

Spring and Summer Black Stem and Leaf Spot Diseases of Alfalfa

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Spring and summer black stem and leaf spot of alfalfa, their causes, symptoms, and management are discussed.

Of the two black stem diseases of alfalfa found in the central and northern Great Plains, spring black stem is more common than summer black stem. Both are damaging when weather conditions favor their development. Although their symptoms differ, each causes spotting and darkening of stems and spotting of leaves.

Spring Black Stem and Leaf Spot

Cause

Spring black stem and leaf spot is caused by the fungus *Phoma medicaginis* var. *medicaginis*. This fungus survives the winter as pycnidia or dormant mycelium in overwintered stem lesions or fallen leaves.

Symptoms

Symptoms occur primarily on stems and leaves but seed-pods, crowns, and upper taproots also may become infected. In the spring, small black spots known as tar spots (*Figure 1*) develop on leaves, petioles, and stems of new shoots. Leaf lesions are irregular, and enlarge and merge until much of the leaflet is covered. Infected leaves yellow and drop from the plant. Lesions on stems and petioles turn black. As stem lesions enlarge and merge, most of the stem becomes black (*Figure 2*). If the stem is girdled by the advancing lesions, the plant will die. The fungus also can invade the plant base and cause the crown and upper taproot to rot. In mature plants, seed pods may become discolored and shrivel under high humidity conditions.

Conditions Favoring Disease Development

Pycnidia (asexual fruiting structures) form in abundance on infected stems and fallen leaves during late fall and early winter. In wet spring weather, spores are produced inside the pycnidia. As the spores ooze from the pycnidia, they are splashed by rain onto the leaves, petioles, and stems of newly emerged shoots. The new shoots become infected as they grow through the residue from the previous year's crop. Some spores may spread by wind and insects. The fungus can be found at the feeding sites of the root curculio insect. The foliage must



Figure 1. Small, dark brown to black spots (tar spots) on the lower leaves in early spring are symptoms of spring black stem and leaf spot.



Figure 2. Darkening of stems caused by spring black stem and leaf spot.

be wet from dew or rain for infection and spread to occur. The disease continues to move upward in the canopy if cool, wet weather persists through spring.

The fungus is also carried in the seed. A seedling blight can occur when infected seed is planted. The disease will often spread from these seedlings to nearby healthy seedlings. Early seedling loss results in poor stand establishment.

Spring black stem and leaf spot is usually just a problem on the first cutting. Regrowth from this cutting may become infected, but disease severity is generally light. If environmental conditions between mid-April and mid-June are favorable

(cool and wet) for disease development, plants may become defoliated before cutting. When severe, as much as two-thirds to three-fourths of the leaf area can defoliate, resulting in the first cutting being primarily stems. This not only reduces yield but significantly lowers hay quality.

Management

Early cutting is recommended if spring black stem and leaf spot is prevalent on the lower portion of plants. Scout fields weekly in spring to determine the extent of disease development. Decide whether to cut early, based on the results of scouting fields and weather forecasts. Don't delay the decision to cut early, otherwise most of the leaves may be lost by harvest time. Ideally, one-tenth bloom is the optimum growth stage for harvesting while maintaining forage quality and limiting premature leaf loss due to disease. If the field is recovering from winter injury, it may be necessary to delay the first cutting at the risk of foliage loss to spring black stem and leaf spot.

Moderately resistant cultivars are available. Planting these cultivars can significantly reduce losses to spring black stem and leaf spot.

Grazing the aftermath after a hard freeze in the fall, which is frequently done in Nebraska, will reduce pathogen inoculum.

Using certified seed produced in arid areas will ensure maximum stand establishment and reduce the chance of seedling blight caused by the spring black stem fungus.

Summer Black Stem and Leaf Spot

Cause

Summer black stem and leaf spot is caused by the fungus *Cercospora medicaginis*. This fungus is most active in the warm, humid regions of the United States and occurs every year in the eastern half of Nebraska. *C. medicaginis* survives as dormant mycelium in infected stems and leaves.

Symptoms

The most obvious symptom is premature leaf defoliation starting with the lower leaves and progressing upward in the canopy. The leaf spots, which develop before the stem lesions, are brown at first, then become ash-gray, roughly circular, and surrounded by a diffuse yellow margin (Figure 3). These spots are quite distinct and once familiar with them, can easily be distinguished from those of other leaf spot diseases.

Lesions on the stem are elongate and range from a reddish brown to a chocolate brown. Sometimes heavy infection of the stems is severe enough to cause extensive defoliation and eventually kill the plant.

Conditions Favoring Disease Development

In the central Great Plains, summer black stem rarely causes losses to the first cutting of alfalfa but can be a problem in the second and third cuttings. Warm-to-hot, wet, or humid weather favors disease development. When the humidity approaches 100 percent in the plant canopy in July and August, plants become infected by spores produced on the previous crop residue. Wind, rain, and irrigation water spread the fungus spores. Secondary spread occurs within the plant canopy on infected leaves and stems.



Figure 3. Ash-gray lesions of summer black stem and leaf spot.

As with most leaf and stem diseases of alfalfa, losses are greatest if harvest is delayed until full bloom. Summer black stem and leaf spot can develop rapidly during the final week before harvest.

This disease usually isn't severe enough by itself in Nebraska to cause economic loss. However, in the presence of other leaf diseases, the combined severity may cause substantial forage loss.

Management

Scout fields regularly during the growing season for early detection of disease so that timely adjustment of cutting schedules can be made. Adjusting the cutting schedule to disease development is the most practical and economical means of management in established stands.

A copper hydroxide fungicide can be applied 10 to 14 days or earlier before harvesting the second and third cuttings. Fungicide application can reduce losses, but it may not be economical for the grower.

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