



# MAIZE GRAIN POSTHARVEST HANDLING PRACTICES



**MAAIF**  
Ministry of Agriculture  
Animal Industry and Fisheries



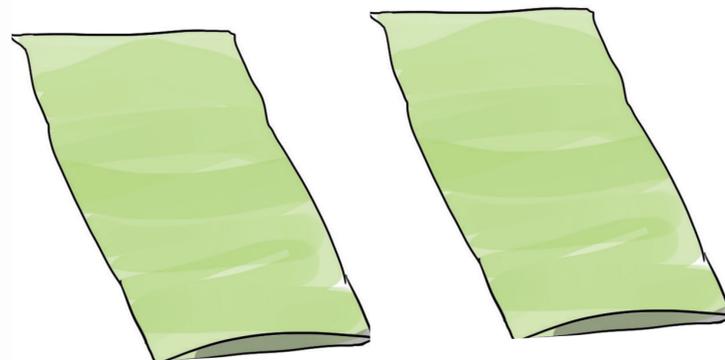


## WHAT TO DO BEFORE HARVESTING?

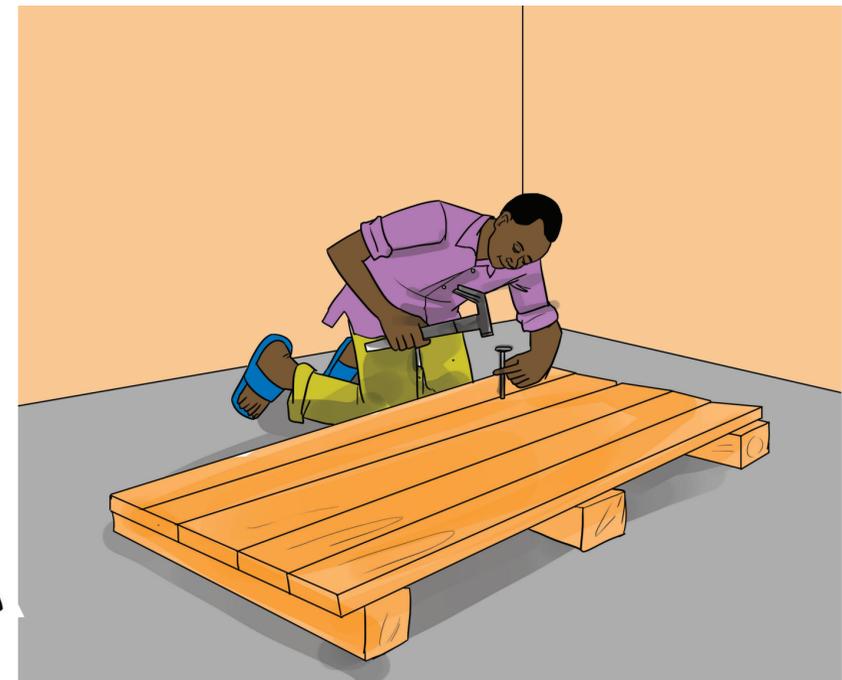
### Prepare yourself before harvesting

- Planning ahead is essential. Make sure you have all the necessary equipment, know where the drying and shelling will be done and how the grain will be stored. Repair cribs and stores.
- Good hygiene is essential. Clean the storage facilities in advance. Remove residues of the previous harvest from the store.
- Fumigate or spray with insecticides all areas used for handling the previous maize stock
- You should ensure timely harvesting of maize

# WHAT TO DO BEFORE HARVESTING?



Buy new sacks and other requirements for harvesting



Repair or buy new pallets

Pre-plan for drying, shelling and storage



Clean the store and crib in advance



Fumigate or spray the storage facilities with the right insecticides



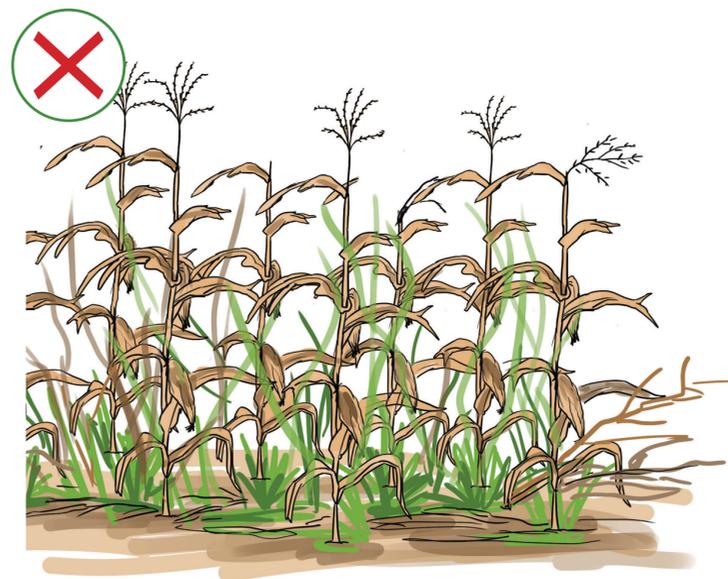
## HARVESTING OF MAIZE GRAIN

- Harvest maize when it is physiologically mature at a moisture content  $\leq 18\%$
- Timely harvesting is important to minimize yield losses
- Too early or late harvesting leads to pest infestation, fungal infection and ultimately yield loss
- For some varieties, the cobs may droop and face downwards as a sign of drying.
- Use of mats, tarpaulins, and gunny bags help to keep the cobs clean and reduces fungal infection from the soil.
- Drying can be done on tarpaulins, drying yards or in well ventilated maize cribs.
- Before bagging for storage ensure that the moisture is  $\leq 13\%$

# HARVESTING OF MAIZE GRAIN



Too early harvesting



Too late harvesting



Timely dry maize harvesting

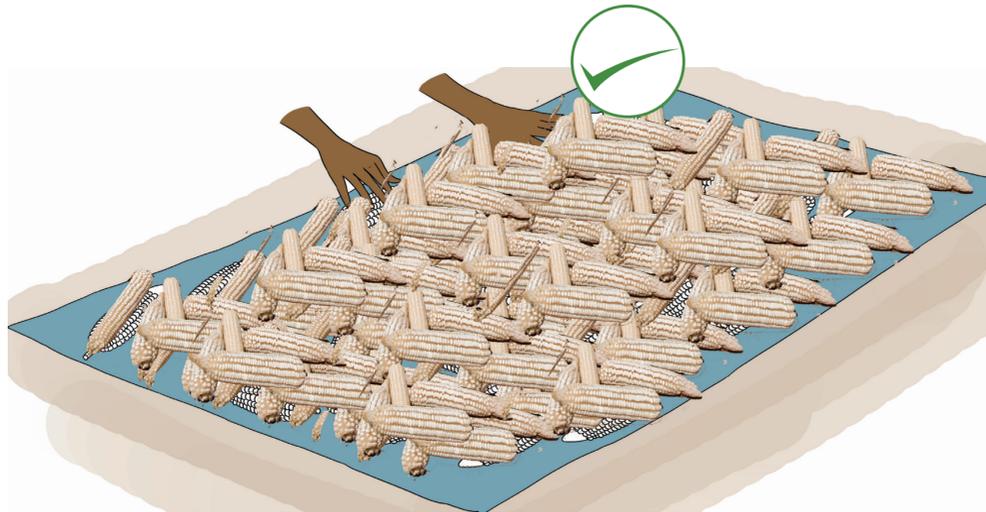
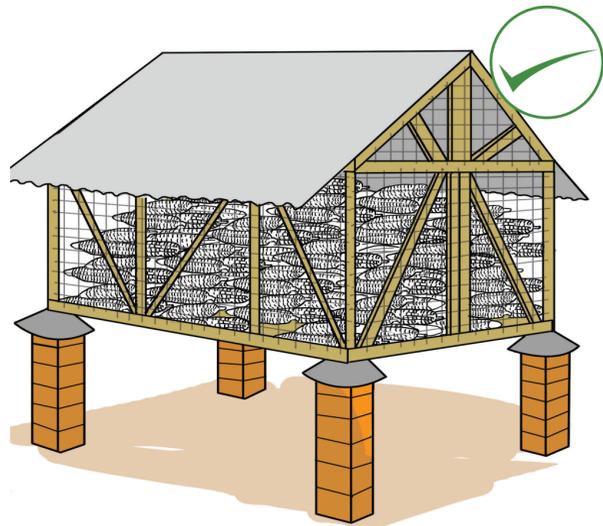




# HOW TO DRY THE GRAIN

- Dry immediately after harvest and avoid heaping the cobs together
- Dry the cobs on mats, tarpaulins or cemented floor so that they are not in contact with the soil and make sure farm animals are kept away
- Alternatively, use a standard crib for protected drying
  - Maize should be kept in the crib for not more than 7 weeks, otherwise its quality will deteriorate
- Don't let dry grain get wet, cover with a tarpaulin if it rains.
- Dry grain to a moisture content of  $\leq 13\%$ , suitable for storage
- There are various methods of testing for moisture content, including:
  - traditional biting,
  - the salt bottle method,
  - use of a moisture meter

# HOW TO DRY THE GRAIN

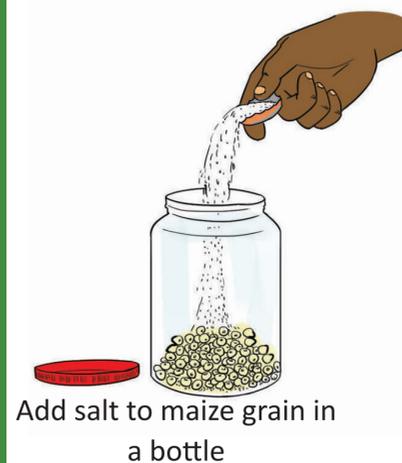


Let maize dry sufficiently ( $\leq 13\%$  moisture content)

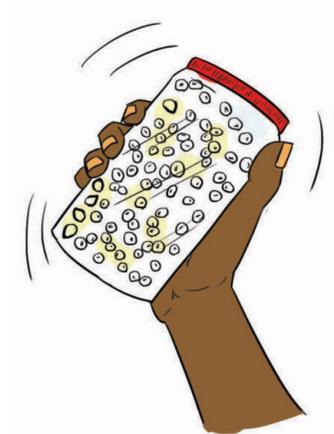
Use mats, tarpaulins, cemented floor or maize drying crib



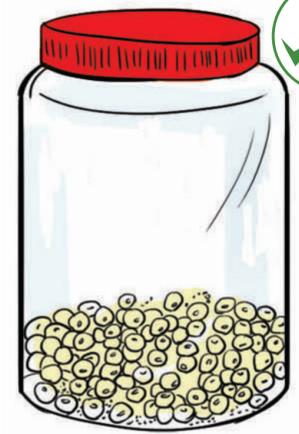
Avoid contact with water



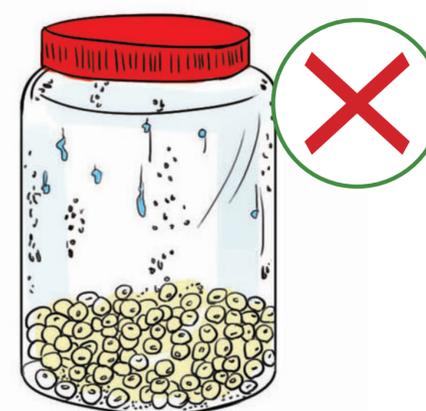
Add salt to maize grain in a bottle



Shake well



Observe if salt attaches on the bottle

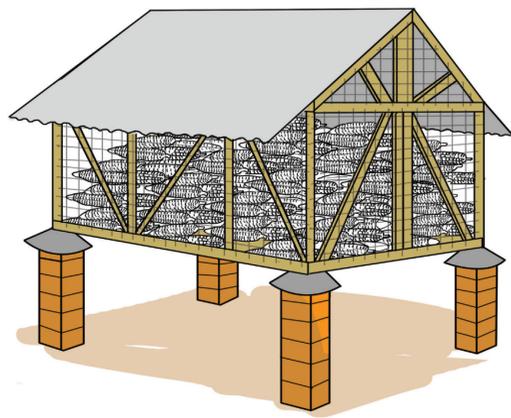


Use moisture meter (13% MC)



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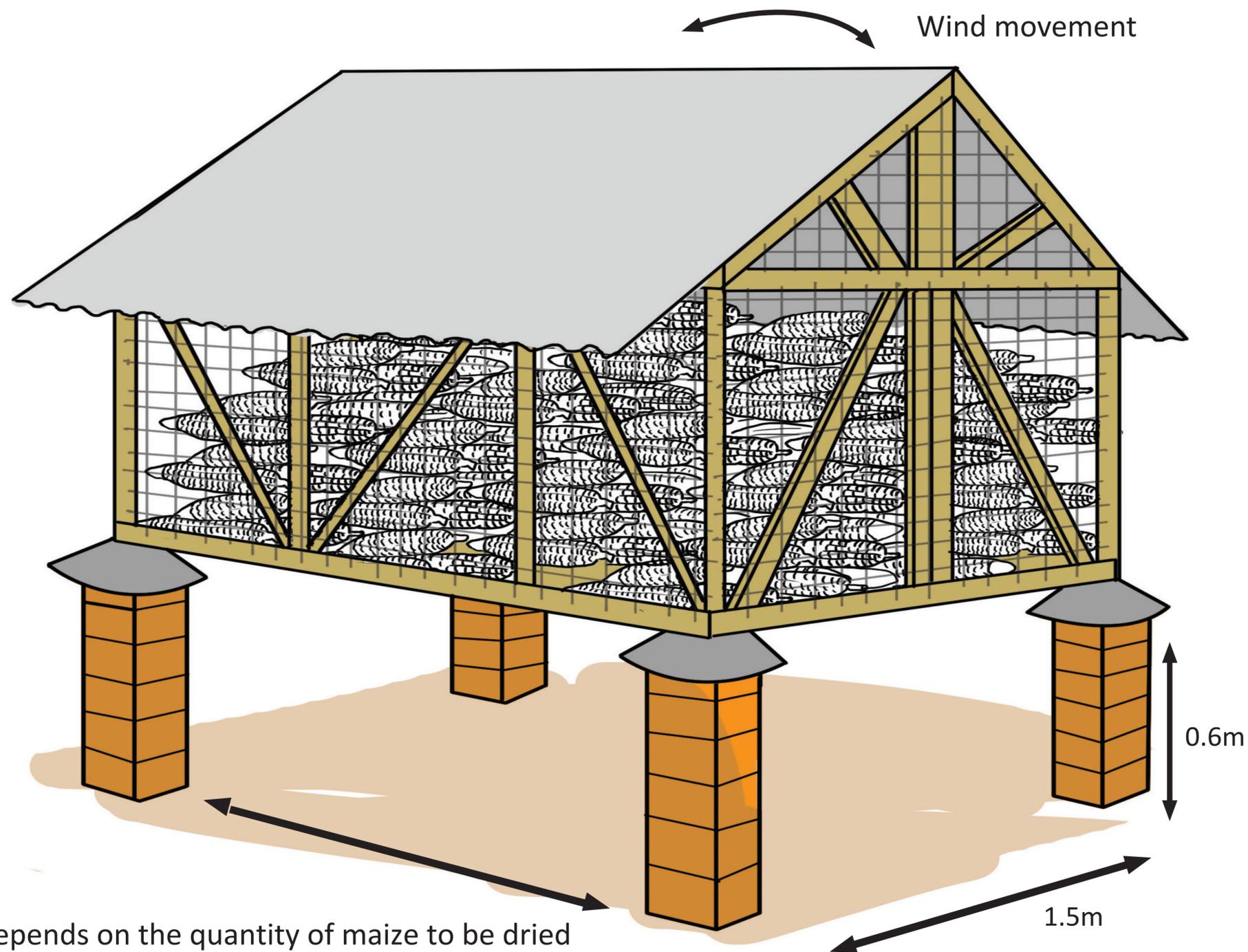




# THE MAIZE CRIB

- It is a structure used for protected drying of maize, it can as well serve as a temporary storage facility
- It is constructed in such a way that wind can easily blow through it to drive away moisture and any heat from the cobs being dried
- The crib width should not exceed 1.5m and should be constructed in an open air environment without wind barriers. The length is dependent on the quantity of maize to be dried and the space available for construction
- The floor base should be at least 2ft from the ground and must be rodent-proof
- The roofing should be in such a way that rain water cannot enter the cobs being dried
- For effective drying, the volume of the cobs to be dried should not exceed 75% of the crib capacity
- Ideally, the drying period in a crib should not exceed 7 weeks, otherwise the grain quality may begin deteriorating

# THE MAIZE CRIB



The length depends on the quantity of maize to be dried and the space available for crib construction



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# SHELLING MAIZE

- Shelling should be done at moisture content of 15% and below
- Continue drying even after shelling up to recommended moisture content  $\leq 13\%$
- Avoid beating the maize cobs to prevent breakage of the grains
- Broken grains will attract infections by mycotoxin- (aflatoxins) producing fungi and/or insect infestation

# SHELLING MAIZE



Hand shelling



Using a hand maize sheller



Motorized mechanical sheller



Do not beat with stick





# HOW TO CLEAN THE GRAIN

- Winnow grain or use a wire-mesh (4.5mm pore size) to remove broken grain, chaff and foreign materials.
- Ensure that all insect damaged grains, mouldy grain and chaff are removed to remain with clean grain.



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# HOW TO CLEAN THE GRAIN



Sieve to remove chaff and broken grain

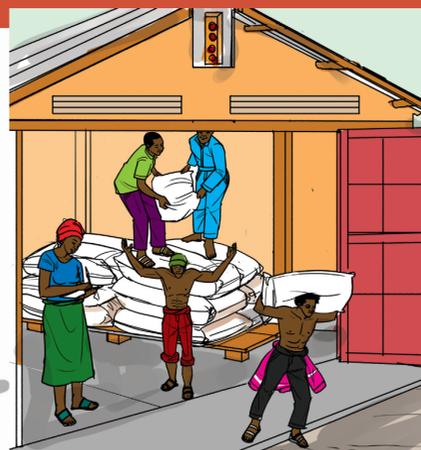


Winnowing



Remove mouldy and insect damaged grain





# STORAGE

- For long storage use hermetic bags or silos,
- Avoid leaking roofs because they enhance mold growth which can lead to aflatoxin accumulation;
- Make sure the store is clean and fumigated before storage
- Ensure the batch of grain stored first is utilized first (first in – first out)

# STORAGE



Hermetic bag (airtight)



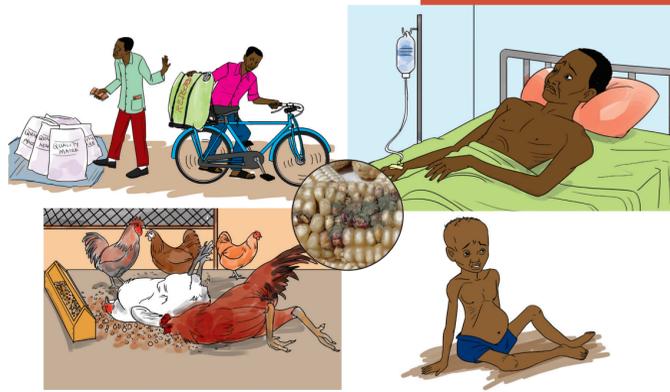
Hermetic Silo (airtight)



Modern store, well ventilated to maintain cool and dry conditions



Grain Sacks



# MYCOTOXINS e.g. AFLATOXINS AND ASSOCIATED DANGERS

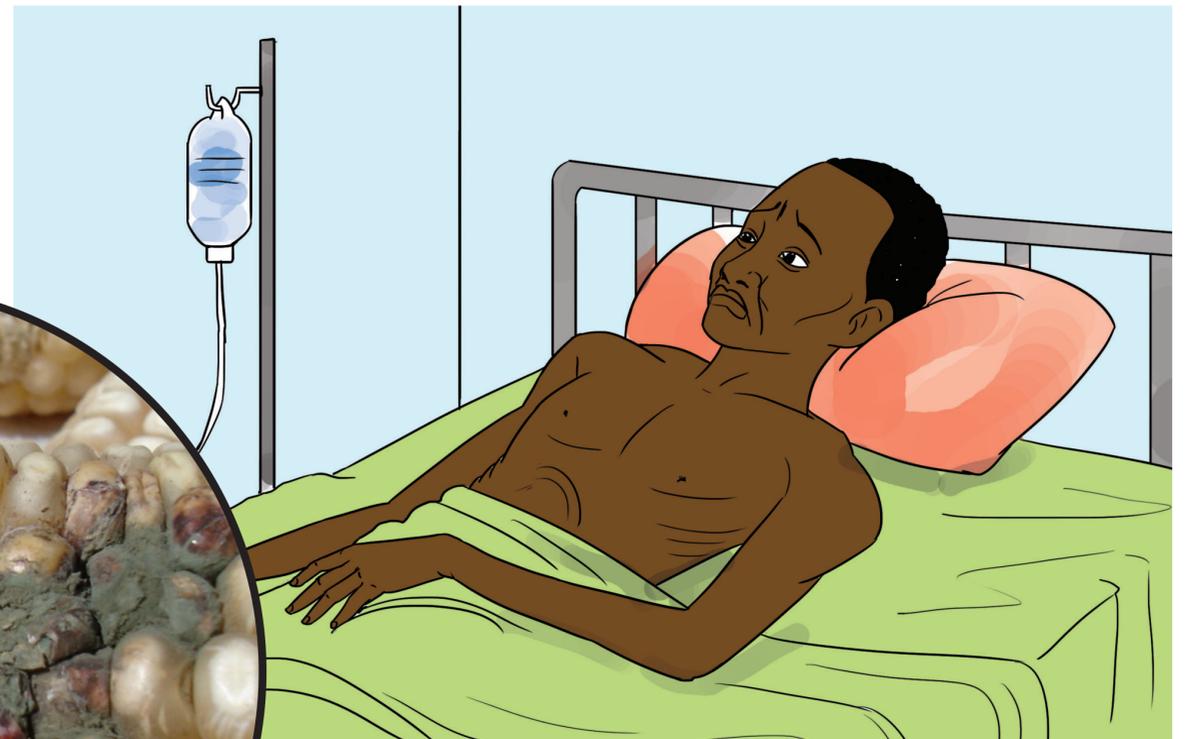
## What are Mycotoxins (Aflatoxins)?

- These are cancer causing poisons produced by fungi (moulds) which may attack maize in the field, poorly dried and/or poorly stored maize grain;
- Aflatoxins can result into stunting of young children and may cause cancer in adults;
- When Aflatoxin levels exceed the acceptable level, it can lead to rejection of grain on the market;
- Infestation of maize grain by storage pests may favour growth of aflatoxin producing fungi .
- Aflatoxins are heat stable even after cooking/boiling they can still be poisonous
- Eating aflatoxin contaminated maize is not healthy both for food and feeds

# DANGERS OF AFLATOXINS



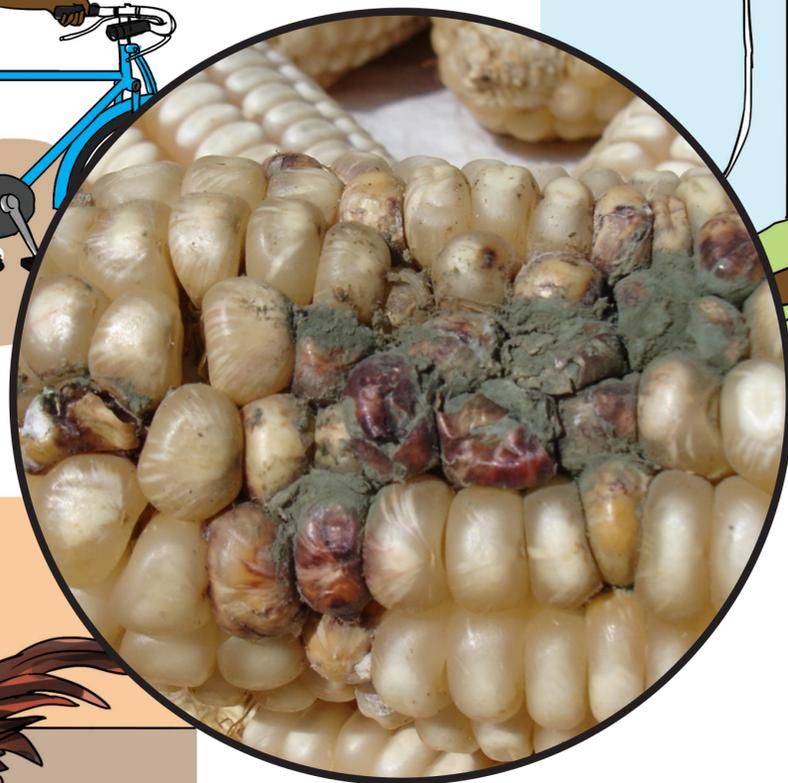
Aflatoxin contaminated maize rejected on the market



Consuming aflatoxin contaminated maize causes health problems including cancer



Consuming aflatoxin contaminated feeds can cause death in chicken and livestock



Consuming aflatoxin contaminated maize can lead to stunting in children



# CONTROL OF AFLATOXINS BEFORE STORAGE

- Receive produce with recommended moisture content for storage ( $\leq 13\%$ )
  - **Check for/Avoid**
    - Chaff, Soil and stone-contaminated grain
    - Check the store to ensure its clean.
    - Check the levels of M.C%
    - Avoid broken grain
    - Avoid mouldy and discolored grains
    - Avoid insects and insect-damaged grains
    - Avoid grain with bad smell, don't allow this in your store

# CONTROL AND MANAGEMENT OF AFLATOXINS

## BEFORE STORAGE



Receive produce with recommended moisture content for storage

## CHECK FOR



Mouldy and discolored grains



Chaff, Soil and stones contaminated grain



Mould contamination



Broken grains



Broken grains Bad smell



Insects and insect-damaged grain



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# DURING STORAGE

- Winnow and remove all the damaged, shrivelled, diseased grains and any foreign materials
- Store sorted, clean and graded grain only
- Periodically re-dry produce to recommended moisture content
- Allow adequate space in the store, to ease movements during monitoring for grain quality and any other operations in the store
- Place and store dried produce in clean silos or hermetic bags
- Store produce with recommended moisture content in clean and dry environment to avoid insects and insect-damaged grain, when you see insects in store, control them immediately.
- Use recommended storage pesticides to control insects and rodents
- Practice store hygiene: Ensure proper management of rodents and avoid grain spillage in the store

# DURING STORAGE



Ensure that stored grain is sorted, clean and graded



Carry out regular monitoring of the grain to ensure the right moisture content, and freedom from insects and moulds



Periodically re-dry produce to recommended moisture content





# DURING TRANSPORTATION

- Use clean and untorn bags, preferably new bags;
- Do not expose produce to rain and dust during transportation;
- Do not offload and put grain on bare ground;
- Ensure that grain is well dried before transportation for the market
- Do not transport produce (grain) with other products e.g. petroleum, water, charcoal, etc;
- Transportation is in phases, from the field to home: here avoid cobs falling along the way. To achieve this ensure that the bags used for harvesting are intact without holes;
- Avoid any contact with water and dust, so transport the produce when it is not raining or when covered with tarpaulin;
- Do not transport unbagged or poorly-bagged produce, this will avoid grain spillage along the way.

# DURING TRANSPORTATION



Dry grain should be transported when well protected from dust and rain



Use clean and untornd bags



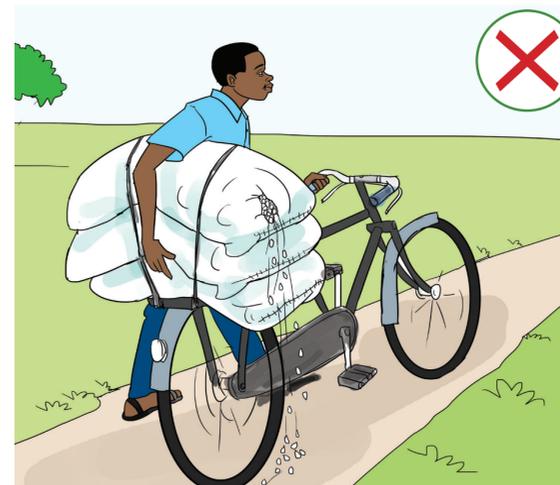
Ensure that grain is well dried before transportation



Do not expose produce to rain and dust during transportation



Do not offload on bare ground



Do not transport unbagged, poorly-bagged produce



Do not transport produce with other products eg petroleum, water, charcoal etc

# QUALITY ASSURANCE FACTS

- When grain quality is lost, it can never be recovered
- Ensure you handle your grain properly right from your field to your plate
- Quality grain leads to better health and better income.

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