Forest Pest Fact Sheet

June 2018

MOUNTAIN PINE BEETLE, (*Dendroctonus ponderosae.*)

BACKGROUND

The mountain pine beetle is a member of a group of insects known as bark beetles. At normal endemic population levels this insect attacks over mature, stressed and weakened trees. However, widespread epidemics that kill millions of hectares of healthy forest do occur. These epidemics often last for more than ten years.

DISTRIBUTION

This species is native to western North America, extending from northern British Columbia and western Alberta, through the western United States and into Mexico. There is an outlier population in the lodgepole pine forests of Cypress Hills in south western Saskatchewan. In recent years, due to warmer winters, mountain pine beetle has expanded beyond its traditional range, extending further north in British Columbia and further north and east in Alberta.

DESCRIPTION OF LIFE STAGES

Adults are about 5 mm in length, stout, black, cylindrical beetles. Eggs are pearly white and about 1 mm in size. Larvae are legless grubs that are about 5 mm to 6 mm long in the final instar. They have a white body and a red-brown head. The pupae are white at first and later change to light brown. They are about 5 mm long and have the external characteristics of the adult.

Mountain pine beetle adult

Image: Dion Manastyrski, BC MoF

Mountain pine beetle larva

Image: Dion Manastyrski, BC MoF

Mountain pine beetle pupa

Image: Dion Manastyrski, BC MoF

Mountain pine beetle teneral adult

Image: Dion Manastyrski, BC MoF

HOST SPECIES

The major host species include lodgepole, ponderosa, sugar, and western white pines. Limber pine, bristlecone pines and pinyon pines are less susceptible. Although mountain pine beetle does not occur within the range of jack pine, research indicates that jack pine would be a suitable host species. In Alberta, lodgepole/jack pine hybrids have recently become host trees.

LIFE CYCLE

Adults emerge from dead and dying trees in July and August. Females seek out suitable brood trees and bore through the bark to the cambial layer. Following mating, females construct vertical egg galleries in which they lay their eggs. A single female lays approximately 75 eggs. Larvae hatch in 10 to 14 days and begin feeding in tunnels. Mountain pine beetles spend the winter as larvae and resume feeding the following spring. There four larval instars. Once feeding is complete, larvae construct oval cells and transform into pupae. Later, new adults emerge and attack other trees within one or two days. There is normally one generation per year, but depending on elevation and latitude, the life cycle may be shorter or longer.

Mountain pine beetle adults carry blue-stain fungal spores on their bodies. These spores are introduced into host trees at the time of attack. Once introduced into tree, the blue stain fungi grow rapidly through the phloem and sapwood.

SIGNS, SYMPTOMS AND DAMAGE

Yellow masses of resin called pitch tubes, made when females bore into trees, are visible on the outer bark of the trunk. Red boring dust is visible in bark crevices and on the ground at the base of attacked trees. Within the inner bark, long straight vertical egg galleries are packed with boring dust and insect droppings. The wood of infested trees is often discoloured by blue-stain fungi. The blue-stain fungi produce melanin, which discolours the wood, giving the characteristic blue stain that is associated with trees killed by mountain pine beetle. Blue-stain fungi colonize the phloem and xylem, which blocks the flow of nutrients and water and assists the beetle in killing the tree. Foliage discolouration occurs several months after a tree is attacked. Foliage turns yellow and later reddish brown. Signs of woodpecker feeding can also be an indicator of mountain pine beetle attack. As woodpeckers search for larvae, they make holes in the bark or remove strips of bark from the tree.

Pitch tubes on trunk

Image: Saskatchewan Ministry of Environment

Galleries under bark

Image: Dion Manastyrski, BC MoF

During epidemics, widespread tree mortality often has a major impact on commercial forests in terms of timber volume loss and site conversion to less desirable tree species or to grass or shrubs. In addition to the impact on commercial forestry, the destruction of millions of hectares of forest can impact the ecological balance.

Blue stain fungi in wood

Image: Saskatchewan Ministry of Environment

Landscape level tree mortality

Image: Saskatchewan Ministry of Environment

MANAGEMENT PRESCRIPTIONS

Early detection, followed by rapid aggressive and sustained fall and burn response action can prove successful in containing incipient populations. Synthetic attractants, used to trap beetles to trees for subsequent fall and burn control, can also be an effective approach to containing small infestations. During outbreaks, salvage harvesting is done to maximize timber utilization and reduce beetle populations. However, over the long term, managing the structure and age of the forest is the most effective way to prevent mountain pine beetle outbreaks. Employing techniques such as thinning and patch harvesting can create more structural diversity in terms of stand density and age and size class. Managing in this manner

will reduce the amount of beetle susceptible forest present at any given time, creating a forest landscape that is less vulnerable to beetle epidemics.

WHAT THE PUBLIC CAN DO

The mountain pine beetle is a regulated pest in Saskatchewan. Do not transport pine wood with bark intact from infested to non-infested areas.

Designation of MPB and "Lands": http://publications.gov.sk.ca/details.cfm?p=84110
Minister's Order: http://publications.gov.sk.ca/documents/66/97511-Mountain%20Pine%20Beetle%20Ministers%20Order.pdf

REFERENCES FOR ADDITIONAL INFORMATION

The Mountain pine beetle: A synthesis of Biology, Management and impacts on Lodgepole pine. 2006. Safranyik and Wilson (eds). Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre Victoria B.C. Canada. 304 pp.
https://www.for.gov.bc.ca/hfd/library/documents/bib96122.pdf

Mountain Pine Beetle
British Columbia Ministry of Forests, Lands and Natural Resource Operations
http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/

Mountain Pine Beetle
Gene D. Amman, Mark D. McGregor, and Robert E. Dolph, Jr. 1990
Forest Insect & Disease Leaflet 2
United States Department of Agriculture Forest Service
http://www.barkbeetles.org/mountain/fidl2.htm