

# Spruce Budworm



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## Spruce Budworm

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Additional information on this insect can be obtained from your local UAF Cooperative Extension Service office, Alaska State Forestry office, or from:

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## Spruce Budworms (*Choristoneura fumiferana*, *Choristoneura orae*)

Lepidoptera: Tortricidae

Spruce and fir forests throughout North America are subjected to annual growth losses and tree mortality due to infestations of the spruce budworm, *Choristoneura* spp.. In Alaska, significant budworm damage was detected in 1978 on white spruce in many residential and park areas of Anchorage. More than 160,000 acres of white spruce were defoliated in 1992 in interior Alaska. Sitka spruce forests in southeast Alaska have also been impacted.

## Description

There are at least two known spruce budworm species in Alaska. These two species appear the same and cannot be differentiated with certainty without molecular analysis. However, the Eastern Spruce Budworm, *C. fumiferana*, feeds mainly on white spruce and is normally found north of the Alaska Range, and the Sitka Spruce Budworm, *C. orae*, will feed on Sitka, Lutz, and white spruce, and is found predominantly to the south of the Range. However, there are populations of *C. orae* in the Interior. Both species of adult budworms are medium sized moths about 1.5 cm long. There is a variety of wing coloration ranging from orange-brown to gray. Pupae are reddish-brown to black in color, about 1.5 cm long, and are normally found within the webbing previously formed by feeding caterpillars. Full grown caterpillars are about 3 cm long with dark brown heads and bodies with prominent light colored spots along the back (Figure 1).



Figure 1: the 5th instar of *C. fumiferana*.

## Life History

Adults emerge from their pupal cases among the foliage from mid-June to mid-July. Adults are active throughout the late afternoon and early evening. The moths can be carried up to ten miles by storm fronts. The female lays greenish eggs in a shingled mass on the spruce needles in the area of previous caterpillar feeding sites (Figure 2). The pale-cream



Figure 2. An egg mass laid by *Choristoneura* spp. on the underside of a spruce needle.

caterpillars hatch in about ten days. The newly-hatched caterpillars do not feed but spin silken shelters in twig and bark cervices

where they remain until the following spring. About mid-May the caterpillars bore into new buds and feed on the new growth. From mid-to-late June mature caterpillars spin loose cocoons in the damaged foliage and pupate. Adults emerge in about ten days.

## Damage

In Alaska, the spruce budworms are primarily a pest of white and Sitka spruce. Damage occurs when budworm caterpillars (larvae) eat the buds and needles of spruce, causing the foliage to turn reddish-brown (Figure 3). In most cases, feeding is restricted to new growth, but during heavy infestations, older



Figure 3. The tip of a spruce branch following larval feeding by *C. fumiferana*.

needles can also be affected. Consecutive years of heavy feeding can result in complete defoliation and few buds, which can cause further damage (Figure 4). This damage is described below:

**Top-kill** can result in forked or multiple leaders, affecting the merchantable tree height in forest situations and tree aesthetics in urban settings. This is an issue of primary concern in interior Alaska, where



Figure 4. Extensive defoliation and discoloration caused by *C. fumiferana*.

an outbreak of budworm can set back stand growth by five to ten years or more.

**A Reduction in Growth** is observed, depending on the amount of defoliation. In urban settings this is of little concern, unless rapid growth is desired for overall landscape balance. Under forest conditions, however, intense defoliation can cause a significant reduction in wood production in merchantable forest stands.

**Tree Death** rarely occurs in Alaska from budworm damage. Potential tree mortality does exist in urban setting though, where spruce are under greater stress and subsequently are less healthy and vigorous. This often occurs in new construction areas where trees are mechanically damaged and soil is compacted or placed on top of root systems in excess amounts. Bark beetles often move into trees that are highly stressed, resulting in tree death.

## Guidelines for Reducing Damage

Spruce budworm suppression is not presently necessary on forested land. However, in urban settings budworm can cause more

damage, and homeowners may need to select one of the following alternatives:

If budworm feeding is low to moderate and spruce trees are vigorous, damage is minimal. The use of pesticides is not usually taken:

1. Be careful and avoid damaging the trunk, injuring the roots, altering the drainage patterns, or severely compacting the soil.
2. Spring fertilization helps promote tree vigor. The University of Alaska Cooperative Extension recommends approximately one pound of fertilizer per inch of tree diameter. Any complete lawn or garden fertilizer high in phosphorous is adequate. Apply by making a series of holes, 8 to 10 inches deep around the tree, starting two feet from the trunk and extending a few feet beyond the dripline. Fertilizing should begin in the spring and continue through the summer, then be discontinued prior to fall dormancy. A feeding program may not be necessary every year. Fertilizer uptake, soil type, rainfall, weather, and grass cover will all determine the time of reapplication.

If ornamental spruce trees show signs of heavy budworm feeding for two or more consecutive years, chemical treatment may be warranted. Insecticides should be applied from mid-May to early June when budworms are beginning to feed on new growth. The young caterpillars are susceptible to chemical treatment at this time and damage can be kept at a minimum. There are a number of insecticides containing carbaryl, chlorpyrifos, and B.t. which are registered by the Environmental Protection Agency

for budworm suppression. Contact the University of Alaska Cooperative Service for current information, and always consult the product label for use on spruce against spruce budworm.

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