



Forest Health Note

Hosts:

Ponderosa Pine

Importance:

Western pine beetle infestations are an important cause of tree mortality in mature and second growth ponderosa pine. Outbreaks of this beetle usually occur in trees weakened by drought or fire damage. Second growth ponderosa pine stands growing in the oak zone of southwest Oregon and on the east flank of Mount Hood appear particularly susceptible to attack during dry years.



Photo: USDA FS Archives, Bugwood

Figure 1: Mature ponderosa pine with fading crown after a western pine beetle attack.

Western Pine Beetle (*Dendroctonus brevicomis*)

Look For:

Tree mortality associated with western pine beetle attacks follows two characteristic patterns: 1) dying old growth trees scattered within a stand, and 2) clumped mortality of second growth ponderosa pine in overstocked stands (Figures 1 and 2).

The foliage of successfully attacked trees first turns pale green then yellow and eventually a brownish-orange. When attacks occur between spring and mid-summer, the foliage will normally fade by fall. Trees attacked in the late summer and fall may not fade until the following spring. Even while the foliage is still green in the winter, infested trees can be identified by the patches of bark removed by woodpeckers foraging for beetle larvae (Figure 3). The rate at

Photo: James Everitt, USDA ARS, Bugwood



Figure 2: A stand of second growth ponderosa pine infested by the western pine beetle.

which foliage fades is dependent on the weather and how rapidly the blue stain fungus introduced into the tree by the

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Photo: Ken Gibson, USDA FS, Bugwood

Figure 3: Patches of bark removed by woodpeckers indicate a bark beetle infestation.

beetle blocks the conductive vessels of the sapwood.

April – September

The earliest sign of tree attack, months before any change in foliage color, is the appearance of small pitch tubes ($\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter) on the tree's outer bark (Figure 4). Pitch tubes consist of white to red-brown masses of resin which are often associated with a fine boring dust that collects in bark crevices. Because the western pine beetle has several generations a year, new pitch tubes can appear on trees from early spring through September.

Infestation Characteristics:

Frequently, the western pine beetle is associated with a variety of beetles that



Infest ponderosa pine. The Oregon pine engraver beetle infests the tree's crown (top kill), while the western pine beetle attacks the main bole, and the red turpentine beetle colonizes the root collar area (Figure 5).

Photo: Ken Gibson, USDA FS, Bugwood



Figure 4: Small pitch tubes on the bark of ponderosa pine indicate points of western pine beetle attack.

Infestations of the western pine beetle increase dramatically following periods of drought. Other factors such as root disease, soil compaction, and mechanical damage can predispose pine to beetle attacks.

The western pine beetle has two generations a year in most of Oregon except for southwest where three to four generations are possible. Western pine beetle attacks are confirmed by removing the bark from dying trees and exposing the winding, crisscrossing galleries. The sapwood of infested trees will show a dark color that is characteristic of the blue stain fungus introduced into the tree by the beetle (Figure 6).

Adult beetles and larvae can also be found beneath the bark of recently infested trees (Figure 7).

Management:

Silvicultural

Thinning overstocked ponderosa pine stands reduces the hazard of western pine beetle attack. A general guideline is that reducing stocking levels to 55-70 percent of the basal area needed for full site utilization lowers the risk of beetle infestation. Thinning operations should be conducted so that slash accumulations do not provide breeding sites for another bark beetle, the Oregon pine engraver. Contact an ODF stewardship forester, OSU extension agent, or consulting forester to determine an appropriate basal area figure for stands in your area.

Salvage

Removing beetles from a stand by salvaging infested trees is best accomplished in the winter months. During the summer months, beetles often leave the tree before the foliage changes color. In contrast, trees that change color during the winter months usually contain beetles. If salvage is attempted during the winter, the operation needs to be completed before beetle emergence in April – May. All green trees with pitch tubes or woodpecker feeding, as

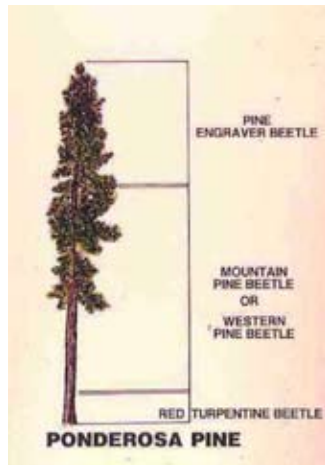


Photo: Dave Overhulser, ODF

Figure 5: Typical distribution of beetles attacking the crown, trunk and root collar of ponderosa pine.



Photo: Ladd Livingston, IDL, Bugwood

Figure 6: Western pine beetle forms crisscrossing galleries on the surface of the sapwood.



Photo: Darren Blackford, USDA FS, Bugwood

Figure 7: Adult western pine beetles are brown to black and 1/8 inch in length.

well as trees with yellow or red crowns should be removed from the site.

Preventing Western Pine Beetle Attacks with Insecticides:

Use of insecticides is only justified to protect high-value trees, typically those found around homes or in recreation areas. When treating trees, the insecticide solution should be sprayed on the bark of the main bole to run-off. Insecticide should be sprayed as far up the trunk as possible and to a height of at least 30 feet. The insecticide treatment should be made in April, before any beetle flight. However, because of the beetles' multiple generations, treatment of unattacked pines anytime during the spring and summer months may be beneficial.

The following insecticides can be used for preventing bark beetle attacks on standing pines:

- **Ground applications to forest trees**
Carbaryl
- **Ground applications to ornamental trees**
Carbaryl
Permethrin

Remember, when using pesticides, always read and follow the label.

For further information about the Oregon Department of Forestry's Forest Health Program,

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