Pine Looper

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The pine looper, *Phaeoura mexicanaria* (Grote), is native to the Western United States and British Columbia, Canada (fig. 1).

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Figure 1.—Reported *Phaeoura mexicanaria* locations.

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The only reported host plant is ponderosa pine, *Pinus ponderosa* Laws.

Prior to 1969, this insect had not been reported as being economically important. In 1969, an infestation occurred on approximately 25,000 acres of forested land in eastern Montana. The infestation increased to over 63,000 acres in 1970, then collapsed. In 1971, a separate infestation was detected on about 15,000 acres also in eastern Montana and persisted at about the same level through 1972.

Infestations seem to develop almost explosively, going from obscurity one season to a full-scale epidemic the next season.

Defoliation by pine looper can result in tree mortality, especially of younger trees. Some mature trees are killed outright by defoliation and others are predisposed to secondary attack by ips bark beetles.

Trees of all sizes are attacked, and both old and new needles are eaten.

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Life History and Description

The pine looper completes one generation a year. Eggs are deposited in clusters on needles or branches in early July (fig. 2). Clusters may be as much as 2 inches long and completely encircle the needle. Eggs are laid in irregular patches, one layer deep on branches. Eggs are slightly less than elliptical and range from 0.80 to 0.95 mm. in diameter. They are pale green when first deposited and after hatching the case becomes crystalline white. Egg masses may contain as many as 500 eggs, but average 160. Eggs hatch about 2 weeks after deposition.

Newly hatched larvae are about 2.7 mm. in length and grow to 44 mm. upon completion of the final instar (5th). The surface of the young larva is smooth and light brown in color, with yellow stripes along the sides (fig. 3). The stripes disappear as the larvae mature. The body surface then becomes rough with numerous tubercles the length of the body. The older larvae range from tan to dark brown and closely resemble dead ponderosa pine twigs (fig. 4). The larvae are solitary and feed one to a needle. The larval period lasts for about 6 weeks. Prior to pupation, they migrate from the tree to the ground in search of a pupation site.

Pupation occurs in the duff near the zone where the litter layer meets the mineral soil. Pupae are deep reddish-brown in color and range in length from 23.0 to 32.5

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Figure 2.—Pine looper egg mass.

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Figure 3.—An early instar pine looper larva.

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Figure 4.—A late instar pine looper larva.

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Figure 5.—Pine looper pupae.

mm. They are obtect and fairly stout (fig. 5). Pupation usually begins in early September in Montana. The winter is passed as pupae.

Moths emerge from mid-June through early July and mating occurs shortly after emergence. The moth flight continues for about 2 or 3 weeks. The moths are, for the most part, nocturnal. The moths have dark brown bodies and wings of mottled brownish gray, ranging from tan to black. The adult female has a wingspan of 45–63 mm.; the male is slightly smaller (fig. 6). The antennae of the female are threadlike; those of the male are comblike.

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Figure 6.—Pine looper adults. Female at top.

Damage

All reported pine looper epidemics have occurred in pure stands of ponderosa pine. The largest reported outbreak covered 63,000 acres. Most severe defoliation occurs near ridge tops and on plateaus. Trees of all ages and crown levels are defoliated (fig. 7).

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Figure 7.—Pine looper-caused defoliation.

First evidence of feeding appears in late July in the form of reddened needles. This results from the small larvae feeding only on a portion of the needle, causing it to die and turn brown. Later, the larger larvae devour the entire needle, stripping the trees of nearly all foliage.

A survey conducted in a 2,000-acre area of looper defoliation showed that the more severely defoliated trees were predisposed to attack by bark beetles. However, some severely defoliated trees died from defoliation alone. The survey found 98 percent of the trees suffered defoliation; 44 percent were nearly completely defoliated; and 54 percent were partially defoliated. Over 70 percent of the severely defoliated trees were subsequently attacked and killed by the bark beetles *Ips calligraphus* (Germar) and *I. pini* (Say). Only 2½ percent of the partially defoliated trees and none of the nondefoliated trees were attacked by the beetles.

Natural Control

Parasites, predators, and diseases are common during pine looper outbreaks. The most significant natural enemy, and the major cause of past population

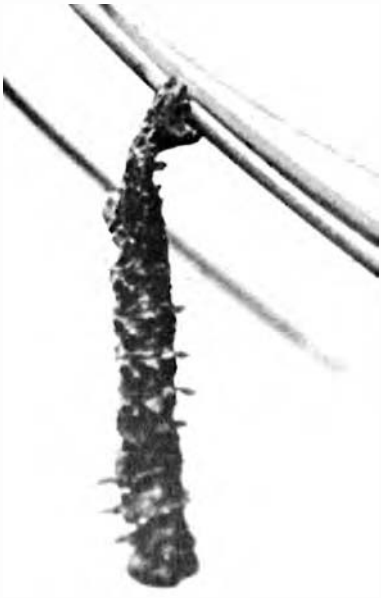

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Figure 8.—Pine looper larva infected with a bacterial pathogen.

collapses, is an unidentified bacterium. This pathogen infects the larvae and causes death prior to pupation (fig. 8).

A pathogenic fungus, *Paecilomyces farinosus* (Dicks. ex Fries) Smith and Brown, has been isolated from several pupae, but its role as an effective control agent is not known.

The most common parasite is *Ichneumon pulcherior* (Heinrich). This species parasitized 34 percent of 2,015 pupae collected in 1969. Two other parasites, *Coelopisthia suborbicularis* (Provancher) and *Euphorocera* sp. near *edwardsii* (Williston), possibly a new species, attack the pine looper. The predatory bug *Apateticus bracteatus* (Fitch) has been found associated with looper outbreaks; this insect is known to be predatory on eggs and larvae of other pine defoliators. Wild turkeys have been observed feeding on the pupae. In some areas the duff is completely scraped away where turkeys have scratched for pupae.

Applied Control

To date, no insecticides are registered for control of the pine looper. If need for control should arise, consult with a forest entomologist or county extension agent to learn whether direct control measures have been developed and are registered for use against this pest.

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