

SEED ENTERPRISE MANAGEMENT INSTITUTE (SEMIS)

Management of Storage Diseases in Seed Lots



Dr. W. M. Muiru
Department of Plant Science and Crop Protection
University of Nairobi

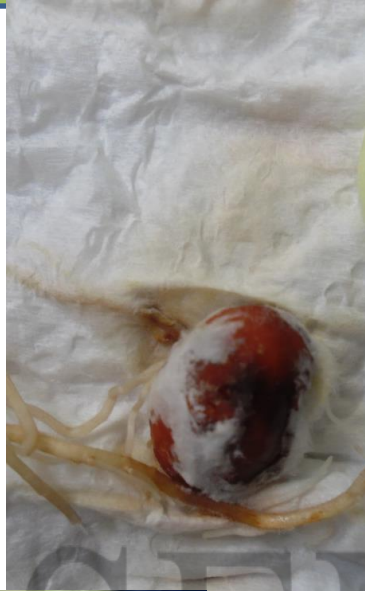
Introduction

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
- Movement of infected seed leads to spread of diseases across regions/countries
- Use of infected seed leads to significant crop losses (infected seeds=primary inoculum)
- Seed-borne diseases often strike early in the growth of a plant causing poor crop establishment and reduced plant vigour
- Storage fungi reduces seed quality, destroys seeds, mycotoxin production
- Pathogens can adversely affect germination, cause seedling infection and damage mature plants
- Diseases caused by viruses usually have higher transmission rates than those caused by fungi or bacteria

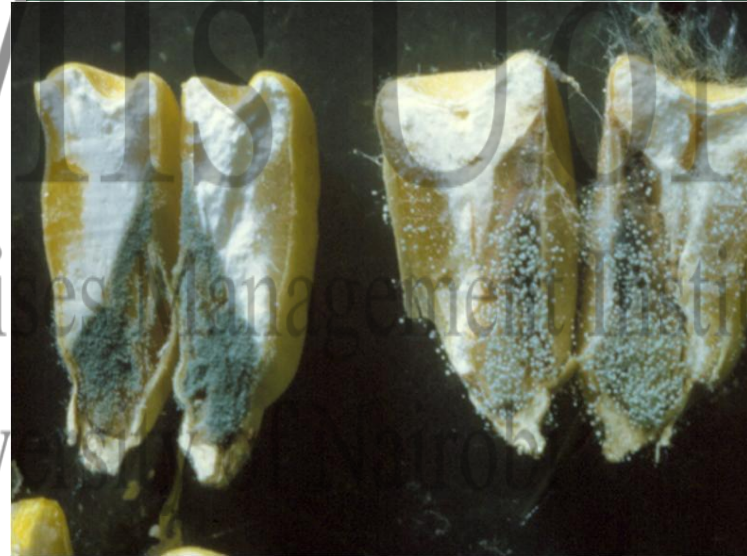
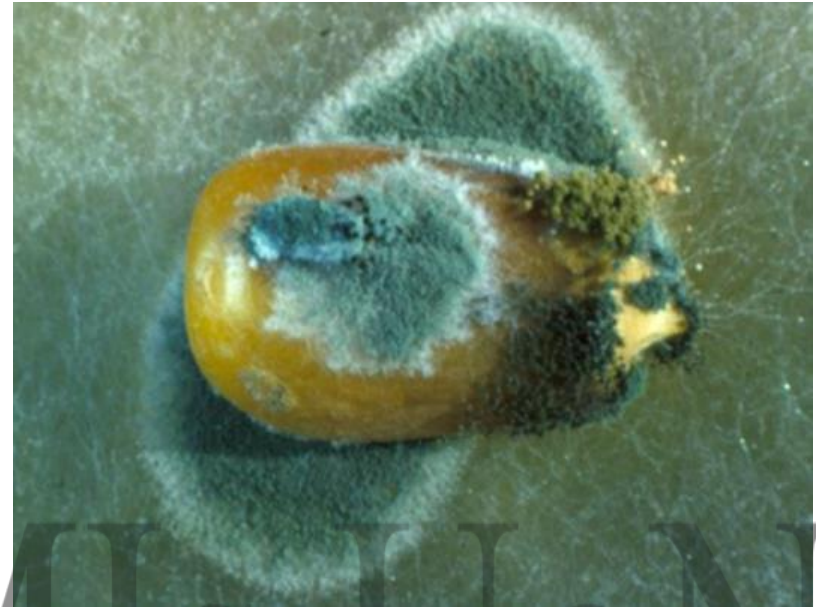
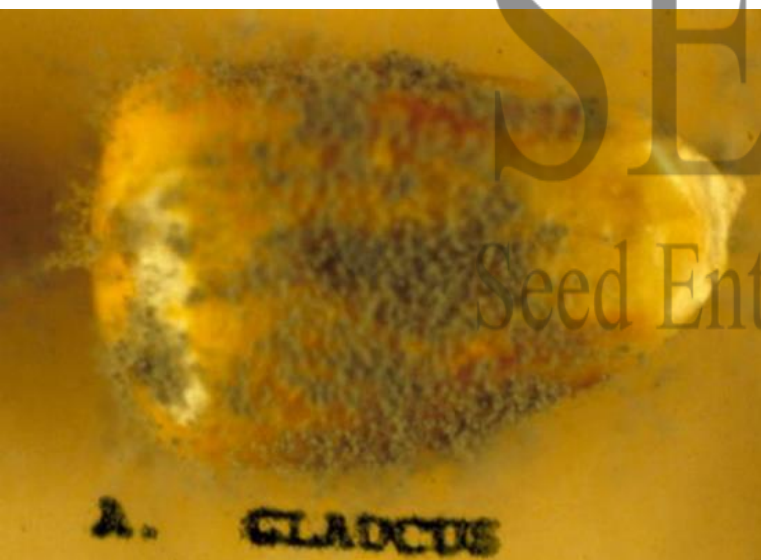
SEMIS UON
Seed Enterprises Management Institute
University of Nairobi

Infected seeds



SEEDS UoN
Seed Enterprises Management Institute
University of Nairobi

Infected seeds



Aspergillus growing on maize seeds

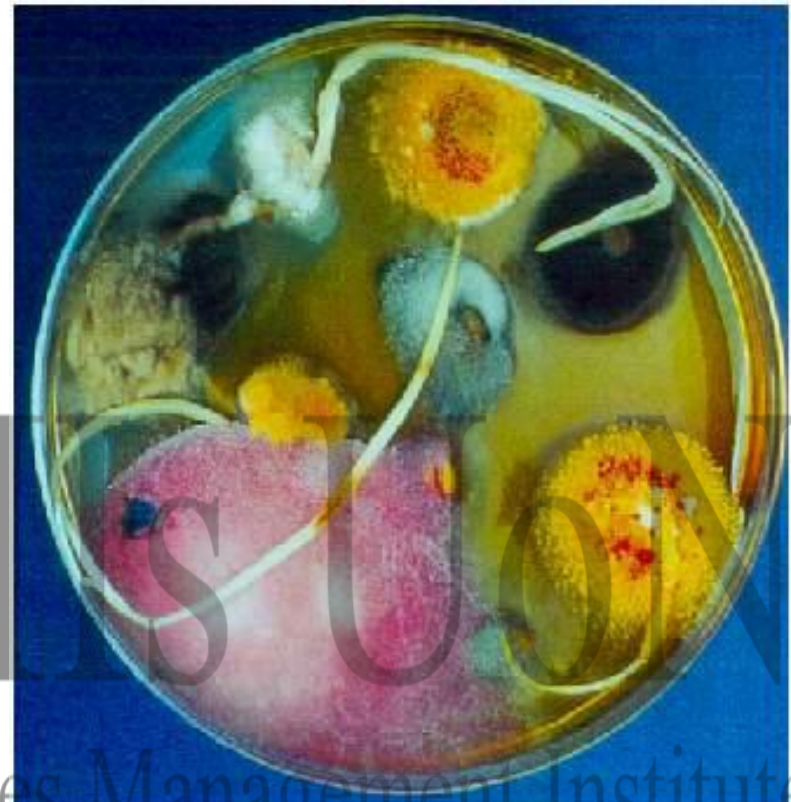
Penicillium growing on maize seeds

Infected seeds

Maize seeds

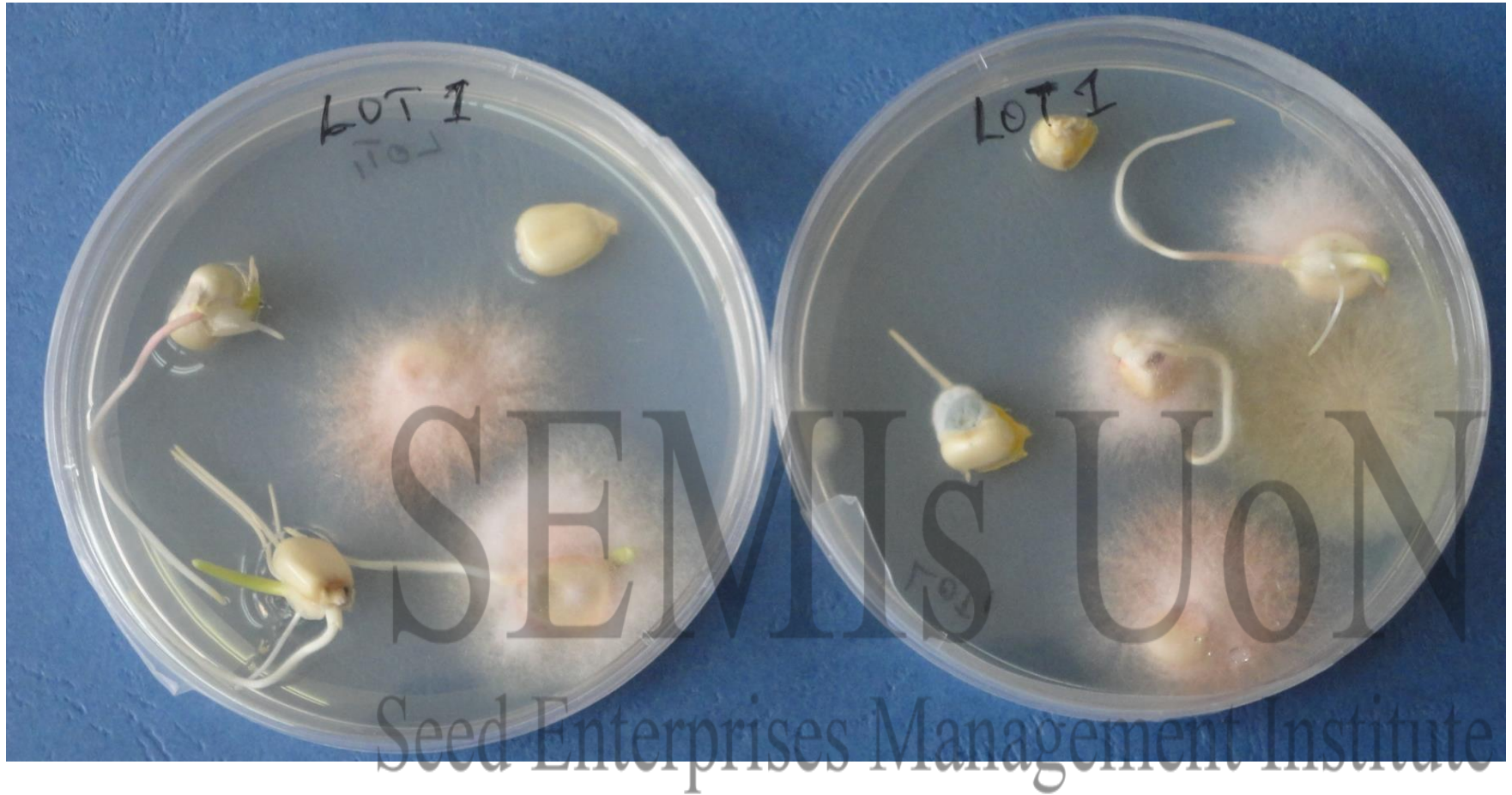


Wheat seeds



SEMISU
Seed Enterprises Management Institute
University of Nairobi
Fungi growing from infected seeds

Seed infections

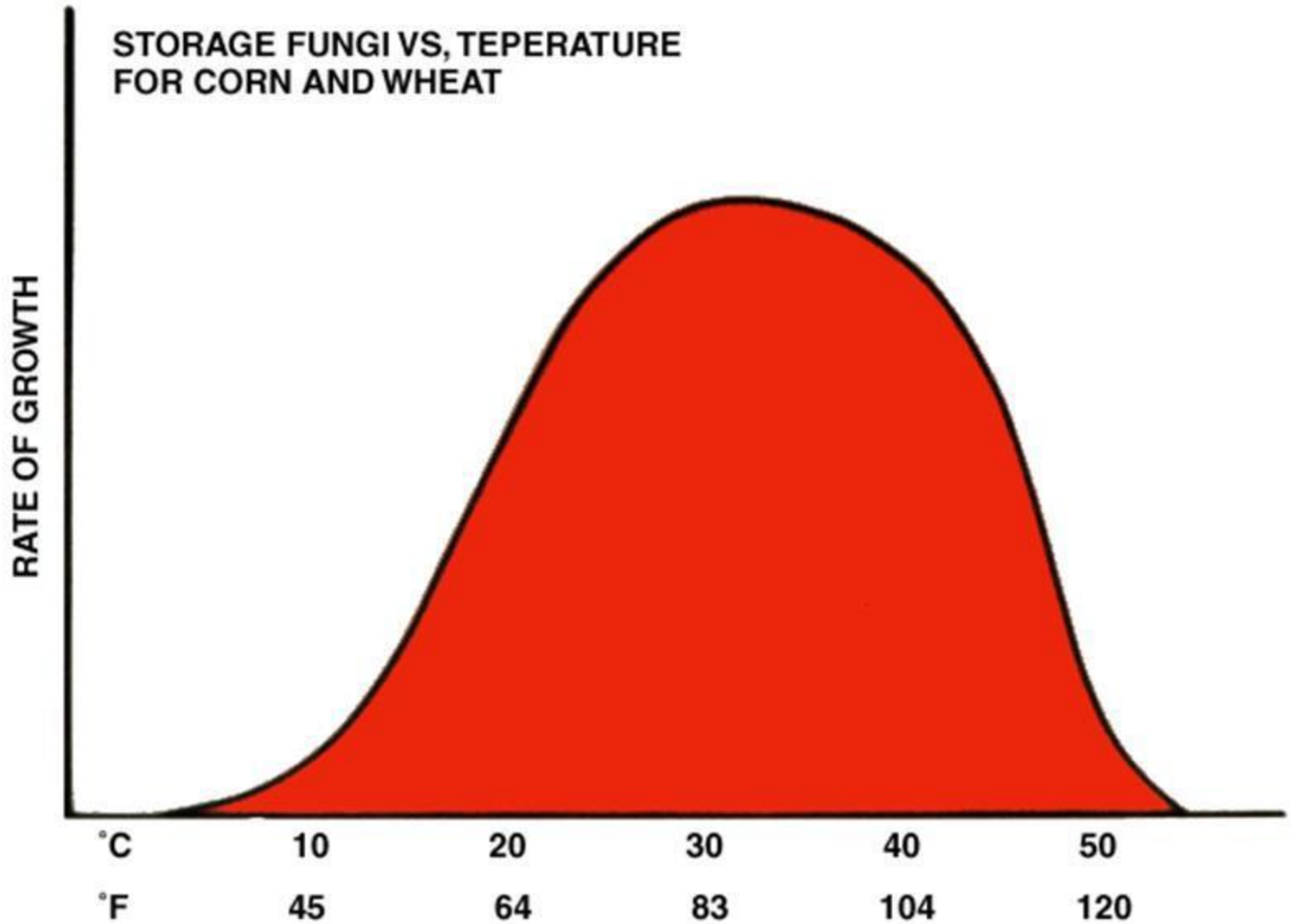


Fungi growing from infected maize seeds

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
- 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, maize 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

STORAGE FUNGI VS, TEPEPERATURE FOR CORN AND WHEAT



Conditions favouring storage diseases

- 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 favour storage mould development
- Extent of infection before harvest - grain already invaded by storage fungi has a high risk of damage in favourable moisture & temperature
Poor handling during harvest, drying, processing and storage
- 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.

Damage due to storage fungi (moulds) on seed



Mould damaged maize seed

Seed Enterprises Management Institute

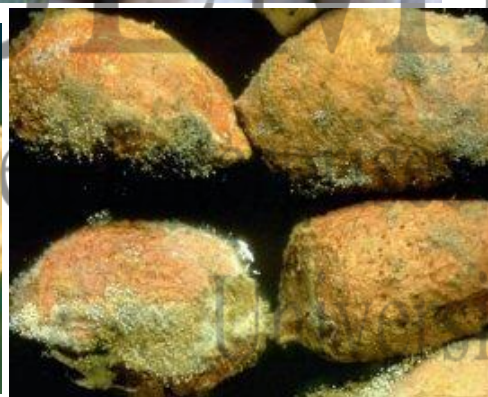
University of Nairobi



Seed Enterprises Management Institute

Mould damaged wheat seed

University of Nairobi



Mould damaged groundnut seed

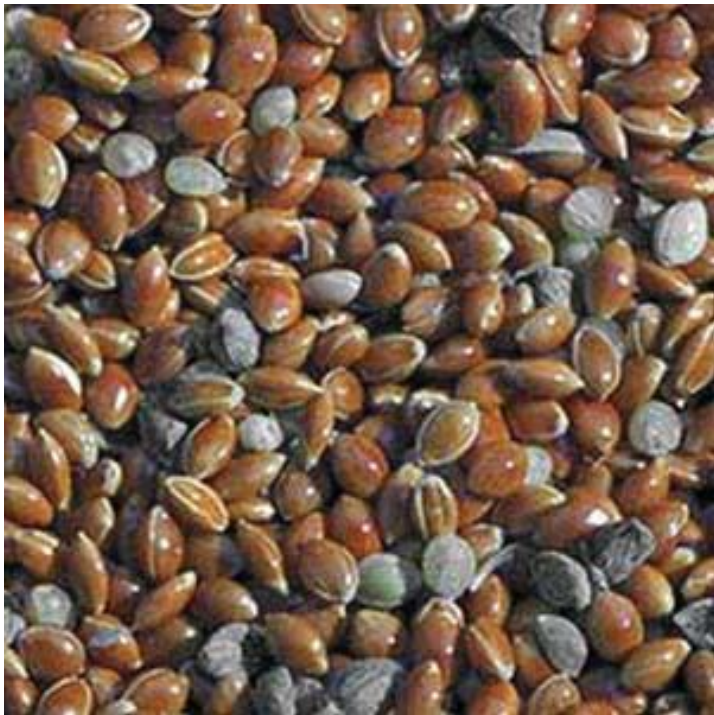


Healthy groundnut seed



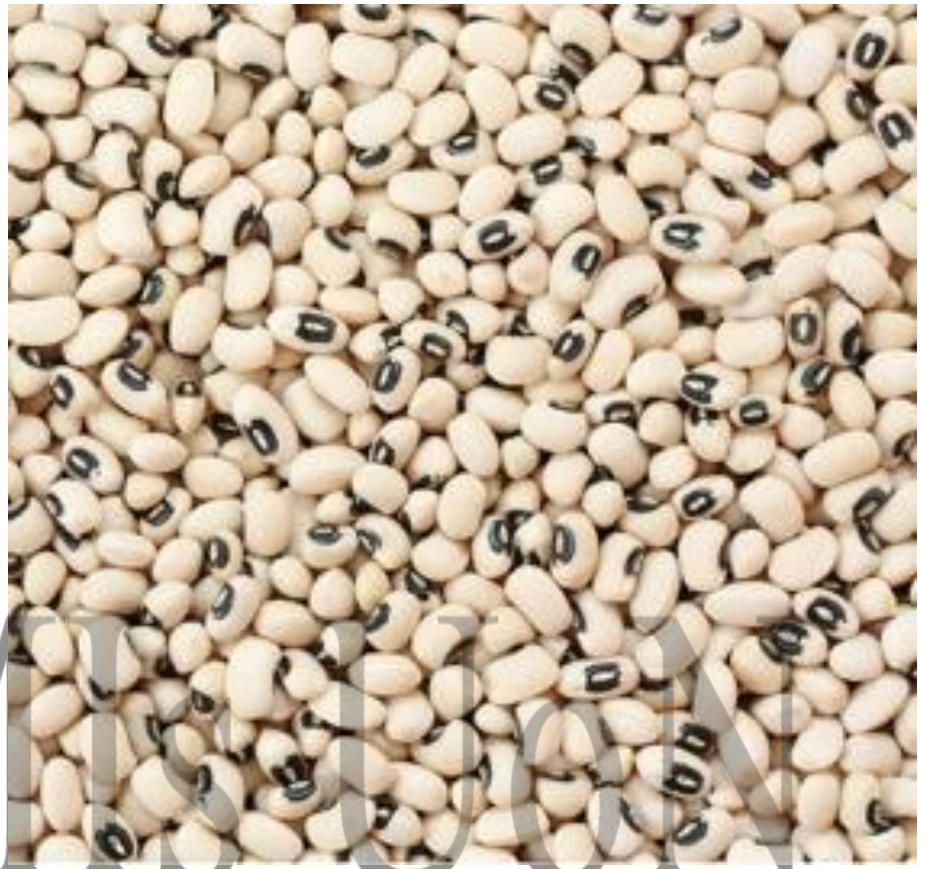
SEMIS UON
Seed Enterprises Management Institute
University of Nairobi

Aspergillus flavus growing on infected groundnut seed



Mould damaged sorghum seed

SEMIIS UON
Seed Enterprises Management Institute
University of Nairobi



Mould damaged cowpea seed

Healthy cowpea seed

SEMISSUON
Seed Enterprises Management Institute

University of Nairobi



- A. Leaf spot on leaves
- B. Infected seeds
- C. Fungal growth on seed

Seed Enterprises Management Institute

University of Nairobi



*Lentil seed discolouration caused by
Ascochyta lentis*

*Grey mould caused by Botrytis on
chickpea seed*



Pea seedborne mosaic virus (PSBMV)

Halo blight on bean pods and 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 seeds
- 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

- 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.

SEMMIS UoN
Seed Enterprises Management Institute
University of Nairobi

Management stored grain fungi

- 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.
- Seed treatment (to prevent and treat)—various strategies can be used
- Seed certification-compulsory for certified seed production
- Plant quarantine-to keep out new diseases from introduction
- Proper storage- hermetic bags



Poor storage of grains



Hermetic bag

SEMI S UON
Seed Enterprises Management Institute
University of Nairobi

End

Thanks for listening

Seed Enterprises Management Institute

University of Nairobi