

Threat at the border: oak wilt caused by *Bretziella fagacearum*

For forest insects and pathogens, borders do not exist. With the increase in cross-border trade and climate change, the risk of them crossing over into Canada has grown significantly. When the right conditions are in place, these exotic pests will attack trees that have not yet developed an effective defence system against them, allowing these new species to propagate beyond their natural range. The integrity of Canada's forests may thus be put in jeopardy by these newcomers. What role does research play in today's efforts to prevent the introduction into Canada of the fungus that causes oak wilt?

“Oak wilt,” you say?

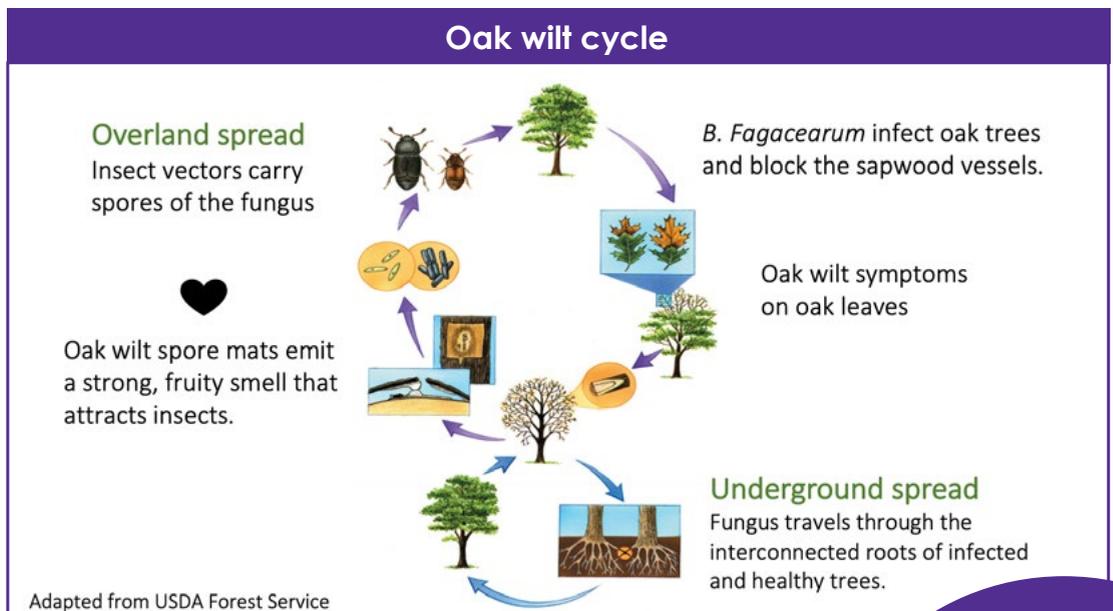
Oak wilt is a disease caused by the *Bretziella fagacearum* fungus that affects the sapwood's vascular tissues. Identified and described by scientists in the early 1940s, the disease now has a range extending from Texas to Minnesota and into the northeastern United States. Although the presence of DNA from this pathogenic fungus was detected on insects captured

in Ontario in June 2019, the disease is not yet present in Canada.

Locally, the disease spreads mainly through intertwining tree roots. Certain insects that feed on oak tree sapwood help propagate the disease. Pellets of infected wood may also have helped the fungus travel over longer distances during the shipping process. Although all species of oak can be infected, their levels of sensitivity vary. For

example, the fungus is particularly virulent in red oak, which generally succumb within one growth season. The most obvious symptoms are leaves wilting and turning brown early on in the growth season. Fungal masses form in the vascular tissues, forcing the infected tree to defend itself by secreting gums that eventually obstruct sap circulation.

Oak wilt cycle



Branching Out

from the Canadian Forest Service - Laurentian Forestry Centre

Early detection: everybody on the lookout!

The early detection of oak wilt is essential in order to limit the ecological and economic losses that this disease causes. The Canadian Food Inspection Agency, the Ontario Ministry of Natural Resources and Forestry, Quebec's *ministère des Forêts, de la Faune et des Parcs*, the Canadian Forest Service (CFS) and various local organizations are working together to prevent this disease from being introduced into Canada and becoming established here.

Genomics front and centre

Biomonitoring is already in place for insects capable of propagating the fungus in Ontario and Quebec's border regions. CFS researchers have developed genomic tools to detect *B. fagacearum*. Working with federal, provincial, municipal, and industry partners, researchers are tracking the pathogen in regions of Canada that are at risk, such as along the Canadian-American border. To do so, disease vector insects are captured using a trapping technique. The insects and all the fungal spores they carry are then analyzed to detect the genetic signature of *Bretziella*.

This early detection system, along with raising Canadians' awareness of the imminent arrival of this disease, should allow us to detect oak wilt early and work towards controlling it and mitigating its impact on Canadian soil.



- A) Typical crown symptoms of oak wilt on red oak. Photo: Joseph O'Brien, USDA Forest Service, Bugwood.org.
B) Cracked bark caused by fungal mat of oak wilt disease. Photo: David L. Roberts, Michigan State University.
C) Oak wilt symptoms on red oak leaves. Photo: D. W. French, University of Minnesota, Bugwood.org.
D) Sap-feeding beetle (*Nitidulidae*) on diseased oak tree in Sawyer County. Photo: Wisconsin DNR forestry.

Useful links

For more information about the Oak Wilt Response Framework in Canada:

<https://www.inspection.gc.ca/plant-health/plant-pests-invasive-species/plant-diseases/oak-wilt/response-framework/eng/1563898431188/1563898479048>

For more information on recognizing the symptoms of the disease:

https://www.inspection.gc.ca/DAM/DAM-plants-vegetaux/STAGING/texte/texte/oak_wilt_1548355987542_eng.pdf

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