

Western Spruce Budworm

Imparts reddish brown cast to forest

Name and Description—*Choristoneura occidentalis* Freeman [Lepidoptera: Tortricidae]

The Western spruce budworm is a widely distributed defoliator. The nondescript, brownish moths are 1/2 inch (13 mm) long and have a wingspan of 7/8-1 1/8 inches (22-28 mm). Both sexes are similar in appearance and are able to fly (unlike the Douglas-fir tussock moth) (fig. 1). Young larvae are yellow-green with brown heads and distinctive white spots. Larvae change colors as they develop through six stages (fig. 2). Mature larvae are 1-1 1/4 inches (2.5-3.2 cm) long, have tan to light-colored heads and olive-brown or reddish brown bodies with large, ivory-colored areas. Eggs are oval, light green, about 1/25 inch (1 mm) long, and overlap like shingles on needles.



Figure 1. Western spruce budworm adult. Photo: Rocky Mountain Region, USDA Forest Service.

Hosts—Commonly found on Douglas-fir, Engelmann spruce, blue spruce, white fir, and subalpine fir; occasionally found on pines when mixed with other hosts

Life Cycle—Western spruce budworm has a 1-year life cycle. Moths usually emerge from late July to early August. Eggs are laid on the underside of conifer needles and hatch in about 10 days. Young larvae seek a sheltered place and overwinter in a silken casing called a hibernaculum. From early May to late June, larvae begin to feed within closed buds, 1-year-old needles, and new foliage. New foliage is preferred, followed by older needles. Larvae mature in 30-40 days and pupate in early July. Pupation usually lasts 10 days and is followed by adult moth emergence.



Figure 2. Western spruce budworm larva. Photo: Scott Tunnock, USDA Forest Service, Bugwood.org.

Damage—Young larvae will feed by mining needles or newly swelling buds. Larvae feed mainly on new foliage but will feed on old foliage if all the new foliage has been destroyed. Cones and seeds can also be destroyed. Larvae and pupae can be seen in silken nests of webbed, chewed needles (fig. 3). Defoliation occurs at tops of trees and outer branches. During a defoliation event, entire stands will have a brown appearance from the needle damage. Understory trees are most severely impacted (fig. 4). Repeated severe defoliation (4-5 years) can decrease growth, cause tree mortality, or render weakened trees more susceptible to other damaging agents such as bark beetles.



Figure 3. Early instar webbing and feeding. Photo: Ladd Livingston, Idaho Department of Lands, Bugwood.org.

Management—Western spruce budworm can be managed through silvicultural methods. Because larvae disperse on silken threads and often impact the understory more intensively, removing the understory (thinning from below), lowering stand density, and maintaining tree species diversity can reduce the budworm populations. If more short-term, direct control is desired, then insecticides can be applied. The micro-

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bial insecticide *Bacillus thuringiensis* (B.t.) is available and is not hazardous to most beneficial insects, birds, small mammals, and aquatic systems. Other contact chemical insecticides are also available for budworm management.

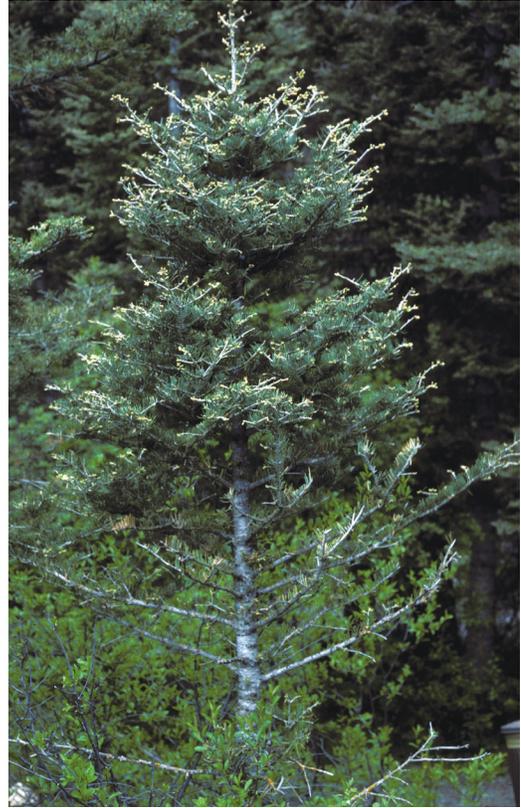


Figure 4. Western spruce budworm damage. Photo: Rocky Mountain Region, USDA Forest Service.

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1. Fellin, D.G.; Dewey, J.E. 1986. Western spruce budworm. Forest Insect and Disease Leaflet 53. Washington, DC: U.S. Department of Agriculture, Forest Service. 10 p.
 2. Furniss, R.L.; Carolin, V.M. 1977. Western forest insects. Misc. Publ. 1339. Washington, DC: U.S. Department of Agriculture, Forest Service. 654 p.