

- By Prof. J. Muthomi and Prof. R. D. Narla

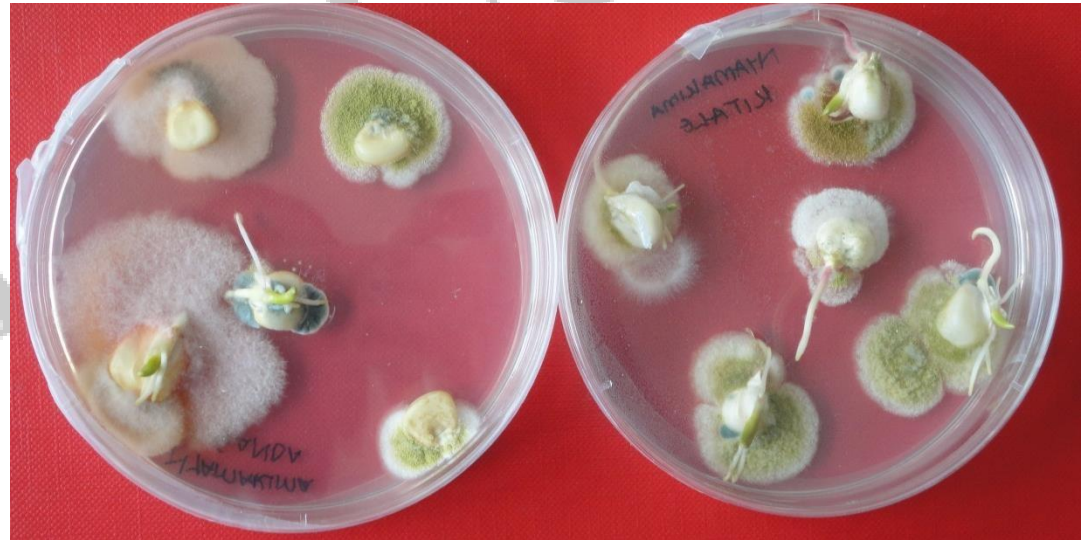
Contents

1. Management of Storage Diseases in Seed Lots

SEMIs - UoW

Seed Drying, Processing and Storage

Management of Storage Diseases in Seed Lots



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Management of Storage Diseases in Seed Lots

Importance of seed-borne diseases

- ✓ Healthy seed is a prerequisite for success in efficient crop production.
- ✓ Production and distribution of healthy seeds is an international issue thus affects seed trade
- ✓ Use of infected seed leads to significant crop losses
- ✓ Storage fungi reduces seed quality by causing heating and spoilage, packing or caking, & reduced germination

Management of Storage Diseases in Seed Lots

Importance

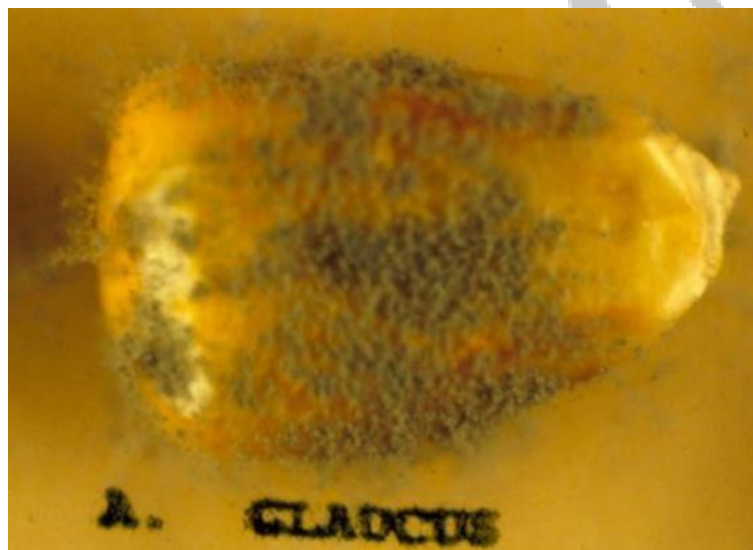
- ✓ Movement of infected seed leads to spread of diseases across regions/countries
- ✓ Pathogens can adversely affect germination, cause seedling infection and damage mature plants
- ✓ Seed-borne diseases often strike early in the growth of a plant causing poor crop establishment and reduced plant vigour
- ✓ Diseases caused by viruses usually have higher transmission rates than those caused by fungi or bacteria

Management of Storage Diseases in Seed Lots

Infected seeds



Management of Storage Diseases in Seed Lots



Aspergillus growing on maize seeds



Penicillium growing on maize seeds

Management of Storage Diseases in Seed Lots

Maize seeds



Wheat seeds



Fungi growing from infected seeds

Management of Storage Diseases in Seed Lots



Fungi growing from infected maize seeds

Conditions favouring storage diseases

Conditions favouring storage diseases

- ✓ Storage fungi (molds) invade grains or seeds during storage
- ✓ Most common storage fungi are species of *aspergillus* & *penicillium*
- ✓ Storage fungi are usually present in small quantities on grain going into storage or may be present on spilled grain present in harvest, handling and storage equipment or structures
- ✓ Improper storage conditions favours the multiplication of the disease inoculum

Conditions favouring

- ✓ Storage fungi are usually inactive at low grain-moisture levels
- ✓ Moisture content below 13.5 percent in starchy cereal seeds such as wheat, barley, rice, corn and sorghum and below 12.5 percent in soybean prevents invasion by storage fungi
- ✓ Cooling the seed grain and reducing the humidity will help prevent mould growth
- ✓ Temperature between 8 to 15 °C, storage fungi grow very slowly. At 25 to 35 °C , they grow much more rapidly

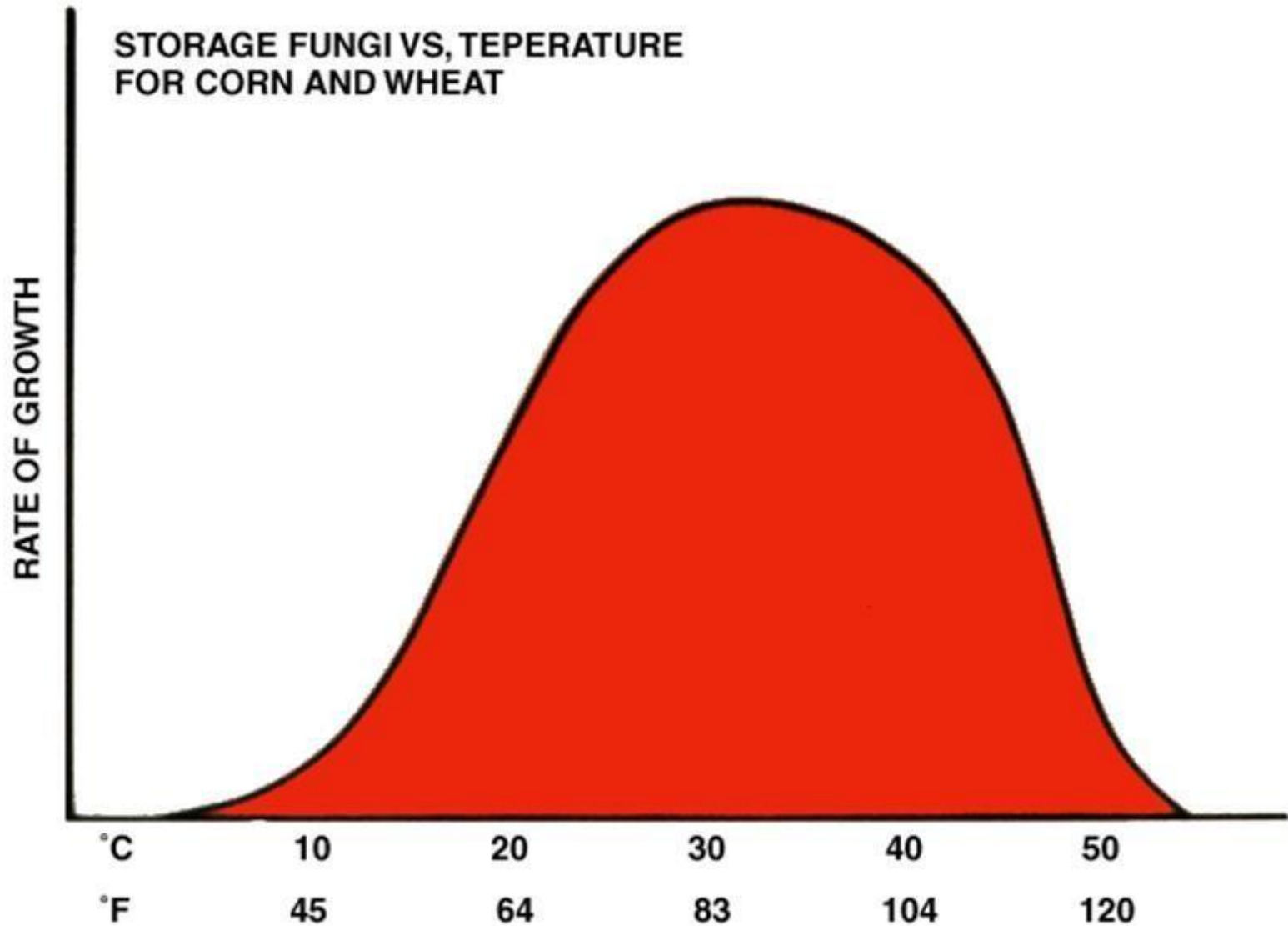
Conditions favouring

- ✓ Cracked and broken kernels - Broken or cracked kernels are more likely to be contaminated with storage fungi going into storage
- ✓ Foreign material may restrict air movement through the grain mass leading to temperature and moisture problems which may favor storage mould development
- ✓ extent of infection before harvest - grain already invaded by storage fungi has a high risk of damage in favourable moisture & temperature

Conditions favouring

- ✓ insect and mite activity in grain- Insects and mites may carry fungal spores thus introducing storage fungi into the grain mass.
- ✓ Insect and mite activity in a grain mass lead to increase in temperature and moisture content of the grain surrounding the insect infestation. This creates 'hot spots' with increased mould growth.

Management of Storage Diseases in Seed Lots



Damage due to storage fungi
(moulds) on seed

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Mould damaged maize seed

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Mould damaged wheat seed

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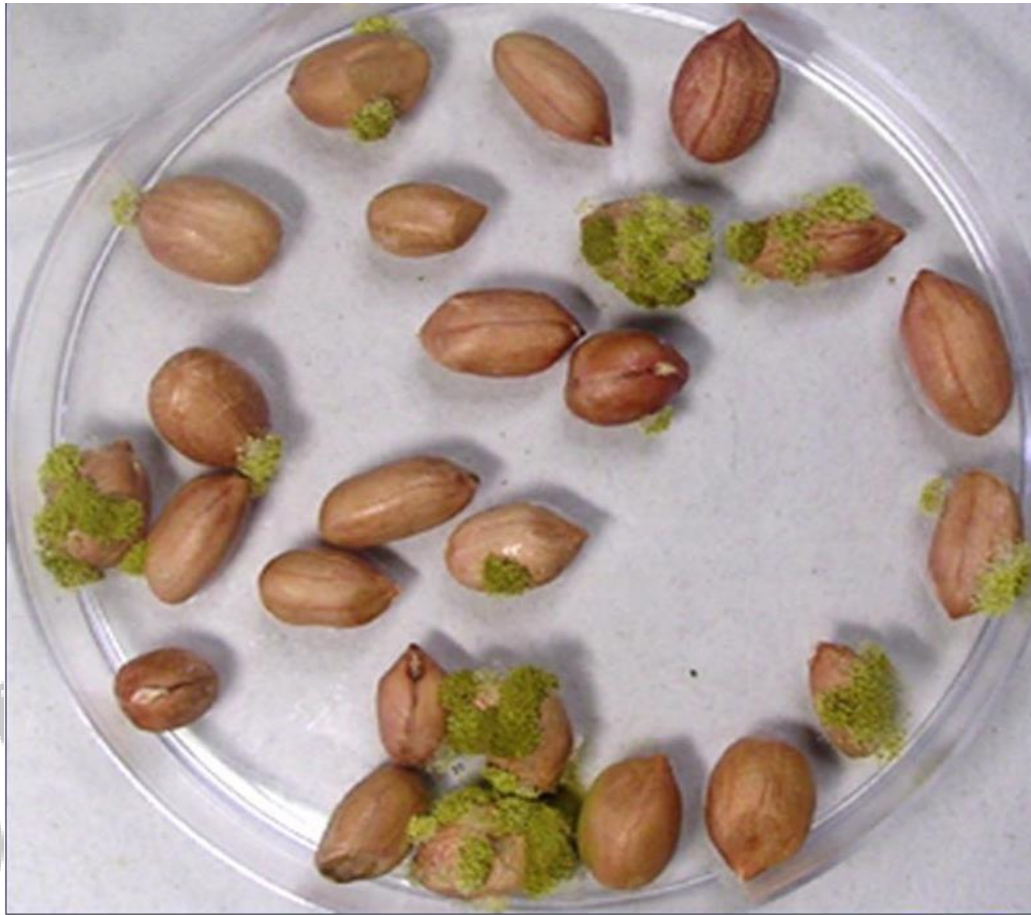


Mould
damaged
groundnut
seed



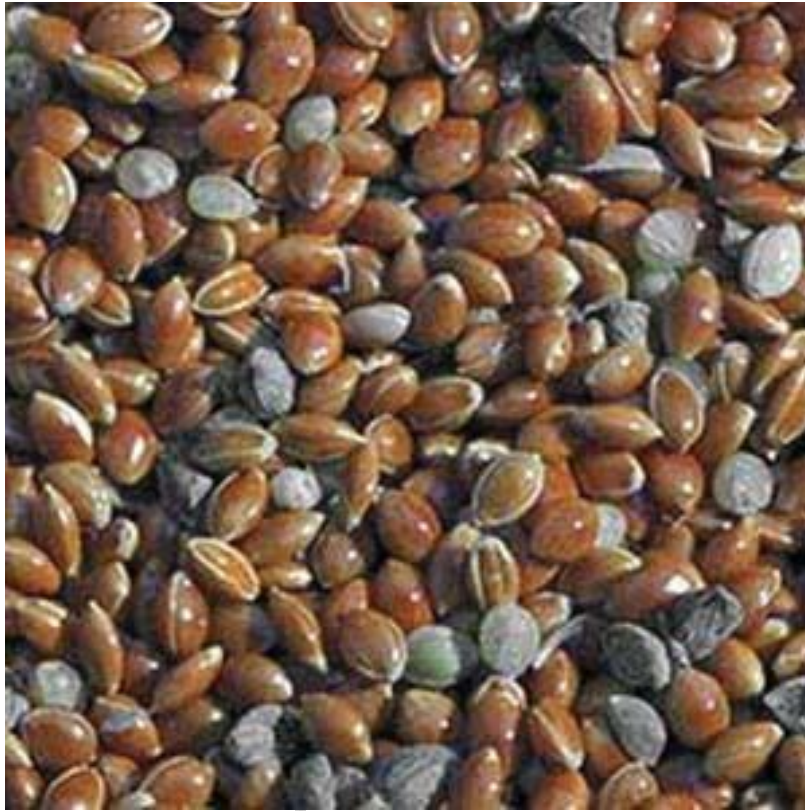
Healthy
groundnut
seed

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Aspergillus flavus growing on infected groundnut seed

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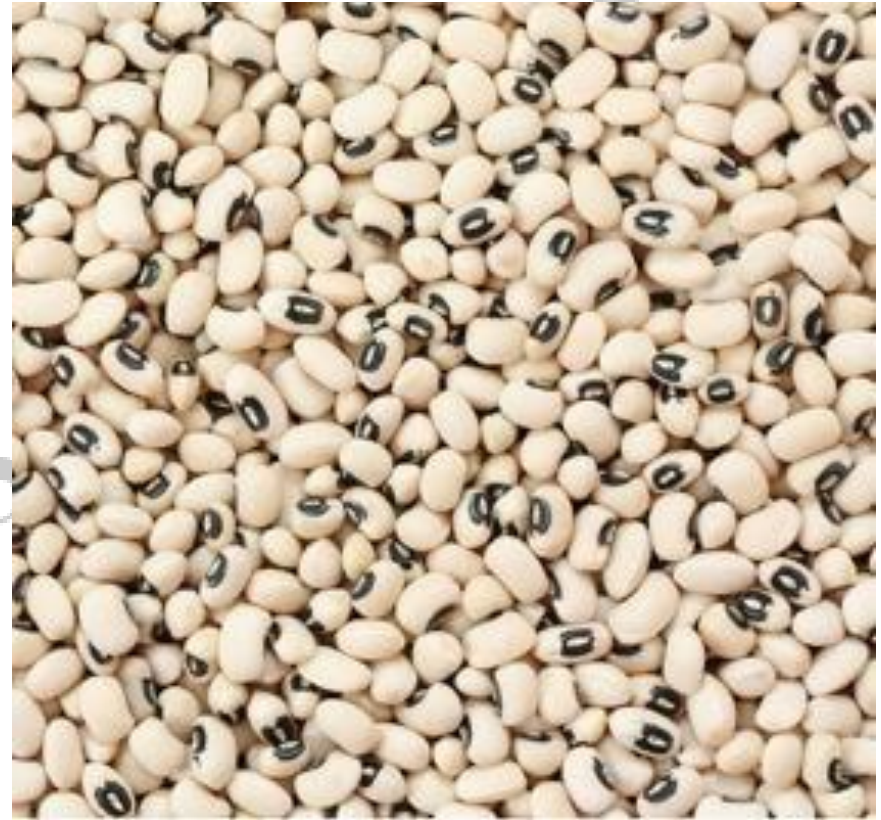


Mould damaged sorghum seed

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Mould damaged
cowpea seed



Healthy cowpea seed

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Mould damaged green gram seed

Survival of disease causing pathogens on seed

- ✓ Seed-borne pathogens can survive for several years in and on seed
- ✓ Fungi and bacteria are mostly located on the seed coat
- ✓ Viruses are not carried on the seed coat, and are only found in the seed embryo or tissues of the seed coat

Measuring the amount of seed-borne disease inoculum

- ✓ Amount of inoculum may be expressed in terms of the proportion of infected seeds
- ✓ Most seed tests measure the proportion of infected seed
- ✓ Fungi may be detected using a standard blotter test or an agar plate test
- ✓ Seed-borne bacteria can also be detected using an agar plate test
- ✓ Seed-borne viruses are usually detected using ELISA or PCR tests.

Management stored grain fungi

Management stored grain fungi

- ✓ Produce pathogen-free seed by ensuring dry weather between flowering and maturity to minimize pod infection
- ✓ Harvest seed crop as soon as the moisture content allows for minimum grain damage.
- ✓ Adjust the harvesting equipment for minimum kernel or seed damage and maximum cleaning.
- ✓ Clean all grain harvesting and handling equipment thoroughly before beginning to harvest.
- ✓ Clean bins or storage facilities thoroughly to remove dirt, dust & other foreign material, crop debris, chaff & grain debris.

Management

- ✓ Clean grain going into storage to remove light weight and broken seeds as well as foreign material and fines.
- ✓ Seed should be dried to safe moisture contents as quickly as possible after harvest
- ✓ Aerate grain to safe and equalized temperatures through the grain mass.
- ✓ Protect grain from insect and mite damage.
- ✓ Check stored seed grain on a regular basis and aerate as needed to maintain low moisture and proper temperature.

Management of Storage Diseases in Seed Lots



THANK YOU