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Prevention and Control of Aflatoxin and Associated Losses during Postharvest Handling of Agricultural Commodities in the EAC

EXECUTIVE SUMMARY

Aflatoxins are a set of poisonous substances produced by fungi (molds) that can potentially cause cancer and contribute to stunting and immunosuppression in vulnerable groups. Aflatoxin contamination occurs in major staple crops in East Africa, such as maize, rice and sorghum.

Poor postharvest handling enhances the contamination of the susceptible crops with aflatoxins. Factors such as insect infestation, high moisture causes Post-harvest losses, these further allow the proliferation of aflatoxin producing fungus to grow in susceptible crops and produces aflatoxin. Accumulation of aflatoxins in these crops further increases both quantitative and qualitative losses. High aflatoxin contamination exceeding by far the maximum permissible level of 10 ppb have been reported in maize and ground nuts for Kenya, Tanzania and Uganda. This can potentially cause rejection of contaminated products in domestic and international markets. For example in Kenya, 13,922 Metric Tonnes of maize were rejected by the regulatory authority in 2014 due to high levels of aflatoxin contamination. Majority of people in East Africa are not aware of aflatoxin problems and its control strategies. For example, in 2012 only 35 % of interviewed farmers in Kongwa district of Tanzania were found to be aware of aflatoxin problems and control strategies. The main cause of the above problems is limited research on technologies that prevent and control aflatoxin contamination and inadequate application of available technologies due to insufficient capacity along the value chain.

This is compounded by inadequate aflatoxin contamination surveillance systems in the region. In this regard, EAC should invest in research, development and dissemination of appropriate technologies that minimize Post Harvest Losses (PHL) and concurrently reduce aflatoxin contamination levels in susceptible crops. Furthermore EAC should establish monitoring, reporting, and information systems for aflatoxin contamination levels and associated postharvest losses in susceptible crops.

THE PROBLEM

Aflatoxins are a set of poisonous substances produced by fungi (molds) that can potentially cause cancer. In addition, aflatoxins are believed to contribute to stunting and immunosuppression in vulnerable groups. As many as 5 billion people in developing countries worldwide may be exposed to aflatoxins (Shephard 2003; Williams, Phillips et al. 2004).

Aflatoxin contamination occurs in more than 40 raw agricultural commodities including the major staple crops in East Africa, such as maize, rice and sorghum; oilseeds, such as sesame and cottonseed; groundnuts and the main pulses; various tree nuts; copra from coconut; cassava and other root crops.
Poor postharvest handling enhances the contamination of the susceptible crops with aflatoxins. Stages that are critical to control aflatoxin includes post-production; harvesting; field drying; platform drying; threshing/shelling; winnowing; transport to packing shed; storage at the farm level; grading and sorting; handling and transport to first receiver; storage and handling at the trader level; processing; downstream storage; and distribution.

The post-harvest loss can be defined as any reduction in the volume or value of agricultural products of interest that are available for consumption or sale. Post-harvest losses can be quantitative when losses in the mass of harvested crops occur for many reasons, such as adverse weather, pests and disease, spillage, mechanical damage, labor shortages, lack of credit, limited storage capacity, poor handling, or diversion of product. Qualitative losses occur when crops lose value because decline in quality or condition as perceived/required by the buyer, nutrient content has been compromised and decay, contamination, or adulteration has made the product unfit for its intended use.
The United Nations Food and Agriculture Organization (FAO) has asserted that as much as 25% of the global food supply may be lost during postharvest handling, and storage, and aflatoxin contamination is a major contributing factor for many crops (FAO 1997). Additionally, IITA estimates that globally, about US$1.2 billion in global commerce is lost annually due to aflatoxin contamination, with African economies losing US$450 million each year (IITA 2013).

Since predisposing factors for PHL are similar to predisposing factors for Aflatoxins contamination, EAC should invest in research, development and dissemination of appropriate technologies that minimize PHL and concurrently reduce aflatoxin contamination levels in susceptible crops.

SIZE OF THE PROBLEM

High aflatoxin contamination exceeding by far the maximum permissible level of 10 ppb have been reported in maize and ground nuts for Kenya, Tanzania and Uganda (Sebunya and Yourtee, 1990; Kaaya and Muduuli 1992, Kaaya and Warren 2005, Mutegi et al. (2010) and Kimanya et al. (2008). This can potentially cause rejection of contaminated products domestic and international market. In Kenya, 13 922 Metric Tonnes of maize were rejected by the regulatory authority in 2004 due to high levels of aflatoxin contamination . The quantities and associated cost has been estimated by Comtrade in East Africa in 2011 and given in the table below.

Table 1:
Formal Trade Volume And Value (Usd) Lost Due To Aflatoxin Regulations

	Maize Prevalence Scenario (Percentage above 10 ppb)							
Country	Volume Lost (MT)	Value Lost (USD)	Volume Lost (MT)	Value Lost (USD)	Volume Lost (MT)	Value Lost (USD)	Volume Lost (MT)	Value Lost (USD)
Burundi	112	$9,400	168	$14,100	504	$42,300	672	$56,400
Kenya	1,085	$656,700	1,628	$985,050	4,883	$2,955,150	6,510	$3,940,200
Rwanda	169	$12,700	254	$19,050	761	$57,150	1,015	$76,200
Tanzania	744	$218,100	1,116	$327,150	3,349	$981,450	4,465	$1,308,600
Uganda	5,498	$1,709,600	8,247	$2,564,400	24,740	$7,693,200	32,987	$10,257,600

Source: UN Comtrade 2011

Majority of people in East Africa are not aware of aflatoxin problem and its control strategies. For example, a recent study conducted in the three districts of Tanzania: Bukombe, Kongwa and Njombe showed that the awareness levels of farmers were 19%, 35% and 0%, respectively (Abt, 2012).

CAUSE OF THE PROBLEM

Limited research on aflatoxin prevention and control technologies (biocontrol, indigenous technologies and improved storage facilities). Inadequate postharvest handling infrastructure e.g: laboratory facilities, storage facilities, transportation systems do not effectively prevent and control aflatoxin contamination and associated postharvest losses. In addition limited application of Good Agricultural Practices (GAPs), Good Manufacturing Practices (GHPs) and insufficient adoption of appropriate technologies for aflatoxin prevention and control further aggravate the problem.

There is lack of data on postharvest losses associated with aflatoxin. Surveillance systems are weak thus policy makers do not receive appropriate data for decision making. The only data available are from Africa Postharvest Loss Information System (APHLIS) and this covers only selected grains: maize, wheat, rice, sorghum, barley, oats, millets, and teff. Not all data from aflatoxin susceptible crops such as ground nuts and cassava are available.

POLICY OPTIONS/RECOMMENDATIONS

Policy Option 1: EAC should invest in research, development and dissemination of appropriate technologies that minimize PHL and effectively reduce aflatoxin contamination levels in susceptible crops.

- Predisposing factors for PHL including high moisture, insect infestation and others are similar to those of Aflatoxins contamination therefore technologies that reduce PHL can be strengthened to concurrently reduce aflatoxin contamination levels in susceptible crops.
- There are technologies which have proved to be effective for aflatoxin prevention and control in other regions but have not been adapted and up-scaled in the EAC e.g biocontrol.
- The existing GAPs, GMPs guidelines do not adequately cover aflatoxin prevention and control furthermore the extension service do not have adequate capacity to intervene on prevention and control.

Policy Option 2: EAC should establish monitoring, reporting, and information systems for aflatoxin contamination levels and associated postharvest losses in susceptible crops.

In EAC there are existing tools such as APHLIS and FEWS-NET,that monitor food security vulnerability and postharvest losses. However, such systems do not cover all susceptible crops and lack the depth and breadth of data to inform policy actions and programs implementation especially information related to aflatoxin prevention and control.

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