SEED ENTERPRISE MANAGEMENT INSTITUTE (SEMIs)

Seed Quality Assurance, Management and Control Processes

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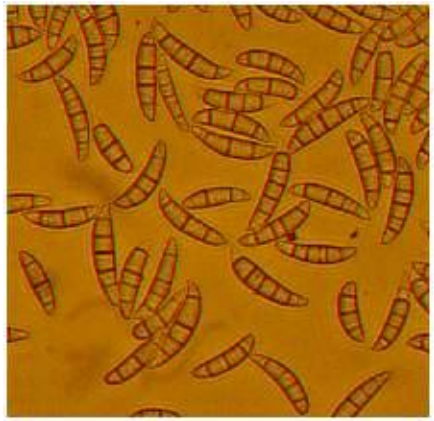
Introduction to Seed Quality and Quality Attributes



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Quality Seed

Seeds of high quality should:

- ✓ be true to its kind or variety,
- ✓ contain a minimum of impurities
- ✓ have high establishment rates in the field (high vigour)

Seed Quality and Seed Quality Attributes

- Deterioration in seed quality may begin at any point in the plant's development stage from fertilization.

These factors are **seed quality determinants** & include physical conditions during:

- ✓ Original seed source
- ✓ growth stages - field contamination, temperature, nutrition, moisture
- ✓ harvesting,
- ✓ Processing (conditioning),
- ✓ storage
- ✓ planting

Seed Quality Attributes

- Genetic quality
- Physical purity
- Seed health
- Seed viability
- Seed vigor
- Moisture content
- Testing for traits or unintended presence

Seed Quality and Seed Quality Attributes

- Genetic purity - refers to the trueness to type. The genetic purity has direct effect on ultimate yields
- Physical purity - refers to the physical composition of seed lots.
- Seed germination - refers to the ability of a seed when planted under normal sowing conditions to give rise to a normal seedling.

Seed Quality and Seed Quality Attributes

- Seed viability is the ability of the embryo to germinate and is affected by a number of different conditions
- Seed germination is a process by which a seed embryo develops into a seedling
- Germination involves the reactivation of the metabolic pathways that lead to growth and the emergence of the radicle or seed root and plumule or shoot

- Three fundamental conditions must exist before germination can occur:
  - ✓ The embryo must be alive, called seed viability
  - ✓ Any dormancy requirements that prevent germination must be overcome
  - ✓ The proper environmental conditions must exist for germination

- Seed vigor is a measure of the quality of seed, and involves the viability of the seed, the germination percentage, germination rate and the strength of the seedlings produced

Seed Quality and Seed Quality Attributes

- Planting value - the real worth of a seed lot for raising the crop.
- Pure live seed = Pure seed % X Germination % X 100
- Seed health - refers to the presence or absence of disease organisms/ insect pests on seeds
- Seed moisture - seed moisture is important in the maintenance of seed germination and viability during storage. The seed must be dried to safe moisture content.

Seed Quality and Seed Quality Attributes

High quality seeds are the result of good production practices, which include:

- ✓ proper maintenance of genetic purity
- ✓ good growing conditions
- ✓ proper timing and methods of harvesting
- ✓ appropriate processing during threshing, cleaning and drying
- ✓ appropriate seed storage and seed distribution systems

Factors Affecting Seed Quality

i) Seed quality is determined by genetic and physiological characteristics

ii) Genetic factors that can influence quality include:

- ✓ genetic make-up,
- ✓ seed size
- ✓ bulk density

iii) The physical or environmental characteristics include:

- ✓injury during planting and establishment
- ✓growing conditions during seed development
- ✓nutrition of the mother plant
- ✓physical damage during production or storage by either machine or pest
- ✓moisture and temperature during storage
- ✓age or maturity of seed

Seed Health

How does seed contamination occur?

Seed contamination or infestation

Pathogen itself or parts of it stick or mix with seeds

during:

- ❑Harvesting
- ❑Extraction
- ❑Threshing
- ❑Selection
- ❑Packing

Accompanying contamination

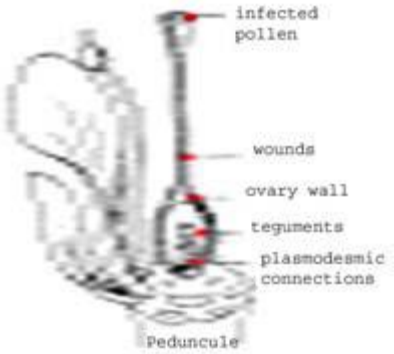
Physical mixing of the seed with pathogen's propagation organs

- Spores
- Sclerotium
- Nematode's galls
- Contaminated plant parts or soil particles containing pathogens

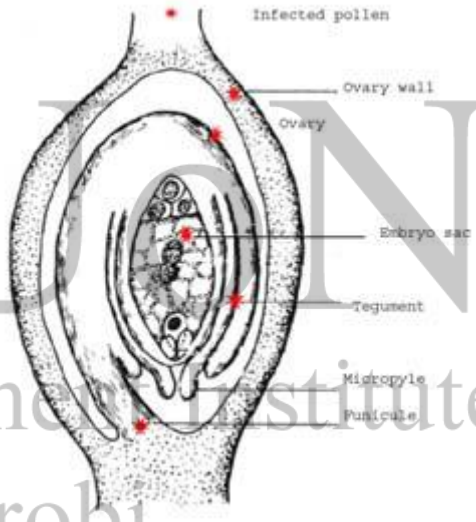
Location of pathogen in seed

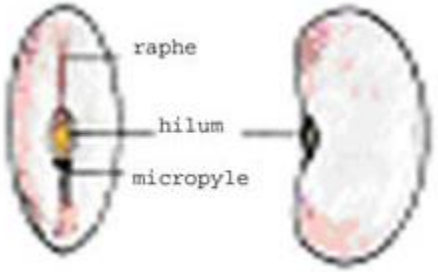
- Infection of the embryo
- Under the seed coat
- In the endosperm or cotyledon
- On the surface of seed

How pathogens infect seed



- **Systemic Infection of the Seed**
  - Through flowers, fruits or funiculus
  - Through the stigma
  - Through the wall of the ovary or immature seed covers
  - Through wounds & natural openings





- **Seed contamination or infestation**
  - Pathogens that stick to the surface of the seed

- **Accompanying contamination**
  - Structures of the pathogens
  - Mix with infected plant parts
  - Soil

The seed borne pathogens may result in:

- ✓ loss in germination
- ✓ discolouration and shrivelling
- ✓ development of plant diseases
- ✓ distribution of pathogen to new areas
- ✓ introduction of new strains or physiologic races of the pathogen along with new germplasm from other countries
- ✓ toxin production in infected seed