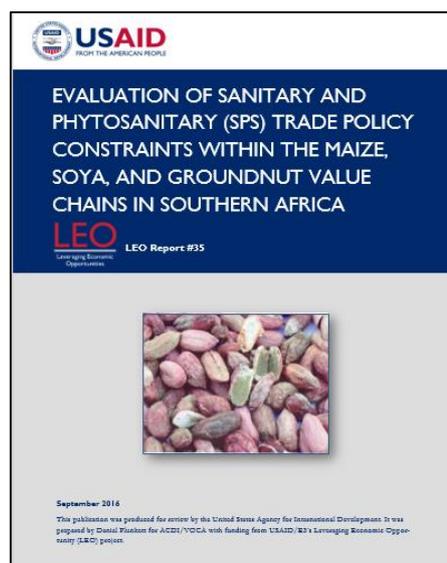


EVALUATION OF SANITARY AND PHYTOSANITARY (SPS) TRADE POLICY CONSTRAINTS WITHIN THE MAIZE, SOYA AND GROUNDNUT VALUE CHAINS IN SOUTHERN AFRICA

BRIEF 3: MLN AND MYCOTOXINS: A ROLE FOR THE SEED INDUSTRY

USAID's Bureau for Food Security commissioned the study *Evaluation of Sanitary and Phytosanitary (SPS) Trade Policy Constraints within the Maize, Soya, and Groundnut Value Chains in Southern Africa* through the [Leveraging Economic Opportunities](#) (LEO) project¹. The study is one of three regional assessments carried out in East, Southern, and West Africa regions to identify key SPS-related constraints to trade within priority Feed the Future value chains, in order to gauge opportunities for potential SPS-related investments. The Southern Africa study targeted four countries: Malawi, Mozambique, South Africa, and Zambia. The study identified Maize Lethal Necrosis (MLN) and mycotoxins (e.g. aflatoxin, fumonisin) as two of the most important SPS issues in the region; this brief highlights the impact that the maize seed industry could play in mitigating the impacts of these plant and food safety threats.



SITUATIONAL OVERVIEW

SPS issues are rising in prominence as potential barriers to trade in staple foods within southern Africa. The main threats to plant health and food safety for the maize, groundnuts and soya bean value chains in southern Africa are MLN and mycotoxin contamination such as aflatoxin and fumonisin. The well-organized maize seed industry in southern Africa reports few problems with their operations, noting low levels of aflatoxin and no sign of MLN. While maize seed can be a source of the spread of aflatoxin and perhaps of MLN, the region's maize seed businesses could help lead the way in finding a solution wherein resistant varieties are grown and properly managed.

COMMERCIAL MAIZE SEEDS PRESENT LOW CONTAMINATION RISKS

Plant diseases can be spread through a variety of ways, for example air-borne diseases spread when the wind carries contaminated spores from one field to another. Pest-borne diseases can be spread through the movements of bugs such as maize thrips. Some plant diseases can be spread through seed itself, as contaminated seed is transported from one field to another and planted, with the resulting crop infected with the disease present in the original field (The Seed Bin, 2011). When maize seed is exported, as occurs frequently in southern Africa, plant diseases can promptly move from an endemic exporting country to infect the fields of the importing country, if the maize seed is bearing the particular plant disease.

MLN is a relatively new plant disease and the modes of transmission are still being studied with the main cause in Kenya believed to be insect vectors such as maize thrips, rootworms and leaf beetles. The MLN-bearing insects may be carried by wind over long distances. Seed transmission of Maize Chlorotic Mottle

¹ For more information on LEO, and to access the full studies for East, West, and Southern Africa, visit www.microlinks.org/leo.

Virus (MCMV), one of the potential components of MLN, has been reported, but it is not known at this time if the MLN combination of diseases can be borne by seeds².

Aflatoxins are produced by fungi such as *Aspergillus flavus* and *Aspergillus parasiticus* and can contaminate a number of crops such as maize, groundnuts, rice, and cassava. Aflatoxin occurs typically when there is dry weather during planting, high moisture during harvest, and during the drying and storage of crops (PACA, 2013). The presence of aflatoxin in maize seeds has been found to reduce overall germinability, seedling length and total chlorophyll content (Archives of Applied Science Research, 2012). Aflatoxin contamination can thus affect maize yields, reducing both the volume produced and the value per ton of the crop due to deterioration of the kernels and the presence of mycotoxins (Toxin Reviews, 2008).

Interviews with the organized formal segment of the maize seed industry in each country during the LEO Southern Africa SPS study revealed that aflatoxin is not an issue in their highly-controlled operations. However, the disease can spread when farmers used ‘saved seed’ rather than improved seed for planting the subsequent year, the most common practice among smallholder farmers in southern Africa.

MAIZE SEEDS AS A POTENT FORCE FOR PREVENTING OF CONTAMINATION BY MLN AND AFLATOXIN

While maize seeds can contribute to the transmission of plant diseases under certain circumstances, there are far greater positive benefits for preventing plant diseases by using more-robust resistant conventional or GMO-containing maize seed cultivars. Disease-resistant maize, along with drought-resistant maize, has been a focus for USAID, USDA, international organizations, other development partners and the private sector in recent years.³ Aflatoxin-resistant varieties are a key element in the Aflasafe initiative, where trials are underway in all four of the target countries. In combination with soil treatment, resistant varieties help crowd out the more-susceptible varieties

Disease-resistant maize seed has certain advantages as a preventative measure, not least of which that it can be easily distributed in large or small quantities to farmers compared to other inputs that are required in larger quantities. Efforts to develop MLN-tolerant varieties have also been ongoing since 2013 with the establishment of the MLN screening facility in Kenya through collaborative efforts by the international research organization CIMMYT and the Kenya Agricultural and Livestock Research Organization (CIMMYT, 2015). This has led to the release of five MLN-tolerant varieties in Kenya, Tanzania and Uganda (CGIAR 2016).⁴ Commercialization and access to expanded quantities of quality seed in these varieties will be key to mitigating the spread of MLN.

Aflasafe™, a package of soil treatments and seeds, is an innovative biocontrol solution for aflatoxin that was developed by IITA in collaboration with Agriculture Research Service of the United States Department of Agriculture. This breakthrough technology, already widely used in the US, reduces aflatoxins during both crop development and postharvest storage, and throughout the value chain. Field testing of aflasafe™ in Nigeria over the past 4 years has produced extremely positive results: aflatoxin contamination of maize and groundnut was consistently reduced by 80–90%, and even as high as 99%. *Source: IITAI*

² Maize Lethal Necrosis (MLN) is caused by a combination of two viruses, the Maize Chlorotic Mottle Virus (MCMV) and cereal viruses such as Sugarcane Mosaic Virus (SCMV), Wheat Streak Mosaic Virus (WSMV) or Maize Dwarf Mosaic Virus (MDMV), all in the *Potyviridae* group (FAO, 2016). The double infection of the two viruses gives rise to what is known as MLN (Niblett and Claffin, 1978).

³ USDA’s Agricultural Research Service (ARS) is running a project through 2017 to create and characterize new hybrid and synthetic maize varieties displaying high and stable resistance to aflatoxin accumulation and MLN. Germplasm and genes identified will be used in practical breeding programs to develop resistant varieties in the developing world.

⁴ In Kenya, the Kenya Seed Company is scaling up production of H12ML and H13ML for marketing in 2017. In Tanzania, Meru-Agro plans to have HB607 on the market by 2017 as well. In Uganda, UH5354 (brand name “Bazooka”) is already available to the public, along with UH5358 in 2017.

PROPER MANAGEMENT OF MAIZE SEEDS TO MAINTAIN PHYTOSANITARY HEALTH

While MLN-resistant varieties have promise, effective management of other maize variety seed operations is also a critical control point for the spread of plant diseases. When reproducing maize seeds, the incidence of MLN can be reduced through rigorous disease management practices such as controlling weeds and alternate hosts, keeping unnecessary machines and people out of the field, controlling insect vectors by means of appropriate insecticides, and other Good Agricultural Practices (GAP). Seed inspectors working hand-in-hand with plant health inspectors to test for MCMV and aflatoxin in seed and material for breeding coming into the country is a sound disease protection strategy.

ORGANIZE AN MLN STUDY TRIP TO KENYA AND TANZANIA

One of the key recommendations under this study is to raise the level of knowledge in southern Africa about MLN-resistant varieties by organizing a study trip to Kenya and Tanzania, two of the earliest-afflicted countries. In addition to Ministry of Agriculture and other public sector experts, including maize seed businesses from Malawi, Mozambique, South Africa and Zambia in the study trip would encourage them to invest in new varieties and increase the public-private dialogue on MLN.

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