

سورة التوبة

Storage Fungi

Importance:

- Reduction of storage losses could result in 10-20% increase in available food.

Losses caused by fungi growing in stored grains.

- 1. Decrease in germinability.
- 2. Discoloration of embryo or all of the seed or kernel.
- 3. Heating and mustiness.
- 4. Various biochemical changes.
- 5. Production of mycotoxins.

Fungi involved

Ecological categories of fungi

Field fungi:

- Which invade seeds on the developing plants in the field and after the crop is cut.
- They may be pathogens or saprophytes.

Common Field Fungi

- 1. *Alternaria tenuis*
- 2. *Cladosporium herbarum*
- 3. *Curvularia* spp.
- 4. *Epicoccum purpurascens*
- 5. *Fusarium* spp.
- 6. *Verticillium alboatrum*
- 7. *Fusarium* sp.

During storage of seeds their activity is restricted because they require high relative humidity for growth—mostly above 95%.

Alternaria alternata



Cladosporium herbarum on marshmarigold



Storage fungi

- Storage fungi grow on stored products mostly without free water.
- Most of the storage flora are species of *Aspergillus* and *Penicillium* which are active at relative humidity ranging from 70-90%.
- They may be present not only as contaminants but also as dormant mycelium within tissues of pericarp or seed coat.

I. *Aspergillus*

- 1. *Aspergillus restrictus*
- 2. *A. repens*
- 3. *A. amstelodami*
- 4. *A. ruber*

II. *Penicillium*

1. *Penicillium cyclopium*

Predisposing conditions

- Mechanical damage in seed and cracks, scratches and abrasions in the seed coat favour invasion of storage fungi.
- **Harmful effects:**
- **1. Loss of germination**
- Invasion of embryos by the storage fungi.
- **2. Seed discoloration and decay.**
- **3. Fat acidity:** The deterioration of stored grains containing fats or oils may be accompanied by increase in fatty acids, measured in terms of Fat acidity value (FAV). The odours and flavours of these fatty acids make partially spoiled fats rancid.

- **4. Heating and mustiness**
- Any moist organic material may heat in storage.
- **5. Toxin production**
- Many fungi, both in field and storage produce metabolites, toxins or poisonous substances.

- ***Aspergillus flavus:*** Aflatoxin
- ***A. candidus***
- ***A. fumigatus***
- ***A. ochraceus:*** Ochratoxin complex
- ***Penicillium islandicum:*** Islanditoxin
- ***P. citrinum:*** Citrinin
- ***P. rubrum:*** Rubratoxin
- ***P. viridicatum:*** Hepatotoxin
nephrotoxin

Seed Diseases Caused by Fungi

- **1. Seed abortion:**
- Certain parasitic fungi belonging to fungi imperfecti are pathogenic to flowers and seeds. They cause deterioration of ovules and young seed primordia.
- Examples: *Fusarium graminearum*, *Fusarium culmorum*, *F. moniliforme*.
- **2. Shrunken seeds**
- Examples: *Alternaria brassicicola*, *Ascochyta rabiei*, *Septoria* sp., *Drechslera* sp.

- **3. Seed rot:**
- Many seed borne fungi produce seed rot either in the crop or during germination.
- **Examples:**
- *Fusarium avenaceum*
- *F. culmorum*
- *F. graminearum*
- *F. moniliforme*
- *F. nivale*
- *F. semitectum*
- *Dreschlera oryzae*
- *D. maydis*

- *Alternaria porri*
- *Alternaria radicina*
- *Botrytis cinerea*
- *Botryodiplodia theobromae*

- **4. Sclerotisation, Stromatisation:**
- Transformation of floral organs or seeds into sclerotia or stromata.
- **Example:**
- Ergots produced by *Claviceps purpurea*

- **5. Necroses:** Many seed rotting fungi cause necrosis on the seed.
- In leguminous seeds, anthracnose fungi like *colletotrichum* spp. and *Ascochyta* spp. often penetrate into fleshy cotyledon, producing necrotic lesions in seeds of bean, soybean, pea, chickpea and cowpea.

- **6. Seed discoloration:** Seed discoloration is very important degrading factor.
- This shows the presence of seed transmitted parasites.
- Examples of Necrotic discolorations:
Ascochyta pisi in pea.
- *Colletotrichum lindemuthianum* in bean.
- *Dreschlera oryzae* in rice.

- *Fusarium equiseti*, *F. semitectum*, *Macrophomina phaseolina* in mung bean.
- Necrosis greatly reduces the seed viability and shelf life in storage.
- Wheat seeds affected by dormant mycelium of *Ustilago nuda* and *U. tritici* lose resistance to severe adverse field conditions.

- **7. Physiological alterations:**
- Metabolic products of seed-borne microorganisms may affect the seed or may become toxic to animals and human beings.

Major Issues in Postharvest Handling

- **1. Lack of high quality planting material** for horticultural crops.
- **2. Lack of technical training facilities** for farmers.
- **3. Poor production technologies**-improper planting, poor nutrition, non-recommended irrigation systems, plant protection and IPM management.
- **4. Limited knowledge of maturity indices** – stages of maturity, time and method of harvest.

Major Issues....

- **5. Lack of proper sorting and grading**
- **6. Lack of pre-cooling facilities.**
- **7. Improper packing** of fresh produce to be supplied both within the country and overseas
- **8. Lack of a cold chain** and proper storage and infrastructural facilities from the site of production to the point of consumption.
- **9. Lack of a network of local markets,** and poor access to market information.

*Sources

- 1. Recommended books.
 - 2. Latest research articles downloaded from Google.
 - 3. Google images.
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- *Solely for academic purpose and guidance of students.