

Forest Pest Fact Sheet

March 2016



LODGEPOLE PINE DWARF MISTLETOE, (*Arceuthobium americanum*)

BACKGROUND

Lodgepole pine dwarf mistletoe is native parasitic seed plant. It is the one of most serious diseases of pines in western North America. Damage to host trees includes deformity, growth loss and mortality. This disease generally spreads slowly through the forest over many years. However, long-range dispersal can occur from movement of seeds by mammals and birds.

DISTRIBUTION

Lodgepole pine dwarf mistletoe extends throughout the range of lodgepole pine in the western United States, British Columbia and Alberta. In the boreal forest, it extends from northern Alberta, through Saskatchewan and east to Lake Winnipeg..

DESCRIPTION OF LIFE STAGES

The visible part of the plant is the perennial, light green aerial shoots that grow out of the infected host tissue. These shoots average about 6 cm in length. Inside the host tree, the dwarf mistletoe plant has an absorption system consisting of sinkers. These sinkers are connected to the host tree's xylem, from which the dwarf mistletoe plant derives its nutrients. Lodgepole pine dwarf mistletoe is a dioecious plant, meaning there are separate male and female plants. Flowers bearing pollen are produced on the tips of aerial shoots of the male plants. The aerial shoots of the female plant produce flowers, which after pollination, develop berry-like fruits on stalks. Each berry contains a single green coloured seed.

Male plant, aerial shoot with pollen



Image: Manitoba Conservation

Female plant with mature fruits



Image: Saskatchewan Ministry of Environment

HOST SPECIES

The major hosts of this parasite are lodgepole pine and jack pine. Jeffrey, limber, and ponderosa pines are occasional hosts. Rare hosts include Colorado spruce, Englemann spruce and whitebark pine. In Saskatchewan, jack pine is the main host and occasionally the introduced Scots pine

LIFE CYCLE

Both male and female plants flower in the spring. Pollen is produced by the male flowers. The female flower is pollinated by wind or insects in late spring. Berries, each containing a single seed are formed on the female plant. The berries mature between mid-August and mid-September of the summer following pollination. Once mature, pressure builds within the berry and the seed is forcibly discharged for a maximum horizontal distance of 18 metres. However, the majority of seeds travel less than 10 metres. The seed is covered in a sticky substance called viscin, which allows it to adhere to its host over winter. Seed germination occurs the following spring in late April to early May. A root-like structure grows out of the seed and penetrates the host through a needle fascicle or other irregularity in the bark surface to initiate a new infection. An absorption system develops within the host's xylem. Aerial shoots are produced within three or five years from the time of infection. At this time the infection causes branch swellings and the formation of witches' brooms.

SIGNS, SYMPTOMS AND DAMAGE

The most obvious symptom is the prolific growth of infected branches known as witches' brooms. Branch swellings at the infection site are also a disease symptom. Aerial shoots of the dwarf mistletoe plant can be seen protruding from infected branches. Lodgepole pine dwarf mistletoe often has a significant impact on host trees. The parasite removes nutrients from the host, which causes tree deformity, stunting, growth loss, tree decline and mortality. Trees of any age can be attacked. Infected seedlings and young trees are killed more rapidly than older trees, which often decline gradually over many years. As trees decline, infected branches die and the brooms often break off leaving an entry point for wood decaying pathogens. As dwarf mistletoe spreads in the forest, infection centres increase and coalesce causing extensive decline and mortality, which can reduce both the quantity and the quality of merchantable timber over a large area. Heavily infected forests have an abundance of large witches' brooms and dead and dying trees, which can produce a serious fire hazard. Lodgepole pine dwarf mistletoe also has an impact on renewal of the forest, as seed production of infected trees is significantly reduced. This disease may also have a negative impact in recreation sites in pine forests as declining and dead trees are unsightly and can also be a safety hazard to property and the public.

Heavily infected trees with witches' brooms



Image: Saskatchewan Ministry of Environment

Severe tree deformity



Image: Saskatchewan Ministry of Environment

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During epidemics, widespread tree mortality often has a major impact on commercial forests in terms of timber volume loss and site conversion to less desirable tree species or to grass or shrubs. In addition to the impact on commercial forestry, the destruction of millions of hectares of forest can impact the ecological balance.

Dwarf mistletoe mortality centre



Image: Manitoba Conservation,

MANAGEMENT PRESCRIPTIONS

When harvesting infested stands, the management objective is to eliminate all infected trees, as they are a source of infection to the renewed forest. Clearcut harvesting is the most effective way to manage dwarf mistletoe in mature pine forests. The cut block design should have a regular shape and a low ratio of perimeter to area. This configuration can help reduce the spread of dwarf mistletoe into the renewed forest. Where possible, cut block boundaries should be laid out so as to avoid leaving edge infections along the periphery. Within the cut block all host trees should be removed. In addition to merchantable trees, which will be utilized, non-merchantable hosts and advanced regeneration (young stems in the understorey) must be cut, as these trees are a source of infection to the renewed forest if left on site. Following the harvest, any remaining edge infections should be removed or killed, where feasible. If not feasible, an alternate resistant tree species should be planted in a 20-metre buffer around the periphery of the cut block. Volunteer host trees should be cleared periodically from the buffer to prevent encroachment of the disease into the renewed forest stand. On severely infested sites, the seed source will be significantly reduced due to poor seed production of infected trees and low host tree density due to mortality. On these sites, planting is usually required.

Control of lodgepole pine dwarf mistletoe in young stands is only feasible where infection levels are light. Thinning, where the focus is on removal of infected trees, can be effective if optimum stand density can be retained. Combined thinning and pruning is not recommended, as it is very cost prohibitive and usually not effective. Latent infections, missed during pruning, remain on site to continue the infestation.

Thinning and pruning may be effective in high-use recreational areas and residential properties. This treatment involves the removal of heavily infected trees and pruning infected branches from lightly infected trees. Trees should be inspected within three to five years and pruned again, if needed

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REFERENCES FOR ADDITIONAL INFORMATION

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