Eastern Spruce Budworm

Choristoneura fumiferana (Clemens)

The Eastern spruce budworm is the most widely distributed and destructive forest defoliator in North America. It has caused more damage to Nova Scotian softwood forests than any other insect. The spruce budworm causes the most damage in overmature balsam fir stands. White, black, and red spruce are also defoliated. Other species such as larch can be consumed during outbreaks.


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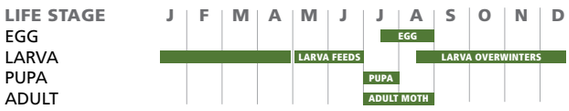
Life History

The spruce budworm has one generation per year. Adult moths emerge from late June to early August and mate. Females lay their eggs on the underside of needles. The eggs hatch in July and August. Tiny larvae emerge and spin silken covers called hibernacula under buds and bark crevices. Once in the hibernacula, the larvae moult to the second stage or instar and remain there until the following spring. They emerge with the warm weather in late April to early May, just prior to bud expansion. Larvae mine old needles, unopened buds, and male flowers. Later they feed in expanding buds and on new foliage. When populations are high, old foliage will also be eaten once the new foliage has been consumed. Feeding is completed in approximately five weeks depending on weather conditions. Larvae pass through six instars during their development. Fully grown larvae change to pupae on the foliage. Adults emerge 10 to 14 days later.



Description of Life Stages

Adult moths have a wingspan of 21 – 30 mm. They are grey-brown in colour with silvery white patches on the forewings. The light green eggs are deposited on the needles in elongate masses containing approximately 20 – 40 eggs. Eggs are laid in two rows, which overlap like shingles on a roof. Mature larvae are about 18 – 24 mm long. The body is a dark greenish-brown colour with rows of small pale spots on the back. The head is dark brown. Pupae are about 12 mm long, are pale green when first formed, and later turn reddish-brown.

History of Outbreaks

Records dating back to the 1700s indicate spruce budworm outbreaks have devastated huge areas of forests on a more or less regular basis. Spruce budworm outbreaks tend to recur every 30 to 40 years in eastern Canada and may persist for 10 years or more. Since the early 20th century, eastern North America has experienced three major spruce budworm outbreaks. In Canada, the last major outbreak reached its peak in the 1970s, damaging more than 50 million hectares of forest.

In Nova Scotia, damage was first seen in the North Mountain area of the Annapolis Valley and western Cumberland County. As the population continued to grow, damage spread through Cumberland, Pictou, and Antigonish counties and then through all four of the counties of Cape Breton. At the peak of this outbreak, moderate to severe defoliation, covering 1,220,000 ha, could be found on Cape Breton Island and in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pockets on northern mainland counties. This outbreak died out in the late 1980s.

In eastern Canada, populations have been steadily increasing since 2006. In Nova Scotia, moth trap catches have been increasing since 2011, which may indicate resurgence and a new outbreak.

Damage Symptoms

The larvae are the damaging phase of this pest. Feeding begins in the upper crown of the tree on new shoots and progresses downward. As the new shoots are consumed, larvae may feed on the older needles. Populations tend to increase steadily and spread to younger trees. High populations will result in repeated loss of all new foliage, killing the trees within three to five years. The first symptoms of damage are usually frass (insect droppings) and silk webs in buds or on last year's needles. Tree crowns may appear brown because needles have been partly chewed and frass and dead buds have accumulated. Light


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defoliation may cause partial loss of new foliage. Heavier feeding for three years may cause mortality of leaders and other terminal shoots. Severe defoliation over three to five years can cause tree mortality.

References

Spruce Budworm. 2014. Natural Resources Canada.
nrcan.gc.ca/forests/insects-diseases/13383
The Spruce Budworm. Harmful Forest Insects. Gouvernement du Quebec, Ministere des Ressources naturelles.
sopfim.qc.ca/admin/datas/pdf/PDF_06_EN.pdf

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