



AGRI FOCUS

Aflatoxin: Good News for Farmers

Scientists offer a natural, safe, and cost-effective solution to prevent future contamination of maize by the killer aflatoxin to secure the food and income of millions of small-scale farmers in Kenya and the rest of Africa.

Kenya is again grappling with high levels of aflatoxin contamination that has rendered at least 2.3 million bags of maize unfit for human and livestock consumption and trade, to the dismay of the millions of small-scale farmers that depend on the crop for food and income.

The contamination of the country's main staple with aflatoxin, a highly poisonous cancer-causing chemical produced by a fungus scientifically known as *Aspergillus flavus*, was a result of poor drying and storage of the grain following heavy rainfall near harvest time.

Although the situation is grim, it is not hopeless! Scientists have developed a cost-effective, safe, and natural method to prevent aflatoxin formation in maize while in the field. The biocontrol technology works by introducing strains of the *A. flavus* fungus that do not produce the aflatoxin or 'the good guys,' in the affected fields, which, outcompete and drastically reduce the population of the poison-producing strains or 'the bad guys'.

Dr Peter Cotty of the Agriculture Research Service of the United States Department of Agriculture (USDA-ARS) and Dr Ranajit Bandyopadhyay, a plant pathologist with the Africa-based International Institute of Tropical Agriculture (IITA), have identified biocompetitive strains of the good fungus native to Kenya that can now be used to control aflatoxin contamination in the country.

According to Dr Bandyopadhyay, a single application of this biopesticide 2-3 weeks before maize flowering is sufficient to prevent aflatoxin contamination throughout and beyond a cropping season and even when the grains are in storage.

"*A. flavus* strains are either toxigenic (produce aflatoxin) or atoxigenic (do not produce aflatoxin). Our biocontrol technology makes use of carefully selected atoxigenic strains that can safely outcompete and virtually eliminate their toxic relative, effectively reducing contamination of the maize grains in fields," says Dr Bandyopadhyay.

He says that the technology's ability to continue working even when the grain is in storage ensures the safety of maize from aflatoxin contamination. These atoxigenic strains are also carried in the grains from the field to the stores. So, even if the grains are not stored properly or get wet during or after harvest, as is happening this year, they continue to prevent aflatoxin contamination during the postharvest period.

Aflatoxin is a silent killer that causes liver cancer and suppresses the immune system. It also retards growth and development of children. People exposed to very high aflatoxin concentrations experience liver failure and rapid death. From 2004 to 2006, nearly 200 unsuspecting people in Kenya died in this manner after eating highly contaminated maize. Aflatoxin is a colorless chemical that is invisible and only laboratory tests can confirm its presence and contamination levels.

Kenya is one of the world's hotspots for aflatoxin. Research performed by one of Dr Cotty's graduate students, Claudia Probst, has shown that in areas where aflatoxin is a persistent and serious problem, there is a very high occurrence of one of the most toxic strains of *A. flavus* in the world, the S strain.

According to Dr Cotty, the S strain produces very high levels of aflatoxins and dominates in regions where contamination is very high, including some areas of the US. In Africa, this S strain has been only found to be dominant in the severely affected regions of Kenya. In the US, biocontrol with atoxigenics has successfully reduced its contamination.

In Nigeria, IITA has obtained provisional registration of the technology under the name Aflasafe™, a mixture of four atoxigenic strains of Nigerian origin. In 2009, maize farmers in Nigeria were able to reduce aflatoxin contamination by 80% by broadcasting 10 kg/ha Aflasafe™ 2-3 weeks before maize flowering.

Research has shown that Aflasafe™ treatments provide long-term benefits and that Aflasafe™ may not need to be applied every year. IITA, in partnership with the Nigerian government and the United Nations Industrial Development Organization (UNIDO), is working on obtaining full registration and identifying an entity that would mass manufacture, market, and distribute Aflasafe™ in Nigeria to save the health and income of millions of families.

The researchers are now calling upon the government and the private sector in Kenya to partner with them and make this biocontrol option and other management practices available to the farmers to save their much-needed harvests from future aflatoxin contamination.

Institutions involved in the initiative include IITA, USDA-ARS, African Agricultural Technology Foundation (AATF), and local partners.

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