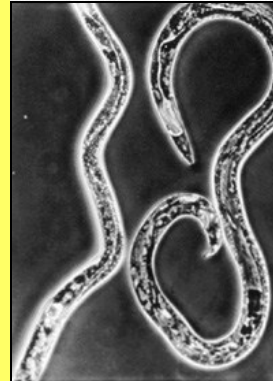


PINE WILT IN KANSAS



Pine wilt is an invasive disease to Kansas and gradually spreading westward into areas where the disease is not known to occur. The disease infects and kills pines that are planted in windbreaks, parks, yards, nurseries, and cemeteries. Trees die rapidly in the late summer months and the fall. The disease can be stopped by removing the infected dead tree before the next spring.

- Pine wilt is caused by the nematode *Bursaphelenchus xylophilus*.
- The pine sawyer beetle, *Monochamus carolinensis*, transmits the nematode from tree to tree.
- The pine sawyer is attracted to trees that are stressed from such factors as heat and drought.
- Scotch and Austrian pines are the primary hosts for this disease in Kansas.
- Older trees are generally at risk after 10 years of age but younger trees do get the disease.
- The nematode and pine sawyer spend their entire life cycle except for one life stage inside the tree. When you remove the tree and destroy the wood then you control both the nematode and sawyer.



The nematodes (left) are microscopic roundworms which attack the resin canals and water transport cells of a tree. Image from the University of Kentucky.

The sawyer beetle as seen below, feeds on bark tissue of new growth in late spring and summer. The nematode crawls out of the trachea of the insect and enters the wound tissue.



This is an infected Scotch pine tree in a windbreak in mid summer. Trees first show a change in color of the needles to a dull green. The needles then rapidly turn to a tan color as seen in the image. The nematode which can produce a new generation in 5 days becomes systemic in the tree in a very short period of about six weeks. The tree is then dead.

For more information regarding plant pests go to:
agriculture.ks.gov/divisions-programs/plant-protect-weed-control

The pine wood nematode was first reported in the United States in 1931 but was not recognized till 1979 in Missouri on Scots pine as a pathogen. Following the discovery in Missouri, the disease was discovered in southeast Kansas the same year.

Symptoms of pine wilt begin to occur in mid summer and continue into early winter in Kansas. During feeding by the adult pine sawyer after emergence in late April and May, the nematodes leave the respiratory system of the beetle and enter the wound tissue. There the nematodes transform into adults and invade the sapwood primarily feeding on resin canals. The nematodes reproduce rapidly with each generation taking only 5-6 days to complete. In four to six weeks following feeding, the nematode is systemic through the tree and symptoms begin to develop.

At first the infected tree begins to wilt and needles turn a dull green. If conditions are hot and dry, the tree rapidly dies with needles turning brown and no resin flow. Some trees die slowly up to three months of infection if conditions are not stressful. Pine sawyers continue to emerge from infected wood through the summer months resulting in new infection of nearby trees over the summer and into the fall. Overall, symptoms include flagging of branches, wilting of needles, absence of resin in branches, and rapid death of the tree. Pines affected to some extent in the Great Plains include Scots, Austrian, mugo (a small shrub like pine), Japanese Black, white pine, and loblolly pines. Scots, mugo, and Japanese Black pines are considered highly susceptible to the nematode. To complete the infection cycle, the pine sawyer lays its eggs into these dead and dying nematode infested trees. Inside the tree, sawyer larvae develop and overwinter in the wood. In the spring, the sawyer larvae develop into pupae which the nematodes migrate into before the emergence of the adult sawyer. The presence of pine wood nematodes in wood does not always indicate that the tree died of pine wilt. When the pine sawyer lays its eggs in dead or dying pines, it can transmit the nematode also at that time and the nematode is considered secondary to the death of the tree.

In Kansas, Scots pine in the eastern half of Kansas has had epidemic outbreaks. The disease is moving westward and encompasses much of the planted range of Scots pine in Kansas. Austrian and mugo pines have had many reports in Kansas with the disease in addition to Scots pine.

Control measures include destruction of pine wilt trees by either burying, chipping, or burning the wood before emergence of nematode laden adult sawyer beetles from infested wood in the spring. Neighbors and communities should work together to help manage the risk in local areas.

Best management practices for pine wilt:

- Stressed trees attract pine sawyer beetles. Crowding of trees and drought conditions should be avoided. Pines when possible should be watered during stressful periods.
- Plant a mix of tree species. Consider Ponderosa pines in plantings since we have reason to believe that those trees possess some resistance to the disease complex.
- Get confirmation of the disease in most situations. Some other reasons such as drought, bark beetles, cankers, root rots, and herbicide damage may cause death of the tree. A sample should consist of a couple of branch pieces about 1 foot long or several 1/2 inch thick disks taken near the trunk. Take the sample *where branches are expressing symptoms and needles recently died*. The samples should be sealed in a plastic bag and sent to a qualified lab.
- If the disease is confirmed, the tree should be removed as soon as possible. Owners who are hiring out the work should probably wait for removal of trees after mid October to see if any other trees are infected.
- Infected trees need to be disposed of by cutting the trees off at the ground and then burning, chipping, or burying the wood. The primary goal is to destroy the larvae and pupa of the pine sawyer.
- Insecticides are generally not cost feasible or effective in spraying for the adult pine sawyer who begin emergence in May and live for two months.
- Removal of infected trees from July to February will destroy the nematode and any insect stages in the tree. It will break the cycle of infection.
- Landowners should check pines periodically. Symptoms develop under stress periods. It is recommended that pines be monitored every two months. After removal, the site should be monitored for the following twelve months.
- Wood of infected pines should not be used as firewood unless it is used on the original site and completely burned by spring. The movement of this wood to a new area could move the pine sawyer and the nematode and start a new disease cycle.
- Nurseries and other large plantings should be constantly monitored for any pines that die or start decline during the summer and fall months. Those trees should be removed and disposed of in a recommended manner so not to attract pine sawyers.

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