Aflatoxin Control Action Plan for ECOWAS Member States

2014-2024

PACA | Partnership for Aflatoxin Control in Africa | Partenariat pour la lutte contre l'aflatoxine en Afrique | Parceria para o Controle da Aflatoxina em África | الشراكة من أجل مكافحة الافلاتوكسين في أفريقيا

PREFACE

It is with great pleasure that I present to you the **Aflatoxin Control Action Plan (ECOACAP) for ECOWAS Member States** that has been developed in 2014 in collaboration with the African Union Commission's Partnership for Aflatoxin Control in Africa (PACA), the International Institute for Tropical Agriculture (IITA), the Forum for Agricultural Research in Africa (FARA) and other Stakeholders. This regional action plan on aflatoxin control is a comprehensive plan that identifies key actionable strategic interventions that are relevant across ECOWAS member States.

Aflatoxins have proven to be a major barrier in linking African farmers to markets, as they prevent commodities from meeting international, regional and local regulations and standards governing agricultural trade and food safety. The widespread occurrence of aflatoxins could undermine regional integration and the establishment of continental free trade areas in agricultural commodities. Aflatoxins contribute to large post-harvest losses in many crops further contributing to food insecurity and economic loss in Africa.

Aflatoxins are also a major health hazard in many ways. They are known carcinogens that cause liver cancer in humans and animals, as well as suppress the immune system. Aflatoxins are also associated with stunting in children. The majority of our population relies heavily on staple crops that are highly susceptible to aflatoxin contamination, therefore making effective management of aflatoxins an urgent necessity.

Through this regional aflatoxin control plan implementation, ECOWAS aims to improve incomes of farmers and other stakeholders such as traders and processors in the various value chains through increased quantity of safe food in the ECOWAS region; improve health of the population including farmers and consumers through increased awareness creation; and increase regional and international trade as a result of regionally harmonised policies, standards and practices.

ECOWAS, with the support of the African Union Commission and other stakeholders, is spearheading the fight against aflatoxins at the regional level to contribute to the overall vision of "An Africa Free from the Harmful Effects of Aflatoxins". I would like to invite all stakeholders to read this Aflatoxin Control Action Plan (ECOACAP) for ECOWAS Member States and our intention to enhance the health of our people and economies of our countries.

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The ECOWAS Aflatoxin Control Action Plan (ECOACAP) was developed based on regional priorities identified by the approximately 40 delegates from agriculture, health, and trade from ECOWAS member states, as well as the civil society organization (PROPAC), who attended the 2013 Regional Conference on the Aflatoxin Challenge in West African States in Accra, Ghana.

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EXECUTIVE SUMMARY

Aflatoxin is a major cause of pre- and post-harvest loss in many crops, and therefore constitutes a significant threat to food and economic security in Africa. Aflatoxin contamination can result in foregone revenues from domestic and regional commerce and international trade. In addition, toxicity of aflatoxins pose a major public health challenge to consumers all over the continent. Studies have shown that Aflatoxin damages the liver and is a known causal agent for liver cancer. It has also been clearly associated with stunting in children and immune-suppression.

Aflatoxin exposure is high in West Africa due to climatic conditions favorable for fungal growth and development and high level of reliance on cereal grains that are susceptible to aflatoxin contamination.

Aflatoxin is a toxin produced by strains of the fungus, *Aspergillus flavus* and related species. The aflatoxin problem is complex, straddling agriculture (including animal and fish) and food security, trade and health sectors. Research has shown that measures can be taken to reduce aflatoxin exposure to consumers and improve opportunities to make available aflatoxin-safe crops and feed to markets. However, despite being cost effective, options may involve costs for farmers and often need to be supported by appropriate policy and regulatory actions for appropriate and effective use. Sustainable efforts to mitigate the aflatoxin problem and to ensure control across the crop and feed value chain will require well planned and targeted human and infrastructure capacity building efforts.

Through the leadership of the African Union Commission (AUC), and with participation from African and other governments, Regional Economic Communities, the private sector, farmers' organizations, and civil society leaders from across Africa, the Partnership for Aflatoxin Control in Africa (PACA) is establishing a comprehensive, Africa-wide approach to mitigate the agriculture and food security, trade, and health impacts of aflatoxin which is inter-twined with regional and country-level actions. ECOWAS is spearheading sub-regional efforts for the West African Region, in partnership with international, national and local agencies towards development of a comprehensive aflatoxin control Plan for West African States. ECOWAS is a founding member of the steering committee that guides PACA.

On 18 – 20 November 2013 in Accra, Ghana the Economic Community for West African States (ECOWAS), The Partnership for Aflatoxin Control in Africa (PACA), The International Institute for Tropical Agriculture (IITA) and the Forum for Agricultural Research in Africa (FARA) organized a regional workshop on the aflatoxin challenge in West Africa. The Workshop aimed to gather information and input towards the development of a regional action plan on aflatoxin mitigation to benefit ECOWAS member States.
Using the inputs from the workshop participants (communiqué attached as Annex 1) and working with experts and leaders from the region, this Action Plan has been developed to guide actions on aflatoxin and control in the ECOWAS region. An overview of the plan objectives, outcomes, and strategic interventions is provided below.

Goal of the Action Plan

The overall goal of the ECOWAS Aflatoxin Control Action Plan (ECOACAP) is **"to enhance agricultural development, safeguard public health and facilitate international and sub-regional trade in the ECOWAS region"**

The overall objective is to **"reduce prevalence and levels of aflatoxin contamination in food and feed within ECOWAS sub-region".**

Strategic objectives

To achieve the overall objective, the following specific objectives will be pursued:

1. To enhance demand for aflatoxin safe food and feed;
2. To improve the pre and post-harvest management practices for selected crops within the ECOWAS sub-region as a means of reducing aflatoxin contamination in food and feed; and,
3. To put in place an enabling policy and regulatory environment for controlling aflatoxin in food and feed in the ECOWAS sub-region;
4. To promote learning and accountability and assess impact through monitoring and evaluation

Expected Outcomes:

Effective implementation of the ECOACAP will lead to important outcomes in the ECOWAS regions that will benefit as a whole the citizens of the sub-region. Expected outcomes are;

1. Improved income of farmers and other actors such as traders and processors in the value chain through increased quantity of safe food in the ECOWAS region;
2. Improved health of the population including farmers and consumers; and
3. Increased regional and international trade as a result of regionally harmonised policies, standards and practices.
4. Impact oriented Monitoring and Evaluation established

Strategic Interventions:

The ECOWAS Aflatoxin Control Action Plan (ECOACAP, 2014) identifies key actionable strategic interventions that are relevant across ECOWAS member states for mitigating and controlling aflatoxin contamination in food and feed. The strategic interventions clarify how the Action Plan will deliver on the three strategic objectives (SO) that have been identified by stakeholders.

SO 1: Enhance stakeholder awareness and demand for aflatoxin safe food and feed

4.1.1 Improved communication and awareness creation
4.1.2 Strengthening Capacity for aflatoxin sampling and estimation in the ECOWAS region
4.1.3 Strengthen aflatoxin risk assessment, monitoring, management and communication capacities.

SO 2: Improve the crop management and post-harvest handling practices to mitigate aflatoxin contamination in food and feed

4.2.1 Enhance use of available technologies for crop production, harvesting, post-harvest handling including processing
4.2.2 Enhance provision of agricultural advisory services to small –scale farmers
4.2.3: Establish/investigate alternative uses for contaminated produce

SO 3: Create an enabling environment for aflatoxin control within ECOWAS

4.3.1: Harmonise relevant policies and regulations for aflatoxin control across the ECOWAS region to enhance trade
4.3.2: Build capacity of stakeholders to develop and implement policy guidelines and regulations
4.3.3 Strengthen farmers associations and value chain actors as a driving force for market related initiatives to encourage good practices.

This action plan further details the status of the aflatoxin problem in West Africa, actions needed to implement each of the strategic interventions, and parties who can play a lead role in implementing each of these actions.

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1.0 BACKGROUND

The Aflatoxin challenge constitutes a significant threat to food and economic security and poverty eradication in Africa. It is a major cause of pre- and post-harvest loss in many crops that further constrains the quantum of safe food reaching our markets and households across the continent. In addition, toxicity of aflatoxins pose a major public health challenge to consumers all over the continent and can result in foregone revenues and profit from domestic and regional commerce and international trade. Aflatoxin affects livestock (causing similar effects as observed in human, albeit with slightly higher tolerance), and milk of animals that have consumed contaminated feed pose threats to human health, particularly of young children.

Aflatoxin is a toxin produced by strains of the fungus *Aspergillus flavus* and related species. Studies have shown that Aflatoxin damages the liver and is a known causal agent for liver cancer. It has also been clearly associated with stunting in children and immune-suppression. It is possible that aflatoxin may result in increased incidence and severity of several important diseases such as the human-immunodeficiency virus-acquired immune deficiency syndrome (HIV/AIDS).

Although aflatoxin contamination poses a global problem, its impact is higher in tropical climatic regions including most of the African continent. The economic impact of aflatoxin significantly hampers profitability of the livestock industry. For instance, 62% of commercial poultry feed sold in Nigerian markets were found to be unsafe, greatly impacting productivity, increasing mortality and contaminating the gizzards of chickens commonly consumed as a local delicacy. Aflatoxin contamination levels in food crops have contributed to significant trade losses to African countries, but these losses have been difficult to measure. One study estimated that if all countries were to adopt EU standards on aflatoxin, then global trade would decline by US $3 billion (Dohlman, 2008). The aflatoxin problem is so complex that it straddles agriculture (including animal and fish) and food security, trade and health sectors.

Cognisant of these, in March 2011 at the 7th CAADP Partnership Platform, the African Union Commission was urged to oversee the establishment of a Continental SPS Working Group to mainstream sanitary/ phyto-sanitary matters in the CAADP framework and establish an Africa-led Partnership for Aflatoxin Control. Through this call, the Partnership for Aflatoxin Control in Africa (PACA) was established.
Many public and private institutions are involved in developing solutions to control aflatoxin contamination and exposure along the value chain, from crop production through processing and food preparation to consumption. Research has shown that measures can be taken to reduce aflatoxin exposure to consumers and improve opportunities to make available aflatoxin-safe crops and feed to markets. However, despite being cost effective, options may involve costs for farmers and often need to be supported by appropriate policy and regulatory actions for appropriate and effective use.

Combating dangers associated with aflatoxins contributes significantly to the Millennium Development Goals (MDGs)[1]. Specifically, contributions to MDG 1 (eradicate extreme poverty and hunger) will be made by enhancing the amount of quality and aflatoxin safe food and feed on the market; MDG 4 (reduce by two thirds the mortality of children under five) and MDG 5 (Improve maternal health) through the reduction of aflatoxin contaminated food and feed consumed by mothers and children below five; Reduction in aflatoxin contamination would favor MDG 6 by lowering mortality and morbidity due to HIV/AIDS, malaria and other diseases by reducing aflatoxins' immune suppressive effects; by controlling the synergistic

[1] In September of the year 2000, leaders of 189 countries met at the United Nations in New York and endorsed the Millennium Declaration, a commitment to work together to build a safer, more prosperous and equitable world. The Declaration was translated into a roadmap setting out eight time-bound and measurable goals to be reached by 2015, known as the Millennium Development Goals. See http://www.un.org/en/mdg/summit2010/pdf/List%20of%20MDGs%20English.pdf

effects of aflatoxin on Hepatitis B, C and HIV/AIDS and on the immune systems that is known to exacerbate the HIV/AIDS complex; MDG 8 (In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies) by enhancing partnerships across the sub-region to harness available technologies for the benefit of small-scale farmers. Since aflatoxin is a non tariff trade barrier, producing maize and groundnuts with aflatoxin levels within regulatory limits would also enable better international market access.

Through the leadership of the African Union Commission (AUC), and with participation from African and other governments, Regional Economic Communities, the private sector, farmers' organizations, and civil society leaders from across Africa, PACA is establishing a comprehensive, Africa-wide approach to mitigate the agriculture and food security, trade, and health impacts of aflatoxin which is inter-twined with regional and country-level actions. ECOWAS is spearheading sub-regional efforts for the West African Region, in partnership with international, national and local agencies towards development of a comprehensive aflatoxin control Plan for West African States. ECOWAS is a founder member of the steering committee that guides PACA.

This document summarises the action Plan. The document has been arranged into 7 sections. This Section provides contextual settings for the Action Plan, providing background to the Action Plan including the evolution of PACA and the need for an Africa wide response to the Aflatoxin problem. Section 2 of the document provides our current knowledge of the aflatoxin problem in West Africa, including current research efforts and technologies that have been adapted to the region. The overall aims and objectives of the Action Plan are presented in Section 3, preceded by a description of the key issues underlying the action components (Section 2) and followed by the detailed action Plan (Section 4).

2.0 STATUS OF THE AFLATOXIN PROBLEM IN WEST AFRICA

Aflatoxin contamination[2] is an important concern worldwide significantly affecting food and feed quality, trade, profitability and health (Wu *et al*., 2013). As described earlier, aflatoxins are a group of approximately 20 closely related toxins that are produced (as a metabolic by-product) by fungi of the genus *Aspergillus.* Based on how they are observed under ultra-violet light, aflatoxins have been broadly classified into forms B_1, B_2, G_1 and G_2 (Bennet and Klich, 2003) and M_1 and M_2 in milk. Aflatoxins have gained particular prominence due to their effects on health. Chronic aflatoxin exposure causes cancer of the liver and exacerbates complications involving hepatitis B and C and the human immunodeficiency virus infection / acquired immune deficiency syndrome (*HIV*/*AIDS*) as demonstrated in Ghana. As a result, aflatoxins have been classified by the International Agency for Research on Cancer (IARC) as a Group 1 carcinogen (IARC, 1993). Acute exposure leads to death (Afriyie-Gyawu et al., 2008). Exposure for humans is usually a result of consuming contaminated crop produce and also through the consumption of animal products such as milk from animals that have been fed on contaminated produce. Animals also die of aflatoxicoses; decreased weight and low productivity (eggs and milk); among other concerns, also results from chronic aflatoxin exposure.

Aspergillus flavus[3], the fungus that produces the poisonous toxin is widely distributed globally and within West and Central Africa. Studies have been undertaken in various parts of West Africa to identify *Aspergillus spp*. and strains that produce aflatoxins. To date, close to 10 *Aspergillus* species are known to produce aflatoxins, including *A. flavus*, *A. parasiticus*, *A. nomius* and others. It is also known that high proportions of strains from *Aspergillus* Section Flavi are toxigenic. These toxin-producing strains occur in high frequencies in several ECOWAS nations such as Nigeria (Donner et al., 2010), Senegal (Diedhou et al., 2011), Ghana (Perrone et al., 2014), Burkina Faso, Ivory Coast and Sierra Leone (Probst *et al*., 2014), suggesting that all ECOWAS countries are endemic with toxin producing strains.

Aflatoxin contamination is important on many crops. The Food and Agricultural Organization (FAO) estimates that 25% of the world's food crops are contaminated with mycotoxins (Scholthof, 2004). In the tropics, including within ECOWAS member states, where climatic conditions are favorable for fungal growth and development (Waliyar et al., 2008) there is increased risk of aflatoxin contamination of food and feed. Contamination is of particular importance where regulatory compliance is inadequate. Other factors implicated in increased fungal growth and subsequent aflatoxins production include end of season drought, insect /nematode damage to crops in the field, delayed harvest of crops, rain at harvest time, delayed or improper drying, storage and other post-harvest methods (Craufurd et al., 2006). In West and Central Africa, aflatoxin exposure is particularly alarming since peanuts and maize—the two frequently consumed crops— are highly contaminated by aflatoxins. Since maize and groundnuts are dietary staple, mycotoxin-poisoning problems are more in Sub-Saharan Africa (Wagacha and Muthomi, 2008). A direct correlation existed between socio-economic status and exposure to mycotoxins in Sub Sahara African countries (Wagacha and Muthomi, 2008). In addition, other crops in West African food basket are also prone to aflatoxin contamination.

In peanuts, end-of-season drought predisposes peanuts to contamination and significantly reduces crop yield. Infection is known to increase significantly during storage (Kaaya and Kyamuhangire, 2006) and high levels of aflatoxin contamination have been reported from many developing countries of Sub-Saharan Africa (SSA). Maize in West Africa is commonly contaminated by aflatoxins (Hell et al., 2003).

[2] Other mycotoxins are important sources of human diseases. These are, in addition to aflatoxins, fumonisins, ochratoxins (A), deoxynivalenols and zearalenones.

[3] Aspergilli also produce a neurotoxin called CPA for which research efforts are currently inadequate.

Aflatoxin exposure is particularly high in West Africa due to high level of subsistence on cereal diets resulting in various nutritional deficiencies (Bankole et al., 2003). Exposures in children are prominent as shown by studies in Benin and Togo (Gong et al., 2002; 2003) where 'exceptionally' high levels of aflatoxin biomarker was found in children (> 1,100 pg aflatoxin-lysine equivalents per milligram albumin). Similar results were revealed in Gambia by Turner et al. (2002; 2003) where 93% of 472 children involved in a study were found to be exposed to aflatoxin contamination. Studies from West Africa over a four year period (2008-2012) revealed aflatoxin levels in peanut granaries in excess of 3000 parts per billion (ppb) with a mean contamination of 164 ppb (Waliyar *et al*., 2013). These levels are over 100 times international allowable limits for human consumption (4 ppb in the EU, and 20 ppb in the USA, 10 ppb for all processed food in Codex standard). It is estimated that less than half of all peanut products from SSA are safe for human consumption based on EU standards. Aflatoxins have been found from human breast milk in Ghana, Nigeria, and Sierra Leone, as well as from umbilical cord blood samples from Nigeria and Sierra Leone (Bhat and Vasanthi, 2003). Positive aflatoxin markers have been reported in over 98% of individuals tested in Nigeria, Gambia, Guinea Conakry and Senegal (Turner et al., 2012).
Studies commissioned by the African Union Commission through the Partnership for Aflatoxin Control in Africa (PACA) in Nigeria, the Gambia and Senegal, revealed that the economic impact aflatoxins in the various sectors are enormous.

In the Gambia, it has been revealed that the cumulative economic loss (international and domestic trade) is estimated at about USD 22,874,517 from 2000 to 2014. This is a yearly loss of USD 1,524,968 for the Gambia. However, the most significant impact has been shown to be on human health. The study found that from a median of 79,592 positive chronic Hepatitis B cases, 2575 will develop HCC with total monetized DALY worth USD 94,383,398 of GDP which is equivalent to 9.4 % of GDP. This is an enormous loss to the country and health of the people (IRIS 2015).
In Senegal, the total cost (in health) related to aflatoxin is estimated at a minimum of about 92 million US dollars which is 0.6% of GDP and a maximum of nearly USD 161 million corresponding to approximately 1.1% of GDP. Thus, the cost of inaction is at least 46 billion CFA francs (34% of the budget of the Ministry of Health in 2015) and a maximum of 81 billion CFA francs (60% of the budget of the Ministry of Health in 2015) (Bioscope 2015).

The previous section has shown that Aflatoxin contamination has been reported from many of the ECOWAS member states. It is important to recognize that the current understanding of prevalence of the toxin is much related to where studies have been undertaken. It is expected that as capacity for undertaking research on aflatoxin increases, information on the prevalence rate will also increase. Aflatoxin regulatory limits are currently known to exist for five West African Countries (FAO, 2004). In Nigeria, for example, standards have been set to 4 parts per billion (ppb) by the National Agency for Food, Drug Administration and Control (NAFDAC). Also, in Ghana, limit for total aflatoxin in peanut butter has been set to 4 ppb (GS 49:2003) and that for raw peanut and maize to 20 ppb (GS 764:2003). Within these countries, aflatoxin limits vary widely. However, even in cases where aflatoxin standard and regulations exist, their enforcement remains low especially at the informal and household levels where, for example, most farmers consume their own farm produce.

Several methods are currently being used in West Africa for detection and estimation of aflatoxin contamination in the region. High performance liquid chromatography (HPLC) is available at testing facilities of some countries, with costs usually ranging from US$30 to over $60 per sample. Other testing methods include thin layer chromatography (TLC) and quantitative test kits such as immuno-fluorometry and lateral flow devices that are relatively inexpensive and commercially available. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has developed an ELISA based technique that makes use of polyclonal and monoclonal antibodies (Waliyar et al., 2009) for aflatoxin B1 and M1 that is now widely used in Niger, Mali, Malawi, Mozambique, Kenya, Senegal, Zambia, among others. The Food Research Institute of Ghana and NAFDAC in Nigeria currently have accredited laboratories for testing

aflatoxin in food and feed. An ELISA laboratory will soon be established in Nigeria with support from the Government of Nigeria. The advantage of the method is its low cost; significantly less laborious; less time consuming and requires less extensive sample clean-up (Waliyar et al., 2009). The availability of reagents at national testing facilities and ability to pay for services by public, remain important constraints.

As populations in West Africa continue to increase, pressure on available land to produce more food is expected to grow. Further, the West African region is expected to face a disproportionately high increase in temperatures arising from climate change, and related changes in rainfall patterns. These are expected to further exacerbate aflatoxin contamination in food and feed, due to increased irregularity of rainfall patterns (intermittent drought), increased incidence of end of season drought, and higher incidences of aflatoxin exposure, if no action is taken.

Several effective aflatoxin management technologies for peanuts and maize are available in different parts of the globe and if deployed can mitigate aflatoxin contamination. Appropriate drying and storage practices can also minimize postharvest aflatoxin contamination. These need be validated through widespread testing prior to adoption in specific agro-ecological zones. Pre-harvest infection can be minimised by use of resistant varieties. Sources of resistance have been reported in the cultivated peanut and varieties are available that reduce contamination to less than 5ppb (Waliyar *et al*., 2013). Similarly, maize germplasm with aflatoxin resistance have been reported (Menkir et al., 2008). However, resistant varieties exhibit high genotype by environment interaction which affects deployment strategies. There is thus need for a more detailed and controlled assessment of aflatoxin resistant materials across various locations to assess their resistance to aflatoxin contamination.

Biocontrol technology for instance is the deliberate use of one organism to regulate the population size of a pest organism. One such successful strategy has been accomplished by using native non-aflatoxin producing strains of *A. flavus* (Cotty, 2006) and use of other commonly available fungi in the soil such as strains of *Trichoderma*. Actinomycetes, a common bacterium are also being tested at various facilities for ability to control *Aspergillus* growth and production of aflatoxins.

The atoxigenic strain based biocontrol technology is being adapted in Africa with excellent efficacy to reduce aflatoxin aflatoxin during pre- and post-harvest stages (Atehnkeng *et al.,* 2014). This technology in Africa is known as 'aflasafe'. The aflasafe products developed specifically for each country consistently reduced aflatoxin by more than 80% on maize and groundnut in more than 3,000 farmers' fields. An aflasafe manufacturing plant, capable of producing 5 tons aflasafe per hour has been set up at the IITA, Ibadan, Nigeria. As part of Africa-wide biocontrol program, biocontrol products are ready for up-scaling and adoption in Senegal, Burkina Faso and Nigeria. Products are also being developed for Ghana, The Gambia and Mali. Widespread use of aflasafe will minimize aflatoxin burden in West Africa by drastically reducing the population of the root cause of aflatoxin—the aflatoxin producing strains—in the entire environment.

Sustainable efforts to mitigate the aflatoxin problem and to ensure control across the crop and feed value chain will require well planned and targeted human and infrastructure capacity building efforts. Evidence has shown the clear benefits of improving research efforts and capacity of the national agricultural research systems in ECOWAS member states, particularly the National Agricultural Research Institutes (NARIs), Universities, public and private sector and NGOs undertaking research will need to be supported to enhance capacity for aflatoxin research. Governments should support more research on the area of aflatoxins and its management by allocating research budgets to relevant agencies. As a starting point, aflatoxin and other mycotoxins, should be mainstreamed within the education curriculums at various levels to ensure that they are adequately taught and awareness is improved. National agencies need to ensure that there is a strategic plan to ensure testing facilities for aflatoxin and for monitoring and evaluating the risks of aflatoxin exposure, as well as impacts.

A survey conducted by PACA in 2015 shows that over half of the 15 ECOWAS countries (eight) have food safety legislation in place (Hell, 2015). Three countries have an aflatoxin standard (Benin, Nigeria and Ghana). The other countries use Codex limits, except for Sierra Leone which has no legislation (no information was provided by Guinea-Bissau, Guinea, Niger and Liberia). Laboratory infrastructure in most countries is good including human capacity, but the number of staff is low. Low volume of analysis also prevents staff from having the necessary routine. Most ECOWAS Member States have taken actions to raise awareness on aflatoxin in the region. However, awareness campaigns are not continuous and country- or region-wide, which diffuses their impact. And, although many aflatoxin control projects are being implemented, few are comprehensive or at the scale needed to curb the problem.

Section three of this document presents the rationale and objects of this Action Plan. The section clarifies the linkages between this Action Plan and the broader, Africa wide initiatives under the Partnerships for Aflatoxin Control of the African Union and specific objectives of the ECOWAS Action Plan. Expected outcomes resulting from implementation of the plan are also indicated.

3.0 ACTION PLAN FOR STRENGTHENING AFLATOXIN CONTROL IN WEST AFRICA

3.1 Introduction

The Partnership for Aflatoxin Control in Africa (PACA) in collaboration with the Economic Community for West African States (ECOWAS), The International Institute for Tropical Agriculture (IITA) and United States Agency for International Development (USAID) organized a regional workshop on the aflatoxin challenge in West Africa on 18 – 20 November 2013 in Accra, Ghana. The Workshop aimed to initiate the process towards strengthening aflatoxin control in West Africa through a three - step process.

Firstly, the workshop assessed previous, on-going and planned initiatives by member States for mitigating/ controlling the aflatoxin problem in the sub-region. Such initiatives were to inform the development of comprehensive plans for aflatoxin control and to ensure that lessons learnt in one member state could be used in other member states.

Secondly, based on the information available with member states represented, undertake a priority setting process towards the development of a regional action plan on aflatoxin mitigation to benefit ECOWAS member States. The Regional Action Plan would contribute to the wider objectives of PACA, and the agreement by AU member states to combat the aflatoxin problem on the continent, but provide benefits directly to the people of region.

Third, the workshop was used as a opportunity to sensitise stakeholders on the magnitude of the Aflatoxin Challenge in West African States, while engaging experts, and relevant stakeholders including representatives of small holder farmers towards the Regional Action Plan. The workshop underscored the importance of cross –sectoral actions and highlighted priorities to address the aflatoxin problem across the agriculture, trade and health sectors. It offered an important opportunity for regional leadership, experts on aflatoxin and other stakeholders from ECOWAS states from Agriculture, Trade and Health sectors to discuss the aflatoxin contamination and its impacts in the ECOWAS community. Key issues highlighted by stakeholders at the workshop on “revamping the groundnut value chain of West Africa through aflatoxin mitigation” included (read full workshop report at [insert link to PACA website]):

1. **Scoping the problem and current actions for aflatoxin mitigation in ECOWAS States**
   - Based on available research, understanding aflatoxin situation in ECOWAS member States;
   - Sharing lessons based on initiatives currently addressing aflatoxin control in ECOWAS States, including highlighting best practices.

2. **Regional Trade and Standards**
   - Assessing current available regulations for aflatoxin control and possible role of harmonized standards for aflatoxin levels in food for humans and feed for animal contextualised for the region;
   - Role of ECOWAS in setting and overseeing regional policy and protocols for regulation of aflatoxin disposal systems; and,
   - Identification of existing and exploration for alternative uses of aflatoxin contaminated commodities.

3. **Institutions and Systems for Implementing Interventions**
   - Role of Private Public Partnership (PPP) in promoting awareness, dissemination and adoption of aflatoxin-control technologies;
   - Development of regional policy on registration, licensing and application of bio-control products

4. **Awareness Building**
   - Raising awareness of policy makers and mobilizing political will;
   - Raising awareness of producers groups on impact of aflatoxins and potential benefits of technology solutions;
   - Raising awareness of consumers groups, health personnel on the impact of aflatoxin on health

5. Monitoring and Evaluation
   - Develop a strong M&E system at the regional level
   - Monitor progress of implementation of the plan
   - Evaluate the effectiveness and impact of interventions in policy, technology and awareness creation at the regional level

The Accra Workshop resolved to develop a roadmap for aflatoxin control in the ECOWAS region. Thus, using the inputs from the workshop participants (communiqué attached as Annex 1) and working with experts and leaders from the region, this Action Plan has been developed to guide actions on aflatoxin and control in the ECOWAS region.

3.2 Objectives of the Action Plan

The overall goal of the ECOWAS Aflatoxin Control Action Plan (ECOACAP) is:

"To enhance agricultural development, safeguard public health and facilitate international and sub-regional trade in the ECOWAS region"

The overall objective is to

"Reduce prevalence and levels of aflatoxin contamination in food and feed within ECOWAS sub-region".

This is expected to lead to improved public /consumer health of residents of the ECOWAS region and specifically for small-scale farmers who consume home-grown food.

To achieve the overall objective, the following specific objectives will be pursued:

3.3 Strategic objectives

The Action Plan pursues three strategic objectives as presented below. The three objectives will lead to the delivery of the overall objective of increased quantities of aflatoxin-safe food in the ECOWAS region:

5. To enhance demand for aflatoxin safe food and feed;
6. To improve the pre and post-harvest management practices for selected crops within the ECOWAS sub-region as a means of reducing aflatoxin contamination in food and feed; and,
7. To put in place an enabling policy and regulatory environment for controlling aflatoxin in food and feed in the ECOWAS sub-region;

3.4 Expected Outcomes:

Effective implementation of the ECOACAP will lead to important outcomes in the ECOWAS regions that will benefit as a whole the citizens of the sub-region. Expected outcomes are:

5. Improved income of farmers and other actors such as traders and processors in the value chain through increased quantity of safe food in the ECOWAS region;
6. Improved health of the population including farmers and consumers; and

7. Increased regional and international trade as a result of regionally harmonised policies, standards and practices.

The following section (Section 4) of the Action Plan describes the key components of the Action Plan, highlighting significant issues underlying the Action Plan and identifying elements that require immediate re-dress. The Section also identifies key partners that would be important in the successful implementation of each identified component of the Action Plan. A detailed set of actions is included in Section 4.

4.0 STRATEGIC INTERVENTIONS

The ECOWAS Aflatoxin Control Action Plan (ECOACAP, 2014) identifies key actionable strategic interventions that are relevant across ECOWAS member states for mitigating and controlling aflatoxin contamination in food and feed. The strategic interventions clarify how the Action Plan will deliver on the three strategic objectives (SO) that have been identified by stakeholders below:

1. SO 1: To enhance stakeholder awareness and demand for aflatoxin safe food and feed
2. SO 2: to improve the pre and post-harvest management practices for selected crops within the ECOWAS sub-region as a means of reducing aflatoxin contamination in food and feed
3. SO 3: To create an enabling environment for aflatoxin control in the ECOWAS region

4.1 SO 1: Enhance stakeholder awareness and demand for aflatoxin safe food and feed

A major challenge for aflatoxin control in food and feed is the low level of awareness of the problem and its mitigation measures among stakeholders such as farmers, consumers and all actors along the value chain, agriculture extension workers, health professionals, researchers and policy and decision makers. Increasing awareness will lead to two important outcomes: 1) The overall realization by smallholder farmers of the importance of use of improved crop husbandry techniques and other technologies that will reduce aflatoxin contamination both pre and post-harvest and 2) enhanced stakeholder (including traders, processors and other actors along the production to consumption continuum) understanding of the aflatoxin problem and subsequent increased demand for aflatoxin safe food and feed. There is therefore an urgent need to raise awareness about aflatoxin using effective communication strategies.

4.1.1 Improved communication and awareness creation

Key issues: Key stakeholders, including consumers and farmers lack awareness of the aflatoxin problem and its inherent dangers to human health. There is further a lack of awareness of the available technologies and practices that could be used to mitigate aflatoxin contamination.

Actions required: Enhanced communication and awareness can be achieved through a number of interlinked strategies in ECOWAS countries. For each country, the following menu is provided for actions that should be pursued:

- Conduct baseline study on awareness level among all stakeholders
- Designate a unit/department/institution to coordinate handling of food safety (aflatoxin) data
- Develop and publicize a dedicated website food safety (aflatoxin data) – this could be a subdomain in an existing website
- Coordinate and collaborate with local, regional and international research institutions and other science-based information sources for up-to-date research data for regular update of website
- Conduct policy advocacy at country levels
- Design targeted messages and communication to:
    a. Raise awareness of policy makers and mobilize political will

b. Raise awareness of producer groups and other value chain actors on impact of aflatoxins on health and trade and the need to adopt practices for production and marketing of aflatoxin-safe foods
c. Raise awareness of consumers about the aflatoxin problem and how they can protect themselves

- Develop a combination of communication channels for awareness creation among all stakeholders (including women, informal value chain actors and vulnerable groups). E.g., use channels such as:
  a. Workshops, conferences, seminars, and community meetings
  b. Media: mass media, social media
  c. Publications: publicity materials such as leaflets, fact sheets
  d. Campaigns
  e. Grassroots organization and peer educators to reach the informal/rural/vulnerable population
- Establish a ECOWAS mycotoxin/ aflatoxin awareness Day
- Create formalized national Mycotoxin (aflatoxin) Associations to regularly raise awareness

Responsibilities: ECOWAS, Ministries responsible for food and agriculture, trade, health, science and technology, media, standards and regulatory institutions, extension departments (agriculture and health), research and universities, private sector, and NGOs and grassroots organizations

4.1.2 Strengthening Capacity for aflatoxin sampling and estimation in the ECOWAS region

Key issues: Taking into the cognisance the importance of aflatoxins to human and animal health in the region, and the complementary inadequate human and infrastructural capacity, including equipment within the ECOWAS for diagnostics, and research, there is urgent need for governments to strengthen the relevant national level institutions as well as human capacity for research on aflatoxins. Many chemical procedures have been developed to identify and measure aflatoxins in various commodities including maize and groundnuts. The basic steps include sampling, extraction, lipid removal, cleanup, separation and quantification. Depending on the nature of the commodity, methods can sometimes be simplified by omitting steps. To minimize quantitation errors, two different methods can be used to quantify the same mycotoxin, or collaborative testing methods can be employed, which requires considerable planning in terms of design of the trial, the type of matrix or matrices to be analysed, the level of contamination of the mycotoxin of interest and the numbers of samples. As for aflatoxins analysis in food commodities, methods used include enzyme-linked immunosorbent assay (ELISA), liquid chromatography (LC), immunoaffinity column (aflatest), multifunctional column, gas chromatography (GC), thin layer chromatography (TLC), and high performance liquid chromatography (HPLC) and Liquid chromatography mass spectrometry (LCMSMS). The principle behind each method differs as well as the limit of detection (LOD). Very few African countries (ECOWAS region) conducting aflatoxin testing use one or a combination of the listed above methods. Therefore there is a need to support and strengthen diagnostic capacities in the region. The diagnostic pipeline has to be accurate, low cost, affordable, and applicable at all levels along the value chain. Therefore, this will involve institutional, human and technical capacity development. Each member country will establish aflatoxin detection laboratory (ADL) and ECOWAS will coordinate this activity by establishing a regional aflatoxin reference laboratory (RARL). The personnel in each of the laboratory will be trained on the appropriate aflatoxin detection methods as indicated above.

Actions required:

- Identify current facilities available for mycotoxin and aflatoxin testing in the region;
- Undertake participatory evaluation of the different methods available, taking into account target markets of produce, including international markets, need for certification, ease of access and

storage of reagents, cost of sample analysis etc., to identify list of aflatoxin methods for use at national level;
- Support the establishment of testing centres at various locations with clear strategy for operation and sustainability
- Train staff on aflatoxin detection methods, based on selected strategies and testing methods;
- Validate methods for aflatoxin detection, surveillance and monitoring.

Responsible: ECOWAS, National Bureau of Standards, Ministries of Agriculture, Health and Trade in ECOWAS member countries, research institutions.

4.1.3 Strengthen aflatoxin risk assessment, monitoring, management and communication capacities.

Key Issues: At the heart of the problem is the limited capacity and efficient systems for monitoring, reporting and communicating aflatoxin prevalence and exposure data. This invariably results in a lack of awareness of the aflatoxin problem in West African states. There is inadequate database (aflatoxin and related information) to inform policy and regulations. So, the establishment of a database for the region is required. In the developing world especially Africa (ECOWAS region), enforcement of food safety management systems is generally weak. Moreover, the risk assessment and monitoring systems, where they exist, do not fully operate to gather information needed to guide policy and regulation. In addition, the inadequate communication and coordination among relevant stakeholders hampers awareness creation efforts. Therefore, there is need to strengthen risk assessment, monitoring and communication in the ECOWAS region.

Actions Required: The following will be conducted in member states. These include data on aflatoxin occurrence, exposure and health effects;

- There is a need for representative data for major staples such as maize and groundnuts, including total diet studies, to reduce uncertainties in the risk assessment. Methods should be applied that allow measurement of individual aflatoxins at concentrations well below the regulatory maximum levels (if exist).
- Data on the efficiency of sorting process of groundnuts and maize with different levels of aflatoxins are desirable.
- The possible aflatoxin contamination of foods grown in the ECOWAS member states should be kept under review, particularly in the light of potential changes in climate.
- Designate a unit/department/institution to coordinate the handling of food safety (aflatoxin) data
- Develop and publicize a dedicated website food safety (aflatoxin data) – this could be a subdomain in an existing website
- Coordinate and collaborate with local, regional and international research institutions and other science-based information sources for up-to-date research data for regular update of website
- Develop a training programme for food safety (aflatoxin) risk communication (for scientists/researchers, journalists/media, civil/public servants, etc.)
- Data on prevalence and exposure of aflatoxins from all food sources should be assessed using harmonised tools;
- A bio-monitoring approach using validated biomarkers would complement food analysis and consumption data in providing information on prevalence and level of aflatoxin exposure in the ECOWAS region.
- Establishing epidemiological studies to examine the quantitative relationship between aflatoxin exposure, hepatitis B and C infection and liver cancer incidence are required to better perform quantitative risk assessment.
- Further investigation of the potential health implications of the effects of aflatoxins on the immune system and child growth are required.

Responsible: Ministries of Agriculture, Health, Education, and Science in each country; ECOWAS will coordinate the activities and synthesise data.

4.2 SO 2: Improve the crop management and post-harvest handling practices to mitigate aflatoxin contamination in food and feed

Application of good agricultural practices and good post-harvest handling practices lead to additional benefits beyond reduction of aflatoxin contamination such as increased yields and quality of grain. Technologies are currently available that have been adapted to West African conditions that have potential to significantly reduce aflatoxin contamination in food and feed. These technologies include crop husbandry practices such as dates of planting and harvesting, techniques for water and soil management, soil amendments such as application of gypsum/ lime, harvesting and drying methods, storage practices, sorting among others.

4.2.1 Enhance use of available technologies for crop production, harvesting, post-harvest handling including processing

Key Issues: Technologies are currently not adopted at scale by majority of rural farmers in West Africa due to various reasons such as lack of funds to access the technologies, inefficient dissemination methods, and inadequate knowledge and skill. Currently, there are inadequate incentives to encourage the production and marketing of aflatoxin-safe food and feed. Also, lack of price differential between aflatoxin-safe and aflatoxin-contaminated food is not attractive enough for producers and processors. In addition, farmers and other food handlers are often not aware of existing technologies for reducing aflatoxin contamination along the value chain.

Actions required:

- Facilitate the dissemination of aflatoxin mitigation technologies to all value chain actors (women and informal sector inclusive)
- Support value chain actors (large and small-scale and women) to adopt and implement aflatoxin mitigating technologies.
- Provide tax rebates and other incentives to motivate value chain actors to invest in aflatoxin mitigating technologies
- Organize awareness campaigns to stimulate patronage of aflatoxin-safe products
- Actively promote the utilization and consumption of locally produced aflatoxin-safe products
- Provide motivation and compulsion measures to consumers including and public institutions (providing institutional feeding) to adopt aflatoxin-safe products;
- Develop effective and efficient systems that ensure the production, marketing and consumption of aflatoxin-safe products.
- Encourage NGOs and private sector to play an active role in appropriate technology transfer, adoption and implementation.

Responsibilities: ECOWAS, Ministries responsible for finance, food and agriculture, trade, health, science and technology, Extension departments (agriculture and health), standards and regulatory institutions, research and universities, private sector, and NGOs

4.2.2 Enhance provision of agricultural advisory services to small –scale farmers

Key issues: Farmers' can contribute to enhancements in agricultural productivity in line with the ECOWAP and CAADP objects. However, farmers need to be supported by the provision of appropriate and timely advice to enable them improve their practices in a manner that ensures both the reduction of aflatoxin

contamination of produce, and the increase in the efficiency of farmer level production. There services should ensure that farmers have knowledge and access to appropriate technologies, including quality seed of improved varieties coupled with crop husbandry, access to critical inputs such as fertiliser and market incentives to promote higher quality produce;

Action Points:

- Through the CAADP Agricultural Food Security and Investment Plans (AFSIPs) strengthen the integration of aflatoxin issues into support for agricultural advisory services at national level;
- Strengthen the capacity of agricultural advisory providers to support the use of improved practices and technologies that lead to reduced aflatoxin contamination;
- Build capacity of AAS providers to enhance their capacity to support farmers on aflatoxin issues;

Responsible: Ministries of Agriculture; Agricultural Research and Extension organisations; NGOs, private sector players involved in extension.

4.2.3: Establish/investigate alternative uses for contaminated produce

Key Issues: Alternative use refers to alternatives to human consumption for produce that is contaminated with aflatoxin. Contaminated produce is sometimes destroyed, which reduces revenue for farmers. In other cases, smallholder farmers are sorting, selling the least contaminated products, and keeping the contaminated food for their own consumption, which increases health risks to the most vulnerable members of society. It is also common for contaminated produce such as maize and groundnut to be processed into products such as maize flour and groundnut paste for sale in the open markets for human consumption. Alternative uses are required to reduce losses to farmers and prevent contaminated produce from re-entering processing lines and markets to be consumed by humans.

Actions Required:

- Compile and disseminate information about established alternative uses for contaminated produce
- Promote research on safe disposal and alternative use of unsafe commodities, such as biofuels or blended feeds (which in the aggregate conform to safe maximum levels) and finishing feeds, which can have slightly higher levels (300ppb) of aflatoxin without harming the animal[4].
- Conduct further research on ammoniation and other commercial processing techniques[5].
- Disseminate findings from investigation of alternative uses.

Responsibilities: ECOWAS can facilitate sharing of information about alternative uses among Member States. Technical organizations and universities can conduct research on safe disposal and alternative use of unsafe commodities. Member States and NGOs can help disseminate information about safe disposal and alternative use of contaminated produce.

4.3 SO 3: Create an enabling environment for aflatoxin control within ECOWAS

The aflatoxin problem is so complex that multi-sectoral approaches are required for its control. Moreover policies, standards and regulations that are appropriate for aflatoxin control are scattered in various sectors and countries. This increases the challenge of solving the aflatoxin problem. Thus, there is the need

[4]The United States Department of Agriculture, for example, allows for aflatoxin contamination of up to 300 ppb for maize and groundnuts destined for finishing feed (feed used for up to 2 weeks before slaughter) for cattle, <200 ppb for finishing feed for swine, <100 ppb for breeding cattle, swine, and mature poultry, and <20 ppb for dairy cows and young animals. (Dohlman 2008, US FDA 2000, Rowe, 2007).

[5]Placing maize crops in a sealed container for 1-2 weeks and applying ammonation gas could reduce aflatoxin levels by 90% (Nyandieka et al 2009).

to create enabling policy, standards and regulatory frameworks that will comprehensively address the aflatoxin challenge thereby protecting public health and promoting domestic, regional and international trade.

4.3.1: Harmonise relevant policies and regulations for aflatoxin control across the ECOWAS region to enhance trade

Key issues: Policy is a key enabler for stakeholders to implement strategic goals of the State. In a sense, it is the absence of an enabling policy environment for the control of aflatoxin and food and feed that exacerbates the aflatoxin problem in the region. However, other challenges will also need to be tackled to manage the aflatoxin problem. These challenges include the weak linkages among research, industry (users of technology) and policy; weak policy and regulatory frameworks; lack of standards for all staple food and other food products susceptible to aflatoxin contamination; lack of harmonized standards among ECOWAS member countries; and inability to develop standards based on current consumption and exposure levels of specific foods. Other challenges that constrain aflatoxin control are limited enforcement of aflatoxin standards and regulation especially in the domestic markets and inadequate testing and monitoring infrastructure, e.g., well-equipped laboratories and testing kits.

Actions required

- Integrate national and regional food safety (aflatoxin control) into existing food, agriculture, health and trade policies and regulations and designate lead agencies
- Set-up regulatory and monitory mechanism for the informal value chain
- Develop and promote standards for specific staple foods and advocate their enforcement;
- Establish functional and accredited laboratories
- Support advanced research on aflatoxins
- Develop and implement food safety and quality management systems, e.g., principles of GAP, GMP, GHP, and HACCP for major staples and other foods susceptible to aflatoxin contamination
- Facilitate and support value chain actors to implement food safety and quality management systems
- Establish systems to enhance linkages among research, (users) industry and policy
- Assess the status of country specific standards and regulations for aflatoxin management
- Enhance the role of ECOWAS regional policy and protocols for regulation of disposal systems and alternative uses of aflatoxin contaminated commodities;
- Encourage voluntary labeling of aflatoxin safe foods
- Increase investment and budgetary allocation for development and enforcement (at least 1% of GDP) to aflatoxin control efforts

Responsibilities

ECOWAS, Ministries responsible for food and agriculture, trade, health, science and technology, standards and regulatory institutions, research and universities, private sector, and NGOs. Managing the evolving regulatory frameworks is one of the strategic thrusts for aflatoxin management in the ECOWAS region. ECOWAS will engage in knowledge and information sharing to support knowledge-based advocacy that will contribute to public understanding and to the establishment of a supportive, enabling environment for aflatoxin management in the region by implementation of programmes in targeted member countries over the next 10 years.

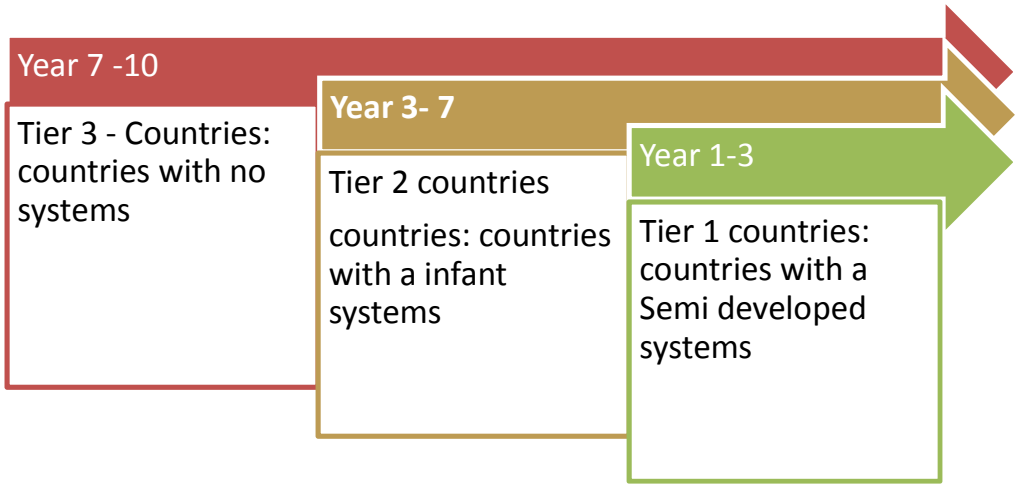
4.3.2: Build capacity of stakeholders to develop and implement policy guidelines and regulations

Key issues: Capacity is critical to implementation of policies and other agreements. Key stakeholders such as smallholder and commercial farmers, agricultural advisory service providers, regulators and traders all require the necessary abilities to enable them undertake their roles under the policy environment

efficiently. Steps must be taken to enhance the capacity of stakeholders to respond to the aflatoxin problem.

Action required:

- Provide training to enhance knowledge and skill for risk monitoring, assessment, and surveillance of aflatoxin risks
- Establish rapid response systems for aflatoxin incidences
- Support aflatoxin research in the field of agriculture, science and technology, health and trade
- Establish systems to enhance communication and linkages among research, (users) industry and policy
- Facilitate and support value chain actors to implement food safety and quality management systems along the food and feed value chains
- Enhance national and regional infrastructural and human capacities for testing and monitoring aflatoxin contamination Review curricular to include and emphasize food safety (including aflatoxin control) from basic levels of education in conjunction with ministries of education
- Provide training, resources and logistics for the development and implementation food safety and quality management systems, e.g., principles of GAP, GMP, GHP, and HACCP for major staples and other foods susceptible to aflatoxin contamination
- Develop a training programme for food safety risk communication (for scientists/researchers, journalists/media, civil/public servants, etc.)
- Enhance the infrastructural and human capacities of regulatory agencies to manage aflatoxin risks.



Strategic thrust : Creating and enabling environment for Aflatoxin control in ECOWAS region		
Establishment and harmonisation of regional trade, safety standards and coordinating mechanisms	Capacity strengthening for policy makers, regulatory and other agencies at national and regional levels	Communications and Public awareness

4.3.3 Strengthen farmers associations and value chain actors as a driving force for market related initiatives to encourage good practices:

Key Issues: At the moment, the market does not differentiate between low aflatoxin and high aflatoxin products; both are sold at the same price. Regulation that demands gradation of products with respect to aflatoxin levels would provide a stick for adoptions. However, regulations can often take a long time to occur and be challenging to enforce

Actions Required:

- Make the economic incentive for farmers explicit. This can be achieved by incorporating a 'pull mechanism' similar to the World Bank AgResults program or through a less hands –on approach, by facilitating linkages between buyers and farmers.
- Provide support to enhance farmer production. This would likely be in the form of working capital and training to enhance farmers' yield. This is particularly critical as results have shown that the use of Aflasafe will likely become economically viable, in Nigeria, for the farmer when their maize yield exceeds 3Mt/Ha (2x the national average). In the long term, once farmer associations have scaled appropriately, the program can work with farmer organizations to create a branded product for the market.
- Run trials and targeted marketing efforts to select industries. For example with poultry operations and other end users of low aflatoxin products. The effect of the trials will be to demonstrate the impact of low aflatoxin products on profitability of poultry farmers and stimulate demand.
- Overtime, demand can be stimulated in consumer markets by partnering with public health associations to raise awareness about the effects that aflatoxins have on human consumption.
- Treat low aflatoxin products as any new product launch and support with appropriate marketing plan targeted at specific customer segments.

Responsibilities: ECOWAS can facilitate sharing of successful strategies and challenges across efforts to strengthen farmers associations, and can provide funding to support training and build capacity. Member States can provide training through agricultural extension agents to enhance farmers' yield. Financial institutions can provide working capital. Private sector businesses and NGOs can facilitate linkages between buyers and farmers.

PLAN OF ACTION OF THE ECOWAS AFLATOXIN CONTROL 2014 - 2024

STRATEGIC OBJECTIVE 1: TO ENHANCE CONSUMER AWARENESS AND DEMAND FOR AFLATOXIN SAFE FOOD AND FEED					
	Activities	**Success Indicators**	**Responsible Institution**	**Sources of Verification**	**Time frame**
1.1	Enhance communication and awareness creation of key stakeholders on the aflatoxin problem	A focal point (unit/department/institution) to coordinate food safety (aflatoxin) data established	ECOWAS secretariat, with support from PACA secretariat	Focal point is identified and operational	By May 2014
		A dedicated website for food safety (aflatoxin) data developed and publicised	PACA/ECOWAS /Ministries of Agriculture	Database established for ECOWAS member states	By Dec. 2015
		Coordination and collaboration with local, regional and international research institutions and other science-based information sources for up-to-date research data for regular update of website increased	CORAF/ WECARD/ ECOWAS	Database is functional and up to date	Continuous
		National Aflatoxin Associations established and functioning	ECOWAS/PACA/Member states		
		Regular workshops, conferences and seminars on food safety (aflatoxin) topical issues and debates organized	ECOWAS/REC/PACA	One workshop is organized per year (or every 2 years)	2015 and beyond
		ECOWAS Aflatoxin Awareness Day established	ECOWAS/PACA		
		A system to share and disseminate information on food safety (aflatoxin) with all stakeholders through the media – TV, radio, publications (e.g., leaflets, fact sheets), websites, social media etc. established	ECOWAS, REC, PACA, member state	One TV show (e.g. shamba shape up) every quarter; One radio show (3 times/day) for 5 days; 3500 leaflets printed and disseminated in member states.	May 2014-Dec. 2015
		A training programme for food safety (aflatoxin) risk communication (for scientists, researchers, journalists/media, civil and public servants, etc.) developed	ECOWAS, REC, PACA, member state		
		Database for public and private entities that			

		value aflatoxin safe raw materials			
1.2	Strengthening Capacity for aflatoxin detection and estimation in the ECOWAS	Identify current facilities available for mycotoxin and aflatoxin testing in the region;	PACA/ECOWAS/REC	Report on existing capacities and capabilities for Mycotoxin and Aflatoxin testing	April-June 2014
		Undertake participatory evaluation of the different methods available, taking into account target markets of produce, including international markets, need for certification, ease of access and storage of reagents, cost of sample analysis etc to identify list of aflatoxin methods for use at national level;	PACA/ECOWAS	Report on participatory evaluation	June-August 2014
		Support the establishment of testing centers at various locations with clear strategy for operation and sustainability	ECOWAS/PACA	2 reference testing centers established	By Dec. 2015
		Train staff on aflatoxin detection methods, based on selected strategies and testing methods;	PACA/ECOWAS	20 technicians trained on Aflatoxin detection methods	By Dec. 2015
		Validate methods for aflatoxin detection, surveillance and monitoring.	PACA/ECOWAS	At least one method validated	By Dec. 2014
1.3	Strengthen aflatoxin risk assessment, monitoring, management and communication capacities	There is a need for representative data for maize and groundnuts, including total diet studies, to reduce uncertainties in the risk assessment. Methods should be applied that allow measurement of individual aflatoxins at concentrations well below international regulatory levels.	ECOWAS, REC, member state, PACA	Availability of data in all member states	By Dec. 2015
		Data on the efficiency of sorting process of groundnuts and maize with different levels of aflatoxins are desirable.	ECOWAS, PACA, REC, member state	Data on sorting are available in member state and harmonized at regional level	By Dec. 2015
		The possible aflatoxin contamination of foods grown in the ECOWAS member states should be kept under review, particularly in the light of potential changes in climate.	Member state (Ministry of Agric.), ECOWAS, PACA	Routine surveillance report.	May 2014-
		Food safety (aflatoxin) risk communication capacities of scientists, researchers, journalists/media, civil and public servants, etc. enhanced			

STRATEGIC OBJECTIVE 2: TO IMPROVE THE PRE AND POST-HARVEST MANAGEMENT PRACTICES FOR SELECTED CROPS WITHIN THE ECOWAS SUB-REGION AS A MEANS OF REDUCING AFLATOXIN CONTAMINATION IN FOOD AND FEED					
	Activities	**Success Indicators**	**Responsible Institution**	**Sources of Verification**	**Time frame**
2.1	Enhance use of available technologies for crop production, harvesting, post-harvest handling and processing	Facilitate the dissemination of aflatoxin mitigation technologies to all value chain actors (women and informal sector inclusive)	ECOWAS/REC/PACA	At least one technology in each category (production, harvesting, processing) contributing to aflatoxin mitigation is disseminated	June 2014-
		Support value chain actors (large and small-scale and women) to adopt and implement aflatoxin mitigating technologies.	ECOWAS/REC	At least one aflatoxin mitigating technology is adopted and implemented	June 2015-
		Provide tax rebates and other incentives to motivate value chain actors to invest in aflatoxin mitigating technologies	ECOWAS, Government Ministries (Agric., Health, Trade and Commerce), private sector	Tax rebates and incentives are provided and implemented	2015-
		Farmers aware of potential benefits of reducing aflatoxins through various methods			
		Actively promote the utilization and consumption of locally produced aflatoxin-safe products			
		Provide motivation and compulsion measures to consumers including and public institutions (providing institutional feeding) to adopt aflatoxin-safe products;			
		Develop effective and efficient systems that ensure the production, marketing and consumption of aflatoxin-safe products.			
		Encourage NGOs and private sector to play an active role in appropriate technology transfer, adoption and implementation.			
		At least 50,000 tons of aflatoxin-safe crop products traded annualy			
2.2	Enhance provision of agricultural advisory services to small –scale farmers	Through the CAADP Agricultural Food Security and Investment Plans (AFSIPs) strengthen the integration of aflatoxin issues into support for agricultural advisory services at national level;	•		
		Strengthen the capacity of agricultural advisory providers to support the use of improved practices and technologies that lead to reduced aflatoxin contamination;			

		Build capacity of AAS providers to enhance their capacity to support farmers on aflatoxin issues;			
2.3	Establish/investigate alternative uses for contaminated produce	Compile and disseminate information about established alternative uses for contaminated produce			
		Promote research on safe disposal and alternative use of unsafe commodities, such as biofuels or blended feeds (which in the aggregate conform to safe maximum levels) and finishing feeds, which can have slightly higher levels (300ppb) of aflatoxin without harming the animal.			
		Conduct further research on ammoniation and other commercial processing techniques			
		Disseminate findings from investigation of alternative uses.			
STRATEGIC OBJECTIVE 3: CREATING AN ENABLING ENVIRONMENT FOR AFLATOXIN CONTROL IN THE ECOWAS REGION					
	Activities	Success Indicators	**Responsible Institution**	**Sources of Verification**	**Time frame**
3.1	**Assist member states establish and harmonise food safety standards (aflatoxin), regional trade, and coordinating mechanisms**	An assessment of the status of country specific standards for aflatoxin management	ECOWAS, Member states ; Standards and regulatory institutions, research and universities, private sector	Country status reports	2014
		Standards for aflatoxin levels in staple foods and feed developed, promoted and enforced	Member states	Copies of national/regional standards	2014 -2017
		Regional standards for aflatoxin levels in food and feed harmonized and enforced	ECOWAS, Government Ministries Standards and regulatory institutions	Copies of national/regional standards	2014 -2019
		Protocols for disposal and alternative uses of aflatoxin contaminated commodities developed and disseminated	ECOWAS, Government Ministries Standards and regulatory institutions	Copies of protocols	2014 -2017
		Protocols for voluntary labeling of aflatoxin safe foods developed	ECOWAS, Government Ministries Standards and regulatory institutions	Copies of protocols	2014 -2017
		An integration of aflatoxin control into mainstream food safety policies and programmes, QC mechanisms etc	ECOWAS, Government Ministries Standards and regulatory institutions	Progress reports Coordinating agency at national and regional level	2014 -2019
		1% of GDP as budgetary allocation to	ECOWAS, Member states	National reports and	2014 -2024

		aflatoxin control efforts		statistics	
		Regulatory and monitoring mechanisms for contamination in the informal food value chain established	ECOWAS, Member states, private and civil society sector	Periodic reports	2014 -2024
3.2	**Member states to strengthen capacity for policy makers, regulatory and other agencies in aflatoxin management**	Knowledge and skill for aflatoxin risk monitoring, assessment, and surveillance enhanced	ECOWAS, Member states, private and civil society sector	Surveillance reports Presence of systems at national and regional levels	2014 -2019
		Rapid response systems for aflatoxin incidences established			
		Aflatoxin research in the field of agriculture, science and technology, health and trade supported and increased			
		Systems to enhance communication and linkages among research, industry (users of technologies) and policy established			
		Food safety and quality management systems, e.g., principles of GAP, GMP, GHP, and HACCP for major staples and other foods susceptible to aflatoxin contamination developed and implemented	ECOWAS, Member states, private and civil society sector	Copied of codes of practice; reports	2014 -2019
		National and regional infrastructural and human capacities for testing and monitoring aflatoxin contamination enhanced	ECOWAS, Member states, private and civil society sector	Accredited labs, Trained personnel Equipment	2014 -2019
		Food safety (including aflatoxin control) included and emphasized in school curricular from basic levels of education	ECOWAS, Member states, private and civil society sector	Curricular review	2014 -2024
3.3	Strengthen farmers associations and value chain actors as a driving force for market related initiatives to incentivise good practices:	Make the economic incentive for farmers explicit. This can be achieved by incorporating a 'pull mechanism' similar to the World Bank AgResults program or through a less hands –on approach, by facilitating linkages between buyers and farmers.			
		Provide support to enhance farmer production. This would likely be in the form of working capital and training to enhance farmers' yield. This is particularly critical as			

		results have shown that the use of Aflasafe will likely become economically viable, in Nigeria, for the farmer when their maize yield exceeds 3Mt/Ha (2x the national average). In the long term, once farmer associations have scaled appropriately, the program can work with farmer organizations to create a branded product for the market.			
		Run trials and targeted marketing efforts to selected industries. For example with poultry operations and other end users of low aflatoxin products. The effect of the trials will be to demonstrate the impact of low aflatoxin products and stimulate demand.			
		Overtime, demand can be stimulated in consumer markets by partnering with public health associations to raise awareness about the effects that aflatoxins have on humans.			
		Treat low aflatoxin products as any new product launch and support with appropriate marketing plan targeted at specific customer segments.			
	Strategic Objective 4: Monitoring and Evaluation				
	Activities	Success Indicators	**Responsible Institution**	**Sources of Verification**	**Time frame**
4.1	**Monitoring and Evaluation**	Develop a robust Monitoring and Evaluation strategy for the plan	ECOWAS, PACA	M&E Strategy	
		Conduct surveys and use other monitoring tools such as periodic reporting, financial reporting, performance to determine progress	ECOWAS, Member States		
		Conduct annual review process to assess progress	ECOWAS, PACA, Member States		
		Conduct mid-term evaluation (in the first 4 years)	ECOWAS and Member States		
		Conduct a Final-end of plan evaluation (in the last year of plan	ECOWAS, Member States and PACA		

5.0 RESOURCE MOBILISATION

There is a need for adequate investments to support Implementation of the ECOWAS Aflatoxin Control Action Plan (ECOACAP) at regional and country level. The resource mobilization could take two forms, namely, coordinated funding at regional level (for overarching regional initiatives such as policy harmonization and for specific initiatives covering multiple countries) as well as bilateral funding of country level activities. The following activities are envisaged to support the fund raising activities. These are supposed to be coordinated by relevant departments of the ECOWAS Commission working in tandem with an expert task force.

- Establish a task force at regional level to lead mobilization of resources through member states and development partners
- Package interventions identified in the EACAP in terms of coherent, marketable projects.
- Use CAADP National Investment Plans and the Regional Investment Plan to mobilize resources (incorporate the EACAP into the regional and national investment plans to attract funding from government budget and other sources)
- As appropriate establish a grant mechanism to support private and research organizations to drive interventions in priority, high impact areas and to ensure program sustainability.

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7.0 ABBREVIATIONS AND ACRONYMS

AAS	**Agriculture Advisory Services**
ADL	**Aflatoxin Detection Laboratory**
AFSIPs	**Agriculture and Food Security Investment Plans**
AUC	**African Union Commission**
CAADP	**Comprehensive Africa Agricultre Development Program**
CORAF/WECARD	**Conseil ouest et centre africain pour la recherche et le développement agricoles/West and Central African Council for Agricultural Research and Development**
ECOACAP	**ECOWAS Aflatoxin Control Action Plan**
ECOWAP	**Regional Agricultural Policy for West Africa**
ECOWAS	**Economic Community of West African States**
ELISA	**Enzyme Linked Immunosorbent Assay**
EU	**European Union**
FAO	**Food and Agriculture Organization**
GAP	**Good Agricultural Practices**
GC	**Gas Chromatography**
GDP	**Gross Domestic Product**
GHP	**Good Hygiene Practices**
GMP	**Good Manufacturing Practices**
GS	**Ghana Standards**
HACCP	**Hazard Analysis and Critical Control Points**
HIV/AIDS	**Human immunodeficiency virus infection and acquired immune deficiency syndrome**
HPLC	**High Performance Liquid Chromatography**
IARC	**International Agency for Research on Cancer**
ICRISAT	**The International Crops Research Institute for the Semi-Arid Tropics**
IITA	**The International Institute for Tropical Agriculture**
LC	**Liquid Chromatography**
LCMSMS	**Liquid Chromatography Mass Spectrometry**
LOD	**Limit of Detection**
MDG	**Millennium Development Goals**
MOA	**Ministry of Agriculture**
NAFDAC	**National Agency for Food and Drug Administration and Control**
NAFSIP	**National Agriculture and Food Security Investment Plan**
NARI	**National Agriculture Research Institute**
NBS	**National Bureau of Standards**
NGO	**Non-Governmental Organization**
PACA	**The Partnership for Aflatoxin Control in Africa**
ppb	**parts per billion**
PPP	**Private Public Partnership**
RARL	**Regional Aflatoxin Reference Laboratory**
REC	**Regional Economic Community**
SO	**Strategic Objectives**
SSA	**Sub-Saharan Africa**

SWOT analysis	**Strengths, Weaknesses, Opportunities and Threats**
TLC	**Thin Layer Chromatography**
USAID	**United States Agency for International Development**
WAAPP	**West Africa Agricultural Productivity Program**