Special feature

Dealing with the Fall Armyworm on the farm P18

Why the seed sector must focus on benefits sharing treaty P17

Newer seeds to drive growth in Africa’s agriculture sector F26

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African Seed Trade Association is a not-for-profit membership association formed in 2000 to champion interests of private seed companies in Africa. It is registered in Kenya as an International Organization with an office for West Africa in Dakar, Senegal. Currently, the Association has about 100 members comprising seed companies and National Seed Trade Associations, among others.

Mission
To promote trade in quality seed and technologies in Africa for the benefit of members and farmers

Vision
To be the principal organization at the centre of achieving sustainable food security through use of quality seed for improved livelihoods in Africa

Objectives
The objectives of AFSTA are to:
1. Promote the trade in quality seeds;
2. Strengthen communication with African seed industries and with the world;
3. Facilitate establishment of national seed trade associations in Africa;
4. Provide information to members;
5. Interact with regional governments and NGOs involved in seed activities in order to promote the interests of the private seed industry;
6. Promote activities that lead to regulatory harmonization throughout Africa to facilitate movement of seed; and
7. Develop a statistical database on African seed production and trade.

Cover Photo Credit: Clifford Akumu, Talk Africa and Sketch Solutions Limited

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SEEDS OF SUCCESS
Allow me to congratulate AFSTA for consistently producing the African Seed Magazine annually for the fourth year running. This achievement resonates with our resolve at AFSTA to enhance communication to our members who are the core of our mandate.

Even as we continuously provide up to date information to our membership, we are obliged, through this magazine and other communication tools, to tackle issues that are at the heart of our industry.

For many years, our work has been tethered around debates shaping our sector mainly emanating from our trading environment. Take for instance the case of intra-African trade: you will agree with me that this debate could impact our work. Pundits point out that the volumes of trade amongst us are painfully low. This does not augur well for our economic well-being. While some say it is 10 percent, others say it is underestimated because it could be more than that, and put it at 12 percent. All the same, in the context of global trade, intra-African trade accounts for only about 3 percent.

According to the African Trade Policy Centre (ATPC) of the United Nations Economic Commission for Africa (UNECA), global trade (in current prices) increased from $13 trillion in 2000 to an estimated $30 trillion in 2010. Africa’s share of world trade has been on a downward spiral since 1980 and currently stands at about three percent.

In comparison, in 2009, intra-European trade stood at 7 percent, intra-Asian trade was 52 percent and intra-North American trade was 48 percent. Intra-South and Central American trade was 26 percent but intra-African trade was 11 percent which represented about $170 billion.

Africa produces large amounts of raw materials, which are exported as primary products. Available data shows that the high concentration of African exports in primary products are made up of agricultural and food products. Primary products account for 36%, other industrial products stand at 35% with service said to be contributing 79%.

Dr. Benedict Oramah, the President of the African Export-Import Bank (Afreximbank) last July told the Ghana Business News, that the size of intra-African trade could be doubled from the current level of about $170 billion per year to almost $400 billion by addressing the issue of availability of market information on the continent.

But one other issue that Dr Oramah raised, and which makes our magazine and indeed association very relevant, is the fact that lack of knowledge of the continent and limited access to trade information among African businesses constitutes major constraints to cross-border trade.
All AFSTA meetings bring together competitors in the seed trade to discuss industry concerns. Therefore, it is absolutely necessary to comply with national and international antitrust laws. Whereas some activities among competitors are both legal and beneficial to the industry, such gatherings of competitors are inherently treated as suspect under most antitrust laws. Antitrust laws do not require agreements or combinations among competitors to be necessarily formal in order to raise questions. It may include any kind of formal or informal understanding, secretive or public, under which each of the participants can reasonably expect that another will follow a particular course of action.

All participants in any AFSTA meetings are responsible for ensuring that topics, which may give an appearance of an agreement that would violate any antitrust law, are not discussed. It is the responsibility of each participant to avoid raising improper subjects for discussion. These guidelines have been prepared to ensure that participants in any AFSTA meeting are aware of their obligations.

The dos and don’ts presented below highlight only the most basic antitrust principles. Each participant in any AFSTA meeting should be thoroughly familiar with his or her responsibilities under antitrust laws and should seek counsel for specific situations, interpretations or advice.
Meetings, Dos & Don’ts

Dos

1. Have a written agenda and adhere to it for all meetings.
2. Prepare minutes of all meetings and object if they do not accurately reflect discussions and actions taken.
3. Consult with legal counsel on all antitrust questions relating to meetings.
4. Protest against any discussions or activities which appear to violate the antitrust laws; disassociate yourself from any such discussions or activities and leave any meeting in which they persist.

Don’ts

1. Do not, in fact or appearance, discuss or exchange information regarding products or services, including,
   (a) Individual company prices, price changes, price differentials, mark-ups, discounts, allowances, credit terms, etc., or data that bear on price, such as costs, production, capacity, inventories, sales, among others.
   (b) Industry pricing policies, price levels, price changes, differentials, among others.
   (c) Changes in industry production, capacity or inventories.
   (d) Bids on contracts for particular products and services; procedures for responding to bid invitations.
   (e) Plans by individual companies concerning design, production, distribution or marketing of particular products, including proposed territories or customers.
   (f) Matters relating to actual or potential individual customers or suppliers that might have the effect of excluding them from any market or of influencing the business conduct of firms toward such suppliers or customers.
2. Do not discuss or exchange information regarding the above matters during social gatherings incidental to meetings, even in jest.

In our effort to provide comprehensive, factual and up-to-date information on seed issues in Africa, we have, in this fourth edition of The African Seed Magazine, dedicated nearly ten pages with technical information on the spread and impact of the Fall Armyworm (FAW).

The FAW is a moth that causes devastating damage to almost 100 plant species, including sorghum, rice, wheat and sugarcane. It thus threatens food and nutritional security, trade, household incomes and overall economies. This devastating moth spreads very fast – in its adult stage it can cover over 100 kilometres in a single night. The pest is also capable of laying hundreds of eggs, with the emerging larvae burrowing into crops, destroying and eventually killing the plants.

Estimates from research in Benin, Cameroon, Democratic Republic of Congo, Ethiopia, Malawi, Mozambique, Nigeria, Uganda, Tanzania and Zimbabwe indicate that the potential impact of FAW on maize yield lies between 7.2 million and 17.9 million tonnes annually, with losses estimated at, $2,218m and $5,518m per year. The Centre for Agricultural and Biosciences International (CABI) projects losses of Africa’s maize crop at US$ 3 billion in the coming year.

It is vital to generate massive awareness amongst farmers on early detection signs, so that infestations are tackled early and swiftly. Farmers also need to know exactly what they need to do - which pesticides are effective, and how they need to be applied. They also need to access supplies, and may require support in applying control measures rapidly enough.

The African Seed Magazine is a great platform for all of us to engage and share ideas on how the seed sector can confront the various challenges that surround seed production and trade.

I thank all authors of the articles, partners, advertisers, the AFSTA Board and all who actively participated in the production of the magazine.

Word from the Secretary General

Mr. Justin Rakotoarisaona
Secretary General | AFSTA

The African Seed Magazine
Known-You Seed is a professional seed company engaging in breeding, production and marketing of hybrid vegetable seeds for nearly 50 years. Our crop range covers most of cucurbit, solaniceae, sweet corn, papaya and also crucifers. Our sales network covers around 90 countries around the world.

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PAPAYA
"RED LADY"
The oft-told story of the seed sector in Africa is one fraught with challenges. No little wonder that the continent cannot even grow enough food for her people.

It is thus incumbent upon players in the sector to engage more visibly than they have ever done. This, even as they push governments to keep their many promises. Such industry engagements must aim to ensure that seed companies, who are major taxpayers in many African countries, hold political and business leaders to account by measuring their actions against promises.

Bottlenecks that bedevil the sector, could, for example, be slain if political leaders kept their word sprouting from their meetings. This includes the renewed commitment in June 2017 for African countries to allocate at least 10 percent of their national budgets to agriculture. Whenever agriculture is neglected, there is always the risk of malnutrition, which, in the words of Kofi Annan, Chair of the Africa Progress Panel, ‘represents political failure’.

Many smallholder farmers in many parts of Africa produce fruits and vegetables alongside their staple foods – such as cereals, tubers and roots. Yet, farmers still lose more than 50% of their crop due to lack of cold storage facilities.

The UN Food and Agriculture Organization (FAO) estimates that one third of the food produced in the world for human consumption (approximately 1.3 billion tonnes) gets lost or wasted. Thus, there is urgent need for post-harvest handling facilities for both horticultural produce as well as cereals.

Technology holds huge opportunity for addressing these challenges. Drone technology is the new fad. Drones (or Unmanned Aerial Vehicle) are revolutionizing agriculture. Use of remote sensing in agriculture, in essence, drones for Precision Agriculture, farming, pest management and crop management, is exploding worldwide. The seed sector in Africa should therefore keep authorities on their toes so that such valuable technology does not leave behind any country on the continent.

If that were to be done, many farmers and seed producers could benefit from enhanced sustainable agricultural development and food security through improved use of ICTs.

With two thirds of Africans dependent on farming for their livelihoods, boosting agricultural production on the continent will no doubt have significant trickle-down effects. This includes creation of economic opportunities, reducing malnutrition and poverty, and generating faster, fairer growth.

That African farmers need more sustained investment in infrastructure, better access to financial services such as loans, as well as quality inputs including seeds and fertilizers, is a fact that need not be labored but rather acted upon. Its yield is in the millions of jobs.

Sadly, neglecting these issues has allowed inequality on our continent to persist and accelerate. Africa currently imports food worth US$35 billion each year. Not that African farmers cannot produce enough food and earn this money. The continent could – and should – be feeding itself and other regions too.

Recent discussions at high level meetings on agriculture hold it that it is indeed possible to change the fortunes of African agriculture. Similarities have been drawn between Africa’s agriculture and changes in the telecommunications sector from the turn of the millennium, that have been described as “possibly the greatest modern revolution this continent has ever seen”. Africa’s agriculture sector should seize the moment!
Q: From your perspective, how has the seed industry in Africa evolved over this period?
A: I am delighted by the research work that has been undertaken to mitigate the impact of climate change. However, more needs to be done to avail water and nitrogen efficient varieties, which are climate change smart innovations. It is a little disappointing that Africa still reels from weak agronomic practices that have not taken advantage of available hybrids for better yields. Poor agricultural practices, sadly stifle gains made in research. We celebrate the fact that research periods have been shortened using technologies such as Marker Assisted Selection (MAS), Double Haploid, among others. The human resource in the agricultural field has continued to grow with competent, technologically savvy, technically minded young graduates that have made huge contributions towards transforming how breeding is done in Africa. We celebrate the fact that research periods have been shortened using technologies such as Marker Assisted Selection (MAS), Double Haploid, among others.

The human resource in the agricultural field has continued to grow with competent, technologically savvy, technically minded young graduates that have made huge contributions towards transforming how breeding is done in Africa. Today, we are witnessing mergers and acquisitions; besides, we in COMESA are almost beginning to enjoy what implementation of seed harmonisation regulations can offer in the region.

Q: Looking back at your tenure as the President of AFSTA, are there some milestones, events or issues that stand out for you?
A: As the President of AFSTA, I ensured that the Board took very strong and close interest in responding to the needs of our members from both African home grown institutions and associations from across continents. This included ensuring that we reached out to international seed associations. A large number of our membership wanted formation of Special Interest Groups (SIGs) to tackle issues specific to field crops and vegetables. We listened to them and today SIGs are delivering to them results. The formation of SIGs is my brainchild. In our journey, we have met and worked with great minds such as Jacqueline Hughes and her work at Word Vegetable Centre (AVRDC); John McRoberts, a renowned breeder; Calvin Fambisai and Jitu Shah, a past AFSTA President. Our African Seed Magazine, born during Mr Shah’s era, has continued to grow from strength to strength. As President, I paid close attention to this communication platform that is supported by a dedicated staff. Today, it is a publication that our members look forward to. The fact that we are already knocking at the doors of the World Bank and USAID means that we have begun talking to the right partners to fund our projects. That seed is already planted and it is my hope that the next President will take advantage of the inroads we have made and take it to the next level of engagement.

Another milestone during my tenure, was a skills audit we undertook of the Secretariat. We wanted to determine gaps in terms of our human resource so as to take measures of addressing them in order to achieve more from our Secretariat. The growth of the annual congress in terms of numbers and revenue is yet another milestone that cannot go unmentioned. This growth was manifested by taking AFSTA back to West Africa after so many years and breaking even in terms of interest, enthusiasm and ‘return on investment’ displayed by the seed sector from the West Africa seed players.

Interview
Interview with AFSTA Out-going President, Mr Denias Zaranyika

Q: Please tell us about your experience and involvement in the seed industry.
A: I have been in the seed industry for the past 24 years, initially with Cargill (now part of Monsanto) before joining Seed Co – the African Seed Company. Throughout my career, I have yearned for a continent filled with top quality seed. I have been involved in strategic management and this has given me the exposure and knowledge critical for leading an institution like AFSTA.

I have served on the AFSTA board for the past seven years, two of them as Vice President and now step down from the Presidency after being at the helm for two years. These roles have no doubt significantly contributed to the growth and transformation of AFSTA. My passion and drive emanate from a strong belief that the strongest pillar for the growth of seed companies rides on the productivity and returns of farmers.

I strongly believe that farmer insights during on-farm trials for new varieties in suitable agro-ecological zones, supported by strong agronomic practices are the cornerstones of agricultural growth. Strong analyses of the seed value chain enable seed companies to formulate sustainable strategies, thus R&D approach should always be market and technology driven.
I am proud to have given AFSTA thought leadership… which looks at both the African and global seam to help formulate strategies that lead to seed security in Africa and help address the intended goal of food security. This has been manifested in the formulation and implementation of the five year strategy. Unlike many strategies that rot in drawers, the roll out of our 5-year strategy means that we are practically confronting and addressing some of the challenges facing the African Seed Sector.

A: My milestones go beyond my Presidency at AFSTA. These include:

- The founding of Zimbabwe Seed Trade Association (ZSTA) as a national seed trade association
- Founder of the Special Interest Groups (SIGs)
- As head of the Communication and Advocacy Committee we started to document and publish the history and activities of AFSTA first in 2014 – when we published the African Seed Story which gave way to the African Seed Magazine.
- Presided over the third Strategic Plan for AFSTA which introduced new and fresh thinking in terms of making the board more involved in the running of the Secretariat and leading a team to a learning visit in the USA – to share experiences with our counterparts in the US about how they have sustainably run their association for over 100 years.

Q: What would be your recommendations for the seed sector in Africa?

A: To me, Africa is the growth continent hence seed companies must position and align themselves to this growth. However, Africa remains the net importer of seeds – we must work on addressing this scenario to facilitate increased inflows of foreign currencies in Africa. This continent needs to take up and adopt new technologies like yesterday. AFSTA membership must continue to invest in farmers and in technologies that give them the best seed – which are drought and insect-pest tolerant.

Focus should be on building the capacity of National Seed Trade Associations (NSTAs) as the mouth piece of the seed sector at the national level. Belonging to AFSTA is a rewarding adventure hence there is need for those countries – and they are 27 in number - which are not yet on board at AFSTA to join us to add more voices to the cause of the seed sector in Africa. A united front will yield into working together to cobble solid plans and help source funding that will support growth and expansion of seed associations.

Africa’s growth is as good as the growth of its members and strong interaction should always form the core of relationships within the association in line with its mission and vision.

I want to see conversion of farmers who use retained seeds to massive use of certified seeds that have gone through rigorous R&D testing and field trials. This, to me, is the real deal. The seed sector provides a fertile ground for the growth of African economies. My call is therefore a timely one for a reality check. A harsh reminder of this is just one statistic from the recently published report, ‘The Jobs Gap: Making Inclusive growth work in Africa’. It highlights several countries in Africa that are struggling “to transform their economies fundamentally and generate inclusive growth”. The reason being that policies “have often failed to coalesce around a single, workable plan for inclusive growth”.

Africa will face a shortfall of 50 million jobs by 2040, thus putting at risk the stability of some countries. Africa must therefore grab its chance to exploit the USD73 billion worth global seed sector of 2021 to make meaningful contribution and partly provide jobs to its citizenry. More efforts should be channelled towards converting the generality of our farmers to massive use of certified seeds and combining it with GAPS to enhance productivity as a way of pushing production costs down as yields go up. The approach is double barrelled whilst results are twofold. These two are the real deal for both seed houses and the generality of our farmers.

Challenges facing the seed industry are not insurmountable if partnerships for sharing research and knowledge are explored. AFSTA should continuously embrace, support and actualise the CAADP principles to steer agriculture led development; wealth and job creation as well as empower women. This goes hand in hand with our adoption of Africa Union’s aspirations of making Africa a strategic player and beneficiary in agricultural science and technology development.

Finally, may I end by saying that AFSTA needs to hold special sessions with parliamentarians in each country so that they can push our issues to the highest level in their parliaments.
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AFSTA story in figures

- 26 Affiliated National Seed Trade Associations
- 4.3m The number of visitors to our website
- 50 Countries at Congresses
- 4000 number of delegates at AFSTA congresses
- 11 Projects implemented
- 114 Active Members
- 18 Congresses held by AFSTA since inception
Vegetable seeds for professionals

Bejo Zaden: leading in seeds.
Specialists worldwide in the food chain choose vegetable seeds from Bejo.
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Five years ago, AFSTA launched the Special Interest Groups (SIGs) under the coordination of AFSTA's Technical Officer, Ms Grace Gitu. Last month, the African Seed Magazine crew caught up with Ms Gitu in her office as she was putting last touches on the 19th AFSTA Congress. Below are the excerpts from questions we fielded to her.

ASM: Having been at the heart of AFSTA Special Interest Groups since formation in 2013, do you think there is growth in SIGs?
Ms Gitu: First and foremost, AFSTA is obliged to offer service to its members and the establishment of the SIGs was a step towards members’ service. It was gratifying to see AFSTA members embrace overwhelmingly the SIGs initiative, on its launch 5 years ago, with the registration of the first 30 members. Today SIGs membership has grown to 100 members and the growth continues. This growth is in itself a huge achievement seen in terms of numbers, but also in terms of the increasing number of requests from members not just on issues of common interests to be addressed by the SIGs.

ASM: What do you see as the role of SIGs to AFSTA members?
Ms Gitu: Our platform offers members a platform to share knowledge, experiences, provide solutions to problems and network widely on issues pertaining to trade of seeds of crops of their interest. Two SIGs of Vegetables (SIGV) and Field crops (SIGFC) exist at AFSTA.

ASM: In your own words, what are the benefits of this group?
Ms Gitu: The SIGs bring together AFSTA members with interests in specific crops to identify and recommend solutions to issues that impact on seed trade in Africa and beyond. Over the years we have witnessed stakeholders share seed trade knowledge and experiences that have contributed significantly to seed business opportunities and solutions to critical trade issues on the continent.

Away from that, identification and facilitation of specific relevant seed research areas desired by our members has formed the crux of our very existence. Such kind of interactions often yield leveraging and influencing of policy change for better trading environment through group action. We are proud of the fact that some of our members share non-exclusive seed information for the benefit of their work.

ASM: We know that under your coordination, the SIGs are spearheaded by two steering committees. Tell us about these committees.
Ms Gitu: Yes, it is true that we have established two effective steering committees to spearhead the activities of Special Interest Groups on Vegetable (SIGV) and another is on Special Interest Groups Field Crops (SIGFC). Upon formation, each SIG, elected a steering committee to spearhead activities of common interests as presented by members, and report back to members in the annual meetings held during the AFSTA congresses. Issues of common interests to the SIGFC have over the years been on management of Maize Lethal Necrosis Disease in East Africa, addressing climate change and its impacts on the seed industry, biotechnology concerns in Maize, Cotton, Soya Beans, etc., and phytosanitary concerns in seed movement have also tended to shape discussions of this group.

The International treaty multilateral system (MLS) through Standard Material Transfer Agreement (SMTA) and on benefits sharing (ABS), under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), has also been a key concern for this group. Add to it low adoption of seeds of improved varieties, market attraction of sorghum and millet plus slow variety release processes in various countries, then you have an almost full plate of issues to tackle.
that most African countries have weak or no regulations country phytosanitary measures applied considering. Besides, we want to see establishment of country by Special Interest Groups on Vegetables membership. Involvement and interests are close to the hearts of contaminants and food preparation methods. Africa arbitrations. Further headache comes from hazardous to be addressed urgently as well as Trade ethics and management and marketing form a pair of problems demand for vegetables on the continent. Postharvest the growth requires fast tracking to meet the high sector in Africa is in its infancy but growing and inadequate quality seed availability and production issues both biotic and abiotic. The vegetable seed sector in Africa is in its infancy but growing and the growth requires fast tracking to meet the high demand for vegetables on the continent. Postharvest management and marketing form a pair of problems to be addressed urgently as well as Trade ethics and arbitrations. Further headache comes from hazardous contaminants and food preparation methods. Africa vegetable Seed market analysis in terms of value and trend also is critical to the industry. Stakeholders’ involvement and interests are close to the hearts of Special Interest Groups on Vegetables membership. Besides, we want to see establishment of country by country phytosanitary measures applied considering that most African countries have weak or no regulations governing vegetables seed trade.

The group seeks to collaborate with all relevant vegetables stakeholders to come up with the appropriate regulatory framework that allows for safe and efficient vegetable seed trade in Africa. Given that seeing is believing, the group’s steering committee seeks to make site visits to key associations such as ASTA, APSA, EU etc. We recognize them as giants and so we want to stand on their shoulders and see as far as they see and probably farther than them.

ASM: One can see, the concerns of the SIGFC are quite handful. What have you done demonstrably to tackle these issues?
Ms Gitu: From the time we began, we have been holding conference calls, face to face meetings and most importantly, we have held three consortia where we have had presentations and discussions on Climate Change and Impact on Field Crops Production in Africa, MLN Management in Eastern Africa and on Biotechnology Consolidated Information Related to Field Crops Production in Africa.

Other topics we covered are Seed Trade Opportunities in Dryland Field Crops, Experiences in Field Crops Seed Trade under International Seed Regulations; Regional Seed Certification: Challenges and Opportunities in Africa and Prospects of Rice Production in Western Africa. All these presentations are available electronically as well as on the AFSTA website for those interested. The theme on the consortium has been Expanding Access to Market and Investment in Seed Business of Field Crops in Africa. We are indeed grateful to the very experienced speakers who have graced our consortia held within the precincts of the AFSTA Annual Congress.

ASM: Thank you for articulating the functionality of the SIGFC. Could you now tell us what makes the other group, Special Interest Groups on Vegetables to gel for nearly five years now?
Ms Gitu: Indeed. Like their counterparts in field crops, this group on vegetables is out to slay issues around inadequate quality seed availability and production issues both biotic and abiotic. The vegetable seed sector in Africa is in its infancy but growing and the growth requires fast tracking to meet the high demand for vegetables on the continent. Postharvest management and marketing form a pair of problems to be addressed urgently as well as Trade ethics and arbitrations. Further headache comes from hazardous contaminants and food preparation methods. Africa vegetable Seed market analysis in terms of value and trend also is critical to the industry. Stakeholders’ involvement and interests are close to the hearts of Special Interest Groups on Vegetables membership. Besides, we want to see establishment of country by country phytosanitary measures applied considering that most African countries have weak or no regulations governing vegetables seed trade.

Another grey area is our inability to get funding to develop a seed database. You would of course see that our challenge is basically lack of money which is the reason why we do not carry out projects proposed by members and crucial outreach programs.

ASM: Thank you for your time.
Ms Gitu: You are welcome and thank you too for your interest in our work.
“How can biotechnology help us in fighting the Fall armyworm? With the cotton story filling our ears, what do we need to accept and adopt genetically modified organisms?”

When I heard these questions from the floor during our December meeting with seed companies in Burkina Faso, I knew that our small seed companies had finally come of age. In fact, the issue in Burkina Faso, among the members of ANES-BF was no longer the definition of GMOs and the controversies surrounding it; but how we can fast track commercialization of crops under confined field trials such as cow pea and maize in Burkina Faso.

The Burkinabe environment has been one of great concern because the GMOs issue in the country has been on the news headlines for all the wrong reasons.

During the Association Nationale des Entreprises Semencieres du Bukina Faso (ANES-BF) engagement one could not help but agree with the seed merchants’ clear stand that the time for adopting GM technology was nigh, notwithstanding their government’s stand due to debatable fortunes of bt cotton in the country.

A few key concerns linger. What are the yields of the bt cow pea? How can we, as members of ANES-BF, access the seeds? When does the variety reach farmers? How do we make the best out of the cotton issue to our advantage and for smooth trading in GM technology?

During the Association Nationale des Entreprises Semencieres du Bukina Faso (ANES-BF) engagement one could not help but agree with the seed merchants’ clear stand that the time for adopting GM technology was nigh, notwithstanding their government’s stand due to debatable fortunes of bt cotton in the country.

Mr. William Kotey from Ghana giving a speech last July in Accra, Ghana about the role of Seed Associations in enhancing seed quality

“Progress: Biotech program has grown from strength to strength

By Aghan Daniel I daghan@afsta.org

Mr. William Kotey from Ghana giving a speech last July in Accra, Ghana about the role of Seed Associations in enhancing seed quality

In the words of Jonas Yogo, the President of the Burkina Association, the wait for relevant GM seed can no longer be postponed.

Similar sentiments are held in Ghana where the National Seed Trade Association of Ghana (NASTAG) will support efforts by the Authorities to introduce GMO crops to the country under strict regulations. They say the technology is crucial to help farmers deal effectively with pest attacks and impact of climate change thus accelerating the development of the agricultural sector.

“At the moment, confined trials are being carried out on three crops (cowpea, cotton and rice) results are yet to get into the public domain,” said president of NASTAG, Thomas Havor. He dismissed concerns that the GMO crops are harmful and could damage the health of consumers.

“The hesitancy about adopting GMOs is only because people do not understand it. But there is nothing unsafe about it,” he noted.

GMOs have come to stay. With cowpea, farmers have to spray five times before harvest. Whereas with the Maruca resistant GMO Cowpea, they only need to spray twice. And the production of cowpea is higher because GMO has brought down the destruction of cowpea pods,” President of the Seed Producers Association of Ghana Patrick Osofo Apullah told Joy News in an interview. “It has reduced the hazardous way farmers work. GMOs reduce the burden of farmers. They are no longer spending so much on chemicals,” he explained.
Following the passage of the Biosafety Act 2011 by Parliament, the Council for Scientific and Industrial Research (CSIR) has been undertaking field trials for GM cotton, cowpea and rice as part of regulatory procedures before introduction into the market. Researchers have announced the GMO cowpea will be ready for release into the market in 2019, following successful field trials.

Across the border, into Nigeria is a mixed grill. Our engagement with the Seed Entrepreneurs Association of Nigeria (SEEDAN) has been fruitful. For the first time, we were able to engage directly with the giant association members flanked by their own Nigeria Seed Council in a meeting which brought together two strongly opposing sides to the GM technology. At the end of the meeting, the seed companies agreed that they could no longer wish away commercialization of GM seeds and hence have to prepare for a smooth take off.

They urged the scientists to periodically share with them accurate and timely information to enable them make informed choices. They noted that the time to discuss the pros and cons of the technology were long gone and they have to start engaging effectively with the government through the Seed Council and the Ministry of Agriculture.

They urged the NBMA to invite the minister for an on-site visit to the on station trials as a way of exposing him to the processes and promises of the technology. They felt this would work magic since seeing is believing.

On their part, and as they have repeatedly stated over the past three years, seed companies in Malawi want the government to support their bid to trade in Genetically Modified Organisms as one way of increasing international trade within the continent.

Through their parent organization, the Seed Trade Association of Malawi (STAM) the traders want strategic partnerships to increase Malawians’ awareness of the importance of cultivating genetically modified crops.

The call came following increased cases of pests that are destroying crops countrywide, threatening farmers’ livelihoods and the nation’s food security.

Speaking during a consultative meeting organized by the African Seed Trade Association and the Seed Trade Association of Malawi (STAM) held in Lilongwe last June, Nessimu Nyama, Secretary of STAM, noted that time for commercialization of GMOs had come and that government needs to move fast and state its position on the technology to let trade thrive in it.

The seed companies noted that as farmers prepare to start commercial cultivation of Bt cotton, it was time they started to discuss how it will co-exist with conventionally grown cotton.

Trials on genetically modified crops have been done on cassava, bananas, cowpeas and cotton.

According to Nyama, the seed sector in the country stands to reap big in the projected $73 billion global seed industry (by 2021) if the government spoke out in support of the technology besides supporting the seed companies efforts. “Given that Africa only contributes two percent of the global seed industry, Malawi, endowed with good weather and soils, could take advantage and grow more for export than for local consumption,” said the secretary.

“For instance looking at cotton, there are a lot of diseases and pests attacking the crop so there is need to have new technologies that will eradicate these challenges and make the crops heather. Every technology comes with merit and demerits so people have to be sensitised,” he said.

On her part, Dr Wezi Mkwaila, a senior lecturer in the department of horticulture at the University of Agriculture and Natural Resources (LUANAR) said that Malawi no longer discusses biosafety issues because the country is soon commercializing GMOs.

The discussion now is on co-existence. She added that all precautions have been taken to ensure that small holder farmers who do not plant GM cotton are protected from GMOs. She also added that Malawi is adequately equipped to start using GMOs.

The hesitancy about GMOs is only because people do not understand it. But there is nothing unsafe about it.

The author is the Communication Officer, AFSTA.
The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) has put in place a Multilateral system that facilitates access to a global pool of genetic resources to potential users in the Treaty’s ratifying nations for research, breeding and training for food and agriculture.

Those who access genetic materials through the multilateral system agree to share benefits from their use through Access Benefit-Sharing (ABS) mechanisms established by the Treaty. Under the Treaty, member countries apply Multilateral System (MLS) and Standard Material Transfer Agreement (SMTA) to access over 64 important food and forage crops from a global gene pool of plant genetic resources which can be shared cooperatively by all members.

Last year, AFSTA and representatives of the International Seed Federation (ISF), joined a global forum to present its members’ views on the future direction of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

The meeting, which brought together 144 member countries, observer nations, farmers’ groups, NGOs, experts, and other international organizations was hosted by Rwanda in Kigali, the Seventh Session of the Governing Body of the ITPGRFA from 30 October - 3 November 2017.

In his opening ceremony speech, ISF President Jean-Christophe Gouache expressed the seed sector’s wholehearted support for the Treaty and its MLS as the preferred tool to access and share the benefits of genetic resources, and called for “a system that serves the many, and not the few.”

“A declaration signed by 41 seed companies on a voluntary contribution to the benefit-sharing fund provide further substantial evidence of the seed sector’s continued commitment to the Treaty. What we need now is to move towards a multi-access benefit-sharing system that makes sound business sense, and meets some critical legal and economic conditions,” said Mr Gouache.

But why should the seed companies be interested in this Treaty? The seed sector plays a key role in the exchange of genetic resources towards provision of improved crop varieties that offer resistance to pests and diseases, and adaptable to the effects of climate change thus contributing to better nutrition and livelihoods of communities. Breeders from the private and public sectors and farmers are continuously exchanging plant genetic resources to improve crop production. It is estimated that over 800 samples of plant genetic resources are exchanged daily.

Only countries that are signatory to ITPGRFA can apply the Multilateral System (MLS) in accessing genetic resources. By signing to the Treaty, countries agree to make available, through MLS, their genetic diversity and related information on crops stored in their gene banks. This cuts down the time and cost for breeders to negotiate contracts with individual gene banks.

All countries in Africa are already contracting parties to the treaty except South Africa, Botswana, Mozambique, South Sudan and Somalia. Countries are also required to take measures which will protect and promote “Farmer’s Rights” on; traditional knowledge associated with plant genetics resources, promoting “farmers’ rights” to participate in decisions directly related to genetic resources. The “farmers’ right” also intends to ensure that farmers’ are the beneficiaries from the conservation and sustainable use of genetic resources.

The treaty further affirms the importance of a farmers’ right to save, use, exchange and sell farm saved seed, but also acknowledges that such decisions rests with the national authority of each individual contracting member. As such, implementation of the “Farmers’ Right” may differ between various contracting parties of the ITPGRFA. By accessing genetic materials through MLS, one agrees to share freely benefits with others for further research, but if they want to keep the benefits to themselves, then agree to pay a percentage of any commercial benefit into a common fund to support conservation and further development of agriculture especially to the developing countries.

Seed companies need to engage with other stakeholders on establishing commercial and non-commercial benefits arising from access to genetic resources. Access and Benefit Sharing is under discussion in Africa and seed companies need to engage with stakeholders to arrive at amicable agreement towards voluntary benefit sharing.

The author is the Technical Officer, AFSTA.
Fall armyworm, scientifically known as Spodoptera frugiperda, invaded Africa possibly in 2015 as it was reported ravaging maize farms in the early 2016. By October 2016, it is suspected to have invaded farms in western Kenya, which was confirmed in March 2017. By this time, it had established itself in the off-season maize crop, usually grown by irrigation systems for mainly provision of green maize. Seed crop is usually grown 2-3 weeks earlier than the farmer crop. Thus in March, majority of the seed crop had huge infestation by this pest. However, it was not reported as a threat because farm managers were not aware of the pest and how it manifests itself. This pest is a small moth at its adult stage. The moth will only need water and nectar to survive for a few weeks and enable it to lay 1500-2000 eggs in her lifetime. However, they lay about 50-200 eggs at any single time. These are laid in batches (egg mass covered with proteinous sheath).

Moths are shy insects and are active at night.

This implies that it is hard to see the moth during the day when it is resting. A major differentiating feature of moths and butterflies (which both belong to a large grouping (order) of insect called Lepidoptera) is the coloration of their body (wings mainly). Given that they are active at night, moths have very dull coloration. Even with the dullness, their wing patterns are excellent and are highly used in fashion industry for high-end markets. In contrast, butterflies (which are active during daytime) are very colourful, fly with easiness adding beauty to their flight behavior. The FAW moths do not cause any direct damage to the crop. The eggs hatch within a short period, say less than a week, releasing caterpillars (worms), which are the crop feeders. Worms at the time of hatching are very tiny, 1mm or so but will eat and grow to become a big worm. The worms go through 5 resting phases, resulting to six stages (so called instars by the insect scientists).

Illustration of the feeding stages of the FAW caterpillars. Notice how small and how big is the first and last feeding stage. The green shapes show how much food each stage comparatively feed.

Now, stage 1, 2 and 3 are very small and cause negligible damage. Therefore it is very easy for a farmer or manager to overlook their invasion. The damage is little and do not warrant any interest from farmers. But as you may realize, knowledge of this early invasion is important because it can affect management of the pest weeks ahead.

Stage 4 of the worm is a bit big and farmers can easily notice them. They also defecate sawdust like material, which is haphazard on the crop. Keenly, you can notice the faeces (so-called frass by scientists) fresh or dry on the leaves, stems or infested areas. Ability to see those sawdust faeces can help in initiating early control measures.

Fifth instar FAW caterpillar. Notice the frass, which at this moment is turning to granules.
What do you need to know to control FAW?

Several approaches exist that can be utilized to effectively manage this pest. However, success of these methods relies heavily on knowledge, including knowledge about the pest biology and ecology. You should be aware of the following:

1. **Pesticides**: synthetic pesticides are not your best friends! The faster you accept this truth, the faster you will gain from understanding how to manage the pest

2. **Pests**: FAW is not the only pest that attacks maize. The only advantage here is that you have some experience about the other pests, and you have been able to keep them at bay for a while. BUT there lies the problem. You may confuse FAW for stem/stalk borers or vice versa. That confusion will cause you a dime since you will initiate wrong control measure, and you are likely to incur more losses. Therefore proper identification becomes very essential.

3. **Source of Information**: remember agriculture is devolved and every county is doing what it can to support agriculture. Even before you seek support from national institutions, reach out to the county director of agriculture at the county HQ, you will get recent information about everything about FAW. In case you can’t, reach out to national experts. Don’t delay taking action; it may be the only difference between profit and loss.

4. **Acreage**: your seed crop size impacts a lot on the control measure to be applied. Tools for FAW control that can work for less than 1 acre sometimes may not work for 100s of acres. Therefore, customize the appropriate tool to fit your needs.

5. **Farm scouting, monitoring and surveillance**: Your farm requires someone frequenting your seed crop at least twice weekly. This helps in noticing early infestation and taking appropriate measures. The biweekly scouts should go on till the crop is about 4 months. By this time the crop, if well protected and healthy, has already grown and capable of meeting your yield expectations.

What are the tools available for FAW control?

Various tools exist that can help mitigate the challenges of FAW. The following can be applied in large-scale seed crop farms;

1. **FAW Pheromones**: Pheromones are chemical cues (signals) that FAW adults communicate to locate their mates. Usually in normal circumstances, the females will release the chemical to attract males.

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What is FAW capable of doing to your maize seed crop?

FAW caterpillars are great defoliators. They shred leaves, stem, inflorescence any succulent part of maize. They are not selective in eating and will eat relentlessly to cause havoc on your seed crop. Defoliated plant cannot manufacture enough food for the plant to grow well. This will result in stunted growth of the plant, resulting in poor yield performance. Additionally, the worms eat tassel and ear, hence directly interfering with the yield potential of your seed crop. Left unattended, FAW will cause total yield loss and therefore causing huge havoc to the production and poking major hole to the finances of the merchant. FAW can interfere with the quantity of seed produced, which ultimately has impact on the ability of the merchant to supply reliable amounts of the seed to the market.

Left (above): the 4th instar FAW caterpillar in the tassel; Left (below): the 5th instar caterpillar boring into the stem. In both images, notice the sawdust frass all over the place.

Notice the 4th instar worm in the maize whorl. Up the crop is further shredding of the leaves, indicating presence of many worms on the same plant.
With respect for nature

we actively want to contribute to the world’s food supply and stimulate vegetable consumption by laying the foundations for healthy and appealing vegetables.
Using the natural chemical produced, industry has formulated synthetic chemical cues that act in a similar way to the natural product released by female FAW. These products are available in the market and can be acquired. Once placed, the product will attract males. They come with a trap, which helps in killing the attracted males. For example, some traps contain insect sticking substance (glue), which causes the males to get stuck when attracted. They die out of desiccation. Other traps contain a killing agent such as synthetic pesticide. Once in contact, the insect dies. Pheromones will disrupt the mating process for the FAW and reduce reproduction of the pest, reducing its density on crop. It is recommended to place at least 2 traps per acre and replace the lure (attractant) every 6 weeks or as recommended by manufacturer. Even when not growing, pheromones can still be placed to continue reducing population of males. Another useful role of pheromones is that it provides indication of the presence of this pest in the environment. Therefore it can help you note possible invasion within the cropping period and prepare yourself well.

2. Biological control: FAW is not native to Africa and as such it does not have regular natural enemies. However, since it is not so unique (at least there are other pests similar to it), there are possible biological control agents that may find it consumable. It is advisable not to use any pesticide when the caterpillars are in stage 1-3 (when worms are or below 10 mm (1 cm)). The reasoning is that the worms are very vulnerable to biological control agents and are likely to be controlled easily. Sometimes many different stages exist at any moment. However, this is more so when control measures are not initiated at the right time.

3. Synthetic pesticides: The FAW strain that invaded Africa is likely a resistant strain to most pesticides registered for use in the continent. Latin America has huge volume of pesticide molecules and it is safe to say that FAW has been exposed to majority of these. Therefore, care need to be taken to prevent resistance development to pesticides used. As of now, there is no scientifically proven molecule in Kenya effective against the pest. However, wide array of pesticides have been recommended to farmers. In addition, pesticide companies are recommending several of their products for use; sometimes withdrawing those not effective after initial experiences. Even though seed crop is not meant for human consumption, it is important to consider pesticide residues as part of choosing the products. This is particularly for those seed companies that make fodder/silage from maize stalk and have cows to feed. Recently there was an incident from western Kenya where a farmer lost 20 dairy cows due to feeding of neglected maize crop that he had tried to control FAW and was unable.

a. Success of pesticides is highly dependent on application method. Making sure the pesticide gets into contact with the pest enhances efficiency. In addition, maintaining recommended dosage is very critical for successful pesticide use.

b. Insecticide resistance management: high and frequent use of insecticides will result in resistance development by the pest. This can result in a ‘super’ caterpillar not responsive to insecticides. To avoid this, it is recommended that you change insecticide molecules and/or class after every three (3) spray intervals of using same molecule. Further, combining with other methods of control reduces and minimizes chances for resistance development.

4. Microbial pesticides: these are industrial-produced disease causing pathogens particularly in the groups of fungi, bacteria and viruses. Some products are already registered and are available in the market that can be applied at the earliest to target FAW. Early application when the pest is up to 4th instar is appropriate. However, even late instars are susceptible.

5. Mechanical control: Once the FAW caterpillar is fully grown, it changes to pupa, which is a non-eating stage, which is used to prepare for adult structures. At this period, the pupa is buried in the soil. Thus ploughing and turning soil exposes the pupa to sun heat and bird predators. This can reduce the pest population drastically. There are huge discussions on disadvantages of turning soil in contrast to not touching soil and here the seed merchant should make decision. In the long run, it is more beneficial to the farming community not to turn soils. Remember you are dealing with an ecosystem and many processes are at play to benefit you!
How can you recognize that you have the FAW?

1. Pheromone traps: Pheromones are usually specific to the pest. You can be assured of the majority of the catches in your pheromone trap is FAW adults (mainly males). This way you know there is likely infestation on the farm.

2. Caterpillars: Though carrying the tag ‘army worm’, the caterpillars don’t forage matching like the African armyworm. They are scattered all over the place based on how the females lay eggs. Most of the laying is on the maize crop. It is easy to notice fall armyworm caterpillar from 4th instar.
   a. The young ones will be noticed by white longitudinal stripes along the body. They can be greenish or brownish in color.
   b. The first obvious feature is the inverted ‘Y’ shape in the head, when observed from the front.
   c. The second feature easily noticeable is within the long body formation. The presence of white or pale stripes along the body with broad pale band along the top of the body, which is different from the body sides. In addition, the skin has hairs (usually called setae).
   d. Another very essential feature of the caterpillar is the presence of four (4) spots arranged in square at the rear end (8th segment) of the abdomen. Those three features should be used at the same time to confirm the pest. This is because some other caterpillars such as cutworms closely resemble FAW e.g. they have the inverted Y and their body form is very close to the fall armyworm caterpillar.

3. Identification of fall armyworm by damage caused
   a. Larvae never tie leaves together. They are known to shred the leaves or any other parts of the plant without any particular format. They eat everything on its way. On leaves, they leave fully skeletonized plants and leaves are windowed when the attack is by first 3 instars.
   b. Frass is a major identifier for this pest. In young instars, the frass is sawdust like and it is in large amounts. The older worms defecate granules. Likewise, these are produced in large amounts. The frass is obviously seen in plants.
   c. Stem damage: The worms bore onto the stems but do not get fully stuck there unlike the stem borers; they eat in and out without any specific pattern. They seem to come out to defecate. The pest also attacks and feeds on inflorescences and fruiting structures such as cobs. Maize plants past the silking stage are less susceptible due to hardened plant tissue but they can still be damaged.

Dr Muo Kasina, an Economic Entomologist is the Centre Director, KALRO National Sericulture Research Centre, Thika, Kenya
A recent study has established that a climate-adapted version of Push-Pull, an already widely used technology developed by icipe and partners is effective in controlling the fall armyworm, providing a suitable, accessible, environmentally friendly and cost-effective strategy for management of the pest. These findings represent the first documented report of a readily available technology that can be immediately deployed in different parts of Africa to efficiently manage the fall armyworm.

Push-Pull, an innovative companion cropping technology developed over the past 20 years by icipe in close collaboration with national partners in eastern Africa and Rothamsted Research, United Kingdom, is modelled along the African smallholder farming system of multiple cropping. Originally developed for the control of stemborers, the key pests of cereal crops across most of Africa, and the parasitic Striga weeds, Push-Pull involves intercropping cereal crops with insect repellent legumes in the Desmodium genus, and planting an attractive forage plant such as Napier grass as a border around this intercrop. The intercrop emits a blend of compounds that repel ('push') away stemborer moths, while the border plants emit semiochemicals that are attractive ('pull') to the pests. Push-Pull has recently been adapted to drier areas through the incorporation of drought tolerant companion plants: Greenleaf Desmodium as an intercrop and Brachiaria cv Mulato as a border crop. In addition, Push-Pull also controls maize ear rots and mycotoxins, while improving soil health and providing high quality fodder, since the companion crops are superior forages. Therefore, the technology facilitates crop-livestock integration thus expanding farmers’ income streams.

“Over the past several months we received information from Push-Pull farmers that their fields were free of fall armyworm infestation while neighbouring monocrop plots were being ravaged by the pest. Therefore, we evaluated the climate-adapted version of the technology as a potential management tool for fall armyworm in Kenya, Uganda and Tanzania,” explains Prof. Zeyaur Khan, Push-Pull leader at icipe.

The study revealed fall armyworm infestation to be more than 80% lower in plots where the climate-adapted Push-Pull is being used, with associated increases in grain yields, in comparison to monocrop plots. The findings were supported by farmers’ perceptions through their own observations regarding significantly reduced presence of fall armyworm in Push-Pull plots.

“The ability to manage such a devastating pest clearly demonstrates Push-Pull’s utility as a platform technology in addressing the multitude of challenges that affect cereal-livestock farming systems in Africa. icipe intends to continue disseminating the technology as widely as possible across Africa, while advancing studies to understand the scientific basis of its effectiveness against the fall armyworm,” says icipe Director General, Dr. Segenet Kelemu.

The Push-Pull technology involves intercropping cereals with a pest repellent plant, such as Desmodium, which drives away or deters stemborers from the target food crop. An attractant trap plant, for instance, Napier grass (Pennisetum purpureum), is planted around the border of this intercrop, to attract and trap the pests. As a result, the food crop is protected from the pests. In addition, Desmodium (D. uncinatum or D. intortum) stimulates suicidal germination of Striga and inhibits its attachment to the roots of cereal crops by hindering growth of its haustorium. Moreover, Desmodium improves soil nitrogen, phosphorous, carbon and biodiversity. The technology has also been noted to reduce aflatoxin contamination, and more recently, the fall armyworm that has invaded several African countries. Push-Pull also has significant benefits for dairy farming, since Desmodium and Napier or Brachiaria grass are high quality animal fodder plants. Therefore, Push-Pull improves household nutrition, incomes and overall livelihoods.

icipe’s mission is to help alleviate poverty, ensure food security, and improve the overall health status of peoples of the tropics, by developing and extending management tools and strategies for harmful and useful arthropods, while preserving the natural resource base through research and capacity building.

This article first appeared at www.icipe.org
A growing number of African countries is increasingly becoming food insecure as delayed and insufficient rainfall cause the most severe maize crisis in the last decade. To this list add crop damaging pests such as the ongoing outbreak of the fall armyworm.

Experts have warned that as weather patterns become even more erratic and important crops such as maize are unable to resist the fall armyworm infestation, there will be inadequate food on the table. Confirming that indeed a severe food crisis looms while at the same time calling for immediate and sufficient responses, the Food and Agriculture Organisation of the United Nations (FAO) 2017 World Food Day theme was “Change the future of migration. Invest in food security and rural development.”

Over 17 million people in Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda reached emergency food insecurity levels, according to the UN agency. “Maize is an important food crop in many African countries and the inability of local varieties to withstand the growing threats from the fall armyworm which can destroy an entire crop in a matter of weeks raises significant concerns,” said Hilda Mukui, an agriculturalist and conservationist in Kenya.

“Due to its migratory nature, the pest can move across borders as is the case in Kenya where the fall armyworm migrated from Uganda and has so far been spotted in Kenya’s nine counties in Western, Rift Valley and parts of the Coastal agricultural areas,” she observes.

FAO continues to issue warnings over the fall armyworm expressing concerns that most countries are ill prepared to handle the threat. David Phiri, FAO sub-regional coordinator for Southern Africa says that this is “a new threat in Southern Africa and we are very concerned with the emergence, intensity and spread of the pest. It is only a matter of time before most of the region is affected.” The pest has destroyed at least 17,000 hectares of maize fields in Malawi, Zambia, Namibia and Zimbabwe. Across Africa, an estimated 330,000 hectares have been destroyed.

“To understand the magnitude of this destruction, the average maize yield for small scale farmers in many African countries is between 1.2 and 1.5 tons per hectare,” observes Dr George Keya, the national coordinator of the Arid and Semi-arid lands Agricultural Productivity Research Project.

FAO statistics show that Africa’s largest producers of maize including Nigeria, Kenya, Tanzania, Uganda and South Africa are all grappling with the fall armyworm outbreak.

Uganda’s Ministry of Agriculture notes that the maize stalk borer or the African armyworm which is different from the fall armyworm cost farmers at least US$25 million annually in missed produce and is concerned that additional threats from the vicious Fall Armyworm will cripple maize production.

FAO and the government of Nigeria in September 2017 signed a Technical Cooperation Project (TCP) agreement as part of a concerted joint effort to manage the spread of the fall armyworm across the country.

"Change the future of migration. Invest in food security and rural development."
According to experts, sectors such as the poultry industry that rely heavily on maize to produce poultry feed have also been affected.

Within this context, scientists are now pushing African governments to embrace biotechnology to address the many threats that are currently facing the agricultural sector leading to the alarming food insecurity. According to the African Agricultural Technology Foundation, a genetically modified variety of maize has shown significant resistance to the fall armyworm. Based on results from the Bt (Bacillus thuringiensis) maize trials in Uganda, scientists are convinced that there is an immediate and sufficient solution to the fall armyworm invasion.

The African Agricultural Technology Foundation confirms that in a scale of one to nine, based on the Bt maize trials in Uganda, the damage from the armyworm was three for the Bt genetically modified variety and six on the local checks or the popularly grown varieties.

Similarly, Bt maize trials in Mozambique have shown that on a scale of one to nine, the damage was on 1.5 on Bt maize and seven on popularly grown varieties.

The Water Efficient Maize for Africa (WEMA) which is a public-private crop breeding initiative to assist farmers in managing the risk of drought and stem borers across Africa is currently undertaking Bt maize trials in Kenya, Uganda, Mozambique and recently concluded trials in South Africa to find a solution to the fall armyworm invasion.

According to Mukui, only four countries; South Africa, Sudan, Burkina Faso and Egypt have commercialized genetically modified crops, while 19 countries have established biosafety regulatory systems; four countries are developing regulatory systems; 21 countries are work in progress; and 10 have no National Biosafety Frameworks.

Nigeria, Uganda, Malawi and more recently Kenya are among countries that have approved GM crop trials. In Kenya, the Biosafety Authority granted approval for limited release of insect resistant Bt maize for trials.

As Africa’s small scale farmers face uncertain times as extreme climate conditions, crop failure, an influx of pests and diseases threaten to cripple the agricultural sector, experts say that there is sufficient capacity, technology and science to build resilience and cushion farmers against such threats.

“These results are very promising and it is important that African countries review their biosafety rules and regulations so that science can rescue farmers from the many threats facing the agricultural sector,” Mukui explains. In Africa, there are strict restrictions that bar scientists from exploring biotechnology solutions to boost crop yields.

“But even as we push for biotechnology, there is a need for regulations that guarantee the protection and safety of people and the environment,” Mukui cautions.
Introduction
Seed is the beginning and sustenance of plant life. The “Green Revolution”, launched by Borlaug’s “miracle seeds”, is often credited with having transformed India from “a begging bowl to a bread basket”, and the Punjab is frequently cited as the Green Revolution’s most celebrated success story. Using seeds with superior genetics was the scientific aspect of the Green Revolution. Research developed new strains of high yielding seed varieties, mainly Wheat, Rice and Millet and Maize. Overall, the Green Revolution was a technology package comprising material components of improved high yielding varieties of two main staple cereals (Rice and Wheat), irrigation or controlled water supply and improved moisture utilization (allowing double cropping), fertilizers, pesticides, and associated management skills (through extension services).

We all know that Africa missed the Green Revolution of the 1960s and 1970s and is in dire need of an inclusive agricultural transformation, to raise productivity of land and labour, increase incomes, nutrition and empower smallholder farmers. On the seed technology side, the current rate of genetic gain and varietal turnover delivered by breeding networks is slow relative to what it was during the Green Revolution. It (genetic gain) is, in fact, inadequate to allow smallholder farmers in sub-Saharan Africa to adapt to climate change and cropping system intensification needed to drive this agricultural transformation espoused in the CAADP’s Malabo Declaration – 6% per annum agricultural growth.

Seed Systems under Climate Change Conditions
It has become apparent that breeding and dissemination methods designed to deliver the simple plant architecture and biomass partitioning changes underpinning the Green Revolution will not deliver the changes in quantitative traits needed in agricultural systems in which modern varieties have already been adopted. Simple plant type changes are not enough to increase productivity.

Climate change now demands that all farmers replace the seed varieties they plant more frequently than before. In Africa, climate change is expected to reduce yields through increased temperatures (Challinor et al 2016). For example, Maize yield losses average approximately 1% for each growing degree day (GDD) above 30 degrees Celsius in SSA (Lobel et al 2013). Climate change also affects pest and disease prevalence (Dawson et al 2015). Because of climate change realities and impact on productivity and production, private and public crop research devote billions of dollars to develop products that combat drought, pests, diseases, floods and heat.

On the other hand, smallholder farmers adopt varieties based on many considerations, notably, yield potential, end use quality and agronomic fit for their cropping system. Therefore, adaptation to climate change requires an effective and efficient system that connects robust private and public breeding programs that churn out adaptable varieties with farmers who know the incremental value of these newer and better performing products.

Therefore, if and when these breeding systems are delivering these superior varieties, then the replacement and average age of varieties in farmers’ fields matters more than just adoption rate of “improved varieties”. Planting newer and better performing varieties is widespread practice in the US, Europe and South Africa where 3-4 years is the average age of varieties of most crops. In China, within 15 years (1997 – 2012), the average age of staples especially rice, improved from 8 to 5years with incremental yield of 15-20% per varietal generation. In SSA, to drive agricultural transformation, average varietal age varieties must improve from the current 15-20 years to below 10 years.

Seeing is Believing and Knowing is Planting
Farmers who are protected from the vagaries of climate change are those who have access to a steady stream of new seed varieties bred under the prevailing climate at the time of planting.
For example, Fall Armyworm (FAW) is causing yield losses in East and Southern Africa.

In the past 5 years, MLN caused crop losses in East Africa and years before that, Grey Leaf Spot (GLS) was a scare to crop production. The best adaptation to these pests and diseases that emerge because of climate change, is to plant newer and better performing varieties that have been bred to combat these pests and diseases. Since climate is changing more rapidly, a system that increases the replacement of old varieties is not only necessary, but very essential. The key challenge for farmers in SSA is that they continue to plant varieties selected more than 20 years ago, or landraces selected a generation ago under a different climate regime (Gary Atlin et al 2016).

Seed systems that deliver new varieties to farmers quickly, replacing them in keeping with the changing climate are critical to drive agricultural transformation in SSA. There are several hurdles to overcome to get to this state. These seed system challenges require broader partnerships involving the private sector, the government, public sector and the development community involved in agriculture.

The old paradigm was based on the strong and clearly visible differences in plant type between traditional and modern varieties. These differences, readily visible to farmers, extension officers, seed producers, and scientists alike, were easily seen and understood by all seed system actors. Creation of demand for new varieties during the Green Revolution was primarily a matter of conducting demonstrations in farming communities.

In the current context, when farmers are already often using some modern varieties (albeit obsolete ones), field demonstrations are not sufficient to generate demand, because the new varieties are often not visibly different from the old ones, although they may be 10% higher yielding and improved in nutritional quality. These differences are important for income and health, but they are usually not visible in a demonstration plot. The new paradigm must be based on extensive, high-quality data. The yield advantage of a new variety resulting from 5 or 6 years of highly effective breeding is likely only to be 10-15%. Modern testing and dissemination systems must be designed to detect a difference of this magnitude under farmer management and make the investment case for varietal replacement.

In this new system, seeing is not enough, more data is needed for the seed ecosystem to determine which varieties to release, register, produce, promote and adopt.

**Building a Trustworthy Seed System**

If smallholder farmers are to adopt newer and better performing varieties for climate adaptation reasons, they must trust the system.

As always, trust is earned! It is however, disappointing that currently, smallholder farmers cannot trust the system that delivers new seed varieties and hence they stick to the old varieties, which have become weaker due to the new diseases, pests, nutrient and heat stresses imposed by climate change. Restarting this robust, trustworthy seed system requires; policy reforms, capacities for data driven varietal choices; healthy competition among seed enterprises; increased confidence in the data provided by seed companies, the government and the agricultural advisory system (extension).

Here are some thoughts about how to build such a credible system that endears itself to smallholder farmers;

- Seed breeding systems connected to global network and free exchange of germplasm
- Product concepts informed by the consumption and commercial needs of growers
- Widespread testing network with robust data collection and analytics before varieties are released for registration
- Efficient seed varietal release and registration systems
- Facilitative seed certification system supported by good government capacities and facilities
- Sufficient incentives for the entrepreneurs that produce and distribute the various seed classes
- Industry campaigns around “Newer is Better” to mitigate and adapt to climate change
- Sustainable view of smallholder farmers as long term viable clients, and not merely recipients of seed aid

**Conclusion**

Providing reliable information about the performance of new varieties is especially critical to the survival and profitability of seed companies who increasingly deliver seed over the “last mile” into relatively isolated rural communities where smallholder farmers reside. Many such companies are in SSA, the clear majority of which have no own research capacity; they simply multiply and market varieties developed by the public sector or through license from big companies. For these companies to invest in new varieties, they must be convinced of its superiority to what their farmer customers currently grow. The current system does not adequately provide them or their customers with this assurance. Providing this information will help increase the uptake of new varieties and replacement of obsolete ones.

The African Seed Trade Association (AFSTA) is best positioned to play a critical role as a convener for all the key players to offer assistance in building robust seed systems that engender trust and credibility for massive adoption of newer and better performing seed varieties. The development community stands ready to join such a partnership.

The author, a former President of AFSTA, is the Deputy Director, Agricultural Development, Global Development at Bill and Melinda Gates Foundation
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Historically, seed rarely moves on its own. It is being windblown, carried by rivers, mud slides, ocean currents, and animals, but mostly distributed by humans. Historians attribute maize in Africa to Vasco da Gama. Jan van Riebeek, head of the Dutch East India Company, in 1652 brought planting material and seeds to South Africa. Migrating French Huguenots settled in the Western Cape which boosted the wine industry. Seeds have been moved from their centres of origin to all continents. Explorers from Polynesian islands operated before Columbus.

And that is why we are here as temporary custodians of biodiversity on a wobbly planet. To help feed 9 billion people.

The advent of private breeders
Declining access to seeds from Europe occurred due to WW I and later WW II in the 1940s. The South African government phased in certification for quality seed to ensure food security. Our hybrid maize breeding took off in 1949 under Prof Leonard Josephson from Missouri State University. Our first top-cross white maize hybrid was released in 1950. Private breeders and seed companies soon took over breeding of new varieties of many crop species.

Plant breeding is a time-consuming and expensive process. It may take up to 10 years before open-pollinated new varieties and hybrids are marketable and entered on official variety lists. This is where expenses and farm-saved seed practices meet head-on. NGOs against breeders’ rights somehow never mention Article 27 of the Universal Declaration on Human Rights: Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he/she is the author.

Agreement on farm-saved seed
Retaining part of harvested material – seeds, scions, etc. for re-use as planting material in the following season, is as old as farming. However, these practices have had adverse impact on modern breeders, owners of PBR protected varieties, and entrance of new seed companies. Recouping breeding expenses by raising seed prices only leads to a vicious circle that stimulates more farm-seed saving. Following many meetings and discussions between affected stakeholders, an agreement was finally drafted and accepted. The Agreement was formally released to stakeholders on 17 November 2017.

It contains inter alia the following key points:
A non-profit company, South African Cultivar and Technology Agency SACTA.npc, has been established to collect levies (royalties) from farmers who use farm-saved seed for re-planting.

The levies will apply, for a start, to Wheat, Barley, Soya beans, and some canola cultivars. The Agreement may be extended to other or all open- and self-pollinated crops. The basis for the Agreement is an end-point levy, i.e., at the first point of sale. Collected royalties will be re-allocated to owners of protected varieties of which farm-saved seed had been used, on a pro rata basis of variety market share. Twenty percent of collected levies must go to transformation i.e. development of disadvantaged black farmers.

The stakeholders who drove this process included farmers, farmer associations, agriculture business chamber, SANsOR, with support from the Department of Agriculture, Forestry and Fisheries (DAFF).

Stakeholders requested DAFF to agree to statutory measures as voluntary agreements are unenforceable. These measures were published by DAFF in Government Gazette 10645 and key points are:
• Price of one MT of wheat set at R3 699 (US$ 298) – as baseline for percentages; price of one MT barley set at R3 000 (US$2 417).
• Levy per MT set at R25 (US$2)
• Of total levies collected, 70% must be applied to research, breeding and technologies, 20% goes to transformation.

Soya beans was levied at R65 per MT in 2016-2017 and R80 per MT from 2019.
Dawn of GMOs

While studies on genetics were common, the first academic response on genetic modification management came from a few academics who established South African Genetic Experimentation Committee (SAGENE) in 1973 to assist both government and scientists in developing a manageable framework. By 1989, SAGENE had also developed a set of biosafety guidelines in booklet format when the first GM species was to be field-tested: Bt cotton resistant to bollworm. The tests were successful and Bt cotton approved for commercial release in 1997. Bt maize with stalk borer resistance followed in 1998 but commercial application was delayed as the novel genes first had to be placed in locally adapted lines and seed bulked up. Herbicide tolerant soya beans were approved in 2000.

The GMO Act and regulations

The GMO Act no. 15 of 1997 was approved by Parliament and entered into force when GMO regulations were published and the SAGENE group replaced by the new GMO Advisory Committee (AC).

Decision making is vested in the Executive Council (EC) which comprises a representative from each of six government departments: Agriculture (DAFF), DTI, DST, Environment, Health, Labour, plus senior official of DAFF as Chair, and the Chairman of AC. Agriculture houses the Secretariat which deals with GM/GMO regulatory frameworks.

The regulatory framework operates on a permit system that provides for 14 kinds. Applicants must submit an application for a chosen use of the GMOs including: import, export, seed multiplication, field testing, contained use (lab or greenhouse), commodity clearance for grain imports, planting of GM seed, handling GM/GMOs, further modification of GMOs by cross-breeding. The number of approved permits over the past years numbered from about 400 to 750.

To date, there has been no substantiated evidence that planting of GM crops has had any adverse impact on humans, animals or the environment. Benefits to farmers have been manifold, a major one being reduced use of chemical pesticides. It is also important to know that planting of GM crops is for all kinds of farmers. The Human Science Research Council ran an opinion poll and found that 50% of interviewees feel comfortable with buying and eating products derived from GM crop plants.

Improving crop estimates

The agri-industry requires accurate statistics on areas planted and on national crop yields in order to minimize incorrect expectations or misinformation as such variables may impact on commodity grain prices. The traditional approach of following areas planted and estimating potential crop yields was to employ the Crop Estimates Committee (CEC) in DAFF to collate statistics submitted by a wide range of monitors, rural agri-cooperatives and institutions.

This approach has become increasingly time and expense consuming. One private company was contracted to use their small low-flying planes and helicopters outfitted with sensors and on-board computers to record and analyse the incoming information designed to identify each designated farm field, type of crop and health or production status of each field.

To achieve this, each crop field has had its boundaries and dimensions pre-recorded. To have experts combined in one team required establishment of a National Crop Statistics Consortium which includes the ARC, GTI, and Spacialintel. Use is made of signals from two satellites and the system can classify crop type and status of the plants. The system can also be applied to other targets such as livestock. Processed data are sent to the CEC for further synthesizing into informative estimates on crops. Truly a valuable homegrown scientific break-through.

Wynand J. van der Walt from South Africa, is a senior partner FoodNCropBio. He is an AFSTA founder and life member

Source of additional information: overview by Mr Leon du Plessis in Crop Estimates Project; article by W. Durand and F. Fereira in Oilseeds Focus, December 2017 p.28-29. (permission to use excerpts from article granted by Publisher of Plaas Media).
My name is Maria Zaloumis and I am 32 years old. I am a tomato farmer in Zambia. My mother, a constitutional lawyer, and my father, a businessman, sometime back bought 43 hectares of land for the family and they started farming. As a trained medical doctor, specialised in cardiology, it never occurred to me that one day I would be growing crops. My biggest wish was to care for the sick. But when my mother left me to help look after the farm when she went on holiday with my father, little did I know that would be the birth of a desire to cultivate the land and manage the family farm.

Today, Tuzuni Farm, which I run, is slowly becoming a household name in my country. I did nursing and later trained as a doctor in Australia at the Australian Catholic University. I returned to Zambia in 2015 but struggled to get a job. I have never practised as a doctor though I worked as a nurse for some time in 2014.

When I returned to Zambia in 2015 I was looking for a job but the salary they were offering me was not what I wanted. And as luck would have it, one day, my mother was leaving for holiday and asked me to look after the farm in April 2016. My task was clear, to look after a half hectare of tomato, which in one week, produced a good amount of money.

That was the turning point in my career. I saw potential in making money out of farming and when I looked at other farmers, I got inspired and started farming slowly. From half a hectare, it grew to one and continued growing. Today, I cultivate 13 hectares of tomatoes with little agronomic knowledge. I never knew anything about farming. I started learning and I am still learning by working closely with seed companies such as Syngenta, and agro based companies like MRI Seed Zambia Limited, Omnia Fertiliser and Amiran. Farming is a constant learning process and after nine months of managing Tuzuni Farm, I am loving and enjoying it.

The farm was started by my father and was later taken up by my mother, Mwangala Zaloumis who could not manage to run the farm and her law firm at the same time. After taking over the farm in September last year, I have been harvesting between 250 and 400 boxes everyday giving me a daily revenue of approximately US$1,250 at the lowest price of $5 per box. I sell my tomatoes to traders at Soweto market, the country’s biggest market, Kasumbalesa border, targeting people of the Democratic Republic of Congo and in Mongu District in the Western province of Zambia targeting traders from Angola. I have 28 employees - four guards, among whom are two workers responsible for the 30 cattle at the farm and two supervisors.

I want the farm to grow, I am financially disciplined and I do not spend money anyhow. I want to exhaustively utilise the 40 hectares at my disposal. Recently, our family bought another farm in Mikango Barracks called Tuzuni Two.
I will be running the two farms. It will be tough but I believe there are no limits to what a woman can do. My biggest dream is to feed the entire Africa despite the fact that currently only the Democratic Republic of Congo and Angola are the only countries where I export to.

The farm also grows rape and cabbage whose proceeds go to the day to day running of eight hectares of maize. You cannot go wrong in agriculture; it gives me honour to know that I am putting food on the table. It is encouraging that government of Zambia attaches great importance to agriculture and I am happy that the Minister of Agriculture Dora Siliya took time to tour our farm early this year in March. I believe that for farming to grow in the country there is need to provide more funding to young people who want to venture into agriculture. Agritech centres will be appropriate for farmers to learn from.

My parents are proud of my farming business. My mother has been my anchor and backbone and she always urges me not to give up. Every Sunday, my mother and I meet to undertake the post-mortem of the week’s activities as well as forecast for the coming week. My mother is my boss who ensures that I am accountable over the farm business. I am also teaching my daughter, Taonga Nyirenda aged five years to be a farmer and over the weekends I tag her along to help pick tomatoes as a way of teaching her to work. In return, I give her a little allowance.

I urge women not to look down on themselves because there is no limit to what they can do. Stay focused and be determined to achieve a goal.
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Making seeds more climate-smart towards a sustainable food future in Africa

By Dr. Robin Buruchara | r.buruchara@cgiar.org

Some of these new varieties of a grass called Brachiaria, are high-yielding, nutritious and, because they are easier for cows to digest, animals produce far less of the greenhouse gas methane per litre of milk produced. Since Brachiaria seeds flower in a commercially viable way only in specific climates, there is no established industry driving widespread Brachiaria seed availability in Africa. Our researchers have mapped areas where there is enough daylight available to grow these forage grasses, in Zambia for example. The next step is to find partners to commercialize seed production. But once commercial seed is available, we still have to ensure improved seeds get to farmers. Over the last 20 years, we have had to learn valuable lessons about how to identify market gaps and reach farmers. In the Pan-Africa Bean Research Alliance (PABRA), we have done this using our “commodity corridors,” approach. From the farm gate to the supermarket shelf, buyers are linked with sellers: they know each other, listen to the challenges, and come up with joint solutions as part of a network.

For example: Abdul Kadir is a farmer in Ethiopia. Ten years ago, he had never heard of the small, white pea bean. Today, Kadir earns three times more income from this bean, referred to as “white gold” by many. It has enabled him to buy cattle, send his children to school and build a house. It is well suited to local soils and ecological conditions, and crucially, meets stringent market export requirements of his buyer. Buyers like Mekonnen Kebede. Two hundred kilometers away, wearing a crisp lab coat, he inspects a handful of white pea beans in a dimly lit packing house. Eighty percent of the beans packed up are destined for Europe. His company – Agricultural Commodity Supplies (ACOS) – has helped transform the grain into a major export product, providing business opportunities to farmers to stimulate their investment in bean farming. The PABRA partnership model, implemented by the Ethiopian Institute of Agricultural Research with CIAT, brought Kebede and Kadir together. The researchers identified and bred higher-yielding white pea beans, more resilient to local pests, diseases and drought, and worked with farmers like Kadir to help them boost their production.

Today, Ethiopia is Africa’s biggest exporter of the beans, and ACOS is the largest supplier. Sustaining the white pea bean revolution, Kadir and Kebede work at different ends of a US$120 million export value chain, linking farmers in Ethiopia’s bean corridor with European consumers of canned beans. Ten years ago, farmers harvested 0.75 tons of the beans per hectare - now, they harvest 1.6 tons. But producing these examples requires investment: not only in better seeds, but in infrastructure, marketing and distribution channels - as well as cutting-edge research - to engage with the private sector and make high quality seeds like the livestock forage grass Brachiaria and the common bean available to farmers across the continent today, for prosperity tomorrow.

The author is the Director for the Pan-Africa Bean Research Alliance (PABRA)
Farmers know that some years are good and some years are bad.

I’ve suffered through what may be the worst year of my life in agriculture. That’s how I’ll remember 2017.

On my land in Uasin Gishu County, Kenya, everything went wrong. After planting in the last week of March, a dry spell struck our region. My crops failed to germinate, and I had to replant them in the middle of April. Even then, they struggled to germinate and grow. News reports described the ordeal as the worst drought in East Africa in six decades. It was certainly the worst I’d ever witnessed.

Then came the pests. The armyworms—moth larvae that attack with military ferocity—feasted on my maize. I tried to control these bugs, but their numbers overwhelmed me. Because of their relentless assault, I lost about half of my crop.

If nothing else had gone wrong, the horrible drought and the armyworm infestation of the May-July period would have made 2017 a lousy year for farming. Then things went from bad to worse. Pounding rains washed out more of my crops. By harvest time, almost nothing was left. Farmers rarely suffer alone: Other growers in my area shared my sorry fate. When Kenya’s breadbasket doesn’t produce, people go hungry. They hurt in other ways as well. I’m convinced that my country’s recent political turmoil, with its violent protests and cancelled presidential election, was due at least in part to food insecurity.

It makes me wonder: Did things have to be this way? If Kenya had adopted GMO technologies years ago, when it first had the chance, we probably would have cut our losses.
Farmers in African countries such as Burkina Faso and South Africa also use GMOs. For them, GMOs are ordinary and conventional—and I envy what they have. I can’t help but think GMOs would have helped Kenya meet its food-security challenges in 2017. I’ll be the first to admit that GMOs are no salvation—no magic bullet. Technology can’t defeat Mother Nature: Some years are just bad for farming. Yet GMOs have the potential to make the worst seasons a little less awful and to turn good seasons into great ones, especially as we grapple with climate change and other problems.

Kenya’s biosafety regulators are finally planning to let us take an important step forward in 2018, as they allow open-field trials of maize in Kitale, not far from where I live. If these succeed, we may enjoy commercialization of GMO maize by 2019.

Better late than never—but then again, this innovation can’t come soon enough. When Kenyan farmers enjoy access to GMO seeds, our nation’s food security will improve almost immediately. It won’t solve all of our difficulties in agriculture, such as poor roads and limited access to credit, lack of irrigation technology, but it will help us do a better job of feeding our people.

We also need to keep up with farmers in neighboring Uganda, where parliament in October approved the adoption of GMOs. This enlightened decision will give Ugandan farmers the means to resist banana wilt, a deadly bacterial disease that afflicts a staple crop. (To understand the problem, plus the potential of biotechnology to solve it, see “Food Evolution,” an excellent new documentary film that includes footage from Uganda, South Africa, and elsewhere.)

Kenyans trade extensively with Ugandans, and my farm is in fact closer to the border than it is to Nairobi, my country’s economic and political center. As Ugandans adopt GMOs, we’ll see Ugandan food products flood our markets: bananas, maize, rice, sorghum, cassava, sugar cane, and more.

That’s a good thing because trade has the power to improve everyone’s situation. Hungry people don’t care where their food is grown. Yet we also want our own farmers to compete—and to export Kenyan food to Uganda and elsewhere. This is good economics. It’s also good food security for ourselves and others.

Success will require access to the latest technologies. Right now, we’re a few steps behind Uganda, let alone so much of the developed world. We need to catch up. If and when we do, farmers will continue to have good years and bad years—but maybe the worst ones won’t be as ‘deadly’ as 2017.

Gilbert arap Bor grows maize, vegetables and dairy cows on a small-scale farm in Eldoret, Kenya.
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The prospects of the African farmer to exit subsistence farming are easily found in the availability of good seed and this will happen much faster if the seeds are improved using modern biotechnology tools.

The poverty level of the typical African small holder farmer is so alarming that his children are looked at as potential parasites since he/she will never be able to send them to school where they will be able to expand their horizon.

The possibilities offered by biotechnology of fortifying seeds against commonly known enemies like insects, fungi, herbicides like striga as well as making them to resist drought and also improve their yield are poised to take the African small holder out of subsistence to prosperity.

A lot of sensitization is going on in Nigeria for the farmers to embrace biotechnology and grow GM crops as a sure way to attain the yield which will make them smile to the bank.

Field trials and eventual release of GM seeds are viewed with hope and eagerly awaited by our farmers as a result of the work currently being undertaken by OFAB, the Nigerian Agricultural Seed Council (NASC) and the Nigerian National Biosafety Agency (NNBA).

For AFAN, the all farmers association, this is a sine qua non for prosperity. The various strata of leadership in the 36 states, 774 local governments and the wards of Nigeria must as a matter of urgency key into the acquisition of Agricultural biotechnology so as to ensure food sufficiency and overall economic independence for the large mass of the nearly 180 million of our people.

The current drive for the economic diversification of Nigeria’s economy from oil to Agriculture is on course and the Nigerian farmer is hopeful of an enabling environment to practice sustainable Agriculture. This will ensure good agribusiness as well as attract the much desired foreign exchange which will shore up our ailing economy and bring about improved purchasing power to the large number of people in agriculture.

The adoption of GMOs as a veritable vehicle to attain food sufficiency as well as food security in Africa is necessary at this time more so because our population growth is at an all-time high and requires more food to feed it.

It is pertinent to note that the global food security drive requires Africa for its large cultivable land and as the world will be inhabited by nearly 10 billion people come 2050 Africa will also play a very important role in the attainment of food security. The deployment of GMO technology with its well-known offerings of the seeds being able to withstand drought due to climate change, resist disease and have higher yield will mitigate hunger and poverty as well as bring about prosperity.

In Nigeria, we view ourselves as the giant of Africa therefore in order to walk the talk it has become necessary to embrace this technology regardless of the endless diversions from the anti GMO activists.

The farmers are in the vanguard of the clarion call to embrace this technology as it will take them out of poverty, provide food security and general prosperity.

*The author is the National President, All Farmers Association of Nigeria (AFAN)*
Picture Speak

1. Senegalese Permanent Secretary for Agriculture, Dr. Dogo Seck (centre) arrives at the King Fahd Hotel in March 2017 to officially open the Dakar Congress. He was flanked by AFSTA President, Mr. Denias Zaranyika (left) and a board member, Mr. Francois Burgaud (right).
2. AFSTA President, Denias Zaranyika gives a welcome speech at the Congress.
3. Modou Thiam, NOC Chairman welcomes delegates to the Dakar Congress.
4. Mr. Nick Goble, former AFSTA President is all ears for the Congress proceedings.

WELCOME: Senegalese Permanent Secretary for Agriculture, Dr. Dogo Seck (centre) arrives at the King Fahd Hotel in March 2017 to officially open the Dakar Congress. He was flanked by AFSTA President, Mr. Denias Zaranyika (left) and a board member, Mr. Francois Burgaud (right).

AFSTA President, Denias Zaranyika gives a welcome speech at the Congress.

Modou Thiam, NOC Chairman welcomes delegates to the Dakar Congress.

Mr. Nick Goble, former AFSTA President is all ears for the Congress proceedings.
ATTENTIVE: 1-3. A section of delegates from Ghana and other countries follow proceedings of the Congress keenly, 4. Malian delegate and Prof Eugene Terry, founding Executive Director of AATF follow proceedings,
1, 3, 4. Delegates take a breather in between the activities at the Congress
2. Ms. Betty Kiplagat, Africa Government Affairs Lead at Monsanto spotted at the Annual General Assembly in Dakar
Picture Speak

1-3. Sudanese participants closely following Congress proceedings in Dakar, 4. A team of ushers takes a deserved break to pose for a photo.
1. Mrs. Azara Ali-Mamshie of West African Agricultural Program delivers a speech during the launch of the National Seed Trade Association of Ghana in July 2017 in Accra, Ghana. 2. A section of Kenyan delegates captured in Dakar. 3. Mr. Richard Olafare, MD of Savannah Seeds, Nigeria is seen with a delegate from Sudan. 4. A delegate takes time to go through the Congress program. 5. The CEO of Uganda Seed Trade Association, Mr. Nelson Masareka, makes a contribution during the Dakar Congress. 6. AFSTA Board members follow the Congress proceedings.
AFSTA STAFF as captured during the Congress,
1. Ms Grace Gitu takes a bite at the gala dinner
2. Charles Nyachae, poses for a photo with a section of the delegates
3. Mercy Bor, the Finance Officer follows the proceedings
4. Ms Henriette Tine captured shuttling between the conference rooms
1. Delegates from North Africa, led by AFSTA Vice President, Mr Riadh Gabsi (extreme right) pose for a group photo,
2. A delegate, Engineer Steve from Nigeria listens attentively to presentations being made at the Congress,
3 & 4. Exhibitors: Mr Abu Joseph Umaru (3) from AATF and the Selected Seeds Zimbabwe Team (No 4) take charge of their exhibition booths in Dakar.
### USEFUL INFORMATION ON SEED STATISTICS IN AFRICA

**Imports of seed for sowing by country - Calendar year 2015**

Source: ISF Compilation based on official statistics and international seed trade reports

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<th>Field Crops</th>
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<tr>
<td>Total</td>
<td>5152</td>
<td>20</td>
<td>86'274</td>
<td>90'851</td>
<td>206</td>
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### Exports of seed for sowing by country – Calendar year 2015

<table>
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<th>Country</th>
<th>Vegetable Crops</th>
<th>Flower seed</th>
<th>Field Crops</th>
<th>Total</th>
<th>Vegetable Crops</th>
<th>Flower seed</th>
<th>Field Crops</th>
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<td>69</td>
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<td>0</td>
<td>94</td>
<td>94</td>
<td>3</td>
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<tr>
<td>Nigeria</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
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<td>South Africa</td>
<td>1'463</td>
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<td>125'000</td>
<td>126'463</td>
<td>25</td>
<td>0</td>
<td>78</td>
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<tr>
<td>Tanzania</td>
<td>65</td>
<td>107</td>
<td>3'100</td>
<td>3'272</td>
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<td>27</td>
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<td>Total</td>
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<td>107</td>
<td>215'669</td>
<td>217'398</td>
<td>38</td>
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<td>134</td>
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### Notes
- Only seed exports with a value greater than USD1 million have been reported
- Flower seed includes seed of herbaceous and non-herbaceous plants cultivated mainly for flowers
- Field crops seed includes seed of pulses, cereals, industrial crops and forages
- Vegetable crops seed includes seed of all vegetable crops
- Potato seed and mushrooms are not included
### AFSTA Members

#### Private seed companies (44 Full members)

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Contact Person</th>
<th>Telephone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hygrotech International (Pty) Limited</strong></td>
<td>1 Gerhard Braak Street, Pyramid 0120, South Africa</td>
<td>Mr. Habé Roode (General Manager)</td>
<td>27 12 545 0100, 27 12 545 0099</td>
<td></td>
<td><a href="mailto:haberoode@hygrotech.co.za">haberoode@hygrotech.co.za</a></td>
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<tr>
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<td>+27 33 413 1261</td>
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<td><a href="mailto:deniassza@seedco.co.zw">deniassza@seedco.co.zw</a></td>
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<td><a href="mailto:info@simlaw.co.ke">info@simlaw.co.ke</a></td>
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<td>+221 832 05 36</td>
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<tr>
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<td>+27 11 762 5261, +27 11 762 4111</td>
<td></td>
<td><a href="mailto:seedjhb@africa.com">seedjhb@africa.com</a> and <a href="mailto:Brad@advanceseed.com">Brad@advanceseed.com</a></td>
</tr>
</tbody>
</table>

#### Other Members

<table>
<thead>
<tr>
<th>Company Name</th>
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#### Contact Information

- **Hygrotech International (Pty) Limited**: P.O. Box 17220 – Pretoria North 0116, South Africa, Phone: 27 12 545 0100, Fax: 27 12 545 0099, Email: haberoode@hygrotech.co.za, Contact Person: Mr. Habé Roode (General Manager).
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<tr>
<th>Company Name</th>
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<th>Contact Person(s)</th>
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<tr>
<td>Capstone Seed South Africa (Pty) Ltd</td>
<td>South Africa</td>
<td>Tel: +27333304474, Fax: +27333303252, Email: <a href="mailto:andrew@capstone.co.za">andrew@capstone.co.za</a>, Contact Persons: Mr Andrew Taylor and Philip Taylor</td>
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<tr>
<td>COTUGRAIN</td>
<td>Lot N°9-Zone Industrielle- Saint Gobain, 2014 –Mégrine- Tunisie</td>
<td>Tel: +216 71 426 313, Fax: +216 71 426 644, Email: <a href="mailto:cotugrain@gnet.tn">cotugrain@gnet.tn</a>, Contact Person: Mr. Adel Ghariani</td>
</tr>
<tr>
<td>Wienco Ghana</td>
<td>Tel: +233 24 40 00 00, Email: <a href="mailto:kotey@wienco.com">kotey@wienco.com</a>, Contact Person: Mr. William Kotey</td>
<td></td>
</tr>
<tr>
<td>COTUGRAIN</td>
<td>2, Nagib Mahfouz st. Nasr City, Cairo Egypt</td>
<td>Tel: +202 22755041/2278509, Fax: +202 22755043, Email: <a href="mailto:Raman.sehgal@hytechseed.com">Raman.sehgal@hytechseed.com</a>, Contact Person: Mr. Raman Sehgal</td>
</tr>
<tr>
<td>Semagri, BP 5655 Douala, Cameroun</td>
<td>Tel: +237 33 47 52 41, Fax: +237 33 47 52 46, Email: <a href="mailto:semagri@semagicrcmr.com">semagri@semagicrcmr.com</a>, <a href="mailto:alain.kanmegne@agrivisioncmr.com">alain.kanmegne@agrivisioncmr.com</a>, Contact Person: Mr. Alain Bermond Kanmegne</td>
<td></td>
</tr>
<tr>
<td>Neema Agricole du Faso (NAFASO)</td>
<td>P.O. Box 3240 Bobo-Dioulasso 01, Bobo-Dioulasso, Burkina Faso</td>
<td>Tel: +226 20 98 00 65/20 96 63 27, Mobile: +226 70 31 84 25, Email: <a href="mailto:nafaso@yahoo.fr">nafaso@yahoo.fr</a>, Website: <a href="http://www.nafaso-burkina.com">www.nafaso-burkina.com</a>, Contact Person: Mr. Abdoulaye Sawadogo, General Manager</td>
</tr>
<tr>
<td>Zambia Seed Company</td>
<td>P.O. Box 35441 Lusaka Zambia</td>
<td>Tel: +260 211 243762, Fax: +260 211 248028, Email: <a href="mailto:zamseed@zamnet.zm">zamseed@zamnet.zm</a>, <a href="mailto:seed@zamnet.zm">seed@zamnet.zm</a>, Contact Person: Mr. Benson Zulu</td>
</tr>
<tr>
<td>Prime Seeds Pvt Ltd – Zimbabwe</td>
<td>318 Hillside Road, Msasa, Harare, Zimbabwe</td>
<td>Email: <a href="mailto:office@primeseed.co.zw">office@primeseed.co.zw</a>, Contact Person: Mr. William Ranby</td>
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<tr>
<td>United Seeds CCP – South Africa</td>
<td>P.O. Box 101385, Moroleta Park, 0044 South Africa</td>
<td>Tel: +27 832308444/ +27 836471146, Fax: +27 865657090, Email: <a href="mailto:drgaborbarla@gmail.com">drgaborbarla@gmail.com</a>, Contact Person: Dr. Barla-Szabo Gabor</td>
</tr>
<tr>
<td>CIMBRIA East Africa Ltd – Kenya.</td>
<td>Muiri Lane 10, Off Langata Road</td>
<td>P.O. Box 24580 - 00502, Karen – Nairobi, Kenya</td>
</tr>
<tr>
<td>Kannar Earth Science Pty Ltd – South Africa</td>
<td>Address: PO Box 4630 Edenvale 1610 South Africa</td>
<td>Tel: +27 11 372 4700, Fax: +27 11 372 4710, Email: <a href="mailto:Lyle.Peters@kannar.co.za">Lyle.Peters@kannar.co.za</a>, Website: <a href="http://www.kannargroup.com">http://www.kannargroup.com</a>, Contact Person: Mr. Lyle Peters</td>
</tr>
<tr>
<td>Bayer East Africa – Kenya</td>
<td>Thika Rd /Outering Rd, Ruaraka</td>
<td>P.O. Box 30321 - 00100 GPO, Nairobi, Kenya</td>
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<tr>
<td>The Lane Trading – Commercio Geral</td>
<td>Rua 21 de Janeiro S/N Morro-Bento, Angola</td>
<td>Tel: +244923345297 and +244912509088, Email: <a href="mailto:pereira2.ngola@gmail.com">pereira2.ngola@gmail.com</a> and <a href="mailto:preirangola@yahoo.com">preirangola@yahoo.com</a>, Contact Person: Mr. Pereira Ngola (Director General)</td>
</tr>
<tr>
<td>Bayer (Ply) Ltd</td>
<td>Wrench rd 27, Isando 1600, South Africa</td>
<td>P.O. Box 143, Isando 1600, South Africa</td>
</tr>
<tr>
<td>MRI Seed Zambia Ltd</td>
<td>Plot No 5255 Mukwa road</td>
<td>Tel: +260 211244766; +260977771195, Email: <a href="mailto:info.mriseed@syngenta.com">info.mriseed@syngenta.com</a>, Contact Person: Mr. Given Mudenda</td>
</tr>
<tr>
<td>Monsanto Zambia Ltd</td>
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</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Contact Person</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Victoria Seeds Ltd – Rwanda</td>
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<td></td>
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<td>Contact person: Mr. Dilip Gokhale</td>
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<td></td>
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<td></td>
<td><a href="mailto:Charles@sorghumafrika.com">Charles@sorghumafrika.com</a></td>
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<tr>
<td>AGRO ASTEL Suarl</td>
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<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Contact Person: Mr. Bruno Tinland and Mrs Stéphanie Yada</td>
<td></td>
</tr>
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<td>Tel : +226 64 07 34 09, +226 57 17 86 86</td>
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<td></td>
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<td></td>
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<tr>
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<td>Tel: +254731 631 118</td>
<td>Email: <a href="mailto:info@qualibasicseed.com">info@qualibasicseed.com</a>,</td>
<td></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:wanjiru@qualibasicseed.com">wanjiru@qualibasicseed.com</a>, <a href="mailto:andy@Qualibasicseed.com">andy@Qualibasicseed.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contact person: Mr. Driss Morabit, Directeur Général</td>
<td></td>
</tr>
<tr>
<td>Maslaha Seeds Limited</td>
<td>Plot 87, Rijia Road, Industrial Estate, , Gusu, Zamfara State, Nigeria, P.O. Box 63, Gusu</td>
<td>Mr. Adel Midany</td>
</tr>
<tr>
<td>Tel +2348062774866, +234838051923, Email: <a href="mailto:maslahaseeds@yahoo.co.uk">maslahaseeds@yahoo.co.uk</a></td>
<td>Contact Person: Managing Director, Sadi Suleiman Dansadau</td>
<td></td>
</tr>
</tbody>
</table>

### Seed Associations in Africa (full members) 26 Seed Associations

<table>
<thead>
<tr>
<th>Association Name</th>
<th>Address</th>
<th>Contact Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMPROSEM</td>
<td>B P 1156, Lot II H Besarety, Antananarivo 101 Madagascar</td>
<td>Mr. Eddy Randrianatsimbazafy</td>
</tr>
<tr>
<td>Tel: +261330704347 or +261340754347</td>
<td>Email: <a href="mailto:ofmata@moov.mg">ofmata@moov.mg</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contact Person: Mr. Eddy Randrianatsimbazafy</td>
<td></td>
</tr>
<tr>
<td>Association des Producteurs Privés des Semences du Niger (APPSN) rue 61 Porte 223 Kouara Kano</td>
<td>P.O. Box 11239, Niamey, Niger</td>
<td>Mr. Salifou Mahaman</td>
</tr>
<tr>
<td>Tel: +227 20 37 44 28</td>
<td>Cell: +227 96 96 20 34, Fax: +227 20 75 23 55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:masalifou@yahoo.com">masalifou@yahoo.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contact Person: Mr. Salifou Mahaman</td>
<td></td>
</tr>
<tr>
<td>Chambre Nationale Syndicale du Commerce des Semences et Plants (UTICA) 17 rue Abderrahmane Jaziri, Tunis 1002, Tunisia</td>
<td>Tel: 216 71 34 76 71, Fax: 216 71 34 76 71</td>
<td>Mr. Adel Midany</td>
</tr>
<tr>
<td>Tel: 216 71 34 76 71, Fax: 216 71 34 76 71</td>
<td>Email: <a href="mailto:seeds.tunisia@yahoo.com">seeds.tunisia@yahoo.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contact Person: Mr. Riadh Gabsi</td>
<td></td>
</tr>
<tr>
<td>Egyptian Seed Industry Association (ESIA)</td>
<td>Manorly Towers No.5, 14th Floor qprt.4, ElBahr ALAzam Road GIZA, Egypt</td>
<td>Mr. Adel Midany</td>
</tr>
<tr>
<td>Tel: +202 2617 9234/5, Fax: +202 356 97975</td>
<td>Mobiles: +20122 221 2202/ +20114 119 2577</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:eg.esia@yahoo.co.uk">eg.esia@yahoo.co.uk</a>, <a href="mailto:sidahmed.adel@yahoo.com">sidahmed.adel@yahoo.com</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contact Person: Mr. Adel Midany</td>
<td></td>
</tr>
</tbody>
</table>

Maslaha Seeds Limited, Plot 87, Rijia Road, Industrial Estate, , Gusu, Zamfara State, Nigeria, P.O. Box 63, Gusu Tel +2348062774866, +234838051923, Email: maslahaseeds@yahoo.co.uk Contact Person: Managing Director, Sadi Suleiman Dansadau
AFSTA Members

Union Nationale des Producteurs des Semences du Burkina Faso (UNPSB), 01 BP 3240
Bobo Dioulasso, Burkina Faso
Email: nafaso@yahoo.fr
Tel: +226 20966327; 70318425; 76612417
Contact Person: Mr. Abdoulaye Sawadogo

Seed Entrepreneurs Association of Nigeria (SEEDAN)
c/o Premier Seed Nigeria Limited
Chikajji Industrial Estate, P.O. Box 1673, Zaria
Tel: +234 69 33 48 04/331630
Fax: +234 69 33 32 02
Email: savannahseedsandlivestock@yahoo.co.uk
Contact Person: Mr. Richard Olatare

Seed Trade Association of Kenya (STAK)
P.O. Box 2581 - 00202, Nairobi, Kenya
Tel: +254 20 258 71 62, Fax: +254 20 271 36 71
Cell: +254 710 575207
Email: stak@stak.or.ke
Website: www.stak.or.ke
Contact Person: Mr. Duncan Onduu

South Africa National Seed Organisation (SANSOR)
P.O. Box 72981, Lynnwood Ridge 0040
Pretoria - South Africa
Tel: 27 12 349 1438, Fax: 27 12 349 1462
Email: genman@sansor.co.za;
lukeshni@sansor.co.za
Contact Person: Dr Lukeshni Chetty

Tanzania Seed Trade Association (TASTA)
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( Kibo Seeds 255 0272 503259), Tanzania
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Email: bobshuma08@hotmail.com
Contact Person: Mr. Bob Shuma

Union Nationale Interprofessionnelle des Semences (UNIS),
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Email: thiamodou@yahoo.fr
Contact Person: Mr. Modou Thiam

Uganda Seed Trade Association (USTA)
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P.O. Box 29726, Kampala, Uganda
Tel: +256 772 601803/+256 701 601803
Email: usta@usta.ug and nelsonmasereka@gmail.com
Contact Person: Mr. Nelson Masereka

Zambia Seed Trade Association (ZASTA)
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Lumumba Post Office, Lusaka, Zambia
Tel: +260 211 258646 Cell: +260 9666780497
Email: zasta@zasta.net
Contact Person: Dr. Watson Mwale

Zimbabwe Seed Trade Association (ZSTA)
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P.O. Box A 1906, Avondale, Harare, Zimbabwe
Tel: 263 4 700655 / 701846/701795
Fax: 263 4 702023
Email: denias.zaranyika@seedcogroup.com
Contact Person: Mr. Dennis Zaranyika

Association Marocaine des Semences et Plants (AMSP)
5, rue Oum Errabie, App.n°4, 3ème Etage, Agdal-Rabat.
Tel: 05.37.68.25.17
Fax: 05.37.68.25.07
Email: m.elbedraoui@gmail.com
Contact Person: Mr. Mariam El Bedraoui

Association Interprofessionnelle des Semences du Congo (AISC)
Tel: +243 9923853
Contact Person: Mr. Pierre Bukasa & Mr. Richard Mula
Email: bukasapierre@gmail.com and secretariat.aisc@yahoo.fr

Association Semenciére du Mali (ASSEMA)
B.P. 2336 – Bamako
Avenue l’Artois, Porte 443 N’Golonina
Commune 2 – Bamako
Tel: 223 221 36 43, Fax: 223 221 36 43
Email: mkayentao@yahoo.fr
Contact Person: Mr. Mamadou Kayentao

Seed Trade Association of Malawi (STAM)
P.O. Box 2505, Lilongwe 3, Malawi
Tel: +265 01 710144
Email: staminformation@gmail.com
Contact Person: Mr. Supply Chisi

Ethiopia Seed Growers & Producers Association (ESGPA), P L C 1134, Addis Ababa – Ethiopia
Tel: 251 1 510 155, Fax: 251 1 510 155
Email: esgpa10@gmail.com, lemmades2014@gmail.com
Contact Person: Mr. Melaku Admassu or Mr. Lemma Desalgne

Seed Trade Association of Sudan (SSTA)
Tel: +249912132121
Email: sudsta1987@gmail.com;
sud.seedasso@yahoo.com
Contact Person: Mr. Mahmoud Seddon

Association National du Commerce des Semences de la Côte d’Ivoire (ANASEMCI) Apollinaire
Tel: 0022507887089, Fax: 0022522413743
Email: koutouass@yahoo.fr
Website: http://arlasemci.net/
Tel: +22522006833 and +22522413743
Email: dibyazi@live.fr
Contact Person: Mr. Azi Leopold Diby
## AFSTA Members

<table>
<thead>
<tr>
<th>Seed Associations/ Seed Companies from Outside Africa (38 Associate Members)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American Seed Trade Association (ASTA)</strong>&lt;br&gt;225 Reinekers Lane&lt;br&gt;Suite 650 - Alexandria – Virginia&lt;br&gt;22314 – 2875, USA&lt;br&gt;Tel: 1 703 837 8140, Fax: 1 703 837 9365&lt;br&gt;Email: <a href="mailto:mkohn@amseed.com">mkohn@amseed.com</a>&lt;br&gt;Contact person: Mrs. Michelle Kohn (Director, International Programs)</td>
</tr>
<tr>
<td><strong>Vikima Seed A/S Industriparken 9, 4960 Holeby</strong>&lt;br&gt;Tel: +45 54 60 70 10&lt;br&gt;Web: <a href="http://www.vikima.com">www.vikima.com</a>&lt;br&gt;Contact: Mr. Dennis D. Pedersen (Area Sales Manager)&lt;br&gt;E-mail: <a href="mailto:ddp@vikima.com">ddp@vikima.com</a></td>
</tr>
<tr>
<td><strong>Takii Europe B.V., Hoofdweg 19, 1424 PC Dekwakel, The Netherlands</strong>&lt;br&gt;Tel: +31(0)297-345700&lt;br&gt;Email: <a href="mailto:sni@takii.eu">sni@takii.eu</a>&lt;br&gt;Contact person: Mr. Stive Niyungeko</td>
</tr>
<tr>
<td><strong>Tokita Seed Company Limited</strong>&lt;br&gt;1069 Nakagawa, Saitma-Shi Saitama-Ken 330-8532, Japan&lt;br&gt;Tel: 81 48 686 7235, Fax: 81 48 688 1167&lt;br&gt;Email: <a href="mailto:ttokita@tokitaseed.co.jp">ttokita@tokitaseed.co.jp</a> <a href="mailto:mgotoh@tokitaseed.co.jp">mgotoh@tokitaseed.co.jp</a>&lt;br&gt;Contact Person: Mr. Mark Goto (Chief, International Division)</td>
</tr>
<tr>
<td><strong>Bejo Zaden B.V.</strong>&lt;br&gt;P.O. Box 50&lt;br&gt;1749 ZH Warmenhuizen&lt;br&gt;Tel: +31 226 396162&lt;br&gt;Contact: Mr. André Dekker&lt;br&gt;Email: <a href="mailto:a.dekker@bejo.nl">a.dekker@bejo.nl</a>&lt;br&gt;Website: <a href="http://www.bejo.com">www.bejo.com</a></td>
</tr>
</tbody>
</table>
AFSTA Members

Centre de Co-operation Internationale en Recherche Agronomique pour le Développement - CIRAD  
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Contact Person: Mr. Ed Swier

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Rijk Zwaan Export B.V  
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Burg CreZeelaan 40, 2678 KK DE LIER  
The Netherlands  
Email: j.omvlee@rijkzwaan.nl and v.neve@rijkzwaan.nl  
Contact Person: Mr. Jan Omvlee

Syngenta Foundation For Sustainable Agriculture  
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CH-4002-BASEL, Switzerland  
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Email: george.osure@syngenta.com  
Contact Person: Mr. George Osure Kena

Indo-American Hybrid Seeds (India) Pvt Ltd.,  
Post Box.No. 7099, 7th KM,  
Banashankari-Kengeri link Road,  
Sy.No: 13/4/14, Channasandra,  
Rajarajeshwari Nagar (Post), Bengaluru - 560098  
Tel: +918028611499 / +918028611450  
Fax: +918028612912  
Mob. No: +9198440914442  
Email: santosh@indamseeds.com,  
hema@indamseeds.com  
Contact Person: Mr. Arthur Santosh Attavar, Managing Director

HM Clause Veg  
Rue Louis Saillant  
26800 Portes Les Valence – France  
Tel: + 33 4 75 57 57 57  
Fax: + 33 4 75 57 57 90  
Email: lydie.montredon@hmclause.com  
Contact Person: Ms. Lydie Montredon

Takii & Company Limited  
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Shimogyo-ku, Kyoto, Japan 600-8686 Company  
Tel: +81(0)75 365 0123  
Email: daichi-hashiyada@takii.co.jp  
Contact person: Mr. Daichi Hashiyada  
International Sales Dept.

INCOTEC – South Africa  
P.O. Box 19999, Ashburton, South Africa 3213  
Tel: +27 333 861560/1; Fax: +27 333 861474  
Email: ISA.Admin@incotec.com;  
tertia.erasmus@incotec.com  
Contact person: Dr Erasmus Tertia

Nirit Seeds Ltd – Israel  
Moshav Hadar Am Israel 42935  
Tel: +972-9-8322435  
Mobile: +972-54-6668201  
Fax: +972-9-8322438  
Email: hana@niritseeds.com  
Contact Person: Ms. Hana Slabbaert

Tera Seeds Srl – Italy  
Via della Rotaia, 4, 47035 Gambettola Forlì - Cesena, Italy  
Phone:+39 0547 653884  
Fax: +39 0547 657634  
Email: dmagnifico@teraseeds.com  
Contact Person: Mr. Domenico Magnifico

Seed Processing Holland B.V., P.O. Box 32  
Tel: +31 228 353000  
Fax: +31 228 35001  
Email: sylvia.jorritsma@seedprocessing.nl  
Contact Person: Ms. Sylvia Jorritsma

Hazera Seeds Ltd  
Beruriam, M.P Shikmim, 7983700 Israel  
Tel: +97288508815  
Email: info@hazera.com and nili.snir@hazera.com  
Contact Person: Mr. Jawdat Badawieh
### AFSTA Members

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Contact Person</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Euralis Semences – France</strong></td>
<td>Avenue Gaston Phoebus, 64231, Lescar, France&lt;br&gt; Tel: +33 5 59 92 38 38 /+33 5 59 92 39 82&lt;br&gt; Fax: +33 5 59 77 60 31&lt;br&gt; Email: <a href="mailto:jean-pierre.dufourcq@euralis.com">jean-pierre.dufourcq@euralis.com</a>&lt;br&gt; Contact Person: Mr. Jean Pierre Dufourcq</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Limagrain Group (Vilmorin and Co), Biopôle Clermont</strong></td>
<td>Limagne rue Henri Mondor 63330, Saint Beauzire, France&lt;br&gt; Tel: +33 4 45 400 108 / +33 473 634 313&lt;br&gt; Fax: +33 473 634 004&lt;br&gt; Email: <a href="mailto:frederic.savin@limagrain.com">frederic.savin@limagrain.com</a> and <a href="mailto:valerie.guenaud@limagrain.com">valerie.guenaud@limagrain.com</a>&lt;br&gt; Contact Person: Mr. Frédéric Savin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overseed Srl, Via Brigenti, 15, Agna PD, Italy</strong></td>
<td>Tel:+39 049 538 1270&lt;br&gt; Email: <a href="mailto:info@overseed.eu">info@overseed.eu</a>&lt;br&gt; Contact Person: Mr. Salvatore Occhipinti</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ICS France, ZA Croix-Fort 12 Rue du Soleil 17220 La Jarrie France</strong></td>
<td>Tel: +33 5 46 35 28 28&lt;br&gt; Fax: +33 5 46 35 28 29&lt;br&gt; Email: <a href="mailto:cf@ics-agri.com">cf@ics-agri.com</a>&lt;br&gt; Contact Person: Mrs. Celine Fiorelli</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Known-You Seed Co., Ltd</strong></td>
<td>No 114-6 , Zhuliao Road, Dashu districct, Kaoshiung 84043, Taiwan&lt;br&gt; Tel: +886 7 651 9668, Fax: +886 7 652 3491&lt;br&gt; Email: <a href="mailto:afr@knownyou.com">afr@knownyou.com</a>, <a href="mailto:morrison@knownyou.com">morrison@knownyou.com</a>&lt;br&gt; Contact Person: Mr. Morrison Lin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GSN Semence</strong></td>
<td>Rue de la Menoue 32400 Riscle (France)&lt;br&gt; Tel: +33 5 81 23 80 00&lt;br&gt; Fax: +33 5 81 23 80 01&lt;br&gt; Email: <a href="mailto:gsn@vivadour.com">gsn@vivadour.com</a>&lt;br&gt; Contact Person: Mr. Bernard Nabarro</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>East West Seed Thailand</strong></td>
<td>50/1 M.2 Sainoi-Bangbuathong Road, Sainoi, Nonthaburi 11150 Thailand&lt;br&gt; Telephone: +6628317700&lt;br&gt; Fax: +6629237794&lt;br&gt; Email: <a href="mailto:porntipa.niyatanon@eastwestseed.com">porntipa.niyatanon@eastwestseed.com</a>&lt;br&gt; Contact Person: Porntipa Niyalanon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KWS SAA SE</strong>, Finanzbuchhaltung, Postfach 13 63, 37554 Einbeck – Germany&lt;br&gt; Tel: +49 5561 311-245, Fax: +49 5561 311-95245&lt;br&gt; Email: <a href="mailto:henning.vonderohe@kws.com">henning.vonderohe@kws.com</a>, <a href="mailto:Bettina.Haussmann@kws.com">Bettina.Haussmann@kws.com</a>&lt;br&gt; Contact person: Dr. Henning von der Ohe and Dr. Bettina Haussmann</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Service Providers (6 Members)

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Contact Person</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CropLife International</strong></td>
<td>Avenue Louise 326, Box 35-B-1050 Brussels-Belgium&lt;br&gt; Tel: +32 2 542 04 10, Fax : +32 2 542 04 19&lt;br&gt; Email: <a href="mailto:croplife@croplife.org">croplife@croplife.org</a> and <a href="mailto:Craig.Rickard@croplife.org">Craig.Rickard@croplife.org</a>&lt;br&gt; Contact Person: Mr. Craig Rickard</td>
<td>ICRISAT Nairobi&lt;br&gt; P.O. Box 39063, Nairobi 00623, Kenya&lt;br&gt; Tel: +254-20 7224536&lt;br&gt; Fax: +254-20 7224001&lt;br&gt; Email: <a href="mailto:m.siambi@cgiar.org">m.siambi@cgiar.org</a>&lt;br&gt; Contact: Dr Moses Siambi</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AVRDC-The World Vegetable Center, Regional Center for Africa</strong></td>
<td>P.O. Box 10, Duluti-Arusha, Tanzania&lt;br&gt; Tel: +255 27 2553093/2553102&lt;br&gt; Fax: +255 27 2553125&lt;br&gt; Email: <a href="mailto:thomas.dubois@worldveg.org">thomas.dubois@worldveg.org</a>&lt;br&gt; Contact Person: Mr. Thomas Dubois</td>
<td>African Fertilizer and Agribusiness Partnership (AFAP)&lt;br&gt; P.O Box 53, Rivonia, Johannesburg 2128&lt;br&gt; Tel: +27118447320&lt;br&gt; Email: <a href="mailto:info@afap-partnership.org">info@afap-partnership.org</a>&lt;br&gt; Contact Person: Jason Scarpone</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IFDC, ICIPE Duduville Campus</strong></td>
<td>Kasarani, Thika Road&lt;br&gt; P O Box 30772-00100, Nairobi, Kenya&lt;br&gt; Tel : +254 208632720/ 0729075745&lt;br&gt; Email: <a href="mailto:shumphreys@ifdc.org">shumphreys@ifdc.org</a>&lt;br&gt; Contact Person: Dr Steven Humphreys</td>
<td>African Agricultural Technology Foundation&lt;br&gt; P.O. Box 30709-0100, Nairobi, Kenya&lt;br&gt; Tel +254 20 422 3700&lt;br&gt; <a href="mailto:aatf@aatf-africa.org">aatf@aatf-africa.org</a>&lt;br&gt; Contact Person: Dr Denis Kyetere Executive Director</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of countries in AFSTA (36 countries)<br> - 25 African countries, - 11 countries outside Africa
Why join AFSTA?

Joining AFSTA is a long term investment and the benefits of becoming a member include:

1. **Visibility:** Member company’s logo is listed on AFSTA website and linked to the website of the members.
2. **Directory listing in the African Seed Magazine:** All members’ contact addresses are published annually in the African Seed Magazine distributed during the annual congress and is also available on line.
3. **Provision of up to date information on seed matters:** You will have information on the seed industry in Africa regularly through our quarterly electronic newspaper (E-Review) and Flash News sent from time to time when important news on the seed industry come up.
4. **Access to our website:** All AFSTA members are given a user account with username and password to access the AFSTA website. Once logged in using these credentials (username and password), you will be able to offer seed items for sale.
5. **Low Congress Fees:** Members pay lower rates when registering to AFSTA annual congresses.
6. **Official introduction:** New members are officially introduced at the AFSTA General Assembly which gives them a lot of visibility, given Membership Certificates and have an opportunity to make a short speech during the event.
7. **Networking:** AFSTA offers members more opportunities to network with the African seed business people and companies hence opportunity to expand own business in the continent.
8. **Platform to share experiences:** Members use AFSTA as a platform to share experiences, show case their products and discuss issues that improve their businesses and trade in high quality seeds.
9. **Knowledge:** AFSTA members get the opportunity to appreciate the various linkages and use them to improve their seed businesses.
10. **Integration:** The annual congresses venue rotates among the member countries and this offers members an opportunity to interact and learn from the diverse cultures in Africa.
Being a farmer is about more than just working the land. You have dedicated your life to feeding the world – to providing a sustainable source of much-needed food and raw materials. For 60 years, PANNAR has been proud to accompany you along this journey, supporting and empowering you in every way.

Our Sustainable Farming Formula

- DIVERSE PRODUCTS
- AGRONOMY SERVICES
- RISK MANAGEMENT
- SUCCESS AND PROSPERITY

Supporting sustainable food production
DEFINITE HARVESTS, DEFINITE PROFITS
A bumper harvest begins with the right seed