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Sclerotinia crown and stem rot of alfalfa

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A crown and stem disease of alfalfa caused by a fungus was identified as a potentially serious problem in Missouri in 1983. Since that time, the disease has been identified in several counties, mostly in southwest Missouri and occasionally in southeast Missouri. It appears that the disease is becoming more widespread.

The disease is very serious, especially in fall-planted alfalfa. Losses may involve small areas in a field, or the entire fields may be completely devastated.

The severity of the disease varies from season to season. Plants of all ages are susceptible, but the incidence and severity appears to be greatest in young seedlings, especially in falls of cool, wet weather conditions.

Cause

The fungus, *Sclerotinia trifoliorum* Eriks, is generally considered as the causal agent that attacks forage legumes. The fungus produces round to irregular-shaped black sclerotia (survival structures). It is closely related to several other fungi that produce similar sclerotia, but may have different host ranges.

The host range of *S. trifoliorum* is limited mainly to forage legumes, and there appears to be very little host specificity. The fungus can attack alfalfa, red clover, crownvetch, ladino clover, arrowleaf clover and crimson clover.

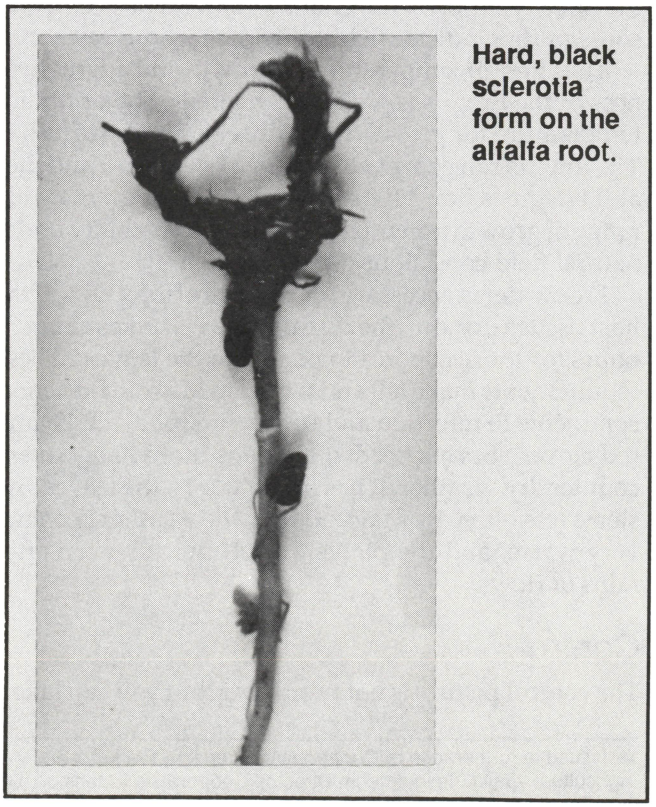
Symptoms

New stands

Fall-seeded alfalfa can be infected during the seedling stage regardless of fall planting date. Seedings made from mid-August through early October have been infected in southern Missouri. Early infections begin following wet, cold conditions and have been observed in early December in Oregon County.

The fungus first appears as a white, cottony growth in the crown area of the alfalfa seedlings. Stems and leaves wilt and turn yellow to grayish-green. They die as the infection progresses. Producers often fail to notice these early symptoms because they often associate them with the yellowing of leaves caused by frost damage. Noticeable stand reductions are evident in February or March when affected plants fail to green up. Stand reductions may be limited to small scattered thin or dead spots or the entire stand may be killed.

Hard, black sclerotia form on the alfalfa root just below the soil surface. In severe cases, they are visible in the dead alfalfa leaf litter on the soil surface. The black sclerotia are off-white to gray colored inside. They are usually 1 to 5 mm in diameter.



Hard, black sclerotia form on the alfalfa root.

Old stands

Infections can occur on established stands. Symptoms are like those of young stands. Leaves and stems turn yellow or grayish-green and then collapse.

Sometimes affected plants may have a few green shoots remaining even though the other shoots have died back. Sclerotia usually appear in the crown areas or inside the dead stems. If the crowns are severely affected, the plants eventually die. In older stands, stand reductions often appear as irregular or circular thinned-out areas from 1 foot in diameter to several feet across.

Disease cycle

The fungus oversummers as dormant, hard, round-to-irregular sclerotia, up to 8 to 20 mm in diameter in soil or crop residues. Sclerotia formed in the spring lie dormant in soil or on surface debris during the summer. These structures can survive in a field for an indefinite period of time.

In the fall, sclerotia produce fruiting structures known as apothecia. The funnel-shaped apothecia produce microscopic ascospores. The apothecia forcibly expel the spores, and the wind carries them to leaves and stems in alfalfa fields.

Primary infections occur during cool, wet weather when the ascospores germinate and penetrate the host tissues directly. If high moisture and cool temperatures prevail in the fall and winter, secondary infections can occur when fungus mycelium spreads to other leaves and stems.

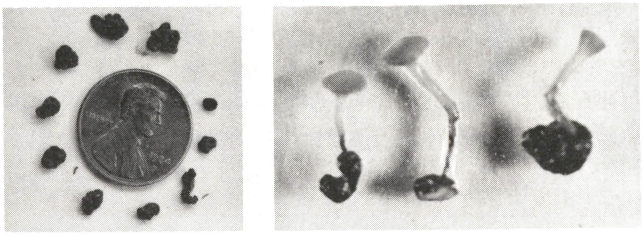
Researchers don't know how far the wind can carry the infective spores. Infections within fields occur, and some studies indicate field-to-field infections can occur.

The effect of temperature on growth and aggressiveness of the fungus is well documented. The optimum temperature for growth (in culture) is 59-60 degrees F. The fungus can grow between 28-81 degrees F and dies at -11 degrees F and 108 degrees F. This suggests a wide range of growth potential and good survivability under natural field conditions.

Free water is necessary for successful infection. If the host tissues dry out, the disease stops. It takes about 36 hours for the acospores to penetrate the leaves. These requirements make fall and winter in Missouri the most conducive to infection and serious injury to alfalfa and red clover. Spring-seeded alfalfa is more likely to encounter dry weather. It has free water on the leaves and stems less often. By May and June the weather becomes very warm, and the plants dry off quickly even after rains or dews.

Control

The control picture is not promising, but you can take a number of steps to control the disease.



Left: The fungus survives as hard, round-to-irregular sclerotia in soil or crop residues. Right: The sclerotia produce funnel-shaped fruiting structures called apothecia.

1. Plow deep to bury sclerotia. If you can plow the field and put it into another crop, do so to bury the sclerotia. Many pasture and hay fields in Missouri do not fit this option.

2. Plant seed free of sclerotia. It is possible that this fungus disease was introduced into the state by way of contaminated seed. Exercise caution and avoid bringing the fungus into uninfested fields. This practice may not entirely prevent new infections because the fungus spores are airborne from field to field.

3. Maintain three-to four-year intervals between forage legumes in rotations to reduce the inoculum potential. In fields used mainly for forages, this is not a desirable option. Instead, use annual forage grasses or grain crops, or, perhaps, perennial grasses, in rotations. Avoid using legumes in the rotation to reduce yearly reinoculation of the field.

4. Avoid planting alfalfa in the fall in fields with a history of clover or alfalfa or in fields adjacent to established fields of alfalfa. The chances of having Sclerotinia crown rot infection appears to be much higher in such circumstances.

5. Plant spring-seeded alfalfa rather than fall-seeded. It appears that fall-seeded alfalfa is damaged most seriously in the early seedling stage. Mature plants are more tolerant than seedlings. Pre-emergence herbicides can reduce weed problems during establishment.

6. No alfalfa cultivars are known to be resistant to *S. trifoliorum*. A supposed tolerant cultivar, Cimmaron, was tested in the H.O.S.T. area and proved to be susceptible.

7. Researchers applied fungicides in the fall in an effort to protect the seedlings in the critical stage. An experiment conducted in fall 1985 in the H.O.S.T. area used systemic and protectant fungicide combinations (Benlate plus Mancozeb; Topsin M plus Mancozeb; Kocide 101, an inorganic copper). Researchers sprayed the plot twice (Oct. 24 and Nov. 7) in an effort to protect during the rainy weather. The experiment was unsuccessful but will be repeated with modification in the future.

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