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Summary of 2013 corn and soybean diseases

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Corn diseases

Because of the late planting and dry weather during the bulk of the season, corn diseases were of minor importance this year in Iowa. A few "common" diseases, such as common smut and common rust, were found at higher than usual levels, but this was field specific. A few interesting diseases "popped" up late.

Seedling blights

We did have several reports of seedling blight, but this will not be covered in this talk. Please see Dr. Martin Chilvers' presentation for further details on root rot pathogens.

Common smut and rusts

Common smut was found at fairly high levels in some fields. Common rust was found in many fields, but was not a true threat to yield most of the time. Southern rust was active early in southern states, but was not a factor in Iowa.

Physoderma stalk rot

An unusual disease was reported in several fields in southwest and western Iowa towards the end of the season. Several samples were received in the Plant Disease and Insect Clinic and pathologists from ISU Extension and Outreach visited a field in Adair County. First symptoms noticed were plants that break at the first or second node (Figure 1). The nodes at which breakage occurs are black and some stalk rot of the pith may be present. Microscopic examination of the symptomatic tissue reveals thousands of light brown sporangia. This has been confirmed as *Physoderma maydis*. This fungus also causes the more familiar Physoderma brown spot; however, the foliar symptoms have not been widely prevalent in fields with the stalk rot. There are a couple of reports of stalk breakage and rot caused by *P. maydis* that occurred in the past. In Illinois, severe outbreaks with up to 80 percent 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) and Mississippi in 1957 (Broyles, 1959). Physoderma is not usually an economic problem in Iowa or the United States. In recent years, however, we have seen an increase in the occurrence of Physoderma brown spot on leaves. This may be related to hybrid genetics or the wet springs we have experienced.

Figure 1. Physoderma stalk rot

Stalk rots

Lodging was a problem in several fields, particularly in central and north central Iowa. Fusarium stalk rot was the most prevalent disease associated with the lodging. The risk of stalk rot increases when plants are stressed and extremely dry conditions that occurred during grain fill likely contributed to stalk rot.

Red root rot

In some fields with lodging problems, poor root development and red roots were prevalent on a few plants. These symptoms are characteristic of red root rot caused by *Phoma terrestris*, although in the field red root rot is seldom caused by this fungus alone. In Delaware, when *P. terrestris* infected corn roots together with *Pythium irregulare*, red root rot progressed faster and was more severe (Mao et al., 1998). Tests to confirm that *P. terrestris* was the cause of red root rot in Iowa are currently being done. Although the fungus is a weak parasite, populations can increase rapidly when host crops are planted in succession, which consequently increases the risk of disease.

*Soybean disease*s

A few soybean diseases were observed early, but these mostly disappeared during mid-season. Many of the normal diseases, such as white mold and sudden death syndrome, could be found in various parts of the state, and sometimes at damaging levels. However, from a soybean pathology perspective, this season will be best known because of several new or unusual diseases found near the end of season.

Soybean vein necrosis virus

Soybean vein necrosis virus (SVNV) was first confirmed in Iowa during the 2012 season. In 2012, we did not see SVNV until August; however, we identified SVNV in several locations in Iowa in early July in 2013. This virus belongs to the tospovirus group, which is vectored by soybean thrips and possibly other thrips species. Symptoms often begin as chlorotic (light green to yellow) patches near the main veins (Figure 2)., which may enlarge eventually becoming necrotic (brown) areas The veins may appear clear, yellow or dark brown. The browning of the veins may be especially noticeable on the lower leaf surface, but this may not always occur.

Figure 2. Soybean vein necrosis virus

Tobacco streak virus

From the end of August through the end of the season, we received several samples in the Plant and Insect Diagnostic Clinic with irregular blotches and necrotic lesions on the pods (Figure 3). These samples tested positive for tobacco streak virus (TSV), also known as bud blight. This virus was first identified in Iowa and the United

States in 1967. The soybean plants with "pods showing necrotic spots" were noticed in late-planted soybeans. From this 1967 report, TSV reduced the number of pods per plant and delayed seed maturation. Other symptoms include stunting, bud blight, leaf mosaic (mottling), dwarfed leaves and stem discoloration. At the end of the year, TSV caused plants to delay maturity, not only causing green stems, but also some entire plants that remained green. This virus is mainly seed transmitted and several thrips species have been reported as TSV vectors.

Figure 3. Tobacco streak virus

Charcoal rot

This disease is known to be more problematic in hot, dry seasons so it is not surprising that charcoal rot was found in several fields across much of Iowa. In general, these patches were limited in size, but yields within these patches were reduced significantly. The disease can be identified by finding microsclerotia on the lower stems or upper roots of plants that prematurely died and left dead leaves attached to the plant.

Northern stem canker

If conditions were ideal for charcoal rot, then they were perfect for northern stem canker. This disease is more common in seasons with wet springs followed by dry weather, which defines the 2013 season. Northern stem canker was reported in all parts of Iowa, but mostly in the southern half of the state. Like charcoal rot, the disease was found in smaller patches in fields. However, there were locations where northern stem canker was found across most of the field. This disease can be identified by a dark canker on the stem (Figure 4).

Figure 4. Northern stem canker

Green stem syndrome

A disorder commonly seen across Iowa during harvest was green stem syndrome (GSS). Green stem syndrome is a soybean disorder in which stems remain green after pods and seeds are fully mature and ready to harvest. Cutting affected plants during harvest is difficult and seed quality can be reduced. There is a classic definition of how GSS appears, but in reality, the symptoms vary quite a bit. Sometimes, plants with GSS can have just a few pods on the upper nodes, or there can be leaves still attached at upper nodes. Also, immature green pods may be clustered on the upper part of the plant. This type of GSS was common in 2013 because of TSV. Depending on the location, other factors can cause GSS, including other viruses, soybean aphids, thrips, stink bugs, leafhoppers, bean leaf beetles and Cercospora leaf blight. These factors do not always cause GSS, but certainly can under the right conditions. There is also evidence that GSS may be caused by a physiological process in the soybean plant. Research from Kentucky showed a dramatic increase in GSS by severe pod removal. Over the past few years, season long soil moisture stress, especially post flowering, has caused pod abortion. When a soybean plant is growing normally at the beginning of the season, it produces high levels of carbohydrates to feed itself; when drought or other stress hits, pods can fall off or not fill in relation to the carbohydrate supply in the plant. If the plant has a pool of carbohydrates in reserve, it may stay green longer. That is one theory. Other factors that have been associated with GSS, at least anecdotally, include lower fall humidity and higher fall temperatures that lead to faster drydown for the grain and not enough time for stems to dry. Also, foliar fungicides have sometimes been associated with GSS. This year the drought limited the number of acres receiving fungicide applications so this was not a large factor in 2013. Plant populations also have been associated with GSS, but oddly, both lower and higher populations have been accused of being the problem. There have been many observational or anecdotal reports about varietal tendencies, but this is really hard to accurately assess. For now, the best thing to do is to note the varieties that have more GSS and try to avoid these varieties in future years. Harvesting green, stemmy beans is frustrating but so is waiting to harvest and risk pods splitting or shattering.

References

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