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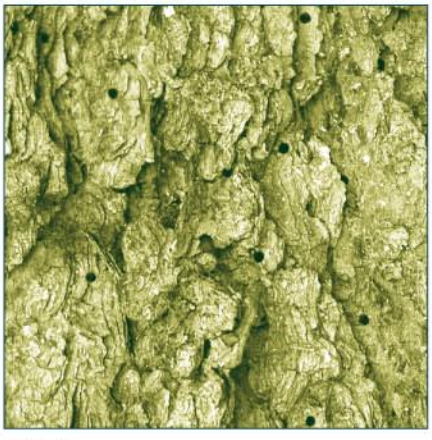
Thinking strategically to outsmart the mountain pine beetle

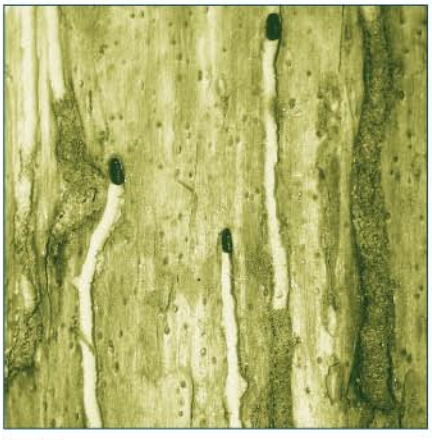
The mountain pine beetle (*Dendroctonus ponderosae*) has been wreaking havoc in the forests of British Columbia since the mid-1990s. Millions of hectares of pine forests have come under attack in that province and the outbreak is now spreading into Alberta. Does this insect pose a serious threat to the forests of eastern Canada?

The mountain pine beetle is a species native to British Columbia's pine forests. Normally, these beetles play an important role in forest dynamics by attacking old or weakened trees, and thus helping to speed the process of stand regeneration. Severe winter cold and forest fires help keep their populations in check.

Mountain pine beetle.
Photo: SCF



Exit holes.
Photo: SCF



Galleries.
Photo: SCF

However, a combination of factors, including a series of mild winters, successful fire suppression and extensive areas of mature lodgepole pine forest, have created conditions conducive to the explosive growth of mountain pine beetle populations, resulting in a large-scale outbreak.

Although it is unlikely, there is still a risk that the mountain pine beetle will continue its eastward advance and attack vast stands of jack pine. A strategy has been developed to slow the spread of the mountain pine beetle, reduce the size of infestations, and minimize the associated economic losses.

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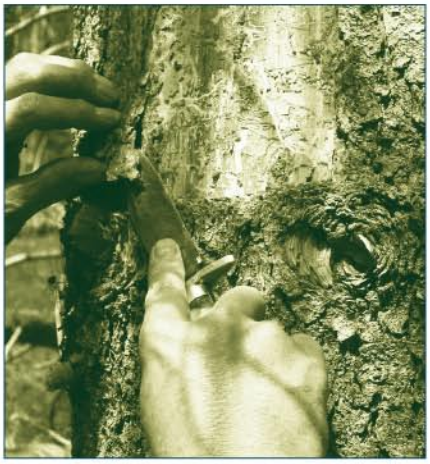
Larva.
Photo: SCF

Based on prevention, early detection and rapid control of infestations, this strategy is aimed at keeping mountain pine beetle populations in check by maintaining them at the lowest possible levels. The battle plan is two-pronged, consisting of direct (short-term) and indirect (long-term) control measures.

Direct measures include harvesting or burning infested trees shortly after the beetles' presence has been detected, before the adults have a chance to fly off in search of new hosts. If the population reaches a large size, pheromone traps can be used to attract and keep the beetles in a given area that will later be cleared. Felling certain trees along the border of infested areas can also help to contain the population.



Checking for beetle.
Photo: SCF

Indirect control consists in reducing the risk of future beetle infestations through careful regeneration planning aimed at replacing contiguous stands of mature pines susceptible to beetle attack with less vulnerable stands comprising a mixture of tree species and age classes. This approach basically changes the landscape, making it less attractive to the mountain pine beetle. Measures that can be taken to create a more diverse forest include prescribed burning, felling of host trees, and early harvesting of stands to reduce the number of mature host trees that could attract beetles.

Antifreeze to beat the cold

As temperatures decline in the fall, mountain pine beetle larvae secrete an antifreeze-like substance, glycerol, in their blood. With this protection, most of the larvae can withstand temperatures as cold as -40°C. However, if a severe freeze occurs suddenly in early winter or lasts long enough at the end of winter for the cold to penetrate the snow and bark, large numbers of larvae will die.

The mountain pine beetle's colourful lifestyle

The mountain pine beetle has a life cycle that normally lasts one year. In late summer, the adults emerge from the trees in which they fed and developed and fly off in search of healthy trees, into which they bore in search of a partner. The females bore vertical galleries just under the bark, in which they lay their eggs. The larvae that emerge from the eggs spend the winter feeding under the bark. Adult emergence takes place between July and September.

Bluestain.
Photo: SCF

A key stage in the life cycle occurs when the beetle transmits a bluestain fungus to the tree. Attacking beetles carry the spores of the fungi, which gain entry to the tree and eventually overcome its defence system and its ability to withstand beetle attack.

USEFUL LINK:

Mountain pine beetle home page
cfs.nrcan.gc.ca/subsite/mpb

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