Pine Reproduction Weevil

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The pine reproduction weevil (*Cylindrocopturus eatoni* Buchanan) attacks and kills several species of young pines in California. It is primarily a plantation pest; infestations tend to be highly persistent and end only after many trees have died. The weevil usually infests young trees of about 18 inches to 5 feet in height but will occasionally attack trees up to 10 feet in height.

Occurring throughout much of California's lower ponderosa pine forests (under 4,500 feet elevation), the pine reproduction weevil largely escapes notice under natural forest conditions. Here it usually attacks only scattered weakened or suppressed trees. Occasionally, however, large patches of dense natural reproduction are killed. Such outbreaks are somewhat more spectacular, but are also somewhat less persistent—generally not lasting for more than 3 or 4 years.

The weevil was first considered an economic pest in 1939, after several severe infestations occurred in brushfield pine plantations in northern California. Since then, weevil infestations have broken out in other plantings on similar sites. The nearly complete destruction of a 3,000-acre brushfield plantation in the Lassen National Forest was attributed to weevil activity.

The weevil appears to be restricted to northern and central California (fig. 1), although it may occur farther south in California and also in Oregon.

Hosts

Ponderosa pine is the principal host of the pine reproduction weevil. The insect also attacks sugar pine and Digger pine, but only rarely. Jeffrey pine has been severely attacked under some conditions when planted within the natural range of ponderosa pine, but weevil activity does not occur in areas where Jeffrey pine grows naturally.

In addition to these species, other pine species and hybrids—mostly hard pines—have proved susceptible to weevil infestation in tests at the Institute of Forest Genetics at Placerville, Calif.

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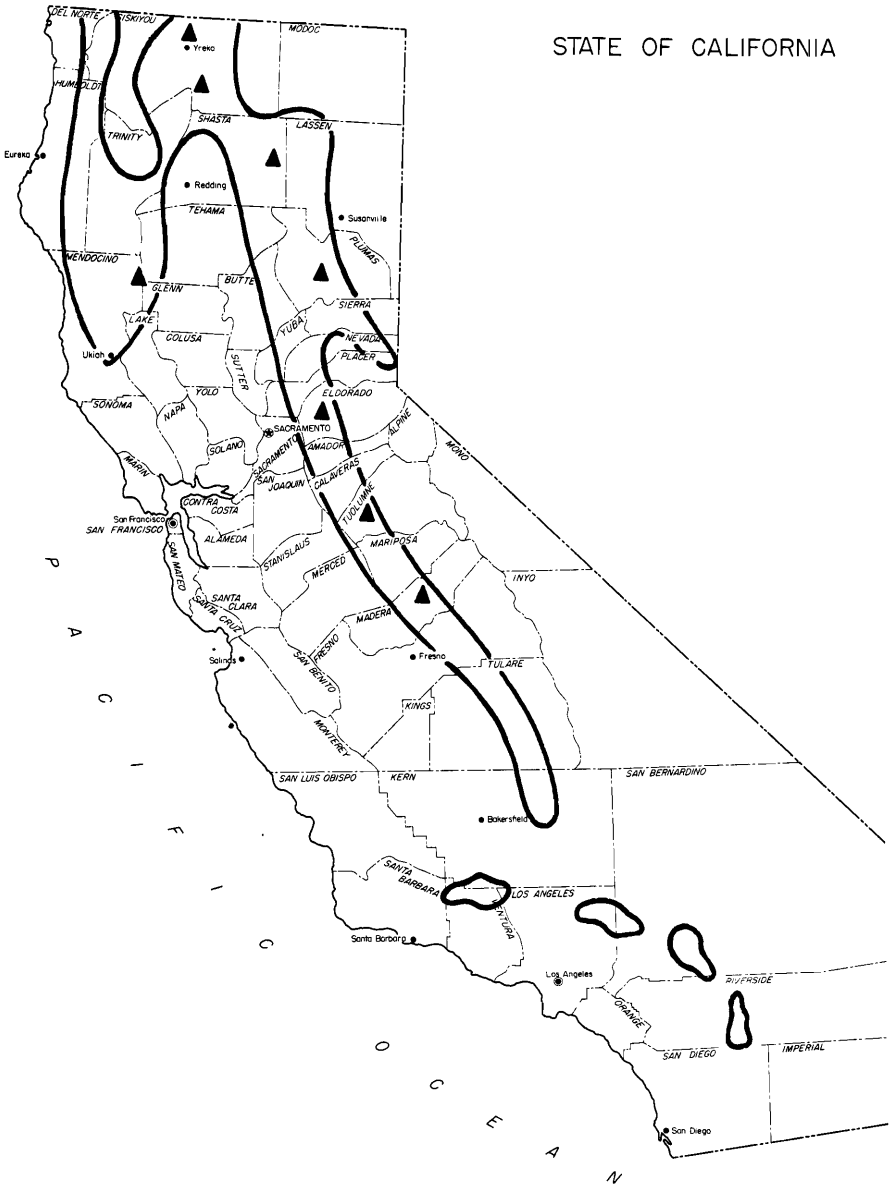

***Figure 1.*—Distribution of the pine reproduction weevil and generalized California range of ponderosa pine, its most important host.**

Evidences of Infestation

Weevil attack is usually first indicated by the fading of infested trees in fall. Fading progresses from the top downward, most trees appearing off color by early autumn. The foliage becomes progressively straw colored, then bright yellow. By the following spring the needles of most infested trees are a deep reddish brown. Lightly attacked trees sometimes fade more slowly, not changing color appreciably until the spring following the attack.

Feeding punctures in needles and stems, made by adult weevils, are also evidences of attack. Feeding punctures on the needles (fig. 2) appear as concentric brown rings about 1 mm. in diameter. The weevils feed in the cortex of the twigs and stems; many of the punctures produce pitch globules —the result of resin vessels rupturing.

Heavy feeding on the needles by adults may cause some browning of the foliage, but it seldom, if ever, kills the tree. Feeding by larvae in the cambium area, however, is generally followed by death of the tree. Most commonly the entire tree becomes infested and dies, but sometimes only the upper part is killed. The rest of the tree may be killed by subsequent generations of weevils or, more rarely, may escape further attack.

Successful weevil attack is usually accompanied by the development of a wood-staining fungus, another good indication of reproduction weevil activity. Finally, adult-emergence holes in the

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Figure 2.—**Feeding punctures on pine needles.**

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Figure 3.—Adult pine reproduction weevils.

bark indicate that the tree was killed by weevils.

Stages of Development

The adult (fig. 3) is minute, about 2.5 mm. long by 1 mm. wide. Its dark and light scales give it a generally gray appearance. Its long, black, curved beak, typical of the weevil family, is a prominent feature. The eggs are pear-shaped, whitish, and translucent —barely visible to the naked eye. The larvae are small, cream-colored legless grubs about 4 mm. long when fully mature. The pupae, also cream colored, are about 3 mm. long.

Life History and Habits

Adult weevils emerge from infested trees from about the last week in May until about mid-July. They then feed on the pine foliage, twigs, and stems for about 2 to 3 weeks, often moving about rapidly on the needles and twigs. They are strong flyers. When disturbed, they hop into the air and fly down in a characteristic spiral onto a lower branch.

Mating takes place during the 2- to 3-week feeding interval. The females lay single eggs in some of the feeding punctures in the cortex of the main stem and twigs below the current year's growth. The eggs hatch in about 2 weeks, and the small larvae chew through the inner bark to the phloem-cambium area, where they continue feeding until maturity.

As the larvae mature, they tunnel between the wood and the outer bark, the tunnels crossing and running together, until eventually this entire area may be destroyed. When the larvae are fully developed in late fall, they construct simple pupal chambers in the outer layers of the wood, in the larger twigs and stems, or in the pith in smaller twigs or stems. Late the next spring the larvae

transform to pupae. After about 2 weeks, they become adults and emerge, thereby completing their 1-year life cycle (fig. 4).

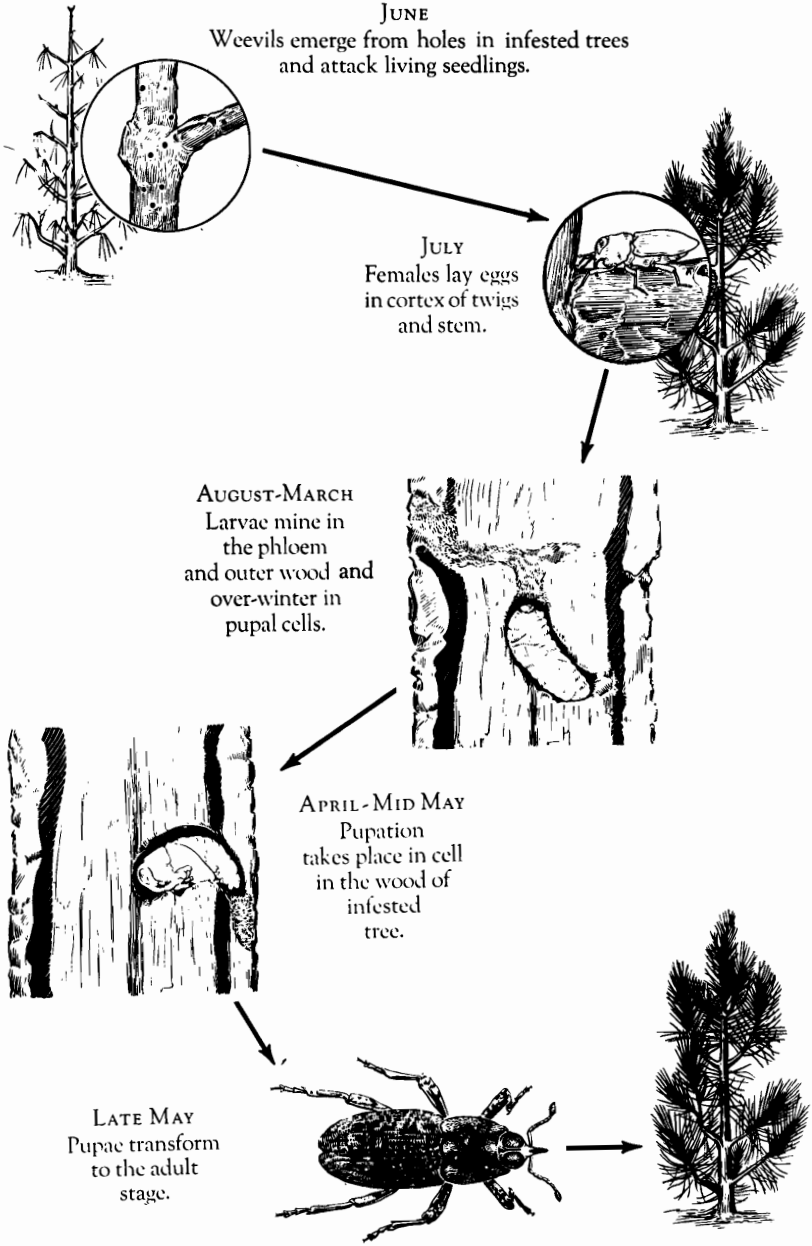

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***Figure 4.*—Generalized life cycle of the pine reproduction weevil.**

If weather conditions permit, a few weevils may complete development during the summer in which the eggs are laid. These reach the adult stage and emerge before winter begins; their subsequent fate is not known.

Natural Control

The main factors controlling pine reproduction weevil populations are parasitic and predaceous insect enemies and the condition of host trees. The most important of the weevil's insect enemies are several species of tiny parasitic wasps. These prey on the weevil larvae, as does at least one species of predaceous beetle.

Soil moisture available to the tree has been regarded as indirectly important in regulating weevil populations, presumably through its effect on tree vigor. Severe weevil outbreaks have been recorded in plantations during years of low spring soil moisture.

Applied Control

The answer to pine reproduction weevil infestations in plantations lies in maintaining suitable growing conditions for trees. Infestations have developed in the presence of severe brush competition, for example, but not in brush-free plantations. Dry, south-facing slopes and thin soil on rocky ridgetops are other conditions that have existed in weevil infested areas.

In areas where there are unfavorable growing conditions, use of trees with greater resistance has shown promise. A backcross hybrid between Jeffrey pine and the natural hybrid of Jeffrey X Coulter pine has been shown to incorporate the weevil resistance characteristics of the Coulter parent and the good form characteristics of the Jeffrey pine. A small mass production program was carried out by the USDA Forest Service in California in the early 1960's to provide such hybrids for potential weevil problem areas.

Infested trees have sometimes been pulled and burned. This has proved unsuccessful in halting infestations; not only is it very difficult to find all the infested trees, but adult weevils from outside the treated areas can invade, feed, and lay eggs without being adversely affected.

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