



Dutch Elm Disease

Ophiostoma ulmi (Buisman) Nannf.¹
Ophiostoma novo-ulmi Brasier 1991³
 Syn. *Ceratocystis ulmi* (Buisman) C. Moreau,
Ceratocystis ulmi (Buisman) C. Moreau,
Pesotum ulmi (M.B. Schwartz) J.L. Crane & Schoknecht¹



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Overview:

Dutch elm disease is the result of a fungus which affects the vascular system, resulting in wilting and death of foliage. Conduction of the sap is eventually cut off and the tree dies - this can take a few days or a few years.¹ The fungus lives in the trunk, branches, and leaves. The disease is transmitted by bark beetles which bore through the bark to produce their broods in the sap wood. Infection can also occur via root grafting.³ The next generation of bark beetles emerge from the trees the following spring carrying spores of the fungus to the elms they attack.¹

Ophiostoma novo-ulmi, resulted from natural mutation of *O. ulmi* and has proven to be more aggressive.¹ *O. novo-ulmi* is considered to be the causal agent of the current Dutch elm disease pandemic in North America. *O. novo-ulmi* is not yet established in Alberta and some of the U.S. states.³ The purpose of Alberta's quarantine regulations is to prevent

establishment. These regulations pertaining to Dutch Elm disease prevention and control can be found here:

[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/prm1043/\\$FILE/ded_measures.pdf](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/prm1043/$FILE/ded_measures.pdf)

The origin of Dutch elm disease is unknown, but international trade of timber products has facilitated global spread. The popularity of elm trees resulted in lower genetic diversity and greater susceptibility to the fungus and pandemics among elm populations.³

Two other pathogens cause wilt disease in elms but effects are much milder than *O. ulmi*.⁵

Identification:

Symptoms of infection begin with wilting, yellowing, and then drying of leaves early to mid-summer that remain on the infected branch.¹ These affected branches can be

hard to detect on very large trees.³ Later season infection can cause premature leaf drop. An infected branch will have numerous brown streaks under the bark. In cross-section a ring of brownish discoloration will be visible.¹ The disease will progress through the vascular system from the branches to the stem of the tree. Once infection reaches the stem the tree dies that year or the next.³

Ecology:

Spores of the Dutch elm disease fungus are deposited into chewing cavities and under the bark by beetles. The fungus then spreads through the vascular system. A toxin produced by the pathogen causes the wilting.⁵ The fungus does best where bark is the thickest where moisture content is highest and constant.³

Economic Impacts:

Associated costs include tree removal and

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impacts to property values.

Environmental Impacts:

Loss of native elm stands, biodiversity, and the resulting decrease of genetic diversity among elms.³

Sociological Impacts:

The large population of elms in urban environments has made Dutch elm disease well known to the public. Historically elm wood was used for tools, wheels, and archery.³ Loss of elm trees in urban parks decreases aesthetic values.

Prevention:

Dutch elm disease can be introduced by infected pieces of elm wood with bark attached, crates made of elm wood, firewood, and bark mulch.³ Do not bring elm firewood or logs into Alberta. It may be carrying the elm bark beetles and the fungus. Do not transport or store elm wood within Alberta. Stored firewood provides a perfect breeding area for the elm bark beetles.² Dutch elm disease-resistant cultivars have been bred.⁴

“Take preventative measures by keeping your elm trees healthy, vigorous and properly pruned.

Elms should be well watered from April to mid August. To allow the tree to harden off for the winter, watering should be stopped mid August followed by a good soaking or two before freeze-up.”²

“Dead branches and trees that provide beetle habitat should be removed. Since elm bark beetles are attracted to fresh tree wounds, pruning should be done between October 1 to March 31 when the beetles are not in their active stage. Avoid pruning elms between April 1st and September 30th. Elm bark beetles are active between these dates and are attracted to fresh wounds.”²

“Dispose of all elm wood you have by taking it to your local landfill or by burning, burying or chipping it. Chips should be no greater than 2.5 cm (1 inch). Elm wood provides ideal breeding sites for the tiny elm bark beetle that spreads Dutch elm disease.”²

“Learn how to identify the signs of Dutch elm disease and beetle activity so that you can report them to the nearest DED Hotline to your community.”²

For information about STOPDED or Dutch elm disease call:

STOPDED Hotline: 1-877-837-ELMS (3567)

Control:

Important: Infected trees must be reported to the STOPDED Hotline. Under the Agricultural Pest Act pruning of elm trees is legally restricted to certain periods of the year and trimmings must be disposed of at designated facilities.

The Alberta regulations pertaining to Dutch Elm disease prevention and control measures can be found here:

[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/prm1043/\\$FILE/ded_measures.pdf](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/prm1043/$FILE/ded_measures.pdf)

Sanitation: Consult the Alberta regulations noted above.

Chemical: There are a number of restricted and commercially available products registered for use on Dutch Elm disease. Restricted products require applicator certification. Always check product labels to ensure the product is registered for use on the target species in Canada by the Pest Management Regulatory Agency. Consult your local arborist, Agricultural Fieldman or Certified Pesticide Dispenser for more information.

Biological: The active ingredient of the biocontrol product consists of the fungus *Verticillium albo-atrum* strain WCS850. A conidiospore suspension of this fungus is injected into the vascular system of elm trees at a height of 1.3 m. This biocontrol product prevents healthy elm trees from fungal infection transmitted by elm bark beetles. Dutch Trig®, however, does not protect already infected trees.⁴ Fungal viruses and bacteria have also been investigated.³



Fruiting Bodies

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Sign

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Symptoms

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- 4 Postma, J et al. Twenty-four years of Dutch Trig® application to control Dutch elm disease. *BioControl* (2016) 61: 305. doi:10.1007/s10526-016-9731-6. <http://link.springer.com/article/10.1007/s10526-016-9731-6>. Accessed: July 7, 2016.
- 5 Hitatsuka, Y., Langor, D., Crane, P. 1995 A field guide to Forest Insects and Diseases of the Prairie Provinces. Canadian Forest Service. Natural Resources Canada. pp 213.