Home and Horticultural PESTS

European Pine Sawfly

When inspecting plantings in early spring, homeowners, nursery personnel and Christmas tree producers often are dismayed to find that pines have been stripped of needles (Figure 1). For the homeowner, this means aesthetically unacceptable, spindly looking plantings. For nurseries and Christmas tree growers, damaged stock represents an economic loss. Trees scheduled for harvest and sale later in the year may not be marketable because they lack a full appearance. Such early season needle loss can be attributed to the feeding activities of European pine sawfly larvae.

Figure 1

Figure 2

Figure 3

Although similar in appearance, sawfly larvae are not true caterpillars. They possess a pair of fleshy prolegs on each body segment (Figure 2). True caterpillars are the immature stages of butterflies and moths (Order: Lepidoptera). They lack prolegs on the abdominal segments between anterior true legs and posterior prolegs (Figure 3). Adult sawflies are not true flies (Order: Diptera) either, but rather a type of nonstinging wasp (Order: Hymenoptera). They are called sawflies because of their somewhat fly-like appearance, but more importantly because each female possesses a saw-like ovipositor that is used to slit pine needles into which they deposit a single egg.

Developmental Stages

Eggs

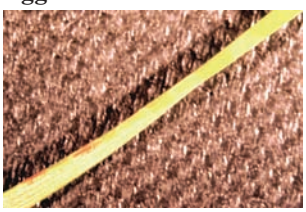

Figure 4

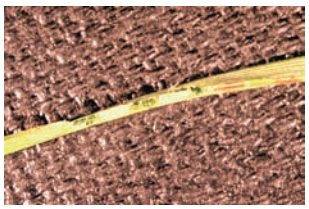

Figure 5

Once inserted into needles, eggs are hidden from view (Figure 4). If needle tissue is stripped away, the cream-colored, sausage-shaped eggs can be seen easily (Figure 5). Larvae with darkened eyespots are visible through the "eggshell" (chorion) just before they emerge.

Larvae

Figure 6

Newly emerged larvae are 1.5 to 2.0 mm long with a light greenish tinge. Head capsules soon turn shiny black (Figure 6). As they grow, larvae develop a grayish green body with a single light longitudinal dorsal stripe and two distinct dark green-to-black lateral stripes on each side (Figure 7). New head capsules are light-colored after each molt but darken to a shiny black. Typically, male larvae pass through four feeding stages; female larvae pass through five. Larvae molt one last time after the final feeding phase.

Figure 7

Cocoons

Within a day of last molt, larvae spin silken cocoons. These generally are golden brown, and darken with age. Larvae may form cocoons on the host plant (Figure 9), but most move to the ground. Cocoons are often adorned or camouflaged with bits and pieces of ground debris including frass pellets (Figure 10).

Figure 9

Figure 10

Adults

Adult European pine sawflies are dimorphic, meaning they have different appearances (Figure 11). The smaller males are black with large feathery antennae. Females are brown with filamentous antennae. Again, despite their name, sawflies are not true flies, but rather hymenopterans with two pairs of wings (Figure 12).

Figure 11

Figure 12

Seasonal Life History

European pine sawflies produce a single generation each year. They overwinter as eggs. Although embryonic development begins in the late fall, it progresses most rapidly in the early spring. Eggs swell and separate the lips of the slit into which the eggs were initially inserted (Figure 13). Depending on springtime temperatures, emerging larvae (Figure 14) have been recorded as early as March 22 to as late as April 12 in the Manhattan area. Emergence occurs slightly earlier in southern Kansas.

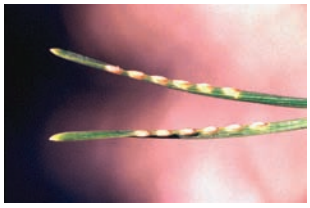

Figure 13

Figure 14

Figure 15

European pine sawfly larvae are gregarious. Groups of newly emerged larvae move to and encircle the tip of the needle in which they developed. They consume the needle's succulent parenchymous tissues, progressing down to the needle sheath. They do not consume the needle's central vascular bundle or the tissues around where eggs were deposited (Figure 15). Larvae move to an adjacent needle and continue feeding. As they grow, larvae become more voracious, rapidly consuming entire needles (Figure 16). Different larval clusters eventually coalesce, rapidly consuming all needles on the branches. By mid-May, larval feeding is complete. Larvae molt one last time before pupation.

Figure 16

Figure 17

Figure 18

Within the cocoon, larvae are relatively inactive throughout the late spring and summer months. In late summer to early fall, larvae are transformed into pupae. Adult sawflies emerge in the fall. Female sawflies (Figure 17) position themselves to release their sex attractant pheromone into moving air currents (Figure 18). Males use their feathery antennae to detect the pheromone (Figure 19). By following the pheromone trail, males locate and mate the females that proceed to insert eggs into pine needles. The mean number of eggs per female, based on 15 scientific reports, ranged from 57 to 122.

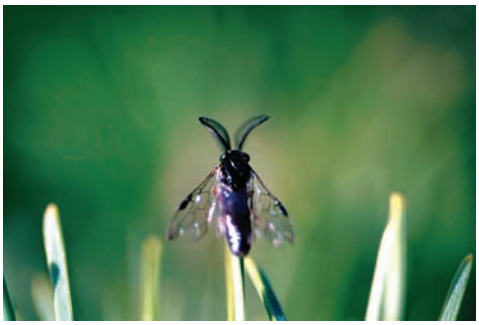

Figure 19

Damage

Figure 20

Figure 21

Figure 22

Figure 23

European pine sawfly larvae feed on needles produced in previous years. The current year's needle production proceeds unimpeded (Figures 20-22), and by season's end the plant appears healthy, although somewhat sparse. Healthy terminal growth on bare branches gives the plant a puffy appearance (Figure 23).

Figure 24

Figure 25

If sawfly larvae populations are suppressed or eliminated in ensuing years, this growth remains intact and new growth (Figure 24) helps restore the full appearance of plantings and trees (Figures 25 and 26).

Figure 26

Host range

European pine sawfly larvae primarily feed on two-needled pine species. In Kansas, the prevalent two-needled species are Austrian, mugo, ponderosa, and Scotch. Three-needled Virginia pine and five-needled white pine also are grown in Kansas. Studies have shown that European pine sawfly larvae thrive when reared on each of these species, but are unable to survive when confined on Eastern red cedar, blue spruce or Hick's yew.

Control

Naturally occurring parasites and predators work against all European pine sawfly developmental stages, but achieve minimal control in most cases. Intervention is necessary to protect pines against European pine sawfly larval feeding damage. The larvae's defined feeding period makes this task easier. The key is knowing exactly when larvae emerge from overwintered eggs. This can vary from year to year depending on temperatures the previous winter and current spring.

To make monitoring easy, select a nice winter day and inspect needles closely for the presence of eggs (Figure 27). Mark several egg-laden terminals with white twist-ties. Beginning in March, use the ties to locate infested needles. Periodically inspect them for the presence of newly emerged larvae. Another monitoring tactic is to permit larvae to feed for a short time until whitened terminals reveal themselves among the green, worm-free terminals (Figure 28).

Figure 27

Figure 28

It is best to control European pine sawfly larvae when they are small and have not caused much feeding damage. While pruning out infested terminals is a control option, the removal of an excessive number of infested terminals might result in a plant with an undesirably sparse appearance. In these situations, insecticidal treatments can be used to eliminate sawfly larvae. European pine sawfly larvae are susceptible to a number of insecticidal products.

Many products available to the general public contain the same active ingredient. It is not possible to list all of the products registered for use in the state of Kansas, nor does every retail outlet stock all products. When purchasing an insecticide, rely on the active ingredient for determining its proper use.

*Active Ingredients In Insecticidal Products Available At Retail Outlets**

Active Ingredient	Specific "Target Pest" Wording
acephate	European pine sawfly
bifenthrin	Sawflies
carbaryl	Pine sawfly
deltamethrin	European pine sawfly
esfenvalerate	European pine sawfly
horticultural oil	Sawfly larvae
imidacloprid	Sawfly larvae
insecticidal soap	Sawfly larvae
lambda-cyhalothrin	European sawfly
neem oil	Pine sawfly larvae
rotenone/pyrethrin	Sawfly larvae
spinosid	Sawfly larvae

** Because a company may include or exclude specific pests and sites, the end user is responsible for reading the product label to ensure safe and legal use.*

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