

## Douglas-fir Beetle

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The Douglas-fir beetle (*Dendroctonus pseudotsugae*) is the most destructive insect pest of Douglas-fir (*Pseudotsuga menziesii*). Heavy attack by this bark beetle can kill trees due to the feeding of larvae in the phloem (sugar-conducting tissue), which cuts off the transmission of water and nutrients taken in from the roots and sugars produced from the needles. In addition, the beetle often introduces blue-stain fungi into attacked trees leading to further blockage of the vascular system.

### Damage and Life Cycle

The Douglas-fir beetle (Figure 1) is a small insect about the size of a grain of rice. It is generally considered a stress-related pest, and is most often found breeding in trees that are fallen, damaged, or diseased. The beetle will also attack healthy trees when population levels are very high, which generally occurs following physiological stress events such as drought, fire, or winter damage. Because inland areas are more susceptible to drought than coastal regions, they are more likely to suffer a Douglas-fir beetle attack.

The first defense response of attacked trees is to eject the beetle through mass resin flow, resulting in streaks of resin at attack sites. When trees are drought-stressed or their resin resources are depleted, a successful attack results in the production of frass (Figure 2), which is a combination of beetle excrement and fine wood dust. Frass can be found around attack sites, in bark cracks, and around the base of attacked trees. The needles of beetle-infested trees turn from green to reddish brown before eventually dropping.

The beetle overwinters as adults, and emerges in the spring when ambient temperatures reach approximately 60.8°F (16°C), or roughly from April to June in most areas. Female bark beetles find a suitable

**Figure 1: Adult beetles in gallery**

Photo Credit: Constance Mehmel, USDA Forest Service, Bugwood.org



**Figure 2: Douglas-fir beetle frass from attack sites**

Photo Credit: Doug Page, USFS / BLM, retired, Bugwood.org



host tree and release aggregation pheromones (chemical signals), which attract males for breeding. Males and females create galleries (tunnels) where eggs are laid, and blue-stain fungi are often introduced. The heaviest attack of host trees occurs between June and August. There is one generation per year.

Two other bark beetle pests of Douglas-fir are the Douglas-fir pole beetle (*Pseudohylesinus nebulosus*) and the Douglas-fir engraver beetle (*Scolytus monticola*). Both of these bark beetles generally attack stressed trees and damage results in the top half of the tree dying.

## Management

Management of Douglas-fir beetle and related species is difficult, and relies on a multi-faceted approach including sanitation removal, stress reduction, pheromone manipulation, and preventative bark barrier applications to high-value trees.

Removing stressed and/or dying trees and woody debris from the site is critical to limit the Douglas-fir beetle population. They can breed in dead and dying trees as well as any host material that is 8 in (20 cm) diameter or larger.

For individual or small groups of trees, it is important to practice cultural methods that will reduce stressors and enhance host defenses against beetle attacks. Mulch and irrigate during prolonged drought or seasonal dry periods and correct drainage problems. Improve soil conditions with organic matter and nutrients according to a current soil nutrient analysis.

Another option is pheromone manipulation, the use of synthetically-processed attractants and deterrents that mimic natural beetle compounds. Trapping live beetles with a sex attractant in funnel traps (Figure 3) and pushing beetles away from trees with the deterrent is called a push-pull management strategy and can be employed for this insect. Not all properties are suitable for this tactic.

**Figure 3: Bark beetle funnel trap used in a push-pull management strategy**



In certain situations, preventative barrier applications may be warranted. It is important to remember that these treatments can prevent new attacks, but will have no effect on beetles that have already infested the trees. Treatments must be applied prior to beetle emergence in the spring, and should be reapplied according to labeled recommendations to maintain protection throughout the period of beetle activity. Please contact your Bartlett Arborist Representative to learn more about management strategies for Douglas-fir beetle.



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