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Gray Leaf Spot of Perennial Ryegrass in Nebraska

by John E. Watkins
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Gray leaf spot, caused by the fungus *Pyricularia grisea*, was reported in the early 1970s to be a damaging disease of annual ryegrass grown for forage in the southeastern United States. Forage yield losses were so severe that the disease was named ryegrass blast. Researchers in Mississippi and Louisiana concluded that *P. grisea* was already present in the area, and that the rain, fog, humidity and dew associated with a recent hurricane in the gulf created optimal conditions for spore production, infection of the ryegrass and rapid development of the disease.

The saga of gray leaf spot as a serious disease of certain turfgrass species began from these early findings on forage grasses. Since then, gray leaf spot has been a chronic problem in mature stands of St. Augustine grass in the southeast. Among the cool-season grasses, annual and perennial ryegrasses are the primary hosts. The disease can occur on fescues and bentgrasses, but these occurrences are relatively rare. Recently, it was found on tall fescue in Kansas; however, the significance of its occurrence on that host remains to be determined.

In 1991 gray leaf spot occurred on some golf courses in southeastern Pennsylvania, and in 1995 it caused serious damage to perennial ryegrass fairways in Maryland. Both of these outbreaks coincided with unseasonably warm temperatures and high relative humidity during July, August and early September. Almost identical conditions occurred during 1998 in the Midwest. In Nebraska May and June were wet and July, August and early September were dry but hot and humid. The disease had not been reported in Nebraska prior to 1998, but apparently *P. grisea* was here, and when optimal conditions for disease development occurred, fairways overseeded with perennial ryegrass were decimated.

Gray leaf spot is particularly damaging to ryegrass seedlings. In Nebraska the August outbreak coincided with the overseeding of fairways to perennial ryegrass. Mature ryegrass plants in these fairways developed leaf spots and were sometimes blighted, but the emerging seedlings were killed.

Diagnosing Gray Leaf Spot

Diagnosis of gray leaf spot in a ryegrass turf is fairly easy once you become familiar with the symptoms. In 1998, however, the disease was unexpected in Nebraska, so initially, no one knew what to look for. The overall appearance of turf affected by gray leaf spot may be confused with the nonuniform blighting by a late season outbreak of brown patch. By the time the disease was identified, the damage was done and turf managers were faced with a reactive situation rather than a proactive one.

First, look for gray leaf spot to occur in hot, drought-stressed areas and in newly seeded or overseeded areas. Affected ryegrass turf takes on an unhealthy scorched appearance as if suffering from drought.

Age of plants at the time of infection is an important factor in the extent of damage to the turf. Infected seedlings up to one month old appear flaccid and water-soaked and are blue-gray. They are often killed within hours after infection. Under ideal conditions, gray leaf spot can progress faster and be more destructive than *Pythium* blight. In early September 1998, many golf course superintendents in eastern Nebraska who had overseeded their fairways would probably have agreed with that assessment.

On the leaves and stems of mature, tillered perennial ryegrass plants, the first observable symptoms are small, circular, olive-green to reddish-brown spots with brown to purple borders. Later the spots become oval lesions with gray or blue-gray centers surrounded by the same brown to purple margin. A yellow (chlorotic) zone surrounds these older lesions. Eventually most of the infected leaf turns yellow, and the affected turf develops patches of chlorotic or blighted turf. In the early morning hours, the centers of the spots may be covered with a velvety, gray mold because of the production of abundant spores by the fungus. **A key symptom to look for is the presence of twisted leaves that resemble a fish hook.** During warm, humid periods, the twisted leaf tips

turn an olive-green, and the area just below the twist may be covered with a gray velvety felt-like mold. This mold growth contains thousands of fungus spores that can be observed with a microscope.

Future Occurrences of Gray Leaf Spot

Whether gray leaf spot occurs from one year to the next is highly dependent on weather conditions during the growing season. As weather in Nebraska is unpredictable, so gray leaf spot will be unpredictable. The potential is there, and by understanding those conditions under which the disease develops, superintendents can be proactive in their approach to managing gray leaf spot. A recurrence is likely, particularly on those turfs that had gray leaf spot the previous year. The severity of that recurrence will depend on environmental conditions.

Dr. Peter Dernoeden, Professor of Agronomy/Plant Pathology at the University of Maryland, outlines some of these conditions as they contributed to plant death during a gray leaf spot epidemic in Maryland in 1995:

- High temperature stress and drought predisposed plants to infection.
- Drought precipitated the need for more frequent night irrigation. This increased the duration of leaf wetness and promoted greater spore production by *P. grisea*.
- The rapid loss (three to five days) of leaves and sheaths due to the disease and the stress from heat and drought triggered root dysfunction with the ultimate outcome being plant death.

The 1998 outbreak in Nebraska closely fit this scenario of events.

A prolonged (more than four weeks) humid, heat wave will likely trigger a gray leaf spot outbreak in August and early September. Warm temperatures and drought during summer exacerbates the damage. **Criteria that serve as an alert to a potential gray leaf spot outbreak include:**

- Prolonged drought and heat stress periods.
- Extended periods of warm (70-90°F), humid weather, particularly during August.

Under these conditions, *P. grisea* produces extremely large quantities of spores, each of which is capable of infecting a leaf blade. These spores are moved about within the turf by rain/irrigation splash, wind dispersal, mowing or traffic. Grass whose growth has been slowed by a growth regulator will not recover rapidly once infected and often will suffer greater damage.

Managing Gray Leaf Spot

The tools for managing gray leaf spot include:

- Irrigate in the early morning.
- Initiate light (1/8 lb nitrogen per 1000 sq ft), weekly urea applications on newly seeded or reseeded areas to improve seedling vigor, but do not over stimulate growth with excess nitrogen.
- Avoid applying herbicides or growth regulators during warm, humid periods.
- Apply a preventive fungicide program to newly seeded and overseeded turfs and to established perennial ryegrass turfs with a history of gray leaf spot. Use a tank mix of a systemic fungicide such as Heritage or Banner MAXX and Daconil Ultrex and begin treatment the end of July followed by a second application in 21 days. If only Daconil Ultrex is used, then the treatment schedule should be every 14 days beginning mid-July and continuing through August.

Table I. A selected list of fungicide active ingredients registered to control gray leaf spot include:

<i>Common name</i>	<i>Some trade names</i>
Azoxystrobin	Heritage
Chlorothalonil	Daconil Ultrex Manicure Flowable, DG Turf Fungicide Thalonil Excel, Thalonil 4L
Propiconazole	Banner MAXX
Chlorothalonil + fenarimol	TwoSome Flowable Fungicide

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C-4, Field Crops

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