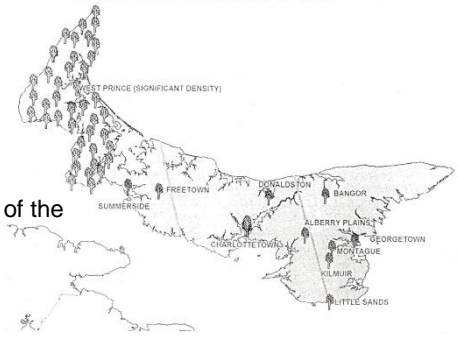


Dutch Elm Disease (DED)

DUTCH ELM POSITIVES IN PEI



History

- Introduced to North America from Europe in the early 1930's.
- DED reached Eastern Canada in the 1940's and by the late 70's and '80's, many of the elms in Eastern Canada had been lost to DED.
- DED was **first detected in Charlottetown in 1996**.

What causes DED?

- DED is known as a wilt disease which is caused by **fungal spores** (*Ophiostoma ulmi* and/or *Ophiostoma novo-ulmi*) that plug the conducting tissue of the infected elm tree causing characteristic wilting symptoms.
- There is some genetic resistance to DED within elm populations but the only way to identify resistance is the trees failure to succumb to DED while surrounded by infected elms.

How is it spread?

1. By an **insect vector** – the **European elm bark beetle**, *Scolytus multistriatus*, and the **native elm bark beetle**, *Hylurgopinus rufipes* – both occur on PEI.
 - The **beetle** feeds on infected trees and becomes **covered with fungal spores** which they carry from tree to tree.
 - **Fungal spores** are introduced into the vascular tissue of the elm during **feeding, breeding and overwintering** activities of the elm bark beetle.
 - **Volatiles** from wounded, stressed and dying trees **attract the beetles**. This is compounded by the fact that the beetles themselves give off a pheromone that attracts more beetles.
2. Through **root grafts**.
 - Roots from adjacent trees form grafts that allow nutrients and water to move back and forth from tree to tree.
 - **Root grafts transfer fungal spores** from an infected tree to a healthy tree and can kill a healthy elm in a matter of weeks.
 - Trees up to 50 ft. apart can pass the infection from one to the other.
3. Via **human activity**.
 - **Transport and storage** of infected elm wood and products. CFIA has a “Don't Move Firewood” campaign to prevent the spread of insects and diseases that can devastate our forests. <http://www.inspection.gc.ca/plants/forestry/firewood/eng/1330963478693/1330963579986>
 - **Not cleaning pruning tools** properly between pruning cuts. Several products are available on the market and are effective. When choosing a disinfectant it should be environmentally friendly, safe for the user and non-corrosive to the pruning tools.
 - **Improper removal** (timing) **and disposal** of DED infected elms.

The Elm Bark Beetles

- Native and European species look similar. **Small, shiny, brownish to reddish black beetle** about 3-6 mm (depending on the species). They are not often seen.
- Native bark beetles overwinter as an adult beetle or larvae. European bark beetles overwinter as larvae.
- **Adults emerge to feed in early spring**; first in the axils of small twigs and in the tree canopy.
- They move to the trunk and larger branches as the tree health declines.
- Eggs are laid under the tree bark in spring.
- Larvae are small, c-shaped and legless with a yellowish or brownish head.
- Egg galleries and larval feeding activities create distinct fern-like shapes under the bark that can be used to help with identification – beetle presence and species.

Symptoms

- Usually **show up in late spring** (may show up earlier if the tree was infected the previous year).
- Flagging – **drooping, wilting, curling, yellowing and browning of the leaves** at the ends of the branches. Flagging symptoms are often seen first on the water sprouts that occur on the main trunk of the elm and on individual branches in the tree canopy.
- **Progressive dying of leaves and branches** occurs until the entire tree is affected.
- **Root graft** symptoms usually start in the lower crown on the side nearest the root graft and rapidly spread to the rest of the tree canopy. Leaves wilt rapidly and the tree may die in as little as 3 weeks of initial infection.

- **Brown staining occurs on the water conducting vessels.** Peel back bark of dying branch and look for brown staining. Cut the twig in cross section to see if there is an inner brown ring.
- The presence of woodpeckers probing and debarking an elm tree may be an indication that elm bark beetles are present.
- DED look-alikes: storm damage, heat stress, drought, damaged or broken branches, leaf miner and damage from other insects, other disease symptoms.

Management

- **Monitor** your elm trees on a regular basis to detect DED symptoms as early as possible.
- Pruning is not recommended unless there is less than 5% of the canopy affected. Pruning cuts must be made 10 ft. below the symptoms. Check for brown staining to ensure the pruning cut is below the point of infection. Disinfect pruning tools between cuts. Pruning may extend the life of your elm tree but will not save it once it is infected. **There is no known cure for DED.**
- **Sanitation** is crucial to a successful DED management program: removal and disposal of infected trees.
- Prompt removal of infected trees helps to reduce the spread of DED by removing the bark beetle habitat. All elm maintenance **work should be done during the late fall and winter months** when the bark beetles are not active.
- **Proper disposal** is key to prevent DED from spreading. Elm wood **cannot be stockpiled during the summer months** when the beetles are active as the wood is an attractant to, and a habitat for, the elm bark beetles that spread DED. If elms are removed and stockpiled during the winter months, all wood must be **used by March 31st** as this is when the beetles become active again. Wood can be used for other purposes such as woodworking but care must be taken to de-bark the wood (burn or bury the bark) before March 31st.
- **Trenching** cuts the root grafts that form between adjacent elm trees preventing the spread of infection to healthy trees.
- **Don't store elm as firewood** - it is illegal in several provinces. If transporting elm wood, it should be from the location of removal directly to the point of disposal.
- **Keep your elms healthy** – proper pruning, watering, fertilization = less stress and more resistance.
- Elm species **should NOT be pruned between April 1st and September 30th** as these open wounds give off the volatiles that attract the elm bark beetles.
- **Sterilize tools** between pruning cuts to prevent spread of DED.
- Plant suitable replacement trees in areas where elms are present to lessen the impact of their possible loss to DED. Planting diverse tree species increases the health of the urban forest.
- When planting elms, **plant resistant varieties** such as: Patriot, Pioneer, Regal, Valley Forge, Princeton, New Horizon, etc.
- **Inoculate** your specimen trees to help increase their resistance to DED.

Regulation

Canadian Food Inspection Agency; <http://www.inspection.gc.ca/english/plaveg/protect/dir/d-97-07e.shtml>

1.6 Regulated Areas

Canada: **Prince Edward Island**, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba

United States: All states

1.6.1 Generally Infested Areas

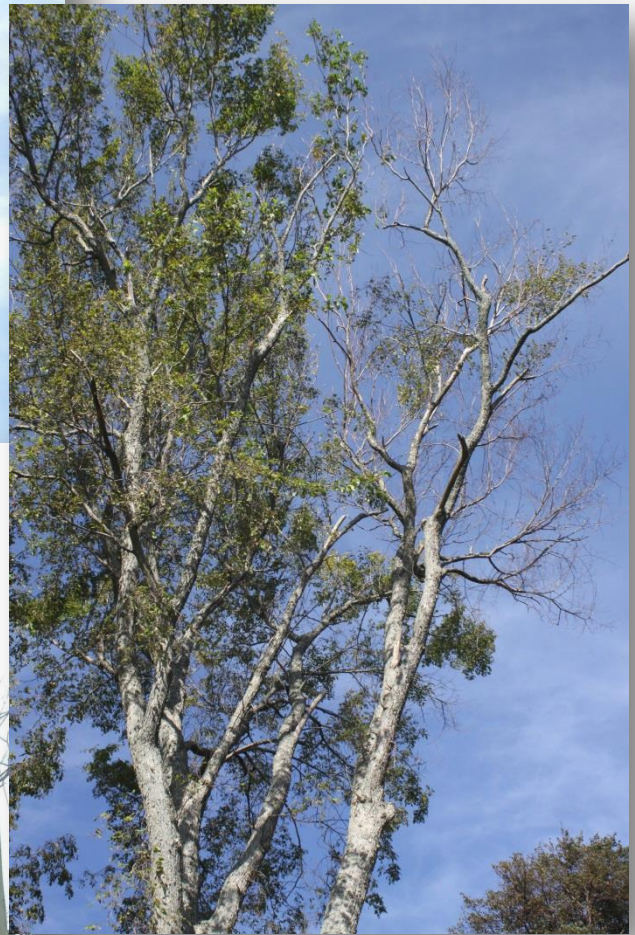
From generally infested provinces (PE, NS, NB, QC, ON and MB) to non-infested provinces (NF, AB and BC) (Section 2.3.3)			
Commodity	Movement Certificate	Movement Import Requirements	Comments
Non-propagative material with bark attached or isolated bark (includes firewood)	Prohibited	-	-
Propagative material	Prohibited	-	-

This directive regulates commodity pathways and therefore governs the movement of propagative material, including nursery stock, and non-propagative material with bark attached such as logs, lumber, firewood, crates and isolated bark of all species, hybrids and horticultural cultivars of elm (*Ulmus* spp. and *Zelkova* spp.).

Flagging in tree canopy



DED infected elm tree



Dead DED infected elm tree



**Curled, drying leaves on
DED infected elm tree**

Photos courtesy of David Carmichael, Andrew Williams, Beth Hoar

For more information contact: City of Charlottetown at 902 892-3837

