

AFLATOXINS: FINDING SOLUTIONS FOR IMPROVED FOOD SAFETY

Market-led Aflatoxin Interventions: Smallholder Groundnut Value Chains in Malawi

ANDREW EMMOTT



RESEARCH PROGRAM ON
Agriculture for
Nutrition
and Health

LED BY IFPRI



FOR FOOD, AGRICULTURE,
AND THE ENVIRONMENT

Focus 20 • BRIEF 8 • NOVEMBER 2013

In the 1960s, Africa south of the Sahara controlled 90 percent of the international groundnut market, valued in today's money at US\$220 million annually. Although the market has since rocketed to \$1.2 billion, Africa's share has plummeted to just 5 percent. A key factor in this substantial decline in earnings has been the strict food import regulations on safe levels of aflatoxins imposed by highly regulated Western markets.

The World Bank estimates that the EU's tightening of the Maximum Allowable Levels (MALs) of aflatoxins to four parts per billion cost African countries \$670 million in annual export losses of cereals, dried fruits, and nuts. Underinvestment in infrastructure and systems, coupled with a lack of incentives and information, has made it difficult for smallholders in Africa to respond to these market demands for better aflatoxin controls. China, Argentina, and the United States have emerged as global leaders by continuously investing and improving aflatoxin management practices.

Aflatoxins are more than a barrier to trade for smallholders—they are a serious risk to public health. The US Centers for Disease Control and Prevention estimate that 4.5 billion people are chronically exposed to the toxin through the consumption of staple foods, leading to cancer and childhood stunting as well as contributing to immune disorders. Over the past decade, efforts to tackle aflatoxin contamination in Africa have focused on practices within formal export value chains. In countries like Malawi, however, 60 percent of groundnuts are sold on poorly regulated local or regional markets, exposing populations to high levels of the toxin and undermining food security and nutrition interventions. Improvements to processing, storage, and trading practices are therefore urgently needed along the smallholder groundnut supply chain in order to sustainably address the economic and health impacts of aflatoxins.

Targeting critical control points with appropriate interventions

Although aflatoxin contamination points have been identified along the supply chain, the key challenge remains the complex set of factors driving inappropriate farming, postharvest, and consumption practices. Any attempts to change practices need interventions that will be accepted, adopted, and maintained by smallholder farmers. A good example is the case of African groundnut farmers who have traditionally shelled groundnuts by hand. This painful and time-consuming task is mostly done by women, who spend an estimated 4 billion hours hand shelling each year. The shells are often softened in water to ease the process, and the shelled nuts are subsequently kept in unsuitable storage conditions on-farm until the crop is taken to market. Moisture introduced during shelling promotes fungal growth on the nuts, and the long storage times in poor conditions further increase the risk of aflatoxin contamination. Hand-operated mechanical shellers make the shelling process ten times faster and remove the need to

wet the groundnuts, significantly reducing contamination at the farm level.

Basic equipment, such as mechanical hand shellers, can often be too expensive for individual smallholders to purchase. Twin is working with two partners—Exagris, the UK-based agri-business, and National Smallholder's Farmers Association of Malawi (NASFAM)—to develop sustainable business models for the distribution and maintenance of the technology at an affordable price. Local entrepreneurs could be engaged to establish rental services for equipment with a maintenance contract, or farming organizations could invest in equipment to help their members improve both their labor efficiency and practices for the management and control of aflatoxins. This is but one example of a simple, cost-effective intervention that can significantly reduce contamination at a key entry point, thereby resulting in more reliable access to international markets as well as reducing the levels of aflatoxins entering local food systems via informal markets. To ensure optimal impact, the introduction of new technology should be accompanied by systematic changes, such as buying and storing nuts in shell and improving storage practices.

Developing products and systems that pull aflatoxins out of human food chains

While interventions along the value chain can greatly reduce levels of aflatoxins in formal and informal human food chains, evidence from more regulated value chains suggests some level of contamination may still occur. For example, in 2012 the US maize crop had higher than usual levels of aflatoxin contamination as a result of unusually hot and dry growing conditions. Similar problems occurred in Germany and Holland in 2013 when milk was found to be contaminated with M1 aflatoxin. The incident, traced to maize grown within the EU, was detected and managed by following standard EU testing procedures. Even if developing countries improve aflatoxin management along their supply chains, the limited testing, consumer awareness, and market regulation in these countries is likely to result in exposure to unsafe levels of aflatoxins, especially among the food insecure.

In order to reduce risk for vulnerable communities in the absence of market regulation, there is a need for innovative, safe, and economically viable uses for contaminated products to be developed in combination with programs to raise awareness. In the case of contaminated groundnuts, the production of groundnut oil is an example of the potential to convert high-risk stock into a safe value-added product. Groundnut oil has been identified by Malawi's National Export Strategy as a key regional export and import-substitution product in the country's effort to diversify from tobacco dependency. Once contaminated nuts have been pressed into oil, a simple filtration process that removes protein can significantly reduce aflatoxins to safe levels. This results in both a nutritious product and access to value-added markets for crops

that would otherwise be considered waste—or irresponsibly dumped on local markets. Groundnut oil is a high-value product in demand both locally and internationally, with global production doubling over the past 30 years. Pilot crushing programs and market research are underway in Malawi to better assess the profitability of large-scale pressing facilities.

The waste product of pressing groundnuts for oil, known as press cake, can be treated with clay for safe use in animal feed. The contaminated press cake is added to normal feed and mixed with clay, which binds with the toxin while the food is digested by livestock. Clay feed additives are already used extensively in the United States and the EU as anti-caking agents to improve the physical properties of feed. That these additives increase health benefits to the animals by binding aflatoxins further strengthens the economic case for the inclusion of the clay. Establishing alternative uses for aflatoxin-contaminated groundnuts reduces waste and prevents dangerous products from entering the food systems of poor and marginalized people. It also provides both access to new markets and more consistent access to value-added international markets, thereby increasing farmer incomes.

Creating incentives to improve the processes for aflatoxin management and control

Currently, there is limited quality grading or price differential for groundnuts sold on Malawi's markets. With little price incentive to produce higher quality products, smallholders consequently choose not to invest their time, energy, and resources in producing quality nuts. Most smallholders also have low awareness levels of the health implications of aflatoxins. Higher awareness may act as an incentive for farmers to change their practices to protect their families and communities. However, even farmers aware of the risks do not have access to affordable, rapid aflatoxin testing equipment to assess quality at either the farm gate or buying station. Therefore, alternative indicators can be used to assess the risk of aflatoxin exposure, such as quality of grading and the presence of moldy nuts.

One viable alternative to testing for aflatoxins is testing moisture content using low-cost portable meters. Twin and NASFAM are piloting a buying system in which smallholders receive a bonus for selling groundnuts with low moisture content. Financial incentives that encourage good drying practices can significantly reduce aflatoxin contamination because fungal growth on groundnuts stops when the moisture content falls below 7 percent. The costs of the bonus scheme are offset by weight savings made at the point of purchase and in transport costs because dry nuts are lighter than wet nuts. Furthermore, by investing at this point in the supply chain, producer cooperatives and processors, who shoulder most of the risk of containers being rejected due to safety regulations in the EU

and elsewhere, can more reliably identify products acceptable to international markets.

Developing collaborative value chains

The complex nature of aflatoxin contamination means a holistic and multidisciplinary approach is required in order to change pre- and postharvest practices. Furthermore, developing innovative market mechanisms to remove aflatoxins from the human food chain may bring sustainability and scale to these interventions. The entire supply chain needs to share the cost of interventions to control and manage aflatoxins, as smallholders—the poorest in the supply chain—cannot bear this financial burden alone. Expertise from a variety of stakeholders must come together to develop and coordinate a system- and industry-wide response to the problem of aflatoxins in smallholder value chains. Agricultural researchers, public health and nutrition practitioners, technical farmer trainers, trading and farmer organizations, and ultimately the companies that purchase the products all have a part to play. Without such a concerted effort, smallholders will continue to lack the necessary incentives and capacity to respond adequately to market demands and thus to compete in the global marketplace.

Key recommendations

Working within market realities and taking a sector-wide approach is essential to addressing the issue of aflatoxin control. Agricultural, health, nutritional, and value chain experts need to work together to:

- raise awareness of the public health impacts of consuming unsafe food,
- improve drying, sorting, and storage both on-farm and throughout the value chain,
- provide training and access to equipment to change inappropriate practices, such as by facilitating access to mechanical shellers to stop hand shelling, and
- research and develop innovative market mechanisms to pull aflatoxins out of human food chains.

FOR FURTHER READING

Emmott, A. 2012. *Value Chain Approach – Aflatoxin (Groundnuts)*. USAID Technical Report. <http://satradehub.org/value-chains/sath-content/activities/competitiveness/value-chains/value-chain-approach-aflatoxin-groundnuts-final-report>

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Andrew Emmott (andrewemmott@twin.org.uk) is a senior manager at Twin, London.



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A member of the CGIAR Consortium | A world free of hunger and malnutrition

2033 K Street, NW, Washington, DC 20006-1002 USA | T. +1.202.862.5600 | F. +1.202.467.4439 | Skype: IFPRIhomeoffice | ifpri@cgiar.org | www.ifpri.org

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