Integrated Aflatoxin Management







Aflatoxin kills!



Aflasafe protects your groundnuts, maize and sorghum from this deadly poison.



Towards an Aflatoxin- safe crops in Uganda

The Aflatoxin situation in Uganda:

Over and above food and nutrition security, food safety is a key plank underpinning both. Aflatoxin has recently (March, 2021) attracted serious attention, and sparked a major diplomatic hurdle in East Africa and disrupted regional maize trade when Kenya banned importation of maize from Uganda and Tanzania due to high aflatoxin levels (https://www.independent.co.ug/kenyas-ban-on-uganda-tanzania-maize-threatens-eac-treaty/). In previous years, the issue of aflatoxin has also made it to the regional news. In March 2019, aflatoxin attracted serious attention from the government, humanitarian agencies, and the general population because of deaths from suspected aflatoxin poisoning in Karamoja, northern Uganda (http://nelor24-7.com/2019/03/22/there-is-no-any-bactria-or-poison-found-in-food-supplied-in-karamoja-minacheng/).
Some 262 people were affected with three confirmed dead (https://www.softpower.ug/karamoja -govt-wfp-launchprobe-into-food-poisoning-from-relief-supplies-two-confirmed-dead/).

More recently, our farmers livelihoods are threatened at the regional economic community level (http://eagc.org/2021/03/16/update-on-the-maize-import-ban-by-kenya/and https://kenyanwallstreet.com/maize-imports-to-kenya-to-face-tough-rules/) should Uganda fail to heed to the East African regional block's trading partnership requirement to pass sanitary and phytosanitary standards on farm produce as a prerequisite to access Kenya's market. These events point to the gravity of the intolerable situation regarding aflatoxin, concern by the government, the people of Uganda and more so the consumers of Uganda's exported grains. On October 31, 2018, the Ministry of Agriculture, Animal Industries and Fisheries launched an anti-mycotoxin campaign with special emphasis on aflatoxin mitigation, management and control, with the President of Uganda as the chief guest (http://www.pmldaily.com/news/2018/11/govt-us-in-joint-drive-to-combat-cancer-causing moulds-in-cereals-grains.html).

What is aflatoxin?

This is a poison produced by the fungus, ***Aspergillus flavus***, in major grains such as maize, Sorghum and groundnuts. The word aflatoxin comes from afla (contracted from the term ***Aspergillus flavus***) and toxin (poison). Aflatoxin is invisible to the naked eye, colourless, odourless and tasteless; this means it is hard to detect even when its level is dangerous or lethal. It can only be definitively detected through laboratory testing.

In Uganda, aflatoxins have been found in maize, sorghum, groundnuts, sesame, beans, sunflower, millet, and cassava. The causes and proliferation of aflatoxin contamination of Ugandan foods have been largely due to poor pre- and post-harvest activities, poor government legislation, lack of awareness, and low levels of education among farmers, entrepreneurs, and consumers along the value chains of this plague.



Misconceptions about aflatoxins:

There is a grave misconception that aflatoxin is a post-harvest and storage problem. However, the aflatoxin-producing fungus, ***Aspergillus flavus***, dwells in the soil. Therefore, aflatoxin contamination starts in the field (pre-harvest) and persists – or even intensifies –during storage if grain is not properly stored. Aflatoxin is measured in parts per billion (ppb), with safety levels ranging between 0.1 and 15 ppb in the European Union, and a maximum of 20 ppb for most foods and animal feeds in USA. Once aflatoxin contaminates the grains, there is no known method for its reduction, treatment, or elimination.

However, good post-harvest and storage conditions will protect the grain from further contamination. Thus, it is paramount to avert contamination right from the field and combine this with good practices during harvest, handling, and storage, to prevent aflatoxin buildup during storage. It should also be known that the disposal of condemned crops and food products could also pose a potential environmental hazard. Aflatoxin can colonize more than 40 raw agricultural commodities and their byproducts.

Economic Impact:

Aflatoxins pose a significant economic burden, causing an estimated 25 per cent or more of the world's food crops to be destroyed annually. Uganda loses more than USD38 million annually (Uganda Shillings 140 billion) because of failure to export grains due to aflatoxins. In 2013, more than 600,000 tonnes of maize worth Uganda Shillings 10 billion, and in 2018, also tons of maize, equivalent to USD 48.6 million (Uganda Shillings 180 billion) destined for neighbouring country, Kenya were also rejected owing to poor quality and aflatoxin contamination.

Health Impact:

Public health from the population's consumption of unsafe products can lead to morbidity and mortality. Aflatoxins are of the greatest concern to food safety due to their wide distribution in staple foods and feeds and their high toxicities. Under a regime in which on-farm consumption of aflatoxin-prone foods, notably maize, groundnut, cassava, sorghum, with little diet diversity, the risk of exposure to aflatoxins in Uganda has been exacerbated. This situation is unacceptable and remediable.

Long-term or chronic exposure to aflatoxins has several health consequences including being a potent carcinogen and may affect many
organs, especially the liver and kidneys; they cause liver cancer and have been linked to other types of cancer. According to International Food Policy Research Institute, up to 172,000 liver cancer cases per year are attributable to aflatoxin exposure. In addition, aflatoxins have the potential to cause birth defects; stunting, immunosuppression and therefore may decrease resistance to infectious agents and can cause acute poisoning that can be life threatening.

Additionally, a 2014 study by Asiki et al. (2014) revealed high levels of exposure of Ugandans to aflatoxin. All adults (100%) who participated in the study had aflatoxin (average of 11.5 pg/mg) in

their blood, while for children, 95.8% had detectable aflatoxin with an average level of 9.7 pg/mg. Aflatoxin has been linked to high malnutrition and stunting, especially in children (Suleiman et al., 2013).

Most aflatoxin-prone crops deemed to be of economic and nutritional importance in Uganda: maize, sorghum, groundnut, rice, pulses, cassava, and sweet potatoes play a significant role in improving rural livelihoods and household food security, strengthen regional trade, and promote a more efficient agricultural economy throughout the country. Therefore, sound aflatoxin control policies and programs can be a major contributor to the reversal of these losses and will have tremendous economic and health benefits to Uganda

The solution:

Research confirms technology as the key to addressing the aflatoxin challenge on our hands. This is augmented by well-designed policies regulations, strategic programmes, education and awareness among farmers and consumers along the entire value chain.

Control measures are required both pre- and postharvest. The most long-term, stable solution to controlling pre-harvest aflatoxin contamination is through enhancing the ability of the crop to resist fungal infection and/or prevent production of aflatoxins by the invading fungus. This can be achieved through plant breeding or through genetic engineering of crops of interest.

Integrated aflatoxin management is needed at all stages from the field to the table. Such an approach includes targeted plant breeding practices, enhancement of host plant resistance, and biological control methods, coupled with post-harvest technologies such as proper drying and storage.

IITA has a scientifically proven solution to minimize aflatoxin contamination and thus ensure aflatoxin-safe food for consumers and higher returns from guaranteed access to aflatoxin-conscious lucrative regional and international markets. An all-natural product, Aflasafe uses the ability of native non-toxin producing (atoxigenic) strains of ***Aspergillus flavus*** to naturally out-compete their aflatoxin-producing cousins. The product is broadcast in the field, two to three weeks before flowering of maize.

Aflasafe is an environmentally friendly, safe, and easy-to-use product that consistently reduces aflatoxin contamination by more than 80%. The technology is currently registered in nine countries in Africa, including Tanzania and Kenya in East Africa, and is being developed for eight other countries. In Uganda, strains for making Aflasafe have been identified and the process of validating the product in farmers' fields to generate sufficient data for registration and to identify a private-sector player to manufacture and distribute the product to ensure appropriate commercialization is ongoing. This will improve the income and nutritional health of farm families and generate wealth in the groundnut, sorghum, and maize value chains respectively.

Collaboration opportunities /key activities for supporting the initiative

- Enhancing the technical capacity of national partners, extension services, farmers, and other participants in the maize, sorghum and groundnut value chains for incorporating Aflasafe as a major component of an integrated aflatoxin management strategy (supported through aBi trust).

- Creating awareness among higher levels of policy- and decision-makers and private sector for institutionalization and increased sub- sector investment. Endorse aflatoxin standard-compliant crops that are suitable for trade and human consumption (partially supported through AGRA).
- Effective dissemination of public information and consumer awareness on the extent of the aflatoxin problem and proven solutions to prevent contamination with special focus on Aflasafe.

- Strengthen engagement with the private sector and local producers to build consensus on control measures, which include good agricultural practices to complement Aflasafe.

- Support the strategic engagement in Aflasafe product stewardship to guide technology transfer, commercialization, sustainable and optimal utilization of agricultural technologies.

- Advancing from proof of concept to identifying key customer segments and companies that can drive a market-based strategy for Aflasafe commercialization across the country. Making it accessible and affordable through leveraging on public- and private-sector collaborations in a bid to potentially reach millions of difficult-to-reach smallholder farmers.

To sustain and scale up these collaboration efforts, the development of human, infrastructural and technology transfer capacity in the public system (research and extension) and private sector (support commercialization and use of integrated aflatoxin management practices) are key elements for the project.

Large-scale use of aflatoxin management strategies can improve domestic food safety, reduce aflatoxin exposure, and increase compliance with international food safety trade standards. However, although a solution (Aflasafe) is currently being tested in Uganda, significantly more work is needed to solve the highly complex problem of aflatoxin. Considerably more efforts are needed to promote large-scale use of an aflatoxin management program in Uganda and therefore this concept note has been developed to continue building an appropriate aflatoxin management system for Uganda.





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