



Forest Health Note

Mountain Pine Beetle (*Dendroctonus ponderosae*)

Hosts:

Lodgepole pine, ponderosa pine, western white pine, sugar pine, and white bark pine.

Importance:

The mountain pine beetle (MPB) is the most destructive tree-killing beetle in Oregon. Between 1975 and 1989, the average area of pine mortality from MPB infestations was estimated at more than one million acres per year. The threat of MPB infestations in older, unmanaged pine stands is great enough to influence forest management decisions in much of eastern Oregon.

Photo: Rob Flowers, ODF



Figure 1: Red crowns on trees in central Oregon attacked by mountain pine beetle.

Look For:

Small clumps or large areas of pines with red crowns (Figure 1) and tubes of pitch exuding from the trunk are indicators of infestations of MPB (Figure 2).

Overstocked pine stands >60 years old with a breast height diameter between 6"-26" for lodgepole pine and 6"-40" for

ponderosa pine are susceptible to MPB attack.

Seasonal changes in the appearance of a tree's crown can indicate beetle attack. During May-June, the foliage of pines attacked the previous year turns yellow. By July, the crowns of trees that were yellow in May are now red (Figure 3). Pines

newly attacked in July-August will have pitch tubes present on the bark, but the crowns remain green.

Infestation Characteristics:

The cycle of beetle attack and tree decline is shown in Figure 4. In Oregon, there is generally one generation of mountain pine beetle a year.

Newly attacked trees will have pitch tubes on the trunk, but crowns remain green. Pitch tubes do not

always mean that the tree will die, particularly if the MPB attacks are on ponderosa pine. In

some cases pines that will die can be identified in the fall and winter by patches of bark removed by woodpeckers feeding on grubs. Tree death is confirmed when the



Figure 2: Pitch tubes on the bark of ponderosa pine.



Figure 3: Changes in foliage color indicate mountain pine beetle attack the previous year. Pines with pitch tubes contain living beetles, but their crowns may remain green.

Photo: USDA FS Archives, Bugwood.org

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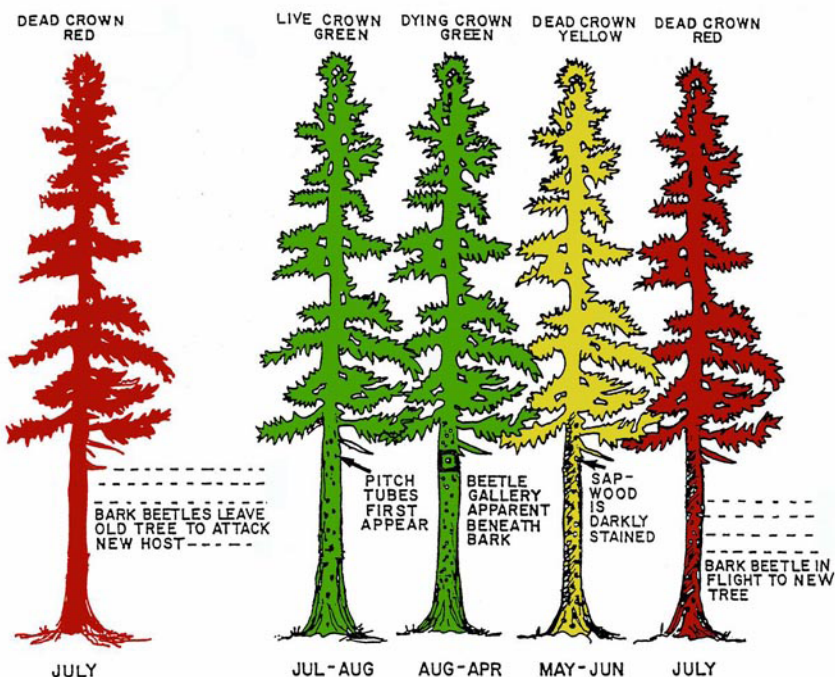


Figure 4: The cycle of mountain pine beetle attack and tree decline.

crown changes color in May-July of the year following the attack. Removing the bark of infested trees will reveal a gallery pattern characteristic for this beetle (Figure 5). From August of the year the tree is attacked to June of the following year beetle life stages can be found beneath the tree's bark (Figure 6). Larvae are very small and most easily seen with the aid of a hand lens. It is estimated that each larva destroys 6-to-10 fascicles (= bundles) of pine needles during its development. The sapwood is also often darkly stained by a fungus the beetle introduces into the tree which disrupts water transport (Figure 7).

The most spectacular MPB outbreaks occur in unmanaged lodgepole pine stands where tree mortality is often on a landscape level. In general, mountain pine beetle infestations develop in overstocked pine stands. Among



Photo: USDA FS Archives, Bugwood.org

Figure 5: Removing the bark of infested pines reveals the beetle's gallery pattern. Galleries are 12-36 inches in length and run parallel to the wood grain with a characteristic "J" shape at the end.

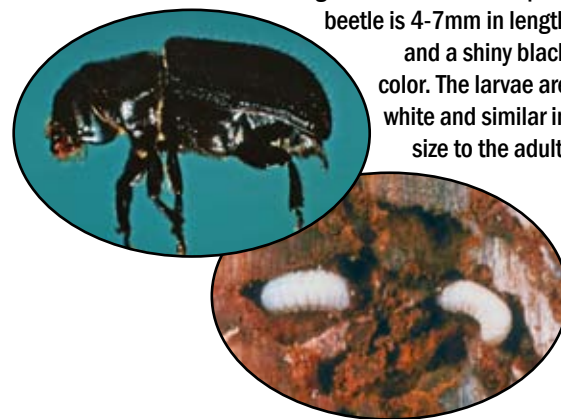


Figure 6: The mountain pine beetle is 4-7mm in length and a shiny black color. The larvae are white and similar in size to the adult.

Photos: USDA FS Archives, Bugwood.org

host trees, lodgepole, sugar, and western white pine are more susceptible to attack than ponderosa. When lodgepole pine and ponderosa pine are growing together, lodgepole is often attacked, but not the ponderosa component. Based on aerial survey data, sugar pine is particularly vulnerable to MPB attack during drought periods.

Site index affects the pattern of tree killing by the mountain pine beetle in ponderosa pine stands. Trees growing on better sites have a low susceptibility to mountain pine beetle attack. In overstocked stands growing on poor sites, tree mortality during MPB outbreaks can be extensive and concentrated in the largest trees.

In the case of lodgepole pine, Site index appears to make little difference in the pattern of tree mortality. For lodgepole pine stands, the probability of MPB infestation increases with the stand's basal area and tree size. Stands with basal areas of >100 square feet per acre and average diameters of >6 inches are considered to have a high probability of MPB attack.



Photos: Roni Billings, TFS, Bugwood.org

Figure 7: Mountain pine beetles inoculate the tree's sapwood with a blue stain fungus that interferes with water transport to the tree's crown.

Management:

Thinning pine stands to prevent over stocking is essential to reduce the hazard of MPB attacks. Guidelines for thinning pine stands are available from Service Foresters and the OSU Extension Service. Thinning pine stands can reduce tree mortality even if conducted in the midst of a bark beetle outbreak. It is important that thinning operations be conducted so that slash accumulations do not provide breeding sites for other bark beetles such as the pine engraver beetle in eastern Oregon and the California fivespined *Ips* in western Oregon.

Pines growing in overstocked mixed conifer stand are also susceptible to MPB attack. To maintain the pine component in a mixed conifer stand, especially on poorer sites, it is advisable to reduce stand densities to that recommended for a pure pine stand.

Preventing Mountain Pine Beetle Attacks With Insecticide:

Chemical insecticides can be used to protect high value pines near homes or structures. An insecticide solution sprayed to run-off on the trunk of ponderosa pine is an effective preventative treatment. Insecticides should be

sprayed as far up the trunk as possible, preferably to a height of 30 feet. The insecticide treatment should be made in June, before the beetle flight in July.

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 + C

Handling Infested Firewood:

Do not cut firewood from recently infested trees. If wood is carried home, the emerging beetles may attack pines growing near houses or used in landscaping. Any existing wood obtained from declining pines should be stored away from living pines and covered with clear plastic to increase temperatures and destroy emerging beetles.

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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