

## Fungal Diseases of Sunflower in México.

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### Abstract

Sixteen different fungi were identified in Mexico attacking different sunflower parts during the last twenty years. Of these fungi only about six or seven are of economic importance, even though some appear sporadically. Short description of symptoms, locality in which the disease was found, incidence and management are mentioned.

**Key words:** Fungi, sunflower (*Helianthus annuus L.*)

### Introduction

Sunflower (*Helianthus annuus L.*) has its origin in Mexico and west-central United States. The plant was introduced to Europe by Spaniards and later found its secondary center in Russia. Also the English people have taken the sunflower from Virginia, U.S.A. and the French people from Quebec, Canada and distributed the sunflower in Europe (2), (3). Sunflower is now cultivated in many parts of the world for its high and excellent quality of oil in the seeds. In Mexico, sunflower's main enemies are the fungi, which throughout the last twenty years and in some geographical areas have produced considerable damage. In order to be able to cope with these pathological problems, studies were undertaken to identify the fungi in different geographical regions where sunflowers have been cultivated. Up till now, sixteen different fungi were found and these include various genera presented in order of importance, giving the maximal incidence and the states in which they occur.

### Materials and Methods

The author had the opportunity to visit most of the areas where sunflower was grown in Mexico in the past 20 years through the facility that was given by the Postgraduate College (Colegio de Postgraduados). The diseased samples of sunflower were brought to the plant pathology laboratory and analyzed. In the field the incidence was estimated and recorded.

### Results

The following are the fungi found in the different regions of Mexico.

Sclerotinia wilt caused by *Sclerotinia sclerotiorum* Lib. de Bary is one of the most important diseases of sunflower in Mexico. It also affects many other plant families. It causes a wilt, root, stem and head rot. The wilt and root and stem rot is usually produced by the invasion of the fungus from the soil where the sclerotia may be found. Aerial parts of the plant is almost always attacked by the ascospores. White mycelium is produced and in all the cases tissue rots and later dark gray sclerotia are produced inside or outside the tissues. Sclerotia remain in soil or may be incorporated into it and thus next year infection of plants may start again.

**Locality:** The fungus has been recorded on sunflower in the states of Mexico, Tlaxcala and Zacatecas.

**Incidence:** It has been estimated that up to 20 % of the plants are affected and usually all of these are destroyed.

**Management:** It is important to sow clean seed, without sclerotia. Sclerotia have about the same size and colour as the seeds. Also fields uninfested with sclerotia should be used. Rotation of 3 to 5 years with nonsusceptible crops such as corn, sorghum and small grains are recommended. Tolerant hybrids may also be useful.

Black circular leaf spot is caused by *Phyllachora* sp. These spots have pale green colour around them. They may combine into bigger areas and in the center of these small dark stromatic bodies may be observed. Later the leaves change to yellow colour.

**Locality:** The fungus has been seen only in the state of Zacatecas.

**Incidence:** The estimation was 15% of the plants infected.

**Management:** It is suggested that deep plowing of plant residues should be done.

Gray mold is caused by the fungus *Botrytis cinerea* Pers. which attacks adult plants, especially heads where it can produce soft rot and cover the seeds with abundant fructifications, under humid and warm conditions.

**Locality:** Present in the state of México.

**Incidence:** Estimated at 10%.

**Management:** No efficient control with copper fungicides was attained. Burning the tissues could be used or a change of locality may be wise.

**Rust:** Rust caused by *Puccinia helianthi* Schw. produces red-coloured spots with yellowish margins mostly on leaves. The spots may become black due to later formation of black spores. Severely attacked leaves wilt, dry up and may fall off.

Locality: This disease was recorded in the states of Mexico and Guanajuato.

Incidence: 10% of the plants were estimated to have this problem.

Management: Planting resistant hybrids is very convenient and not exceeding nitrogen fertilization solves partially the problem.

Soft rot of sunflower head produced by *Rhizopus sp.* after flowering has been observed.

Locality: State of Zacatecas.

Incidence: Estimated at 1%.

Management: As this fungus is introduced into the head by the peering claws of birds such as sparrows and that also other birds feed on seeds, this problem presents itself at the end of the growing period. The best solution is to scare off the birds or reduce their population, so as to reduce the mechanical damage done by these birds on the soft tissues.

Sclerotium wilt produced by *Sclerotium rolfsii Sacc.* can be of some consequence, because the fungus rots the stem close to the ground, produces white mycelium and many very small, round sclerotia which may be easily distributed by water or wind.

Locality: States of Mexico and Sinaloa.

Incidence: Estimated at 1%.

Management: Crop rotation with corn or cereals is recommended, because of resistance. Elimination and destruction of wilted plants is suggested.

*Sclerotium bataticola (Taub.) Butler* a fungus attacks stems and leaves and produce very small, dark sclerotia inside the affected tissues. The heads wilt and loose weight.

Locality: State of Sinaloa.

Incidence: Not known.

Management: Same treatment as for *S. rolfsii*.

Rhizoctonia dry stem rot. *Rhizoctonia sp.* produces a dry rot of stem at the soil level. It debilitates the plant, forming black sunken areas and finally may wilt the plant. Dark mycelium and sclerotia are formed on the affected tissues.

Locality: State of Mexico.

Incidence: Low and sporadic, estimated at 0.5%.

Management: Fungicide seed treatment is suggested.

Verticillium wilt caused by *Verticillium albo-atrum* Rienke & Berth produces a loss of turgor and interveinal yellowing of leaves followed by necrosis. These symptoms start with the older leaves and move up. Sometimes only one side of the plant is affected, depending on the localized invasion of the roots by the fungus. The symptoms are caused by the fungal toxin and the fungus forms great number of microsclerotia at the base of the stem or in the root. The affected plants may die. Seeds may also be affected. The fungus attacks many plants.

Locality: Sporadic in the states of Mexico, Zacatecas and Durango.

Incidence: No incidence data are available.

Management: Clean, disease free seed should be used. Fields with disease history should be avoided. Sowing corn or cereals as a rotation practice is recommended. Using seeds of resistant hybrids (4) is also suggested.

Downy mildew produced by *Plasmopara halstedii* (Farlow) Berl. et de Toni is a dangerous pathogen. Typical symptoms in young plants is stunting. Whitish fungal fructification can be seen on the inferior parts of leaves. Older plants if infected produce erect heads with little or no seed. The fungus can be seed transmitted, but also wind and water may disseminate the propagules (1).

Locality: Sporadic in the states of Mexico, Morelos, Guanajuato and Tlaxcala.

Incidence: Not known with precision, but suspected around 5% in the state of Mexico.

Management: Fungicide seed treatment is recommended. Crop rotation and use of resistant hybrids is advantageous.

Damping off of young plants produced by *Pythium* sp. has been sporadically observed only on very wet, poorly drained soil.

Locality: State of Mexico.

Incidence: Not recorded.

Management: Use well drained fields.

White rust produced by *Albugo tragopogonis* (D. C.) Gray affects young leaves, when rainy periods predominate.

Locality: States of Mexico and Zacatecas.

Incidence: Found sporadically, but with high incidence where high plant population and humidity coincides.

Management: Non practiced.

Alternaria stem spot is caused by *Alternaria zinniae* Pape. Only dark necrotic stem spots are produced frequently at the nodes when plant is older. Sporadic infections have been observed.

Locality: State of Mexico.

Incidence: Not recorded.

Management: None.

Powdery mildew is caused by *Erysiphe cichoracearum* D.C., but only the imperfect state of the fungus was observed, namely *Oidium* sp., as whitish spots on the leaf or stem surfaces, but only at the end of the growing season.

Locality: States of Mexico, Morelos and Zacatecas.

Incidence: Not recorded, but high at the end of the season.

Management: None practiced.

White leaf spots produced by *Pleospora richtophensis* E. & E. and shot hole in leaves produced by *Phyllosticta* sp. *P. richtophensis* produces first flaccidity of the leaf intervenal tissue, which later turn brown. The tissue later becomes papery white with ascostromatic black tissue. Later this tissue falls off and produces a shot hole. *Phyllosticta* sp. causes white areas which fall off as they dry up, leaving shot hole effect. The white areas form dark pycnidia with hyaline, unicellular spores. Both fungi were found in the state of Mexico with no recorded incidence or control practices.

### Conclusion

It is concluded that sunflower in Mexico has its main enemies the fungi belonging to *S. sclerotiorum*, *Phyllachora* sp., *B. cinerea* and *P. halstedii*. The potential problems may reside with the fungi *P. helianthi*, *Rhizopus* sp., *S. rolfsii* and *V. albo-atrum* if not a good attention is paid to them.

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