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Spruce beetle

By Toso Bozic

The spruce beetle (*Dendroctonus rufipennis*) is a bark beetle species native to North America. Host trees include mostly white spruce, but also Colorado Blue and Norway spruce. Known for its devastating impact on large boreal spruce forests, this beetle has recently gain attention due to infestation occurring in towns, summer villages, woodlots, shelterbelts, and windbreaks.

Spruce beetle populations typically infest trees with a diameter at breast height (DBH) greater than 20 cm, but it also attacks trees with less than 20 cm in DBH, weakened and stressed trees, downed, and dead standing trees or logging debris. In woodlots and shelterbelts exist at low, endemic levels but can erupt into large-scale outbreaks under certain conditions and killing alive standing trees. Tree mortality rates in infested areas can be extraordinarily high, sometimes exceeding 90%.

Pest ID

The life cycle of the spruce beetle can be completed in one to two years, depending on environmental conditions, particularly temperature. Beetle fly from early May to early July, when female spruce beetles will attack a host tree by boring into the bark.

Adult beetles are typically cylindrical in shape, measuring about 4 to 7.5 millimeters in length(size of grain of rice). Their coloration varies from reddish-brown to black, depending on age and environmental conditions. Female spruce beetles lay eggs in galleries they excavate under the bark of host trees. A single female can lay several dozen to over a hundred eggs, depending on her size and condition.

The larvae of the spruce beetle are white, legless, and have a distinct C-shaped curvature. Upon hatching, the larvae feed on the phloem tissue of the tree, creating winding galleries as they grow. This stage is crucial as the larvae are primarily responsible for the tree's death due to their feeding habits, which disrupt the tree's ability to transport nutrients and water.

Newly emerged adults exit the tree through small, round exit holes and fly to new host trees to begin the cycle anew. Adults primarily emerge and disperse in the spring and early summer, although some may overwinter under the bark and emerge the following year.



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Picture 1. Black colour beetle (L), fan shaped galleries with beetles (C) and dead trees in shelterbelts after two years of infestation

Symptoms

Early detection and accurate identification of spruce beetle infestations are crucial for effective forest management. Several symptoms and signs can indicate presence of spruce beetle including:

- **Boring dust (Frass):** One of the earliest signs of infestation is the presence of fine, sawdust-like material called frass. This is expelled from the beetles' entry holes and accumulates around the base of the tree or in bark crevices.
- **Pitch tubes (very rare appearance):** As the beetles bore into the tree, they often elicit a defensive response from the tree, causing it to exude resin. This results in small, yellowish, reddish, or brownish pitch tubes on the bark surface. The size and color of these tubes can vary but are typically visible as small, popcorn-like masses.
- **Galleries under bark:** Removing the bark from an infested tree reveals winding, serpentine galleries created by the larvae as they feed. These galleries can be extensive and often radiate from a central egg-laying gallery constructed by the adult female. The presence of these galleries disrupts the tree's vascular system, impeding the flow of nutrients and water. *lps beetle species, sometimes known as engraver beetles, can be distinguished by the gallery patterns and the lack of frass in galleries.*
- **Tree discoloration:** Infested trees may exhibit needle discoloration, turning from green to yellow, red, or brown. This change often starts at the top of the tree and progresses downward. However, this symptom can take several months to a year to become apparent after the initial infestation.



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- **Woodpecker activity:** Increased woodpecker activity is a secondary sign of infestation. Woodpeckers feed on the larvae under the bark, and their foraging can leave distinctive holes and bark chips around the base of the tree.
- **Exit holes:** Small, round exit holes approximately 3 millimeters in diameter are visible on the bark surface when adult beetles emerge. These holes are uniform in size and can be scattered over the trunk



Picture 2: Pitch tube (L), sawdust and frass (C), woodpecker feeding holes

Management and Control

There are few management options for the control spruce beetle:

- Remove, peel, or burn(get fire permits before burning) all pieces of log with a diameter greater than 15 cm at breast height.
- Removing infested trees before beetles' flights and emergence(early May till July) can reduce local beetle populations and slow the spread of infestations
- Do not damage nearby trees during infested tree removal. Hire professional arborist or tree faller
- Remove, burn, or chip all piles of dead or downed trees before annual beetle flight
- Keep stumps as low as possible and peel bark of them
- Use anti-aggregation pheromones methylcyclohexanone (MCH) may successfully repel spruce beetles from your shelterbelts and around your homes.
- Monitor healthy trees regularly for signs of beetle infestations

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