



# Douglas-fir Beetle

*Dendroctonus pseudotsugae*



## HOST: DOUGLAS-FIR

Douglas-fir that are stressed due to root disease, fire injury, drought, and/or defoliation have lower ability to resist DFB attack.

## DAMAGE: MORTALITY

Douglas-fir beetle feeds on phloem (the vascular tissue that transports water and sugars), girdling and killing attacked trees. Once infested, a tree cannot be saved.



Frass on bark



DFB galleries

## Ecology

Douglas-fir beetle (DFB) is native to western North America and is found throughout the range of its host tree, Douglas-fir. When DFB populations are low (endemic conditions), DFB is found in small pockets of downed or dying trees. Healthy trees are able to fight off beetle attacks by producing resin, a physical and chemical defense. Stressed trees are more susceptible to attacks. When environmental disturbances create an abundant supply of freshly downed or damaged Douglas-fir, beetle populations increase and spill over into healthy trees. Outbreak size and duration is limited by the amount of suitable host trees; outbreaks subside once susceptible hosts are eliminated.

## Identification

- Reddish-brown boring dust (frass) accumulating in bark crevices
- Galleries with alternating larval galleries etched into inner bark
- Presence of brown/black adult beetles, approximately the size of a grain of rice, or small white larvae (less than ¼ inch)
- Crowns of currently infested trees may be green. Trees often don't turn red until after beetles have left the tree.
- Pouch fungi, *Cryptoporus volvatus*, may grow out of bark beetle exit holes one year after beetles have left the tree.



DFB-killed trees

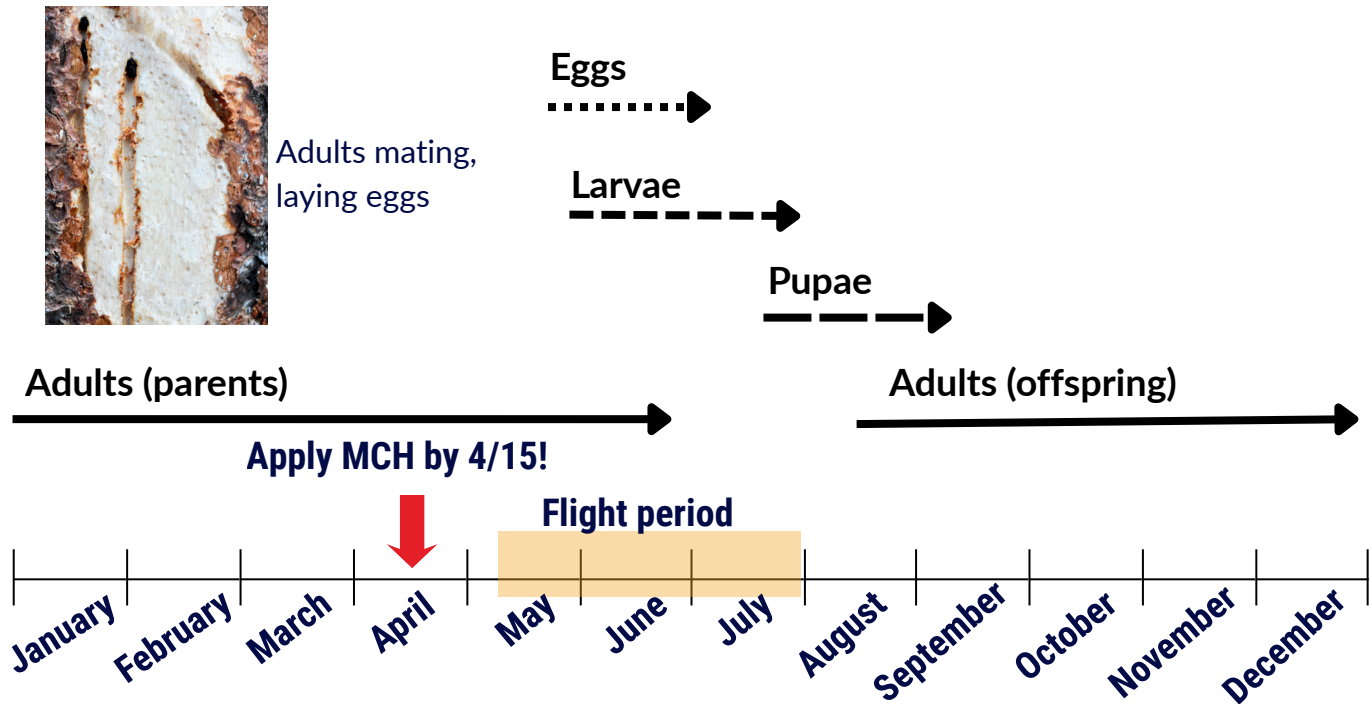


Pouch fungi darken over time

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## Life Cycle

In spring, adults work in unison to attack single trees. Once a suitable host is found, they release aggregation pheromones to recruit more beetles for a successful attack. When a host tree is full, male beetles release the anti-aggregation pheromone MCH to prevent overcrowding. After mating occurs, females lay eggs along alternating sides of a long, vertical gallery. The eggs hatch into small, white larvae that bore outward from the main gallery and pupate into adults. Douglas-fir beetles require one full year to develop, with offspring ready to emerge and attack trees the following spring. The flight period begins once temperatures exceed 60 degrees Fahrenheit, usually mid-May in Montana.



## Management

- **Thin stands** to reduce competition and promote individual tree vigor.
- **Brood tree removal:** identify and remove beetle-infested trees before adult beetles can emerge. Trees may appear healthy but closer inspection will reveal boring dust and galleries.
- **Diversify age and size classes of Douglas-fir:** DFB prefers large (>14" DBH) and overmature (>120 years old) host trees.
- **Promote non-host species** such as ponderosa pine and western larch.
- **Remove or destroy infested material.** Beetles allowed to continue developing in logs and firewood left onsite will emerge the following spring to attack nearby trees.
- **Be proactive.** Remove windthrown, fire-scorched, or overmature trees to limit brood material in the stand.
- **Apply MCH** pheromone to stands by April 15<sup>th</sup> (before beetles emerge).