

Mountain Pine Beetle



Mountain pine beetle (MPB), *Dendroctonus ponderosae*, is native to the forests of western North America. Periodic outbreaks of the insect, previously called the Black Hills beetle or Rocky Mountain pine beetle, can result in losses of millions of trees. They develop in pines, particularly ponderosa, lodgepole, Scotch and limber pine. Bristlecone and pinyon pine are less commonly attacked. During early stages of an outbreak, attacks are limited largely to trees under stress from injury, poor site conditions, fire damage, overcrowding, root disease or old age. However, as beetle populations increase, MPB attacks may involve most large trees in the outbreak area.

Mountain pine beetles and related bark beetles in the genus *Dendroctonus* can be distinguished from other large bark beetles in pines by the shape of the hind wing cover. In side view, it is gradually curved. The wing cover of Ips or engraver beetles, another common group of bark beetles attacking conifers, is sharply spined.



Signs and Symptoms of MPB Attack

- Popcorn-shaped masses of resin, called "pitch tubes," on the trunk where beetle tunneling begins. Pitch tubes may be brown, pink or white.
- Boring dust in bark crevices and on the ground immediately adjacent to the tree base.
- Evidence of woodpecker feeding on trunk. Patches of bark are removed and bark flakes lie on the ground or snow below tree.
- Foliage turning yellowish to reddish throughout the entire tree crown. This usually occurs eight to 10 months after a successful MPB attack.
- Presence of live MPB (eggs, larvae, pupae and/or adults) as well as galleries under bark. This is the most certain indicator of infestation. A hatchet for removal of bark is needed to check trees correctly.
- Bluestained sapwood. Check at more than one point around the tree's circumference

Mountain pine beetle has a one-year life cycle. In late summer, adults leave the dead, yellow- to red-needled trees in which they developed. In general, females seek out large diameter, living, green trees that they attack by tunneling

under the bark. However, under epidemic or outbreak conditions, small diameter trees may also be infested. Coordinated mass attacks by many beetles are common. If successful, each beetle pair mates, forms a vertical tunnel (egg gallery) under the bark and produces about 75 eggs. Following egg hatch, larvae (grubs) tunnel away from the egg gallery, producing a characteristic feeding pattern. Larvae spend the winter under the bark. Larvae are able to survive the winter by metabolizing an alcohol called glycerol that acts as an antifreeze. They continue to feed in the spring and transform into pupae in June and July. Emergence of new adults can begin in mid-June and continue through September. However, the great majority of beetles exit trees during late July (lodgepole pine) and mid-August (ponderosa pine). A key part of this cycle is the ability of MPB (and other bark beetles) to transmit bluestain fungi. Spores of these fungi contaminate the bodies of adult beetles and are introduced into the tree during attack. Fungi grow within the tree and assist the beetle in killing the tree. The fungi give a blue-gray appearance to the sapwood.



Natural controls of mountain pine beetle include woodpeckers and insects such as clerid beetles that feed on adults and larvae under the bark. However, during outbreaks these natural controls often fail to prevent additional attacks.

Extreme cold temperatures also can reduce MPB populations. For winter mortality to be a significant factor, a severe freeze is necessary while the insect is in its most vulnerable stage; i.e., in the fall before the larvae have metabolized glycerols, or in late spring when the insect is molting into the pupal stage. For freezing temperatures to affect a large number of larvae during the middle of winter, temperatures of at least 30 degrees below zero (Fahrenheit) must be sustained for at least five days. Logs infested can be treated in various ways to kill developing beetles before they emerge as adults in summer. One very effective way to kill larvae developing under the bark is by peeling away the bark, either by hand or mechanically; this exposes the larvae to unfavorable conditions -- the larvae will dehydrate, starve and eventually die. Logs may also be burned or scorched in a pile. They can also be buried under at least eight inches of soil, or chipped. Following beetle emergence, wood can be used without threat to other trees. Chemical control options for MPB larvae have been greatly limited in recent years. At present, there are no labeled pesticides for use on MPB.

Prevention involves forest management, i.e. logging to some extent. In general, MPB prefers forests that are old and dense. Managing the forest by creating diversity in age and structure with result in a healthy forest that will be more resilient and, thus, less vulnerable to MPB. There are preventive insecticidal sprays that can limit invasion to particularly valuable ornamental trees in residential setting but are impractical in most natural forest settings. Pheromone traps have also been moderately effective at preventing invasion.

