White-Spotted Sawyer

By Louis F. Wilson[1]

The white-spotted sawyer (*Monochamus scutellatus* (Say)) is an important wood-boring insect in North America. Its range encompasses an area from Newfoundland southward to North Carolina, westward from the Atlantic coast through the North Central States to Minnesota, and northwestward into Alaska, wherever its coniferous hosts are found.

Hosts

The larvae develop successfully in weakened or recently dead conifers, freshly cut pulpwood, and saw logs. Eastern white pine (*Pinus strobus* L.) appears to be the preferred host within its range, but the sawyer will also readily attack jack pine (*P. banksiana* Lamb.), red pine (*P. resinosa* Ait.), balsam fir (*Abies balsamea* (L.) Mill.), white spruce (*Picea glauca* (Moench) Voss), black spruce (*P. mariana* (Mill.) B.S.P.), and red spruce (*P. rubens* Sarg.). Tamarack (*Larix laricina* (DuRoi) K. Koch) occasionally serves as a host.

The adults feed on the needles and tender twig bark of various living conifers.

Damage

The larvae mine first in the surface layers of the wood, then into the inner layers. Their mines open the way for wood-destroying fungi. The borings in a heavily infested pulpstick may decrease the wood volume up to 5 percent. This loss is compounded by discoloration of the wood and the presence of soft, punky sap rot from the associated fungi.

In saw logs much of the shallow tunneling and all the surface galleries are sawed off with the slabs and are not damaging. In contrast, the deep tunnels and the discolorations caused by their accompanying fungi degrade the value of the lumber considerably. The monetary value may be reduced by as much as 35 percent.

Feeding by the adults on the under surface of twigs causes wounds up to 1 inch long. Death of the twig beyond the wound often occurs

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if the twig is nearly girdled or if cold weather arrives before the wound can heal. This condition, when on balsam fir, is called "red branch."

Although these wounds and the resulting branch "flagging" may appear numerous, they alone seldom kill the host. The danger lies in the possibility of several species of pathogenic fungi entering the tree at these points of injury, and causing some dieback or complete death. The common species that have been isolated from the trees and from the mouthparts of the beetles are *Thyronectria balsamea* (Cke. & Pk.) Seel., *Dermea balsamea* (Pk.) Seav., and *Valsa abietis* Fr.

Description

The egg of the white-spotted sawyer is white, elongate, cylindrical, and slightly flattened, with rounded ends.[2] The average size is nearly 3.0 mm. long by about 0.9 mm. wide.

In overall appearance, the young larva is dirty white, somewhat flattened, and without legs. It has a light yellow thorax and an amber-brown head, armed with a pair of short stout mandibles. When fully grown, the larva may be 1½ to 2 inches long and ¼ to ⅜ inch wide at the thorax (fig. 1).

The pupa, ¾ to 1 inch long, resembles the adult insect superficially. At first it is white and soft like the larva; and the mouthparts, legs, antennae, and wings which project externally from the body are incompletely formed. As the pupa ages these appendages become more distinct. The long antennae, coiled tightly against each side of the body, resemble watch springs when completely formed. When the pupa has fully developed, it darkens and its outer skeleton hardens.

The adult body is about ¾ to 1 inch long and 3/16 to ¼ inch wide. The male's antennae are twice body length, while those of the female are just slightly longer than the body (fig. 2). Each sex has a small rounded white spot at the base of the wing covers. Except for this spot, males are always completely shiny black. Females may be colored exactly like males, or they may be mottled; the mottling is due to several small white spots scattered over the wing covers. Both sexes have long, robust legs, a spine on each side of the prothorax, and a pair of stout, strong mandibles.

Life History and Habits

In the northern part of its range, the white-spotted sawyer requires almost 2 years to complete its life cycle. One year is sufficient in the southern areas. Mating generally occurs in the afternoons of warm, sunny days, on or near the host. Shortly after mating, the female chews long slits or niches in the bark of the host, preferably near old branch scars or wrinkled areas. When a slit is sufficiently deep, she turns around and lays one or some-

[2] The description of the egg, larva, and pupa is identical to that of the egg, larva, and pupa of species closely related to the white-spotted sawyer. The very small differences required to separate them are beyond the scope of this leaflet. The description given here will be sufficient to determine if the specimen belongs to this group of insects.

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FIGURE 1.—Nearly full-grown larva cannibalizing upon another larva in adjacent tunnel in balsam fir. (×1¼.)

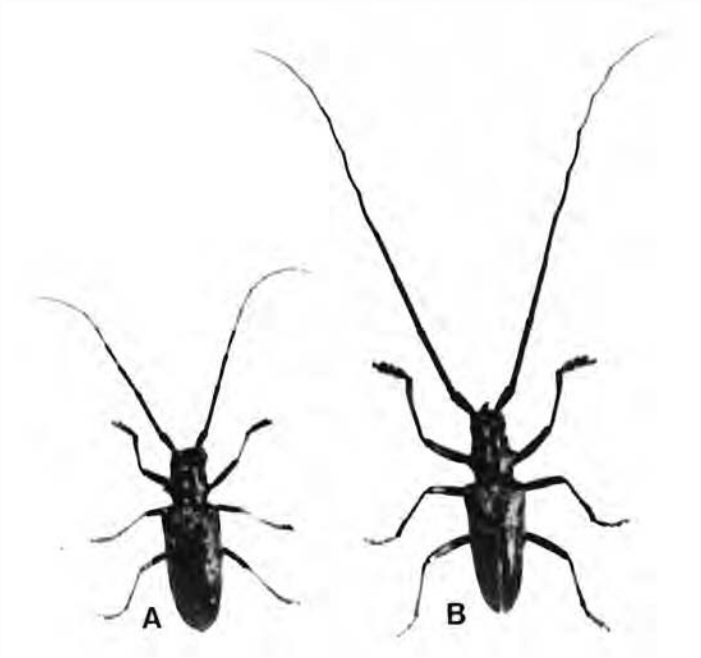

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FIGURE 2.—Adult sawyer beetles: *A* Female; *B* male. (Natural size.)

times several eggs in it. Only 25 to 30 percent of the slits contain eggs. Although the insects are most active on sunny days, the egg slits are cut on the sides and bottoms of trees or logs, away from direct sunlight.

Egg laying begins early in June, even in northern areas, but most of the beetles begin to lay their eggs early in July. Egg laying continues throughout the summer and ceases early in September.

Hatching occurs after 9 to 14 days, and the larva tunnels through the inner bark to the cambium within 3 days. Feeding continues for several weeks in the cambial region. As the larva grows, its galleries become wider and deeper, scoring the surfaces of the xylem and phloem (fig. 3, *C*). Excavated wood chips and excrement are expelled through holes in the bark. By mid or late summer the larva bores down into the wood cylinder. An oval-shaped entrance hole marks the gallery where it dips into the wood (fig. 3, *A*). The larva overwinters in one of these galleries.

Feeding and excavating are resumed the following spring with the advent of warm weather. By midsummer the larva has reached its deepest point of penetration into the wood, which may vary from 1 inch to more than 6 inches from the surface. It then usually reverses its direction and excavates toward the surface again, forming a U-shaped tunnel. Occasionally it may continue to excavate in a relatively straight line without doubling back. After the larva has bored its way to a point near the surface, it widens the end of the tunnel into a pupal cell where it overwinters as a prepupa. The remainder of the tunnel is plugged with excelsiorlike strands gnawed from the pupa cell.

The first pupae are found in late May of the following year. This stage is completed in about 2 weeks. Emergence commences in early June or later depending upon the weather; the peak is reached by mid-July. The adult emerges through a circular hole, which it gnaws through the wood and bark (fig. 3, *B*).

The life cycle in the southern part of the range is completed in just under 1 year. The sawyer larva is fully developed at the end of the first season and constructs its pupal cell. After overwintering as a prepupa, it pupates and emerges the following spring. Both pupation and emergence occur, on the average, 2 to 3 weeks earlier than in the northern areas.

Occasionally in the North, a few larvae from the first eggs of the season may become fully grown by the end of the summer, too. These overwinter, pupate the next spring, and emerge soon afterwards like those in the southern range.

The 2-year cycle has been reported from northern Minnesota and points northward. One-year-cycle specimens have been reared in Lower Michigan.

Similar Insects

The Oregon fir sawyer (*Monochamus oregonensis* (LeConte)), closely resembling the white-spotted sawyer, is found along the Pacific slopes of the United States and Canada. It is sometimes called a variety or subspecies of *M. scutel-*

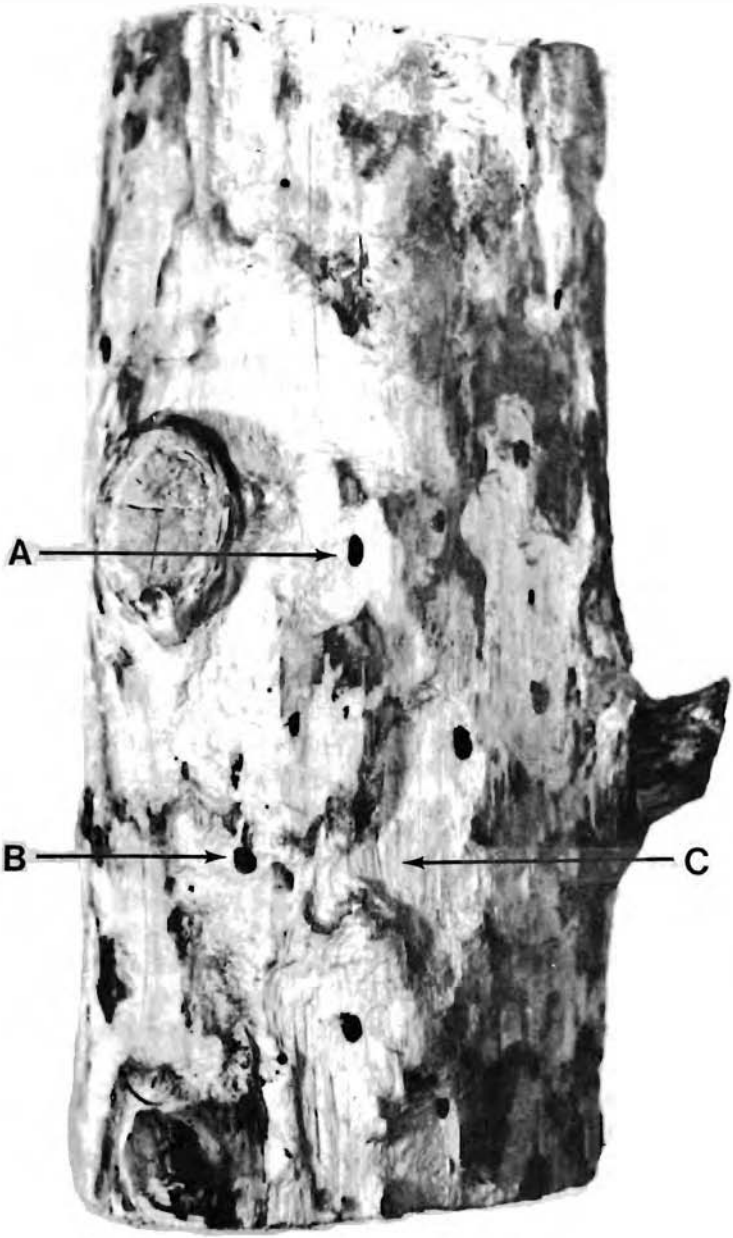

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FIGURE 3.—Section from balsam fir bolt showing: *A*, Larval entrance hole; *B*, adult exit hole; *C*, larval surface galleries. (×½.)

latus, and at least it can be considered the western counterpart. It attacks Douglas-fir, the true firs, and the pines in the western forests.

Three other common species that morphologically resemble the white-spotted sawyer and overlap its range but differ in coloration are the balsam fir sawyer (*Monochamus marmorator* Kirby), the northeastern sawyer (*M. notatus* (Drury)), and the southern pine sawyer (*M. titillator* (Fab.)).

Prevention of Attack

Pulpwood and saw logs, if handled properly, can be made partially or completely immune to *Monochamus* sawyer attack. Peeling or immersion in water eliminates borer attack completely. When both of these methods are impractical and chemical treatment (described later) may not be used, several other measures may be taken to lessen chances for attack.

One practical method is to cover the piles with a layer of slash 1 to 2 feet thick. Another is to pile the sticks or logs in the shade of standing trees. This reduces attacks by as much as 85 percent. These two methods may be used singly or together. They are applicable because the white-spotted sawyer is a sun-loving insect and does not readily lay eggs on heavily shaded piles. Tight or compact piles are better than loose ones, such as pens, since the compactness also causes shading. Consequently, a few large log decks, instead of many small ones, offer less surface area suitable for egg laying, so that fewer sticks are attacked.

Untreated rough logs or sticks that are cut in the summer should not be permitted to remain in the field during the egg-laying period. The beetles are drawn to the freshly cut wood and begin to lay eggs shortly thereafter.

Wood cut and left in the field between early September and early June will not be attacked during this period. However, it still must be treated for protection if it remains there later during the egg-laying period.

Natural Control

Cannibalism is believed to be an important factor in limiting white-spotted sawyer populations. This occurs frequently, particularly in heavily infested wood. Wherever galleries run together, one larva will feed upon another. These adjacent galleries develop when one egg niche is cut too close to another and when more than one egg is laid in a niche.

Woodpeckers search for the larvae, but the number they destroy does not substantially limit the borer population.

Parasitic flies (*Eutheresia* spp.) and the parasitic wasplike insects *Rhyssa lineolata* (Kby.) and *R. persuasoria* (L.) have been reared from *Monochamus scutellatus* larvae, but they are not very effective in natural control.

On the average, about 70-percent mortality occurs from natural factors during the period between larval emergence and adult emergence.

Chemical Control

Insecticide applied to rough wood in the field is also a feasible means

of reducing borer damage. Excellent control can be obtained with 12 percent gamma isomer of benzene hexachloride (BHC) wettable powder. This should be mixed with water to produce a suspension of 0.5 percent gamma isomer of BHC (1 pound of product in 3 gallons of water) and applied at the rate of 1 gallon of 0.5 percent suspension per cord of pulpwood. Each stick should be thoroughly sprayed until wet.

Saw logs can be protected by the same method and spray formulation as mentioned above.

Lindane applied as 0.5 percent gamma isomer water emulsion spray in the same manner as BHC is also effective.

Caution: Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Environmental Protection Agency, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

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