

Pre-and Postharvest Management of Mycotoxins in Rice

What are mycotoxins?

- Mycotoxins are poisonous substances produced by some molds, which grow on foods such as cereals, oil crops, fruits under moist and humid conditions.

Mycotoxigenic fungi and toxins in rice

Major producer	Mycotoxin
Aspergillus	Aflatoxins
Aspergillus & penicillium	Ochratoxins
Fusarium species	Fumonisin
	Trichothecenes
	Deoxynivalenol (DON)
	Zearalenones

Conditions favouring mycotoxins

- Inappropriate drying; moisture content > 14%.
- High relative humidity (>65%) during storage.
- Drought during grain filling.
- Delayed harvesting, when it is raining.
- Inappropriate threshing and milling, leading to broken grains.

Mycotoxins and public health

- Ingestion of mycotoxins cause cancer, immunosuppression, stunted growth in children, and deaths.

Mycotoxins and trade

Mycotoxins impair trade, owing to the strict tolerance levels set by various regional blocs or countries. The legal limit for common toxins in Kenyan foods are: aflatoxin (10 ppb) and fumonisin (1,000 ppb). Kenya is a net importer of rice, importing 90% of the rice consumed. There is need to regularly monitor levels of mycotoxins in imported rice by KEBS.



Fig 1. Mouldy rice grains.
Source: Francis Wayua



Fig 2. Mycotoxin contaminated rice grains.
Source: Samuel Muliga

Mycotoxins and food security

Mycotoxins directly affects food availability, as mycotoxin contaminated food is unfit for human consumption and is destroyed.

Management and control mycotoxins

Pre-harvest management strategies

- Avoid drought stress during grain filling.
- Enhance optimal soil fertility by application of synthetic fertilizer or manure.
- Eradicate insect pests.
- Timely harvesting; avoid exposing mature grain to rains during harvesting.
- If disease symptoms are observed, apply fungicides and bactericides to reduce plant stress.
- During harvest, minimize contact of the harvested produce with the soil.

Post-harvest management strategies

- Minimise grain damage during threshing as damaged grain is vulnerable to colonization by moulds.
- Rice paddy should be dried to a moisture content of 13-14% for safe storage and milling. Stores should be kept at temperatures and relative humidity in which molds do not grow (cool dry place).
- Sort out mouldy grain from clean grain.
- Prevent insect infestation in stored grain (paddy and milled rice).
- Cooking of rice at high temperatures, >150°C, as this degrades fumonisin.