Gray Leaf Spot of Corn

CROP BULLETIN

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PATHOGEN FACTS

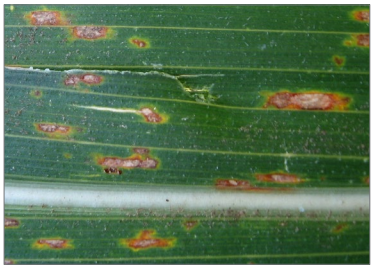
- Gray leaf spot (GLS) is a common fungal disease in the United States caused by the pathogen Cercospora zeae-maydis in corn.
- Disease development is favored by warm temperatures (80 °F or 27 °C) and high humidity (relative humidity of 90% or higher for 12 hours or more).
- *Cercospora zeae-maydis* overwinters in corn residue, allowing inoculum to build up from year to year in fields.
- Cropping systems with reduced- or no-till and/or continuous corn are at higher risk for gray leaf spot outbreaks.
- Conducive weather conditions encourage the rapid spread of disease near the end of summer and early fall when corn plants allocate more resources to grainfill.

Cercospora zeae-maydis spore

IDENTIFICATION

Early Symptoms

- Gray leaf spot lesions begin as small, necrotic pinpoints with chlorotic halos; these are more visible when leaves are backlit.
- Coloration of initial lesions can range from tan to brown before sporulation begins.
- Because early lesions are ambiguous, they are easily confused with other foliar diseases, such as anthracnose leaf blight, eyespot, or common rust.



GLS lesions begin as small, necrotic spots with chlorotic halos.

As GLS develops, lesions become blockier in appearance and more gray in coloration.

GRAY LEAF SPOT LIFE CYCLE

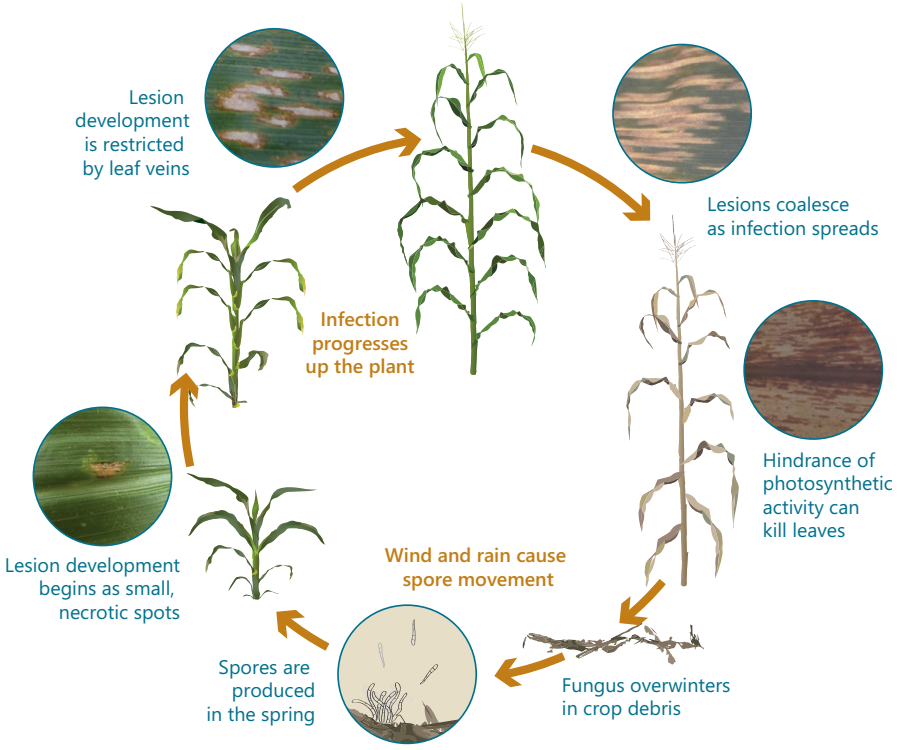


Figure 1. Life cycle of gray leaf spot *Cercospora zeae-maydis* in corn. Spores and lesions are enlarged to show detail

Later Symptoms

- As infection progresses, lesions begin to take on a more distinct shape.
- Lesion expansion is limited by parallel leaf veins, resulting in the blocky shaped “spots.”
- As sporulation commences, the lesions take on a more gray coloration.
- Entire leaves can be killed when weather conditions are favorable, and rapid disease progression causes lesions to merge.

As GLS progresses, lesions will coalesce and form larger necrotic areas.

CROP DAMAGE

- Gray leaf spot lesions on corn leaves hinder photosynthetic activity, reducing carbohydrates allocated towards grain fill.
- The extent to which gray leaf spot damages crop yields can be estimated based on the extent to which leaves are infected relative to grainfill (Table 1).
- Damage can be more severe when developing lesions progress past the ear leaf around pollination time.
- Because a decrease in functioning leaf area limits photosynthates dedicated towards grainfill, the plant might mobilize more carbohydrates from the stalk to fill kernels.
- This can result in a higher risk of stalk lodging and stalk rots due to a loss of structural integrity.

Smaller kernels and a lower test weight can be the result of reduced carbohydrate contributions from photosynthetic activity.

Table 1. Estimated yield loss based off of percent of tissue infected by gray leaf spot (Lipps, 1998).

Percent Leaf Area Affected at R5 (Early Dent Stage)	Approximate Yield Loss
5% or less	0 – 2%
6 – 25%	2 – 10%
25 – 75%	5 – 20%
75 – 100 %	15 – 50%

MANAGEMENT CONSIDERATIONS

Cultural Practices

- *Cercospora zeae-maydis* overwinters in corn debris, so production practices, such as tillage and crop rotation, that reduce the amount corn residue on the surface will decrease the amount of primary inoculum.
- Crop rotation away from corn can reduce disease pressure, but multiple years may be necessary in no-till scenarios.

Hybrid Resistance

- Planting hybrids with a high level of genetic resistance can help reduce the risk of yield loss due to gray leaf spot infection.
- Hybrids and parent lines are improved through a screening process in areas with a high incidence of GLS and specialized "disease nurseries."
- Customers can see the effectiveness of hybrid resistance based off of a score (ranging from 1 to 9) that is assigned to corn products.
- Susceptible hybrids are more likely to benefit from a foliar fungicide application, but resistant varieties may benefit as well under high gray leaf spot pressure (Figure 2).

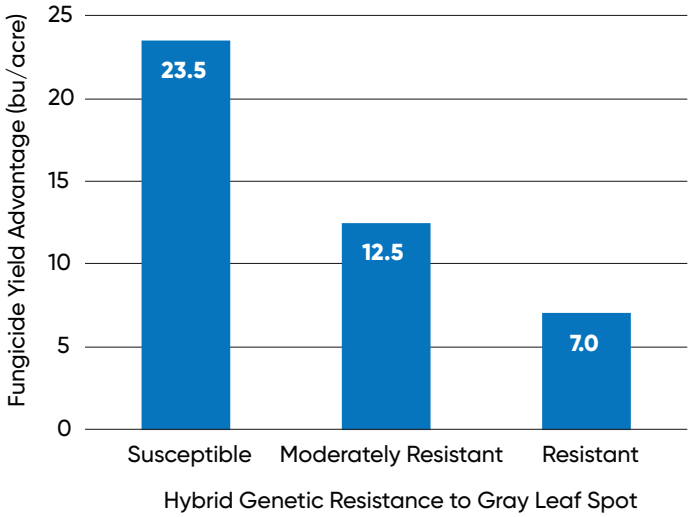


Figure 2. Average yield increase of hybrids with varying levels of resistance to GLS due to a foliar fungicide application in a 3-year University of Tennessee/Pioneer research study with very high GLS pressure.

Fungicides

- During the growing season, foliar fungicides can be used to manage gray leaf spot outbreaks.
- Farmers must consider the cost of the application and market value of their corn before determining if fungicides will be an economical solution to GLS.
- When selecting a fungicide, it is important to keep in mind the efficacy of the available products (Table 2).

Table 2. Fungicide efficacy for control of gray leaf spot. (Wise, 2019).

Fungicide	Active Ingredients	GLS Efficacy
Aproach® Prima	picoxystrobin + cyproconazole	Excellent
Headline®	pyraclostrobin	Excellent
Headline® AMP	pyraclostrobin + metconazole	Excellent
Priaxor®	pyraclostrobin + fluxapyroxad	Very Good
Quilt® Xcel	propiconazole + azoxystrobin	Excellent
Stratego® YLD	prothioconazole + trifloxystrobin	Excellent

REFERENCES

Patrick Lipps, 1998. Gray leaf spot and yield losses in corn. Crop Observation and Recommendation network. Issue 98-23.

Wise, K. 2010. Gray Leaf Spot. Purdue Extension.

Wise, K. 2019. *Fungicide Efficacy for Control of Corn Diseases.* Crop Protection Network.

The foregoing is provided for informational use only. Please contact your sales professional for information and suggestions specific to your operation. Product performance is variable and depends on many factors such as moisture and heat stress, soil type, management practices and environmental stress as well as disease and pest pressures. Individual results may vary. Vol. 11 No. 31 August 2019