

## 4. Diseases of Pearlmillet

### Downy mildew - *Sclerospora graminicola*

#### Symptoms

Infection is mainly systemic and symptoms appear on leaves and inflorescence. The initial symptoms appear in seedlings at three to four leaf stages. The affected leaves show patches of light green to light yellow colour on the upper surface and the corresponding lower surface bears white downy growth of the fungus consisting of sporangiophores and sporangia. The yellow discolouration often turns to streaks along veins. As a result of infection young plants dry and die ultimately. Symptoms may appear first on the upper leaves of the main shoot or the main shoot may be symptom free and symptoms appear on tillers or on the lateral shoots.



Symptoms

The inflorescence of infected plants gets completely or partially malformed with florets converted into leafy structures, giving the typical symptom of green ear.

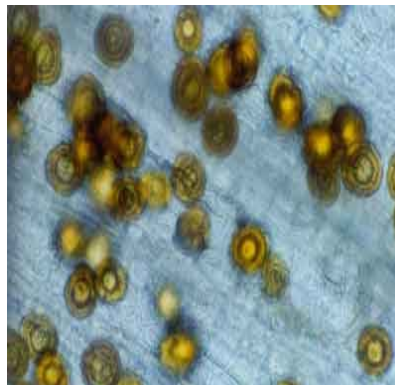
Infected leaves and inflorescences produce sporangia over a considerable period of time under humid conditions and necrosis begins. The dry necrotic tissues contain masses of oospores.



**Green ear symptoms**

### Pathogen

The mycelium is systemic, non septate and [intercellular](#). Short, stout, hyaline [sporangiophores](#) arise through [stomata](#) and branch irregularly, with stalks bearing [sporangia](#). Sporangia are hyaline, thin walled, [elliptical](#) and bear prominent papilla. [Oospores](#) are round in shape, surrounded by a smooth, thick and yellowish brown wall.



**Oospores**

### Favourable Conditions

- Very high humidity (90%).
- Presence of water on the leaves
- Low temperature of 15-25°C favor the formation of sporangiophore and sporangia.

### Disease cycle

The oospores remain viable in soil for 5 years or longer giving rise to the primary infection on seedlings. Secondary spread is through sporangia produced during rainy season. The dormant mycelium of the fungus is present in embryo of infected seeds.

### Management

- Deep ploughing to bury the oospores.
- Roguing out infected plants.
- Adopt crop rotation.
- Grow resistant varieties WCC-75, Co7 and Co (Cu)9.
- Treat the seeds with Metalaxyl at 6g/kg.
- Spray Mancozeb 2 kg or Metalaxyl + [Mancozeb](#) at 1 kg/ha on 20th day after sowing in the field.

### Smut - [\*Tolyposporium penicillariae\*](#)

#### Symptoms

The pathogen infects few florets and transforms them into plump sori containing smut spores. The sori are larger than normal healthy grains and when the sori mature they become dark brown releasing millions of black smut spore balls.



Symptoms

#### Pathogen

The fungus is mostly confined to the sorus. The [sori](#) contain spores in groups and are not easy to separate. Each spore is angular or round and light brown.

### Favourable Conditions

- High relative humidity.
- Successive cropping with pearl millet.

### Disease cycle

- The pathogen survives as spore balls in the soil and serves as primary source of inoculum. Secondary spread is by air-borne conidia.

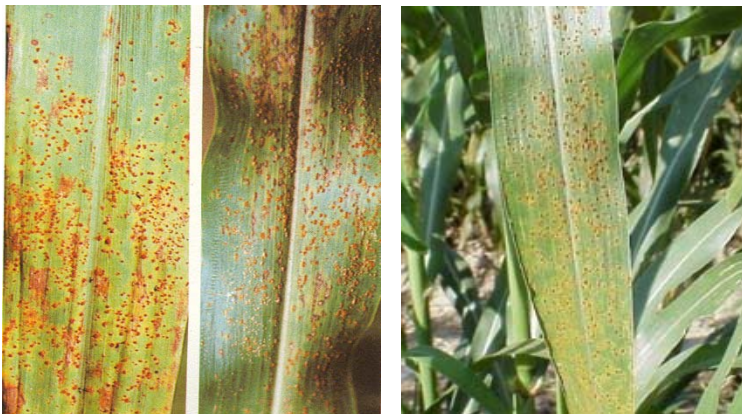
### Management

- The damage caused by the fungus is negligible.
- Removal and destruction of affected ear head will help in controlling the disease.

### Rust - *Puccinia pennisetii*

#### Symptoms

Symptoms first appear mostly on the distal half of the lamina. The leaf soon becomes covered by uredosori [which appear more on the upper surface](#). The pustules may be formed on leaf sheath, stem and on peduncles. Later, telial formation takes place on leaf blade, leaf sheath and stem. While brownish uredia are exposed at maturity, the black telia remain covered by the epidermis for a longer duration.



Symptoms

#### Pathogen

Uredospores are oval, elliptic, sparsely echinulated and pedicellate. Teliospores are dark brown in colour, two celled, cylindrical to club shaped, apex flattened, broad at top and tapering towards base. The fungus is macrocyclic producing uredial and telial stages on pearl millet and aecial and pycnial stages on brinjal.



### **Favourable Conditions**

- Closer spacing.
- Presence of abundant brinjal plants and other species of *Solanum* viz., [\*S.torvum\*](#), [\*S.xanthocarpum\*](#) and *S. pubescens*.

### **Disease cycle**

Air-borne uredospores are the primary sources. The uredial stages also occur on several species of [\*Pennisetum\*](#), which helps in secondary spread of the pathogen.

### **Management**

Spray with Wettable Sulphur 3 kg or [\*Mancozeb\*](#) 2 kg/ha.

### **Ergot or Sugary disease - [\*Claviceps fusiformis\*](#)**

#### **Symptoms**

The symptom is seen by exudation of small droplets of light pinkish or brownish honey dew from the infected spikelets. Under severe infection many such spikelets exude plenty of honey dew which trickles along the earhead. This attracts several insects. In the later stages, the infected ovary turns into small [\*dark brown sclerotium\*](#) which projects out of the spikelet.



Symptoms

### Pathogen

The pathogen produces septate mycelium which produces [conidiophores](#) and is closely arranged. [Conidia](#) are hyaline and one celled. The [sclerotia](#) are small (3-8mm x 0.3-15mm) and dark grey but white inside.

### Disease cycle

[Sclerotia](#) are viable in soil for 6-8 months. The primary infection takes place by germinating sclerotia present in the soil. Secondary spread is by insects or airborne conidia. The role of collateral hosts like [Cenchrus ciliaris](#) and [C. setigerus](#) in perpetuation of fungus is significant. The fungus also infects other species of [Pennisetum](#).

### Management

- Adjust the sowing date so that the crop does not flower during September when high rainfall and high relative humidity favour the disease spread.
- Immerse the seeds in 10 per cent common salt solution and remove the floating sclerotia.
- Remove collateral hosts.

- Spray with Carbendazim 500g or Mancozeb 2 kg or Ziram 1kg/ha when 5-10 per cent flowers have opened and again at 50 per cent flowering stage.

### **Minor diseases**

#### **Grain mould - Fungal complex**

Grains covered with white, pink or black moulds.

#### **Blast - [Pyricularia setariae](#)**

Diamond shaped to circular lesions with dark brown margins and chlorotic haloes.

#### **Zonate leaf spot - [Gloeocercospora](#) sp.**

Rough circular lesions with alternating concentric bands of straw and brown colour, often coalescing over the leaf surface.

#### **Banded leaf spot - *Rhizoctonia* spp.**

Patch of light and dark, discoloured areas and often bearing fluffy to light brown fungal mats.