

 UI Extension Forestry Information Series

## Mistletoes and Dwarf Mistletoes

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Mistletoes and dwarf mistletoes are shrubby, or dwarfed, photosynthetic plants. They are all parasitic on the stems of woody plants, from which they derive water and nutrients. True, or leafy, mistletoes derive most of their nutrients from the products of their own photosynthesis and obtain little from their hosts. Twelve species of true mistletoes occur in the United States, limited in the northwest by the 45° N parallel. This northern limit seems to be determined by winter temperatures. True mistletoes attack both deciduous and coniferous plants in the west, with economic damage considered light. The mistletoe collected and marketed at Christmas is a true mistletoe.

Dwarf mistletoes are small and leafless. They are considered to be the most evolutionarily advanced of all mistletoes and occur across the Northern Hemisphere. Sixteen species of dwarf mistletoe occur in the United States, in every region except the pine forests of the southeast. Dwarf mistletoes cause more damage than any other group of forest pathogens in western North America. Five of these species infect eleven native conifers in Idaho. Major hosts are Douglas-fir, western larch, lodgepole pine, and ponderosa pine.

**Life Cycle.** Dwarf mistletoes are either male or female. Both can damage trees, but only the female plants produce seed. Seeds are borne in berries. From mid-summer to late autumn (depending on the species) pressure builds up in the berries as they ripen and causes the seed to explode from the fruit at initial speeds of 60 feet per second, often traveling distances of 20 to 30 feet. The seeds are covered with a gooey substance that helps them adhere where they land. Seeds that land on conifer needles slide down to the

twig where they germinate. Germinating seeds carry on photosynthesis, which helps the young plant sustain itself until it can parasitize the host plant. A swelling usually appears at the infection site two to five years after infection and can remain in this stage indefinitely if the host lacks vigor. After one to two years, aerial shoots begin to produce minute flowers on both male and female plants, which are then pollinated by wind and insects. The fruit matures, on average, twelve months later.

Dwarf mistletoe populations increase more rapidly in uneven-aged stands or on steep slopes where seeds are scattered from diseased trees in the overstory. Most infections occur on tissue or wood less than 5 years old, although some species of dwarf mistletoe can penetrate older tissue.

**Damage.** Damage occurs in several ways. The transpiration rate of dwarf mistletoes can be many times greater than their hosts and these plants can draw water from the host tree to continue transpiration even if the host is severely water stressed. Carbon is also extracted from the host plant. This, in turn, weakens the host and greatly decreases growth, health, and vigor. Secondary pathogens, or insects such as bark beetles, often become established in weakened trees, hastening death.

Most dwarf mistletoe species induce witches brooms. If the tree supports multiple infections, non-infected branches begin to thin-out and decline, making the contrast between the dense, dark green mistletoe brooms and the remainder of the faded crown dramatic. Mistletoe also suppresses height growth and reduces tree seed quality and quantity. Infected wood

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is weaker and has poor pulping qualities. Distorted trunks and abnormally large knots are also common, further reducing wood quality. With large proportions of dead foliage and branches, dwarf mistletoe infected trees are also very flammable making them serious fire hazards.

**Dwarf Mistletoe Rating (DMR) System.** This method of rating dwarf mistletoe infection is used throughout western North America.

**Step 1:** Divide live crown horizontally into thirds.

**Step 2:** Rate each third separately. Each third should be given a rating of 0, 1, or 2 as described below:

0 - No visible infections.

1 - Light infection (1/2 or less of total number of branches in third are infected).

2 - Heavy infection (more than 1/2 of total number of branches in third are infected).

**Step 3:** Add ratings of thirds to obtain total rating for tree (total rating scale is 0-6).

**Step 4:** Average stand rating can be obtained by averaging individual tree ratings (all live trees).

Infection intensity for individual trees is usually characterized as follows: 1-2 = light; 3-4 = moderate; 5-6 = heavy. Significant growth reduction begins to occur in DMR class 3-4, increasing in classes 5-6 with mortality beginning to occur as trees reach class 6. In contrast to the infection rankings for individual trees, infections ratings for stands are as follows: 0.1-1.0 = light; 1.1-2.0 = moderate; >2.0 = heavy. In stands with an average of 2.0, over 80% of the trees are infected.

**Control.** Resistance to dwarf mistletoe infection is present in native populations of trees. Practical control

of these parasites depends upon cutting practices that remove severely diseased trees and favor even-aged management. Clearcutting or removing an overstory of heavily infected trees can help sanitize an area.

After removing the infected overstory, sanitation of the understory should be done. Trees that are dominant or co-dominant with no visible infection should be favored. In mixed species stands, retain the less susceptible species when possible (Table 1). Young larch seedlings commonly have main stem infections and should be removed during the sanitation cut. Seed trees should have a DMR rating of <3 whenever possible.

Pruning can be effective in controlling light infections of dwarf mistletoe. Cut off branches up to and including the highest infected branch, making sure to remove the entire branch. Do not leave isolated branches below the infected ones, even if they seem to be infection free. If possible, remove branches two feet up from the last infected branch to eliminate young infections that are not easily detected. This type of control is most effective in scattered trees with infections low in the crown.

Like many problems encountered in the forest, dwarf mistletoe can be managed to minimize damage and new infections. Know the condition of your forested land. If you find problems and identify them early, greater success in maintaining and controlling those problems can be achieved.

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Type of mistletoe	Primary host	Secondary host	Insignificant hosts	Immune
larch dwarf mistletoe	western larch	subalpine fir, lodgepole pine, mountain hemlock	ponderosa pine, grand fir, western white pine	Douglas-fir, western hemlock
Douglas-fir mistletoe	Douglas-fir	none	grand fir, Engelmann spruce	western larch, pines
ponderosa pine dwarf mistletoe	ponderosa pine	none	lodgepole pine	true firs, Douglas-fir, western larch, western hemlock
lodgepole pine dwarf mistletoe	lodgepole pine	none	ponderosa pine	true firs, Douglas-fir, western larch, western hemlock