

## What are the benefits of aflasafe™?

- aflasafe™ will significantly reduce aflatoxin concentration in food and feed.
- Farmers will have healthier families and more profit.
- Greater opportunities for trade from less rejection of products in the market.

## Where are we in aflatoxin biocontrol research-for-development?

- IITA has obtained trademark registration for aflasafe™.
- The Nigerian National Agency for Food and Drugs Administration and Control (NAFDAC) has granted provisional registration to determine efficacy in on-farm tests of aflasafe™ in Nigeria.
- Ongoing field testing of aflasafe™ by farmers in Nigeria over the past 2 years has produced extremely positive results in reducing aflatoxin contamination of maize and groundnut, consistently by 80% to 90%.

## What are our future plans for aflasafe™?

- After obtaining final registration approval from NAFDAC, aflasafe™ technology developed by IITA will be licensed to a responsible organization for mass-manufacture and marketing.
- IITA will retain a stewardship role and provide technical backstopping to the licensee. We are also developing similar technology for other aflatoxin 'hot-spot' areas in Africa.

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A farmer displaying a box of aflasafe™.

Photo by IITA

**IITA**  
Research to Nourish Africa

**aflasafe™**

A safe and cost-effective biocontrol product that reduces aflatoxins in field and stores

## What is aflatoxin?

- Aflatoxin is a poison produced by a fungus, called *Aspergillus flavus*.
- This fungus resides in soil and dead/decaying matter in the field.
- Aflatoxin contaminates 25%+ of maize and groundnut crops produced in Nigeria.
- It is very dangerous to humans and animals.
- Aflatoxin affects many other crops, such as cassava, yam, and rice.

## How does aflatoxin harm us?

- Aflatoxin causes liver cancer, suppresses the immune system, and retards the growth and development of children.
- Aflatoxin-contaminated feed and food causes a decrease in productivity in humans and animals and is sometimes fatal.
- Aflatoxin-infected crops are forced into low value markets or destroyed.
- Aflatoxin damages our health and business opportunities.

## Can we see aflatoxin?

- Aflatoxin cannot be seen—it is a colorless chemical.
- *Aspergillus flavus* is green in color (right).
- Grains without visible signs of *A. flavus* may also have high amounts of aflatoxin.
- Laboratory tests determine contamination levels.



Photo by IITA

Green growth of *Aspergillus* fungus on maize grains.



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## Where and how is aflatoxin produced?

- Aflatoxin is produced when the *Aspergillus* fungus attacks grains.
- Insect damage increases fungal growth and aflatoxin contamination.
- Drought and high temperatures increase aflatoxin production so do bad harvest, postharvest, and storage practices.

## Can we reduce aflatoxin contamination?

- Yes, by using a safe and highly cost-effective biocontrol product developed by IITA called **aflasafe™** together with other good management practices.

## What is biological control of aflatoxin?

- *A. flavus* occurs naturally.
- *A. flavus* strains are both toxigenic and atoxigenic.
- Toxigenic strains produce aflatoxin.
- Atoxigenic strains do not produce aflatoxin.
- Biological control involves introducing carefully selected atoxigenic strains.
- These are harmless strains and have a large competitive advantage over toxic strains.
- The atoxigenic strains virtually eliminate the toxic relatives and therefore considerably reduce aflatoxin contamination.
- The mechanism is called competitive exclusion.

## What is aflasafe™ and how does it work?

- **aflasafe™** contains a mixture of four atoxigenic strains of *A. flavus* of Nigerian origin. Colonized sorghum grains hold a few nanograms of the atoxigenic strains.
- **aflasafe™** is broadcast on fields at 10-20 kg/ha 2-3 weeks before flowering of the crop.

Photo by IITA



A farmer broadcasting aflasafe™ in groundnut field.

- Within 2-3 days, the atoxigenic strains sporulate on the sorghum; this continues for up to 3 weeks.
- The atoxigenic strains colonize organic matter and other plant residues in the soil in place of the toxin-producing strains.
- Spores of the atoxigenic strains are carried by air and insects from the soil surface to maize cobs displacing the toxin-producing strains.
- Atoxigenic strains in **aflasafe™** compete with strains that produce large amounts of aflatoxin and in so doing limit the amount of aflatoxin produced.

Photo by IITA



A farmer broadcasting aflasafe™ in maize field.

## How was aflasafe™ developed?

- **aflasafe™** was developed by IITA in collaboration with the Agriculture Research Service of the U.S. Department of Agriculture, University of Bonn, and University of Ibadan.
- More than 4200 strains of *Aspergillus* species from naturally infected maize cobs collected in Nigeria were evaluated.
- 12 safe and effective atoxigenic strains were identified, 4 of which were further tested.

## How effective is aflasafe™?

- **aflasafe™** can reduce aflatoxin concentration by 60-96% in maize at harvest and in storage.
- The beneficial effect of **aflasafe™** is carried over from one season to the next.

## How safe is aflasafe™?

- It is completely safe. There is no possibility of the four constituent atoxigenic strains in **aflasafe™** becoming toxigenic.
- IITA has experience of nearly 50 incident-free person-years of working on aflatoxin biological control technology that led to the development of **aflasafe™**.