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Corn Disease Update

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Introduction

The 2015 corn crop was impacted by several corn diseases from the beginning to the end of the season and in all areas of Nebraska. The increased severity and incidence of some diseases was largely due to the extended periods of favorable weather conditions in varying parts of the state that supported the increase in some diseases. In particular, frequent rainfall and high relative humidity were especially favorable for several fungal diseases. Unfortunately, almost all diseases of corn (except rusts) are caused by pathogens that can successfully overwinter in Nebraska. For this reason, making detailed notes on disease development and history for every field will help you both anticipate which diseases will be problematic in the future and better manage them.

Northern Corn Leaf Blight

Northern corn leaf blight (NCLB) was confirmed as early as in V6 corn in mid-June in several fields in Iowa and in eastern Nebraska. Cool to moderate temperatures and moisture favors infection by the fungus causing this disease, *Exserohilum turcicum*. Weather conditions, including cloudy days, moderate temperatures (64-81°F), high humidity and frequent rainfall especially favored further infection and spread of this fungal pathogen that survives well in infected corn residue from recent years. Like most other diseases caused by pathogens that are in the residue, lesions may develop on the lower leaves first and continue to develop on leaves higher up the plant as long as weather conditions are favorable. NCLB lesions can grow to be larger than those of other diseases and are usually cigar-shaped with rounded ends that might be confused with Goss's bacterial blight lesions because of their size. Although, a large amount of microscopic fungal spores may be produced on NCLB lesions making them appear darker and/or dusty in the centers.

Management

Development and spread of NCLB prior to tassel emergence could substantially reduce corn yield later, particularly as lesions develop and expand, killing photosynthetic leaf area that is necessary for grain fill later. It is most important to protect the ear leaf and those above it which contribute approximately 80% of grain fill. In some earlier planted fields, the disease reached leaves 8-9 by the end of June. Early development of NCLB might need a foliar fungicide application to slow disease spread in susceptible hybrids and protect uninfected leaf tissue. Lesions develop in about one to two weeks after infection occurs. Thus, it is possible that many additional leaves are also infected and will develop more lesions in the days following favorable weather. To determine if a fungicide application is economical for you, consider the price of corn, hybrid susceptibility, yield potential, cost of treatment, and disease severity. Efficacy ratings have been assigned to some commercially available fungicides for their disease control by the multi-state Corn Disease Working Group and included in the Disease Management section of the 2016 Guide for Weed, Disease, and Insect Management in Nebraska.

There are no fungicide treatment thresholds for NCLB (or most other diseases). However, you can assess your risk for developing yield-limiting disease severity by considering the high risk factors listed below. Having more of these high risk factors will increase the likelihood of developing severe or yield-limiting NCLB, as well as getting a return on the cost of a fungicide application:

- Poor hybrid disease rating(s) for NCLB (consult seed catalog or company representatives for ratings)
- Early disease development, especially during pre-tassel growth stages
- Continuous corn
- History of severe NCLB
- Substantial corn residue or no-/minimum tillage
- Weather forecast for humid/wet weather and moderate temperatures

Scout fields early and frequently to monitor for development of NCLB and other diseases in areas where it has been a problem. Considering the NCLB rating provided by your seed company for your hybrid(s) will help you to anticipate whether the disease may become severe or not. In fields previously affected by NCLB, it is important to consider this disease in the future when making hybrid selections and other management decisions, especially crop rotation, tillage, etc. that can be helpful to reduce disease severity in subsequent years.

Gray Leaf Spot

Gray leaf spot (GLS) quickly became the most important leaf disease in corn across much of the state as it increased rapidly mid-season during favorable weather conditions. GLS is also caused by a fungus (*Cercospora zeae-maydis*) that survives in infected plant debris from the

previous seasons. It consistently begins on the lower leaves and continues to move higher on the plant as long as weather conditions are favorable. This disease is favored especially by temperatures of 70-90°F and periods of 12 or more hours of very high relative humidity in the canopy (>90%). GLS lesions begin as yellow flecks that expand to form rectangular gray to tan lesions between leaf veins. Severity of symptoms is evaluated by the amount of leaf area covered by lesions and how high on the plant they have reached. Lesions may take as little as 14 days to develop in susceptible hybrids and up to 28 days to develop in more tolerant hybrids. Keep in mind that conditions are often more favorable later in the season for GLS, after tasseling when the disease tends to increase in severity more quickly. And, the same high risk factors for NCLB, also apply to GLS development.

GLS has also been the predominant disease in fungicide trials conducted at the UNL South Central Agricultural Laboratory during recent years. When they were needed, applications made at tasseling and soon thereafter have most consistently provided yield returns under significant disease pressure. In addition, fungicide applications made at tasseling or soon thereafter also often provided improvements in standability (as measured in push tests) compared to the non-treated control treatments during several trial years. Results from these trials can be viewed on the Crop Watch website under Plant Disease Management Trials for Corn.

For more information on GLS and fungicide application timing, see the article, "Fungicide Application Timing and Disease Control" in the 2016 Crop Production Clinics Proceedings.

Stalk Rot Diseases

Much of the 2015 Nebraska corn crop experienced repeated and prolonged stress (and sometimes wounding) during the growing season. Stress during any part of the season can promote stalk rot and lodging at the end of the season as harvest approaches. Some fields experienced marked lodging, crown rot, top dieback, and stalk rot during the 2015 season due to numerous crop stress events. Some high risk factors for stalk rot diseases and lodging are:

- Higher yielding hybrids
- Thin stalks
- Lost leaf area (due to leaf diseases, hail, etc.)
- Excessive rainfall/ponding
- Drought conditions
- Stalk wounding, usually by hail
- High planting populations

Scouting for Stalk Rot Diseases

The first indication of a problem could be the early, and sometimes rapid, discoloration of the corn plant turning from green to brown or gray. Individual plants may be affected or patches of several plants. Affected plants often have stalks that are hollow and easily crushed by hand or bent using the "push or pinch" test. Stalk rots can occur at any place in the stalk from the crown at/below the soil line to the tassel. Rotting that occurs at an upper node and kills only the upper plant parts is referred to as "top rot" or top dieback and does not necessarily cause lodging of the whole plant. However, top dieback predisposes plants to lower stalk rot. Degradation of the stalk below the ear can lead to plant lodging and losses during harvest.

Assessing stalk rot diseases and standability

Walking through a field, randomly select a minimum of 100 plants representing a large portion of the field. To test for stalk rot you may choose to PUSH the plant tops away from you approximately 30° from vertical. If plants don't snap back to vertical, then the stalk integrity may have been compromised by stalk rot. An alternative method is to use the PINCH test to evaluate plants for stalk rots. Pinch or squeeze the plants at one of the lowest internodes above the brace roots. If the stalks crush easily by hand, then their integrity is reduced by stalk rot and they are prone to lodging. If more than 10% of plants exhibit stalk rot symptoms, then harvesting that field should be a priority over others at less risk in order to reduce the chance of plant lodging and the potential for yield loss.

There are several fungi that are common in our production fields and can opportunistically cause stalk rot diseases in stressed plants. Some of the most common stalk rot diseases in 2015 are listed below:

Fusarium stalk rot is especially common during damp conditions, but may occur anywhere, including in irrigated fields this past year. The pathogen, *Fusarium verticillioides*, can sometimes be visible as white to pink fungal growth on the outside of stalks at the nodes. Eventually, the disease may cause discoloration of the inside of stalks to pink or salmon.

Anthracnose stalk rot can also cause a leaf disease and is a common cause of top rot or dieback in corn. In more advanced stages of stalk rot the disease can cause the development of black lesions visible on the outside of the stalk and is caused by the fungus *Colletotrichum graminicola*.

Diplodia stalk rot can cause either/both an ear and stalk rot. The fungus causing Diplodia stalk rot reproduces with microscopic spores inside minute raised black structures (pycnidia) that can give the stalk a rough/sandpaper-like feeling.

Physoderma brown spot most commonly causes a leaf disease, but under some conditions can sometimes cause stalk rot disease. The pathogen causing Physoderma needs a lot of moisture and is more common this past year following the frequent rainfall events. Infection at the nodes can weaken them and cause stalk lodging or breakage.

Charcoal rot is one of a few diseases that are more common during drought conditions, and so, is more likely to affect corn in non-irrigated fields or pivot corners. The disease is characterized by the presence of many minute black round structures inside the stalk that can give it a gray to black appearance, like charcoal dust. In addition, the fungus that causes charcoal rot, *Macrophomina phaseolina*, has a wide host range and can cause the same disease in several crops, including soybean, sorghum, and alfalfa.

Management

There is nothing that can be done late in the season to stop stalk rots as affected stalks will continue to degrade over time further weakening them. But, you can work to minimize your losses by identifying which fields have the worst stalk rot diseases and adjust the harvest order of those fields. Consider harvesting or chopping those fields that are heavily impacted by stalk rots first or earlier to minimize losses that can occur after lodging. Any stresses that can be avoided during the growing season may help reduce the incidence of stalk rot diseases.

Other Diseases

Southern Rust

Southern rust was confirmed as early as July in Nebraska. Eventually, southern rust was confirmed in many counties in eastern and southern parts of the state, although its severity was less than expected considering its early development in the state. Warm temperatures and high humidity promote development and spread of the disease and cooler temperatures that developed after its development may have helped to slow its development. Rust diseases produce large amounts of spores that can be easily moved by wind for long distances. The fungus can quickly cause disease during favorable conditions and because most commercial dent corn hybrids have no resistance to the disease. Having a history of southern rust in corn does not have any impact on disease development now, because this pathogen does NOT overwinter in infected residue. The spores must be carried into the area from other locations by winds from diseased areas. Fields planted later are at highest risk for disease and potentially severe yield impacts because of how early the disease is developing. However, it is important to remember that it can take anywhere from a few days to several weeks for widespread and severe southern rust to develop if it is going to do so. For that reason, we recommend scouting fields frequently, especially those at higher risk, such as later planted fields.

Goss's Bacterial Wilt and Blight:

Although Goss's Bacterial Wilt and Blight did develop in some areas of the state, overall the severity seemed to be less than that experienced during recent years. The combination of cooler temperatures and increasingly widespread use of resistant hybrids and other management strategies are likely the reason for the apparent reduction of the disease. It's important to remain diligent about selection of resistant hybrids, though, in areas where Goss's wilt has been a problem in the past because the pathogen is likely still viable in infected residue and can develop rapidly on susceptible hybrids, especially popcorn or after hail or wind damage.

For More Information

Nebraska Extension publications:

- Corn Disease Profile I: Foliar Diseases (EC 1867)
- Corn Disease Profile II: Stalk Rot Diseases (EC 1868)
- Common Stalk Rot Diseases of Corn (EC 1898)
- Corn Disease Profile III: Ear Rot Diseases and Grain Molds (EC 1901)
- Disease Profiles: Nematodes of Nebraska Field Crops (EC 1908)
- Rust Diseases of Corn (G1680)
- Gray Leaf Spot of Corn (1902)

Diagnostic videos on the Crop Watch YouTube Channel

- Corn Diseases: Identifying Rust
- Corn Diseases: Gray Leaf Spot
- Corn Diseases: Goss's Bacterial Wilt and Blight
- Corn Diseases: Aspergillus Ear Rot
- Corn Diseases: Nematodes
- Corn Diseases: Hail Damaged Corn
- Corn Diseases: Northern Corn Leaf Blight
- Corn Diseases: Crazy Top
- Corn Diseases: Corn Smut