11. Diseases of Sunflower

Root rot or charcoal rot - *Rhizoctonia bataticola* (Pycnidial stage: ***Macrophomina phaseolina)***

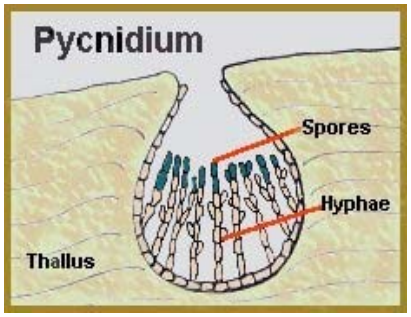
Symptoms

The pathogen is seed-borne and primarily causes seedling blight and collar rot in the initial stages. The grown up plants also show symptoms after flowering stage. The infected plants show drooping of leaves and death occurs in patches. The bark of the lower stem and roots shreds and are associated with a large number of sclerotia. Dark coloured, minute pycnidia also develop on the lower portion of the stem.

Symptoms

Pathogen

The fungus produces a large number of black, round to irregular shaped sclerotia. The pycnidia are dark brown to black with an ostiole and contain numerous single celled, thin walled, hyaline and elliptical pycnidiospores.



Favourable Conditions

- Moisture stress and higher temperature favour development of the disease.

Disease cycle

The pathogen survives in soil and in infected crop residues through sclerotia and pycnidia. The pathogen is seed-borne and it serves as primary source of infection. Wind-borne conidia cause secondary spread. The soil borne sclerotia also spreads through rain splash, irrigation water and implements.

Management

- Closer planting of the seedling should be avoided.
- Optimum nutrition should be provided to maintain the plant vigour.
- Whenever the soil becomes dry and the soil temperature rises then irrigation should be provided.
- Seed treatment with *Trichoderma viride* formulation at 4 g/kg seed.
- In endemic areas long crop rotation should be followed.
- Treat the seeds with Carbendazim or Thiram at 2/kg
- Spot drench with Carbendazim at 500 mg/litre.

Leaf blight - *Alternaria helianthi*

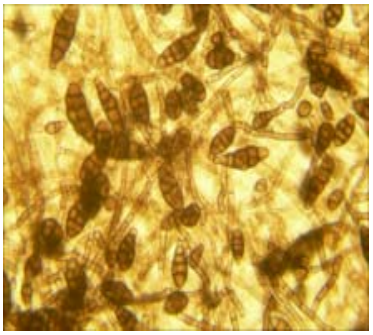
Symptoms

The pathogen produces brown spots on the leaves, but the spots can also be seen on the stem, sepals and petals. The lesions on the leaves are dark brown with pale margin surrounded by a yellow halo. The spots later enlarge in size with concentric rings and become irregular in shape. Several spots coalesce to show bigger irregular lesions leading to drying and defoliation.

Symptoms

Pathogen

The pathogen produces cylindrical conidiophores, which are pale grey-yellow coloured, straight or curved, geniculate, simple or branched, septate and bear single conidium. Conidia are cylindrical to long ellipsoid, straight or slightly curved, pale grey-yellow to pale brown, 1 to 2 septate with longitudinal septa.



Favourable Conditions

- Rainy weather.
- Cool winter climate.
- Late sown crops are highly susceptible.

Disease cycle

The fungus survives in the infected host tissues and weed hosts. The fungus is also seed-borne. The secondary spread is mainly through wind blown conidia.

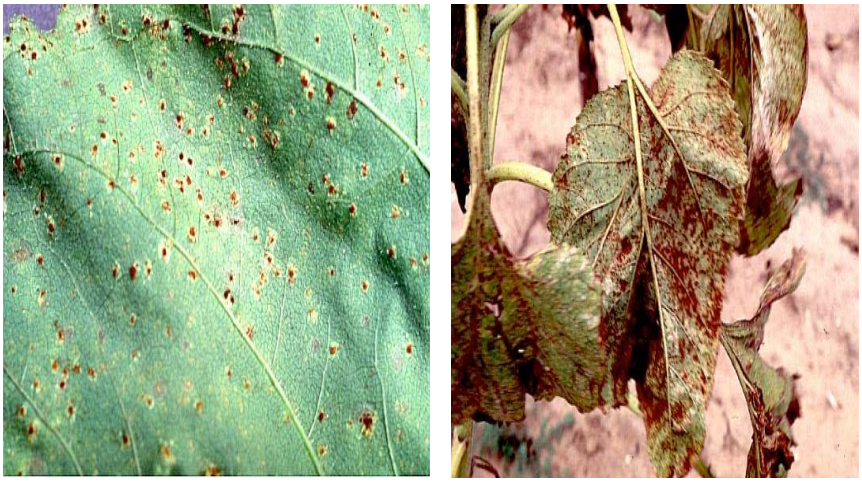
Management

- Deep summer ploughing.
- Proper spacing
- Clean cultivation and field sanitation.
- Use of resistant or tolerant variety like B.S.H.1 .
- Application of well rotten manures.
- Practicing crop rotation.
- Planting in mid-September.
- Remove and destroy the diseased plants
- Treat the seeds with Thiram or Carbendazim at 2 g/kg. Spray Mancozeb at 2 kg/ha.

Rust - *Puccinia helianthi*

Symptoms

Small, reddish brown pustules (uredia) covered with rusty dust appear on the lower surface of bottom leaves. Infection later spreads to other leaves and even to the green parts of the head. In severe infection, when numerous pustules appear on leaves, they become yellow and dry. The black coloured telia are also seen among uredia on the lower surface. The disease is autoecious rust. The pycnial and aecial stages occur on volunteer crops grown during off-season.



Symptoms

Pathogen

The uredospores are round or elliptical, dark cinnamon-brown in colour and minutely echinulated with 2 equatorial germpores. Teliospores are elliptical or oblong, two celled, smooth walled and cheshnut brown in colour with a long, colourless pedicel.

Uredospores and Teliospores

Favorable Conditions

- Day temperature of 25.5° to 30.5°C with relative humidity of 86 to 92 per cent enhances intensity of rust attack.

Disease cycle

The pathogen survives in the volunteer sunflower plants and in infected plant debris in the soil as teliospores. The disease spreads by wind-borne uredospores from infected crop.

Management

- Use of tolerant and resistant varieties
- Crop rotation should be followed.
- Previous crop remains should be destroyed.
- Removal of crop residues
- Spray Mancozeb at 2kg/ha.

Head rot - *Rhizopus* sp.

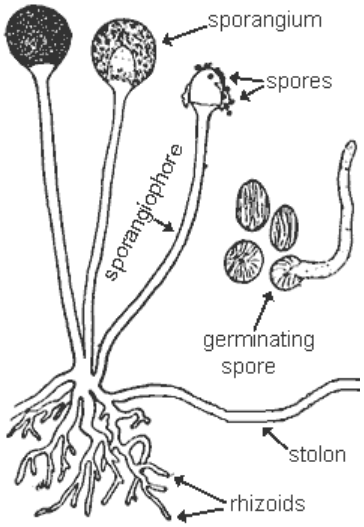
Symptoms

The affected heads show water soaked lesions on the lower surface, which later turn brown. The discoloration may extend to stalk from head. The affected portions of the head become soft and pulpy and insects are also seen associated with the putrified tissues. The larvae and insects which attack the head pave way for the entry of the fungus which attacks the inner part of the head and the developing seeds. The seeds are converted into a black powdery mass. The head finally withers and droops down with heavy fungal mycelial nets.

Symptoms

Pathogen

Pathogen produces dark brown or black coloured, non-septate hyphae. It produces many aerial stolens and rhizoids. Sproangia are globose and black in colour with a central columella. The sporangiospores are aplanate, dark coloured and ovoid.



Structure of *Rhizopus*

Favourable Conditions

- Prolonged rainy weather at flowering.
- Ddamages caused by insects and caterpillars.

Disease Cycle

The fungus survives as a saprophyte in host debris and other crop residues. The disease is spread by wind blown spores.

Management

- Treat the seeds with thiram or carbendazim at 2g/kg.
- Control the caterpillars feeding on the heads.
- Spray the head with Mancozeb at 2kg/ha during intermittent rainy season and repeat after 10 days, if the humid weather persists.

Powdery mildew - *Erysiphe cichoracearum*

Symptoms

The disease produces white powdery growth on the leavesWhite to grey mildew on the upper surface of older leaves. As plant matures black pin head sized are visible in white mildew areas. The affected leaves more luster, curl, become chlorotic and die.

Symptoms

Favorable Conditions

- The disease is more under dry condition to the end of the winter months.

Management

- Complete field and crop sanitation.
- Early varieties should be preferred.
- Removal of infected plant debris.
- Application of karathane or calixin 1L/ha or wettable sulphur 2 kg/ha is found effective in reducing the disease incidences.

Basal rot - *Sclerotium rolfsii*

Symptoms

Initial symptoms of the disease appear 40 days sowing. The infected plants can be identified by their sickly appearance. Plants dry up due to the disease infestation. The lower portion of stem is covered with white or brownish white fungal colonies. In extreme cases the plants wilts and dies. Dark brown lesions appear on the base of the stem near ground level, leading to withering. Large numbers of sclerotia are seen.


Symptoms

Favourable Conditions

- Infection occurs in the crop in the month of July and August.
- The fungus survives through sclerotina in soil and plant debris.

Management

- Deep summer ploughing.
- Complete field and crop sanitation.
- Use of resistant or tolerant varieties.
- Collect and destroy plant debris.
- Apply *Trichoderma* on seed and soil to reduce wilt.
- Apply and incorporate fungus *Coniothyrium minitans* before sowing as it invades and destroy the pathogen in the soil.
- Seed treatment with *Pseudomonas fluorescens* or *P.putida* strains protect sunflower from Sclerotinia infection during seedling stage.
- Seed treatment with captan or thiram at the rate of 3 g/kg of seed.
- Drenching the base of the plant with chestnut compound 3 g per litre of water.
- Seed treatment with carbendazim at 0.2% followed by the addition of *Trichoderma harzianum* 10 g/kg soil and spraying Carbendazim at 0.2 % to 15 days old seedling.

Necrosis -*Tobacco streak virus* (TSV)

Symptoms

Characterised by the sudden necrosis of part of lamina followed by twisting of leaves and systemic mosaic. Necrosis of lamina of the lamina, petiole, stem floral calyx and corolla.

Black streak on stem

Necrosis of stems and petioles, terminal growth curls down and plants often lodge

Advanced symptoms lead to plant death.

Pathogen

Caused by *Tobacco streak virus* an Ilarvirus 25-28 nm, tripartite genome encapzidated separately

Disease cycle

Virus spreads through transmission by thrips *Frankliniella schultzii*. Weed hosts serve as natural virus reservoirs. Long and continuous dry spell increases the disease incidence.

Management

- Removal of weed hosts
- Management of veetor population`
- Changing planting dates