K-STATE Research and Extension

# Gray Leaf Spot of Corn

Department of Plant Pathology | MF2341 | Corn Diseases

Gray leaf spot of corn is caused by the fungus *Cercospora zeae-maydis*. It is the most serious foliar disease of corn, not only in Kansas, but in the entire north central production region. From its first appearance in Kansas in the Republican River Valley in 1989, it can now be found wherever corn is grown in the state.

Historically, it is most severe in the major river valleys of the state including not only the Republican, but also the Missouri, Kansas, and Arkansas river valleys. On a statewide basis, Kansas growers lose about 9 million bushels per year to gray leaf spot. Where susceptible hybrids are grown in no-till or reduced-till systems, losses as great as 20 to 30 percent may occur in individual fields.

## Symptoms

Early symptoms can be easily confused with other leaf diseases. A yellow halo surrounding a small lesion is visible when the leaf is held up to light (Figure 1). Within two weeks however, these lesions will begin to elongate. Mature lesions are pale brown or gray to tan, long (0.2 to 2.0 inches), narrow and rectangular, being characteristically restricted by the veins (Figure 2).

On susceptible hybrids, the disease is usually first noticed attacking the lower leaves well before silking. In about two weeks, these lesions generate a new crop of spores, which then infect the middle and upper leaves. As plants mature, susceptibility to gray leaf spot increases. On susceptible hybrids with favorable

## Quick Facts

- A yellow halo surrounding a small lesion is visible when the leaf is held up to light Within two weeks these lesions elongate. Mature lesions are pale brown or gray to tan, long, narrow and rectangular, being characteristically restricted by the veins.
- The fungus overwinters on corn residue, especially when the residue is on the soil surface.
- The disease develops best between 70 to 85 degrees Fahrenheit. The disease can thrive in even the hottest of Kansas summers if morning dews or fog is present.
- Gray leaf spot fungus has not developed resistance to the currently registered products.
- Management begins with hybrid selection. Although no hybrid is immune to the disease, a range of hybrids have some resistance.
- Begin scouting two to three weeks before tasseling. If gray leaf spot lesions are not present in the field at this time, it is unlikely a fungicide spray will be needed.

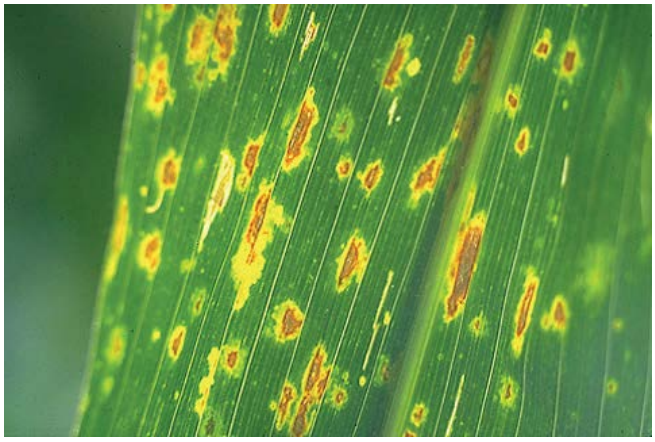

**Figure 1.** *Gray leaf spot lesions showing a yellow halo when backlit. Image courtesy of the American Phytopathological Society.*

**Figure 2.** *Expanded lesions one to two weeks after initial infection. Image provided by the author.*

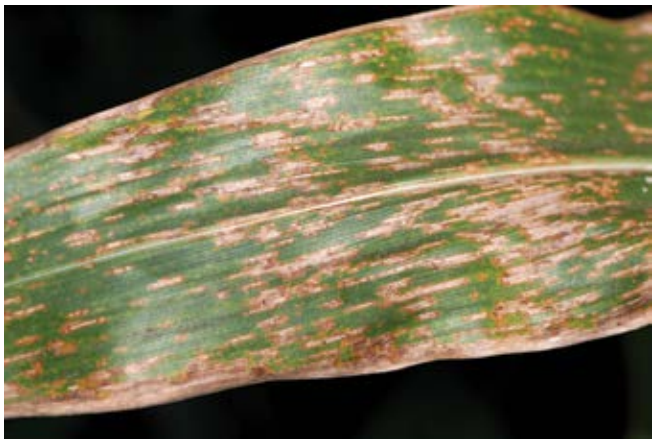

**Figure 3.** *Corn leaf showing an advanced stage of gray leaf spot infection. Image provided by the author.*

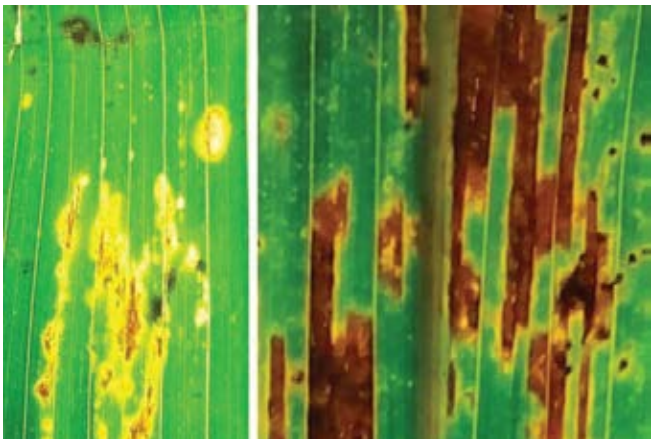

**Figure 4.** *Light passes more easily through the corn bacterial streak lesion (left) than through the gray leaf spot lesion (right). Image provided by the author.*

weather, the lesions rapidly merge, killing entire leaves (Figure 3). Extensive blighting may continue until all leaves on a plant are killed. Plants in this situation incur significant yield loss and are more susceptible to serious stalk rotting and lodging.

Recently, a new disease known as corn bacterial leaf streak (*Xanthomonas vasicola* pv. v*asculorum*) has become established in the western corn belt including Kansas. In the early stages of infection, symptoms can be difficult to discern from gray leaf spot. This is important because a misidentification could result in a needless application of a fungicides, which will not control bacterial diseases. An easy way to identify the two diseases is to backlight the leaf with sun. Light passes more easily through the bacterial streak lesion (translucent) causing it to look a brighter yellow-green color. Light does not readily pass through a gray leaf spot lesion (opaque), giving it a much darker appearance (Figure 4).

## Spread

Gray leaf spot of corn is caused only by *C. zeae-maydis*. Although there is a gray leaf spot disease of grain sorghum, it is caused by a different fungus, *Cercospora sorghi*. Neither fungus can cross over to the other crop under field conditions.

The fungus survives the winter on infested corn residue, especially when the residue is on or above the soil surface. There is ample evidence that under no-till conditions, the fungus survives through at least two winters in Kansas. Yield losses of 30 to 40 percent have occurred in corn planted into soybean stubble that followed no-till corn.

In Kansas, initial infection occurs in early to late June. Prolonged periods of leaf wetness (11 to 13 hours or longer) and high relative humidity (greater than 90 percent) such as might occur with heavy dews or fogs and cloudy days are more important to disease development than is actual rainfall. Severe gray leaf spot damage often occurs in low spots in fields where cooler air results in longer leaf wetness periods or in fields bordered by trees or streams where air drainage is poor. Temperatures of 70 to 85 degrees Fahrenheit are considered ideal for disease development, but the disease can thrive in even the hottest of Kansas summers if morning dews or fog is present.

## Management

Because crop residues are an important part of preventing soil erosion, tillage is not a practical management tool in most fields. Disease severity is generally greater in a continuous corn/no-till production system. Even where corn is rotated with soybeans, enough corn residue usually survives through the year of soybeans to provide adequate inoculum for new infections.

In Kansas, the best management begins with hybrid selection. While no hybrid is immune to the disease, there is a wide range of available hybrids ranging from moderately susceptible to moderately resistant. Growers willing to invest in fungicide applications are more likely willing to plant higher yielding, moderately susceptible varieties, whereas those trying to keep input costs low often choose the slightly lower yielding, moderately resistant hybrids.

There is evidence that, as a group, shorter maturity corn hybrids (95 to 105 days) develop higher levels of gray leaf spot than fuller season hybrids (106 to 120 days). However, there are short-season corn hybrids with good resistance to gray leaf spot, as well as full season hybrids with little resistance. Most seed companies include gray leaf spot ratings in their hybrid descriptions. Companies may use different rating scales or interpret rating numbers differently, so these

ratings cannot be used to compare hybrid resistance between companies. Within a company however, they can provide important information as to which hybrids may be more or less resistant to the disease.

Economically, the best management choice combines the use of a high-yielding hybrid with an active scouting program. Scouting should begin two to three weeks before tasseling is expected to occur. If gray leaf spot lesions are not present in the field at this time, it is unlikely a fungicide spray will be needed. If lesions are found on the lower leaves, the field should be monitored once or twice a week to track the movement of lesions up the plant. If a susceptible hybrid is being grown and lesions can be found on the third leaf below the ear leaf on 50 percent or more of the leaves in a field, a fungicide spray will usually be beneficial. For moderately susceptible hybrids, lesions need to reach the second leaf below the ear leaf on 50 percent of the leaves and the field should have a history of disease problems before a fungicide application is necessary. For the most highly resistant hybrids, a fungicide application is generally not economical.

There are many fungicides registered for use on corn that provide adequate control. Plant pathologists annually update this list and it is available at *https://cropprotectionnetwork.org/download/5214/*. So far, the gray leaf spot fungus has not developed resistance to the currently registered products.

New hybrids with higher levels of resistance are being introduced onto the market. Producers should study the results from hybrid performance tests, local county demonstration plots, and seed company plots when making hybrid selection decisions.

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