FOREST HEALTH FACT SHEET

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Diseases and Insect Pests of Pacific Madrone

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Pacific madrone *(Arbutus menziesii)* is a broadleaf evergreen tree famous for its smooth, reddish-orange bark (Figure 1). A Pacific Northwest native, it grows from southern California to Vancouver Island. In Oregon[1], Pacific madrone is most abundant in Jackson, Josephine, and Douglas counties, but it grows in every county west of the Cascade crest, usually on warm sites with shallow, rocky soils.

As an evergreen, madrone retains foliage throughout the year. New leaves emerge each spring. As the year progresses, these leaves often acquire spots or discolorations as a result of foliar pathogens and, sometimes, insect activity. The foliage may appear unsightly. This is normal. By midsummer, most or all of these leaves are shed, leaving only the new growth from spring. In drought years, or in a year after heavy fruiting, new growth may appear very stunted.

Madrone does not tolerate shade—even its own. A tree will lose lower branches that are shaded by the upper portion of its canopy. Because madrone resprouts vigorously after cutting or fire, it often will dominate the canopy initially. Over time, however, trees that are more shade tolerant may crowd its sides or overtop it. Then the tree will begin to decline in vigor; it may show more symptoms of foliage and other diseases and eventually may die.

Madrone is drought tolerant. In natural settings, it is well adapted to survive long, hot summers with little or no rain. Extended droughts, however, may reduce tree vigor and increase disease susceptibility.

Madrone Diseases

Three major types of disease affect madrone: foliage diseases, branch dieback and trunk canker diseases, and root diseases.

Figure 1. Madrone's evergreen foliage, its cinnamon-color, peeling bark, and its twisting trunk make it a favorite landscape tree.

Foliage diseases

Figure 2. Leaf spot caused by fungal pathogens. Photo: Alan Kanaskie, Oregon Department of Forestry.

More than a dozen fungal organisms can cause leaf spots and dead regions on madrone leaves, and the specific disease can be difficult to identify. For all these foliage diseases, however, young leaves are infected by airborne or water-splashed spores during wet weather, often in spring. Trees growing in creek bottoms, valleys, and the forest understory are most likely to be infected.

Many foliage diseases cause circular to irregular spots about 0.25 to 0.5 inch in diameter (Figure 2, above, and Table 1, page 2). These may remain small or grow into a foliage blight, causing irregularly shaped, dead areas that coalesce and eventually may kill the entire leaf (Figures 3 and 4, page 2). A related disease, tar spot, produces irregularly shaped, black, tarlike spots on the undersides of leaves. These diseases may result in unsightly foliage but seldom are serious. They may lead to an increase in tree stress, however.

What can you do? In the home landscape, pruning dead branches and raking and destroying fallen leaves before

[1] In the southern part of madrone's range, its name is pronounced "mah-drone"; in the north, it's "mah-dron-ahh." Long-time residents in the south sometimes call it laurel.

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fall rains may help reduce the spread of spores and infection of new leaves. Reducing competition for light helps, too; see "Maintaining Madrone Health," page 4. In the forest, minimizing shading and reducing competition will help the tree.

Twig dieback and trunk cankers

These diseases are caused by fungi that kill the cambium (the growth layer inside the bark). The bark initially looks discolored, then peels off, revealing blackened, cracked wood that almost looks as if it's been burned. Madrone twig dieback (Figure 5) progresses from branch tips and works downward. It is associated with drought and is especially common in years following heavy flowering and berry production.

Figure 3 (above left). Madrone with foliage blight.

Figure 4 (above right). A closeup view of the foliage blight. Though it looks bad, it won't kill the tree; note the healthy green bud.

Figure 5 (above). Often associated with moisture stress, madrone twig dieback is a fungal disease that progresses from branch tips downward into the rest of the tree.

Madrone canker occurs on the main trunk or major branches (Figure 6), but also can be on smaller twigs and in the flowering stalk. It usually develops after bark injury. Cankers may spiral around the trunk or branch, girdling and killing it. Vigorous trees form a ridge of callus tissue around the margins of the canker, limiting its spread. Rapidly spreading cankers lack calluses. Often, both twig dieback and trunk cankers are present on the same tree. Some trees affected by these diseases may decline rapidly and die in a year or two. More vigorous trees may persist with multiple cankers for years, perhaps decades.

Figure 6. Madrone canker spirals up the trunk at left. A healthy stem is at right.

Table 1. Diseases of madrone.*

Disease category	Pathogen	Disease name
Root rots	*Pythium* spp.	Damping-off
	Phytophthora cactorum	Collar rot *or* basal canker
	*Phytophthora cinnamomi***	Phytophthora root rot
	Armillaria spp.	Armillaria root disease
	Heterobasidion annosum	Annosus root rot
Twig dieback and branch cankers	*Neofusicoccum arbuti (Nattrassia mangiferae, Fusicoccum arbuti, Hendersonula toruloidia)*	Madrone canker
	Botryosphaeria dothidea (Fusicoccum aesculi)	Madrone twig dieback
Wood-decay fungi	*Phellinus igniarius*	
	Fomitopsis cajanderi	Brown top rot
	Poria subacida	Yellow root rot
Foliage diseases	*Ascochyta hanseni*	Leaf spot
	Coccomyces quadratus	Tar spot
	Cryptostictis arbuti	Leaf spot
	Didymosporium arbuticola	Leaf spot
	Diplodia maculata	Leaf spot
	Disaeta arbuti	
	Elsinoe mattirolianum	Spot anthracnose
	Exobasidium vaccinii	Blister blight
	Mycosphaerella arbuticola	Madrone foliage blight
	Phyllosticta fimibriata	Leaf spot
	Pucciniastrum sparsum	Rust
	Rhytisma arbuti	Speckled tar spot

*Adapted from Elliott (1999) ** Hansen (unpublished)

Deep waterings may help prevent twig dieback (but see cautions below, in discussion of root diseases). Minimizing bark injury is the key to preventing cankers. Madrone bark is so thin, it is easily damaged by sunscald (when the trunk is suddenly exposed to sun) or by mechanical wounding. Trunk wraps can protect against sunscald if placed on the tree before it's exposed to direct sun.

Once diseases are established in the main stem, there's not much you can do: no fungicide is known to be effective. If caught early, however, pruning and burning individual cankered branches, shoots, and flowering stalks seems worthwhile. If the canker is partway up a branch, cut it 1 foot or so below the visible canker margin to include any fungus that may have spread into the wood.

Madrone root diseases

These diseases affect the roots and tree trunk. Cankers (areas of diseased tissue) are usually near the base of the tree (Figure 7) but may be farther up the trunk. Infected bark is brown, and sapwood also may be discolored. Loss of foliage and small, curled leaves are common symptoms. Infected trees often die, sometimes rapidly. Moist soil conditions favor the fungus; hence, overwatered trees or trees growing in poorly drained soils are most susceptible.

Other root diseases, such as Armillaria, are typically associated with root wounding (e.g., during trenching) and with poor tree health. These are most common on older trees.

The main way to avoid root disease problems is to avoid overwatering. In home landscapes, watering every day or two on flat or poorly drained ground and/or heavy clay soils is a recipe for trouble. While some individual madrone trees may do all right in these situations, the risk of developing root disease is much higher. On the other hand, deep waterings every 2 weeks or so, underneath the drip line but well away from the trunk, may promote tree vigor during extended summer dry spells.

Figure 7. Root disease (Phytophthora) *canker near ground line. Photo: Ralph Byther, Washington State University.*

Figure 8. Young madrone infected by P. ramorum. *This leaf and shoot/stem blight often follows the midrib and petiole (connecting stem) of the leaf. Photo: P. Maloney and D. Rizzo, University of California, Davis.*

Sudden Oak Death

Pacific madrone is a host species for the fungus *Phytophthora ramorum,* that causes Sudden Oak Death. The disease has not been detected on madrone in Oregon, however. Like the foliage and canker diseases described above, the Sudden Oak Death fungus causes leaf spots (Figure 8), leaf death, and branch dieback. Diagnosis is difficult: individual trees may be infected by *P. ramorum* and other fungal pathogens at the same time. In Oregon, *P. ramorum* is confined at this time to an area in southern Curry County, in and around Brookings.

Wood-decay fungi

Wood-decay fungi typically invade madrone through wounds, either from mechanical injury, as from pruning, or caused by cankers. The presence of wood-decay fungi in a tree often is obvious; for example, exposed heartrot (Figure 9) or conks (shelflike, fruiting bodies of the fungi). Decays usually are

Figure 9. Madrone with heartwood decay is excellent habitat for a number of cavity-nesting species such as woodpeckers, owls, bats, and small mammals. Note the cavity hole at the top and extensive decay exposed at the butt of the tree.

not considered a major factor in poor tree health, but they can be important in large, old trees near houses or in recreation areas. Madrone can remain standing with extensive heartrot for long periods, though heavy snow loads might result in extensive breakage. Unless the tree is a potential hazard, it usually is not important to remove it.

Proper pruning, avoiding wounds, and maintaining good health help avoid wood decays. Madrone is known as a good wildlife tree, because heartrot creates habitat for cavity-nesting birds and animals. Therefore, in trees that pose no risk to people or property, heartrot may be desired for wildlife values.

Figure 10. Fall webworm feeding on madrone foliage. Though unsightly, fall webworm seldom causes significant damage or mortality. Photo: Don Goheen and Ellen Michaels Goheen, USDA Forest Service, Pacific Northwest Region.

Madrone Insect Pests

Insects normally are not a serious threat to madrone health. Insect pests of madrone (Table 2, page 5) include the fall webworm and western tent caterpillar, aphids, and leaf miners. The western tent caterpillar is uncommon on madrone but can occur on it. The fall webworm is much more common on madrone in southwest Oregon (Figure 10). Both form tents, in which the caterpillars rest and feed. The western tent caterpillar tents are most obvious in late spring and early summer; fall webworm tents are more common in late summer and early fall.

These pests are easily controlled by pruning and rarely cause significant damage. Trees that are defoliated may have smaller leaves the following year.

Aphids may attack leaves and terminals of madrone, and their feeding can cause some leaf curling. The pale green aphid produces copious "honeydew," which coats leaves and gives them a sticky look and feel. The best control for aphids is to knock them off, either by hand or with a strong stream of water.

The madrone psyllid is common around flowers on madrone in California but isn't considered a major pest. However, the white, waxlike covering on the psyllid nymphs (the immature insect) makes them obvious and may alarm people.

Several moth caterpillars feed on madrone by mining the leaf, eating only its interior and not the epidermis. Some cause sinuous mines (Figure 11), others are blotch miners, and one is a blotch miner that cuts elliptical holes in the leaf after it finishes mining. The final injury looks like paper punch holes. Damage is usually minor from these insects, and no controls are necessary.

Wood-boring beetles may invade madrone wood that is exposed by injury or cankers, but the beetles are most important and noticeable in dead material, especially firewood. Two roundheaded woodborers are common: the western ash borer and the oak cordwood borer. These insects are known to arrive at firewood piles within hours of cutting during spring and summer, and they can seriously riddle the wood (Figure 12). Adults may emerge from firewood inside the home, but the beetles are not harmful to people or houses.

Figure 11. Madrone leaf damaged by a sinuous leaf miner.

Figure 12. Western ash borer. Adults sometimes infect dead or nearly dead madrone that is cut during the insects' flying period, from late spring through summer, but the borers do not pose a threat to live trees. Photo: John Davis, Stevenson, WA.

Maintaining Madrone Health

In forestland, ensuring that madrone has adequate sunlight will help promote its vigor and longevity. Adequate sunlight means full sunlight from above and at least partial light from the sides. This may require removing overtopping and/or surrounding trees.

In landscape, park, or home settings where shade is not an

issue, avoiding site disturbance within the critical root zone is key to maintaining tree vigor. The critical root zone is the area within the tree's drip line. (Note, however, that the tree's roots may extend well beyond its drip line.) Avoid piling soil over the existing soil surface, trenching, or soil compaction in this critical zone and, if possible, even beyond it.

As noted above, avoid frequent, light waterings and, especially, letting water directly contact the tree trunk. Deep, infrequent waterings away from the trunk but within the critical root zone may promote tree vigor during severe drought periods. In most cases, fertilizer is not necessary or recommended, because it may stimulate foliage growth, resulting in greater moisture stress. Mulching within the critical root zone will help conserve moisture and improve soil conditions. However, avoid piling up mulch against the tree trunk.

Because madrone has thin, easily injured bark, especially if the tree is growing in shade, avoid suddenly exposing the trunk and branches to full sunlight. To avoid this, thin out surrounding trees in fall or winter, or cut down neighboring trees gradually, or wrap the area of the lower trunk with arborist tree wrap.

Table 2. Insect pests of madrone.

Insect families	Pest	Common name
Aphids/Psyllids	*Wahlgreniella nervata*	Pale green aphid
	Euphyllura arbuti	Madrone psyllid
Wood boring beetles (Roundheaded wood borers)	*Neoclytus conjunctus*	Western ash borer
	Xylotrechus nauticus	Oak cordwood borer
Blotch and Serpentine leaf miners (moths)	*Marmara arbutiella*	Sinuous leaf miner
	Coptodisca arbutiella	Paper punch miner
Defoliators and Leaf chewers (moths)	*Hyphantria cunea*	Fall webworm
	Malacosoma californicum pluviale	Western tent caterpillar

For More Information

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