

Dutch Elm Disease

Cause

The fungus, *Ophiostoma (Ceratocystis) novo-ulmi*, which grows in the vessels that carry water and nutrients through the tree, causes Dutch elm disease (DED). It is introduced into the tree by feeding elm bark beetles or via root grafts with other elms. The elm attempts to protect itself by producing compounds, called tylosis, and gums to stop the fungus. The rapid growth of the fungus and the elm's reaction eventually cut off its water supply. Subsequently, the elm wilts and eventually dies.

Identification

American, red (slippery), rock elm: These species, *Ulmus americana*, *Ulmus rubra* and *Ulmus thomasii* (rare in Minnetonka) are highly susceptible to infection. The first apparent symptom in American and red elms is wilting of the leaves at the top of the tree. In most cases, it begins in a few upper branches and is called "flagging". The fungus moves down the vascular system into the trunk and rapidly involves the entire crown. Field techniques easily determine the presence of DED.

Siberian elm: The species, *Ulmus pumila*, sometimes referred to as Chinese elm, is somewhat resistant to DED, but will eventually succumb as well. The overall shape of the tree varies with some resemblance to the other elms. The leaves are much smaller than the other elms. Regular infestation by the elm leaf miner often gives the leaves a yellow-brownish appearance. Field diagnosis generally requires a combination all techniques for verification.

American elm



Red elm



Siberian elm



Diagnosis

Diseased elm trees are identified and diagnosed by generally accepted field symptoms such as wilting, yellowing of leaves or staining of wood. Laboratory confirmation is only used when it is necessary. At its discretion, the Forestry and Natural Resources Division may sample suspected trees and submit samples to the Minnesota Department of Agriculture Shade Tree Disease Laboratory or the University of Minnesota Plant Disease Clinic for testing. Approximately four weeks are needed for the laboratory to culture the sample and make a diagnosis.

Life Cycle/Spread

Ninety percent (90%) of DED spreads overland by the native elm bark beetle (*Hylurgopinus rufipes*) and the European elm bark beetle (*Scolytus multistriatus*). These small beetles begin their life in diseased and dying elms as larvae. As they are emerging from the diseased elm, the beetles move across areas of DED spores under the bark. These spores adhere to the legs and underside of the beetle. The beetles then fly off seeking the young, nutritious tissue of nearby elm branches. As the beetles feed on the tissue, the DED spores are deposited into the wound. The DED spores then germinate and the fungus enters the vascular system in a vegetative form. After DED kills the tree, adult beetles are attracted to it, burrow under the bark, and lay galleries of eggs. The DED fungus goes through a dormant period and eventually reproduces the spores. The cycle of infection repeats itself unless control measures are taken in a timely manner.

Ten percent (10%) of DED spreads through natural root grafts with nearby elms of like species. The vegetative form of DED spreads down the vascular system into the root system and into the adjacent elm. Quite often, the wilting symptoms appear on the lower branches and under the bark on the root flares of the side nearest the originally infected tree. The possible distance between grafts depends on many factors. Currently, it is unknown if Siberian elms graft to indigenous species.

Control Methods

Identification and prompt sanitation of infected trees is of primary importance in controlling the spread of DED. Once infected elms are identified the Forestry and Natural Resources Manager or his representative mark them for sanitation and notify respective property owners.

The primary control measure is sanitation, which involves the removal and proper disposal of the diseased elm trees. No elm wood, diseased or not, with the bark attached may be stored in the City of Minnetonka. This prevents overland spread of DED spores from woodpiles and the general reproduction of elm bark beetles.

Root graft transmission, the secondary cause of infection, can be controlled through a mechanical trenching, which is about ninety percent (90%) effective, or a chemical barrier (soil sterilant), Vapam™, which is about fifty percent (50%) effective. These are placed between infected and healthy trees of like species, as space permits, prior to the removal of diseased trees.

The third option is mainly used as preventative measure. In some limited circumstances it is used therapeutically. Two fungicides, Arbotect™ and Alamo™, are currently labeled for use in elm trees. The fungicide is injected directly into the vascular system at the base of the elm. Arbotect™ has been labeled for 25 years with a ninety-five percent (95%) effective rate injected every three years into healthy trees. Alamo™ has been labeled for five years with no significant data compiled to date and is injected every three years into healthy trees. For more information about this process call the Forestry and Natural Resources Manager.

Call the Forestry and Natural Resources Manager's office when you first recognize symptoms of Dutch elm disease. The Forestry and Natural Resources Manager can be reached at (952) 988-8400 for more information.

Preventing Dutch Elm Disease

- Frequent inspection of trees for damage, wilting, etc . . .
- Prompt care for damaged trees. Immediately apply pruning sealant to any wounds during growing season.
- Avoid pruning or wounding during growing season.
- Tree climbing irons should never be used on live, healthy, elm trees.
- Consider preventative injection of valuable elms with a fungicide.