

PITCH MOTHS

Integrated Pest Management for Home Gardeners and Landscape Professionals

The sequoia pitch moth, *Synanthedon sequoiae*, (Figure 1) occurs from California north through British Columbia. This clearwing moth (family Sesiidae) infests Douglas-fir and most pine species, especially Monterey pine in urban coastal areas of Northern California, from Monterey Bay to the San Francisco Bay Area. The Douglas-fir pitch moth, *Synanthedon novaroensis*, (Figure 1) infests Douglas-fir, pines, and spruces from Northern California to Alaska. Its appearance and biology is similar to that of the sequoia pitch moth.

DAMAGE

Pitch moth larval feeding causes infested conifers to produce copious amounts of resin that form globular masses on bark (Figure 2). Larvae cause very little injury to cambium or wood; this damage usually does not cause girdling of the trunk and rarely kills trees. Larval feeding sometimes causes one or more limbs to die or break, especially if infested trees are young. Sequoia pitch moth is the more common of these *Synanthedon* spp. and is usually the only one that is managed. It frequently attacks pines with pruning wounds or other injuries, and its damage is most prevalent in planted Monterey pine (Table 1).

IDENTIFICATION

Infestations are recognizable by the gray, pink, reddish, or yellowish pitch masses that protrude from infested trunks and limbs (Figure 3). Pitch masses initially are small, soft, glistening, and reddish brown to pink. As the larva feeds and grows beneath each mass, the gummy exudate enlarges, hardens, and becomes darker gray. A brownish pupal case (Figure 4) may protrude from the mass after the larva has matured and emerged as an adult.



Figure 1. Sequoia pitch moth female (left) and Douglas-fir pitch moth male (right).



Figure 2. Sequoia pitch moth larvae caused these gummy masses on Monterey pine, which do not threaten tree health or survival.

Old pitch masses can remain on bark for several years. Abandoned pitch masses are often reinfested because egg-laying females are attracted to these injury sites.

People unfamiliar with the damage sometimes confuse pitch moth pitch masses with bark beetle pitch tubes. Bark beetle pitch tubes (Figure 5) are usually less than 1/2 inch in diameter, often have a distinct round hole near the center made by an adult beetle, and may resemble the end of a large gummy drinking straw protruding from bark. Sequoia pitch moth masses ultimately



Figure 3. Removing the pitch mass to expose and kill the larva feeding underneath is the only direct control for pitch moths.



Figure 4. Pupal case of sequoia pitch moth.



Figure 5. Unlike pitch moth masses, the maximum size of bark beetle pitch tubes is much smaller and they often have a distinct round hole near their center.

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become much larger, vary in shape from roundish to an elongated oval, and often lack a distinct emergence hole.

Resinous ooze from pine bark can have other causes, including *Diplodia* canker, western gall rust, injuries such as pruning wounds, and pitch canker, caused by the fungus *Fusarium circinatum*. Unlike the distinct pitch protrusions of bark beetles and pitch moths, if injuries or pathogenic fungi are the cause, bark usually becomes coated with a thin layer of resin resembling thick syrup (Figure 6). In addition, bark discolors due to pitch canker, while bark around beetle and pitch moth attacks is not discolored.

Pitch canker can infect pine tissue of any age, including young branches and terminal shoots the diameter of a pencil; bark beetles and sequoia pitch moth attack primarily the main trunk, although they sometimes attack large limbs several inches in diameter. Unlike the natural shed of older (inner branch) needles throughout the tree during late summer and fall, pitch canker can cause dying, yellow and red needles to appear at any time of year. Pitch canker causes dead branches scattered throughout the tree, and it can eventually kill the entire pine tree. When bark beetle feeding causes foliage color to fade to yellowish green, then to tan and red-brown, this tree decline and dieback typically appears first only at the tree top (due to *Ips* beetles). Sometimes the entire tree fades and dies (from *Dendroctonus* species and others) without being preceded by scattered branch dieback. However, these symptoms of tree decline and death can also be due to other causes. For more information, see *Pest Notes: Bark Beetles*, *Pest Notes: Pitch Canker*, and *Pests of the Native California Conifers* in Suggested Reading.

Pitch moth adults are day-flying moths, distinguished from other moths by their mostly clear wings with blackish margins. The Sequoia pitch moth's head, legs, and thorax are blackish and yellow. The abdomen is covered with blackish and yellow hairs in alternating bands, resembling a paper wasp or

yellowjacket wasp. Females are somewhat larger and plumper than males. The adult's body is about 3/4 inch long with a wingspan of 3/4 to 1 1/4 inches. Although the colors and erratic flight behavior of adults resemble those of paper wasps, clearwing moths (including pitch moths) are not wasps: they do not sting and are harmless to people and pets.

The adult Douglas-fir pitch moth is orange and black, instead of yellow and blackish as with sequoia pitch moth. Douglas-fir pitch moth biology, life history, and management methods are similar to those of sequoia pitch moth, but Douglas-fir pitch moth usually is not managed in landscapes.

LIFE CYCLE

Most pitch moth individuals require two years to develop from egg to adult. Because not all pitch moths emerge from pupae at the same time, adults can be present anytime from May through early September. Adults emerge earlier at warmer inland sites and later at cooler sites near the coast. Peak emergence occurs in June and July.

Adults live only a few days, during which they mate, and females lay eggs individually on bark, usually in crevices around pruning wounds and other injury sites. Eggs are 1/16 inch in diameter, reddish brown, oval, and somewhat flattened. They hatch in about two weeks.

The insect spends most of its life in the larval stage. The dirty white, grayish, or pink larva feeds for months, excavating a shallow cavity that penetrates the inner bark to the cambium surface of wood. After feeding as a larva, the pitch moth develops into dark brown pupa that is about 3/4 inch long. The pupa sits in a chamber within the pitch mass for about a month, then moves to the surface just before the adult emerges. After the adult has emerged, the brown, thin-walled pupal case remains protruding from the surface of the pitch mass, or drops and lands in a bark crevice or on the ground.



Figure 6. Pitch canker resinous exudate on Monterey pine.

MANAGEMENT

Protect trees from injury, as moths prefer to lay eggs on bark near pruning wounds and other injury sites. Provide trees with proper cultural care, especially appropriate irrigation, to increase a tree's ability to tolerate pitch damage. The only direct control is to pry off or carefully scrape away each pitch mass to expose and kill the larva or pupa (Figure 3). No other control is known or recommended. Insecticide applications have been found not to be effective for pitch moths.

Cultural Control

Small limbs infested with larvae and pitch masses can be pruned off, but this is not recommended, as it can lead to future infestations around the pruning wound. If pines must be pruned, prune only from October through January, so that injuries begin to close before egg-laying adults emerge in spring. Prune in a way that enhances wound closure, by making cuts just outside the branch bark ridge and branch collar.

Stake pines only if needed to protect or support the trunk or to anchor the root ball during the first year or so after planting. Remove any stakes that came from the nursery and, if needed,

restake the plant. Do not tie or fasten trunks firmly; allow the main stem to flex without rubbing on stakes. Remove ties and stakes promptly when they are no longer needed, usually within two years after planting. For more information, see *Planting Landscape Trees* listed in Suggested Reading.

Keep weed trimmers and lawn mowers away from trunks, and maintain an area several feet wide around the base of each trunk that is free of turf and other vegetation. Also protect trunks from other sources of injury, such as from vehicle bumpers.

Plant only species that are properly adapted to the area. Certain pines are much less susceptible to sequoia pitch moth than others, so consider planting a more resistant species (Table 1). Learn

the cultural requirements of pines, and provide proper care to maintain vigorous growth.

Appropriate irrigation is especially important to tree health. Inappropriate watering, whether it is too frequent or inadequate irrigation, damages trees, and this is probably the most common problem with landscape plants. When irrigating established trees, apply water beneath the outer canopy, not near trunks. Avoid the frequent shallow watering that is often used for lawns. A general recommendation is to irrigate infrequently, possibly once a month during drought periods, but with sufficient amounts so that the water penetrates 1 to 2 feet into the soil. This can be achieved by applying water slowly through drip emitters that run continuously for about one to three days. The

specific amount and frequency of water needed varies greatly depending on the site and tree species.

Physical Control

Scraping away or prying off resinous pitch cankers is the only recommended, direct method of controlling pitch masses and larvae. If resin masses are carefully excised, larvae or pupae can be found and killed. Properly removing pitch masses from all nearby trees, along with appropriate cultural practices, can reduce reinfestations and control local clearwing moth populations. Inadequately removing pitch masses allows a larva or pupa to survive and mature into an adult that can reinfest trees. Only one larva or pupa occurs in each pitch mass, although several adjoining masses sometimes merge. Unless the mass has become reinfested,

Table 1. Relative Susceptibility of Pines (Pinus species) to Sequoia Pitch Moth.¹

	Common name	Scientific name
Most susceptible	Afghan, Aleppo, Brutia, Calabrian, Mondel, Turkish, and others ²	<i>P. brutia</i> , <i>P. eldarica</i> , <i>P. halepensis</i>
	Bishop	<i>P. uricata</i>
	Japanese black	<i>P. thunbergiana</i>
	Mexican	<i>P. patula</i>
	Monterey	<i>P. radiata</i>
	Ponderosa	<i>P. ponderosa</i>
	Shore or Beach	<i>P. contorta</i>
Least susceptible	Canary Island	<i>P. canariensis</i>
	Italian stone	<i>P. pinea</i>

¹ Pines are more susceptible to pitch moths if pruned or otherwise injured.

² Various common and scientific names are used for these closely related Asian and European natives. Many species are quite susceptible, but their susceptibility varies, and confusion among names makes them difficult to distinguish.

Adapted from Frankie, Fraser, and Barthell 1986.

Table 2. How to Distinguish New Pitch Masses from Older Ones and Where to Locate the Borer.

	Pitch mass appearance	Insect appearance	Insect location
Young pitch mass	smaller, soft, glistening, pink to reddish brown	larva white, pink, or yellowish with a brownish head; larva can be as small as 1/12 inch, but pitch is usually overlooked until larva is about 1/8 inch	larva usually beneath pitch mass in bark cavity on phloem wood, scoop inside and slightly upward within cavity to remove pitch and kill the larva
Older mass	larger (up to about 3–5 inches), harder, darker grayish	larva up to about 1 inch long, body is dark gray to black before forming a dark brown pupa	larva usually in pitch mass or pupating in tunnel near surface of mass
Abandoned mass	darker gray, relatively dry, often cracked and more flattened than young masses	no insect present, old mass can remain on bark for several years after insect emergence, mass may become reinfested	an empty, brownish, papery pupal case may protrude from mass
Reinfested mass	abandoned mass (hard, gray, larger) exhibits newer pitch exuding from center, margins, or both; pitch may appear fresh (glistening, reddish brown to pink) or older (grayish) depending on age of reinfestation	insect appearance and location vary depending on age as described above	insect appearance and location vary depending on age as described above

no insect will be present in masses older than about two years, because the insect will have matured and emerged as an adult.

Each pitch mass gradually enlarges, hardens, and darkens as the larva beneath it matures. Learn to distinguish newer pitch masses from older ones in order to recognize where the insect is most likely to be found (Table 2).

Larvae are easily overlooked, because their pinkish to gray color resembles the color of pitch. Young larvae, those found in smaller pinkish masses, typically occur below the bark surface within a small cavity that they have chewed in the inner bark. Pupae and older, larger larvae occur in grayish pitch masses. These older insects are usually found near the surface of the mass, somewhat outward from the bark cavity they had created when younger.

If pitch masses are simply scraped away without actually locating and killing or disposing of the larva or pupa, the insect can survive and cause a new pitch mass to develop at that site. Pupae or older larvae can survive in discarded pitch masses unless insects are crushed or bagged and disposed of away from trees.

Gently pry or scrape a pitch mass off of the bark using a screwdriver or stiff putty knife. Locate the insect on the underside of the mass or in the tree wound and puncture or crush the larva or pupa. Work carefully to avoid further wounding of the bark. Because they are harder and larger, older masses are relatively easy to remove by prying at several locations around their edges until the whole mass can be lifted off. Smaller masses have a softer, stickier consistency that may have to be scooped out. Unless the larva is definitely located and killed during pitch removal, scrape slightly upward within the bark cavity and remove as much of the pitch as possible to increase the likelihood of killing the young larva.

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SUGGESTED READING

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