Specifically Wisconsin

Seven Sinful Diseases of a Wet 2010

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The 2010 growing season was one of the wetter in my memory. The regular rains that much of the state observed throughout the summer of 2010 provided a perfect environment for many types of plant diseases. The following are seven diseases that I frequently observed in 2010 and diseases that likely will continue to be a problem in 2011, particularly if weather conditions are wet once again.

As one might expect given the excessive rains in many areas, root and crown rots were a prime problem. Wilting, branch dieback, and premature fall leaf color were among the symptoms that I saw associated with root rot problems in 2010. Root rots caused by *Pythium, Phytophthora* and *Rhizoctonia* were all prevalent, and distinguishing between the root rots caused by these pathogens requires a lab diagnosis. Proper identification is critical, as chemical controls (i.e., fungicide treatments) vary depending upon the causal pathogen. Oftentimes root rots are identified so late in the progress of the disease that fungicide treatments will not significantly improve tree or shrub health. Root rot issues oftentimes can most successfully be managed preventatively by making sure trees and shrubs are planted in well-drained soils and sites, and making sure that trees and shrubs are not excessively mulched.

Leaf/needle diseases were also rampant in 2010. Tar spot, anthracnose, the various forms of the *Gymnosporangium* rusts (e.g., cedar-apple rust, cedar-hawthorn rust, cedar-quince rust), apple scab (and its kissing cousin pear scab) and Rhizosphaera needle cast were common sights in the clinic. All of these diseases require long leaf wetness periods (i.e., periods when there is a layer of water on the leaves or needles) in order for the pathogens to infect.

Tar spot most commonly occurs on maples, and samples of the disease in 2010 most commonly originated in counties that border or are near Lake Michigan. Several species of the fungus *Rhytisma* can cause tar spot, and typical symptoms include formation of an approximately one-inch-diameter, tarry-black, slightly raised areas on affected leaves. On close inspection, there appears to be a fingerprint-like pattern in the middle of the tarry mass. Some samples that I received in 2010 exhibited large numbers of infections per leaf, to the point where the surrounding leaf tissue bleached and dried. Control of tar spot relies primarily on removal of infected leaves in the fall to remove the source of fungal spores that might infect a tree the following growing season. Fungicides (in particular copper-containing products) are labeled for tar spot control, but I typically do not recommend fungicide treatments due to the cosmetic nature of the disease.

Anthracnose is caused by a wide range of fungal pathogens (including *Aureobasidium, Discula, Gloeosporium* and *Colletotrichum)* and can occur on virtually any deciduous tree or shrub. This disease is oftentimes most visible on maple, ash and oak. The most typical symptom of anthracnose is the formation of blotchy necrotic (dead) areas on infected leaves. If anthracnose occurs early, before leaves have fully expanded, leaves may not only be necrotic, but may also have growth distortions such as cupping and curling as well. In some instances, defoliation may also occur. Even given possible defoliation, I still tend to think of anthracnose as primarily a cosmetic disease. Trees that defoliate due to anthracnose typically releaf by mid-summer. The best management practice for anthracnose is good fall cleanup. Infested leaf litter should be collected and burned (if allowed), buried or hot composted. While fungicide treatments are available for control, I feel that such treatments are not warranted in most situations.

Another distinctive group of diseases that I saw in the PDDC this past summer were the *Gymnosporangium* rusts (e.g., cedar-apple rust, cedar-hawthorn rust, cedar-quince rust). The *Gymnosporangium* rusts are diseases where the pathogen spends part of its life cycle on junipers (redcedars are particularly susceptible) and the other part of its life cycle on woody roseaceous plants such as apple, crabapple, hawthorn and quince. On junipers, the pathogens induce gall formation, and these galls sport bright orange, marmalade-like masses in roughly mid-May to mid-June. These masses produce spores that infect woody rosaceous hosts. On rosaceous host leaves, bright orange spots form in mid-summer. Interestingly, in 2010, I observed cedar-hawthorn rust on pear. I had never seen any of the *Gymnosporangium* rusts on this host in the past. *Gymnosporangium* rusts are most commonly controlled by growing only one host (either junipers or rosaceous hosts) within a given landscape. Mixing of the two types of hosts is possible if resistant junipers are used. In particular, Chinese junipers *(Juniperus chinensis)* tend to have relatively high levels of resistance to *Gymnosporangium* rusts.

Another apple disease that was particularly severe in 2010 was apple scab. I also observed a fair amount of the related pear scab as well. These diseases are caused by two very similar species of the fungus *Venturia (V. inaequalis* and *V. pirina,* respectively). Both pathogens tend to cause multiple infections on leaves, with individual lesions being black and roughly circular with feathery edges. Heavy colonization of the leaves can give the leaves a sooty appearance and cause leaf yellowing and loss. Infections can occur on fruits as well, leading to scabby blemishes and cracking. Control of scab depends on one's emotional attachment to a particular tree. If one of my clients is indifferent, then I recommend removal of the tree and replacement with a newer apple or crabapple variety that has scab resistance. If a client wants to maintain an existing scab-susceptible tree, then removal of infected leaves in the fall, pruning of branches to promote better airflow and more rapid leaf drying during the growing season, and routine fungicide treatments (every seven to 14 days) are needed. Fungicide treatments must be started as soon as a tree begins to leaf.

The last of the common leaf diseases that I saw in 2010 was *Rhizosphaera* needle cast. This is the most common disease of spruces (particularly Colorado blue spruce) that I see at the Plant Disease Diagnostics Clinic (PDDC). Rhizosphaera needle cast is caused by the fungus *Rhizosphaera kalkhoffii,* which colonizes spruce needles, leads to needle purpling and browning, and eventually causes needle drop. The disease is typically first evident on the interior needles of a branch and as needle loss progresses, the branch often becomes denuded except for a tuft of younger, healthy needles at the branch tip. On branches that are shaded, even the tip needles may be cast, leaving branches that are entirely bare. Careful examination of infected needles, particularly after they have been incubated under high humidity, will reveal spherical fruiting bodies (i.e., reproductive structures) of *R. kalkhoffii* popping out the needle stomates (i.e., the air exchange "holes" on the needles). Quite frankly, the best control for this disease is to NOT plant Colorado blue spruce.

The final of my seven sinful diseases of 2010 are the powdery mildews. The common occurrence of these diseases was a little surprising to me, as powdery mildew fungi do not like wet leaves, but

prefer dry leaves with high relative humidity along the leaf surface. Given the amount of rain this past summer, I would have expected the weather to be far too wet for substantial powdery mildew activity. However, there appear to have been sufficient periods of dry weather with high humidity to allow for infections by powdery mildew fungi, and I saw numerous samples of the disease over the course of the summer. The most interesting of the powdery mildews that passed through the PDDC was *Sawadaea tulasnei,* a powdery mildew pathogen of Norway maple that was first described in Wisconsin in 2007. I received numerous samples of this powdery mildew from the southeast part of state, oftentimes on leaves also showing symptoms of tar spot. I have yet to see this powdery mildew on a maple other than Norway maple. However, there is concern that the pathogen may "jump" to other maple species. If it does, it is unclear what impact this disease might have. If you see examples of what you think is *Sawadaea* powdery mildew, feel free to send in a sample for verification (at no charge). I continue to be interested in the distribution and spread of *Sawadaea tulasnei* in the state.

If you have your own "sinful" diseases that you observed in 2010, I would definitely like to hear about them. Contact me at bdh@plantpath.wisc.edu to fill me in. Also, be sure to keep your eyes out for new and unusual diseases. If you see anything that strikes you as unusual, feel free to submit a sample to the PDDC. Details on sample submission are available at http://pddc.wisc.edu.