

SOME INSECTS OF TREES AND SHRUBS¹

by James E. Appleby

Fall Cankerworm

The fall cankerworm, *Alsophila pometaria* (Harris) feeds on many species of deciduous trees, but elm, apple, basswood, and horse-chestnut seem to be the favored hosts. In the Midwest periodic outbreaks of the fall cankerworm have been severe within a 40-mile radius of the southwestern shore of Lake Michigan. This species overwinters in the egg stage. The egg clusters are attached to the lower surfaces of the outer branches. Eggs hatch about the time the leaves are beginning to unfold in the spring. The tiny larvae begin feeding on the new foliage. The larvae feed for a period of about one month. In heavy populations all the leaf surfaces may be eaten except for the major veins (Fig. 1). The larvae will vary somewhat in color, but generally there are some green areas on the sides. The larvae are sometimes referred to as inch worms because of their looping motion during the time they are crawling. In metropolitan areas people are not only annoyed by the damage to the trees, but usually are more disturbed by the larvae falling onto their sidewalks, patios, automobiles, and clothing. When mature, the larvae drop from the trees in silken threads and pupate in the soil. In late autumn the adult moths emerge, mate, and the wingless females crawl up the trunks of trees and deposit their eggs on the outer branches.

Complete defoliation of a tree during a single year rarely results in tree mortality, however, after two or three years of successive defoliation some trees may die or be seriously weakened and ultimately die because of the attacks of other insects, such as borers. Fall cankerworm outbreaks usually persist for three to four years before the population collapses.

In autumn encircling tree trunks with a sticky substance just before adult emergence will prevent the wingless female moths from depositing eggs on the tree branches. This method is somewhat effective if every tree is treated in a

given area. The sticky band has to be observed daily during the period when the adults emerge, as often the dead bodies become so abundant that they form a bridge of dead moth bodies over which the live moths crawl. Therefore, it is important that the band be renewed with additional sticky material daily during periods of heavy moth emergence. In the spring months, during strong winds, newly hatched larvae are often carried considerable distances so that banding the trees will help reduce the population infestation, but

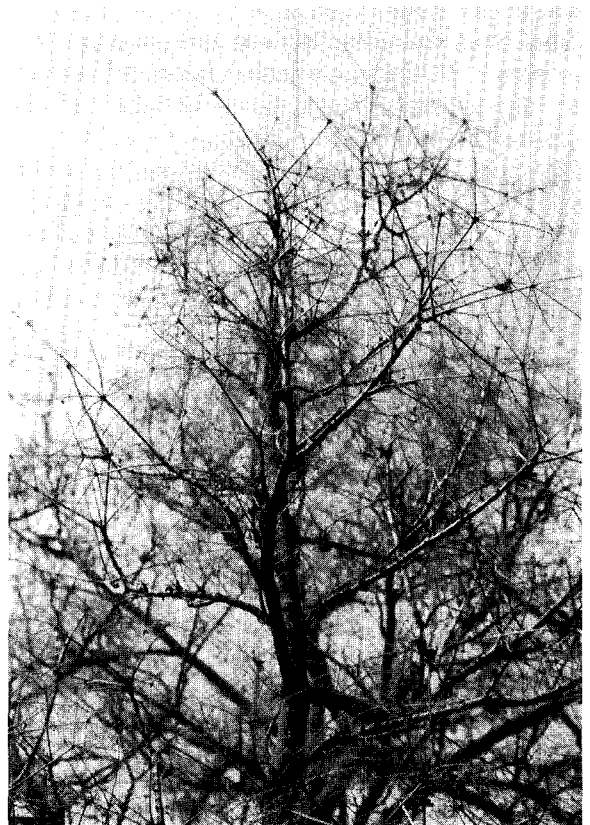


Fig. 1. Upper branches of a horse-chestnut tree completely defoliated by fall cankerworm larvae in late May.

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usually it does not give complete control because of larvae being transported by strong wind currents.

In the spring, after eggs have all hatched, control can be obtained with spray applications of acephate (Orthene), malathion, carbaryl (Sevimol), *Bacillus thuringiensis* (Dipel, Biotrol) and trichlorofon (Dylox). In experiments conducted in the Chicago area several years ago (Appleby et al. 1975) we found that these insecticides gave excellent control one day after application with the exception of the *B. thuringiensis* treatment, however, seven days later the *B. thuringiensis* treatment resulted in good control. The fact that no mortality in the *B. thuringiensis* treatment resulted one day after treatment is not surprising, as sufficient time is required for the bacteria to invade the larval intestinal tract. Larvae stop feeding soon after an ingestion of a lethal dose of *Bacillus thuringiensis* but even though the larvae may remain alive for several days they do not feed. Unfortunately, in some cities having municipal insect control programs, the public is not informed about the expected results of this treatment and quickly conclude that the treatment is ineffective and demand that another insecticide be used.

In areas that have had a history of cankerworm outbreaks and where an abundance of cankerworm larvae might result in great annoyance to the public, tree branches should be examined carefully for fall cankerworm eggs in late winter. If large numbers of eggs are found, branches containing eggs should be pruned and held at room temperatures for about 14 days to ascertain their viability. If egg viability is high, control preparations should be started. Unfortunately, in most municipal areas public complaints are voiced when the larvae are mature and damage has already occurred.

Bagworm

The bagworm, *Thyridopteryx ephemeraeformis* (Haworth) is sometimes called the evergreen bagworm, however, it feeds on many species of trees and shrubs (Fig. 2). The damage to evergreens is particularly serious because the defoliated portion of the plant often dies and if the

infestation is severe the entire plant may die. Bagworms overwinter in the egg stage inside the bag. In late spring the eggs hatch and the tiny naked larvae crawl from the bag and immediately begin feeding on the foliage and constructing a tiny bag over their bodies, which they carry about during their life span. The larvae usually feed for about three months. In mid-August the larvae may become very active, especially if the food supply is scarce and may wander onto other adjoining plants and even onto the sides of buildings.



Fig. 2. Typical bags of the bagworm on a juniper branch.

When feeding is completed a larva generally attaches the 1½ inch long bag to a branch and then changes into the inactive pupal stage. The pupal stage lasts about two weeks after which the adult emerges. The male bagworm is a small gray-black moth. The male flies about searching a female bagworm. The female is wingless and remains inside the bag. The male moth protrudes the tip of

his abdomen inside the bag and mates with the wingless female. The eggs produced by the female moth remain inside the bag until the following year when the eggs hatch and the young larvae crawl out of the bag.

Where an infestation is light, handpicking the bags from the plants anytime prior to the time the eggs hatch is an effective means of control, however, one must be certain that there are no bags remaining, as there are numerous eggs inside each female bag. Where infestations are heavy and where many plants are infested the most convenient means of control is with the use of insecticide sprays. As with most insects the best time to obtain control with insecticides is when the larvae are young. Sprays of *Bacillus thuringiensis* (Dipel, Bitrol), malathion, diazinon, acephate (Orthene), dimethoate (Cygon), oxydemetonmethyl (Metasystox R), and endosulfan (Thiodan) are all effective if applied onto young larvae.

Mimosa Webworm

The mimosa webworm, *Homadaula anisocentra* Meyrick, is a serious pest of honey locust and mimosa trees. This species was first discovered in the Washington, D.C. area in the summer of 1940. Evidence strongly suggests that it was probably imported to the United States. Since the early 1940's the insect has now been found from New Jersey westward, including Iowa, Nebraska, Kansas, and Oklahoma, south to Louisiana and Florida. It has also been found in California.

Mimosa webworms overwinter as pupae inside small white cocoons attached in crevices of the tree bark or surrounding debris. The adult moths emerge in late spring, mate and deposit eggs on the foliage of honey locust or mimosa. The eggs hatch generally in about seven days and the young larvae begin feeding on the foliage. During their feeding they construct matted nests composed of leaflets and much webbing (Fig. 3). In such nests there may be found four or five larvae. The mature larva is about ½ inch in length. The larva is a pale gray to light green with five white longitudinal stripes on the body. When feeding is completed the larvae often fall from the trees on silken threads or occasionally will crawl down the

trunks of trees. The silken threads are occasionally so numerous that a person walking beneath an infested tree is literally covered with hundreds of the threads. There may be two to four generations of this insect per year, depending on the locality. The adult moth is small and gray with black dots on the forewings. The body is about ¼ inch in length. Eggs are very light yellow and become pink when about to hatch.

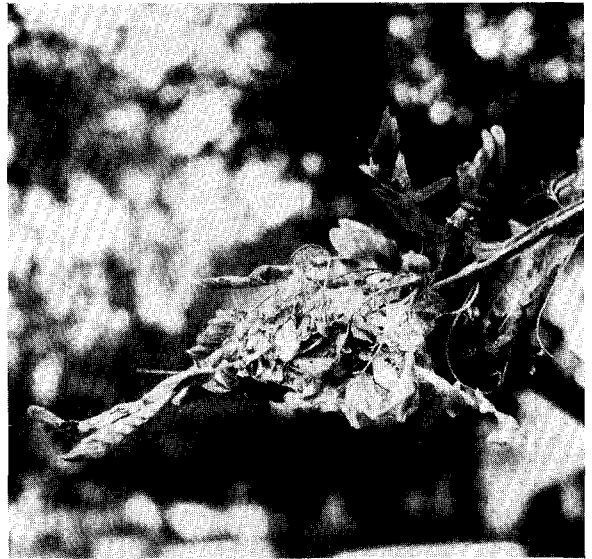


Fig. 3. Matted honey locust foliage caused by the mimosa webworm.

Control is best accomplished as soon as feeding damage is noted, but since eggs may hatch over a period of several weeks a second spray application is needed about 12 days after the initial spray application is made. In areas where heavy infestations have occurred a third application may be necessary in late summer. Foliage spray applications of acephate (Orthene), *Bacillus thuringiensis* (Dipel, Biotrol), carbaryl (Sevin), diazinon, and malathion will give good control if applied onto active feeding larvae. However, after pupation is initiated control is not possible.

Zimmerman Pine Moth

Large masses of sap exudate from pine trees, especially in the whorl area, (Fig. 4), is evidence of Zimmerman pine moth, *Dioryctria zimmermani*

(Grote), attack. This moth is native to North America. It is more common in the northern half of the United States and southern areas of Canada. The larva may infest the branches of pine and the main stem, but it is more commonly found in the whorl area of the tree trunk. In Christmas tree plantations the damage can be so extreme that during strong winds the trees will break at infestation sites. Scotch, Japanese red, red, ponderosa, eastern white, jack, mugho, and Austrian pine are all susceptible to attack. It appears that Scotch and Japanese red are particularly susceptible.



Fig. 4. Sap exudate at the whorl area of a red pine tree in late July.

The larva overwinters in a silked case referred to as a hibernaculum, generally on the tree trunk under bark scales. The larvae emerge from the hibernacula in midspring and move into the tree trunk where they continue to feed until early summer. The full grown larva is about $\frac{1}{2}$ inch long and has a brown head. The body color ranges from a light pink-yellow to a green-yellow. There are rows of dark spots, each with a single bristle on the sides and top of the body. Pupation occurs in the hardened sap exudate. Adults emerge in midsummer and deposit eggs on the tree trunk or branches. The adult moth is a little more than $\frac{1}{4}$ of an inch in length. The forewings vary from gray to

dark gray with rusty colored markings. The adult moth is extremely difficult to observe when resting on a pine trunk, as its color blends so well into the color of the bark scales. After the eggs hatch it is questionable whether the newly hatched larvae actually feed before constructing the overwintering hibernacula. The following year in midspring the larvae emerge from the hibernacula and bore into the branch or tree trunk.

In a recent study conducted by Appleby and Randell, spray treatments in the fall were compared to those applied in the spring. The study was conducted for two consecutive years. It was found that after two years no infestation sites were found on trees treated with chlorpyrifos (Dursban) when treated in mid-April in northwestern Illinois.

Bronze Birch Borer

The bronze birch borer, *Agrilus anxius* Gory, is the most serious insect pest of birch trees. Dieback of the upper branches of white, paper, and yellow birch trees is usually the sign that awakens the homeowner to make a close inspection of his tree. Evidence of small ridges and bumps, as well as an occasional "D" shaped hole in the bark of the affected branches or trunk, is proof that the tree is infested with the bronze birch borer. It is not uncommon for such affected trees to die in a few years after dead branches are noted if no remedial action is taken to prevent borer attack.

The bronze birch borer adult is a small beetle slightly more than $\frac{3}{4}$ inch in length and is very dark bronze. The beetles emerge from the trunk or branches of birch in late May and early June. The exit hole in the bark has a characteristic "D" or semicircular shape. The female beetles deposit small oval-shaped eggs in cracks or crevices of the tree bark. The eggs hatch in 10 to 14 days. Upon hatching the tiny larvae bore into the bark and begin feeding. During the summer and early fall months the larvae feed in the wood. The winter is passed as a light yellow larva inside the trunk or branch of the tree. In April of the following year, the larvae resume feeding. By early to mid-May the larvae change into the inactive pupa stage and by late May or early June the adult beetles ap-

pear, completing their life cycle. Work conducted by Appleby, Randell, and Rachesky (1973) indicated that dimethoate (Cygon) applied in early June with an additional application in late June for two consecutive years gave good control of the bronze birch borer.

It is very important that birch trees be watered during periods of drought and fertilized in early summer to keep the trees in a vigorously growing condition. The trees must be planted where their roots are not subject to soil compaction or rapidly fluctuating moisture and temperature conditions. Unfortunately, most homeowners do not pay any attention to their trees until symptoms occur and by that time it may be too late to save the trees.

Nantucket Pine Tip Moth

The Nantucket pine tip moth, *Rhyacionia frustrana* (Comstock), is found from Massachusetts to Florida. Shortleaf, loblolly, and Scotch pine are particularly susceptible to attack. The larvae feed in the developing buds, causing the tree to have a deformed appearance. Infestations may be so severe that no new growth is formed on the tree. The insect overwinters as a pupa inside a damaged branch. Adult moths emerge during warm days in mid-spring and deposit eggs on the needles or twigs. The eggs hatch in 7 to 10 days and the larvae burrow into the base of the needles and later into the shoots. The larval feeding eventually results in the death of the shoot. The young larva is a light yellow-

white with a black head; the mature larva is a light orange-brown and approximately 3/8 inch long. The larvae feed for three to four weeks. Pupation occurs within the hollowed out shoots. The forewings of the adult moth are gray and brick red in color. One to three generations occur, depending on locality. Trees that are Christmas size and shorter appear particularly susceptible to Nantucket pine tip moth attack. Larger trees seem less susceptible to attack.

Foliar sprays of acephate (Orthene), dimethoate (Cygon), and oxydemetonmethyl (Metasystox R) gave excellent control when applied in early May in southern Illinois (Appleby 1957). At the time when these insecticides were applied the eggs had hatched but the larvae were so small that no apparent injury occurred.

Literature Cited

- Appleby, James E. 1975. *Control of the spring generation of Nantucket pine tip moth with insecticides*. J. Arboric. 1(5): 91-2.
- Appleby, James E., P. Bristol, and W.E. Eickhorst. 1975. *Control of the fall cankerworm*. J. Econ. Ent. 68(2): 233-4.
- Appleby, James E., R. Randell, and S. Rachesky. 1973. *Chemical control of the bronze birch borer*. J. Econ. Ent. 66(1): 258-9.

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