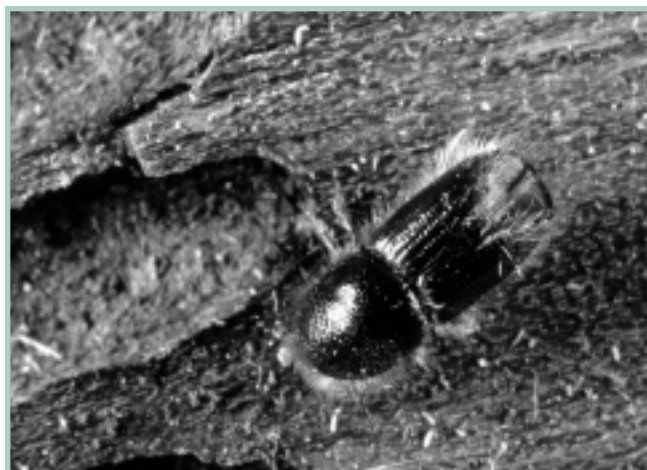




Eight-spined Spruce Bark Beetle – *Ips typographus*

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Figure 1. Eight-spined spruce bark beetle, top view.

Introduction

The eight-spined spruce bark beetle, *Ips typographus* (L.) (Coleoptera: Scolytidae), has been intercepted at several locations in North America during the 1990s. This spruce beetle is one of the most serious pests of spruce in its native range of Europe and Asia. Adult beetles have been trapped and detected in dunnage and raw logs in British Columbia, Ontario, Quebec, New Jersey, Indiana and Pennsylvania. There is no evidence that this species is established in Canada, though Canada's suitable climate and widespread host availability would easily enable *I. typographus* establishment.

Hosts

This beetle is usually associated with windblown, damaged and recently felled trees where populations build before moving on to attack adjacent live trees. The beetle prefers Norway spruce but also attacks other spruce. It occasionally feeds on fir, pine, cedar and larch.

The Threat

- Mature and semi-mature natural and managed spruce stands across Canada are at risk.
- Export restrictions might be imposed on Canadian softwood products if this pest were to become established in Canada.
- This beetle is a vector of several fungi that are pathogenic to conifers.
- Wood infected by these fungi are stained blue, which reduces commercial value.

Life History

The number generations per year and the timing of the life cycle depends on climate. There are two generations per year in Europe where there are more than 1250 degree days above 7°C. Adults can overwinter in the soil or under the bark of attacked trees. Spring emergence usually occurs when air temperatures are over 17°C. In Europe, this usually occurs in April-June depending on latitude and



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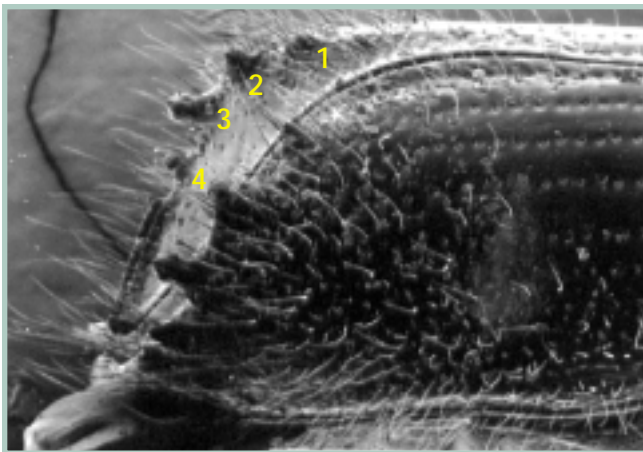
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altitude. The distance covered during flight ranges from a few metres to a few kilometres.

The flight can be broken into two stages: the initial search for a suitable host, and the subsequent mass attack. Males initiate the mining of galleries and release aggregation pheromone to attract up to three females. The pheromone attracts both sexes and is derived from resinous chemicals in the trees. The female searches for a male-dug hole beneath the bark from where she can begin excavating a longitudinal, 10-cm tunnel in which to lay eggs in niches along each side. Her eggs are enormous compared to her body size. In the three weeks during which she lays eggs, she may lay more than 50 eggs. During gallery construction, spores of several blue-stain fungi, which have an active role in killing the tree, contaminate the phloem and cambium.

Larvae feed and pupate under the bark. The new adults make winding tunnels in the inner bark before maturing and boring out of the bark. Parental beetles may leave successfully attacked host trees in 2 to 5 weeks to produce a second brood in other trees, and may even reemerge for a third attack.



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Figure 2. Posterior abdomen of the eight-spined spruce bark beetle showing spine 2 equidistant from spine 1 and 3, and the enlarged head of spine 3.

Recognition

Detecting exotic pests is difficult. They can be mistaken for indigenous insects that breed or feed in similar habitats.

- The legless grublike larvae are small, whitish, with orange-brown heads.
- Pupae are waxy white and approximately 4 mm long.
- The mature beetle is cylindrical, reddish to dark brown and about 4.5-5.5 mm long (Figure 1).
- Adults have four spines on the outer side of each wing cover (elytra) near the posterior. The third spine has an enlarged head (globose) in both sexes. Spine 2 is equidistant from spines 1 and 3 (Figure 2).
- The posterior appears as if it has been cut at an angle and hollowed out (declivity); the hollowed out portion looks dull (Figure 3).
- Adults are similar to the pine engraver beetle, *Ips pini*. The pine engraver beetle is smaller with a shiny posterior, and only male *Ips pini* have a globose third spine.
- It is hard to differentiate the adult male from the female. The males have a larger knob in the middle of their "face" and fewer hairs on the pronotum than the females.



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Figure 3. Side view of the eight-spined spruce bark beetle showing concavity of the posterior abdomen (arrow).

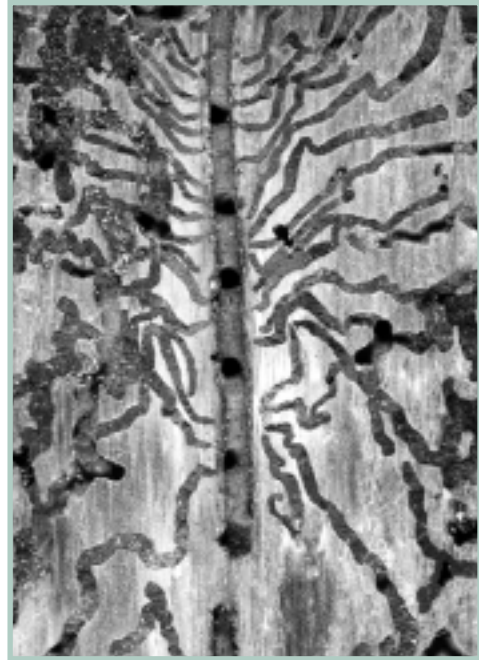
Damage To Trees

Trees attacked by *Ips typographus* are usually noticed when needles turn red or yellow (Figure 4). Infested trees will have dry, reddish brown boring dust in the bark crevices. Attack density varies from two to eight entrance holes per 10 cm × 10 cm area, averaging 3.7. More than 10 m of the stem height is infested. Trees may have dime-sized pitch tubes, and a mixture of bark and pitch is pushed out by the beetles. Females develop a linear gallery system, from which larval galleries radiate; the larval galleries become wider as the larvae grow. This pattern is unique to *Ips typographus* (Figure 5). When the beetle leaves the tree their emergence holes appear as shot holes on the bark surface (Figure 6).



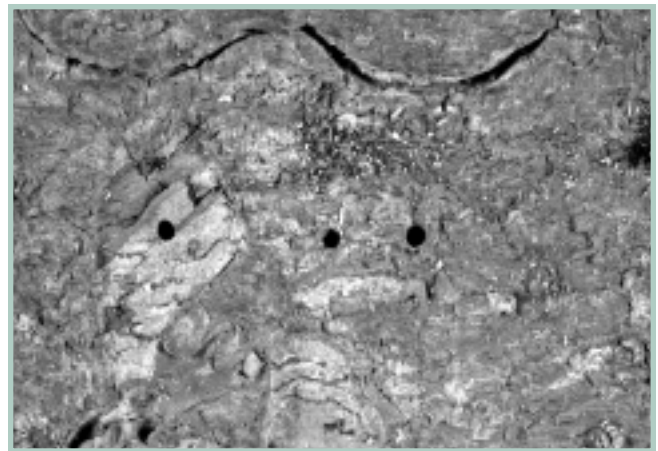
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Figure 4. Foliage turning chlorotic on infested trees.



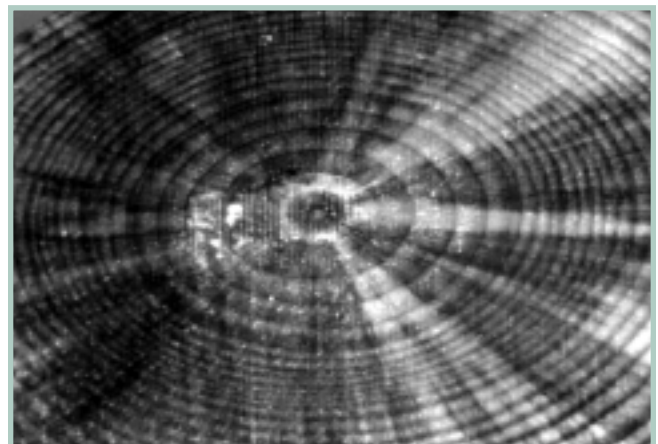
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Figure 5. Larval galleries of the eight-spined spruce bark beetle.



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Figure 6. Emergence holes of adult beetles.



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Figure 7. Wood discolored by blue stain fungus.

Ips typographus carry a variety of fungal spores on the outside of the abdomen and internally in their gut. Four of the most common species are *Ophiostoma bicolor* Davids & Wells, *O. penicillatum*, *O. polonicum* Siem. and a *Graphium* species. *Ophiostoma polonicum* is the primary invader and is able to kill healthy Norway spruce. The bluestain spores germinate in the egg galleries and the fungus colonies grow into the sapwood (Figure 7). The fungus interferes with the upward flow of water into the tree crown. Lack of water causes the foliage to change colour from dull green to yellow-green to red-brown and the foliage drops within a few weeks. Diseased wood is stained, resulting in a much lower market value.

Detection

What to Look For

- Discoloured spruce foliage.
- Reddish brown boring dust or pitch tubes.
- A linear gallery system.
- Shot holes on bark surface.

Pheromone traps can be used to detect *Ips typographus*. A series of traps could be set along the edge of high-risk spruce stands or in port areas that may have European dunnage or imports of Norway spruce logs. Trees growing on poor sites and areas of declining and dying spruce, or recently cut stumps, especially Norway spruce, are likely hosts.

Control

The life-cycle of the spruce beetle limits control measures to trapping using pheromones or trap logs, and burning infected material.

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