

Management Guide for
Red Turpentine Beetle
Dendroctonus valens LeConte (Coleoptera: Scolytidae)

<p>Hosts (primarily):</p> <ul style="list-style-type: none"> • Ponderosa pine • Lodgepole pine • Monterey pine • Coulter pine 	<p>Red Turpentine Beetle is not considered to be a tree killer, but its attacks may indicate that the tree is stressed and at increased risk of dying.</p>
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Key Points

- Not usually a tree killer
- Usually associated with damage from other insects or diseases or acute tree stress
- Prevent attack by limiting predisposing factors

Introduction

The red turpentine beetle (RTB) is the largest (1/4 – 3/8th inch long) and most widely distributed bark beetle in North America. It is a common pest of forest, shade, and park trees 8 inches or larger in diameter. It has been recorded from at least 40 species of domestic and foreign conifers, but is most commonly found on ponderosa, Monterey, and Coulter pines. It is not considered to be a tree killer, but its attacks may indicate that the tree is stressed and at increased risk of dying. There is evidence that red turpentine beetle can kill Monterey pines.

Outbreaks of this beetle have not been extensive or severe. red turpentine beetle is most frequently found in individual trees or in groups of trees in localized areas.

Stressed pines are the most common host.

Adults are attracted by the odor of tree pitch or resin. Adults primarily attack freshly cut stumps or the bases of trees that are dying. Freshly cut logs with thick bark may be attacked, but they will not produce large numbers of beetles. Red turpentine beetle may be attracted to healthy trees near freshly cut logs and lumber and to stands attacked by other bark beetles.

Red turpentine beetle has been destructive in areas disturbed by fire, logging, land clearing, or construction. In some stands up to 3% of pines remaining after logging have been attacked. On construction sites, injured trees or those adjacent to fresh lumber frequently become infested.

Red Turpentine Beetle Management

1. **Prevention.** Thin pine stands to maintain tree vigor. Avoid damaging trees. Salvage promptly any trees that are damaged or diseased.
2. **Chemical pesticides.** Can be used to temporarily protect high-value trees during periods of drought or other stresses.
3. **Pheromones.** Reduce beetle populations using attractant-baited funnel traps.

Damage

All serious damage by red turpentine beetle has been to pines. Monterey pine is the tree most frequently killed and ponderosa pine is the most frequently attacked. Attacks on other genera of conifers- spruce, larch, true fir, and Douglas- fir- are infrequent and have never led to serious losses.

Seldom are healthy trees killed. Usually trees of poor vigor or those infested with other bark beetles are attacked. However, populations may build up in areas disturbed by

fire, logging, or land clearing. Injured trees, stumps, or trees near fresh lumber or slash can be infested and residual healthy trees nearby may be killed.

Red turpentine beetle attack trees wounded or stressed by construction activities, like paving, grading, trenching or root smothering. Damage from red turpentine beetle can be prevented by not conducting any of these activities within 40-50 feet of the large pines.

Seldom are healthy trees damaged

Host Range

In the Northern and Intermountain Regions most frequently attacked:

- Ponderosa pine (*Pinus ponderosae*)
- Lodgepole pine (*Pinus contorta*)

In North America the most frequently attacked:

- Ponderosa pine
- Monterey pine (*Pinus radiata*)
- Coulter pine (*Pinus coulteri*)

Red Turpentine Beetle has been found on over 40 species of conifer including larch (*Larix* sp.), spruce (*Picea* sp.) and white fir (*Abies concolor*).

Life History

Adult beetles initiate new attacks

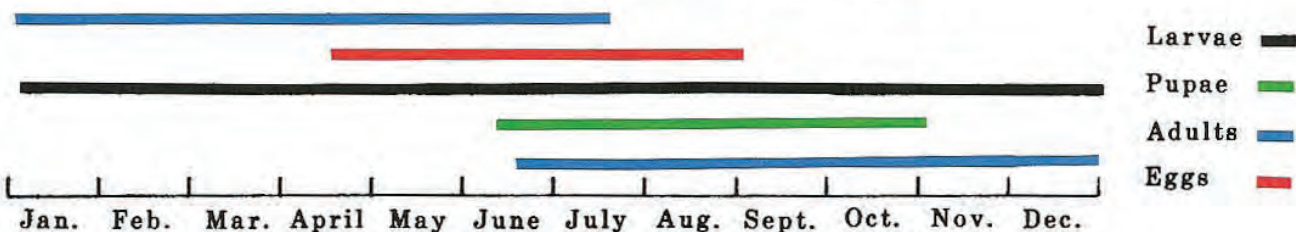
Red turpentine beetle peak flight and attack activity usually occur in the spring. Beetles emerging from recently cut stumps and dying trees and attack trees, exposed roots, or freshly cut stumps. The female bores inward through the outer corky bark and inner, spongy phloem to the surface of the wood where she is quickly joined by a male. The pair generally bore downward, although at first the gallery usually has a lateral or even slightly upward direction. Where attacks are made just above the ground line, the gallery may extend below the ground line and along the larger roots. Boring may

exceed an inch a day. Typically one pair of beetles is found per gallery, but 1, 3, or 4 adult red turpentine beetles may be present.

Egg galleries

Eggs are laid in an elongate mass along the side of the gallery and are partitioned off from the adult gallery by a wall of pitchy borings. The egg mass may extend from 1 to several inches along the gallery; the number of eggs in it varies from a few to more than a hundred. A single female may deposit one or more groups of eggs farther along the gallery, usually several inches or more below the previous group.

Red Turpentine Beetle Life Cycle



The parent beetles continue to feed in the gallery for several weeks, and then they either bore out through the bark and make additional attacks or die within the gallery.

Larval feeding

In summer eggs hatch in 1-3 weeks. A unique feature of red turpentine beetle is that the small larvae feed gregariously where as most other bark beetle larvae maintain separate feeding tunnels. red turpentine beetle larvae tunnel away from the adult gallery. As they grow they feed more extensively and make an irregularly margined, fan shaped gallery. Larvae feed side by side in an irregular line, steadily moving forward into fresh tissue. Their feeding kills patches of cambium which may vary from a few inches to more than a foot wide.

Pupation

As larvae complete their feeding they scoop out bits of wood or bark to make separate pupation cells. The cells are located between the bark and the wood, either in the area of the gallery or a short distance forward in the fresh inner bark. Here the larvae pupate then

emerge as adults.

New adults emerge from galleries

New adults move around in the gallery area for a few days to several months. In warm weather they soon bore outwards through the bark and fly to new host material. Several adults may use the same exit hole. The adult beetles are capable of flying more than 10 miles.

The rate of development and number of generations per year are largely dependent upon temperature. In most areas there is at least one generation of red turpentine beetle per year. In northern areas and at high elevations, 2 years may be required for a single generation. In southern areas at low elevations, there may be as many as three generations per year.

In the warmer parts of their range, the beetles' flight may occur during intermittent warm periods in the winter and new attacks may occur at nearly any time of the year. In the colder parts winter is passed in hibernation, chiefly in the adult stage and to a lesser extent in the larval stage. Pupae and eggs rarely overwinter.

Assessing Red Turpentine Beetle Damage

Signs of Attack

Red turpentine beetle attacks generally start near ground level and rarely occur above eight feet. Attacks are often accompanied by the presence of light pink to reddish brown pitch tubes around the base of the tree and/or white granular material on the ground.

Pitch tubes vary in size, texture, and color depending on the kind of tree and the relative amounts of bark borings and frass embedded in

the resin. The resin is usually white to yellow and the borings are red. On pines red turpentine beetle pitch tubes may be as large as 2 inches in diameter, much larger than the pitch tubes of other pine infesting bark beetles. On other species of trees which produce little resin (such as fir or spruce) the pitch tubes may be small or absent, but boring dust or small pitch pellets may be found on the ground around the base of the tree.

A unique feature of Red Turpentine Beetle is that the small larvae feed gregariously where as most other bark beetle larvae maintain separate feeding tunnels.

Attacking adults are attracted by the odor of tree pitch or resin

Red Turpentine Beetle Attacks—

- Generally start near ground level and rarely occur above eight feet
- May occur over a period of two years or more, especially on vigorous trees.
- Have been destructive in areas disturbed by fire, logging, land clearing, or construction

Pitch masses of an inch or more in diameter that occur higher on the trunk or on the branches are probably due to attacks by the Sequoia Pitch Moth.

Red turpentine beetle is the largest (1/4-3/8th inch long) and most widely distributed bark beetle in North America.

Factors that may help Red Turpentine Beetle by decreasing resin production—

The introduction or invasion of blue stain fungi which grow in the sapwood surface of the gallery.

Lowering of the sapwood moisture content as a result of beetle feeding activity.

Red turpentine beetle attacks, especially on vigorous trees, may occur over a period of two years or more.

Often crown fading from green to yellow to sorrel and red lead to the discovery of red turpentine beetle attacks. In most cases crown fading is a direct result of associated attacks by other insects, primarily bark beetles, not red turpentine beetle.

Evaluating Attacks

Pitch tubes are the result of the trees defensive reaction to red turpentine beetle attack. As long as the tree continues to release resin, pitch tubes are formed and the tree is resisting attack. A few pitch tubes on an otherwise healthy tree or old pitch tubes that are hard and have turned yellow are generally not a

reason for concern.

The appearance of 5 or more new pitch tubes over a one to two month period warrants a more careful inspection of the tree to determine why it is being attacked. Injury, disease, or attacks by other bark beetles are likely causes for repeated red turpentine beetle attacks. A tree that exhibits symptoms of stress and has many red turpentine beetle attacks is at high risk for mortality.

In vigorous trees the flow of resin apparently prevents egg-laying. Beetles may remain in these trees expanding their galleries laterally or vertically but they seldom deposit eggs.

When Assessing Tree Vigor Consider:

Stressed trees often exhibit crown symptoms such as:

- Needles shorter than normal.
- Poor needle retention, resulting in tufts of foliage at branch ends (lion's tail) and a thin crown that is easy to see through.
- Off-color, chlorotic foliage.
- Slow height growth, resulting in a flattened, rounded top.
- Excessive amounts of dead or dying branches.

In contrast, a vigorous fast growing tree will have a pointed top and a full green crown.

Wounding can attract red turpentine beetle:

- Has there been any major wounding to the trunk or roots of the tree? Have roots been cut?
- Have the roots been disturbed by soil compaction, sidewalks or pavement ?

Management Considerations

Prevention

The most effective way to prevent red turpentine beetle attacks is to maintain tree vigor and avoid practices that attract beetles.

Tree disease

Red turpentine beetle activity is often associated with tree diseases, including root diseases. If disease is present, it will be important to learn about the disease and how it can be managed.

Wounds and site factors

Wounding has the potential to attract red turpentine beetle. If portions of the root system are cut or paved over, the vigor of the tree may be seriously impacted. Any sudden or dramatic change in the soil/root environment e.g. compaction, grade changes, flooding, etc. will adversely affect the trees health. When building near trees special precautions need to be taken to maintain the integrity of the tree's environment

Pesticides

Certain pesticide formulations containing carbaryl, chlorpyrifos, or permethrin when applied to the bark of a tree have been proven effective at preventing bark beetle attacks. Pesticide applied to the lower 6-8 feet of the tree trunk can be used to prevent red turpentine beetle attacks, but it must be realized that other species of bark beetles may pose a threat to the tree as well.

Pesticide treatments can be useful at protecting high value trees during drought or other periods of acute stress.

and health.

Fire damage

Red turpentine beetle attacks frequently occur on pines that have been damaged by fire.

Actions to prevent red turpentine beetle attacks

Preventative measures can be taken to make your property fire safe and reduce the potential for fire damage to your trees.

- **Thin**— In forest situations, thinning trees to achieve wider spacing can help alleviate stress and reduce the possibility of tree mortality.
- **Avoid damage**— Damage to stands or individual trees should be minimized through improved logging, construction, and management practices. Fresh stumps, slow-dying trees, fire-scorched trees, exposed roots of live trees, and trees with compacted soil around them should be treated or removed

Factors to consider before choosing to use a pesticide for this purpose:

- Only those portions of the main stem of the tree that are sprayed will be safe from bark beetle attack.
- It is important to use a pesticide specifically formulated for use against bark beetles. All pesticides must be applied according to label instructions, and if the pesticide is a restricted material it must be applied by a certified applicator or under their direct supervision.

The most effective way to prevent red turpentine beetle attacks is to maintain tree vigor and avoid practices that attract beetles.

Natural Control

There is little information available on the biological or natural control of red turpentine beetle.

- Insect parasites and predators have been observed destroying some stages of the beetles beneath the bark.
- Many beetles die in their attempts to attack healthy trees.
- Woodpeckers feed on larvae and pupae.
- The competition for food within and between broods may result in reducing beetle populations.

None of these natural or biological means can be counted on to control the beetle.

The use of pesticides against bark beetles is best viewed as a temporary measure for protecting trees during periods of temporary stress.

- Pesticides that are injected into trees have not been proven effective against bark beetles.
- One treatment in the spring before bark beetle flight begins is usually sufficient to protect trees for the duration of the beetles' flight.
- A common mistake is to spray pesticides on a tree that is already dead or dying.
- The use of pesticides against bark beetles is best viewed as a temporary measure for protecting trees during periods of temporary stress.
- Trees that have little or no chance of recovering from the effects of chronic stress should not be treated with pesticides, as such attempts to save them eventually fail.

Warning- remember, when using pesticides, always read and follow the label!

Baited funnel traps need to be placed well away from host trees (over 20 yards) to avoid unwanted attacks.

Pheromones

Attractant pheromone baited 8 or 12 unit Lindgren funnel traps have been used to reduce local populations of red turpentine beetle. The standard red turpentine beetle pheromone blend used in North America is a 1:1:1 blend of

(+)-alpha-pinene, (-)-beta-pinene, and (+)-3-carene.

Baited funnel traps need to be placed well away from host trees (over 20 yards) to avoid unwanted attacks.

Other Reading

NOTE—

Red Turpentine Beetle is a recent New World introduction to the People's Republic of China.

An outbreak of these beetles has infested over 1.25 million acres of pine forests and has killed several million Chinese pines in the Taihang Mountain region in North China's Shanxi Province.

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