Tar Spot of Corn

CROP BULLETIN

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PATHOGEN FACTS

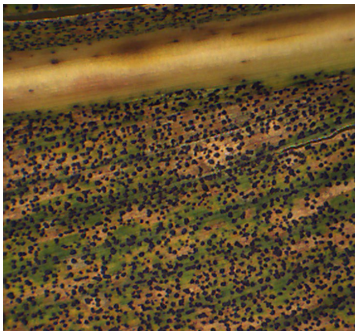
- Tar spot, caused by the fungal pathogen *Phyllachora maydis,* is a relatively new foliar disease of corn in the United States, first appearing in Illinois and Indiana in 2015 and subsequently spreading through much of the Corn Belt.
- Look for tar spot to develop during cool temperatures (60-70 °F, 16-20 °C), high relative humidity (>75%), frequent cloudy days, and 7+ hours of dew at night.
- Tar spot reduces yield by reducing the photosynthetic capacity of leaves and causing rapid premature leaf senescence.

IDENTIFICATION AND SYMPTOMS OF TAR SPOT

- Tar spot is the physical manifestation of circular-sharped, tar colored fungal fruiting bodies, called ascomata, developing on corn leaves.
- Initial symptoms are small brown lesions that darken with age.
- The texture of the leaf becomes bumpy and uneven when the fruiting bodies are present.
- Tar spot lesions cannot be rubbed away completely or dissolved in water.

Corn leaves infected with tar spot in a field in Illinois in 2018

- Under favorable conditions, tar spot spreads from the lowest leaves to the upper leaves, leaf sheathes, and eventually the husks of the developing ears.
- Severe infection can cause leaf necrosis.
- Affected ears can have reduced weight and loose kernels, and kernels at the ear tip may germinate prematurely.



Corn leaf under magnification showing dense coverage with tar spot ascomata.

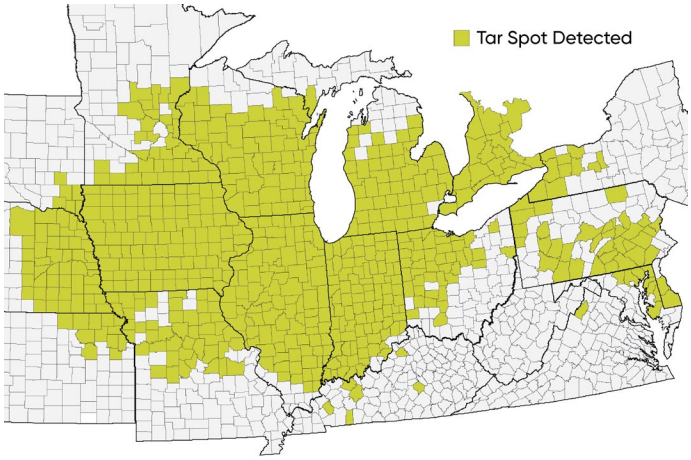


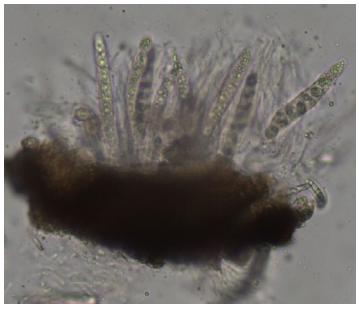
Figure 1. Counties in the Corn Belt with confirmed incidence of tar spot, 2015-2023 (as of October 2023). Source: Corn ipmPIPE, 2023.

TAR SPOT OCCURRENCE IN THE U.S.

- Tar spot in corn was first observed over a century ago in high valleys in Mexico.
- The first confirmations of tar spot in the U.S. were in Illinois and Indiana in 2015 (Bissonnette, 2015; Ruhl et al., 2016).
- It has subsequently spread across much of the U.S. Corn Belt and into southern Ontario (Figure 1).
- Tar spot has also been found in several counties in southern Florida and southwestern Georgia.
- In 2018, tar spot established itself as an economic concern for corn production in the Midwest, with severe outbreaks reported in several states.
- A severe outbreak of tar spot impacted a large portion of the Corn Belt again in 2021.

TAR SPOT EPIDEMIOLOGY

- *P. maydis* is an obligate pathogen, which means it needs a living host to grow and reproduce. It is capable of overwintering in the Midwestern U.S. in infected crop residue on the soil surface.
- Tar spot is more likely to develop during cool temperatures (60-70 °F, 16-20 °C), high relative humidity (>75%), frequent cloudy days, and 7+ hours of dew at night.
- Tar spot is polycyclic and can continue to produce spores and spread to new plants as long as environmental conditions are favorable.
- *P. maydis* produces windborne spores that have been shown to disperse up to 800 ft. Spores are released during periods of high humidity.



Microscopic view of fungal spores of P. maydis.

MANAGEMENT CONSIDERATIONS

Yield Impact of Tar Spot

- 2018 was the first time that corn yield reductions associated with tar spot were documented in the U.S.
- University corn hybrid trials conducted in 2018 suggested potential yield losses of up to 39 bu/acre under heavy infestations (Telenko et al., 2019).
- Severe tar spot infestations have been associated with reduced stalk quality. If foliar symptoms are present, monitor stalk quality carefully to determine harvest timing.
- There is no evidence that tar spot causes ear rot or produces harmful mycotoxins (Kleczewski, 2018).

Differences in Hybrid Response

- Observations in hybrid trials have shown that hybrids differ in susceptibility to tar spot (Kleczewski and Smith, 2018).
- Longer maturity hybrids for a given location have been shown to have a greater risk of yield loss from tar spot than shorter maturity hybrids (Telenko et al., 2019).
- Genetic resistance to tar spot should be the number one consideration when seeking to manage this disease, as it appears to have a greater impact on symptoms and yield loss than either cultural or chemical management practices.

Foliar Fungicides

- Several foliar fungicides are labeled for control of tar spot in corn (Wise, 2023).
- A multistate university study conducted in 2020 and 2021 showed that fungicide treatments with multiple modes of action were better at reducing tar spot severity and protecting corn yield than those with only a single mode of action (Telenko et al., 2022).
- Research suggests that tar spot may be challenging to control with a single fungicide application due to its rapid reinfection cycle, particularly in irrigated corn.
- A 2019 Purdue University study compared single-pass and two-pass treatments for tar spot control using Aproach® and Aproach® Prima fungicides under moderate to high tar spot severity (Da Silva et al., 2019).
- Aproach Prima fungicide applied at VT and the two-pass treat-ments all significantly increased yield relative to the nontreated check. Aproach Prima fungicide applied at VT followed by Aproach fungicide at R2 had the greatest yield, although it was not significantly greater than Aproach followed by Aproach Prima (Figure 2).

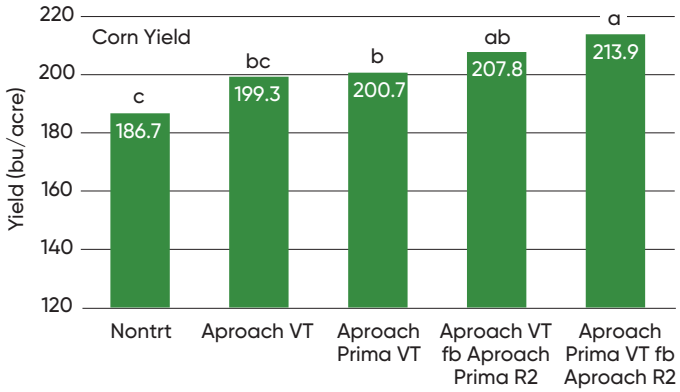


Figure 2. Fungicide treatment effects on corn yield under moderate to high tar spot severity in a 2019 Purdue University study.

Means followed by the same letter are not significantly different based on Fisher's Least Significant Difference test (LSD; α=0.05)

Agronomic Practices to Manage Tar Spot

- The pathogen that causes tar spot overwinters in corn residue. How the amount of residue on a field's soil surface affects disease severity the following year is unknown.
- Observations so far suggest that rotation and tillage probably have little effect on tar spot severity.
- Duration of leaf surface wetness appears to be a key factor in the development and spread of tar spot. Farmers with irrigated corn in areas affected by tar spot have experimented with irrigating at night to reduce the duration of leaf wetness.

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