

## Aflasafe in farmers' fields: experiences in Nigeria

Joseph Atehnkeng<sup>1</sup>, T. Falade<sup>1</sup>, P.J. Cotty<sup>2</sup> and R. Bandyopadhyay<sup>1</sup>

<sup>1</sup>International Institute of Tropical Agriculture, Nigeria and <sup>2</sup>School of Plant Sciences, University of Arizona, USA; [jatehnkeng@cgiar.org](mailto:jatehnkeng@cgiar.org)

In West Africa, aflatoxin contamination of maize and groundnut is frequent. Aflatoxins are poisons produced by some strains of *Aspergillus flavus* and related species infecting both staple and export crops. The health effects of aflatoxins range from increased risk of immune suppression, growth retardation in children resulting in stunting and cancer to death from acute poisoning. Aflatoxins have also a severe impact on livestock fed with contaminated feed resulting in animal death, slower growth, reduced feed conversion and lower yields. Agricultural products containing aflatoxins above permissible levels fetch lower price or are rejected from trade. The International Institute of Tropical Agriculture and partners have developed a biocontrol method effective in greatly reducing aflatoxin contamination in maize and groundnut in a cost effective manner and over a broad geographic area. The novel biocontrol technology uses native beneficial strains of *A. flavus* that do not produce aflatoxins to competitively exclude both aflatoxin-producing *A. flavus* and other aflatoxin producers from the crop environment. Four highly competitive strains of Nigerian origin have been identified and formulated into a product called aflasafe ([www.aflasafe.com](http://www.aflasafe.com)) using sterilized sorghum grains as carrier. In partnership with Nigeria's Commercial Agriculture Development Project, more than 500 farmers and extension agents have been trained in the use and application of this product in Kaduna, Kano and Enugu States in 2009 and 2010. Awareness was created among more than 4,000 stakeholders in the maize and groundnut value chain. Farmers have treated more than 1,000 ha of maize and groundnut crops with aflasafe and the results have been encouraging. Grains from treated and control fields were analyzed for aflatoxins both at harvest and after storage. In both years, aflasafe application reduced contamination in both crops by 79 to 97% at harvest and by 90 to 99% after poor storage. In untreated control plots, 4.8% of isolates belonged to the same vegetative compatibility groups as the aflasafe strains, implying that the aflasafe strains are native to Nigeria but occur at a low frequency. The results have demonstrated that aflasafe is effective in controlling aflatoxin in maize and groundnut. Aflasafe can offer farmers an opportunity to produce these crops with highly reduced aflatoxin levels, so that they become safe to eat and trade. Current efforts include obtaining full registration for aflasafe from the National Agency for Food and Drug Administration and Control, setting up a demonstration-scale manufacturing plant of aflasafe in Nigeria and developing a business plan to intensify the use of aflasafe by smallholder farmers. Lessons learned from Nigeria, where the biocontrol programme is the most advanced, are being extended to other countries in Africa.

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## Use of yeasts in biological control of toxigenic fungi

Sofia N. Chulze<sup>1</sup>, M.L. Ponsone<sup>1</sup>, M. Schmidt-Heydt<sup>2</sup>, R. Geisen<sup>2</sup> and J. Köhl<sup>3</sup>

<sup>1</sup>Section Mycology, Department of Microbiology and Immunology, Universidad Nacional de Río Cuarto, Argentina, <sup>2</sup>Max Rubner Institute, Germany and <sup>3</sup>Plant Research International, Wageningen UR, the Netherlands; [schulze@exa.unrc.edu.ar](mailto:schulze@exa.unrc.edu.ar)

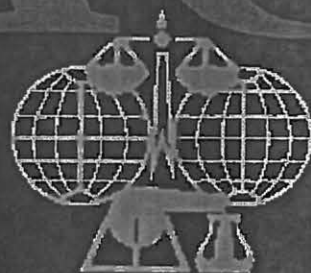
Pathogens and toxigenic fungi can damage a wide range of food commodities both at pre-harvest and at post-harvest stage. Ochratoxin A (OTA) is a mycotoxin produced by species that belong mainly to the *Aspergillus* and *Penicillium* genera and occurs on different commodities such as cereals, coffee, cocoa beans, dried fruits, grapes and wine. *Aspergillus carbonarius* is the main species responsible for OTA contamination in grapes. The development of resistance to fungicides by major plant pathogens and toxigenic fungi and the public concern over chemical residues in food and in the environment have increased the interest in alternative methods for disease control. Biological control has been proposed as a strategy to reduce the impact of ochratoxigenic species. Yeasts are considered one of the most potent biocontrol agents due to their biology and non toxic properties. The mechanism most probably involved in biocontrol of filamentous fungi by yeasts is competition for essential factors, such as nutrients and space.

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