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Michigan State University
Michigan State University Extension
Deborah G. McCullough and Nathan W. Siegert, Department of Entomology and Forestry
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Identification and Management of European Pine Sawfly

By
Deborah G. McCullough and Nathan W. Siegert
Dept. of Entomology and Dept. of Forestry
Michigan State University

Have you noticed sparse or missing foliage on your pine trees? This may be the work of a defoliating insect called European pine sawfly (*Neodiprion sertifer* Geoffroy) (Hymenoptera: Diprionidae). Larvae of the European pine sawfly feed on one- or two-year-old needles of many species of pine, including Scotch, red, jack and mugho pine. As its name implies, this insect is not native to North America. It was discovered in New Jersey in 1925 and is now found from southwestern Ontario through New England and west to Iowa. Many species of native sawflies also feed on pines, spruces and other conifers. European pine sawfly is one of the most common pests of ornamental pines in urban areas, however, and young pines growing in Christmas tree plantations, hedgerows and sometimes forest stands in much of the Great Lakes region. Knowing how to recognize and manage the European pine sawfly will help you protect your pine trees from severe defoliation and damage.

Fig. 1. Larvae of the European pine sawfly usually feed in colonies.

Fig. 2. Sawfly larvae (bottom) have 6 to 8 pair of fleshy prolegs; caterpillars such as the orange-striped oakworm (top) have no more than 5 pair of prolegs, and some segments of the body have no prolegs.

Identification

The European pine sawfly is not a fly at all but rather a primitive, non-stinging insect that is closely related to ants, bees and wasps. Adult sawflies are about the size of houseflies but have two pair of wings. Adult males are usually black and have feathery antennae. Adult females are brown and larger than males and have simple, threadlike antennae.

Sawflies feed on pine foliage only during the larval stage. This is the stage that homeowners are most likely to see. Larvae usually feed in large groups or colonies, with three or four larvae feeding on a single needle (Fig. 1). Sawfly larvae are often mistaken for hairless caterpillars or "worms." Sawfly larvae and caterpillars have a similar body shape and three pair of thoracic legs on the segments behind the head. Sawfly larvae also have eight pair of round, fleshy prolegs, one pair on each of the body segments behind the thoracic legs. In contrast, caterpillars have no more than five pair of fleshy prolegs and some segments will have no prolegs (Fig. 2).

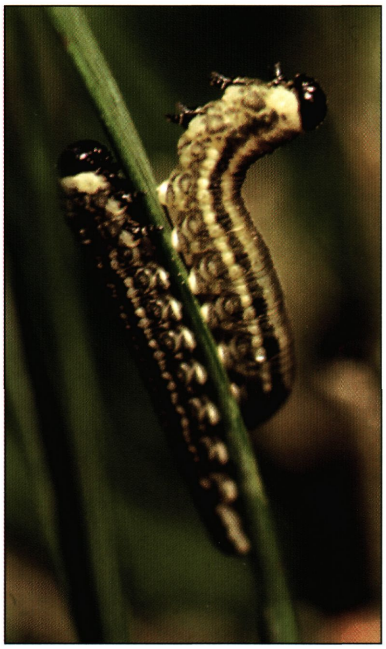

Fig. 3. European pine sawfly larvae have black heads and green stripes.

European pine sawfly larvae are grayish green with a light stripe down the back and a dark green stripe along each side (Fig. 3). As the larvae mature and grow, these stripes may break up into spots. Larvae have shiny black heads and are up to 1 inch long when they complete their feeding.

Life History

European pine sawfly larvae emerge from eggs in the spring, usually between early April and mid-May. This timing usually corresponds with an accumulation of 100 to 200 degree-days, using a base of 50 degrees F. Colonies of the young larvae feed along the edges of needles that are one or two years old and avoid feeding on the main veins of the needles. The dry, strawlike tufts that remain behind the current year foliage are characteristic of European pine sawfly feeding (Fig. 4).

Fig. 4. Young larvae skeletonize needles, leaving dry, strawlike needle remains. Older larvae consume entire needles down to the base.

As the larvae mature, they consume entire needles down to the papery sheath at the base of the needles. Larger larvae are usually present at about 275 to 500 degree-days, using a base of 50 degrees F. Sawfly larvae are relatively neat feeders — shoots defoliated by sawfly larvae often appear to have had the foliage clipped off with scissors (Fig. 4).

Fig. 5. When disturbed, sawfly larvae may rear their heads in unison to startle potential predators.

Colonies typically consume most of the one- and two-year-old needles on one branch before moving to another branch or onto an adjacent tree. European pine sawfly larvae rarely feed on current-year needles unless older needles are gone.

Many sawfly larvae exhibit unusual forms of defensive behavior. When disturbed, colonies of larvae will rear their heads back and forth in unison — behavior that may startle a potential predator (Fig. 5). In addition, sawfly larvae sequester pine resin in a special compartment in their gut as they feed on the needles. When alarmed by an ant or similar predator, a larva spits up a droplet of pine resin and attempts to dab it on the predator. Ants and other predatory insects will usually stop in place and begin cleaning themselves, trying to remove the sticky resin.

Larvae complete their feeding by mid- to late summer, then spin oblong, golden-brown cocoons that are papery but tough. Larvae may drop to the ground to spin cocoons in the duff or may spin their cocoons in a sheltered location on the tree. They pupate inside the cocoon, and adults emerge from late August or early September until late fall.

Fig. 6. An adult female sawfly lays one egg into each slit that she cuts into a needle.

Adults live only a few days and do not feed. After mating, an adult female will use her sawlike ovipositer to cut slits into a current-year needle on a pine tree (Fig. 6). This is where the name "sawfly" comes from. One egg is deposited into each slit. There may be 8 to 10 eggs per needle, and often 8 to 12 needles on a shoot will contain eggs (Fig. 7). Eggs overwinter in the needles, where they are well protected from temperature extremes and most predators. The European pine sawfly has only one generation per year.

Fig. 7. Needles bearing European pine sawfly eggs.

Damage

Trees are rarely killed by the European pine sawfly because the larvae prefer to feed on older foliage and rarely consume current-year needles (Fig. 8). However, moderate or severe defoliation will reduce tree growth. Repeated defoliation will decrease tree vigor and make trees more susceptible to other stresses such as drought or disease. Even relatively light defoliation may affect the appearance of ornamental pines, and light to moderate defoliation can reduce the marketability of pines in Christmas tree plantations. Fortunately, many options exist to control this pest and limit the damage it causes to your trees.

Fig. 8. Defoliation by European sawfly reduces tree vigor but rarely kills the tree because larvae will not feed on current-year foliage.

Management

European pine sawfly populations are usually kept at low and tolerable levels by a complex of natural enemies. A virus disease is one of the most important factors controlling this species, but larvae are also killed by fungal and bacterial pathogens. Many specialized wasps parasitize sawfly larvae or cocoons (Figs. 9 and 10). Birds, shrews, mice, ants and other predators eat larvae and cocoons. Unfavorable weather, such as late spring frosts, will also help control European pine sawfly populations.

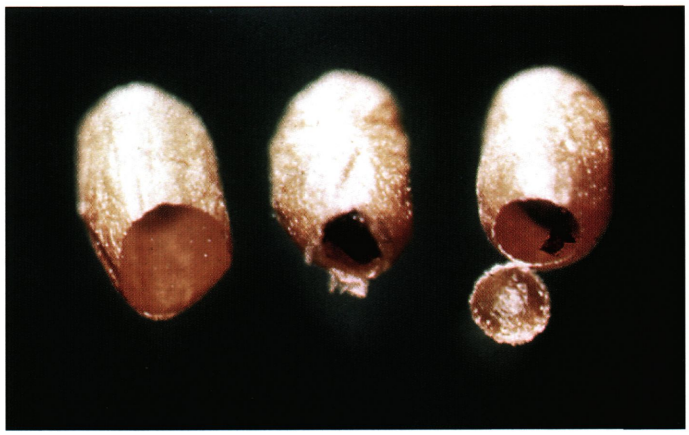

Fig. 9. Adult sawflies emerge from the ends of the papery cocoons.

Fig. 10. The small round hole indicates that this cocoon was attacked by a parasitic wasp.

Occasionally, other control methods may be needed. When ornamental pines are infested, you can use the "clip and squish" control method. Simply prune out the colony and destroy the larvae by smashing them or by soaking them for a few days in soapy water. A high-pressure nozzle on a garden hose can be used to knock down colonies that are out of reach.

When a large area such as a Christmas tree field is infested, a registered insecticide may be needed to prevent untolerable levels of damage. If an insecticide is used, it is best to spot treat individual colonies or infested trees rather than spray entire blocks or fields. This will control sawfly damage while still conserving natural enemy populations. Note that Bt (*Bacillus thuringiensis* var. *kurstaki*), a bacterial pathogen that is often used to control defoliating caterpillars, does not control sawfly larvae.

Remember, the earlier that you can detect and control an infestation of European pine sawfly, the less damage your trees will sustain. In spring, keep an eye out for colonies of young, dark-colored larvae or the tufts of dry, strawlike foliage left by young larvae. Remove colonies as soon as you find them to prevent damaging levels of defoliation from occurring. Also, if your tree was infested last year, it may be worthwhile to check for needles bearing sawfly eggs in the winter or early spring. If you find needles with a row of white-yellow eggs, remove and destroy the needles.

Keeping trees healthy and vigorous is always a good idea. Water if necessary so that trees get an inch of water per week during the growing season. Avoid wounding trees or compacting the soil around them. Healthy trees will be able to tolerate and recover from sawfly defoliation and other minor stresses. Check with your local county Extension office or regional forester for more information on maintaining tree health.

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