenya the Project has successfully completed the first CFT for gene efficacy at the Kenya Agriculture and Livestock Research Organization (KALRO) Alupe.



Confined field trial of the Banana acterial Wilt Project at KALRO in Busia, Kenya

The Project is on a resource mobilisation drive to support further activities towards product development in the target countries. Pending new funding, all the transformed events have been fully secured. The CFT permit approved by Kenya's National Biosafety Authority is still valid up to November 2021 to support some trials and activities at ILRI-BecA.

But a silver lining for the Project in 2018 was that AATF renewed the License Agreement with Academia Sinica, thus allowing the AATF to continue with the use of the *ESPflp* gene until 29 September 2025. The licence for *hrap* and *pflp* are however valid until 2021.

Moving forward

IITA is expected to move the successfully transformed Ensete lines to EIAR in Ethiopia where further activities are planned towards product development. Considering that AATF has a direct agreement with EIAR, discussions will be held with EIAR and IITA around the Project future. Funding will be critical to the next steps.

– **Emmanuel Okogbenin** – **Director Technical Operations**

Mechanisation and Digital Agriculture

According to African Development Bank's (AfDB) *Feed Africa Strategy for Agricultural Transformation in Africa, 2016–2025*, Africa has 202 million hectares of uncultivated arable land – the highest area in the world – which is about 50 percent of the global total. More worrying is that its productivity lags far behind other developing regions. Yields are only 56 percent of the international average.

These unfortunate scenarios are closely associated with poor or lack of agricultural mechanisation. Africa has the least mechanised agricultural system in the world. African farmers have 10 times fewer mechanised tools per farm area than farmers in other developing regions, and access has not grown as quickly as in other regions.

As demonstrated elsewhere in the world, mechanised agriculture has the power to inject competitiveness and open markets for the continent's products and farmers. It can reduce drudgery, increase production efficiency, timeliness of operations and facilitate increased output of higher value products at a lower cost of operations.

Despite the obvious need and recognition for mechanisation, several constraints face the continent in harnessing the benefits of mechanisation. Smallholder farmers are resource poor and often have difficulty investing in physical assets in general and in agricultural machinery in particular. In many countries, agricultural machinery suppliers are only found in the larger towns and cities, as the perceived low demand in rural areas for equipment does not justify the establishment of distribution networks. More so, farmers are not well organised in clusters to effectively and efficiently access mechanisation service by providers. In addition, smallholder farmers find it difficult to access credit to finance farm mechanisation as lending institutions



QUICK FIGURES

25 tonnes

Yield increase in SSA as a result of mechanisation

18,500 ha

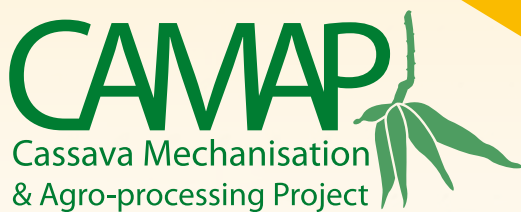
Land that has been put under mechanization in Nigeria, Uganda and Zambia

are reluctant to extend credit to farmers with little collateral and view agricultural production as a high-risk business.

In response, AATF initiated the Cassava Mechanisation and Agro-processing Project (CAMAP) in 2012 to champion the transformation of African agriculture through mechanisation. CAMAP aims to improve cassava productivity, increase efficiency in operations, reduce drudgery as well as create market linkages for smallholder farmers in the three countries of Nigeria, Uganda and Zambia.

To remain sustainable, CAMAP established a revolving fund where farmers pay AATF for mechanisation services and the money is ploughed back into the Project for machine maintenance and mobilisation of new farmers. This approach has since matured into the formation of a private company – Agridrive Limited – which is for now focused on providing mechanisation services in Nigeria on a full commercial basis.





Good progress as farmers commit more acreage to mechanisation

CAMAP continued to record good progress as more farmers committed more acreage to mechanisation and sought more mechanisation services from the Project in all the Project countries of Nigeria, Zambia and Uganda.

In Nigeria, CAMAP expanded cassava mechanisation service to four new states namely Delta, Koigi, Niger and Oyo. The Project has thus increased from the initial three states (Kwara, Ogun and Osun) at inception to seven states. This expansion resulted in remarkable increase in mechanised operations, from 4,092 in 2017 to 4,822 in 2018. These mechanised operations were however short of the annual target of 7,500.

These achievements were attributed to the evident benefits that farmers gained or

witnessed from mechanisation. To support learning and exposure to mechanised agriculture, the Project organised mechanisation demonstrations such as the one held in Bida, Niger State in August 2018 that was attended by high profile dignitaries including the Niger State Governor, Abubakar Sani-Bello, his Deputy, the Emir (traditional king) and other state executives.

6,267 – Number of mechanisation operations done in Nigeria, Zambia and Uganda



Bowen University students training at Iwo, Osun State with George and head of Agriculture Department

AATF endeavours to make agriculture more attractive and a choice for employment and entrepreneurship for the youth. Across Africa, the youth even in rural areas associate subsistence and even potential commercial farm activities with hard physical labour and drudgery leaving them disenchanted with the meagre opportunities for a rural livelihood, worsening an already marked tendency to rural-urban migration.

Through awareness creation campaigns, CAMAP in 2018 successfully increased involvement of youth in agricultural activities. Several youth groups approached

CAMAP for collaboration and training in cassava mechanisation. As a result, CAMAP worked with 155 youths in Oyo and Ogun States. CAMAP also assisted 15 youths from the Value Chain Development Programme to set up a 5ha demonstration farm in Ayetoro, Ogun State in 2018.

CAMAP also held a seminar on cassava mechanisation at Olabisi Onabanjo University, Ogun State for more than 120 students. The aim was to expose the university agricultural students to various mechanisation options and to empower them take up mechanised cassava production as a business. Inspired, the university set up a 1ha mechanised cassava farm alongside its manually planted cassava farm.

In Zambia, CAMAP conducted 690 mechanisation operations in 2018, against the 1,400 annual target. The Project also



Students from the Olabisi Onabanjo University Ogun State during a cassava mechanisation seminar on 23 June 2018

170 – Number of youths directly benefiting from CAMAP initiatives in Nigeria in 2018

successfully linked farmers with GroAfrica to purchase cassava chips and provide transportation and logistical support. This market linkage guarantees easier market access and fair prices for farmers' produce.

CAMAP also stepped up awareness creation campaigns in Zambia with field days in Fibalala and Fimpulu where 202 and 1,265 farmers participated respectively. The field day in Fimpulu was officially opened by the Provincial Permanent Secretary of Luapula Province.

In Uganda, CAMAP conducted 755 mechanised operations on mechanised 186.4ha in 2018. This was an improvement from 2017 where CAMAP managed 530 mechanisation operations.

US\$189,670

– Revenue generated by CAMAP and Agridrive during year

Revolving fund

The revolving fund that was established in 2016 for CAMAP farmers continues to pay dividends. During 2018, the fund demonstrated that mechanisation can be provided to smallholder farmers in a sustainable and economically feasible way as farmers were willing to pay for services. The fund collected US\$34,670 (\$4,970 for Uganda and \$29,700 for Zambia) from mechanisation services in 2018 that was ploughed back into the Project for machine maintenance and for reaching out to new farmers and expanding the Project to new areas. For



A mechanised cassava planting operation at a farm in Oyo State, Nigeria

Nigeria, all mechanisation activities are now managed by Agridrive Ltd, a social enterprise established by AATF as a private company in 2018 to provide mechanisation services on commercial basis. A total of \$155,000 was generated by Agridrive limited during the year.

Moving forward

CAMAP will work closely with Project partners to increase the adoption rate of mechanisation and to out scale the Project into new potential areas. Specific attention will be paid to carrying out farmer education on correct usage of fertilisers and herbicides to correct the notion that this is not necessary where soils are deemed as fertile. The Project will also work with farmers to support their full utilisation of mechanisation services offered and not just ploughing/harrowing. A key priority will be to on-board more entrepreneurs to provide mechanisation services as a business.

– George Marechera, Business Development Manager

Market Systems for Commercialisation



The agricultural sector is the most significant contributor to gross domestic product and employment across Sub-Saharan Africa, making up 15 percent of the region's Gross Domestic Product (GDP) and 50 percent of its jobs. However, despite the scale and potential of African agriculture, its development has been slowed by the slow adoption of new agricultural technologies, from improved seed through to mechanisation.

The slow adoption is in part due to an under-developed private sector and the failure of market systems to bring new agricultural technologies swiftly to the smallholder farmers who often lack access to capital or to credit that would allow them to invest in more advanced technologies. In addition, there are challenges to the supply side of the agricultural input value chains, for example in terms of quality, quantity and price.

Efficient market systems that respond to demand and supply of technologies and ensure smallholder farmers have the necessary inputs at the right time, in right quantities and quality and can access viable output markets are essential for Africa's agriculture to effectively grow incomes for the farmer, business, country and could spur

a transformation of the wider economy. According to the World Bank, the African agricultural sector could more than triple in size by 2030, from US\$300 billion today to US\$1 trillion.

To ensure sustainable delivery of products to farmers, AATF works with partners towards commercial release of products coming from the research and development pipeline; product allocation, licensing and production; and promotion and marketing of new products.

Through the QualiBasic Seed Company (QBS), AATF assists independent seed companies in Africa to access high quality foundation seed, in effect ensuring that farmers have a consistent supply of newer, higher yielding and more resilient seed varieties.

Through the Seeds2B Project, AATF works with seed companies to deliver cutting-edge seed varieties that increase smallholder farmer's productivity and reduce their vulnerability to climate change through technology scouting, analysis and product registration.

Through Agridrive Limited, a social enterprise venture, AATF engages in profitable innovative agribusiness ideas that create social and economic impact for smallholder farmers who are dependent on agriculture for their livelihoods.

AATF, through TAAT Maize Compact, is working with partners to help farmers adopt and use climate smart maize varieties that mitigate the negative effects of climate change and production constraints to maintain high levels of productivity. These projects also provide linkages to farmers with service providers, input suppliers, commodity associations and produce off-takers to make the maize value chain attractive and viable.



Providing mechanisation solutions to improve smallholder farmers' livelihoods

Agridrive Limited was launched in 2018 as a commercial business entity harnessing agribusiness opportunities that support AATF's vision of prosperous farmers and a food secure Africa. As a social enterprise venture under AATF, Agridrive will engage in profitable innovative agribusiness ideas that create social and economic impact for smallholder farmers who are dependent on agriculture for their livelihoods.

The Company started its operations with setting up its structures including Board of management and key personnel. Business started in May 2018 when it defined its target for the year as 7,500 units of mechanisation operations in Nigeria. Each unit of operation is defined as one single operation (ploughing, harrowing, planting, herbicide application or harvesting) per hectare.

Operations kicked off with building a fleet of tractors to support its goals. It procured seven tractors from TATA International in June 2018 to make a fleet of 15 tractors, having inherited eight from CAMAP in Nigeria. To further complement its fleet of machinery and equipment, the company also bought one Hiab truck, six ploughs, four harrows and three boom sprayers.

64% – Rate of mechanisation service provision performance against annual target



The maize, soyabean and groundnut planter acquired by Agridrive

64% – Rate of mechanisation service provision performance against annual target

By end of year, Agridrive Limited had recorded a performance rate of 64 percent against its annual target with completion of 4,822 mechanised operations against the planned 7,500 mechanisation operations in Delta, Kogi, Kwara, Niger, Ogun, Osun and Oyo states. The services generated slightly over \$155,000 against a target of \$285,000.

Agridrive Limited is now offering mechanisation services to all crops depending on farmers' needs. This is an expansion of the scope of mechanisation under CAMAP which only targeted cassava. For instance, in Niger State, most of the mechanisation work was carried out for maize. The Cotton Association of Nigeria also expressed interest in Agridrive providing mechanisation services to its members and discussion on how to further this collaboration was initiated in Ogun.

4,822 – Number of mechanised operations completed in Nigeria in 2018

\$155,000 – Revenue generated during year

Moving forward

The company will expand its services to other states in Nigeria and other countries in Africa and continue engagement with current and potential key customers. A key priority for 2019 will be to develop marketing strategies to attract farmer interest and increase revenue.

– George Marechera – Business Development Manager



On course to overcoming challenges of foundation seed supply in Africa

In its first full year of operations, QualiBasic Seed Company (QBS) made great strides towards ensuring that independent seed companies in Africa have access to high quality foundation seed they have always needed to produce and consistently supply smallholder farmers with newer, higher yielding and more resilient seed varieties.

During 2018, the company achieved a 77 percent performance rate with supply of 26 tonnes of foundation seed against a target of 34 tonnes that generated revenues worth US\$166,000. The company continued efforts to grow its customer base and by end of year had orders from a customer base spread across eight countries with majority in Kenya and Zimbabwe.

Working with AATF, QBS partnered with 15 seed companies in Kenya, Malawi, Mozambique, South Africa, Tanzania,

Uganda and Zambia to establish over 1,300 demonstration sites that were used to conduct 65 field days for seed companies.

Moving forward

QBS looks forward to doubling its customer base and working with them to forecast their foundation seed needs. It also plans to triple its production and increase its footprint on the continent by at least another two countries.

- **Andy Watt, Managing Director, QBS**

77% – Rate of performance against target for year





Delivering better-performing and locally-adapted varieties of strategic crops

The Seeds2B Project made good progress in scaling the access, evaluation and commercialisation of new better-performing and locally-adapted varieties of strategic crops in Malawi, Uganda and Zimbabwe.

By end of 2018, Seed2B had a highly diversified trial pipeline of 89 new varieties of tomato, soybean, groundnut, pearl millet, sorghum, pigeon pea, groundnuts and cowpea. Besides yield advantages, these varieties had potential to address several production constraints while meeting market requirements.

In Malawi, the Project identified two soybean varieties (PanSoy-008 and PanSoy-017) that had better grain yield over the commercial checks. Tomato trials carried out independently by a seed company in

Dedza, Dowa and Lilongwe confirmed farmer preference for TOM1 due to its bigger fruit size that made it easy to market while TOM7 and TOM12 were preferred for higher yield.

89 – Varieties of tomato, soybean, groundnut, pearl millet, sorghum, pigeon pea, groundnuts and cowpea in Seeds2B product pipeline



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

In Zimbabwe, the Project successfully completed trials for sorghum, pearl millet, tomato and soybean that identified high potential varieties for commercialisation, based on the superior yields and grain quality. The Project also identified 15 tomato varieties with processing potential, based on the analysis of their total soluble sugars. In addition, eight national and multinational seed companies in the country also conducted independent trials for sorghum, pearl millet and tomato varieties and identified six sorghum entries, six pearl millet entries and 12 tomato varieties for possible inclusion into their commercial portfolios.

Through the Partnerships for Seed Technology Transfer in Africa (PASTTA) initiative, the Project held a workshop in Uganda to enhance stakeholder awareness on the country's plant variety protection (PVP) system and technology licensing in November. PASTTA is an alliance between USAID Feed the Future, Syngenta Foundation for Sustainable Agriculture, New Markets Lab and AATF. The workshop was attended by 37 participants drawn from the National Agricultural

Research Organisation (NARO), Ministry of Agriculture Animal Industry and Fisheries, Uganda Seed Traders Association, Makerere University, Kyambogo University, and seed companies, among other organisations. The delegates agreed on a roadmap to the development of PVP regulations for Uganda.

Moving forward

The Project's activities will focus on advancing the evaluation of variety performance against best local check varieties in multi-locational on-station and on-farm trials. An assessment of market acceptance and variety promotion through marketing trials and field days will also be carried out. The Project will continue to facilitate the improvement of policies which promote commercialisation of technologies and protection of intellectual property of released varieties. It will also seek licensing partnerships for local seed production and continue training national public breeders on intellectual property rights.

– Edgar Wavomba, Seeds2B Project Coordinator



Technologies for African
Agricultural Transformation

Maize Compact

Increasing uptake of proven high-yielding climate smart agricultural technologies by smallholder farmers

The Technologies for African Agricultural Transformation (TAAT) is an initiative of the African Development Bank (AfDB), developed as a flagship programme of its *Feed Africa Strategy (2016–2025)*. Its overall objective is to boost agricultural productivity in Africa by rapidly delivering proven technologies to tens of millions of farmers to enhance their productivity. Further, it aims to mitigate risks and promote diversification and post-harvest investment across selected agricultural priority intervention areas (PIAs) including maize, rice, wheat, soybean, pulses, cassava, dairy, poultry and fish production. AATF is the Continental Implementation Lead for the TAAT Maize Compact.

The TAAT Maize Compact aims to scale out and disseminate water efficient and other climate smart maize technologies across 12 countries of Benin, Cameroon, Ethiopia,

2 million

– Number of households TAAT Compact targets with water efficient and other climate smart maize technologies

Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda and Zambia. Angola and Zimbabwe were recently added to address the cross-cutting challenge of the Fall Armyworm (FAW) while Togo, Central African Republic and DRC are expected to join the team by end of 2019 due to AfDB leveraging efforts.

Between 2018 and 2021, TAAT Maize Compact targets to reach at least 2.5 million households with water efficient and other climate smart maize technologies as well as other supporting technology packages to benefit 12 million farm family members in the target countries. The Project will increase maize productivity by at least 30 percent and enhance incomes by at least 20 percent for those households involved in the maize value chain. It engages women and youth in the maize value chain and aims to generate an extra 12 million tonnes of maize grain.

12 million

– Number of farm family members to benefit from climate smart maize technologies

ICT, farmer registration and aggregation, off-taker linkages

To ensure that there is increased demand for climate smart maize varieties by farmers, the TAAT Maize Compact plans to enhance off-taker – credit packages – aggregated farmer linkages, as well as utilisation of information, communication and technology (ICT) platforms for scale out. Through these efforts, a total of 15 financial input credit providers were engaged to link farmers to production inputs and grain off-takers. In Nigeria, for instance, 60,000 farmers were registered in

19 states and linked to the Anchor Borrower Program (ABP) of the Central Bank of Nigeria (CBN). Through the ABP, TAAT Maize Compact assisted the farmers to acquire about 2,000 tonnes of seed from 12 elite maize smart varieties which they planted on about 100,000ha during the June–July 2018 cropping season.

Further, the TAAT Maize Compact identified seven ICT platforms in the region to facilitate farmer registration, e-extension, access and use of TAAT Maize technologies including elite climate smart maize varieties. The ICT platforms would also support value-chain linkages. TAAT Maize will tap into the over 600,000 farmers already registered in these platforms.

The TAAT Maize also has mapped and engaged 18 maize grain off-takers in target countries. The off-takers will stimulate the output market pull mechanism by buying off grains produced and provide opportunities for credit sourcing in a vibrant maize value chain.

Scaling out climate smart hybrids

In 2018, the TAAT Maize Compact signed collaboration agreements with 30 seed companies in Ethiopia, Kenya, Rwanda, Tanzania and Uganda that committed to produce and scale out over 27,000 tonnes of climate smart maize varieties.

The varieties produced will enable cultivation of about 1,083,760ha of farmland and reach about 3 million farmers in target

30

– Number of seed companies that have signed agreements with TAAT Maize Compact in four countries of Kenya, Rwanda, Tanzania and Uganda.

countries. Partner seed companies, NARS and commodity associations have facilitated establishment of over 3,400 demos, where 480 field days were conducted. The seed companies were also engaged in distribution of 90,000 small seed packs to boost farmer-led demos, a key strategy for rapid uptake and use of climate smart maize varieties.

14 – Number of seed companies that were contracted to deploy Fortenza Duo treated seed in Zambia and Zimbabwe.

Towards FAW control

TAAT Maize and FAW Compacts signed a joint agreement for acquisition and deployment of the Fortenza Duo seed treatment technology in 2018 to control the worm in Zimbabwe and

Zambia. The seed treatment technology was used to treat 3,000 tonnes of select TAAT Maize varieties through 14 seed companies licensed by AATF in Zambia and Zimbabwe. Government outreach programmes and seed companies distributed the treated seeds to over 300,000 farmers in the two countries.

3,400 – Number of demos seed companies committed to establish in 2018/2019

Moving forward

Deployment of Fortenza Duo seed treatment technology in eastern and western Africa will be a priority in 2019.

– **Gospel Omanywa, Senior Manager, Deployment**



Farmers in SSA have shown willingness to adopt innovative technologies proven to address their farming constraints, increase value and are affordable. However, new and innovative agricultural technologies with great potential to make a difference to African economies and farmers' lives are not getting to market as fast as they should and are also not being scaled up across Africa's agro-ecological zones because of various reasons including unfavourable policy, legal, regulatory and institutional environments.

It is vital to create these enabling environments by giving policymakers the information they need to make informed decisions about the regulation of agricultural technology, and to help them to formulate regulations and support structures that promote innovation. Countries that are able to create conducive climates for innovation and business growth will attract investment and drive the development of their agriculture sectors and wider economies.

Over the years, AATF has focussed on creating and strengthening an enabling environment for increased approval, uptake and use of production enhancing agricultural technologies in SSA. The foundation has spearheaded project initiatives aimed at addressing policy and regulatory bottlenecks and market failures affecting the introduction of agricultural technologies while also supporting emergence of efficient market systems and sound science-based regulatory systems that will deliver safe technologies to market while safeguarding human and environmental health.

Some of the AATF-led project initiatives include: the Open Forum on Agricultural Biotechnology in Africa (OFAB), a project that facilitates the flow of credible biotech information from the scientific community to policy makers and the public through advocacy and communication campaigns; the Technologies for African Agricultural Transformation (TAAT) that supports Enabling Policies for Technology Adoption Initiative, and the AATF-AGRA Seed Policy Initiative dedicated to Supporting African Governments to Implement National Regulatory Reforms Governing Quality Seed Supply Project that are all geared towards improving the seed supply systems; and the USDA-FAS Regulatory Initiatives for facilitating regional harmonization of registration frameworks for biopesticides in selected African countries where control of aflatoxin contamination in food grain has been a national priority.

AATF believes that a supportive and enabling policy environment and public participation will stimulate innovation, technology uptake and agribusiness that is critical if agriculture is to make meaningful difference to the lives of smallholder farmers in Africa.



OPEN FORUM ON AGRICULTURAL
BIOTECHNOLOGY IN AFRICA

Advocacy efforts rewarded as two more countries commercialise GMOs

OFAB's supportive and functional engagement with respective country authorities, grassroots players and other stakeholders was rewarded in 2018 as Nigeria and Ethiopia became the latest countries in Africa growing GM crops through commercialisation of two *Bt* cotton varieties in May and June respectively. Kenya also made progress with approval of *Bt* cotton for national performance trials in June effectively moving closer to commercialisation while Nigeria continued its preparations for environment release of the Pod Borer Resistant Cowpea.

Grassroots mobilisation and awareness creation were intensified in all OFAB countries to support better understanding and action for biotechnology.

In Ethiopia, OFAB strengthened its partnership with universities through the set up of three additional OFAB regional nodes, increasing the number of biotech outreach points to six. These regional nodes that help to sustain biotechnology conversations with local communities and opinion leaders are hosted by local universities and now cover the Central, North, West, East, North-West and South-East regions.

3 – Number of additional OFAB regional nodes in Ethiopia

Ghana and Tanzania held a series of community engagement events to mobilise public support for biotechnology and enhance understanding by farmers, students and extension officers. In Tanzania, the engagements resulted in formation of an additional 120 farmer field schools spread across 13 regions while Ghana established three biotech innovation platforms in Kumasi, Cape Coast and Tamale. In Burkina Faso, farmers, civil society organisations and parliamentarians urged the government to give an affirmative response to their request for reintroduction of *Bt* cotton whose planting is still suspended.

120 – Number of additional farmer field schools in Tanzania

13 – Number of regions with farmer field schools in Tanzania



Calvin Edward Gwabara, OFAB Journalist of the Year 2018, with Denis T Kyetere (left), AATF Executive Director, and Daniel Otunge, OFAB Project Manager, during the 2018 OFAB Media Awards celebrations held in Burkina Faso

US\$3,000-5,000 – Prize OFAB Africa grants to Award winners

In Nigeria, biotechnology received the support of retired Nigerian President Olusegun Obasanjo who called on the government to fast-track the release of biotech crops during a meeting held in May in Ogun State attended by about 300 participants.

OFAB continued meaningful engagements with the media as part of awareness and education on biotechnology. The Project therefore held its second OFAB Africa Media Awards for journalistic excellence in agricultural biotechnology reporting in September in Burkina Faso. Tanzanian TV journalist Calvin Gwabara emerged overall winner of the Awards that were celebrated during the OFAB Annual Review and Planning Meeting. Philip Bagyiliko Tengzu from Ghana and Brian Okinda from Kenya won in the radio and print media categories respectively. The award winners are eligible to apply for competitive OFAB Africa grants, ranging from \$3,000 to \$5,000, to conduct research and publish impact stories related to agricultural biotechnology.

Moving forward

The unpredictable and conflicting biotech policy and legislative environments continue to impede progress in getting technologies to farmers. OFAB will therefore intensify its advocacy and communication campaigns to build better understanding of biotechnology, especially GMOs, to contribute to evidence-based decision making. The Project will continue to encourage generation and use of local, fresh, credible and relevant data to support country conversations.

– Nancy Muchiri, Senior Manager, Communications and Partnerships



Technologies for African
Agricultural Transformation
Policy Enabler Compact

Facilitating technology deployment and adoption through development of a strong regional seed system

The Technologies for African Agricultural Transformation (TAAT) is an initiative of the African Development Bank (AfDB), launched as a flagship programme of the Bank's *Feed Africa Strategy* (2016–2025). The overall objective of TAAT is to boost agricultural productivity in Africa by rapidly delivering proven technologies to tens of millions of farmers to enhance their productivity.

The TAAT programme has six compact enablers. Among them is the US\$ 1.96 million Policy Enabler Compact that was launched in July 2018 with AATF as the continental implementing lead institution. AATF is jointly implementing the Policy Compact with the International Institute of Tropical Agriculture

(IITA), the West and Central African Council for Agricultural Research and Development (CORAF)/WECAD and Market Matters Inc (MMI).

TAAT Policy Enabler seeks to facilitate the creation of an enabling policy environment to facilitate technology deployment and adoption by farmers through development of a strong seed system for regional member countries, increasing access and availability of quality seeds, harmonising regional technology release and registration policies, and facilitating emergence competitive agricultural value chains. The Compact also supports other compacts by responding and addressing commodity-specific policy bottlenecks that may require redress.



Participants during the High Level Workshop on the Status of Implementation of Regionally Harmonized Seed Regulations within the ECOWAS/UEMOE/CILSS region held in Dakar, Senegal

In 2018, the Compact focussed on four workstreams: Seed industry assessment; Accreditation of agro-input dealers; Harmonization of regional seed policies; and Value chain assessments.

Seed industry assessments

In 2018, the Project completed seed industry assessment in DRC, Liberia and Uganda. These assessments primarily sought to identify chokepoints in the seed delivery systems that will help focus discourse with governments on policy interventions to engender efficiency in quality seed supply. This effort leverages

on past work by Market Matters Inc in 13 African countries.

Following the assessments, the Compact worked closely with the African Seed Access Index (TASAI) in updating the DRC National Seed Catalogue and strengthening provincial seed associations in the country such as the Association of Seed Producers in Katanga (APSKA) in Haut-Katanga Province. In addition, mapping of the seed system was accomplished in Liberia, to characterize key industry players and their functions, the flow of actions in the seed supply chain, and the overlying policy environment.



Participants at the high level consultative workshop on the status of the COMESA Seed Harmonization Implementation Plan (COMSHIP) held in December 2018, Nairobi-Kenya

Accreditation of agro-input dealers

A protocol for identifying accredited and genuine seed suppliers and agro-dealers was developed. Guided by this protocol, a survey for seed companies and agro-dealers was conducted in Nigeria and Tanzania to identify genuine seed suppliers and agro-dealers. The outcome of the survey will be used to generate a database of accredited and genuine seed suppliers and agro-dealers.

Harmonization of regional seed policies

To support harmonization of regional variety release and registration policies, a high-level consultative workshop was organized for public and private stakeholders in the seed industry for Common Market for Eastern and Southern Africa (COMESA) countries in Nairobi from 13-14 December 2018. The workshop aimed at assessing the status of implementation of seed policy harmonization in the region, identifying policy implementation challenges and developing action plans for accelerating seed policy harmonization efforts for COMESA region. The Meeting attracted 85 delegates from 16 COMESA member states and concluded with a commitment to fast track domestication and implementation of the regionally harmonized seed regulations. A policy brief on “*Accelerating Seed Policy Harmonization: Key Challenges and Action Plans for COMESA*” was drafted for dissemination.

Value chain assessments

Considering that policy support efforts also seek to facilitate emergence of competitive commodity value chains, the Policy Enabler in 2018, commenced analysis of existing value chains, review and synthesis of



Dignitaries at the opening Session of the high level workshop on the Status of Implementation of Seed Regulations within the ECOWAS/UEMOA/CILSS region held in Dakar-Senegal

policies to propose interventions that can help create market incentives for farmers and agribusinesses. The small ruminant and poultry value chain assessments were conducted for Ethiopia, Mali and Nigeria. Based on these reviews the value chain constraints and gaps were identified and prioritized for further action. In addition, an analysis and review of performance of the cassava value chain were conducted in DRC as part of the Project’s goal of facilitating the emergence of competitive commodity value chains.

Moving forward

Value chain assessments for other existing commodities such as rice and maize are in planning. The analysis will include synthesis of policies that create market incentives for farmers and agribusinesses.

- Dr Francis Nang’ayo, Senior Manager, Regulatory Affairs





Fall Army Worm Pesticide Efficacy and Registration Trials (AFA-PERT) Project

Mozambique and Zambia on course to adoption of harmonised regulations for registration of bio-pesticides in SSA

Regulatory food safety standards across regional economic trading blocs in SSA are a major impediment to regional trade. While most countries in SSA have mechanisms to register pesticide products, some do not have any for the registration of bio-pesticides. This absence of registration and quality control mechanism opens loopholes for irregular registration and marketing of unproven products, exposing farmers to inferior products. Credible companies that have invested heavily in the development of quality products find it difficult to legally register and market their bio-pesticides products, giving way for the infiltration of unregistered and poor quality products in the market.

With support from the United States Department of Agriculture-Foreign

Agricultural Service (USDA-FAS), AATF embarked on initiatives to develop a regional bio-pesticide regulatory framework for Africa to guide the registration of bio-pesticides in SSA. The document, *A Guide to the Development of Regulatory Frameworks for Microbial Biopesticides in Sub-Saharan Africa* (the Guidance Document) was developed and is now available to guide the process of bio-pesticide registration in SSA and to standardise data requirements for product registration.

AATF is facilitating regional consensus building on registration frameworks for biopesticides in selected African countries. Through the process, the Guidance Document for registration of biopesticides was tabled for review and input by stakeholders. Zambia and Mozambique made progress towards its adoption during the year.



Participants to the Biopesticides Guidance Document National Technical meeting in Malawi

The Zambia Agricultural Research Institute and Zambia Environmental Management Authority convened a national technical review meeting on 4–5 April 2018 in Lusaka, Zambia consisting of ministry policy officials and representatives of the pesticides subsector and of research and academia to consolidate input and align the document to existing laws and regulations for adoption. The revised document is awaiting Ministerial approval.

In Mozambique, a national stakeholders' meeting was convened in November through the country's Registrar of Pesticides to review,

customise and align the Guidance Document with Mozambican laws for adoption.

Moving forward

Having undergone the final review processes in Mozambique and Zambia, AATF will continue working with USDA-FAS and the national regulatory authorities of the two countries to ensure that the Guidance Document is approved and used by the governments.

**– Francis Nang'ayo, Senior Manager,
Regulatory Affairs**



Supporting African Governments to Implement National Regulatory Reforms Governing Quality Seed Supply Systems Project

From policy to implementation: A new initiative to overcoming seed policy implementation hurdles

The Supporting African Governments to Implement National Regulatory Reforms Governing Quality Seed Supply Systems Project works with governments to institute policy and regulatory frameworks that are critical to driving accelerated and sustainable adoption of quality seed technologies.

During the year, the Project carried out extensive policy assessments in Ethiopia, Ghana, Malawi, Mozambique, Tanzania and Uganda that identified challenges impacting implementation, legislation, reform programmes and processes on seed policies.

While all the six countries surveyed had regulatory frameworks governing the seed

sub-sector, some inadequacies were noted with most countries lacking key policy instruments such as Seed Policy, Seed Strategy, Seed Act and detailed implementing regulations. In some countries, some of the policies were in draft form while in others they were lacking all together.

In Uganda for instance, it was observed that the National Seed Policy and Strategy exist as draft documents. Mozambique had no explicit seed policy. Similarly, Ghana did not have the Legal Instrument for regulating matters seed, making it difficult to effectively enforce the Plants and Fertiliser Act, 2010 (Act 203).

Other key impediments to moving these policies forward included limited enforcement



Participants to the Seed Policy National Stakeholders meeting held in Ethiopia

capacity including shortage of seed inspectors, poorly equipped seed testing laboratories, and limited stakeholder awareness on policy directives/decisions affected the seed industry.

Following the assessments, AATF held in-country validation workshops for Tanzania and Uganda. The outcomes of the workshops were two key documents: Strategic frameworks and action plans for implementation; and a policy communique that was endorsed by stakeholders for implementation.

Moving forward

Convening in-country validation workshops for the other four countries will be a priority for 2019. An interaction platform between AATF, stakeholders and governments will be established to ensure continuous monitoring, evaluation, feedback, and additional interventions to support governments and regulatory bodies in implementing proposed actions.

**- Francis Nang'ayo, Senior Manager,
Regulatory Affairs**



Financial Report 2018

These AATF standalone audited financial statements cover the period from January 2018 through December 2018 and provide comparative data for 2017 - the previous accounting period.

Funding overview

AATF main investors for the year 2018 were Bill & Melinda Gates Foundation; United Kingdom's Department for International Development; United States Agency for International Development; Syngenta Foundation for Sustainable Agriculture;

and African Development Bank through International Institute of Tropical Agriculture (IITA).

AATF has continued to receive sub-grants from CIMMYT, AGRA and IITA.

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 2018 (US\$)

	2018	2017
ASSETS		
Non-current assets		
Equipment and motor vehicles	175,558	27,529
Intangible assets	5,785	1,040
Investments in subsidiaries	444,319	-
Loans to group companies	435,221	-
	1,060,883	28,569
Current assets		
Contributions receivable	1,776,304	2,264,472
Other receivables	1,475,449	867,108
Cash and cash equivalent	10,479,562	8,001,806
	13,731,315	11,133,386
Total assets	14,792,198	11,161,955
Equity and liabilities		
Current liabilities		
Unexpended grant payable	6,994,880	4,619,035
Deferred income	146,569	24,483
Payables and accruals	1,730,453	1,283,186
	8,871,902	5,926,704
Equity	5,920,296	5,235,251
Total equity and liabilities	14,792,198	11,161,955

Statement of comprehensive income (abridged version in US\$) for the year ended 31 December 2018

	2018	2017
Income		
Grant income	15,371,075	21,335,873
Other income	1,453,924	1,038,158
Deferred income	-122,085	6,688
Total Income	16,702,914	22,380,719
Expenditure		
Project related expenses	13,494,694	19,934,801
Management and general expenses	2,897,712	2,351,118
Total expenditure	16,392,406	22,285,919
Surplus for the period	310,508	94,800
Percentage of management and general expenses to the total operating expenses	17.68%	10.55%
Percentage of project related expenses to the total operating expenses	82.32%	89.45%
	100%	100%

Financial status

The funding received/available income as at 31 December 2018 was adequate for AATF's needs for the year as all expenditures were fully catered for. The organisation's finance is healthy.

AATF recorded a net surplus for the year ended 31 December 2018 of \$310,508. This represented an increase of 227.54% from the net surplus of the prior year of \$94,800. However, the organisation's revenue decreased by 25.37% from \$22,380,719 in the previous year to \$16,702,914 for the year ended 31 December 2018. This is not alarming as this

was majorly due to the fact that a number of key projects that came to an end during the year were renewed/extended after gaps of a few months between the end of the projects and the extension. This led to a significant decrease in grant income. The cash flows from operating activities increased by 122.47% from \$(1,303,792) in the prior year to \$292,944 for the year ended 31 December 2018.

The future is promising with AATF's continued support from the main donors and the opportunities to get new funding from both the existing donors and potential donors.

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The Innovation Hub



Jeremy T. Ouedraogo
Director, African Biosafety Network of
Expertise (ABNE)



Denis T Kyetere
Executive Director, AATF

Staff 2018

Executive Director's Office

1. Denis T Kyetere, Executive Director
2. Alhaji Tejan-Cole, Director of Legal Affairs
3. Sofia Tesfazion, Director Resource Mobilisation
4. Nancy Muchiri, Senior Manager, Communications and Partnership
5. Daniel Otunge, OFAB Project Manager
6. Peter Werehire, Publications and Websites Officer
7. Monica Ndoria, Regional Advocacy Coordinator
8. Jacqueline Kinyua, Executive Assistant to the Executive Director
9. Jane Achando, Legal Officer
10. Everlyne Situma, Project Communications Officer - WEMA
11. Caroline W. Muchiri Associate Legal Officer
12. Suleiman Okoth, Programme Officer - OFAB
13. Nancy Juma, Corporate Communications Officer
14. Josephine Mailu, Head of Human Resources
15. Ruth Rotich, Monitoring and Evaluation Officer

Technical Operations Department

16. Emmanuel Okogbenin, Director Technical Operations
17. Francis Nang'ayo, Senior Manager, Regulatory Matters
18. Sylvester Oikeh, Project Manager, WEMA
19. Kayode Abiola Sanni, Project Manager, Rice
20. Issoufou Kollo Abdourhamane, Project Manager, Cowpea
21. Caroline Thande, Administrative Assistant
22. Francis Onyekachi Nwankwo, Programme Officer - West Africa
23. Caleb Obunyali, Programme Officer - WEMA
24. David Tarus, Programme Assistant
25. Edgar Wavomba, Seeds2B Project Coordinator
26. Abed Mathagu, Programme Officer - Regulatory Affairs
27. Edith Kouko, Project Officer
28. Alex Kariuki, Information Systems Officer

Commercialisation Department

29. Donald Mavindidze, Director Commercialisation
30. Gospel Omany, Senior Manager - Projects Management
31. George Marechera, Business Development Manager
32. James Okeno, Product Stewardship Manager
33. Jonga Munyaradzi, Seeds Production Manager
34. Peter Musyoka, Programme Officer - Seed Systems
35. Grace Muinga, Programme Officer - Business Development
36. Oluseun Bolarinwa, Programme Officer - Seeds
37. Samuel Angwenyi, Project Assistant - Deployment
38. Jovita Joachim Nsumilinda, Project Officer
39. Ayodele Omowumi, CAMAP Project Coordinator

Finance and Administration Department

40. Moussa Elhadj Adam, Director Finance and Administration
41. Nancy A. Okita, Senior Administrative Assistant
42. Amos Kimebur, Accounting Officer
43. Maurice Ojow, Project Accountant
44. Fatuma Wario, Administrative Assistant/Events Coordinator
45. George Njogu, Driver
46. Gordon Ogutu, Protocol/Liaison Assistant
47. Paul Oni, Associate Administrative and Finance Officer
48. Fredah Nyaga, Accountant
49. Simeon Eze Driver, Abuja Office

Acronyms

AfDB	African Development Bank
AGRA	Alliance for a Green Revolution in Africa
ARC	Agricultural Research Council
ARCN	Agricultural Research Council of Nigeria
BMGF	Bill and Melinda Gates Foundation
CAMAP	Cassava Mechanisation and Agro-processing Project
CFT	Confined field trial
CIAT	International Centre for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Center
COMESA	Common Market for Eastern and Southern Africa
DRC	Democratic Republic of Congo
EIAR	Ethiopian Institute of Agricultural Research
FAW	Fall Armyworm
HEAL	Hybrids East Africa Limited
IAR	Institute for Agricultural Research
ICT	Information, communication and technology
IITA	International Institute of Tropical Agriculture
INERA	l'institut de l'Environnement et de Recherches Agricoles
KALRO	Kenya Agriculture and Livestock Research Organization
KEPHIS	Kenya Plant Health Inspectorate Service
MLN	Maize Lethal Necrosis
NARO	National Agricultural Research Organisation
NEWEST	Nitrogen-Use Efficient, Water-Use Efficient and Salt Tolerant Rice Project
NPT	National performance trial
ODK	Open data kit
OFAB	Open Forum on Agricultural Biotechnology in Africa
PASTTA	Partnership for Africa Seed Technology Transfer Activity
PBR	Pod Borer Resistant (Cowpea Project)
QBS	QualiBasic Seed Company
Seeds2B	Seeds to Business
SSA	Sub-Saharan Africa
TAAT	Technologies for African Agricultural Transformation
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USDA-FAS	USDA Foreign Agricultural Service
WEMA	Water Efficient Maize for Africa





AATF

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