



PLANT DISEASE IN KANSAS

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As we approach the Christmas tree season, inevitably thoughts will gravitate towards the trees we use, most notably pines, spruces, and firs. In this edition of Plant Disease in Kansas, two common diseases of Christmas tree species will be discussed.

RHIZOSPHAERA NEEDLE CAST OF SPRUCE AND ENVIRONMENTAL DAMAGE

Rhizosphaera needle cast is a fungal disease caused by the organism *Rhizosphaera kalkhoffii*. It is most common on Colorado blue spruce. Norway spruce and white spruce are more resistant, but may become diseased if they are under stress. Within the state of Kansas, it is most commonly found in the Eastern half of the state, and this fall the Kansas State University Plant Disease Diagnostic Lab has received several reports of it in the Kansas City and Wichita areas. This disease can closely resemble winter damage, however, so be aware in the spring if you see dead, purplish-brown needles on your spruce. Each of these problems requires a different strategy to help your spruce recover.

This disease is characterized by purple-brown, dead, older needles. The younger needles toward the tips of the branches do not tend to be as badly affected. Since humidity is highest at the base of the tree, the branches at the base are usually more severely affected than those at the top of the tree (Fig. 1). A tree that has been infected with this disease for several years may have an almost entirely dead base. In contrast, a tree suffering from winter injury is likely to have needle death on the tips of branches, and sometimes present only on one side (usually the south or west side due to excess wind and sun on those sides).

A sign of the presence of Rhizosphaera needle cast is tiny pimple-like spore-producing structures forming in straight lines at the stomates in the needles. These are difficult to view with the naked eye but may be visible with a hand lens. However, absence of these structures does not mean the disease is not present. They are most likely to form under humid conditions. If the problem is winter damage no spore-producing structures will be produced, regardless of humidity levels.

If the problem is winter damage not much can be done, but it infrequently kills the buds of the tree, so it usually recovers with new growth in the spring. However, watering the tree during the summer to prevent drought stress will help harden the tree for the following winter and reduce winter injury. If the culprit is Rhizosphaera needle cast, a fungicide may be used to protect the new needles from infection. The grower may also wish to purchase more resistant trees such as Norway spruce, white spruce, or concolor fir in the future rather than blue spruce.



Figure. 1: A spruce tree severely infected with *Rhizosphaera* needle cast. Photo by USDA Forest Service - North Central Research Station, USDA Forest Service, Bugwood.org



Figure 2: The spore-producing structures on needles, called pycnidia, develop in lines lengthwise on the spruce needles. Photo by Paul Bachi, University of Kentucky Research and Education Center, Bugwood.org

PINE WILT DISEASE STILL OBSERVED IN WESTERN KANSAS

Pines are a common tree used in windbreaks throughout Kansas due to their ability to tolerate the variable weather in the state. For many years Scots pines (*Pinus sylvestris*) were especially recommended for planting throughout the Midwest. However, over the last few decades, many Scots pines have been decimated by the pinewood nematode, *Bursaphelenchus xylophilus*. This nematode is spread by the pine sawyer beetle. By itself, the beetle does little damage to a tree beyond some minor stress, but it is the primary vector of this nematode, which enters the trachea of the insect at larvae stage and is spread during feeding after the insect spreads to other trees as an adult. This disease is widespread in Eastern Kansas, but remains sparse in Western Kansas at this point.

The Kansas Department of Agriculture continues to survey in Western Kansas for pine wilt annually. In winter 2016 the towns of Hays (Ellis), Liberal (Seward), Meade (Meade), Ulysses (Grant), Elkhart (Morton), Johnson City (Stanton), and Hugoton (Stevens) were surveyed. Three trees were found and removed in Hays. One tree was found in Alma (Norton) in April 2017. This was the first find of pine wilt in Norton county. In addition, 4 trees were found and removed in Goodland (Sherman) in October 2016. KDA will be surveying again this winter season, targeting Greeley, Wichita, Scott, Lane, and Ness counties.

Pine wilt disease commonly kills pine trees within a few weeks to a few months. Pine trees older than 10 years are more susceptible than young ones. Because of this, it does not tend to seriously affect Christmas tree farms. Initially the needles may turn from green to grayish green, which fades to brown

(Fig. 3). The nematodes multiply and clog up the xylem, stopping flow of resin. Needles do not drop immediately but may stay on a dead tree's branches up to a year. Another common sign of pine wilt disease is presence of a blue stain fungus in the wood (Fig. 4), which is spread to pine trees by bark beetles and serves as an alternative food source for the nematodes once the pine tree dies. To prevent the spread of pine wilt, certain preventative management strategies can be implemented. Dead pines should be removed promptly and be burned, buried, or chipped, as they may harbor insects and promote spread of the nematode. Avoid using the wood for firewood, as the insects may still emerge from firewood logs. When planting evergreens, select resistant trees, such as white pine, spruces, firs, and junipers. Susceptible pines include Scots pine, Austrian pine, Mugo pine, jack pine, and red pine. No effective nematicides exist at this time.

If you suspect a pine tree of having pine wilt, a sample of wood is necessary. Take a disk of wood or branch at least 1 inch thick and 3 to 4 inches wide and submit it to the Kansas State University Plant Disease Diagnostic Lab in Manhattan, Kansas. If a pine tree dies it is important to know whether pine wilt was the cause, as it is important to dispose of the tree properly to avoid spread of the nematode.



Figure 3: A pine tree in Goodland, KS with partial dieback due to pine wilt. Photo by Bob Buhler, KDA.



Figure 4: Blue stain fungus spreads via bark beetle and serves as an alternative food source for the nematodes.

Plant Protection and Weed Control staff work to ensure the health of the state's native and cultivated plants by excluding or controlling destructive pests, diseases, and weeds. Staff examine and analyze pest conditions in crop fields, rangelands, greenhouses, and nurseries. Action taken to control potential infestations of new pests, whether they are insects, plant diseases, or weeds, is beneficial to the economy and the environment.

Our mission is to:

- Exclude or control harmful insects, plant diseases, and weeds;
- Ensure Kansas plants and plant products entering commerce are free from quarantined pests;
- Provide customers with inspection and certification services.

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