Pine Dwarf Mistletoe

Yukon Forest Health — Forest insect and disease

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Yukon
Energy, Mines and Resources
Forest Management Branch

Introduction

Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) is a parasitic, perennial plant that infects lodgepole pine (*Pinus contorta*). It has proven to be extremely damaging in some areas of British Columbia. The mistletoe derives its nutrients, water and structural support from its host tissues (usually a branch or portion of the trunk).

While it is absent from Yukon forests, current climate trends could lead to the spread of this parasite into northern latitudes. An extensive fire history has created a continuous coverage of pine from B.C. to Yukon. Most notably, this is the case through the Williston Valley and onto the Liard plains and Dease Plateau of north central B.C., where lodgepole pine forests extend into Yukon. This area is the most likely point of entrance for lodgepole pine dwarf mistletoe.

The northern extent of the range of lodgepole pine dwarf mistletoe is currently 300–400 km to the south of the Yukon-B.C. border at the north end of Williston Lake. Given the short range of dispersal of dwarf mistletoe seeds, it is unlikely this parasite will spread to Yukon in the near future unless it is introduced by human-caused activities.

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Life Cycle

Lodgepole pine dwarf mistletoe is an obligate parasite, meaning its survival is completely dependent on host success. Thus, once a plant has established itself on a pine it will survive as long as the host is alive. The life cycle begins with an explosion of seeds from the long, slender shoots of mature dwarf mistletoe. The seeds are forcibly ejected up to 15 meters horizontally through hydrostatic pressure. An audible "popping" can be heard in forests with high incidence of dwarf mistletoes. This period will begin in late August and usually run for three weeks depending on elevation and latitude. The seeds are coated in a substance called viscin which allows them to adhere to foliage or other host substrate. Many seeds are lost but a great number succeed in finding a suitable host.

The first rainfall hydrates the viscin around the seed and it becomes slippery. The seed slides down the needle, branch or twig to the base, and attaches itself to the tree where it remains until the following spring. When climatic conditions are favourable, the seeds germinate and extend their long slender roots through the bark into the sapwood of the host. The infestation goes through an incubation period of three to five years where the dwarf mistletoe grows vegetatively. After this period, new green and yellow aerial shoots appear with male and female flowers appearing two years after the shoots emerge. The female flowers are pollinated by insects and within one to one and a half years the shoots contain a seed which begins to mature. Once the seed has matured an internal pressure begins to build and when it has peaked the seed is ejected at roughly 100km/hr to begin the life cycle anew.

Mistletoe grows vegetatively for 3–5 years then send out shoots which eventually produce male or female flowers.

Seeds are forcibly ejected from shoots of dwarf mistletoe (females).

When conditions are favourable, seeds germinate and extend roots through the bark, into the sapwood of the host.

Seeds adhere to foliage and attach to the tree where they stay until the following spring.

Host Species Attacked and Damage

Tree species affected: The preferred and most susceptible host is lodgepole pine. Ponderosa pine (*Pinus ponderosae*) and jack pine (*Pinus banksiana*) are also susceptible. The dwarf mistletoe will affect pines of all age classes.

Due to their slow growth, early indications of dwarf mistletoe infestations are inconspicuous. It can take between three and five years before any visible symptoms or signs become apparent. Symptoms include reduced crown and diameter growth and swellings in the bole and branches of the tree. Abnormal production of distorted branch systems known as "witches' broom" is the most apparent tree level symptom. In severe cases, the crown begins to die back leading to a spiked top and eventual tree death. In stands with a high incidence of dwarf mistletoe, tree growth is reduced by up to 32%. Not only will the annual growth be reduced but the wood will be of very poor quality. The proliferation within the bole of the tree leads to abnormal grain, resin impregnation and spongy wood texture. The swollen branches also lead to abnormal amounts and size of knots further decreasing wood value. Often when dwarf mistletoe infested trees are felled they shatter on impact, leading to a large amount of damaged wood and very little usable lumber. Heavily infested trees serve as easy targets for insects and stain and decay-causing fungi, further reducing a stand's vigour and value.

Key features for identification:

- Presence of witches' brooms on the branches or stems of infested trees.
- Perennial, light green, leafless plants growing in a whorled pattern. When the aerial shoots fall off in the fall they leave small circular features called basal cups.

Similar damage

Witches' brooms are the most conspicuous feature of the dwarf mistletoe infection and can often lead to mistaken identity. For further identification a closer examination of the broom or any abnormal swellings will show the aerial shoots or basal cups associated with dwarf mistletoe. There is a third type of broom that is often mistaken for dwarf mistletoe, a stimulation broom. This is a broom that forms on a pine that has been suppressed or with dead or broken tops. They most often are found on residual pines left over in a harvest setting. These brooms, however, are more dense than Dwarf mistletoe brooms and lack aerial shoots and basal cups.

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