IDENTIFYING TAR SPOT IN CORN

Key Points

- Tar spot is a foliar disease of corn that has been confirmed in several Midwest states and has the potential to impact yield potential.
- Disease development is favored by cool, humid conditions with extended periods of leaf wetness.
- If tar spot is suspected, a tissue sample should be sent to a laboratory for analysis to confirm the presence of tar spot.

Tar spot is a foliar disease of corn caused by the fungus *Phyllachora maydis* that has recently emerged as an economic concern for corn production in the Midwest. It first appeared in the U.S. in 2015 in Illinois and Indiana. During the first few years in the U.S., tar spot appeared to be a minor cosmetic disease with minimal impact to corn yield. However, widespread outbreaks of severe tar spot in multiple states in 2018 proved that it has the potential to cause a substantial economic impact. Despite the generally lower disease severity, tar spot continued to expand its geographic range in subsequent years with new confirmations in parts of Indiana, Ohio, and Michigan, Minnesota, and Missouri (Figure 1). With its very limited history in the U.S., much remains to be learned about the long-term economic importance of this disease and the best management practices.

Figure 1. A map of current and previous tar spot infected areas as of September 2020.

Source: Corn IPM PIPE. https://corn.ipmpipe.org/tarspot-2/.

Tar Spot Symptoms

The symptoms of tar spot are distinctive and look like specks of tar on the leaf. Symptoms begin as oval to irregular bleached to brown lesions on leaves in which black spore producing structures called ascomata form (Figure 2). Lesions protrude from the leaf surface, giving affected leaf areas a rough or bumpy feel. Tan to brown lesions with dark borders surrounding *ascomatum* can also develop. These are known as "fisheye" lesions. In Latin America, where tar spot is more common, fisheye lesions are associated with another fungus, *Monographella maydis*, that forms a disease complex with P. maydis known as the tar spot complex. Although fisheye lesions have been observed in the U.S., M. maydis has not been confirmed. Fisheye lesions may potentially be related to hybrid genetics, the genetics of the tar spot fungus, the environment, or some unknown factor. In any case, the cause of fisheye lesions observed in North American tar spot outbreaks is currently unknown; however, research on this disease is ongoing.

It is easy to confuse stromata with structures associated with other fungal diseases. Lesions can densely cover the leaf and may resemble rust fungi pustules. Lesions may coalesce to cause large areas of blighted tissue, which can be mistaken for saprophytic fungal growth on dead leaf tissue. However, unlike saprophytes or rust, tar spot cannot be rubbed off. Symptoms of tar spot can also be present on leaf sheaths and husks. A laboratory diagnosis is required to distinguish tar spot stromata from rust pustules or other pathogens.

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Figure 2. Black spore producing ascomata creating distinctive tar spot symptoms.

Disease Background

Infection and disease development are favored by cool, humid conditions with extended periods of leaf wetness. Although tar spot is new to the U.S., it is common in Mexico and Latin America. P. maydis is an obligate pathogen and requires a living host to grow and reproduce and is not known to be seedborne. Wind-driven rain can aid in spreading the disease.

Like other foliar diseases, the impact of tar spot depends on the timing and severity of infection. When leaves are infected during grain fill, sugars may not be available, and plants may stop filling ears prior to black layer, which can result in an overall loss in kernel weight and yield. When photosynthesis is reduced because of a loss of leaf area, stalks may be cannibalized for sugars, which can result in poor standability and lodging (Figure 3).

In some areas where tar spot has occurred, there are many fields that will likely see little to no yield loss because the disease came in later in the season or symptoms did not develop to levels that impact yield.

P. maydis overwinters on infested corn residue on the soil surface, which serves as a source of inoculum for the subsequent growing season, but to what extent the amount of residue on the soil surface in a field affects disease severity the following year is unknown.

Figure 3. Fields with severe tar spot infection may result in stalk lodging.

Tar Spot Management

P. maydis alone can cause yield loss under favorable environmental conditions. Fields should be monitored in order to help track this disease and determine if management tactics are warranted.

Severe tar spot infestations have been associated with reduced stalk quality. If foliar symptoms are present, stalk quality should be monitored to determine harvest timing. Yield potential of a field appears to be positively correlated with tar spot risk. Fields with high productivity and high nitrogen fertility seem to experience the greatest disease severity in affected areas. Research on P. maydis in Latin America has also suggested a correlation between high nitrogen application rates and tar spot severity.[1]

While there are no corn products grown in the U.S. Corn Belt that are known to have high levels of resistance to tar spot, there appear to be slight differences among products in levels of susceptibility. Most U.S. corn products from all companies appear to be relatively susceptible to tar spot, but only a few products appear to have slightly less severe symptoms.

Two of the most common practices for reducing disease inoculum include crop rotation and tillage. Because the fungus appears to overwinter in infested debris, avoiding that inoculum early in the season should be of some benefit depending on how much inoculum is available to move in from other sources (e.g., neighboring fields) and how far the spores

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spread. Based on the widespread occurrence of tar spot in 2018, the fungus appears to be able to spread very rapidly over long distances when weather is favorable. In years with less favorable weather, rotation or management of infested debris may be of more value in limiting the development of tar spot.

Fungicides may help reduce the incidence of tar spot. With low tolerance to a disease, very susceptible crops historically have required multiple applications of fungicide to prevent yield loss. The combination of fungicides with more tolerant products will likely be the best means of help in the near term.

Delaro® is a recommended foliar fungicide available for corn. For more information about Delaro, please visit https://www.cropscience.bayer.us/products/fungicides/delaro and contact your retailer. Fungicide application should begin when disease first appears and continue at 7- to 14-day intervals if environmental conditions persist that favor continued disease development. More than one fungicide application may be needed in environments with high disease pressure.

Sources

[1] Kleczewski, N.M., Chilvers, M., Mueller, D.S., Plewa, D., Robertson, A.E., Smith, D.L., and Telenko, D.E. (2019). Corn disease management: Tar spot. Crop protection network CPN 2012-W. https://cropprotectionnetwork.org/.

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