



DISEASE OF FIELD AND HORTICULTURAL CROPS – I

**SESSION 6 & 7
MAIZE DISEASES**

Important Diseases

❖ Major Diseases

1. Downy Mildew - *Sclerophthora* spp., *Perenosclerospora* spp.
2. Fungal Stalk Rot - *Cephalosporium acremonium*, *Fusarium* spp.
(Post flowering)
3. Bacterial Stalk Rot - *Erwinia carotovora* ssp *zea* (Pre flowering)
4. Turcicum leaf spot(SCLB)- *Helminthosporium turcicum*
(*Trichometasphaera maydis*)
5. Charcoal rot - *Macrophomina phaseolina*

❖ Minor Diseases

1. Banded sheath blight - *Rhizoctonia solani*
2. Common smut - *Ustilago maydis*
3. Head smut - *Sporisorium relianum*
4. Northern corn leaf spot - *Helminthosporium carbonum*
5. Brown spot - *Physoderma zea maydis*
6. Rust - *Puccinia sorghi*
7. Mosaic - *Sugarcane mosaic virus (Potyvirus)*

Downy mildew

1. Brown stripe DM - *Sclerophthora rayssiae var zeae*
2. Crazy top DM - *Sclerophthora macrospora*
3. Sorghum DM - *Peronosclerospora sorghi* / *P. philippinensis*
4. Sugarcane DM - *Peronosclerospora sacchari*

❖ Symptoms

1. Long chlorotic stripes on the leaf.
2. White downy growth on the lower surface of the leaf.
3. Stripes coalesce, dry and leaf blighting
4. Proliferation of axillary buds (crazy top) and multiple ear emergence
5. Stunted and bushy appearance.

Leaf

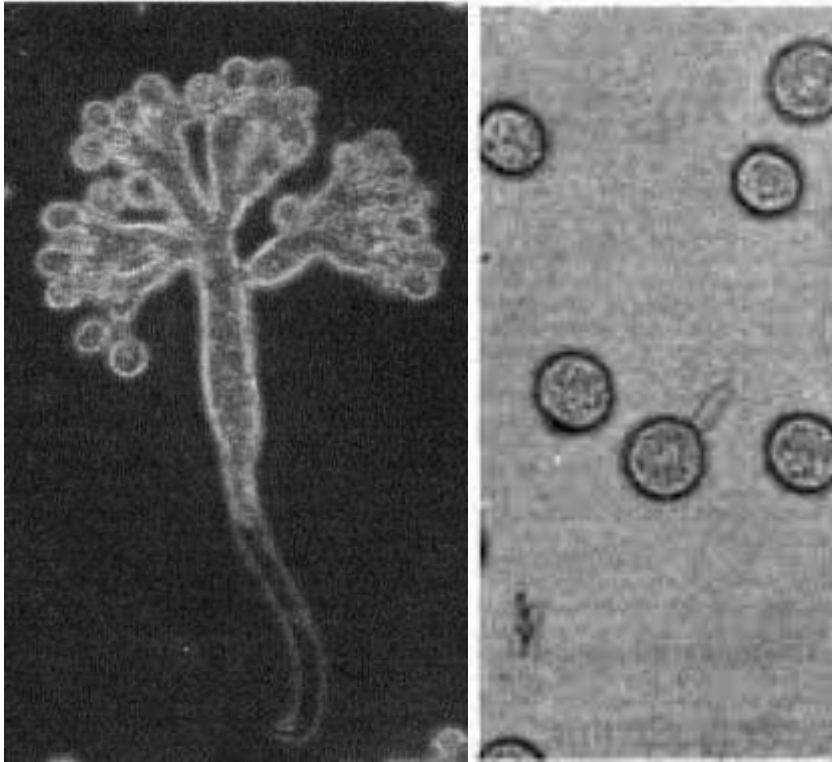


Crazy top

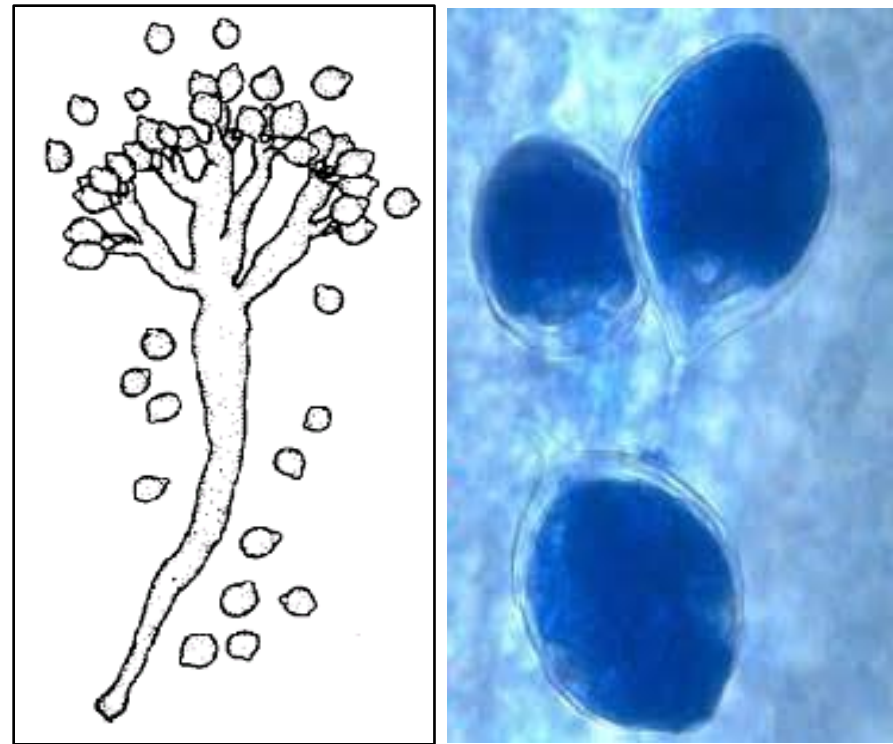


❖ Etiology

- ✓ *Chromista* > *Omycota* > *Oomycetes* > *Perenosporales* > *Perenosporacea*
- ✓ Coenocytic mycelium
- ✓ Sporangium, Oospores



Perenosclerospora



Sclerophthora

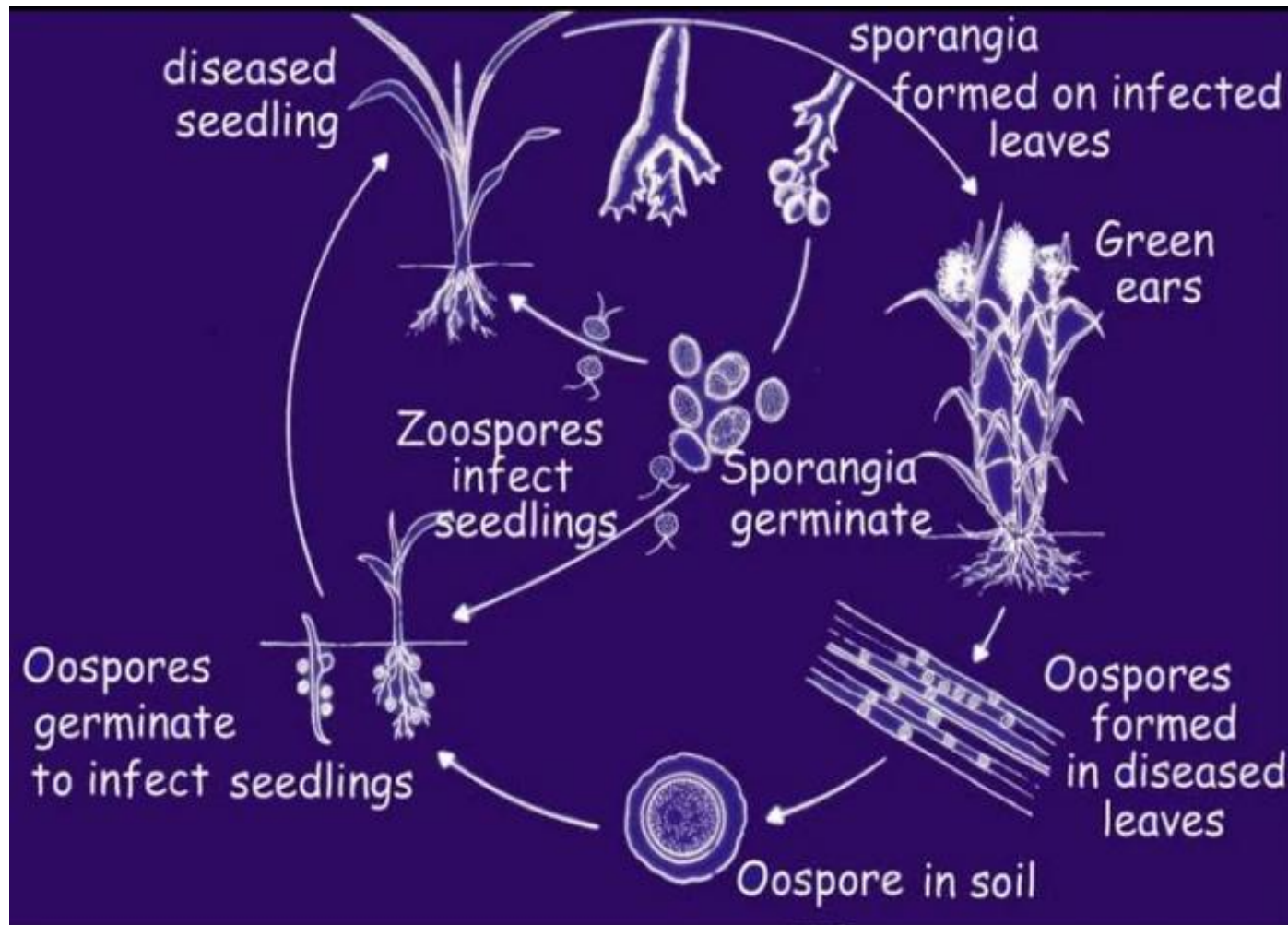
❖ Disease Cycle

Primary inoculum

- Collateral hosts and Oospores in soil/crop debris

Secondary inoculum

- **Air borne sporangia**



❖ Favourable Conditions

- ✓ High relative humidity(90%).
- ✓ Water logging condition.
- ✓ Light drizzles with at Temperature of 20-25⁰C.
- ✓ Young plants are highly susceptible

❖ Management

1. Resistant Varieties - DHM-1, DHM-103, DMR-5, Kalinga Raj
2. Crop rotation
3. Field sanitation – Remove weeds, Crop residues
4. Ensure drainage
5. Deep summer ploughing
6. Seed treatment - Metalaxyl 35%SD- 4g/ kg
7. Foliar spray - Metalaxyl 8% + Mancozeb 64% WP -2g per L

Fungal Stalk Rot

❖ *Cephalosporium acremonium*, *C. maydis*, *Fusarium spp*

❖ ~Black bundle disease and late wilt

❖ Symptoms

1. Evident after flowering
 2. Purpling of leaves and stalks.
 3. **Restricted blackening of vascular bundles** in the stalk
 4. Shredding of the intermodal pith region.
 5. Excessive tillering and multiple ears
- Reddish brown discolouration in case of *C. maydis*

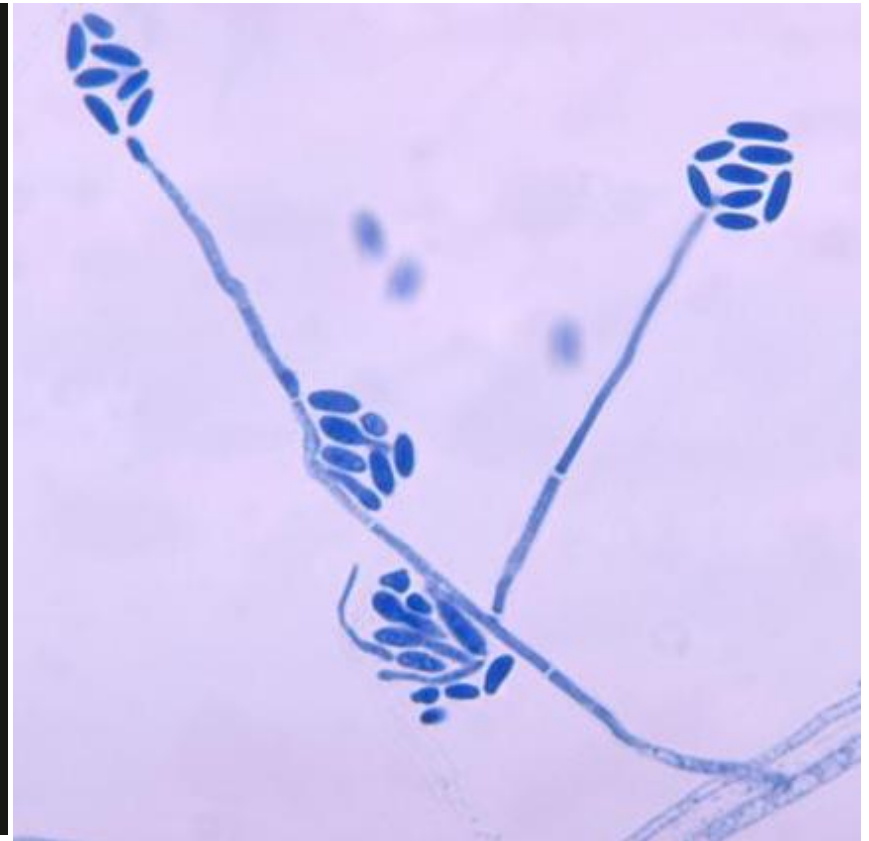
Leaf Blighting



Etiology

❖ ~*Acremonium strictum*

❖ Conidia are cylindrical or ellipsoidal



Disease cycle

- ❖ **Primary infection** – Soil, Plant debris and seed
- ❖ **Secondary infection** – Conidia

Favourable condition

- ❖ High temperature and low soil moisture (drought) favor the disease

Management

1. Crop sanitation
2. Crop rotation
3. Deep summer ploughing
4. Avoid water stress at flowering
5. Seed treatment with Carboxin + Thiram (Vitavax Power) @ 2g/kg of seed.
6. Grow resistant varieties like DHM-103, DHM 105, Hi-Starch and Ganga Safed
7. Soil drenching and foliar spray of carbendazim + Mancozeb @ 0.2%.

Bacterial Stalk Rot

❖ *Erwinia chrysanthemi ssp zea*

❖ ~Preflowering stalk rot

❖ Symptoms

1. The stalk near the ground become water-soaked with brownish discolouration and are easily breakable.
2. Infected plants show dark colour and water soaking at the base of the stalk.
3. Plants die shortly after tasseling.
4. The bacterial decomposition produces an unpleasant odor.

Oozing





❖ Disease Cycle

- ✓ **Primary inoculum**- Crop debris
- ✓ **Secondary inoculum** – Contaminated soil, irrigation water

Favourable condition

- ❖ High temperature and high soil moisture (Water logging) favor the disease

Management

1. Crop sanitation
2. Crop rotation
3. Deep summer ploughing
4. Avoid water logging
5. Planting on ridges
6. Application of bleaching powder 10 kg/ha

Southern Corn Leaf Blight

❖ *Bipolaris maydis* (*Cochliobolus heterostrophus*)

❖ Maydis leaf spot

❖ Symptoms

1. Tan coloured rectangular to oblong lesions (1- 2.5 cm long and 0.3 to 0.6 cm wide)
2. Initially on lower leaves
3. The spots coalesce and gives blighted appearance.
4. Under high humidity the whole leaf area becomes necrotic and plant dry up
5. Lesions may be extended to husk





Northern Corn Leaf Blight

❖ *Helminthosporium carbonum/Exerohilum turcicum*

❖ ~ *Turcicum leaf spot*

❖ Symptoms

❖ Initially- small yellowish round to oval spots are seen on the leaves.

❖ Form bigger elliptical spots and are straw to grayish brown colour in the centre with dark brown margins (2.5-25 cm X 4 cm)

❖ Under high humidity the whole leaf area becomes necrotic and plant appears as dead.

❖ Lesions may be extended to husk





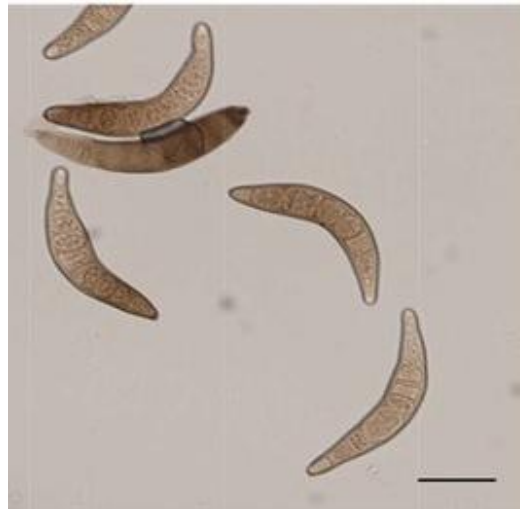
SCLB



NCLB

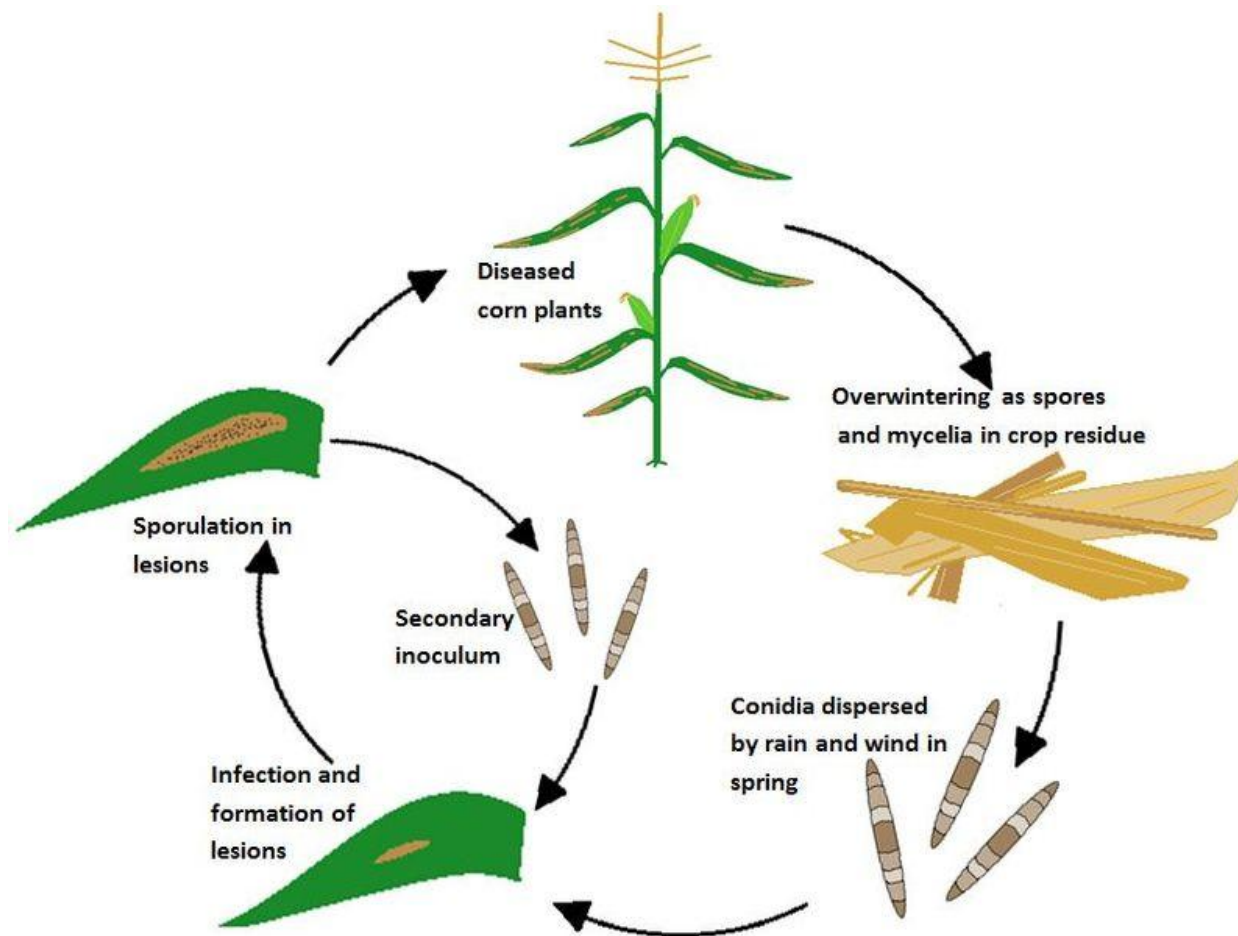
❖ Etiology

- ✓ *Helminthosporium spp.* – *Bipolaris*, *Exherohilum*
- ✓ Conidia – Cyclindrical, multiseptate, Bulged at center



❖ Disease Cycle

- ✓ Primary inoculum- Externally seed borne, Collateral host, Crop debris
- ✓ Secondary spread – Air borne conidia



Charcoal Rot

❖ *Macrophomina phaseolina*

❖ Symptoms

- ❖ Brown, water soaked lesions on the collar region that later turn black.
- ❖ Wilting of plants and yellowing of leaves
- ❖ Bark shredding
- ❖ Interior of the stalks a charred appearance and breaking of the crown.
- ❖ Split open stalks have numerous black sclerotia on vascular strands,

❖ Symptoms

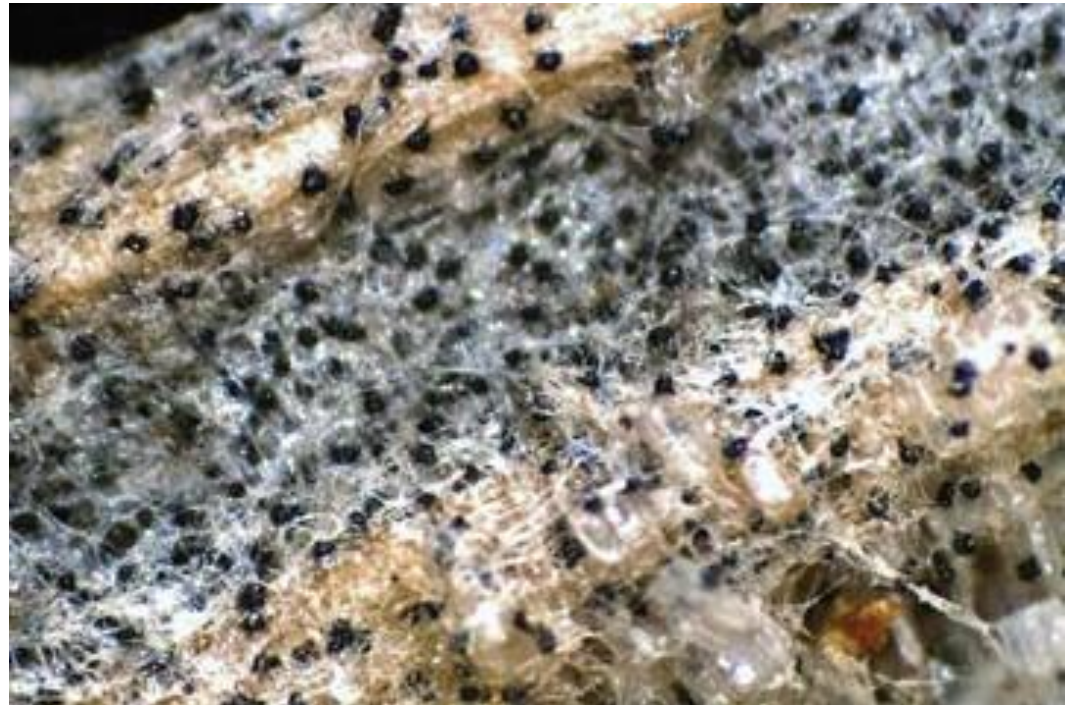
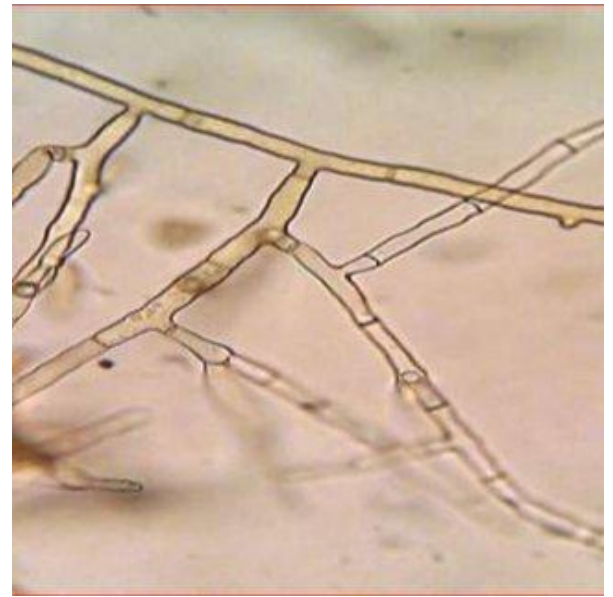


❖ Symptoms



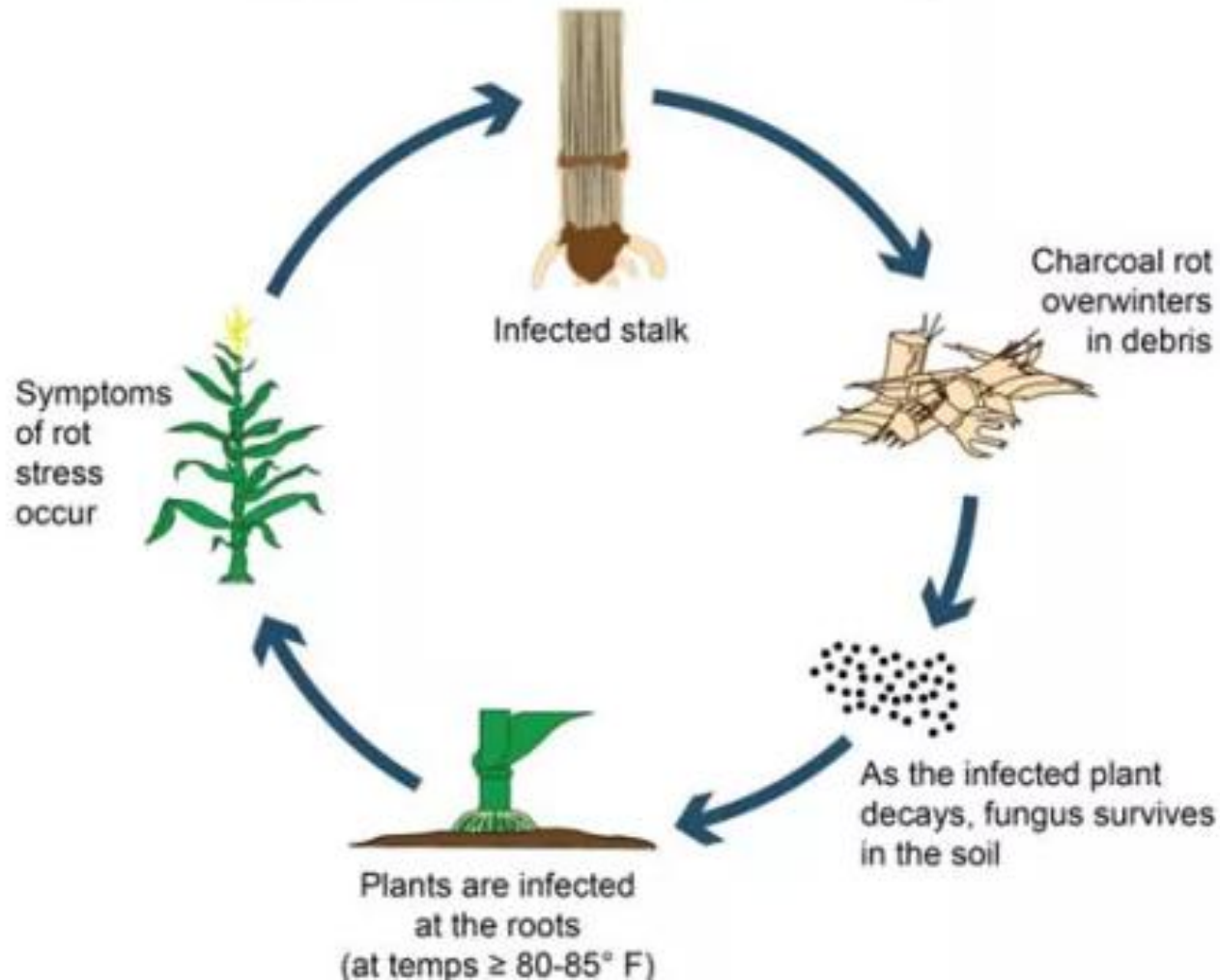
❖ Etiology

- ❖ Mycelium branching at right angle with constriction
- ❖ Minute sclerotia



Disease Cycle

- ❖ Primary inoculum – Sclerotia in soil and crop debris
- ❖ Secondary spread – Irrigation water



Favourable condition

❖ High temperature (~35 °C) and low soil moisture at flowering

Management

1. Resistant varieties- DHM 103, DHM 105 and Ganga Safed 2
2. Crop rotation
3. Field sanitation – Remove weeds, Crop residues
4. Irrigate the crop to maintain soil moisture
5. Seed treatment with Thiram @ 3 g/ Kg

Banded Leaf and Sheath Blight

❖ *Rhizoctonia solani* (*Thanetophorus sasakii*)

❖ Symptoms

1. Large, discoloured areas alternating with irregular dark bands are typical symptoms of the disease.
2. The internodes break at the point of infection
3. The symptoms extend upto silk, glumes and kernels.





Common smut

❖ *Ustilago maydis*

❖ Symptoms

1. Induce gall formation – mainly on the reproductive tissues
2. Initially light coloured, later turn dark
3. Burst to release black spores



Head Smut

❖ *Sporisorium reilianum*

❖ **Symptoms**

1. Entire ear/tassel is replaced by smut sori
2. Sori burst open to release black spores



Brown spot

❖ *Physoderma zea maydis*

❖ Symptoms

1. Oval reddish brown lesions on leaves , leaf sheath and stem
2. Stem break at the point of infection



Rust

❖ *Puccinia sorghi*



Maize Mosaic

❖ *Sugarcane mosaic virus*

