Pinyon Sawfly, *Neodiprion edulicolus* Ross

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The pinyon sawfly, *Neodiprion edulicolus* Ross, is an important defoliator of single-leaf pinyon, *Pinus monophylla* Torr. and Frem., in eastern Nevada. The first recorded outbreak occurred in 1959 in mixed pinyon-juniper stands near Pioche, Nev. Approximately 7,000–9,000 acres were infested; defoliation ranged from 10 to 100 percent. Some mortality of trees 4 feet high and less occurred. In 1960, activity dropped to a low level following subfreezing temperatures and heavy parasitism of surviving larvae. Low populations persisted through 1961. No sawflies were detected again until 1965. At that time, large populations heavily defoliated more than 100,000 acres of pinyon near Pioche and Caliente, Nev. Again, smaller trees were most severely affected, and many were rendered unfit for sale as Christmas trees.

The commercial value of pinyon has increased in recent years. This pine now serves as an important source of Christmas trees, pine nuts, and fuel; it is used, to a lesser degree, for esthetic values and as ground cover for watersheds. Influences, such as sawfly defoliation, will be of concern in future forest operations.

Hosts and Distribution

The pinyon sawfly has been collected from single-leaf pinyon, *Pinus monophylla* Torr. and Frem., at Caliente and Pioche, Nev.; and from pinyon, *P. edulis* Engelm., at the Colorado-New Mexico line, and in Zion National Park, Utah. These two pinyons are the only known hosts. The single-leaf pinyon is the principal host in eastern Nevada. Trees of all ages, sizes, and crown classes are attacked, and heaviest feeding occurs on trees 10 feet or less in height.

Evidence of Infestation and Damage

In spring, a noticeable swelling occurs on the pinyon needle around the eggs prior to larval hatching. Newly emerged larvae feed in groups of two or more, often encircling each needle. The outer tissue of a needle at or near the tip is consumed, leaving a central rib or core (fig. 1). The uneaten parts of the needles turn yellowish brown, shrivel and dry, and are broken off by wind and rain.

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Figure 1.—Branch tip damaged by sawfly feeding.

Larger larvae feed singly or in pairs on a single needle. They prefer older foliage and often eat most of the needle, leaving only the basal part. Large colonies of these feeding larvae produce a "rain" of frass pellets, which accumulate beneath the defoliated trees. Defoliation resulting from light infestations is more noticeable in the exposed upper third of the crown. After moderate to heavy defoliation, the forest appears parched. Sawfly damage may not be detected for a year or more in inaccessible areas. Late spring feeding may leave only the foliage of the current season intact, and the crowns will appear "tufted" or thin. On trees completely defoliated for 2 or more years, new growth appears stunted. Complete defoliation of smaller trees for 3 years may lead to mortality.

Description

The female adult (fig. 2, *A*) is 6 to 8 mm. long and has a golden brown body. The antennae are serrate, about one-third the body length, and are dark brown to black. The adult male (fig. 2, *B*) is 5 to 7 mm. long and is greenish black. The abdomen is somewhat pointed posteriorly. The antennae are bipectinate and about one-third the body length.

The egg is subcylindrical with rounded ends, milky white, and almost translucent when deposited but becomes white to yellowish prior to hatching.

Newly hatched larvae are black and approximately one-eighth of an inch long; their head capsules are grayish white but darken to jet black within a few hours. Soon after hatching, the body becomes pale green. As they grow, a dark green longitudinal stripe develops along each laterodorsal surface, and a narrow off-white stripe is visible along the middorsal surface (fig. 3). There are eight pairs of prolegs. Fifth and sixth instars differ from the preceding ones in having tan instead of jet black head capsules, a pinkish-gray body with dark longitudinal stripes, in contrast to the pale green body and dark green stripes of younger larvae. Mature

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Figure 2.—Adults: A, female; B, male.

larvae are approximately three-fourths of an inch long, turn dark brown prior to shedding their skins, and are less active than preceding instars.

Newly developed cocoons are capsule-shaped, 8 mm. long, and consist of a tough papery material. They are white when first formed but gradually darken to a golden brown. Grains of sand adhere to newly formed cocoons in the field (fig. 4). Cocoons that have remained in the field 2 or more years are dark brown.

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Figure 3.—Mature larva.

Life History and Habits

Eggs are deposited in October and early November. After mating, the female uses her sawlike ovipositor to "saw" small slits and gouge out egg pockets in the needles of the current year. The female does not show a preference for an oviposition site. One egg is deposited in each slit. The number of eggs per needle ranges from one to five, with an average of two. A few eggs may be found in 1-year-old needles. Eggs overwinter within the pinyon needle. Larvae hatch in early April. Groups of three or more larvae move toward the tips of adjacent needles and feed. The larvae align themselves side by side, parallel to the long axis of the needle, with their heads pointed toward the apex (fig. 5). This orientation is usually maintained throughout the feeding period. Initial feeding occurs near or at the needle tip, and feeding proceeds toward the base. First and second instars take small bites and skeletonize the needles. Entire

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Figure 4.—Cocoons.

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Figure 5.—Typical larval feeding group.

needles are consumed by older larvae.

In mid-June, fully developed larvae drop to the ground and form cocoons beneath the duff to depths of 2 inches in sandy soil. Pupation occurs in the fall. Adults emerge in October and early November. The pinyon sawfly produces one generation each year and has a 1-year life cycle throughout its known range.

Natural Control

Late spring storms, followed by subfreezing temperatures and parasitism, appear to regulate pinyon sawfly populations. In Nevada, 11 species of parasitic wasps and six species of parasitic flies have been reared from cocoons of the pinyon sawfly. The most numerous parasites were of the wasp families Pteromalidae and Ichneumonidae. The small parasitic wasp, *Dibrachys* sp., may become abundant, and under favorable circumstances it kills over 90 percent of the larvae. Rodents dig up and destroy some sawfly cocoons. No practical method of direct control is known.

References

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