Management Guide for
Western Balsam Bark Beetle

*Dryocoetes confusus* Swaine

**Host:**
- Subalpine fir

*Windthrow can touch off outbreaks of this beetle, killing hundreds of large trees.*

**Introduction**

The western balsam bark beetle is the most conspicuous of a complex of pests which are responsible for high amounts of tree mortality in subalpine fir forests throughout the host range. Infestations are chronic in some areas. Other agents responsible for the decline of subalpine fir include root diseases (figure 1) and balsam woolly adelgid.

**Figure 1.** Trees attacked by western balsam bark beetle are often infected with root disease such as *Armillaria* shown here.

**Key Points**
- Very common and often damaging insect.
- Usually accompanies damage from other insects or diseases or acute tree stress.
- Beetles can build up in windthrow or logging slash.

**Damage**

Low populations maintain themselves in trees weakened by old age or root disease, and in windthrow or slash. During periods of drought or other environmental stress, infestations can build up over large areas. Outbreaks often occur after windthrow events. Groups of 100 to 1,000 large diameter trees may be killed (Figure 2).

Even in outbreaks, weakened trees are more likely to be attacked. Successfully attacked trees have less crown (lower percent of the bole covered with constant crown and lower crown volume), slower growth, and are older than unattacked trees (Bleiker et al, 2003, 2005).

**Western Balsam Bark Beetle Management**

1. **Prevention:** Destroy logging slash and remove infested trees.
2. **Pheromones:** Although still under development, anti-aggregation pheromones have potential for protecting stands from outbreaks.
In British Columbia, an estimated 35 percent of subalpine fir mortality is due directly to attack by beetles. The remainder is attributed to a beetle-introduced lesion-causing fungus, *Ceratocystis dryocoetidis*, and other unidentified fungi. Initial beetle attacks may be pitched out, but subsequent attacks on trees weakened by lesions are often successful. Coalescing lesions may kill trees without further beetle activity (Molnar 1965, Doidge 1981). Often, other secondary bark beetles become a part of this tree-killing association.

**Western Balsam Bark Beetle Adult**

Adult beetles are glossy, dark brown and cylindrical. They range from 3.4 to 4.3 mm long. Their thorax is evenly convex above; their posterior is abruptly rounded and without spines. The front of their head is covered with a distinct brush of hair. Females have a denser brush of hair than do males.

Overwinter as larvae and then nearly mature adults

Western balsam bark beetle normally has a 2-year life cycle. However, they may develop in one year under the right weather conditions. Normally, they overwinter as larvae under the bark the first year, continue development during spring and early summer, and overwinter the second year as nearly mature adults.

Egg galleries and larval feeding

Egg galleries radiate from the central nuptial chamber in a random pattern (figure 3). Larvae extend their mines from the main egg galleries until freezing weather and then become dormant.

Adult beetles initiate new attacks

Males initiate attacks on trees, excavate a nuptial chamber in the phloem, and attract several females. Female beetles can lay eggs for 2 years, either in the same tree they initially attacked or in different trees. Solitary females can successfully initiate galleries and brood production (Stock 1981).
New adults emerge from galleries

Pheromone trapping conducted in northern Idaho and western Montana indicates initial flights begin in early- to mid-June and continue through September. Peak flights occurred in late June/ early July and in late July/ early August (Gibson et al. 1997). Two main flight periods have also occurred in British Columbia (Stock 1991) and Utah (Hansen 1996).

Evidence of attack

External evidence of attack on the boles of standing trees is hard to detect. Entrance holes and boring dust on the bark or around the base of the tree may be visible during late summer. Pitch flow may be evident and often indicates an unsuccessful attack (figure 4). Attacked trees generally turn yellowish-red within a year and can stay bright red for a year or two after death (figure 5).

Management Considerations

Silvicultural methods

Because of the high elevation and sensitivity of sites on which subalpine fir grows, silvicultural control is seldom possible. To keep epidemics from developing, logging slash should be destroyed. Weakened and beetle-infested trees or windthrow should be salvage logged when feasible.

Pheromones

Aggregative pheromones (exo-brevicomin) have been developed which can help concentrate beetles into stands scheduled for harvest (Stock et al. 1994).

An antiaggregation pheromone, endo-brevicomin, has been shown to reduce the response of beetles to the aggregation pheromone in laboratory and field studies. It also prevented attack on subalpine fir trees baited with the attractant pheromone. Although not yet recommended operationally, the antiaggregation pheromone has potential for protecting individual trees from attack or suppressing western balsam bark beetle activity in high hazard or infested stands (Stock et al. 1990).

Figure 4. Pitch flow on the bole of subalpine fir indicating an unsuccessful western balsam bark beetle attack.

Figure 5. Bright red crowns often indicate western balsam bark beetle attack. Trees may retain red needs for a year or two after death.
Other Reading


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