BETWEEN THE ROWS

August 12, 2010 | STALK ROT DISEASES OF CORN | Length: Three pages

CURRENT CROP SITUATION

Stalk rot diseases of corn are common in the Midwest and are present in every field to some extent. Conditions this season like warm temperatures and high humidity will likely continue leaf disease development. In addition, the appearance of N deficiency symptoms on leaves also point toward a higher risk of stalk rot development. Uneven growth from early season heavy rains adds variability to the crop and increases apprehension of harvest management. Weather conditions during the final month of grain fill can impact our final yield and standability. It is important for growers to become aware of the potential impact if the risk develops significantly before crop maturity.

The presence of stalk rot can be responsible for significant yield loss when the disease causes premature death resulting in poor ear fill or light test weight grain. Yield loss can also occur when stalk lodging is present and harvest losses result. Infection by most stalk rot organisms can occur early in the season but will become evident during grain fill.

When grain fill is occurring, the demand for sugars produced through photosynthesis is intense. Before pollination, some of the sugars are utilized by the roots for normal growth processes. After pollination, the demand shifts to the developing ear. When the supply of sugars produced during photosynthesis does not meet the demand of the ear, root, and stalk, the priority goes to the filling ear. As the supply of sugar lessens to the root and stalk, then disease organisms can increase and advance. Most stalk rots begin through a root infection and then progress up into the lower stalk.

Stress conditions during grain fill can enhance the development of stalk rot diseases. Many agronomic and weather conditions cause stress to the corn plant and impact both the amount and rate of infection. Leaf diseases, nutrient deficiencies, dry weather, high plant populations, insect damage, excessive rain or saturated soils (impacts the root system), high yield levels, cloudy days, and extreme temperature can all, either separately or together, affect stalk rot. We can manage some of the factors and others are out of our control.

CAUSAL ORGANISMS

Stalk rots are caused by both bacteria and fungi. The more common stalk rots that we see every year are caused by fungal organisms. However, one stalk rot that we may see sporadic occurrences of this year is bacterial stalk rot. This stalk rot has had some sporadic scattered presence over the years and typically is associated with irrigation or heavy rain that can cause standing water for a few days accompanied with high temperatures. The bacterium that causes this disease, Erwinia chrysanthemi pv zeae, is present in crop residue on the soil surface, and in some cases, surface water used for irrigation (ponds, lakes, rivers). Entry by the bacterium is through the roots or stalk, particularly through injuries or wounds. The infection can spread rapidly and can kill the plant in a few days. This infection is favored by higher temperatures (90-100 degrees F.) and develops mid-season rather than near black layer. This disease may kill a few individual plants or some areas in a field associated with water saturation.

Symptoms consist of lodging and dark brown, water-soaked lesions that progress to soft or slimy stalk tissue that appears at one to several internodes at or above the ground. Some infection may occur at the top of the plant, particularly with sprinkler irrigation with surface water. Infections are often accompanied by a foul odor. Agronomic management options are limited to crop rotation, residue management, and water management. This disease is usually not a significant factor for us.

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WYFFELS HYBRIDS

Most other stalk rot diseases are caused by fungal organisms and behave by primarily infecting injured, stressed, or maturing plants. Typically, multiple stalk rot organisms are present at initial infections, and then a particular disease is favored by a set of environmental conditions. Because we have had warm and wet conditions and other stresses occurring on the growing crop (like leaf diseases), prospects for stalk rot symptom development are likely.

Many symptoms of the various stalk rots are similar. Plant wilting is often the first indication of a stalk rot problem. This is then followed by leaves of affected plants becoming discolored, gray or brown in color. The interior of the lower stalk deteriorates the inner pith, leaving the hollow rind holding the plant upright. Root decay often precedes the stalk disease.

Several of the more common fungal stalk rot diseases will be highlighted.

ANTHRACNOSE STALK ROT—AN AGGRESSIVE PATHOGEN

Anthracnose stalk rot is an aggressive pathogen that can be evident before plant senescence. It has both a leaf phase and a stalk phase, the only stalk disease to have both. It is caused by the fungus Colletotrichum graminicola. The leaf phase symptoms are highly variable in size and shape and also vary among hybrids, making diagnosis difficult. Presence of the leaf phase does not always cause the stalk phase to be a serious problem. Symptoms of the stalk phase include shiny black lesions on the stalk's outer rind that cannot be rubbed off with your finger nail. Internal stalk tissue or pith becomes discolored, turning gray to brown and shredded. Continued disease advancement causes weakened stalks with lodging as a result. This disease can also develop in the upper stalk causing top die back. High relative humidity, warm temperatures and extended periods of cloudy weather favor disease development.

DIPLODIA STALK ROT—WIDESPREAD IN THE PAST

Diplodia stalk rot can cause both stalk and ear rot diseases of corn. It is caused by Diplodia maydis, which over-winters in crop residue and infects the roots, crown, and lower stalk of corn particularly where insect damage or wounds are present. Infections on the husks and silks will cause ear and kernel rots. This disease can be identified by minute dark brown/black reproductive structures called pycnidia which are embedded in husks, the rind of stalks, or on kernel surfaces. These structures feel rough like sandpaper and are not easily rubbed off. Diplodia was very widespread and destructive in the past, but diseases like Anthracnose seemed to have surpassed it in importance.

GIBBERELLA STALK ROT AND FUSARIUM STALK ROT— WET CONDITIONS FAVOR DEVEOPMENT

Gibberella stalk rot and Fusarium stalk rot have similar appearance and are closely related. Fusarium stalk rot is caused by several Fusarium species and can over-winter in the seed, but more likely over-winters in crop residue and soil. Infection is typically through the roots, stalk, and leaves. It is favored by dry weather prior to silking, and warm, wet weather after silking. At times, the pathogen can cause white fungal growth on the outside of the stalk. A more diagnostic key is the pink or salmon discoloration of the inside of rotted stalks. Fusarium stalk rot typically lacks visible reproductive structures compared to other stalk rot organisms.

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GIBBERELLA STALK ROT

Gibberella stalk rot is caused by Gibberella zeae and over-winters in crop residue and in soil. It can also cause ear rot disease in corn. Infection also occurs through roots, stalks, and leaves. Warm, wet conditions favor continued disease development. This disease causes pinkish-red discoloration inside the stalk. The reproductive structures called perithecia (small blackish specks on the stalk surface) can easily be scratched off the surface of the stalk.


GIBBERELLA STALK ROT

CHARCOAL ROT AND PYTHIUM STALK ROT—LESS COMMON

Charcoal rot and Pythium stalk rot are less common, but present under some conditions. Charcoal rot is more likely under drought stress and hot conditions. It can be identified by a charcoal dust appearance on the inside of the stalk as a result of developing reproductive structure. Pythium stalk rot typically occurs under extended hot (90 degrees F.), wet conditions. The interior of the stalk looks water soaked and usually at a single internode just above the soil line.

Some infected plants remain green and turgid for several weeks because the vascular bundles remain intact (the water transport system).


CHARCOAL STALK ROT

AGRONOMIC MANAGEMENT CONSIDERATIONS

It is not critical for growers to be able to identify the individual stalk rot organism they encounter. The results for all are similar in that an early infection can cause some yield reduction or harvest difficulties if the disease progresses significantly before maturity. Field scouting is critical in scheduling harvest to help avoid harvest losses from lodging.

Since these stalk rot organisms are present every year, weather conditions early in the season and stress situations at the end of the growing season have the biggest impact on disease development. A few agronomic management practices may help in reducing some of the risk.

1. Select disease resistant hybrids plus hybrids with high stalk strength scores. Healthy hybrids can help keep maximum plant tissue available for photosynthesis. Individual ratings for stalk rot tolerance are difficult to obtain because of the sporadic nature of the disease. Stalk strength ratings combine the performance of a hybrid over a wide range of test conditions.

2. Maintain balanced fertility. Typically, in normal weather years, high N rate with low K soil levels place increased stress on the maturing plant. However, this year, N loss from saturated soils caused the opposite fertility stress.

3. Insect control. Injury from insect feeding allows some infection avenues to be present. Bt insect protected hybrids can reduce the chance of injury and the resulting infections.

4. Plant populations. To maximize yield and profitability, pushing plant populations has resulted in increased yield performance. Research suggests maximum yield is obtained with harvest populations from 32,000 to 38,000 plants per acre. The right plant populations for your fields depend on matching field productivity to maximum plants per acre. Newer hybrids are developed and tested specifically to perform under increased population stress. The recommended population provides the best level of performance based on testing conditions over a wide range of environments. When stress conditions develop, scouting for stalk quality as maturity approaches can aid in harvest scheduling to avoid harvest losses.