European Pine Sawfly

Louis F. Wilson[1]

The European pine sawfly, *Neodiprion sertifer* (Geoff.), an introduced insect, was first recorded in North America in 1925 in New Jersey. Its present known distribution in the United States includes most of the Northern States from New England to Michigan; it extends southwest to Iowa and northern Missouri and as far south as southern Illinois and southern Ohio. It is also common in southwestern Ontario in Canada. It is widely distributed overseas—in Sweden, Finland, Germany, Austria, Hungary, Czechoslovakia, and Japan.

Hosts

In North America this sawfly severely defoliates Scotch, red, jack, Japanese red, Table-Mountain, and mugho pines. Some feeding occurs on eastern white, Austrian, ponderosa, shortleaf, and pitch pines when any of these species grow with the favored hosts. Trees of all sizes are attacked.

Females will lay eggs on all these pines. Pitch pine needles containing eggs die and fall, and the eggs fail to hatch. Eggs are found less often on Austrian pine—perhaps because the needles are too hard for egg laying. Eggs are seldom found on white pine.

Injury

After hatching and until the first molt, the larvae skeletonize the needles, starting with those on which the eggs were laid. These strawlike skeletons of needles (fig. 1) die and then drop from the host about 2 weeks later. Older larvae consume the entire needle down to

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Figure 1.—Damaged Scotch pine branch showing young larvae, dried, skeletonized needles, and defoliation.

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Revised January 1971

the needle sheath. Also, the older larvae consume a little bark from the older branches and kill or malform some of the new shoots.

Because emergence begins early in the spring before the new foliage appears, only the old foliage is eaten. At the time of cocooning, the needles on the new shoots are about half grown (fig. 2). The larvae do not defoliate the new shoots. Because new needles are developing while old needles are being devoured, the tree is never completely bare of foliage. For this reason, sawfly feeding seldom kills trees.

Bark feeding kills a few twigs but causes no significant injury. However, both single and repeated defoliations cause losses in height growth. Seldom does a stand averaging more than 5 ft. in height have more than 25 larval colonies per tree, so the average loss rarely exceeds 23 percent. However, greater growth losses will occur on shorter trees with fewer colonies, and repeated heavy defoliations in subsequent years will cause even more pronounced growth losses. Diameter growth is similarly affected.

In the few places where tree mortality has occurred, only the smallest trees, alone or in small groups, have succumbed. Though extensive mortality seldom occurs, repeated defoliation weakens the trees and increases their susceptibility to attack from secondary insects and diseases. The probability of losses from secondary pests should be included in control considerations.

Description

The elongate-oval egg is pale yellow to nearly white. Its average size is 1.8 mm. long by 0.3 mm. wide (fig. 3).

The newly hatched larva is about

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Figure 2.—Young Scotch pine near the end of the larval feeding period. Note the nearly complete removal of the old foliage and the partial growth of the new.

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Figure 3.—Cluster of European pine sawfly eggs in red pine needles.

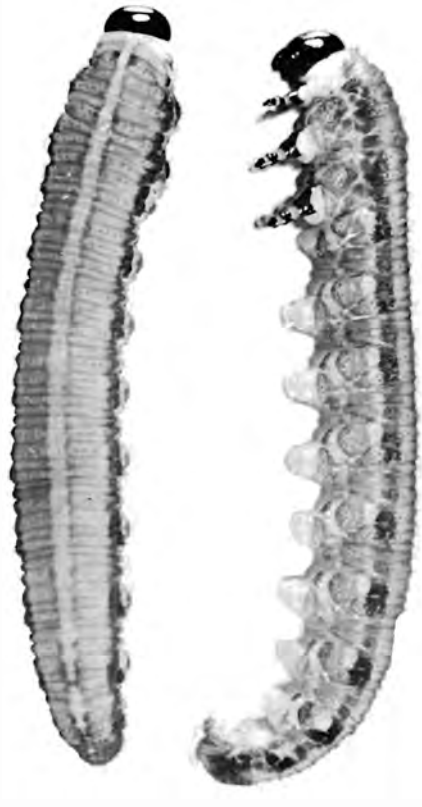

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Figure 4.—**Top and side views of the larva of the European pine sawfly.**

3.5 mm. long with a white head that soon becomes black. Its body is a uniform light gray green, and the thoracic (front) legs are black. When fully grown, the larva is 18 to 25 mm. long (fig. 4). The body has several longitudinal stripes of varying green shades. The dorsal surface is marked with a narrow line, flanked by a broader dark band on either side. Each side of the body has two very dark bands, that are separated by a thin, light stripe. The dark bands may be nearly black and tend to break up into spots in some areas of the body. Another dark spot is present in the upper area on each side of the last abdominal segment. The eight pairs of abdominal prolegs and the underside of the abdomen are light yellowish green.

The fresh prepupa resembles the full-grown larva in size and shape. It is marked by a breaking up of the longitudinal stripes. The remaining bands are less distinct, and the head capsule is brown.

The cocoon is light to dark golden brown, tough, and finely textured (fig. 5). It is cylindrical with bluntly rounded ends. Its length varies from 8 to 10 mm.; the male cocoon is smaller than the female.

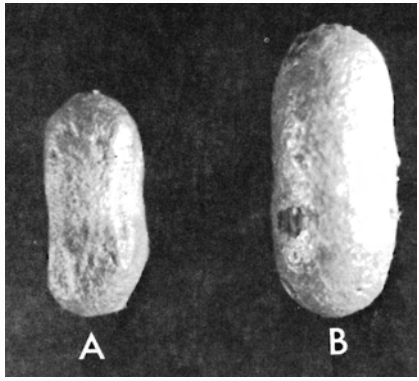

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Figure 5.—**Cocoons of the European pine sawfly: *A*, Male; *B*, female.**

The adult length varies from 7 to 9 mm. The male, which is smaller than the female, has a black head and thorax; the abdomen is black above and reddish brown beneath. Its legs are also reddish brown, and its antennae are feathery. The female has a yellowish brown body. Its eyes, part of the antennae, and thorax are black. Both the male and female are flylike in general appearance but have four shiny, transparent wings.

Life History and Habits

The European pine sawfly completes one life cycle per year. It overwinters as a well-developed embryo in the egg. Depending upon locality and climate, hatching occurs sometime during mid-April or early May and continues for about 2 weeks. The larvae feed gregariously and remain in colonies throughout their development (fig. 6). As the colony feeds, it moves down a branch and onto new branches. If the food supply on the entire tree is exhausted, the larvae crawl to new hosts. Newly developing needles are not fed upon. The 4- to 6-week feeding period ends between early June and mid-July, depending on locality.

During development, the male larva sheds its skin four times, and the female five. The last molt produces active prepupae that do not feed. These prepupae search for sites to spin their cocoons. Cocoons commonly are spun in the duff beneath the host tree, but some may be found in protected locations on a tree beneath male flowers or in the webbing and excrement of other insects.

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***Figure 6.*—A larval colony of the European pine sawfly feeding on Scotch pine needles.**

The prepupae lie in their cocoons in a resting state, called diapause, until late August or early September. Then most of them pupate, although some remain in the cocoon as prepupae for an extra year or two before pupation. Adults emerge between early September and late autumn. After mating, the females deposit their eggs singly in slits that they saw in the edge of the current year's needles. Six to eight eggs are usually laid in each needle, but the number may vary from 1 to 19, depending on the host species and the needle length. Eggs are deposited in a cluster of needles near the end of a branch. An average cluster contains about 80 eggs, but clusters may occasionally contain more than 200 eggs. Each female may lay all her eggs on one shoot or on several shoots.

Natural Control

Various degrees of larval or pupal control have been attributed to natural agents such as low temperatures, parasites, predaceous insects, small mammals, birds, bacteria, and fungi. Occasionally, when populations increase faster than the available food supply, starvation acts as a control. However, none of the agents gives adequate control.

A polyhedral virus that causes a specific and virulent disease sometimes controls this sawfly for several years. Freshly killed, diseased larvae are soft and black and are found hanging head downward from the foliage. At this stage, the larvae are virtually sacs full of

virus particles. Healthy larvae become infected when they consume virus-covered foliage or when they ingest polyhedra released from remains of disease-killed larvae. Rain hastens the spread of infection on each tree, and birds, scavengers, parasites, and other agents are thought to help spread the disease between trees and between stands. First mortality occurs about 4 days after contact with the virus, but heavy mortality seldom occurs before 10 days after such contact.

Larvae infected lightly or late in their development often spin cocoons. Infected females that survive may transmit the virus through their eggs. This causes some early larval mortality in the following generation. The disease persists longer in stands of trees more than 8 feet tall than in stands of smaller trees.

Chemical Control

Control of this insect is rarely necessary in forest stands because the insect seldom kills the trees. However, control is recommended to protect Christmas tree plantings and ornamental trees. Larvae of this sawfly are susceptible to many insecticides. Malathion is especially effective and reasonably economical. Malathion can be applied anytime during the larval feeding period, but it is most effective against the smaller larvae a few days after they hatch from the eggs.

For small infestations use a knapsack sprayer or hydraulic sprayer with 2 tablespoons of liquid Malathion (50 percent emulsifiable concentrate) in 1 gallon of water. Drench foliage on all sides of each infested tree.

Infestations over large or inaccessible areas are controlled best by aerial application. An effective formulation consists of undiluted 95 percent Malathion LV[R] concentrate applied at the rate of 10 fluid ounces per acre. A solvent is not used but the aircraft must be equipped with special low-volume spray nozzles.

Caution—Malathion may be harmful to man and animals if applied improperly. Follow the directions on the container label. Special caution is required when using concentrates: wear rubber gloves and/avoid contact with eyes, nose, mouth, and skin. After mixing chemicals or spraying, wash exposed skin with soap and water. Change clothing if spray has spilled on it, and wash the contaminated area.

Avoid overdosing. Do not apply near or over streams, ponds, and lakes. Avoid drift of insecticide to nearby wildlife habitat and bee yards.

Store chemicals in plainly labeled containers out of the reach of children and where they will not contaminate food. Destroy empty containers.

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 U.S. Department of Agriculture, consult your county agricultural agent or State extension specialist to be sure the intended use is still registered.

References

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