

Managing Oak Wilt Disease in Canada

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Oak wilt is a lethal disease that affects many native oak species in the United States and Canada. The disease is caused by a fungus, *Bretziella fagacearum* (previously *Ceratocystis fagacearum*), which colonizes the vascular system of many oak species causing wilting, branch dieback, and death of affected trees (Figure 1). Oak wilt is known to occur adjacent to the border in neighboring Michigan. Within Canada, oak wilt has recently been found in several areas of Ontario, specifically: the City of Niagara Falls, the Township of Springwater, and the Town of Niagara-on-the-Lake [1, 2].

Symptoms

Species in the red oak group are highly susceptible to oak wilt disease. Symptoms first appear as bronzing and wilting of the leaves in the upper canopy. Leaves then turn brown along the margins and often appear water soaked. This is followed by shedding of most of the leaves, many of which drop when they are still green. Trees can die within a few weeks after the onset of symptoms although recovery occasionally occurs.

Species within the white oak group exhibit some tolerance to oak wilt. Affected portions of the crown display leaf bronzing, browning, wilting and defoliation. The disease progresses slowly through the crown. Branch dieback and decline may occur over a period of years. Recovery of affected trees occurs more frequently than in the red oak group.

Figure 1: Oak wilt decline and rapid defoliation

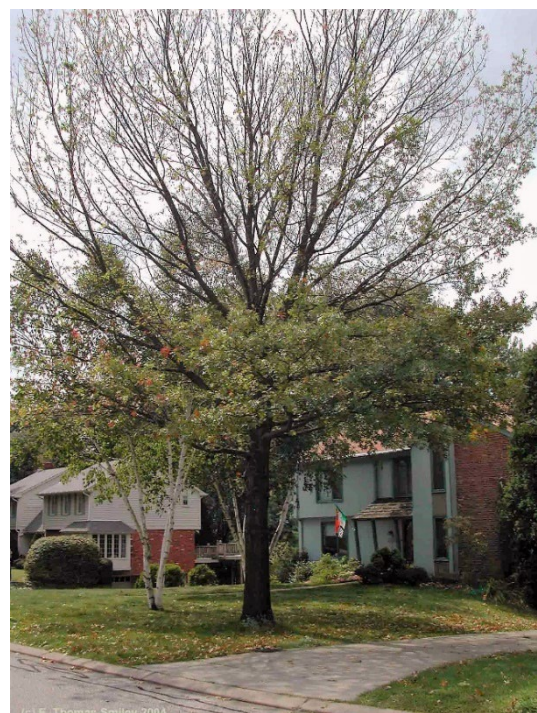


Table 1: Affected oak groups, *Quercus* spp. [3]

Red oak group – highly susceptible

Red oak, *Q. rubra* - Common
Pin oak, *Q. palustris* - Common
Black oak, *Q. velutina*
Shumard oak, *Q. shumardii*
Scarlet oak, *Q. coccinea*
Bear oak, *Q. ilicifolia*
Northern pin oak, *Q. ellipsoidalis*

White oak group – moderate to high resistance

Bur oak, *Q. macrocarpa* – Common
White oak, *Q. alba* – Common
Swamp white oak, *Q. bicolor*
English oak, *Q. robur*
Garry oak, *Q. garryana*
Chinquapin oak, *Q. muehlenbergii*
Dwarf chinquapin oak, *Q. prinoides*

Disease Transmission

Insects are responsible for transmitting the oak wilt fungus over long distances to establish new infection centers. Once a new infection is established, the fungus moves rapidly from tree to tree through root grafts that occur between oaks of the same species group.

Long distance spread: The oak wilt fungus produces spore mats beneath the bark on diseased red oaks in the spring following the year that they died (Figure 2). As these spore mats mature, they exert pressure on the bark tissues, which provides an opening for insects to access the fungal pathogen. The mats emit a fruity odor that attracts certain species of sap beetles (Nitidulids). These beetles become contaminated with spores of the oak wilt fungus when they visit the mats. Nitidulids then transmit the fungus when they feed on sap from wounds on healthy oak trees.

Most new infections from Nitidulids occur in mid-April through June. This is when spore mats form on dead oaks and when wounds on healthy oaks are most receptive to infection. New infections can also occur from July through September, but this is considered a lower risk period.

Figure 2: Spore mat of the oak wilt fungus revealed after cracked trunk bark was removed

Photo credit: Gene Basler, Bartlett Tree Experts



Oak bark beetles may also vector the oak wilt fungus. These insects breed in the inner bark and sapwood of dying and recently killed oaks. Bark beetles transmit

the fungus when broods emerge from infested diseased trees and bore into healthy oaks.

Local Spread: Once new infections occur, localized spread takes place through root grafts that form belowground. Root grafts can occur between oaks growing within 30.5 meters (100 ft) of one another and are responsible for rapid expansion of the infection center. Root graft transmission is more rapid in sandy and gravelly soils compared to clayey soils. Root grafts seldom occur between oaks of different species groups.

Disease Diagnostics

Suspected oak wilt reports can be made by email to OakWiltReportingOntario-Fletrissementduchene@inspection.gc.ca

or by contacting the local CFIA (Canadian Food Inspection Agency) office. Oak wilt may be confirmed through laboratory work done on diseased branches (Figure 3). Branch samples should be collected from portions of the crown exhibiting early stages of wilt. Since the oak wilt fungus is sensitive to heat, samples should be packed in ice (“cold packs”) and overnighted to a CFIA Plant Pathology Laboratory able to isolate and culture the fungus, which may require 8-10 days of incubation. Following a positive result, a survey of nearby oak trees may be required [3].

Figure 3: Close up of vascular staining or streaking of a live branch with bark shaved



Disease Management

Identify Infection Centers: Surveys to identify the extent of the disease and to identify new infection centers are the first steps to disease management. Aerial surveys can be used to identify suspected infection centers, which will need to be confirmed as infection centers by a ground survey. In urban and suburban landscapes, educating homeowners about identification and management of oak wilt will aid in early detection and treatment of the disease.

Sanitation: Infected trees in the red oak group should be removed and destroyed by chipping, burning or burial. Red oak species that have died from oak wilt should be removed before the spring following their death to avoid possible disease transmission from spore mats. Diseased wood should not be stored as firewood through the winter, nor should logs and firewood from red oaks be transported away from infested areas. As spore mats do not form on species in the white oak group, immediate removal and destruction of diseased white oaks is unnecessary.

Pruning/Wounding: Maintenance pruning for oaks should be scheduled for October through March. Oaks should not be pruned or wounded from April through September to prevent possible transmission by Nitidulid beetles and other vectors. If oaks are wounded during this time, a thin coating of black aerosolized paint should be applied to reduce the possibility of disease transmission. In areas where oak wilt occurs, other activities that cause oak tree-wounding should be avoided in the spring and summer, such as clearing and thinning for construction and harvesting timber.

Root Graft Prevention: Trenches should be installed between diseased and healthy trees of the same oak species group to help reduce root graft transmission of the oak wilt fungus. Primary trenches should be installed approximately 30.5 meters (100 ft) from the diseased tree using a vibratory plow, trencher or backhoe. Trenches should be installed to a depth of at least 1 meter (3 ft). Secondary trenches can be installed

immediately between the diseased and healthy trees to further reduce the potential for spread. If secondary trenches are not installed, removal of symptom-free oaks within the primary trench line should be considered. Stumps should be treated with appropriate herbicides to kill the roots. If symptom-free trees are not removed, treatment with a systemic fungicide is the other option, if available.

Chemotherapy: There are currently no fungicide products registered in Canada for root flare injection to prevent oak wilt disease [4].

More Information: Oak wilt has the potential to cause devastating impacts to oak populations within Canada, both in forest communities and urban areas. For more information, map updates, printable resources, and educational videos visit [Invasive Species Center Oak Wilt](#) [5].

Figure 4: Oak stand affected by oak wilt



References

- [1] C.F.I.A. Government of Canada, "Oak wilt," Jan. 03, 2012. <https://inspection.canada.ca/plant-health/invasive-species/plant-diseases/oak-wilt/eng>.
- [2] [Report of oak wilt in Niagara Falls, Ontario \(2023\)](#). North American Plant Protection Organization, Phytosanitary Alert System, Official Pest Report.
- [3] [Oak wilt response framework for Canada](#), Canadian Food Inspection Agency, 2019.
- [4] [Bretziella fagacearum Fact Sheet](#), Canadian Food Inspection Agency, 2023.
- [5] Invasive Species Center Oak Wilt. <https://www.invasivespeciescentre.ca/invasive-species/meet-the-species/invasive-pathogens/oak-wilt/>.