Western Pine Beetle

Meandering egg galleries

Name and Description—*Dendroctonus brevicomis* LeConte [Coleoptera: Curculionidae: Scolytinae]

The western pine beetle attacks and kills mature ponderosa pine throughout much of its range. It is one of the smaller members of the genus *Dendroctonus* (only about 1/8 inch [3-5 mm] long), and is a fairly non-descript bark beetle; it is dark brown and cylindrical in shape (fig. 1).

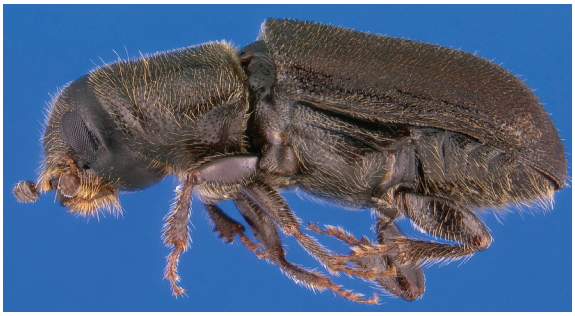

Figure 1. Western pine beetle adult (*Dendroctonus brevicomis*). *Photo: Erich Vallery, USDA Forest Service-SRS-4552, Bugwood.org.*

Host—Ponderosa pine; however, this beetle is never found east of the Continental Divide, and, within the Rocky Mountain Region, it is active only in a narrow band in western Colorado.

Live Cycle—There are several generations per year of western pine beetle. This number varies with location, depending upon elevation and latitude. The number of generations is tied directly to the length of the "growing season," so in some portions of their distribution, they will have two generations per year, whereas in other areas, there may be as many as four generations per year.

Figure 2. Western pine beetle galleries. *Photo: Ladd Livingston, Idaho Department of Lands, Bugwood.org.*

Western pine beetles are virtually inactive during the winter months but as soon as the weather becomes warmer, they will increase their activity. The first sign of western pine beetle attack is the production of pitch tubes on ponderosa pines. The egg gallery that is constructed by western pine beetles is described as being "serpentine;" that is, it is a sinuous, winding gallery that can even cross itself at times (fig. 2). The beetles mate, and eggs are deposited along the margins of the central gallery. *Dendroctonus* beetles pack these galleries with frass (boring dust and beetle excrement) once the eggs have been deposited. These eggs hatch out, and the tiny larvae feed briefly within the inner bark on the phloem layer. However, after this brief period, the larvae turn out into the bark of the host tree and continue to tunnel within the outer bark. Pupation occurs within the outer bark of the host, and the next generation of adult beetles will emerge to renew the cycle. The combination of long, serpentine galleries and the absence of larval feeding beneath the bark of the host tree are key characteristics of western pine beetle galleries that allow positive identification even after the beetles have left the host.

Mixed Broods—One of the more confusing aspects of western pine beetles is the occurrence of mixed broods in a single tree under attack. This term refers to the presence of several different species of bark beetles attacking the same host simultaneously or within the same season. While in some cases, the various species will concentrate their activities in separate portions of the tree (e.g., Ips spp. in the top, *Dendroctonus adjunctus* in the crown, and *D. brevicomis* in the bole), in many cases, the galleries of different species can be found immediately adjacent to each other. This phenomenon is poorly studied but has been noted for some time. Furniss and Carolin (ref. 50) list a number of species that will co-attack a ponderosa pine. Within Colorado, the western pine beetle's most common associates include the roundheaded pine beetle (*D. adjunctus*); the red turpentine beetle (*D. valens*); the

pine engraver (*Ips pini*); and, occasionally, various borers (e.g., Cerambycidae and Buprestidae). The occurrence of mixed broods increases the difficulty of identification in the field, and it also implies that some aspects of bark beetle biology are still not well understood.

Damage—Most of the time, the populations of these native insects are at low levels, and the beetles attack stressed, damaged, or weakened ponderosa pines. Trees damaged mechanically or by lightning or fire are often targets of attack, as are diseased host trees. Western pine beetle populations often increase dramatically during periods of drought, and over-stocked stands are also subject to western pine beetle attack. These beetles kill host trees in a wide range of size classes, from 6-inch (15-cm), pole-sized ponderosa pines to very large "yellow-bellies" with diameters over 3 ft (0.9 m). Populations of western pine beetles can increase when large numbers of susceptible hosts are present, and the large number of beetles can spread to other stands with generally low susceptibility. These outbreaks can last for several years and can affect forests over widespread areas.

Management—As with most bark beetles, the most economical and efficient means of management is to maintain trees and stands in a healthy condition. Stocking reduction and creation of diverse stand conditions reduce overall susceptibility to western pine beetles. During times of drought, vigilance and prompt sanitation of infested hosts can reduce the overall impacts of western pine beetles. Programs that seek to remove infested trees require that managers have a good understanding of western pine beetle biology. They should be familiar with the occurrence of mixed broods and also be able to recognize the various stages of beetle development so that treatments can be prioritized.

Supplemental watering of high-value trees and stands has shown some efficacy in reducing western pine beetle attack. In addition, the use of chemical sprays in landscape or recreational settings has proven to be highly effective at preserving individual high-value trees.

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3. Furniss, R.L.; Carolin, V.M. 1977. Western forest insects. Misc. Publ. 1339. Washington, DC: U.S. Department of Agriculture, Forest Service. 654 p.