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Diseases of Sunflowers in South Texas

Although more than 30 diseases of sunflowers have been documented worldwide, only a handful of those diseases are ever seen in the production areas in the Gulf Coast, Coastal Bend and Lower Rio Grande Valley of Texas. Some of the more important diseases, such as Sclerotinia head rot, do not occur in south Texas because the environmental conditions are unfavorable for disease development. The diseases that do occur in south Texas may not cause significant losses, even if no control measures are taken, because environmental conditions are always not favorable for an epidemic.

The proper diagnosis of the disease is the first, necessary step to managing it. This article will provide information on the diagnosis of the most prevalent sunflower diseases, an understanding of how they operate and how they can be managed. The discussion will be limited to diseases caused by microorganisms.

The primary approaches for managing diseases of sunflowers are the use of resistant varieties and crop rotation. Additionally, seeds may be treated with fungicides to control fungi that cause seedling diseases. Fungicides are labeled for control of foliar diseases, such as rust, but their economic utility has not been determined under Texas conditions.

Disease: Rust
Cause: a fungus, *Puccinia helianthi*

The undersides of leaves have brownish, circular spots (pustules) with a fuzzy texture, sometimes surrounded by yellowing (Fig. 1). These pustules are masses of spores.

Fig. 1. Symptoms of rust on the underside of a leaf.

Other plant parts may also have such symptoms. The disease is most extensive when there is a dense canopy. Individual pustules may merge (Fig. 2). Extensive rust on leaves can result in yield loss.

Fig. 2. Extensive rust on a leaf.

The disease is favored by high night temperatures and extended periods of leaf wetness, which promote spore infection. Higher temperatures also promote a shorter period between spore infection and the formation of new pustules.

Spores can persist in infected crop debris and can infect seedlings as they emerge, so burying residue and crop rotation for at least a year are recommended. Sunflowers should not be planted near fields that previously had sunflowers with rust. Volunteer sunflowers and wild sunflowers can serve as a source of spores for infection. Sunflower species are the only hosts for this fungus.

An earlier planting date could help in slowing the progress of an epidemic later in the growing season.

Hybrids differ in their resistance to rust. However, there are several races of rust present and a hybrid resistant to one race may not be resistant to another. The race composition in south Texas is not known.

The fungicide Onset (tebuconazole) is labeled for rust for rust only. Headline (pyraclostrobin) is labeled for rust and powdery mildew. The disease thresholds for economical use of these fungicides under south Texas conditions have not been determined.

Disease: Powdery mildew
Cause: a fungus, *Golovinomyces cichoracearum* (Synonym: *Erysiphe cichoracearum*)

The upper sides of leaves have a white, powdery appearance, starting with circular spots that later expand and merge (Fig. 3). The symptoms usually appear after flowering on older leaves. The disease is

favored by high humidity and symptoms can become extensive in the lower canopy. Usually, yield loss is minimal because disease development occurs late in the season, so a fungicide control may not be necessary. Varieties can also differ in their response to the pathogen.

Fig. 3. Powdery mildew.

Disease: Downy mildew
Cause: a fungus, *Plasmopora halstedii*

This disease has not been documented in south Texas and may never become a problem there. This disease is first seen in seedlings: pale or yellowish, irregular areas on the upper surface of leaves (Fig. 4). These areas coincide with spores of the fungus (fuzzy, white growth) on the underside of the leaf (Fig. 5). A seedling blight can occur. Surviving plants are stunted and heads contain empty seed. The fungus can be seed-borne and can survive for many years in soil. Cool, wet conditions during seedling emergence favor infection.

Fig. 4. Downy mildew symptoms on upper leaf. (Photo taken near Lubbock, TX).

To prevent introduction of the fungus into a field, plant clean seed treated with a systemic fungicide. Resistant varieties are available. Wild sunflowers are susceptible, but not other plant species.

Fig. 5. Downy mildew spores produced on the underside of the leaf.

Disease: Mosaic
Cause: Sunflower mosaic virus

Uneven areas of light and dark green on the newest leaves (Fig. 6). Symptoms develop early in the spring, but not later.

Fig. 6. Mosaic symptoms on sunflower.

The disease is endemic on wild sunflowers in the Lower Rio Grande Valley, but it has also occurred on commercial crops in central Texas. Aphids transmit the virus, which can also be seed-borne. Varieties differ in their susceptibility. Although yield loss has been shown experimentally, the impact of this disease on commercial sunflowers in south Texas is not known.

Disease: Southern blight
Cause: a fungus, *Sclerotium rolfsii*.

Mature plants wilt and die, usually following a rain or irrigation (Fig. 7). A bright white fungal growth, often with a fan-like appearance can be seen at the base of the plant (Fig. 8). The diagnostic feature of this disease is a survival structure of the fungus (the sclerotium), which is associated with the white growth (Fig. 9). Sclerotia are the size and shape of mustard seed. If the sclerotia are not visible, plant portions with

the white growth can be sealed in a plastic bag with a wet paper towel and, after 2-3 days at room temperature, these structures will form.

Fig. 7. Southern blight.

Fig. 8. Southern blight. Fungal growth on lower stem and root.

Fig. 9. Detail of southern blight fungus survival structures (sclerotia)on a root.

The fungus is soilborne, has a wide host range of dicot plants, and its sclerotia can survive for up to several years. Within a field, the disease can be seen on the occasional plant or in very small areas and control at this level of disease is not warranted. Crop rotation to monocots and/or plowing crop residue several inches deep may reduce disease in subsequent crops.

Disease: Cotton root rot
Cause: a fungus, *Phymatotrichopsis omnivora*

The disease develops late in the spring, as soil temperatures increase. The first symptom on sunflower is wilting, followed by rapid plant death (Fig. 10). Dull white to brown strands of the fungus are found on surfaces of rotted roots (Fig. 11). The disease appears as somewhat circular spots within the field and affected areas increase in size following rain or irrigation.

The disease is confirmed by microscopic observation of characteristic structures from the strands on roots.

Fig. 10. Symptoms of cotton root rot.

The fungus has a wide host range of dicot plants and is soilborne. If it is present in areas of fields cropped to cotton, then it can possibly occur in those portions when they are subsequently cropped to sunflower.

The most effective means of disease control in infested soils is through escape, i.e. early planting to allow harvesting before soil temperatures increase in the summer. Crop rotation with resistant crops such as corn or sorghum can prevent the increase in size of infested areas of the field in subsequent years, but it will not eliminate the infestation.

Fig. 11. Strands of the cotton root rot fungus on the root.

Disease: Charcoal rot
Cause: a fungus, *Macrophomina phaseolina*

Plants wilt and then eventually die during the summer, typically after flowering. The lower stem and root tissue are rotted and have small, black structures embedded in them, which are survival stuctures (microsclerotia) of the fungus (Fig. 12). The presence of these structures is diagnostic for the disease.

Fig. 12. Stuctures of the charcoal rot fungus (microsclerotia) inside a rotted stem.

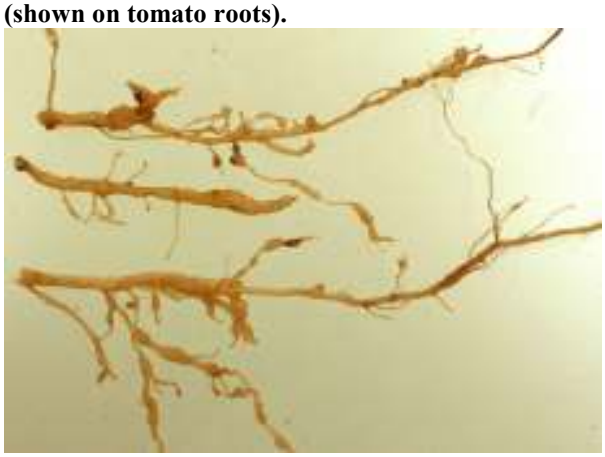
The fungus is soilborne and can also cause disease on sorghum, corn and soybean in south Texas. Drought stress predisposes plants to disease. In irrigated crops, the disease can be prevented by irrigating to prevent moisture stress. There is no plant resistance, but varieties that are more tolerant of moisture stress could be planted in areas where this disease is a problem.

Disease: Root knot
Cause: a nematode, *Meloidogyne incognita.*

Above-ground symptoms may be too subtle to recognize or they may not occur. Root galls are the below-ground symptom (Fig. 13). If galls are absent, the presence of the nematode can only be determined by soil analysis in a nematology lab. The nematode tends to occur on lighter, sandy soils and not on heavy soils.

The effect of root knot nematode on sunflower production in Texas is not known. The root knot nematode has a wide host range of dicot plants and economical control with field crops requires a weed-free rotation to monocot crops such as corn, sorghum, or wheat.

Fig. 13. Root galls caused by root knot nematode (shown on tomato roots).



Other diseases:

The reniform nematode, *Rotylenchulus reniformis*, has been reported on sunflower in south Texas. This nematode occurs on heavier soils and requires a soil analysis for diagnosis. Growers with a history of reniform nematode on their cotton land should not rotate to sunflower.

Head rot is a fungus disease caused by *Rhizopus* spp. The head becomes brown and soft. Fungal growth may be visible inside the flower head. Heads are predisposed to rot as a result of injury caused by hail, birds, or the sunflower head moth.

Text and photos by Dr. Thomas Isakeit, Professor and Extension Plant Pathologist. March, 2011