

Pine Wilt Disease

Pine trees are a staple in rural and urban landscapes due to their hardiness, beauty and diversity, but hundreds are dying each year in south-east Nebraska from pine wilt. The disease, which was first spotted in Nebraska in 1980, mostly kills Scots (also known as Scotch) pines, but Austrian pines and other species also are susceptible. The first noticeable symptoms of pine wilt are the change in needle color from green to grayish green then straw brown in color.

Cause

Pine wilt is caused by the pinewood nematode, *Bursaphelenchus xylophilus*, a microscopic (one mm long), worm-like animal, which is moved from infested to non-infested pine trees by the pine sawyer beetle (*Monochamus* spp.)

Symptoms

Pine wilt typically kills Scots pines within a few weeks to a few months after the pine sawyer introduces the nematode to the pine. The needles initially turn grayish

green, then tan, then brown. Resin flow from the wood ceases as the tree declines and the wood may appear dry when it is cut. Needles remain on the dead tree for a year or more. Scattered branches of the crown may be affected initially, but the symptoms soon spread to the remaining branches. The entire tree may turn brown all at once. In the Midwest, over 90 percent of the trees killed by pine wilt have been Scots pine. Other pine species are occasionally killed by pine wilt and display a similar pattern of symptoms. The disease appears occasionally in Austrian (*Pinus nigra*), jack (*P. banksiana*) and mugo (*P. mugo*) pines and rarely in white pine (*P. strobus*). Ponderosa pine (*P. ponderosa*) is usually not susceptible to pine wilt.

As pines age, susceptibility to pine wilt increases. Almost all cases of the disease have appeared in trees over 10 years old. Pine wilt has not had a major impact on Christmas tree plantations of Scots pine, since most of these trees are harvested before they

reach a susceptible age.

Management

Sanitation is the most important management practice to prevent or slow the spread of pine wilt. **Currently, no chemicals are available to control the nematode or the beetle.** To limit the spread of pine wilt to nearby healthy trees, diseased trees must be removed and destroyed before the beetles emerge from the wood. From May 1 to Oct. 1, dead and dying pines should be cut down promptly and burned, buried or chipped. Do not hold the wood for firewood. Pine sawyers are inactive in the winter, so if you find dead trees after Oct. 1, they do not need immediate removal, but they must be removed and destroyed by May 1.

Sources: *Pine Wilt in Nebraska, NebFact 00-448* online at <http://ianrpubs.unl.edu/plantdisease/nf448.htm> and *Fatal Pine Disease Continues to Affect Trees in Nebraska, IANR News Service.*



(Above) Highly magnified view of a pinewood nematode. (Left) Cross-section of trachea (breathing tube) in the thorax of a pine sawyer beetle. The spaghetti-like strands are pinewood nematodes.



How to Sample for Pinewood Nematode

When a pine dies suddenly, especially a Scots pine, pine wilt is a leading suspect. It is important to check suspected pines for the pinewood nematode because the nematode is easily spread to healthy trees by pine sawyer beetles, and entire wind-breaks or plantings may be lost to pine wilt within a few years.

To confirm the presence of pinewood nematode in a dying or dead pine, it is necessary to extract the nematode from the wood. A wedge-shaped sample of wood should be taken from the lower trunk or the base of large lower limbs. Alternatively, a disk of wood, one-inch thick can be taken from a branch three-inches or greater in diameter near the trunk.

Samples should be placed in a plastic bag, kept cool, and quickly shipped or delivered to the University of Nebraska-Lincoln Plant and Pest Diagnostic Clinic for diagnosis. Each sample should include the appropriate fee (check or money order) made out to UNL P&PDC. The charge for a pine wilt assay is \$10. Send to: University of Nebraska-Lincoln, Plant and Pest Diagnostic Clinic, 448 Plant Science Hall, P.O. Box 830722, Lincoln, NE 68583. For more information about the Plant and Pest Diagnostic Clinic, go to <http://plantpath.unl.edu/ppathdiagnostic.htm> or call 472-2559.

Pine Species to Avoid Planting

Scots pine should not be planted in parts of Nebraska where pine wilt is a major threat. This includes Lancaster County. Austrian pine also can be killed by pine wilt and is extremely susceptible to two fungal diseases: Sphaeropsis tip blight (formerly known as Diplodia tip blight) and Dothistroma needle blight. Spruces, firs, red cedars, junipers, white and ponderosa pines face little threat from pine wilt.



Cross section of pine tree showing tunnel bored by pine sawyer beetle larva, also pictured.



Adult pine sawyer beetle emerges from a dead pine and prepares to fly to a healthy pine.

Predicting the Last Irrigation for Corn, Milo and Soybeans

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One thing irrigators must start thinking about around the first week of August is when to shut down the irrigation system for the season. Ideally, you will want to stop irrigating far enough ahead of maturity so the crop will extract as much moisture from the soil as possible without hurting yield. This makes maximum use of the moisture present in the root zone, minimizes the amount of water pumped (which saves expense) and gives you the driest possible soil at harvest time, which minimizes soil compaction and harvest problems.

Research has shown a **medium-season corn** at the beginning dent stage of growth, will take approximately four weeks time and will require an additional 5.3 inches of water to reach physiological maturity (black layer). At the full dent stage, it will take about two weeks to reach maturity and will require about 2.5 inches of water.

Grain Sorghum requires about five inches of water to reach maturity from the soft-dough stage, and two inches of water from the hard-dough stage of growth.

Soybeans require about 6.5 inches

from the beginning seed fill stage or 3.5 inches from the full seed fill stage to reach maturity. (Check the seed fill stage by examining the development of seeds in the pods at one of the four uppermost nodes on the main stem that has fully developed leaves. The beginning seed fill stage is when bean seeds can be detected by squeezing with the fingers in one of the pods. The full seed fill stage is when one of the pods contain full-sized bean seeds.)

An alternative way to figure when to stop irrigating would be to figure when on what day a full soil profile would carry the crop through to maturity. The silty clay to silty clay loam soils in southeast Nebraska hold 1.6 to 1.8 inches of available water per foot of soil, respectively. If we assume we have a four foot root zone, we have about seven inches total available water holding capacity in the root zone. Research has shown that 60 percent of the available moisture in the root zone can be depleted at crop maturity without reducing grain yield. We can utilize about 4.2 inches of the available moisture without hurting yield.

Having discussed the above, we can now predict the day when a full profile on a silty clay soil would carry the various crops through to maturity. For a medium-season corn, the target

date would be when half of the corn kernels have dented. For grain sorghum, it would occur about one week after the soft-dough stage. For soybeans, it would be at, or just before the full seed fill stage.

Remember, these guidelines assume you started with a four foot soil profile at field capacity on the target date. If the profile was not filled to capacity (most likely it won't be), you will need to continue to irrigate until you have applied enough water to have filled the profile. For example, if the soil would have held another 2.5 inches on the target date, it will take a total of 2.5 inches of rainfall plus irrigation, in addition to the available soil moisture to finish out the crop.

Predicting the date of the last irrigation is an important water management decision. You can minimize expense and leave your soil in good shape for harvest without harming yields by following these simple guidelines.

FOR MORE INFORMATION

NebGuide G82-602 "Predicting the Last Irrigation for Corn, Grain Sorghum and Soybeans" available at the extension office or online at <http://www.ianr.unl.edu/pubs/irrigation/g602.htm>.

Presentation on Sustainable Agriculture, July 8

A free satellite-based conference on Sustainable Agriculture in Nebraska will be aired Friday, July 8 from 1:30 to 3:30 p.m. at the Lancaster Extension Education Center, 444 Cherry Creek Road in Lincoln. Attendees will have an opportunity to phone in questions.

- Conference topics include:
- Sustainable Agriculture Research and Education (SARE) farmer grants
 - Where to get publications on sustainable agriculture
 - What agencies such as the Nebraska Sustainable Agriculture Society and the Center for Rural Affairs can offer farmers
 - What is needed to be certified organically
 - Grants which are available for small and sustainable farming educational programs

This conference is sponsored by SARE. Representatives of the Nebraska Sustainable Agriculture Society, the Center for Rural Affairs, the Natural Resources Conservation Service and the Organic Crop Improvement Association will be involved in the program. For more information, call extension at 441-7180.