

# **Diseases of Sunflower**

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# Diseases of Sunflower

<b>Charcoal rot / Root rot</b>	– <i>Macrophomina phaseolina</i>
<b>Alternaria blight</b>	- <i>Alternaria helianthi</i>
<b>Rust</b>	- <i>Puccinia helianthi</i>
<b>Head rot</b>	- <i>Rhizopus nigricans</i>
<b>Downy mildew</b>	- <i>Plasmopara halstedii</i>
<b>Cercospora leaf spot</b>	- <i>Cercospora helianthicola</i>
<b>Septoria leaf spot</b>	- <i>Septoria helianthi</i>
<b>Verticillium wilt</b>	- <i>Verticillium dahliae</i>
<b>Powdery mildew</b>	- <i>Erysiphe cichoracearum</i>
<b>Southern blight</b>	- <i>Sclerotium rolfsii</i>
<b>Sclerotinia wilt/ stem rot</b>	- <i>Sclerotinia sclerotiorum</i>
<i>Sunflower mosaic virus</i>	
<i>Sunflower necrosis virus</i>	

***Alternaria blight -Alternaria helianthi***  
***Alternariaster helianthi***

**Symptoms**

- **Dark brown to black, circular to oval spots with concentric rings surrounded by chlorotic zone are seen on the leaves.**
- **Linear necrotic lesions are formed on the petioles. Under high humidity, spots enlarge in size, coalesce and cause blighting of leaves and defoliation.**
- **Rotting of flower heads is also seen.**

## **Fungus**

- **Conidiophores are simple, cylindrical, straight or curved and septate.**
- **Conidia are pale green-yellow, cylindrical to ellipsoid, straight with rounded ends without beak, having 2-12 transverse septa and 0-1 longitudinal septa.**



## Leaf blight – *Alternaria helianthi*





**Figure 59.**  
**Stem lesions**  
**caused by**  
***Alternaria***  
***helianthi*.**









## **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.
- Benomyl, imazalil, iprodione, mancozeb + iprodione, procymidone, propiconazole and vinclozolin were effective in controlling the disease

**Charcoal rot and root rot *Macrophomina phaseolina***  
(Sclerotial stage. *Rhizoctonia bataticola*)

**Symptoms**

- **Brown or ashy black discolouration at the collar region, which finally girdles the stem and turns black.**
- **The plant dies within a week and its peeled tissues become studded with numerous black sclerotial bodies.**
- **If the infection occurs in the later stage of the crop, the plant shows initial paling and drying of leaves and root rot.**
- **The most common symptom in the field is sudden wilting of plants usually after flowering.**
- **Black sclerotial bodies can be seen in the root portion where pycnidia bodies can be seen.**

## **Fungus**

- **Produces a large number of black, round to irregular sclerotia.**
- **Pycnidia are dark brown to black with an ostiole and contain numerous single celled, thin walled, hyaline, elliptical pycnidiospores**

# Sunflower Root rot/ charcoal rot – *Macrophomina phaseolina*



Charcoal Rot symptoms on sunflower.  
Courtesy J.A. Amador, TAES, Weslaco, 1996.



**Sunflower root rot**





## **Rust** - *Puccinia helianthi*

### **Symptoms**

- Numerous small pustules (uredosori) appear on the lower surface of the bottom leaves.
- These uredosori are scattered, irregular, cinnamon to brown and up to one mm in dia.
- Infection later spreads to the upper leaves and including leaves below the capitulum.
- In severe infections numerous pustules appear in each leaf leading to yellowing and drying of the leaves.
- Telia, which are black, also seen among uredia in the lower surface of leaves.

## Fungus

- It is an autoecious rust.
- Uredospores are ellipsoid to obovoid or cylindrical with finely echinulated wall.
- Teleutospores are cylindrical.
- Pycnia are found in groups.
- Aeciospores are ellipsoid, hyaline with verrucose walls.

## Rust – *Puccinia helianthi*



Rust (*Puccinia helianthi*) pustules on the underside of a sunflower leaf.  
Courtesy Tom Isakeit, TAEX, Weslaco, 1996.



**Figure 56. Rust occurs most commonly on leaves and after flowering. The cinnamon-red pustules produce summer spores; the black pustules occur late fall and produce overwintering spores.**



Rust (*Puccinia helianthi*) on the underside of a sunflower leaf.  
Courtesy Tom Isakeit, TAEX, Weslaco, 1996.



**Figure 57. Aecial cups of  
*Puccinia helianthi*.**





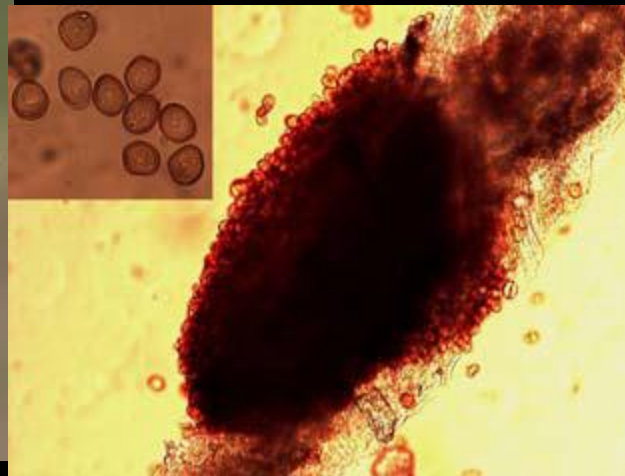
**Orange pycnial lesions infecting cotyledons of volunteer sunflower**



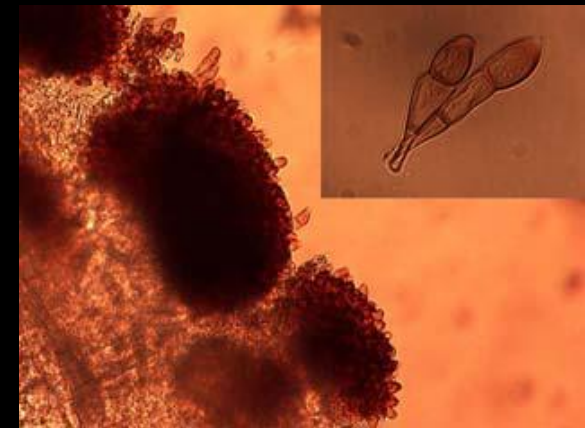
**Reddish-brown to cinnamon-colored uredial pustules found on both upper (left) and lower(right) leaf surfaces**



**Yellowish-orange aecial cups on underside of infected sunflower leaf**



**Uredinia-  
Uredospores**



**Telia teliospores**



## **Pathogen**

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

## **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 nigricans*

### 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.

**Head rot –**  
*Rhizopus nigricans*



Rhizopus Head Rot of sunflower.  
Courtesy J.A. Amador, TAES, Weslaco, 1996.



Rhizopus Head Rot of sunflower showing the grey, mycelial growth.  
Courtesy J.A. Amador, TAES, Weslaco, 1996.





**Sunflower head rot**



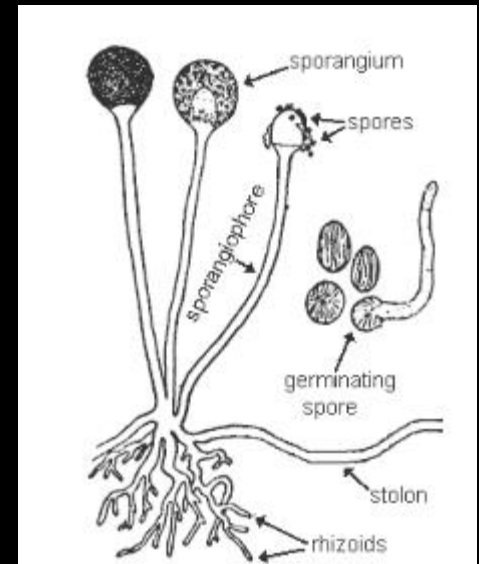
- Pathogen produces dark brown or black coloured, non-septate hyphae.
- It produces many aerial stolens and rhizoids.
- Sporangia are globose and black in colour with a central columella.
- The sporangiospores are aplanate, dark coloured and ovoid.

## Life cycle

- Prolonged rainy weather at flowering.
- Damages 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.

# Sunflower : Downy Mildew: *Plasmopara halstedii*

## Symptoms

- The disease spreads rapidly through seeds.
- Symptoms of the disease are evident as seedling damping off, systemic infection, local foliar lesions and basal root or stem galls.
- First symptoms are yellowing of the first pair of true leaves.





## Downy mildew

– *Plasmopara halstedii*

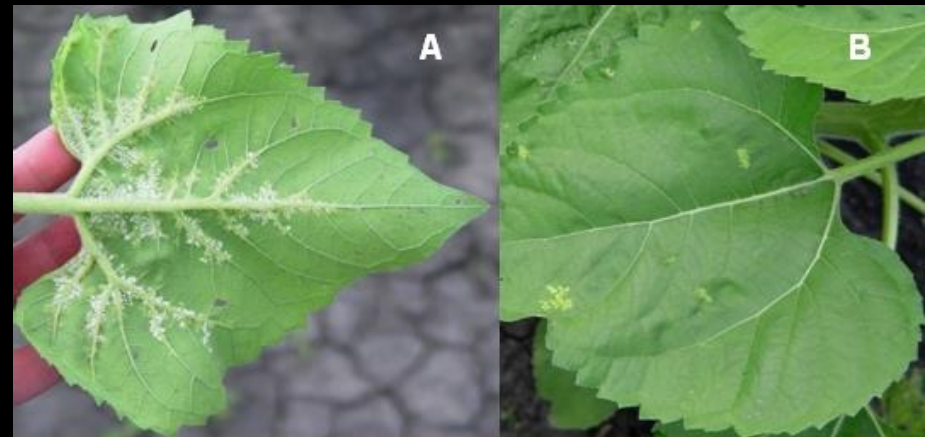


Downy mildew symptoms on sunflower.  
Courtesy J.A. Amador, TAES, Weslaco, 1996.





**Figure 2. Downy mildew of sunflower. Plant exhibits leaf symptoms typical of an early, systemic infection.**



**Figure 3. Downy mildew of sunflower. (A) Underside view of a leaf from a systemically-infected plant. White fungal structures are producing additional spores to spread the disease. (B) A localized (rather than systemic) infection. Production losses associated with lesions such as these are minimal compared to those from systemically infected plants.**



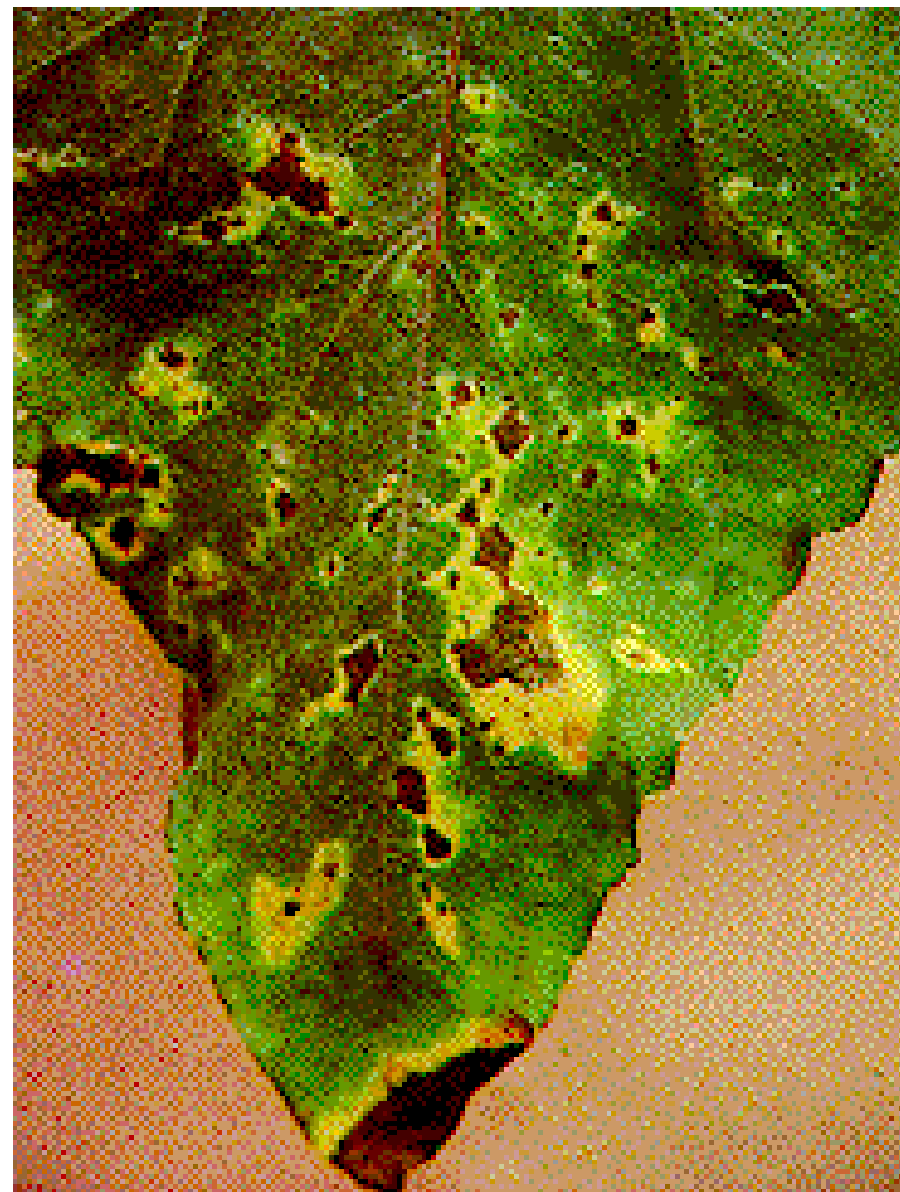
**Figure 53. Lower surface of leaves on downy mildew infected plants frequently exhibit a white cottony growth of fungus.**

# *Plasmopara halstedii* life cycle



## Septoria leaf spot

- *Septoria helianthi*



**Figure 60. Septoria leaf spot. (Note small black pycnidia in lesions.)**



**Figure 72.**  
Plants  
infected with  
**Verticillium**  
wilt show  
interveinal  
necrosis  
with yellow  
margins.

**Verticillium wilt –**  
*Verticillium dahliae*



## **Powdery mildew**

**– *Erysiphe cichoracearum***

The disease produces white powdery growth on the leaves. White 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.





## **Southern blight / Basal rot – *Sclerotium rolfsii***

- 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.

## **Southern blight / Basal rot – *Sclerotium rolfsii***



Southern Blight (*Sclerotium rolfsii*) at base of sunflower plant.

Courtesy Tom Isakeit, TAEX, Weslaco, 1996.



Southern Blight (*Sclerotium rolfsii*) symptoms on sunflower.  
Courtesy Tom Isakeit, TAEX, Weslaco, 1996.

## 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.

# **Sclerotinia wilt / stalk rot / head rot**

**– *Sclerotinia sclerotiorum***



**Figure 62. Basal canker formed from Sclerotinia wilt infection**



**Figure 61. Sudden wilting is a characteristic symptom of Sclerotinia wilt.**



**Figure 63. Dense white mold may form on the surface of the basal canker. Hard black bodies called sclerotia also form on the outside and inside of stems.**



**Sclerotinia Wilt (*Sclerotinia sclerotiorum*). Note white, mycelial growth on sunflower.**

Courtesy Tom Isakeit, TAEX, Weslaco, 1996.



**Sclerotinia Wilt, or Stalk Rot, symptoms on sunflower.**  
Courtesy Tom Isakeit, TAEX, Weslaco, 1996.



**Figure 64.**  
**Middle stalk rot occurs**  
**via ascospore infection.**



**Figure 65.** Head rot showing  
skeleton head filled with sclerotia.



**Figure 66.** Sunflower seed  
contaminated with sclerotia.





# *Sunflower mosaic virus (SMV)*

- Mosaic symptoms accompanied by ring spots or chlorotic spots which had a tendency to coalesce have been frequently reported.
- Another mosaic virus described as mosaic and chlorotic rings that were more common on young leaves which make the plants stunted, producing malformed heads and shrivelled seeds.





- Symptoms as small circular spots on leaves which coalesced to form typical mosaic pattern, cupping and malformation of leaves have also been reported.
- Sunflower mosaic virus is reported to be mechanically sap transmitted and also by several aphid vectors.
- The important vectors are *Aphis gossypii*, *A.craccivora*, *A.malvae*, *Rhopalosiphum maidis* in a non-persistent manner, both under laboratory and natural field conditions.
- The host range of this virus ranged from narrow, infecting only the cultivars of sunflower to as many as more than 25 plant species belonging to different families

## **Necrosis -*Tobacco streak virus (TSV)* *Sunflower necrosis virus (SNV)***

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.

### **Pathogen**

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

### **Disease cycle**

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













**Thank  
you**