

Spruce Beetle

Dendroctonus rufipennis



Insects of the Southern Interior Forest Region



BC Ministry of Forests and Range
Southern Interior Region
Forest Health

Spruce Beetle

The spruce beetle is a highly destructive pest of mature spruce trees and is found throughout the range of spruce in the Southern Interior Forest Region. Sporadic outbreaks have killed extensive stands of spruce in the province and usually last for 5 years or more (1).



Potential hosts of the spruce beetle include Engelmann (interior), white, sitka and occasionally black spruce. Preferred host materials consist of weakened or windthrown trees, stumps and large slash (2). Blowdown occurs naturally, but increases along the edges of roads, utility right-of-ways, and logged areas.



Outbreaks can occur when beetle populations build up in windthrow to high levels and move on to attack live, mature, large diameter standing spruce. The beetle prefers stands composed of more than 65% spruce, occurring in well-drained creek bottoms.

Life Cycle & Description

Adult spruce beetles are hard, stout-bodied, cylindrical insects ranging in length from 4.0-7.0 mm. They are black, brown or black with reddish wing covers. The spruce beetle usually has a two year life cycle. However, the cycle may vary from one to three years depending on geographic location, elevation and climatic conditions.



In late May to early July, females initiate attack by boring into a host tree and releasing an aggregation pheromone which attracts both sexes and ensures mass attack. Eggs are laid in galleries that extend upwards from the entrance hole parallel to the grain of the wood (3,4). At first the larvae bore out horizontally in groups. When they are one third grown they then form individual mines which often intersect to form fan-shaped galleries. The brood overwinters as late instar larvae (5). In the following spring and early summer they pupate and become adults (6). In late August many of these new adults bore out of the tree and crawl or drop to the base of the tree where they again bore under the bark to overwinter.

Spruce beetles must overwinter once as adults prior to attacking new host trees. The overwintered adults emerge and



attack fresh host material from late May to early July.

Tree Damage & Detection

Adult beetles carry a blue stain fungus, which they introduce to the tree when they attack. The feeding of the larvae, combined with the growth of the fungus, kills the tree by inhibiting the flow of food and water between the roots and needles.



Infested trees will have light brown to red brown boring dust present in bark crevices and around the base of the tree (7). Small pitch tubes may form when resin flows out of the entry holes made by attacking beetles. However, pitch tubes rarely form if beetle attack

occurs late in the season or in trees with low vigour. Woodpeckers may remove bark in search of larvae, exposing red patches on the tree (8).

Before any evidence of beetle attack is visible in the crown, green needles may be found on the ground beneath the tree. Dying spruce trees do not exhibit the bright red foliage common to most other dying conifers. Typically, tree foliage fades to a yellow-green colour within one to two years following initial attack.



After a couple of years, needles have usually turned brown and fallen to the ground. The lack of foliage tends to produce a reddish appearance from a distance due to the colour of the bare twigs.

Controls & Management

Spruce beetle populations are usually maintained at low levels by a combination of natural control factors such as unseasonable temperatures, woodpeckers, and insect predators and parasites. However, natural predators and parasites do not significantly impact beetle populations during outbreak periods.

Choice of management strategies for spruce beetle will depend on a variety of factors: size and pattern of the infestation; severity of attack; brood survival and vigour; stand hazard; access; and, harvesting operability. After detection, treatment options are limited to harvesting and conventional trap trees (9). Sanitation harvesting is a control method whereby groups of infested trees are removed and milled. Common methods of



sanitation harvesting include clearcutting, partial harvesting systems, diameter limit harvesting, and single tree selection harvesting. Semi-chemical tree baits may be used as a temporary hold-

ing tactic until the stand can be sanitation logged. Logging practices should include expedient cleanup and removal of material containing adult spruce beetles. Conventional trap trees are large diameter live spruce, felled to attract spruce beetle. Spruce beetle prefers downed material and will attack it more intensely than standing spruce. The warmer, exposed upper surface of trap trees are often attacked by other insects such as engraver beetles (10). Therefore, place trap trees in shaded areas to minimize attack by those secondary insects. Salvage harvesting is employed in the removal and processing of dead trees before wood deteriorates to an unmerchantable state.



The most effective longterm management approach is to manage the older ageclass distribution of spruce on the landscape. A mix of age classes coupled with species diversity will ensure more resilient forests. Large, old valley bottom spruce types are often the "trigger points" for new outbreaks. Landscape level management that breaks up large continuous areas of mature spruce should be considered.

For more information, please contact your local BC Forest Service District or Regional Office.
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