

ALFALFA DISEASES IN TEXAS AND THEIR MANAGEMENT

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INTRODUCTION – THE NATURE OF DISEASE

There are a multitude of diseases that affect alfalfa worldwide—many of which are capable of causing substantial losses. However, very few of those diseases occur or cause significant loss in Texas, either because the climate does not support their development or the agents that cause them are absent. Also, some diseases no longer have an impact because currently-grown varieties have been intentionally chosen for their disease resistance or tolerance.

The impact of a disease on the crop is dependent upon the interaction of the causal agent, the plant, and the growing environment. Usually, all of these factors do not come into play to favor disease development, therefore the lack of disease is the normal situation in crop production.

There are several strategies used for controlling alfalfa diseases. The most commonly used method is the use of resistant varieties. An under-estimated strategy is the deployment of varieties adapted to the climate, which reduces environmental stress on the plant that could predispose it to infectious disease. Cultural practices include crop rotation, early cutting, and irrigation management. Chemical controls include seed treatments to prevent seedling disease. There are several fungicides registered for control of foliar diseases, although there is no information on the economics of using these fungicides under Texas environmental conditions.

Disease: Cotton root rot/Texas root rot.

Cause: A fungus (*Phymatotrichopsis omnivora*).

This is the most important infectious disease of alfalfa in Texas because the pathogen is so widespread within the state. Plants die suddenly in the summer months, usually in a circular pattern (Fig. 1). The size of the circle may increase following rain or irrigation. Roots of affected plants are rotted (Fig. 2).



Figure 1. Appearance of cotton root rot in an alfalfa field.



Figure 2. Root rot of alfalfa caused by the cotton root rot fungus (*Phymatotrichopsis omnivora*).

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Spore mats may be produced on the surface of the soil (Fig. 3). They are initially white, becoming creamy white to tan and are 2 to 12 inches in diameter and 1/4 to 1/2 inch thick.

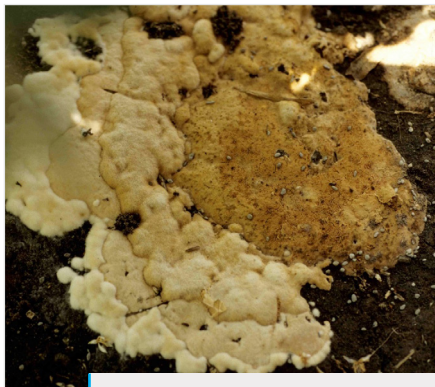


Figure 3. Fresh spore mat of the cotton root rot fungus.

The fungus is soilborne and present throughout most of Texas—except the High Plains and most of East Texas (Fig. 4). It has a host range of more than 1,800 species of plants, primarily dicots. It is prevalent in alkaline soils, particularly calcareous soils with a high clay content and is absent from acidic soils. It survives in soil as small, seed-like structures known as sclerotia, which germinate and infect roots, resulting in root rot. Death occurs rapidly as the soil temperatures increase during the summer months.

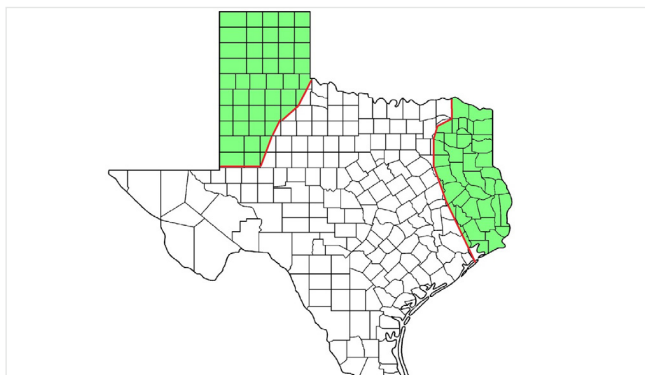


Figure 4. A map of cotton root rot distribution in Texas. Areas shaded in green indicate where the disease is totally absent. Its presence in non-shaded areas is not uniform. Boundaries (in red) are approximate.

There is currently a soil-applied fungicide, Topguard Terra (flutriafol), which is labeled for this disease on alfalfa. As the sclerotia are long-lived in soil, crop rotation with corn or sorghum is not sufficient to control the fungus. Areas with a history of cotton root rot should not be planted to alfalfa.

MINOR DISEASES IN TEXAS

Disease: Rust.

Cause: A fungus (*Uromyces striatus*).

The symptoms are small, reddish-brown circular areas on leaves where spores are produced (Fig. 5). The reddish spores rub off easily.



Figure 5. Rust of alfalfa.

This fungus is specific to alfalfa and some related plants. Wind spreads the spores produced on other plants and water on leaves foster their germination.

There are rust-resistant varieties available. Also, a timely harvest of the crop will reduce the impact of the disease.

Disease: Common leaf spot.

Cause: A fungus (*Pseudopeziza medicaginis*).

The symptoms are small, circular brown to black spots on leaves (Fig.6).

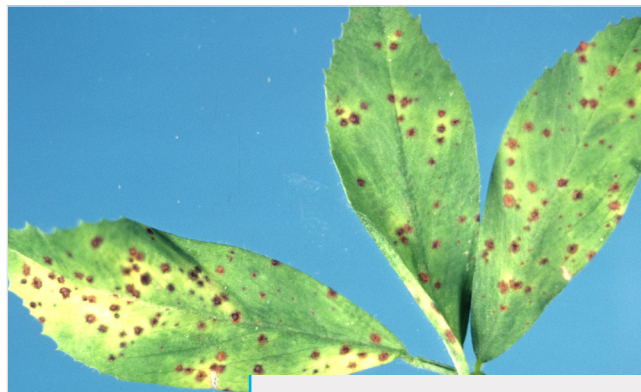


Figure 6. Common leaf spot of alfalfa.

This fungus only infects alfalfa. The fungus survives on old, infected alfalfa tissue on the soil surface. The disease is favored by cool, wet weather. Resistant varieties are available. An early harvest of the crop can minimize losses if there is severe disease pressure.

Disease: Spring black stem and leaf spot.

Cause: A fungus (*Phoma medicaginis*).

The symptoms are black spots on the lower leaves and stems (Fig. 7). The spots increase in size and coalesce.



Figure 7. Spring black stem and leaf spot of alfalfa.

This fungus only infects alfalfa and some other legumes. The fungus survives on crop residue and stubble. Cool, wet weather favors the disease. An early crop harvest can reduce leaf loss. Crop rotation will also reduce the amount of fungus in the field for future alfalfa crops.

Disease: Summer black stem and leaf spot.

Cause: A fungus (*Cercospora medicaginis*).

The symptoms are brown leaf spots with yellow margins—stems will have brown spots (Fig. 8). The affected leaves will defoliate. The disease is associated with high temperatures and humidity. An early harvest will minimize yield loss.

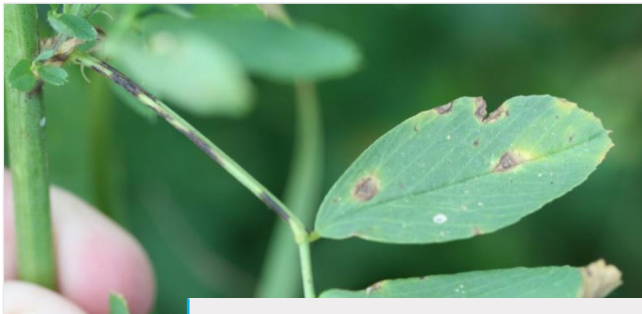


Figure 8. Summer black stem and leaf spot.

Disease: Downy mildew.

Cause: An oomycete (fungus-like organism) (*Peronospora trifoliorum*).

Infected leaves become pale green, with a fuzzy, gray growth on the underside of infected leaves (Fig. 9).



Figure 9. Downy mildew of alfalfa.

This pathogen only infects alfalfa and some other legumes and it only survives in living plants. Spores are produced under humid conditions and will infect leaves during cool, rainy weather. Resistant varieties are available. Metalaxyl and mefenoxam seed or soil treatments will control infections of seedlings.

Disease: Southern blight.

Cause: A fungus (*Sclerotium rolfsii*).

Plants die quickly following warm, wet weather. There is a very fluffy, cottony growth on the plants near the soil and small survival structures (i.e., sclerotia) are produced that resemble mustard seeds are (Fig. 10).



Figure 10. Resting structures (i.e., sclerotia) of southern blight fungus (shown on soybean).

This fungus is soilborne and has a wide host range affecting dicots. Sclerotia germinate and infect plants in wet soil at high temperatures. Varieties tend to be resistant. Effective control strategies include: deep plow the soil to bury sclerotia, ensure good drainage of the field, and clean the soil from machinery when moving to different fields.

A MAJOR ALFALFA DISEASE NOT YET SEEN IN TEXAS

Disease: Verticillium wilt.

Cause: A fungus (*Verticillium alfalfae*).

The initial symptom is a V-shaped chlorosis of the leaflet tip. Leaflets then dry out and fall, leaving petioles attached to the stem (Fig. 11). The infected stem retains its green color until all the leaves are dead.



Figure 11. Verticillium wilt of alfalfa (photo taken in Michigan).

This fungus can cause disease in soybeans and peanuts, and can grow on other plants—including many weeds without producing symptoms.

The fungus can be carried on the seed, where it infects roots and grows through the plant. Cutting can spread the fungus within a field and insects, such as leafcutter bees, can also spread it. The fungus can survive in hay and even manure. The optimum temperature for this fungus is between 68 and 77°F, but an isolate from the Imperial Valley of California can persist on hay at 104°F.

The main control approach is the use of resistant varieties. A 2 to 3 year crop rotation, including good weed control, can reduce the fungal population in soil. Another approach is to disinfect cutter bars with 10 percent bleach when moving to a different field. Be wary of the seed origin.