



OAK WILT: A Threat to Red Oaks

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Oak wilt, caused by *Ceratocystis fagacearum*, is a lethal disease of oak (*Quercus spp.*). The disease is most serious on members of the red oak family, including red oak, scarlet oak, black oak, pin oak, etc. Members of the white oak family are generally not nearly as susceptible: white oak, swamp white oak, burr oak, etc. The disease is analogous to and potentially as serious as Dutch Elm Disease on American Elm. Both are introduced, exotic diseases caused by vascular wilt fungi; both diseases are transmitted by insects; both diseases can be transmitted through root grafts, and both fungi kill their host plants rather quickly.

Disease Cycle

Once a red oak becomes infected with the oak wilt fungus, it usually dies within several months. The most common predisposing factors are injury; and human activity is among the leading causes of infection. Symptoms in recently infected trees include the following: leaf margin browning progressing inward and from the leaf tips to the leaf bases; leaves on branches may appear to be wilting; some leaves may defoliate green or brown while others remain attached; vascular discoloration in the sap may or may not be present. These symptoms may be descriptive of other problems and hence misdiagnosis is not uncommon. Fungal mats, called pressure pads, may develop beneath the bark by the following spring; the fungal mats serve as sources of infection for transmission by the picnic beetles to healthy trees, thus completing the cycle.

Once established in a tree, the oak wilt fungus becomes systemic within the tree. Hence neighboring trees which happen to be root grafted to the diseased tree are now at risk. In this manner, the disease may affect many trees in an area, moving radially from the point source. Urban and rural/native forests can be affected from these point source infections.

The Pruning Connection

The health of oaks becomes high risk during the warm season months when they are injured through human practices, especially pruning, and through storm damage. April, May and June are the months posing the greatest risk but other warm season months are also suspect. Several species of picnic beetles are attracted to the fresh wounds caused by trimming and storm damage, and their activity transmits the fungus to healthy, recently pruned oaks from nearby diseased trees. Trees which come into contact with the fungus in the Spring are often dead by August or September.

Distribution

Although not widely known, oak wilt is widely distributed throughout Michigan and can be found in any areas where oaks are found or propagated. I have often been asked whether oak wilt exists in a county, township or region of the state. My common reply has become, "*prune a red oak in May and wait.*" Anyone who prunes oaks during April, May and June is definitely taking some serious risks, even though such practices might have been acceptable previously.

Field Diagnosis of Oak Wilt

There have been a substantial number of misconceptions and misinterpretations of oak wilt. Many oaks have suddenly died and individuals are perplexed with regard to the cause of death of their oaks. Submissions to diagnostic labs often result in negative tests for oak wilt and the interpretation is that oak wilt is not the cause of death. In several instances, the lack of confirmation of oak wilt resulted in extensive but unnecessary deaths of oak trees due to continued advance of oak wilt. On a good day, with highly expert plant diagnosticians analyzing excellent sample submissions, the oak wilt fungus may only be confirmed about 40% of the time from actual oak wilt affected trees. Unreliable lab tests are why I developed the following criteria for helping us to diagnose oak wilt.

Be suspicious of oak wilt if all or most of the following apply:

- 1) Identity of the oak species as a member of the red oak family
- 2) Presently, wilting symptoms are evident in live trees
- 3) Sudden death, generally on the order of months
- 4) Recent pruning or storm damage (months to a year)
- 5) Proximity to other oaks (root graft transmission from nearby dead oaks)
- 6) Elimination of other causes of oak death: gas leaks, root injury, other diseases, etc.

If laboratory diagnosis is desired, consider the following recommendations: collect samples during the growing season from live symptomatic trees (dead trees are practically valueless for lab diagnosis unless the above mentioned pressure pads are evident); branch segments should be at least one inch in diameter; bole (trunk) samples, preferably with vascular staining, can be submitted-do not include bark; all samples should be kept cool and clean-the oak wilt fungus does not compete well with other fungi and bacteria, and submitted as soon as possible to a reputable diagnostic lab. Remember, a negative lab report for oak wilt does not guarantee that oak wilt is not present in the tree from which the sample was collected.

Management of Oak Wilt

There are several procedures to prevent oak wilt and to minimize the effects of oak once detected. Clearly, the first one is to prevent oak wilt from becoming established in your oaks. Once oak wilt is detected, or perhaps even strongly suspected, several important steps need to be followed. Some of these steps depend on the value of the trees and the extent that the plant owner may want to invest in their oak trees.

1) Pruning: DO NOT PRUNE during the warm season; trimming is a major cause of oak wilt infections in Michigan today. If oaks need to be pruned, the dormant period is best - November through February. If storm damage occurs during the warm season, clean-prune the branch 1-2 feet below any visible injury and seal with a pruning paint. Repair of storm damage should occur as quickly as possible-optimally within hours or within a couple of days of the damage.

Storm damage which has occurred during the dormant (winter) months is not of particular concern for oak wilt. Nevertheless, winter storm damage should be repaired during the winter months and not during the warm season. It is not advised to use pruning paints during winter storm repair.

Except for emergency situations, cessation of pruning during the warm season, is probably our most effective tool for preventing oak wilt at this time. Compared to Dutch Elm Disease, in which elm bark beetles can easily transmit the fungus from diseased trees to healthy trees, the oak wilt insect vector is inefficient at transmitting the oak wilt fungus when no wounds on oaks are present.

2) Removal: Infected trees should be removed promptly. Once a tree has become infected, there is little chance to save it. Tree removal should take into account disposal. Wood may be used for firewood provided it is debarked or covered and sealed during the spring/summer months (remember-diseased trees with bark serve as a source of further infection for neighboring trees). In some situations of dense stands of trees, a tier of healthy oaks surrounding an oak wilt-affected tree may need to be sacrificed to "save the forest". Remember to trench before removal if other oaks are nearby and there is a possibility of root grafts between trees (see below).

3) Trenching: If there is a possibility of root grafts, trenching at least 3-4 feet deep is recommended midway between the diseased and healthy trees. This effort will hopefully prevent transmission of the deadly fungus between diseased and healthy trees which may be root grafted if in close proximity.

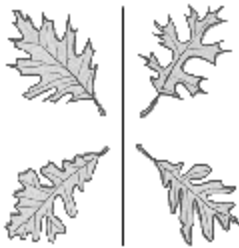
4) Injection: Micro- and macro-injection of fungicides is a protective measure against infection. It should be understood that injection may be expensive and is often not a guarantee of tree survival. In a landscape or urban situation, injection of apparently healthy oaks in the vicinity of dying oaks might be a recommended practice if economics condone the treatments. Injection should not be attempted on an oak wilt-affected tree except as a last ditch, fruitless effort. Research has generally shown that once oaks become infected with the oak wilt fungus, there is little that can be done to save the infected trees. Hence, efforts should be directed toward saving non-infected trees.

5) **Vigilance:** Because of the size, grandeur and value of our oak trees, a constant vigilance must be maintained about the threat of oak wilt. If any unusual problems or symptoms are associated with oaks, obtain help. It is imperative that we spread the words- "DO NOT PRUNE!" during the warm season. Storm damage should be assessed and repaired promptly. It is highly recommended that community efforts be established to thwart the threat of oak wilt. Any time an oak tree succumbs to oak wilt in a community, it eventually becomes everyone's problem.



Oak Wilt Research

There are very few funds available for oak wilt research largely due to the fact that urban oak forests do not represent a traditional agricultural commodity. The information presented herein has been gathered from other states' research and through our own limited research here in Michigan. Limited funds have been competitively obtained by the author through the GREEN Project at MSU. This research would not have been possible however, without the assistance of Mayor Mark Steenburgh, City of Warren, and George R. Lee of Branch Tree Service. If individuals or organizations wish to contribute to our oak wilt research, they may do so by contacting me at Michigan State University Extension at this address:



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