PACA News

Quarterly Newsletter of the Partnership for Aflatoxin Control in Africa-African Union VOL 4, October-December 2017

Dr Charles Tizeba, Tanzania's Minister of Agriculture, being interviewed at the maize workshop in Dar es Salaam in December 2017 © PACA

Upcoming events

- Global Food Safety Conference, 5-8 March 2018, Tokyo, Japan
- 10th Conference of The World Mycotoxin Forum, 12-14 March 2018, Amsterdam, the Netherlands
- 12th Session of the Codex Committee on Contaminants in Foods, 12-16 March 2018, Utrecht, the Netherlands
- 19th International Congress on Nutrition and Health, 12-14 April 2018, Amsterdam, the Netherlands

Vision

An Africa free from the harmful effects of aflatoxins.

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In this issue

Dear PACA community members

Thank you for your support for the PACA Secretariat and aflatoxin control, it has been a successful 2017. Over the last year, all six PACA pilot countries completed comprehensive aflatoxin control action plans with cost estimates based on country-led situational analyses studies. PACA pilot countries embedded these action plans in major national strategies, notably their Agriculture and Food Security Investment Plans. It is encouraging to see that country governments continue to provide valued leadership in aflatoxin control and are beginning to finance the plans with public budgets. Such investments are worthwhile and bring returns in the form of public health and nutrition benefits, as well as increased access to trade and improved incomes, which will enable countries to break the cycle of poverty. I reiterate that your continued partnership will be of immense value in implementing the national plans over the coming year.

The PACA Secretariat's 2018 work plan will particularly focus on the following:

- **A baseline survey on PACA II indicators** – preliminary results of the survey will be available in Q2 2018.
- **Meta-analysis of evidence of aflatoxin contamination in Africa** – a draft report is expected in May/June 2018.
- **A follow up of the capacity building training on sampling and standards for aflatoxins** – the training workshop, which was financed by the United States Department of Agriculture (USDA) and implemented in partnership with the Economic Community of West African States (ECOWAS), was crucial in addressing the gap in effective aflatoxin control. Following this foundational capacity building training, ECOWAS, PACA and USDA intend to work on clarifying and harmonizing maximum limits (MLs) for aflatoxins in key commodities in the ECOWAS region.
- **Africa Aflatoxin Information Management System (AfricaAIMS)** – agriculture, health and trade data sets have been collected from most pilot countries for the AfricaAIMS database. Completion of this data collection and production of the report on the *Status of the Aflatoxin Situation in Africa (SASA)* is expected in Q1/Q2 of 2018. The African Union Inter-Africa Bureau for Animal Resources (AU-IBAR) is upgrading its Animal Resource Information System, which is graciously hosting AfricaAIMS to help further expedite the portal.
- **PACA website** – a revamped new website is expected to be launched in Q1 2018.
- **Pilot Country-led Situational Analysis and Action Planning (C-SAAP) results** – the final reports of the C-SAAP studies and policy recommendations emanating from those reports are expected by Q1/Q2 2018 for all six pilot countries. In addition,

peer-reviewed journal articles on the reports are being developed and are expected to be published in 2018.

- **Implementation of national/regional aflatoxin control plans** – the PACA Secretariat will work with the PACA community to provide catalytic support for the implementation of the country and regional plans, as well as to track the progress of these plans.
- **Advocacy, communication and knowledge management** – the PACA Secretariat will expedite implementation of the Communication Strategy and the Knowledge Management Strategy, which were both finalized and approved by the PACA Steering Committee in 2017.
- **PACA Partnership Platform Meeting (PPM) 2018** – the **Third PACA PPM will be held on 2-4 October 2018**. Save the date! (Please note that the venue is still under review, but will likely be in West Africa).

We are grateful to count on your continued support during the exciting year ahead.

Amare Ayalew (PhD)

Program Manager, PACA, AUC

Experts in Africa meet to address aflatoxin contamination in the maize value chain

Maize drying in Ghana © Ghanaian Times

An African regional workshop to address the challenges caused by aflatoxins in the maize value chain was held in Dar es Salaam, Tanzania from 4-5 December 2017. The theme was 'Unleashing the full potential of the maize value chain through aflatoxin management'.

The workshop was co-convened by the PACA Secretariat in partnership with the International Institute of Tropical Agriculture (IITA), the International Maize and Wheat Improvement Center (CIMMYT), the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH), the CGIAR Research Program on Maize (MAIZE), the Center for Research, Agricultural Advancement, Teaching Excellence and Sustainability in Food and Nutrition Security (CREATES) of Nelson Mandela African University of Science and Technology and the Tanzanian Government represented by Tanzania Food and Drug Authority (TFDA).

It is estimated that 208 million people in Africa depend on maize for food security and economic wellbeing. Of the 22 countries in the world in which maize constitutes the highest percentage of calorie intake, 16 are in Africa. However, maize is one of the most susceptible crops to aflatoxin contamination; a problem that is yet to receive attention among many policy makers in Africa.

PACA and its partners therefore organized the workshop with the aim of galvanizing a multi-sectoral response to the challenges aflatoxins pose to maize value chains in Africa, particularly in terms of health, food security and trade.

The workshop was attended by over 100 participants drawn from the private sector, civil society, the public sector, regional organizations, research and academia, small and medium sized enterprises, the media, and non-governmental organizations. Technical and development partners, such as the World Food Programme (WFP) and the Food and Agriculture Organization of the United Nations (FAO), were also present.

Dr Charles Tizeba (MP), Tanzania's Minister of Agriculture, officially opened the workshop by acknowledging the coordination and leadership role played by the AUC in aflatoxin mitigation on the continent. He called for African governments to show political commitment by taking charge of aflatoxin mitigation efforts in their respective

countries, including the allocation of resources.

Mr Khecha Abderrahmane, Senior Policy Officer at the AUC, said the success of aflatoxin mitigation efforts on the continent will go a long way to support the Malabo commitments made by the African heads of state to boost agriculture and food security, in a welcome address delivered on behalf of Director of the Department of Rural Economy and Agriculture at the AUC.

Dr Bodduppali Prasanna, Director of the CGIAR Research Program, MAIZE, and the Global Maize Program, CIMMYT, encouraged stakeholders on the continent to explore, among other approaches, good traditional methods and technologies for the management of aflatoxin contamination – such as nixtamilization, which is being successfully practiced in Mexico – in his keynote address.

Other speakers called on strong partnerships between stakeholders to address the problem of aflatoxin contamination in maize, including Dr Chris Muyunda, Chairman of the Governing Council of the Comprehensive Africa Agriculture Development Programme Non State Actors Coalition and Mr Hiiti Sillo, Director General of the TFDA.

The following recommendations were produced from the workshop:

- Increase awareness and advocacy of aflatoxins in Africa to create an enabling policy environment for governments;
- Provide simple contamination testing technologies to farmers;
- Standardize aflatoxin assessment tools;
- Increase investment in post-harvest management systems;
- Integrate approaches to control aflatoxins in human food and animal feeds;
- Enhance allocation of resources by stakeholder institutions;
- Focus on private sector investments.

African countries urged to establish aflatoxin sampling and testing protocols

Participants at the aflatoxin sampling and testing training workshop in Dakar, Senegal © PACA

African Member States are advised to adopt aflatoxin sampling and testing protocols that are based on scientific principles. USDA, the Foreign Agricultural Service (FAS) and North Carolina State University (NCSU) have been working with Regional Economic Commissions (RECs) in Africa to train key policy makers, as well as food analysts and inspectors, in the principles for establishing sampling and analysis protocols for monitoring aflatoxins in foods and the importance of doing so.

Appropriate sampling and testing protocols are usually established on the basis of aflatoxin standards set for foods. Sampling and analysis protocols should therefore be established together with aflatoxin standards for foods. Unfortunately, some countries in Africa have adopted aflatoxin standards to protect public health and promote fair food trade without setting sampling protocols for their implementation. It is challenging to enforce aflatoxin limits in foods without the implementation of adequate sampling and analysis protocols to test the levels of toxins in foods.

Major stakeholders have therefore identified a way to ensure proper implementation and enforcement of aflatoxin limits in food and assure that only safe products reach the local population and importing countries. A proper sampling and testing regime is their solution for this, but it requires capacity building of state agencies' personnel in this area. It is in this context, that USDA, FAS and the NCSU have been supporting training on aflatoxin sampling and testing for African regions, in collaboration with the Common Market for Eastern and Southern Africa (COMESA) and ECOWAS.

An earlier training workshop was organized in 2015 in Dar es Salaam, Tanzania, which developed sampling and testing protocols for maize and groundnuts for COMESA countries. A similar training program was held on 12-13 December 2017 in Dakar, Senegal for countries in the ECOWAS region. The Dakar workshop was attended by about 50 participants, including technical and policy experts from the public sector responsible for standards and policy formulation, laboratory analysis and food inspection.

Some of the recommendations from the workshop were as follows:

- ECOWAS and PACA to carry out a scoping study to identify the gaps in the aflatoxin

sampling and testing capacity of state agencies in the ECOWAS region;

- Generate data for performing risk assessments for aflatoxin standard-setting for priority crops;
- Harmonize or develop sampling and testing protocols for the 15 countries of the ECOWAS region;
- Engage the private sector in aflatoxin control initiatives;
- Governments and donors must make greater effort to upgrade or establish laboratories for aflatoxin testing and sampling in all the member states;
- Build capacity for aflatoxin control in the ECOWAS region;
- Ensure consistent information sharing and sensitization for all actors in agricultural value chains;
- Strengthen institutional and regulatory frameworks for aflatoxin standards enforcement.

Aflatoxin sampling and testing workshop in Dakar, Senegal on 12 December 2017 © PACA

The 8th Africa Day of Food and Nutrition Security

Over 180 participants met for the 8th Africa Day of Food and Nutrition Security in in Abidjan, Côte d'Ivoire. © Georgina Smith/CIAT

On 6-8 November 2017, PACA joined major stakeholders to celebrate the 8th Africa Day of Food and Nutrition Security (ADFNS), held in Abidjan, Côte d'Ivoire. This year's theme was, 'Advancing sustainable food systems for healthy diets and improved nutrition'.

The ADFNS was first launched in July 2010 by the AU governments and heads of state at the 15th Ordinary Session of the AU Summit in Kampala, Uganda, which is now celebrated annually under the auspices of the AUC. The ADFNS serves as a platform for rallying political and financial commitments at all levels to address the contemporary challenges of food and nutrition insecurity in Africa. The event is also used by stakeholders to share experiences and knowledge, as well as measure progress towards food and nutrition security by governments and multi-stakeholder partners.

The 8th ADFNS was attended by over 180 participants from about 25 countries, including several ministers of agriculture, other policy makers and civil society organizations. The event was presided over by Her Excellency Mrs Josefa Sacko, AUC Commissioner for Rural Economy and Agriculture, who underscored the commitment of the AUC to supporting its member states to meet their food security and nutrition requirements in her speech at the opening ceremony.

A Regional Symposium on 'Sustainable food systems for healthy diets and improved nutrition' was held as part of the occasion.

PACA's participation at the 8th ADFNS included:

- A presentation on 'Regional and national systems for food safety and aflatoxin control' at the Regional Symposium whose outcome declarations were endorsed by the ADFNS;
- A PACA exhibition booth, which provided information on the aflatoxin challenge in Africa and copies of the book *Good Nutrition; Perspectives for the 21st Century*, featuring a chapter from PACA;
- Highlighting the commitment of the AUC to prioritizing and supporting interventions for aflatoxin control, which has become one of the continent's most pervasive food safety challenges;
- Providing information on efforts towards food safety and aflatoxin control at REC and national levels.

Participants of the Regional Symposium and ADFNS underscored the need to "strengthen food systems to improve the safety of foods, including the reduction of aflatoxins in food".

The Gambian government approves national aflatoxin mitigation measures

Freshly harvested groundnuts in The Gambia © Sidi Sannah

Aflatoxin mitigation efforts in The Gambia have received significant national attention with the approval of the National Food Safety and Quality Amendment Bill at a cabinet sitting presided by President Adama Barrow. Parts of the National Food Safety and Quality Amendment Bill contain extracts from The Gambia National Aflatoxin Control and Investment Plan (NACAIP), which was developed with support from PACA.

A government statement indicated that the approved bill will be presented to the Gambian National Assembly for enactment into a law that will, "provide the legal environment to protect agricultural products and make them viable to compete in the international market."

Vice President, Fatoumata Jallow Tambajang, who is reported to have presented the proposed bill to the cabinet meeting held on 22 November 2017, acknowledged the importance of the NACAIP, which she said will help to support aflatoxin mitigation efforts for crops in The Gambia, particularly groundnuts which are both a staple and a cash crop.

The Vice President is optimistic that the mitigation of aflatoxins in agricultural products such as groundnut "will increase economic opportunities for Gambian farmers given the fact that groundnut is the country's main cash crop."

A C-SAAP study commissioned by PACA between 2015 and 2017, confirmed the prevalence of aflatoxins in major agricultural products in The Gambia, which had debilitating effects on food security, health and the economy. According to the study, the prevalence of aflatoxins in groundnut varies from 30% to 100% depending on the region of production. Yet, groundnut is one of the country's staple foods, as well as its principal export crop, contributing to approximately 66% of the country's earnings from agricultural exports.

The approval of the National Food Safety and Quality Amendment Bill is therefore a positive step towards mitigating the detrimental economic and health impacts of aflatoxin contamination in The Gambia.

Intensification of aflatoxin mitigation in The Gambia

Aflatoxin awareness and mitigation in The Gambia has been intensified with a new countrywide campaign. The awareness raising campaign was conducted from 22-29 November 2017 with support from PACA and funding from the Ministry of Agriculture, under the National Agricultural Land and Water Management Development project.

The target stakeholders for the campaign were operators along the post-harvest value chain, namely, distributors, traders, processors and consumers. The campaign was therefore designed to coincide with the harvesting season when trading in crops is most pronounced.

Spectators at one of the public awareness campaigns © PACA

Spectators at one of the public awareness campaigns © PACA

The first phase of the countrywide awareness raising campaign was held in June 2017 to target farmers and extension officers during the planting season. The second phase of the campaign was designed in an interactive drama format by traditional theatre groups in three local languages. The actual sensitisation was preceded by message development training for the traditional communicators by representatives from the National Agriculture Research Institute, the Ministry of Health and Social Welfare, the Food Safety and Quality Authority and PACA's Country Officer for The Gambia.

The traditional drama communication approach has a feedback mechanism whereby, at the end of each play, the audience is offered the chance to ask questions about aflatoxins, which were addressed by officials of the Ministry of Agriculture. In some cases, audience members with exciting experiences related to aflatoxin mitigation are encouraged to share the lessons they had learned with the audience.

The play was performed in nine market centres in six regions of the country, including the Lower River Region (Soma Market, Bureng – Wellingara Ba Market); the Central River Region – South (Brikama Ba Market, Bansang Market); the Upper River Region (Basse: Sabi Market "Lumoo"); the Central River Region – North (Wassu Market "Lumoo"); the North Bank Region (Farafenni Market) and the West Coast Region (Brikama Market, Serrekunda Market).

Major stakeholders in Nigeria strategize on aflatoxin mitigation

Major stakeholders in Nigeria have met to validate a Country-led Situational Analysis and Action Plan report and strategize on how to generate funding to support aflatoxin mitigation efforts in the country. The study was commissioned by PACA to help generate empirical data and information for the development of a pragmatic national solution to the challenges caused by aflatoxins in Nigeria.

Participants of the meetings, which were held on 7 and 19 December 2017 at Abuja, included major stakeholders such as the Federal Ministry of Agriculture and Rural Development, the Federal Ministry of Industry, Trade and Investment, the Federal Ministry of Health, the Nigerian Export Promotion Council, commodity organizations, the Manufacturers' Association of Nigeria, the WFP, the FAO, the IITA and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), among others.

As part of an initial overview at the meetings, Professor Joseph Atanda, Lead of the Agro-Promotion and Consultancy's team, who conducted the assessment for PACA, explained that the findings generally indicated that aflatoxins were a major problem in agricultural value chains in Nigeria, compounded by low public awareness.

In an economic analysis of the study findings, Professor Adebayo Shittu, a member of the Agro-Promotion and Consultancy team, said Nigeria will be able to generate between US $930 and US $1,192 million annually if the current state of aflatoxin contamination is reduced to an acceptable level. In other words, this is how much Nigeria is losing each year as a result of the inability of some agricultural products to access export markets due to aflatoxins. For example, some agricultural products have been banned from the European market since 2008 due to the unacceptable levels of aflatoxin contamination (PUNCH, 2017). Professor Shittu further added that it will cost the country US $51.3 million annually to address the aflatoxin-induced health related challenges such as liver cancer, stunting and low birth weights.

Professor Atanda and his team recommended the training of more extension officers in aflatoxin control to equip them with the requisite skills and knowledge to guide farmers on good agricultural practices. Agro-Promotion also called for a well-coordinated effort by major public institutions to contribute to the aflatoxin mitigation programs in the country.

In a presentation on how to mobilize resources for aflatoxin control, Dr Folashade Oluwabamiwo – also from the Agro-Promotion and Consultancy team – said the government of Nigeria should take the lead in allocating resources for aflatoxin mitigation and this would encourage other major funding agencies like the World Bank, African Development Bank and other international donors to contribute resources.

The recommendations made by participants of the meeting included the following:

- Improve communication regarding aflatoxins in the country (i.e. awareness creation);
- Develop simple aflatoxin test kits for farmers;
- Promote existing aflatoxin mitigation technologies, such as Aflasafe, and support the development of new ones;
- Commit resources from national and state budgets for aflatoxin mitigation;
- Establish and enforce national food safety and quality legislation, including for aflatoxin standards, regulations and codes of practice for commodities along the value chain.

FAO initiates aflatoxin mitigation project in six districts in Tanzania

In collaboration with the Ministry of Agriculture and under a Technical Cooperation Programme (TCP), FAO has initiated a project in Tanzania entitled 'Aflatoxin Mitigation Response through Dissemination of Appropriate Postharvest Management Technologies and Awareness Raising in Dodoma and Manyara Regions'.

FAO high-level meeting on aflatoxins in Tanzania © FAO

The project is in response to the aflatoxicosis outbreak that occurred in Tanzania in 2016 and is being implemented in the five worst affected districts – Chamwino, Chemba, Dodoma municipal, Kiteto and Kondoa – where the outbreak reportedly claimed several lives. Kongwa district has been added to the project area because of its international maize market at Kibaigwa, which serves neighboring countries.

The project aims at, among other objectives, raising awareness about aflatoxins, promoting good agricultural practices throughout the maize production chain, supporting the use of biocontrol methods (Aflasafe) in the context of integrated mycotoxin mitigation in maize, and promoting improved post-harvest practices and management techniques along the maize value chain.

A workshop was organized on 30 October 2017 to review progress of the project, as well as to discuss other planned activities. It was attended by about 30 participants made up of officials of the Ministry of Agriculture, the Ministry of Health, Community Development, Gender, Elderly and Children, the TFDA, and community leaders. Also in attendance was Dr Happy Magoha, PACA's Country Officer for Tanzania, who is leading the aflatoxin mitigation effort in the country under the auspices of the AUC.

Ms Margaret Natai, National Coordinator of the TCP project, mentioned that activities so far have included the introduction of the TCP project to major national stakeholders including the regional and district authorities in the project area for enhanced collaboration; sensitization meetings with farmers, ward/village leaders and other actors in the maize value chain in selected villages; and the development of aflatoxin awareness messages for actors along the maize value chain.

She said the project is placing emphasis on good agricultural practices (GAPs), such as site selection and land clearance, the selection of high quality seeds, early planting, the use of fertilizer and manure, early weeding, and disease and pest control. Ms Natai further disclosed that techniques to mitigate the risk of aflatoxin contamination would be provided to district officials, nutritionists, extension officers and farmers' groups. She also highlighted that successful trial outcomes from the use of biocontrol methods – such as Aflasafe for aflatoxin mitigation – will be shared with farmers and other stakeholders to promote best practices and enhance their adoption.

Participants commended the work of the project and called for more collaboration among stakeholders in the country's aflatoxin mitigation efforts.

Stakeholders in Malawi meet to raise resources for aflatoxin mitigation

Based on the Malawi Aflatoxin Control Plan (2018-2023), the country requires US $28 million to undertake aflatoxin mitigation interventions to avoid losing US $500 million in export losses and health interventions for the 5-year period.

A business meeting organized under the auspices of the Malawi Program for Aflatoxin Control Technical Working Group, with support from PACA, was therefore held on 14 December 2017 in Lilongwe, Malawi, to strategize on how to mobilize the required resources.

Stakeholders at the meeting included members of the Malawi Donor Committee on Agriculture and Food Security (DCAFS), development partners, parliamentarians, public institutions, the media, non-governmental organizations, civil society organizations and the private sector.

Dr Ken Ndala, Secretary for the Ministry of Industry, Trade and Tourism, officially opened the meeting and indicated that aflatoxin contamination has largely affected Malawi's trade opportunities with high value markets, including the EU, which has caused huge economic losses to the country. He also disclosed that aflatoxin contamination in animal feed is affecting the local livestock and poultry industry.

Dr Ndala further indicated that the population is exposed to the health risks of aflatoxin contamination, such as liver cancer, because most of the crops susceptible to aflatoxins are major staples of the country. He therefore called for a national concerted effort to generate the required resources to support the effective implementation of the Malawi Aflatoxin Control Plan (2018-2023).

Mr Blessings Botha of the World Bank and Chair of the DCAFS applauded the interest shown by members of the DCAFS and other development partners in the management of aflatoxins, but reiterated that a greater impact will be achieved if efforts are coordinated under the Malawi Aflatoxin Control Plan.

Mr Botha urged the government to increase public resource allocation for aflatoxin control,

Malawian groundnut processors in training © USAID

and accelerate the development and approval of policies and legal frameworks to support aflatoxin control measures in the country. He further pledged the support of the donor community towards the control of aflatoxins in Malawi.

Dr Chris Muyunda, Chairman of the Governing Council of the Comprehensive Africa Agriculture Development Programme (CAADP) Non State Actors Coalition and member of the PACA steering committee, said that through public-private partnerships, the private sector is a key driver to effectively implementing the country plan.

Ms Wezi Chunga-Sambo, PACA Program Officer responsible for Southern and Eastern Africa, emphasized the need for the public sector, development partners and the private sector to jointly strategize to raise the necessary resources to implement the plan.

The meeting concluded that, among other recommendations, a task force comprising of major stakeholders in the country be established to lead the effort in mobilizing resources.

Report reviews the economic impacts of aflatoxins in Malawi

Malawi loses approximately US $86 million annually in groundnut sales due to aflatoxins © Footprint to Africa

Stakeholders in Malawi have called for a multi-sectoral approach in the country's aflatoxin mitigation efforts because the problems of aflatoxins are complex with no single 'silver bullet' solution. This comes from a meeting held 22-23 November 2017 in Lilongwe, Malawi to review the *Aflatoxin Economic Impact Assessment in Malawi* report.

The participants, numbering about 35 with varying expertise, unanimously suggested that aflatoxin mitigation interventions be included in the strategic plans, policies and programs of the Ministry of Health, the Ministry of Agriculture, Irrigation and Water Development, the Ministry of Industry, Trade and Tourism, and the Ministry of Education. They further recommended that aflatoxin mitigation programs be mainstreamed into the Malawian Growth and Development Strategy.

According to the report, which was commissioned by PACA and carried out by a team of national researchers between 2016 and 2017, Malawi loses approximately US $86 million annually in groundnut sales alone due to its inability to meet the EU 4 ppb ML for aflatoxin contamination. The study established that the prevalent level of aflatoxins among each of the major crops, including groundnut, maize and sorghum, was above 60%.

It was also revealed that the number of aflatoxin-induced liver cancer occurrences in the country is estimated at 6,344 annually, which could result in monetary losses ranging from US $25 million to US $1.3 billion. Therefore, investing in aflatoxin prevention technologies could reduce the number of deaths and save the country millions.

ICRISAT's integrated approach for the management of aflatoxins

Decades of diligent research carried out by the ICRISAT in Africa and Asia has resulted in technologies that reduce aflatoxin contamination in groundnuts. The organization has also developed a rapid, simple, reliable and affordable test kit for detecting and quantifying aflatoxin concentrations in agricultural crops.

Fighting against aflatoxin contamination in groundnuts using an integrated approach has been a major research area for ICRISAT since its inception in 1972. The aflatoxin research and development priorities included: (i) identification and development of groundnut breeding lines with resistance to drought stresses and *Aspergillus flavus*; (ii) development and promotion of pre-and post-harvest technologies for aflatoxin mitigation; (iii) design of rapid and affordable aflatoxin detection tools; (iv) raising awareness and training of aflatoxin risks; (v) collection and analyses of grains, seeds and processed products; and (vi) setting up aflatoxin detection and quantification laboratories in countries where ICRISAT operates in Africa and Asia.

The outcome of conventional groundnut breeding efforts has been the identification of breeding lines resistant to drought stresses and aflatoxins. Simultaneously, good agricultural practices were developed and are being promoted for pre- and post-harvest aflatoxin management. These include soil fertility and moisture management as well as harvest, drying and storage technologies. Recent efforts using innovative biotechnology approaches, in partnership with American research institutions, have resulted in the development of groundnut lines free from aflatoxins thanks to a double-defense line. A high level of resistance to aflatoxin was obtained in groundnut by overexpressing antifungal plant defensins MsDef1 and MtDef4.2, and through host-induced gene silencing of aflM and aflP from the aflatoxin biosynthetic pathway.

During the decade beginning in 2000 and 2010, ICRISAT scientists successfully designed a fast, simple, reliable and affordable kit for aflatoxin detection and quantification. This kit uses a competitive enzyme-linked immunosorbent assay (cELISA) which reduced the cost of detection from US $25 to US $1 per sample. The core advantage of the kit remains the availability of the required chemicals and the possibility of analyzing numerous samples per day (up to 200).

As part of their development interventions, ICRISAT scientists have also produced polyclonal antibodies for the detection of the aflatoxin-albumin biomarker in human blood using a simple indirect competitive (IC)-ELISA for quantitative estimation of AFB1-lys adducts in human serum albumin. This tool was validated by testing 250 blood samples that included 85 HBV positive samples and 165 blood samples.

Alongside the development of tools and methodologies for aflatoxin mitigation, ICRISAT facilitated the setting up of aflatoxin detection and quantification laboratories across several countries in Africa and Asia. These laboratories currently serve as aflatoxin detection centers for groundnut, sorghum and other crops and processed products, thereby enhancing aflatoxin research and learning in the countries concerned, whilst ensuring that crops meant for local and international markets are initially screened.

In all countries where ICRISAT's research is being undertaken, capacity building events organized for value chain actors are leading to sustained increases in aptitude, knowledge and skills in pre- and post-harvest management of aflatoxins. Communication materials such as flyers, journals and articles in English, French and the major languages of the countries ICRISAT operates in, as well as radio and TV broadcasts, are sustaining and enhancing awareness about aflatoxins and options for their management.

ICRISAT has been partnering with private and public sector actors to develop and promote aflatoxin management technologies, and as such, has benefited from both technical and financial support from governments of host countries, USAID, the USDA, the McKnight Foundation, Irish Aid, Canadian International Development Agency, CFC and many others.

Despite the challenges posed by gene-environment interactions, ICRISAT is poised to continue partnering with credible institutions to contribute to food safety and security in Africa and Asia in order to prevent the consumption of aflatoxin-contaminated agricultural crops with unacceptable levels of the toxin, and their exclusion from export markets.

ICRISAT is a science-based agricultural, non-profit and apolitical international organization with headquarters at Patancheru, Telangana (India). ICRISAT also has two regional hubs and four country offices in Africa and is a member of the CGIAR System.

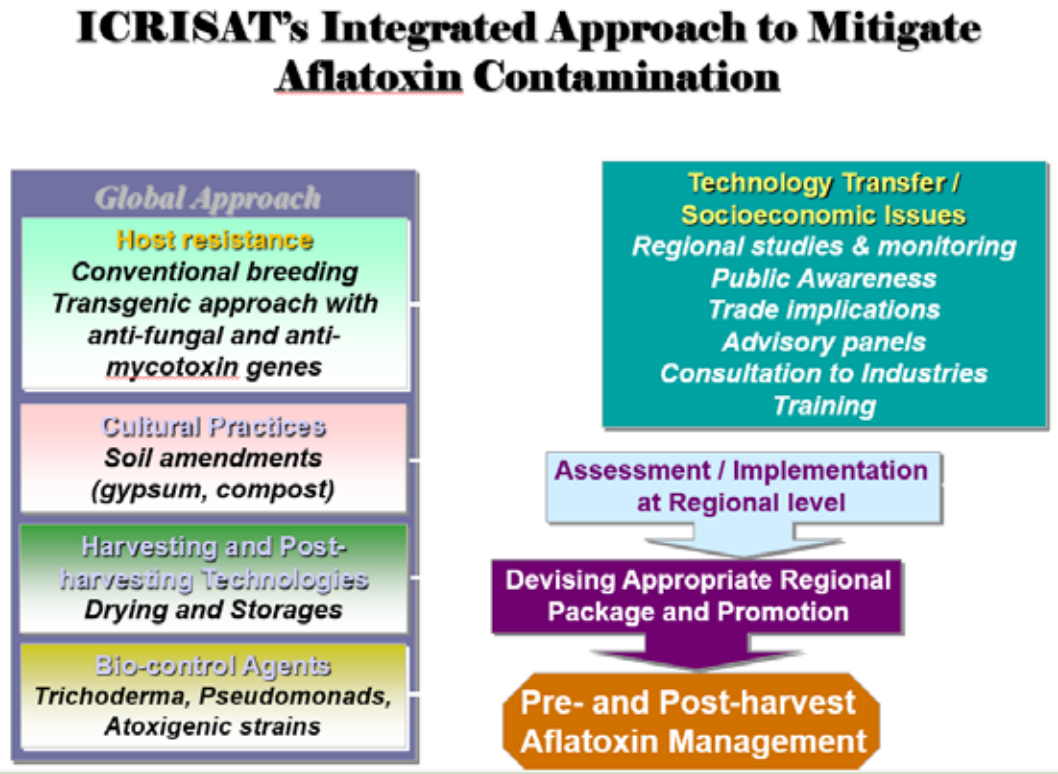

Figure 1: Integrated approach to mitigate aflatoxin contamination (Source: Waliyar, 2015)

Pictures from the regional workshop on aflatoxin control in maize








4-5 December 2017, Dar es Salaam, Tanzania © PACA