Brief on Aflasafe Modular Manufacturing Plant at KALRO-Katumani, Kenya

aflasafe KE01™
for Safe Crops, Better Health, and Higher Income
What are aflatoxins?

- Aflatoxins are poisons produced by the fungus *Aspergillus flavus* and closely related fungi.
- The contamination process takes place in the field and may continue throughout storage and until consumption.
- Aflatoxins pose health risks to both humans and animals even at low concentrations.
- Over 25% of maize and groundnut produced in sub-Saharan Africa contains high aflatoxin levels. In Kenya, the aflatoxin threshold is 10 ppb but sometimes these crops contain more than 20,000 ppb total aflatoxins.

How do aflatoxins harm us?

- Aflatoxins cause liver cancer, suppress the immune system, retard growth and development of children, among other health problems.
- Consumption of contaminated food and feed decreases productivity in humans and animals; sometimes it is fatal.
- Kenya is amongst the nation most severely affected by aflatoxin contamination events. In 2004, 315 Kenyans were severely poisoned after eating contaminated maize; 125 people died.
- In 2010, 2.3 million 90-kg bags of maize that were found to contain unsafe aflatoxin levels were declared unfit as food by the Government of Kenya (GoK).
- Over 60% of the maize produced in Eastern Province contains unsafe aflatoxin levels in some years.

What is aflasafe KE01™?

- KALRO, IITA, USDA-ARS and partners have developed the all-natural biocontrol product aflasafe KE01™, which drastically reduces aflatoxin accumulation in maize.
- aflasafe KE01™ is the first PCPB-approved practical tool available to Kenyan farmers for aflatoxin control at the pre-harvest stage.
- aflasafe KE01™ contains 4 atoxigenic (cannot produce aflatoxins) *A. flavus* strains native to Kenya that outcompete toxigenic strains when applied in the field 2-3 weeks before flowering.
- Roasted, sterile sorghum grains serve as carrier and nutritive source for the atoxigenic strains. Spores of the strains are coated onto sorghum using a sticker. A blue food-dye is used to distinguish aflasafe KE01™ from regular sorghum.

How does aflasafe KE01™ work?

- broth, which is impossible to tell. With aflatoxin, its stealth is its strength, which is what makes it so deadly.

Application of aflasafe KE01™

- A maize farmer broadcasting aflasafe KE01™ on her field. Treated crops have drastically less aflatoxins than untreated crops. Farmers earn more since aflatoxin-safe crops have higher chances to be sold in premium markets.

Benefits of aflasafe KE01™

- One annual application of aflasafe KE01™ provides multiple-year and multiple-crop benefits.
- aflasafe KE01™ is cost-effective providing high returns on investment and health benefits.
- Farmers reduced aflatoxin by 80% to 99% in several Counties by applying aflasafe KE01™ in maize fields.
- Over 3,500 acres of maize in Galana-Kulalu scheme of the National Irrigation Board were treated with aflasafe KE01™ imported from Nigeria
  - 99% of the maize contained less than 10 ppb total aflatoxins, a safe aflatoxin level.
  - 95% of the maize had up to 4 ppb aflatoxin, a level compliant with the strict European limit.
  - Enough aflatoxin-safe maize produced to feed over 492,000 people for 1 month in drought-stricken areas.
Reasons for building the production plant

- Produce and sell aflasafe KE01™ in Kenya & for biocontrol research in the region. Currently aflasafe KE01™ is imported from Nigeria. GoK imported 228 tons in 2015.
- Model turn-key facility for replication by public & private sector investors and as incubation platform for testing business models.
- Demonstrating product value in different value chains such as food and animal feed.
- Produce aflasafe KE01™ for area-wide application in priority Counties such as Coast and Eastern Provinces and for public distribution for health outcomes for the poor.
- Provide aflasafe KE01™ for work on developing market linkages between farmers and interested industries.

Aflasafe modular plant facts

- First aflatoxin biocontrol modular plant & second factory in Africa. Jointly built and owned by KALRO & IITA.
- Groundbreaking in 2014 by the Cabinet Secretary and Principal Secretary of the Ministry of Agriculture, Livestock & Fisheries.
- Consultative Agreement guiding IITA and KALRO in the construction and handover signed on 9 February 2015.
- KALRO dedicated 2 acres at Katumani research station for laboratories, offices, meeting room, factory, and stores. IITA & USDA-ARS provided technical support & turnkey construction.
- Funding by USAID East Africa Regional Mission, Bill & Melinda Gates Foundation (on PACA’s behalf), and USDA-FAS.
- Construction, installation and pre-certification completed.
- Commissioning proposed for June/July 2017.

Plant specifications

The modular facility consists of three distinct modules: Module R, Module C, and Module P. Units of each module may vary depending on needs and resources. This is because off-the-shelf technology is used and each module type takes equipment from different industry segments with different throughput requirements.

Module R (Roasting): Prepares grain for coating by eliminating both the ability of sorghum seeds to germinate and microbes associated with the seed; off-the-shelf roasting technology from the feed & food processing industries is used. The grain is cooled in a mechanically vented silo.

Module C (Coating): Coats sterile grains from Module R with spores, colorant, and polymer. Off-the-shelf seed coater from the planting seed industry is used.

Module P (Packaging): Packs aflasafe KE01™ in waterproof bags of intended distribution sizes. Off-the-shelf equipment from the food industry is used.

Layout of the modular plant

The active ingredient fungi is produced in the inoculum production laboratory, mixed with a polymer sticker and blue food colorant and then taken to Module C to be coated on sterile sorghum grains.

aflasafe KE01™ produced at KALRO-Katumani

This was produced and packed in KALRO-Katumani in 2017 during installation and testing of the equipment. Quality control tests were conducted in the lab of the modular facility & the KALRO/IITA Regional Mycotoxin Lab.
KALRO hosts IITA’s Regional Mycotoxin Laboratory, where research and development of Aflasafe products for East Africa is conducted. These include aflasafe products for Burundi, Uganda, and Rwanda. In years to come, it is anticipated that Aflasafe for other countries will also be produced in Kenya.

Future Directions

• USAID and Bill & Melinda Gates Foundation through Aflasafe Technology Transfer and Commercialization (ATTC) initiatives will assist and partner with KALRO to scale-up the commercialization of aflasafe KE01™ through Private, Public and or Public-Private Partnerships (PPP).
• KALRO and IITA, will license the manufacturing, marketing, and distribution of aflasafe KE01™.
• KALRO and IITA scientists will provide stewardship and technical backstopping functions to the licensees.

Partners

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