

TREE FRUIT CROPS



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European Apple Sawfly

Hoplocampa testudinea (Klug)

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The European apple sawfly is an introduced pest that was first noted in North America infesting crabapples on Long Island (Farmingdale, N.Y.) and Vancouver Island (Victoria, B.C.) during 1939 and 1940, respectively. Since then it has spread into southern New Jersey, Vermont, New Hampshire, and the Southern Tier of New York State. The pest is especially troublesome in the apple-growing regions of Massachusetts, Connecticut, Rhode Island, and the Hudson Valley of New York. In the Pacific Northwest, the European apple sawfly appears to be limited to Vancouver Island. The pest is distributed over the entire continent of Europe but is most common in the north. It is found throughout England but is abundant only in certain localities. The larvae feed on all apple and crabapple varieties but show a preference for early or long-blooming varieties with a heavy set of fruit. Sawflies are primitive hymenopterous insects and are related to bees, wasps, and ants. Although two generations a year have been reported in England, only one seems to occur in populations in North America.

Adults

The European apple sawfly overwinters as a mature larva in a cocoon a few inches below the surface of the soil. The larva pupates early in the spring and emerges as an adult "fly" or wasp (fig. 1) about the time apple trees come into bloom. Adults are 6 to 8 mm in length, with the male smaller than the female. The head is yellow with yellow antennae and black eyes. The wings are covered with tiny black hairs, giving them a dusky appearance. The body is brown; the upper surface appears almost black and shiny and the lower surface lighter and orange to yellow. The males emerge first in the season, and as the season progresses both sexes can be found flying unsteadily about the blossoming apple trees. When they alight, they move rapidly around, quickly vibrating their antennae. The adults apparently feed on pollen and are most active when the sun is intense, usually around midday. The average adult life span is from one to two weeks.

Eggs

The female sawfly lays her eggs in apple blossoms, often at the base of the stamens. She inserts her ovipositor (the saws) through the sepal. The insertion and withdrawal of the ovipositor often leaves a brownish discoloration on the sepal or receptacle (fig. 2), which helps in detecting infested blossoms. The egg is about 0.8 mm in length, oval, colorless, and shiny (fig. 3). The eggs hatch within one to two weeks depending on daily temperatures.



Larvae

The larva measures about 1.7 mm in length at hatch. It is light cream colored with a black head and caudal (rear) shield. The head and shield become lighter as the larva matures until they are pale brown in the mature fifth-instar stage. The larva increases in size by approximately 1.4 times during each instar so that when mature it is 9 to 11 mm long (fig. 4). The codling moth and similar lepidopterous larvae (e.g., the lesser appleworm), which may be feeding on the apple fruit at the same time as the sawfly, may be distinguished from the sawfly larvae by the number of prolegs on the abdomen. Prolegs are the fleshy, stumplike appendages that extend beneath the abdomen behind the three slender pairs of true legs. There are seven pairs of prolegs on sawfly larvae but only five pairs on the larvae of the lepidopterous pests. When mature, the sawfly larvae leave the fruit, enter the soil, and construct cocoons in which they remain as pupae until the following spring. The cocoons are egg-shaped, parchmentlike brown cases usually 4 by 8 mm in size. The appendages of the pupae (fig. 5) are not glued to the body, and they resemble mummified adults.

Damage

The first larval instar commences feeding just below the skin of the fruit, creating a spiral path usually around the calyx end. Should the fruit receive no further injury, this early larval feeding will persist as a scar that is very visible and objectionable at harvest (fig. 6). Following this feeding, the larva usually molts and begins tunneling toward the seed cavity of the fruit or an adjacent fruit. The larva's feeding to the core usually causes the fruit to abort. As the larva feeds internally, it enlarges its exit hole, which is made highly conspicuous by the mass of wet, reddish-brown frass, or insect excrement (fig. 7). The frass may drip on adjacent fruit and leaves, giving them a similarly unsightly appearance. The secondary feeding activity of a single sawfly larva can injure all the fruit in a cluster, causing stress on that fruit to abort or drop during the traditional "June drop" period. The time of insecticide

application usually determines the extent of sawfly injury; for example, a late application, after petals fall, will often kill developing sawfly larvae in the early tunneling stage so that tunneling scars will be short and indistinguishable from damage caused by the tarnished plant bug.

Monitoring and Control

European apple sawfly adults are visually oriented toward apple blossoms. Field trials found sticky-coated, non-ultraviolet-reflecting white rectangles to be the most effective trap for capturing and monitoring sawfly adult populations. The number of adults captured may determine the necessity for treatments directed at the pest.

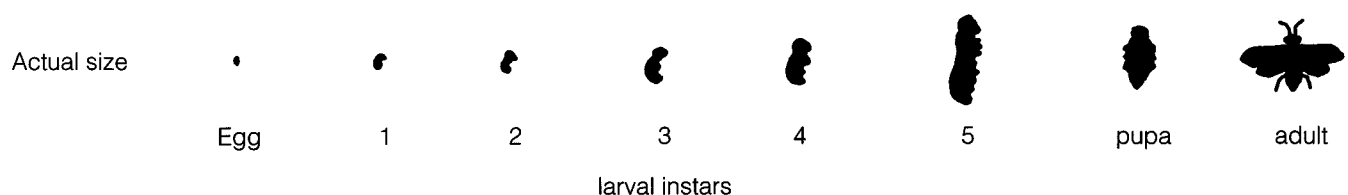
Application of an insecticide at calyx (petal fall) usually provides adequate control of the pest. Before using chemical control measures, one should consult with the local Cooperative Extension or IPM specialist about the best materials and use patterns for the area.

Because the sawfly is a hymenopterous insect, insecticides that control it also adversely affect bees. Because bees play an essential role in the pollination of the apple crop, no insecticide sprays should be permitted during the bloom period. This poses a problem at petal fall because certain apple varieties lose their petals before others. Thus in blocks of trees where petal fall has occurred on one variety but not the others, the variety that has lost its petals is likely to sustain some fruit injury from the European apple sawfly until the insecticide is applied. Growers can remedy this situation by choosing pollinizer varieties that do not overlap widely.

Because the sawfly is an introduced pest, many of its natural enemies probably remained behind in Europe. The absence of such enemies may be a major reason for the pest's highly successful establishment in this country. Studies comparing the European apple sawfly parasite and predator fauna between continents would be useful and could lead to the introduction of more effective natural enemies.

GUIDE TO STAGES

Stage	Timing	Where to Look
Adult	Late pink to fruit set	On the blossom clusters during warm days
Egg	Bloom to fruit set	Oviposition scars visible on fruit sepals
Larva	Petal fall to "June drop"	In fruit
Pupa	Midsummer to next spring	In soil



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