

Getting to know mistletoe

This Northwest-native parasitic plant can be viewed as a pest, as a resource, or both

By David Shaw

Unbeknownst to most people, there are many mistletoes throughout the Pacific Northwest, with the highest diversity in Southern Oregon and Northern California. There are 13 species of mistletoes in Oregon alone.

Mistletoes are perennial, parasitic, flowering plants that attach to the above-ground stems of other plants. Some may be very host specific, others not.

There are more than 2,000 species of mistletoes in the large sandalwood order (*Santalales*). The order includes five families, which have arisen independently.

Mistletoes in the largest family, *Loranthaceae*, have showy flowers that are pollinated by birds. Different birds consume the fruit and then disperse the seed. This family is mostly tropical and subtropical throughout the globe. In North America, the loranthaceous mistletoes are limited to Mexico.

In the U.S., there are two genera in the family *Viscaceae*: *Arceuthobium*, the dwarf mistletoes (nine species in Oregon; see Figure 1), and *Phoradendron*, the leafy mistletoes (four species in Oregon; see Figure 2).

Dwarf mistletoes and leafy mistletoes are dioecious, which means they



Figure 1. True fir dwarf mistletoe (*Arceuthobium abietinum*) on white fir, Southern Oregon.

both have separate male and female plants. Their flowers are very small and have nectar. However, the spatial patterns of these mistletoes on the landscape are driven by very different dispersal systems.

The leafy mistletoes produce a berry that is consumed by birds, which

then disperse the seed. The dwarf mistletoes, by contrast, discharge their seeds explosively. It's unusual for birds to consume the berries.

Where mistletoes grow

Mistletoes around the world are mostly considered pests, especially ▶



Figure 2. Dense mistletoe (*Phoradendron densum*) on western juniper, Southern Oregon.



Figure 3. Oak mistletoe (*Phoradendron villosum*) on Oregon white oak near Corvallis.

on fruit and nut trees in tropical/sub-tropical Asia and India, and on pecan and almond trees in the U.S.

The key principal hosts of dwarf mistletoes in the Pacific Northwest include ponderosa pine, lodgepole pine, grand/white fir, western hemlock, and eastside and southwestern Oregon Douglas fir. The aerial shoots are small, perennial and leafless (Figure 2). They can cause large deformations called witch's brooms, and have an impact on growth, while the aerial shoots remain diminutive.

For leafy mistletoes in the Pacific Northwest, the most common host is Oregon white oak. From the Willamette Valley south through California oak forests, large shrubs of oak mistletoe (*Phoradendron villosum*) grace the canopies of many trees (Figure 3). The juniper mistletoe (*Phoradendron juniperinum*) shows up wherever juniper grows, particularly in the western juniper woodlands of eastern Oregon and south of Bend.

In Southern Oregon and Northern California, *P. libocedri* occurs on incense cedar, and *P. densum* on juniper and cypress. In all, that gives

Oregon four species of *Phoradendron* (Table 1).

The oak mistletoe in Oregon white oak is rather poorly studied. The northern range of oak mistletoe in the Willamette Valley ends just south of Portland. For some reason, oak mistletoe has not moved into the Columbia River Gorge, nor has it crossed into Washington. It has not colonized oaks in the eastern Cascade foothills of Oregon, either.

Like most mistletoes, the plant loves light and does very poorly in the shade, especially of conifers. The seed can only penetrate the bark of younger twigs, and therefore colonizes the outer and upper canopy of trees. The perennial plant develops in place, eventually causing the stem to swell at the infection site.

The mistletoe is initially in the outer canopy, but as the tree ages and the branches continue to grow, it eventually is shaded in the interior, unless the plant is in the upper crown of a mature tree. Often, one can observe a garden of mistletoe plants across the top of mature oak canopies.

Whenever the spatial patterns of mistletoe are studied, all mistletoes

seem to fit the same pattern; they tend to occur mostly in the largest trees of their hosts and are clumped or aggregated in patches.

Mistletoe seeds are covered with a sticky substance called viscin. This amazing substance allows the seed to stick to its host or anything else. It is also lubricated by wetting, allowing the seed to slide down leaf petioles, conifer needles and twiglets, until it comes in contact with the branch, where it appears to “glue” the seed in place.

The seeds of *Viscaceae* are also unique in that the endosperm has chlorophyll, unlike any other angiosperm seed.

The mistletoe you know

Perhaps the best-known mistletoe is the European mistletoe, *Viscum album*. It was used by pagans in Europe, and today, it is commercially produced. It has a host range of more than 400 mostly hardwood tree species. *V. album* is composed of several subspecies which also occur on pine and true fir in Europe.

There are many folklore legends about mistletoe, from Frazer's “golden bough,” which was a European mistletoe branch, to pagan winter fertility rites

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Figure 4. European mistletoe (*Viscum album*) on black locust near Sebastopol, Calif.

that occurred under mistletoe-laden tree crowns. And we all know about kissing under the mistletoe during the Christmas season.

Around the year 1900, the famous horticulturist Luther Burbank imported seed of the European mistletoe and introduced the plant to Sebastopol, Calif. on fruit trees. His idea was to grow the mistletoe for the Christmas ornament industry. The mistletoe persists to this day in Sonoma County, but has only spread about 15 miles, occurring on horticultural trees such as black locust, poplar and maple (Figure 4).

Luckily, the European mistletoe does not occur on most of the native trees in Sonoma County, such as redwoods, Douglas firs or native oaks. I personally have purchased boughs of *V. album* from Girl Scouts at the Safeway in Sebastopol.

Apparently, when the idea of eradication was proposed, the public was not supportive. The European mistletoe has also been reported in Vancouver, B.C.

Keeping it under control

Should oak mistletoe be considered a pest in Oregon? Well, that depends ►

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The general consensus is that a few plants in the crown won't affect tree vigor. Eventually, however, mistletoe can become well established enough in the host's crown to cause decline and die-back. This can take decades to occur.

The best-known control for oak mistletoe is pruning to remove and kill it. Make the cut about 2 feet below the obvious swelling caused by the mistletoe plant. However, if an oak tree is heavily infected, pruning out all the plants may remove all the branches, leading to decline of the host tree anyway. Therefore, it's best to begin when there are few plants in a tree crown, before it becomes fully occupied.

There are also these lesser approaches:

- Removing the aerial shoots. This will not kill the plant. The root-like endophytic system will stay alive in the branch and can re-sprout.
- Band-Aid approach. Some have tried removing shoots and wrapping the location with aluminum foil or duct tape to prevent re-sprouting.
- Growth regulators. No herbicides are registered for control of oak mistletoe, although the growth regulator Ethephon is registered for use. Ethephon causes the aerial shoots to fall off, but does not kill the plant. Therefore, the aerial shoots can come back and require re-treatment.





Benefits to wildlife

Oak mistletoe, a native plant, may provide benefits to wildlife and other biota in two ways. First, the plant itself can provide them with resources. Second, the plant can improve tree habitat.

Oak mistletoe flowers in mid-to-late summer, providing a nectar/pollen resource to pollinators at a time when most other native plants have already flowered out. The female plant may have many berries that mature in late fall and early winter, again providing a resource when other resources are scarce.

Birds such as American robins, western bluebirds, Townsend's solitaire

TABLE 1. Leafy (*Phoradendron* spp.) mistletoes of Oregon, principal and other hosts, and general geographic occurrence.

				
	PRINCIPAL HOST	OTHER HOSTS	GEOGRAPHIC DISTRIBUTION	
1 Dense mistletoe (<i>Phoradendron densum</i>)	Western juniper	In Oregon, only Western juniper	Extreme Southern and Central Oregon	
2 Incense cedar mistletoe (<i>P. libocedri</i>)	Incense cedar	None	Southern Oregon	
3 Juniper mistletoe (<i>P. juniperinum</i>)	Western juniper	In Oregon, only Western juniper	Central and Southern Oregon	
4 Oak mistletoe (<i>P. villosum</i>)	Oregon white oak, California black oak, red oaks in cities	Manzanita, locust, alder, aspen, buckeye, European birch, sycamore, walnut, willow	Western Oregon, I-5 corridor; not in Portland city limits, but just south	

and starlings are thought to feed on mistletoe berries and disperse the seed. Oak mistletoe infection introduces complexity to the tree crown, which diversifies the biota of oak canopies.

The mistletoe infection site typically becomes swollen. After many years, it may produce a distinctive deformation that is colonized by decaying fungi, making habitat for cavity-nesting birds. Partially dead crowns with large deformations and many mistletoe plants make great wildlife habitat.

Markets for mistletoe

In Oregon, oak mistletoe is the local mistletoe that is collected as a Christmas ornament. In California, oak mistletoe, European mistletoe and large-leaved mistletoe (*P. macrophyllum*) are collected and sold. The female plants with berries are the most sought-after plants for sale, as the white to pinkish-white berries add a delightful ornament to the evergreen plants.

If you purchase mistletoe plants in packaging, these may be *P. serotinum* from the eastern U.S., or the European mistletoe that is collected by the ton in the United Kingdom for Christmas decoration.

Other than Luther Burbank's attempt, I am not aware of anyone in the U.S. who grows mistletoe commer-

cially, but who is to say this couldn't be done with our local species? ☺

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