

Throughout this growing season we have had the unfortunate pleasure to see about every disease imaginable in our corn fields. The most recent worry has been based around Tar Spot that has begun to infect a few fields in various parts of our territory.

### **What is Tar Spot?**

Tar spot is a relatively new fungal disease that began appearing in fields across Illinois and Indiana in 2015. While they have been battling this disease just north of us for several years, we have never had onset this early in the growing season. Normally we would see a small amount of development right before harvest, which obviously is too late to cause any damage. Tar Spot develops when we have cooler night time temperatures (60-70), high humidity, and long periods of morning dew or saturated plants. This disease presents itself on the leaf as small black specs that cannot be rubbed off by hand, very similar as if the plant was speckled with tar as it is named. These specks will usually be located near other diseases such as Gray Leaf Spot or Northern Corn Leaf Blight if they are present. While this does not have to be the case, Tar Spot is known as a secondary disease so these initial infections make the chances for Tar Spot worse.

### **How does it damage the plant?**

Very similar to other foliar fungal diseases Tar Spot causes injury to the plant by decreasing the amount of foliage that is available to create the starches that are needed to fill the ear. In severe infestations this could cause reduced test weight or loss of stalk quality due to the plant cannibalising itself to fill the ear as much as possible.

### **What can we do about it?**

Over the past week we have been in several fields around our territory assessing levels of Tar Spot to see if a second fungicide application was needed. As of today we have ruled that all of these fields are far enough along in their reproductive stages that an additional application for strictly Tar Spot control is not needed. If a field was located that had extremely high pressure many of our most common fungicides on the market, including Approach Prima, are rated good to very good on control on this disease. Hybrid susceptibility to Tar Spot is a rating that Pioneer is working to include in our foliar disease packages, genetic

resistance is currently considered the number one factor in attempting to manage this disease as we look to fight this disease in the coming years.

**As always if you have any questions or would like a field scouted for this disease please contact anyone on our staff!**



## Tar Spot of Corn

### 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.
- 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.

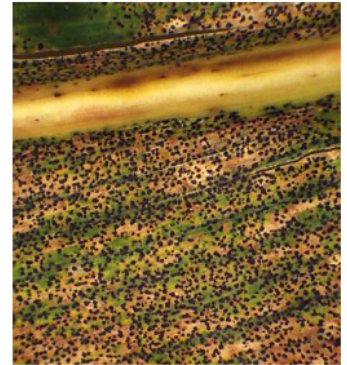
### Identification and Symptoms of Tar Spot

- 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.

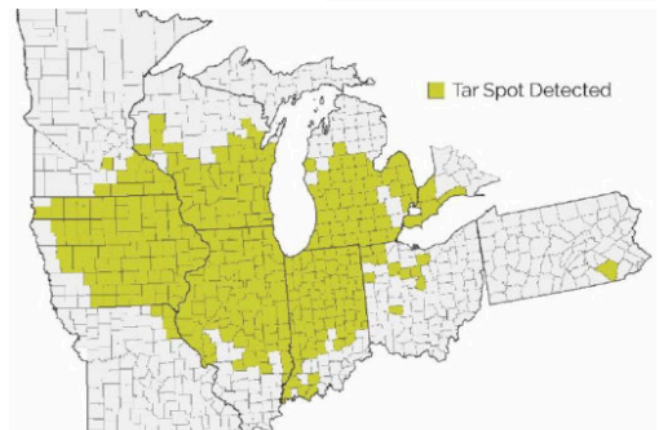


Corn leaves infected with tar spot in a field in Illinois in 2018.

- Under favorable conditions, tar spot spreads from the lowest leaves to the upper leaves, leaf sheaths, 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.



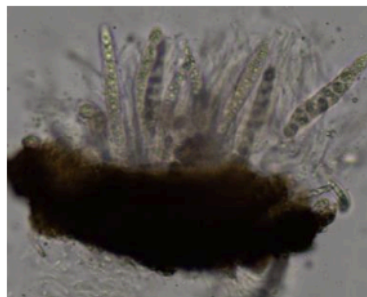
**Figure 1.** Counties with confirmed incidence of tar spot, 2015-2020 (as of 10-12-20). Source: Com ipmPIPE, 2020.

### 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 to Michigan, Wisconsin, Iowa, Ohio, Missouri, Minnesota, Pennsylvania, and southern Ontario (Figure 1).
- Tar spot has also been found in four counties in southern Florida.
- In 2018, tar spot established itself as an economic concern for corn production in the Midwest, with severe outbreaks reported in several states.

## 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 indicate 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 (Table 1).
- Field research on tar spot has been limited so far, but has shown that fungicides can reduce tar spot symptoms and help protect yield.
- Specific management recommendations for fungicides in the Midwestern U.S. are still being developed.

**Table 1.** Efficacy of fungicides labeled for tar spot in corn (Wise, 2020).

Fungicide	Tar Spot Efficacy
Affiance® 1.5SC	good
<a href="#">DuPont™ Approach® Prima 2.34SC</a>	good - very good
Delaro® 325SC	good - very good
Headline® AMP 1.68SC	good - very good
Lucento®	good - very good
Miravis® Neo 2.5SE	good - very good
Priaxor® 4.17SC	unknown
Quilt® Xcel 2.2SE	good - very good
Revytek™	good - very good
TopGuard® EQ	good - very good
Trivapro® 2.21SE	good - very good
Veltyma™	good - very good

Fungicide application timing is extremely important and needs to be made near the onset of the tar spot symptoms. Efficacy ratings based on limited site locations from 2018 and 2019. A 2(ee) label is available for several fungicides for control of tar spot, however, efficacy data are limited. Check 2(ee) labels carefully, as not all products have 2(ee) labels in all states.

- 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.

### 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.

## References

- Bissonnette, S. 2015. CORN DISEASE ALERT: New Fungal Leaf disease "Tar spot" *Phyllachora maydis* identified in 3 northern Illinois counties. The Bulletin. University of Illinois Extension. <http://bulletin.ipm.illinois.edu/?p=3423>
- Kleczewski, N. 2018. Tar Spot on Corn: Setting the Record Straight. Illinois Field Crop Disease Hub. University of Illinois Extension. <http://cropdisease.cropsciences.illinois.edu/?p=822>
- Kleczewski, N. and D. Smith. 2018. Corn Hybrid Response to Tar Spot. The Bulletin. University of Illinois Extension. <http://bulletin.ipm.illinois.edu/?p=4341>
- Ruhl G., M.K. Romberg, S. Bissonnette, D. Plewa, T. Creswell, and K.A. Wise 2016. First report of tar spot on corn caused by *Phyllachora maydis* in the United States. Plant Dis 100(7):1496.
- Telenko, D., M.I. Chilvers, N. Kleczewski, D.L. Smith, A.M. Byrne, P. Devillez, T. Diallo, R. Higgins, D. Joos, K. Kohn, J. Lauer, B. Mueller, M.P. Singh, W.D. Widdicombe, and L.A. Williams. 2019. How tar spot of corn impacted hybrid yields during the 2018 Midwest epidemic. Crop Protection Network. <https://cropprotectionnetwork.org/resources/features/how-tar-spot-of-corn-impacted-hybrid-yields-during-the-2018-midwest-epidemic>
- Wise, K. 2020. Fungicide Efficacy for Control of Corn Diseases. Crop Protection Network. CPN-2011-W. <https://crop-protection-networks3.amazonaws.com/publications/fungicide-efficacy-for-control-of-corn-diseases-filename-2020-03-18-150007.pdf>