



# Mountain Pine Beetle

*Dendroctonus ponderosae*



## HOSTS: ALL PINE SPECIES

Lodgepole, ponderosa, western white pine, limber pine, whitebark pine, and ornamental pines

## DAMAGE: MORTALITY

Mountain pine beetle feeds on phloem (the vascular tissue that transports water and nutrients) and introduces blue stain fungi. Together, the beetle and fungal pathogens girdle the tree, resulting in death.



MPB pitch tubes

## Ecology

Mountain pine beetle (MPB) is native to western North America and is a natural part of pine ecosystems. It is considered one of the most aggressive bark beetles because it can kill healthy trees and cause landscape-level mortality during outbreaks. At low-level (endemic) populations, MPB kills stressed/dying trees. When MPB attacks a healthy tree, the tree will attempt to “pitch out” the beetles with resin. However, if there is sufficient beetle pressure, or if trees are drought-stressed and can’t produce enough resin, MPB numbers will overwhelm the host defenses. Weather events (ex. blowdown) can cause populations to increase by providing more food for the beetles, and favorable climate coupled with susceptible forest conditions allows outbreaks to develop. Forests more susceptible to outbreaks have a high proportion of densely-stocked, large diameter pine hosts.

## Identification

- Orange-red boring dust (“frass”) accumulating in bark crevices
- Creamy orange pitch tubes, approximately the size and shape of popcorn, up the main bole of tree
  - Note: this is different from red turpentine beetle, whose red pitch tubes are found on the first 6 feet.
  - “Blind attacks” may occur when trees do not have enough moisture to produce pitch tubes.
- Distinct vertical galleries with a regular or reversed “J” hook at the base etched into inner bark
- Presence of brown adult beetles (less than ¼ inch) and/or presence of small white larvae (approximately the size of a grain of rice)



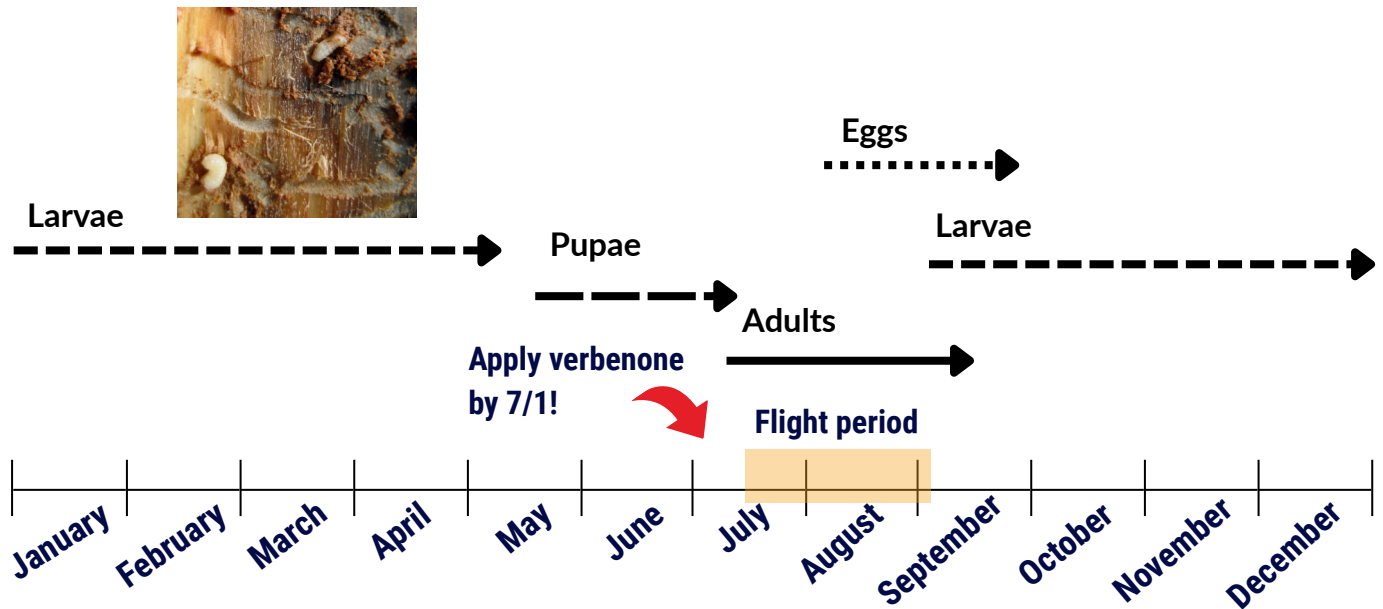
MPB galleries

- Crowns are often still green while trees are infested with beetles, and generally turn red once beetles have emerged.
  - Note: look for infestations in trees with green crowns and external signs/symptoms of attack (frass and pitch tubes).

# Mountain Pine Beetle

## Life Cycle

Adult beetles emerge from trees between mid-July and August. Females are the host-selecting sex, and release aggregation pheromones to recruit more beetles for a successful attack. Once a tree is at capacity, males release an anti-aggregation pheromone (verbenone) to signal the tree is full and repel additional beetles. After mating, females excavate a vertical gallery, laying eggs along the margins. Eggs hatch into larvae that feed under the bark until cold temperatures trigger dormancy. They overwinter as larvae and pupate into adults the following summer. Mountain pine beetle completes one generation per year in Montana. Development is temperature-dependent and may require two years to mature at higher elevations.



## Management

- Stands with a high stocking density are more susceptible to MPB. Thin stands to reduce competition and promote remaining individual tree vigor.
- Identify and remove infested trees prior to beetle flight period. Trees may look healthy with green canopies, but boring dust in bark crevices indicates infestation. Infested material should be removed or destroyed, as beetles will continue developing in logs and firewood. If infested material is left onsite, beetles will emerge the following summer to attack nearby trees.
- Diversify age and size class; outbreaks are most severe in pine stands 80-120 years old with an average DBH greater than 8 inches. Diversify species composition to limit host availability.
- Apply verbenone to stands by July 1 (before the flight period begins). Follow manufacturer instructions for dosage rate.
- Chemical preventive sprays (ex. carbaryl, bifenthrin, permethrin) can protect individual uninfested trees when applied to the entire trunk before MPB flight. Consult with a licensed pesticide applicator.