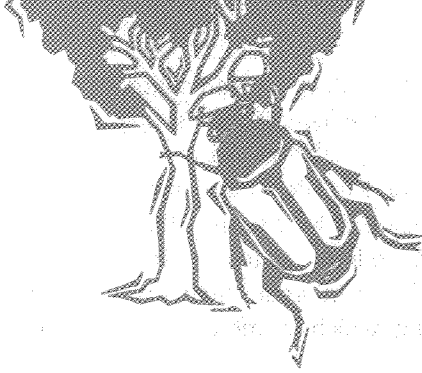




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TREES & SHRUBS

Western spruce budworms

no. 5.543

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Description and Life Cycle

Quick Facts...

Western spruce budworms are the most important tree defoliators in the West.

Budworm larvae eat the new growth of host trees.

Douglas-fir is the favored host in Colorado.

Budworm has a one-year life cycle with moths flying in mid-summer.

Budworm control measures usually are conducted in June.

The western spruce budworm, *Choristoneura occidentalis* Freeman, is the most widely distributed and destructive forest defoliator in western North America. Several outbreaks have occurred in Colorado, the largest exceeding two million acres. In Colorado, the most commonly infested hosts are Douglas-fir and white fir. Occasionally, Engelmann spruce, blue spruce and subalpine fir also become infested.

Western spruce budworm adults (Figure 1) normally are small, mottled rusty-brown moths but color can vary from tan to almost black. In Colorado, they are present from late June to early August. After mating, females lay masses of overlapping green eggs on the undersides of needles (Figure 2). The masses consist of 25 to 40 eggs that hatch in about 10 days. The young larvae do not feed but move to crevices under bark scales or lichens where they spin silken shelters called hibernaculae. There they remain dormant throughout the winter.

In late April or May, the larvae migrate to the foliage where they mine old needles or feed on host tree flowers. In a week or two, they enter developing buds, a habit to which their name is attributed. As the new needles lengthen, the rapidly growing larvae continue to feed. It is during this stage that most of the damage occurs. They web the new foliage together loosely and feed inside, where they are somewhat protected from predators and other enemies.

In the late larval stages (Figure 3), budworms have brownish heads and brownish-olive bodies and each body segment has two conspicuous pairs of white spots. About 40 days after feeding begins in the spring—usually about the end of June—the larvae pupate inside feeding webs or on foliage. Adults emerge a week or so later and the cycle is complete. There is one generation per year.

Damage and Associated Impact

Budworms are important because they have the potential to consume all new growth produced by host trees. The new needles are most important in producing food for the tree, so the immediate effect of defoliation is a reduction in

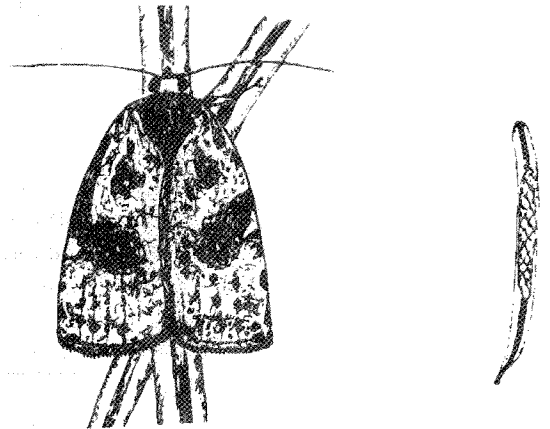


Figure 1: Western spruce budworm adult; budworm egg mass on a spruce needle.

growth. To the homeowner, defoliation mostly means a loss of aesthetic value. As defoliation progresses, both in extent and duration, more significant impacts are likely. The foliage, especially the branch tips, turns brown and dies. Twigs, branches or entire tops of trees may be killed. During long-running outbreaks of three to five years or more, about one tree in four will die.

Control

Budworm populations usually are held in check by a combination of predators, parasites, adverse climatic conditions or inadequate food supply. Spiders, insects and a variety of birds are important predators. Adverse weather conditions, particularly sudden freezing temperatures in late spring, may kill large numbers of larvae. A major factor in the termination of long-term outbreaks in forest stands appears to be starvation resulting from inadequate or nutritionally poor food sources. However, this may not be a factor in urban situations. Cultural practices such as thinning, watering and fertilizing, which promote tree vigor, may help trees better withstand repeated attacks.

Chemical control often is used to protect high-value trees from defoliation and associated damage. The materials listed below are among those registered for western spruce budworm control, and have been used with success in Colorado. They can be applied both from the ground and aerially. In either case, spraying should be timed to occur during the two to three weeks immediately following budbreak or flush of new growth. During most years, this period occurs about mid-June.

Insecticide	Trade name
acephate	Orthene
Bt (<i>Bacillus thuringiensis</i>)	Dipel, Thuricide
carbaryl	Sevin

Related Insects

A close relative of western spruce budworm, the so-called pine budworm, *Choristoneura lambertiana ponderosana* (Obraztsov) also is present in this area (See fact sheet 5.567, *Ponderosa pine budworm*). This species attacks pines, especially ponderosa pine, and occasionally causes serious damage to individual trees. However, it is not normally an important defoliator in the urban environment.

References

- Fellin, David G. and Jerald E. Dewey. *Western Spruce Budworm*. USDA Forest Service, Forest Insect and Disease Leaflet 53, 1982.
- Furniss, R. L. and V. M. Carolin. *Western Forest Insects*. USDA Forest Service Miscellaneous Publication No. 1339, 1977.

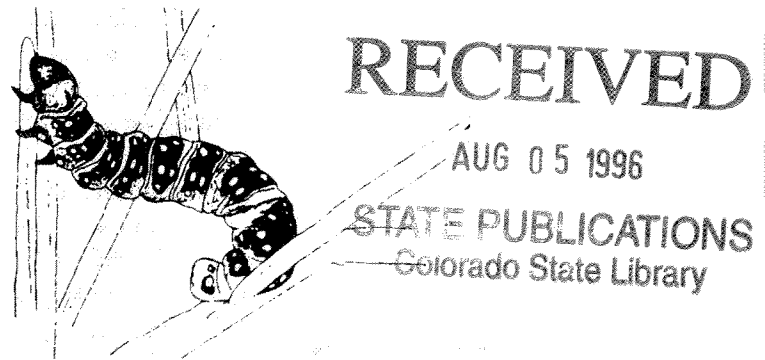


Figure 2: Mature larva of western spruce budworm.

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