



# Forest Insect & Disease Leaflet

## Douglas Fir Beetle



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### **Douglas-fir Beetle: a tree-killing bark beetle affecting Douglas fir:**

The Douglas-fir beetle, *Dendroctonus pseudotsugae*, attacks and kills Douglas-fir throughout most of its range in the western United States.

The beetle normally kills small groups of trees, but during outbreaks it may kill groups of 100 or more. It prefers dense stands with a high percentage of mature or over-mature Douglas-fir. This beetle favors fresh downed material and trees damaged by: fire, ice or snow, drought, root disease, or defoliation. Normally the beetle maintains small numbers in fresh downed material, but populations may increase where downed or weakened Douglas-fir trees are abundant. If surrounding standing trees are susceptible, beetle populations may increase quickly and spread, killing large numbers of healthy Douglas-fir.

### **How Douglas-fir beetles damage trees:**

Damage occurs when adult beetles colonize and reproduce in conductive tissues of host trees. Conductive tissues transport water and nutrients throughout the tree. Female beetles construct a tunnel just under the bark to lay eggs. When the eggs hatch, the larvae feed and destroy the tissue so water and nutrients cannot be transported. Once these tissues are destroyed, the tree soon dies.

### **Life cycle of the Douglas-fir beetle:**

The Douglas-fir beetle has one generation per year. Adult emergence is associated with temperature. In Utah the majority of adult beetle flight occurs from May through June. A second flight of re-emerging adults may occur in late July sometimes continuing into August.

Eggs of the Douglas-fir beetle are ovoid, whitish, and about  $\frac{1}{16}$  inch long. Larvae are stocky and legless with light brown heads. Mature larvae transform into pupae before becoming adults. Pupae are white with some adult features such as folded wings. Adults that have recently emerged from the pupal stage are light brown and gradually darken to a brownish black. Adult beetles are stout, cylindrically shaped and approximately  $\frac{1}{4}$  inch long. The head and thorax are dark brown to black, and the wing covers are reddish-brown, turning darker with age.



Douglas-fir beetle galleries under bark



Pitch streamers on infested Douglas-fir

**How do you know if a tree is infested?** When a beetle chews through the bark it produces a reddish boring dust. Successfully attacked Douglas-fir trees have this boring dust in bark crevices and around the base of the tree. Infested trees also may produce pitch or sap streamers, visible on mid to upper portions of the tree trunk. Sometimes neither sign is visible, particularly after a heavy rain washes away boring dust. To determine if a tree has been successfully attacked, remove a portion of the outer bark to reveal developing insects or feeding galleries. Foliage may begin to fade as soon as August, or it may remain green until the next June. Needles begin to drop the year following attack. Successfully attacked trees are more noticeable the second year.

### **Can you control the Douglas-fir beetle?**

Control options for managing the Douglas-fir beetle depend largely on beetle populations, age of stand, size of the trees and condition of site.

#### **Long term control:**

Silvicultural treatments to reduce stand characteristics susceptible to the insect are effective when implemented before an outbreak. Thinning to reduce stand density will relieve competition between the remaining trees for water, light, and nutrients, thus increasing tree vigor and reducing tree susceptibility to bark beetle attack. Develop a vegetation management plan that reduces tree density and promotes a variety of tree species, ages and size classes. Larger landscape vegetation management plans are most effective; however, smaller ownerships can be combined to create a more effective silvicultural prescription. For assistance with developing a vegetation management plan contact the Utah Division of Forestry, Fire and State Lands.

#### **Short term control:**

Avoid tree wounds, maintain tree vigor, detect early, remove or treat blown down and infested trees. Treatments include burning, burying, or removing bark on infested trees.

Pheromone treatments--Pheromones are beetle-produced chemicals emitted to attract a mate or influence dispersal and attack behavior. Repellent or anti-aggregation pheromones are used to manipulate beetle populations. Use repellants to protect single trees or areas of susceptible trees. This pheromone is often referred to as MCH and works quite well if administered properly. Pheromone treatments should be done under the supervision of a trained forest entomologist from the Utah Division of Forestry, Fire and State Lands or the USDA Forest Service, Forest Health Protection.

Chemical treatments—Are effective if done correctly, however they are more expensive and more difficult to do than using MCH anti-aggregation pheromone. Carbaryl\* emulsifiable concentrate formulations registered for use against bark beetles are effective preventative treatments for Douglas-fir beetle. Other insecticides are also registered for use against bark beetles\*. Once a tree is heavily infested, where attacks exceed more than 50 percent of the circumference of the tree, it cannot be saved. If a tree is not infested or if beetle infestation is limited to less than 50 percent of the tree circumference may be sprayed with a registered insecticide for individual tree protection. Trees with some level of current beetle infestation under the bark may still be lost even if the tree is treated. Since this insect attacks high surfaces on the tree trunk, a protective spray should be administered on all trunk surfaces including the root collar no less than 50 feet high or to a trunk diameter of 6 inches. If any part of the trunk is

missed, then the beetles can successfully attack the non-treated area. Carbaryl treatments are effective for 16 to 18 months and must be applied following label directions for bark beetles. Continue treatments until all signs of beetle populations are gone. Because the formulation has to reach a height of 50 feet, a high pressure ground sprayer capable of maintaining 450 psi (through the pull) and equipped with a #10 or #12 orifice nozzle is recommended.

Removing infested trees may reduce the risk to uninfested standing trees. Infested trees should be chipped, peeled, burned or moved to another site at least one mile away from other Douglas-fir host trees. Burning should completely remove the outer bark to ensure all life stages of the insect are destroyed. If burning is used as a treatment, it should be used with caution to prevent wildfires. Infested wood used as firewood should be burned before the adult beetles emerge the following April.

Cut all branches or sections larger than 6 inches in diameter into 12-inch lengths. Scatter them in the sun to dry. Roll the infested sections weekly one-quarter turn to expose all infested surfaces to the sun throughout the summer months. If rolling them is not practical, they can be split and scattered, bark up, in full sun. This procedure promotes inner bark drying which reduces the insect's ability to develop. Keep woody debris to a minimum in forested sites to reduce fire hazard.

\*Mention of products or companies by name does not constitute endorsement by the Division of Forestry, Fire and State Lands, nor does it imply approval of a product to the exclusion of others that may also be suitable

***Always use EXTREME CAUTION when applying pesticides/insecticides/pheromones. Follow instructions and safety recommendations.***

**For further information contact:**



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*Photos courtesy of USDA Forest Service, Forest Health Protection*

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