Douglas-Fir Dwarf Mistletoe

Large brooms, small aerial shoots

Pathogen—Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) causes large brooms but has very small shoots. Aerial shoots are olive green, average 4/5 inch (20 mm) long (maximum 3 inches or 8 cm) and 1/25-1/16 inch (1-1.5 mm) in diameter, and have fan-shaped branching (fig. 1).

Douglas-fir dwarf mistletoe occurs throughout the range of Douglas-fir in the central and southern mountains of Colorado. It is absent from northern Colorado (except for the extreme northwest) and from the portion of Wyoming in the Rocky Mountain Region (fig. 2).

Hosts—Douglas-fir dwarf mistletoe primarily infects its namesake, although several true firs and spruces are occasional or rare hosts.

Signs and Symptoms—Douglas-fir dwarf mistletoe has the smallest shoots (fig. 3) of all mistletoes in the Region, but it can form the largest witches' brooms (fig. 4). Douglas-fir infections grow along with the infected host branches (systemic infection). Mistletoe shoots may be spread along young host branches or be aggregated near the annual bud scars. Because shoots are so small, they are normally detectable only in branches close to the ground. Witches' brooms, which are used for detection and rating, become noticeable about 10 years after infection and develop best in direct sunlight. Brooms occur mostly in the lower half of tree crowns. They can weigh hundreds of pounds, can break off of the tree, and are considered hazards in developed sites.

Figure 1. Douglas-fir dwarf mistletoe parasitizing Douglas-fir. Note that the mistletoe plants are growing with the branch (systemic infection). *Photo: Robert Mathiasen, Northern Arizona University.*

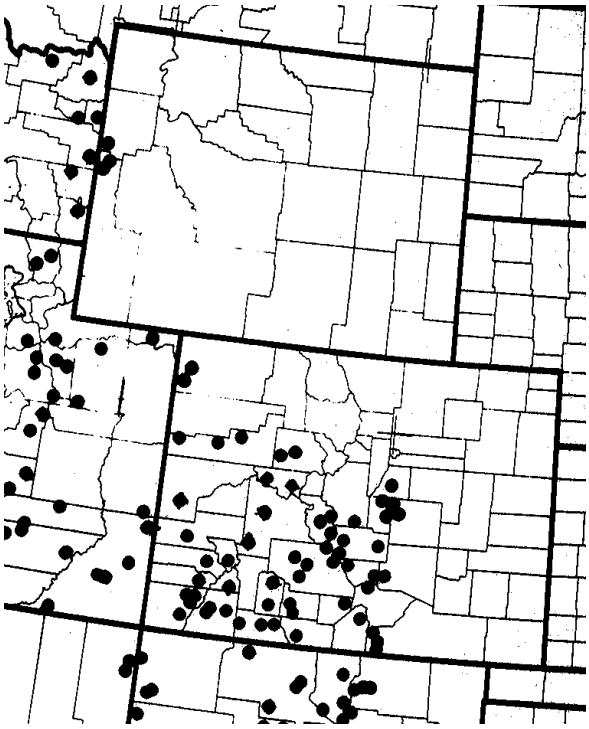

Figure 2. Distribution of Douglas-fir dwarf mistletoe in the Rocky Mountain Region (from Hawksworth and Wiens 1996).

Figure 3. Douglas-fir dwarf mistletoe plants, which are approximately the same length as the host's leaves. *Photo: USDA Forest Service.*

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Figure 4. Large brooms are typical in Douglas-fir heavily infected with Douglas-fir dwarf mistletoe. *Photo: USDA Forest Service.*

Figure 5. Trees heavily infected with Douglas-fir dwarf mistletoe typically die from the top-down, causing dead (spike) tops. *Photo: USDA Forest Service.*

Impact—Dwarf mistletoe is the most detrimental disease of Douglas-fir. Damages typically associated with dwarf mistletoe infection are: growth reduction, spike tops (fig. 5), reduced cone and seed production, and mortality. Infections have reportedly increased in abundance since the late 1800s. In northern Idaho and western Montana, Douglas-fir stands have become more widespread due to fire suppression, a history of selective harvesting that removed pines and encouraged shade-tolerant species, and white pine blister rust, which largely eliminated western white pine.

Data on growth effects from western Montana indicate that light, medium, and severe infections caused decreases in basal area growth rate of 14, 41, and 69%, respectively. Effects on height growth were similar. Horizontal spread in single-storied stands is estimated at 1.5-2 ft (45-61 cm) per year. Upward spread in crowns is about 4-6 inches (10-15 cm) per year.

Please see the Introduction to Dwarf Mistletoes entry for disease cycle and management information.

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1. Hadfield, J.S.; Mathiasen, R.L.; Hawksworth, F.G. 2000. Douglas-fir dwarf mistletoe. Forest Insect and Disease Leaflet 54. Washington, DC: U.S. Department of Agriculture, Forest Service. 9 p. Online: http://www.fs.fed.us/r6/nr/fid/fidls/douglasfirdm.pdf.

2. Hawksworth, F.G.; Wiens, D. 1996. Dwarf mistletoes: biology, pathology and systematics. Agricultural Handbook 709. Washington, DC: U.S. Department of Agriculture, Forest Service. 410 p.