CORN DISEASES: **TAR SPOT**

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INTRODUCTION

Tar spot of corn is a foliar disease common to areas of Latin America, where it is considered the most important disease of corn. The first reported occurrences of tar spot in the United States were confirmed in Illinois and Indiana in 2015. The disease has spread quickly and has since been found in SW Ontario in 2020. Certain growing seasons have seen epidemics with enough severity to establish the disease's capability to substantially reduce yields. Losses of 20-60 bushels per acre have been reported (Telenko et al., 2019). Recent estimated yield losses from U.S. production have ranged from 45.4 million bushels in 2019 (Mueller et al., 2019) to 184.9 million bushels in 2018 (Mueller et al., 2018).

ESTIMATED U.S. YIELD LOSSES

45.4M
BUSHELS IN 2019

184.9M
BUSHELS IN 2018

IDENTIFICATION AND SYMPTOMS

Tar spot is caused by the fungal pathogen Phyllachora maydis. The most obvious sign of tar spot is the development of small, raised black spots across upper and lower leaf surfaces (Figure 1). As suggested by the name, these spots look like tar has been splattered across the leaves (Figure 2). These spots are the fruiting structures (where spores are produced) of the fungus, and they are also known as stromata. Stromata may be found on healthy and dead tissues including leaves, sheaths, husks, and stalks (Figures 3 & 4). Stromata are raised from the leaf surface and bumpy. As they grow, stromata can change from tiny, circular structures to larger, irregular and elongated bodies.

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Figure 1. Raised, black spots (stromata) are typical of tar spot.

Figure 2. Characteristic signs and symptoms of tar spot.

Figure 3. Tar spot stromata on ear husks.

Figure 4. Tar spot stromata on a corn leaf and stalk.

Figure 5. Fish-eye lesions can accompany tar spot infection.

They cannot be rubbed off the plant tissue in which they are established. Tar spot stromata may be accompanied by a tan halo that narrowly surrounds the black body. This halo symptom surrounding the black fruiting structure is often referred to as a "fish-eye lesion" (Figure 5).

In Latin America, fish-eye lesions are commonly observed. They are associated with a second fungus, *Monographella maydis*, which forms a disease complex with P. maydis. The complex of these two fungal organisms is known as the tar spot complex. While fish-eye lesions have been observed in the United States, *Monographella maydis* has not been detected. The cause of fish-eye lesions in the United States is currently unknown, but could be related to a number of factors including environment, hybrid genetics, pathogen genetics, a different organism forming the complex with *P. maydis*, or something else unknown (Kleczewski et al., 2019). Observations in the U.S. also indicate that noticeable yield loss can occur even without the presence of the secondary fungus or fish-eye lesions.

Corn at any growth stage is susceptible, but disease is generally most severe after silking.

DISEASE CYCLE

It has been established that *P. maydis* can survive the winter as stromata in infected residue on the soil surface. Upon release, spores can travel short distances through the air and are then spread by wind and splashing rain. In Latin America, spore release, infection, and disease development are favored by long periods of leaf wetness, high humidity, and cool temperatures (60-70˚ F). New stromata will form in 12-15 days and they will produce viable spores shortly

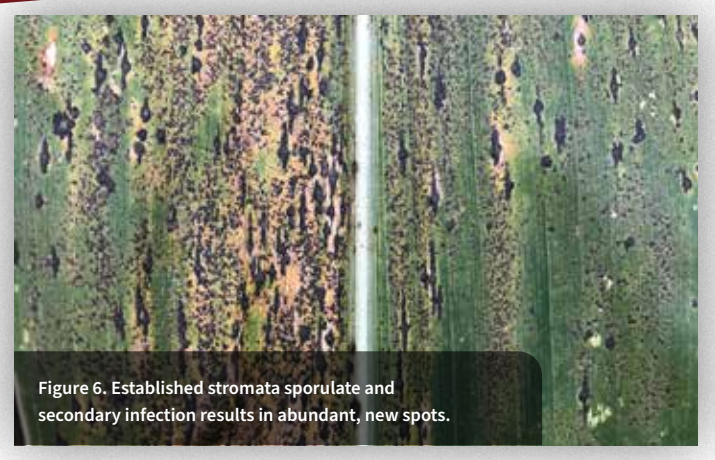

Figure 6. Established stromata sporulate and secondary infection results in abundant, new spots.

Figure 7. Senescence on a corn leaf with dense stromata.

after (Kleczewski et al., 2019) (Figure 6). Corn at any growth stage is susceptible, but disease is generally most severe after silking. Disease often first appears on lower leaves. With proper conditions, disease can then move up to ear height and above or to other uninfected tissue. On highly susceptible hybrids, stromata may cover up to 50 percent of surface area. University research has suggested that early senescence (death) of leaves can occur when ear leaf severity surpasses 30 percent (Kleczewski et al., 2019) (Figure 7). Yield losses in the U.S. are primarily the result of early senescence and a reduced grain filling period. There are not any other known hosts of P. maydis.

MANAGEMENT

While knowledge of disease specifics of tar spot in the United States and Canada is growing, there is still much to be learned. Management options do exist that may help in mitigating tar spot. While most hybrids do seem susceptible to infection, they do vary in their responses to tar spot. Disease severity, formation of fish-eye lesions, and propensity to rapid senescence can all vary greatly (Telenko et al., 2019). Avoidance of susceptible hybrids is crucial in managing tar spot. Tillage to incorporate residue and crop rotation will aid in reducing initial inoculum. Fungicides are available for tar spot control. Economic thresholds are not yet established, and optimal application timing can be case specific. Research continues to investigate the many factors that contribute to an application's efficacy in hopes of helping farmers to make informed application decisions.

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CITATIONS:

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