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Corn diseases of 2014: Northern corn leaf blight, Physoderma brown spot, ear and stalk rots
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The 2014 growing season started with good conditions at planting. Above normal precipitation in June however was prevalent across most of the state and likely played a role in infection and development of Northern corn leaf blight (NCLB), Physoderma brown spot and stalk rot, and stalk rot. A dry July brought NCLB to a stand still but frequent precipitation events in August and September enabled further development of the disease. Goss's wilt was also prevalent on hybrids rated susceptible to moderately susceptible to this disease. Although southern rust was reported, the cooler than normal temperatures in August and September prevented the disease from developing and impacting yields. It was common to notice prematurely dead plants in cornfields at towards the end of grain fill. Diplodia and Gibberella ear rot were also present in some fields.

Northern corn leaf blight
Northern corn leaf blight (NCLB) was very prevalent across Iowa this growing season. Most of the reports were associated with hybrids that were rated susceptible or moderately susceptible to the pathogen, but it some cases disease also developed on resistant hybrids.

Symptoms of northern corn leaf blight
Typical symptoms of the disease are large (1- to 6-inch long) cigar shaped lesions that are usually tan. NCLB is sometimes misdiagnosed as Goss's wilt and leaf blight although there are certain characteristics of the lesions that enable the two diseases to be differentiated (see Robertson, 2009).

Disease cycle of northern corn leaf blight
The NCLB fungus (Exserohilum turcicium) survives in infested crop residue for at least 12 months. Spores produced on the residue are splash- or wind-dispersed. Infection of corn occurs when temperatures are warm (65 to 80°F) and free water is present on the leaves for 6 to 18 hours.

There are several races of E. turcicium. Race 0, Race 1 and Race 23N are believed to be the most prevalent in the US. There are also several resistance genes (Ht genes) that have been identified in corn. Many commercial hybrids contain one or more of these genes, but these genes are only effective against certain races. Resistance is not complete, so smaller, yellowish lesions may be visible on hybrids with resistance. Note however, that some races of the fungus are able to cause disease on resistant hybrids that is as severe as on a susceptible hybrid. For example, Ht1 would provide resistance to races 0 and 23N, but not to race 1. Corn breeders anticipate what races may be prevalent in an area and breed for and release hybrids suitable for that area. However, race shifts inevitably occur, probably in response to selection pressure placed on the pathogen by widespread use of resistance genes. It is not known what races of E. turcicium were present in Iowa in 2014.

Management of northern corn leaf blight
Managing NCLB requires an integrated approach that includes planting resistant hybrids, rotation and residue management and use of foliar fungicides. In fungicide trials around the state, applications of fungicides at R1 reduced NCLB severity compared to applications at V5 to V6 and no application of fungicides.

Physoderma brown spot and stalk rot
Physoderma brown spot is caused by the fungus Physoderma maydis. This disease is not usually an economic problem in Iowa or the U.S. In recent years, we have seen an increase in the occurrence of Physoderma brown spot on leaves (Robertson, 2008). Furthermore, up to 80 percent incidence of Physoderma stalk rot was reported from several fields in southwest and western Iowa in 2012, and northwest and northern Iowa in 2014 (Robertson et al, 2013). There are only a couple of reports of stalk breakage and rot caused by Physoderma. In Illinois, severe
outbreaks with up to 80% lodging in some fields were reported in the early 1970s (Burns and Shurtleff, 1973). There are also reports from North Carolina in 1919 (Tisdale, 1919), Mississippi in 1957 (Broyles, 1959).

The increased prevalence of Physoderma may be related to hybrid genetics, crop production practices and/or the wet springs that occurred in each year.

**Symptoms and signs of Physoderma brown spot and stalk rot**

Symptoms of Physoderma brown spot are numerous very small (approximately one-fourth inch in diameter) round to oval spots that are yellowish to brown in color and usually occur in broad bands across the leaf. Dark purplish to black oval spots also occur on the midrib of the leaf, and may also occur on the stalk, leaf sheath and husks. This foliar disease is easily confused with eyespot and southern rust. The purplish spots on the leaf sheaths may also be mistaken for purple sheat blight.

Physoderma stalk rot symptoms are not as evident. In fact, most agronomists first notice the stalk rot when scouting fields and infected plants easily snap at one of the lower nodes as they walk across the rows. The nodes at which breakage occurs are often black and rotted, and some stalk rot of the pith may be present. Microscopic examination of the rotted tissue reveals thousands of light brown round sporangia Interestingly, the foliar symptoms have not been widely prevalent in fields with the stalk rot.

**Disease cycle of Physoderma brown spot and stalk rot**

Sporangia can overwinter in soil and infected tissues. Under wet weather conditions, this pathogen produces swimming zoospores and consequently free water is necessary for infection to occur. The risk of infection increases at moderate temperatures (73-86° F) and when rainwater sits in the whorl for a period of time. Moreover, young plants (V5 to V9) are more susceptible to disease but become more resistant with age.

**Management of Physoderma brown spot and stalk rot**

In order to reduce the risk of infection, choose resistant hybrids and avoid planting susceptible hybrids in poorly-drained areas. Crop rotation and tillage practices may reduce sources of inoculum from soil and infected plant debris. Although some fungicides are labeled for management of Physoderma brown spot, there are no U.S. data available. A report from China indicates that application of a fungicide at V8 reduced the disease. Fungicide applications made at VT to a field in Illinois where symptoms of Physoderma brown spot were observed did not slow disease development or affect yield (Carl Bradley, U. Illinois, personal communication).

**Ear rots**

Although several ear rots may occur on corn, in 2014, the most prevalent ear rots were Diplodia and Gibberella. Both ear rots are favored by cool, wet weather during early ear development.

Diplodia ear rot is easily recognized. Look for a dead ear leaf while scouting fields. Often times, a white mold or “black pepper” may be visible in the husks at the base of the ear. Peeling back the husks will reveal the same dense white mold growing up from the base of the ear. No mycotoxins have been associated with Diplodia in the U.S.

When the husks of the ears are peeled back, a pink to red mold developing from the tip of the ear is diagnostic for Gibberella ear rot. Mycotoxins (DON and zearalenone) are associated with Gibberella ear rot.

**Management of ear rots**

In fields where more than 10 percent of the ears have signs of ear rot, harvest should be done as soon as possible. The grain should be quickly dried to below 15% moisture and cooled to prevent further growth of the pathogen in storage. Grain harvested from affected fields should be stored apart from grain harvested from ‘healthy’ fields to avoid contamination.

**Stalk rots**

Not surprisingly stalk rot was an issue during the 2014-growing season. When significant leaf blight occurs in the upper canopy, such as we have had with NCLB, the risk of stalk rots increases. Furthermore, overcast conditions, such as we had throughout most of the grain filling period, favor stalk rot development. Diplodia, Gibberella,
anthracnose and Fusarium stalk rots were all reported. While all stalk rots result in rotting and shredding of the pith tissue, they each have their own identifying characteristics.

**Management of stalk rots**

Since stalk rots reduce standability, fields in which greater than ten percent of plants are affected by stalk rots, should be scheduled for an early harvest.

**References**


Tisdale. 1919. Phytopathology 9:51-51