



**FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES**

**DISEASES OF FIELD CROPS PPA - 301**

## LECTURE 06

### Diseases of Maize

#### Downy mildew/Crazy top

Sorghum downy mildew - *Peronosclerospora sorghi*

Philippine downy mildew - *Peronosclerospora philippinensis*

Crazy top - *Sclerophthora macrospora*

#### Symptoms

The most characteristic symptom is the development of **chlorotic streaks** on the leaves.

Plants exhibit a stunted and bushy appearance due to shortening of the internodes. White downy growth is seen on the lower surface of leaf. Downy growth also occurs on bracts of green unopened male flowers in the tassel. Small to large leaves are noticed in the tassel.



#### Pathogen

The fungus grows as white downy growth on both surface of the leaves, consisting of **sporangiophores** and **sporangia**. Sporangioophores are quite short and stout, branch profusely into series of pointed **sterigmata** which bear hyaline, oblong or ovoid sporangia (conidia). Sporangia germinate directly and infect the plants. In advanced stages, **oospores** are formed which are spherical, thick walled and deep brown.

#### Favourable Conditions

- Low temperature (21-33°C)
- High relative humidity (90 per cent) and drizzling.
- Young plants are highly susceptible.

## Disease cycle

The primary source of infection is through oospores in soil and also dormant mycelium present in the infected maize seeds. Secondary spread is through airborne conidia. Depending on the pathogen species, the initial source of disease inoculum can be oospores that over winter in the soil or conidia produced in infected, over wintering crop debris and infected neighboring plants. Some species that cause downy mildew can also be seed borne, although this is largely restricted to seed that is fresh and has high moisture content.

At the onset of the growing season, at soil temperatures above 20°C, oospores in the soil germinate in response to root exudates from susceptible maize seedlings. The germ tube infects the underground sections of maize plants leading to characteristic symptoms of systemic infection including extensive chlorosis and stunted growth. If the pathogen is seed borne, whole plants show symptoms. Oospores are reported to survive in nature for up to 10 years.

Once the fungus has colonised host tissue, sporangiophores (conidiophores) emerge from stomata and produce sporangia (conidia) which are wind and rain splash disseminated and initiate secondary infections. Sporangia are always produced in the night. They are fragile and can not be disseminated more than a few hundred meters and do not remain viable for more than a few hours.

Germination of sporangia is dependent on the availability of free water on the leaf surface. Initial symptoms of disease (chlorotic specks and streaks that elongate parallel to veins) occur in 3 days. Conidia are produced profusely during the growing season. As the crop approaches senescence, oospores are produced in large numbers.

## Management

- Deep ploughing.
- Crop rotation with pulses.
- Rogue out infected plants.
- Treat the seeds with metalaxyl at 6g/kg.
- Spray the crop with Metalaxyl + Mancozeb @ 1kg on 20th day after sowing.
- Grow resistant varieties and hybrids viz. CO1, COH1 and COH2.

## Leaf blight - *Helminthosporium maydis* (Syn: *H. turcicum*)

### Symptoms

The fungus affects the crop at young stage. Small yellowish round to oval spots are seen on the leaves. The spots gradually increase in area into bigger elliptical spots and are straw to grayish brown in the centre with dark brown margins. The spots coalesce giving blighted appearance. The surface is covered with olive green velvety masses of conidia and conidiophores.



### Pathogen

**Conidiophores** are in group, geniculate, mid dark brown, pale near the apex and smooth.

**Conidia** are distinctly curved, fusiform, pale to mid dark golden brown with 5-11 septa.



### Conidia

### Favourable Conditions

- Optimum temperature for the germination of conidia is 8 to 27°C provided with freewater on the leaf.
- Infection takes place early in the wet season.

### Disease cycle

It is a seed-borne fungus. It also infects sorghum, wheat, barely, oats, sugarcane and spores of the fungus are also found to associate with seeds of green gram, black gram, cowpea, varagu, Sudan grass, Johnson grass and Teosinte.

### Management

- Treat the seeds with Captan or Thiram at 4 g/kg.
- Spray

## **Bacterial Stalk rot - *Erwinia dissolvens***

### **Symptoms**

The basal internodes develop soft rot and give a water soaked appearance. A mild sweet fermenting odour accompanies such rotting. Leaves some time show signs of wilting and affected plants topple down in few days. Ears and shank may also show rot. They fail to develop further and the ears hang down simply from the plant



### **Disease cycle**

Borer insects play a significant role in initiation of the disease. The organism is soil borne and makes its entry through wounds and injuries on the host surface. The organism survives saprophytically on debris of infected materials and serves primary inoculum in the next season.

### **Favourable Conditions**

- Optimum temperature for the germination of conidia is 8 to 27°C provided with freewater on the leaf.
- Infection takes place early in the wet season.

### **Management**

- Treat the seeds with Captan or Thiram at 4 g/kg.
- Spray