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CANKERWORMS

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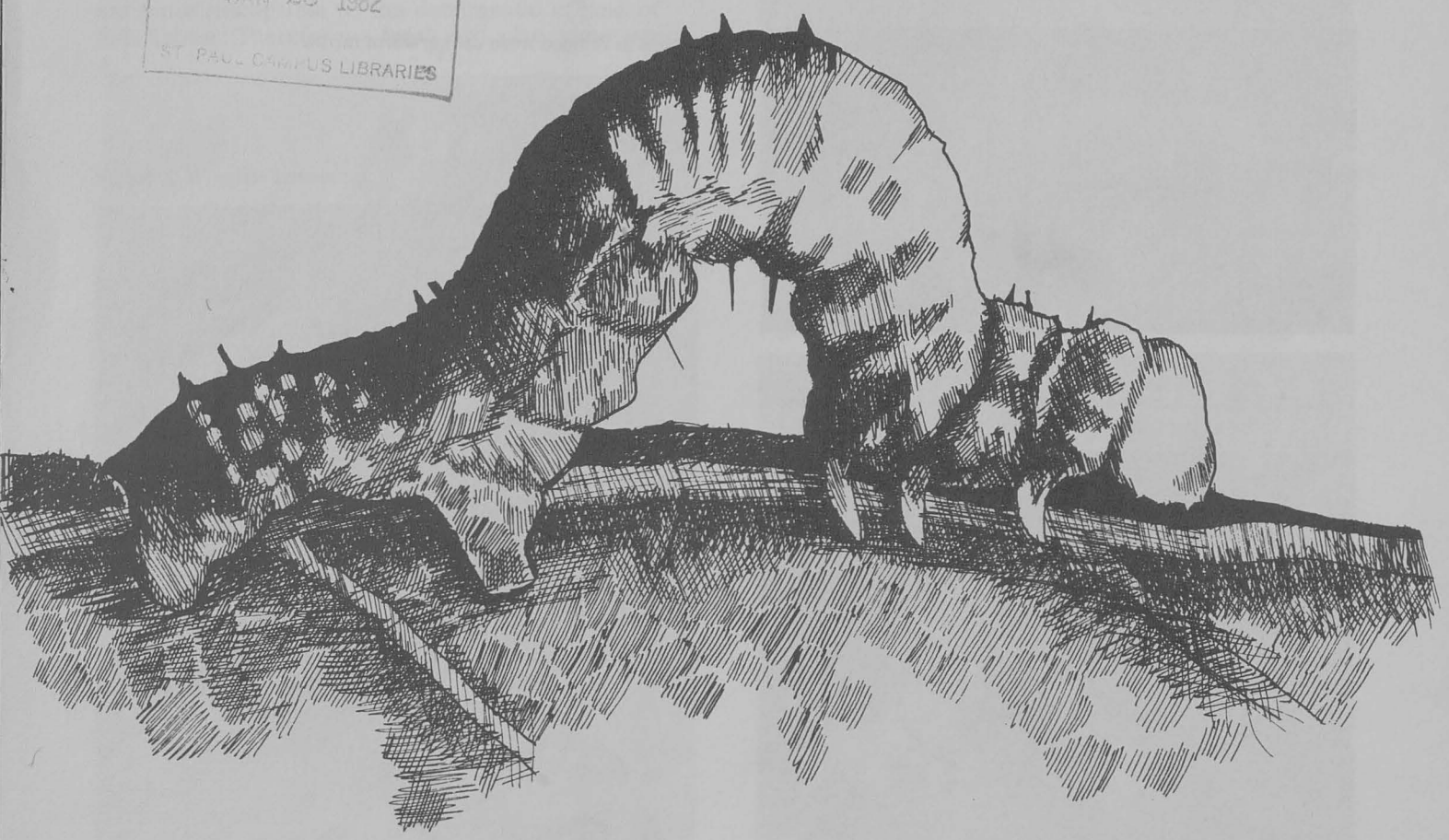


The cankerworm, or inchworm, is the most common shade tree defoliator in areas of Minnesota where elm predominates. The slender, green or brown caterpillars (figures 1 and 2) prefer elm and apple but will also feed on hackberry, basswood, oak, box elder, maple, and ash as well as on shrubs that are beneath heavily infested trees. Cankerworms, native to the United States, go through natural cycles, with periods of abundance ranging from two to seven years (with an average of four years), followed by periods of low populations lasting 13 to 18 years.

LIFE CYCLES

There are two species, the fall cankerworm and the spring cankerworm. Although similar in the kind of damage they do, they have different egg-laying habits and somewhat different body shapes. Both feed at the same time of year, often on the same tree, and spend the summer as nonfeeding pupae in the soil.

Fall Cankerworm. This species emerges from the soil as an adult moth, generally in late October after a hard freeze. The gray-brown male moths are winged, about ½ inch long (figure 3), and emerge a few days before the wingless, spiderlike female (figure 4). Mating takes place as the females crawl up tree trunks in search of small twigs on which to glue clusters of eggs (figure 5). The males and females die shortly after the eggs are deposited. Some people are bothered by large numbers of moths crawling up exterior walls, but chemical control at this time is not effective and therefore is not recommended.

The eggs stay on the tree throughout the winter and hatch in the spring. Egg hatch varies from late April to mid-May with the exact time dependent on weather conditions. It normally coincides with the opening of elm buds. Knowing the time of egg hatch in a given year is important for successful chemical control of the cankerworm.

Newly hatched fall cankerworm larvae are less than 1/16 inch long and spin silk threads that allow them to be readily blown from tree to tree. They reach 1 inch in length when fully grown, which takes about four weeks. Fall cankerworm larvae have three pairs of legs called prolegs on the back half of the body (figure 1).

Figure 1. Fall cankerworm larva. Note the three pairs or prolegs at the back of the body.

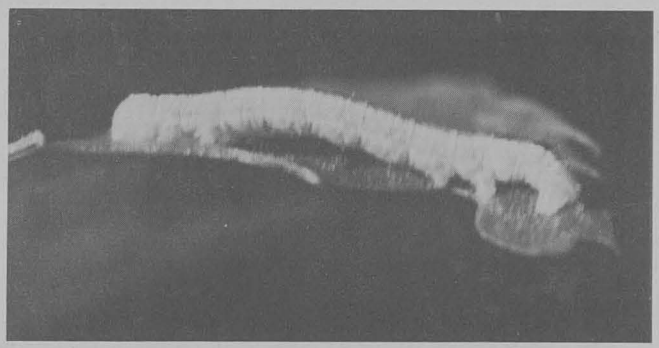


Figure 2. Spring cankerworm larva. Note the two pairs of prolegs at the back of the body.

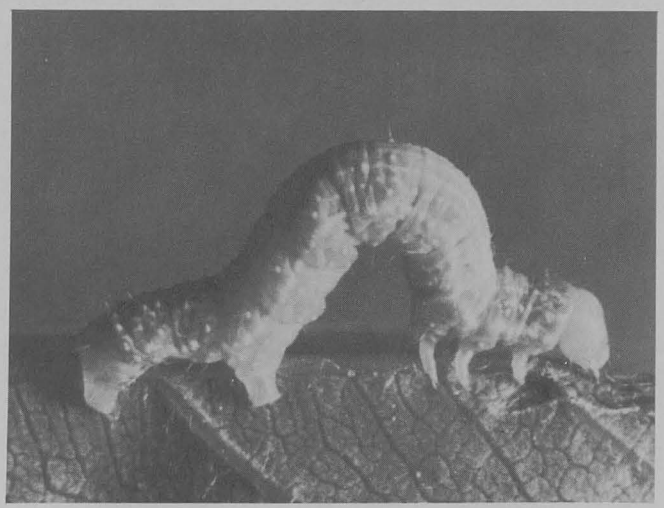


Figure 3. Winged male cankerworm moth.

Spring Cankerworm. The spring cankerworm differs from the fall cankerworm in that the pupae in the soil do not emerge as adult moths until early spring. Emergence of the winged male and wingless female typically occurs during the third week of March in the Twin Cities area. Adult spring cankerworm males (figure 3) and females (figure 4) are similar to fall cankerworm males and females in color, size, and appearance and can create the same nuisance of crawling on houses. As with fall cankerworms, chemical control when adult moths are present is not effective and is not recommended. Eggs are deposited in loose clusters (figure 6) in bark cracks and under bark scales. The eggs are not easily seen. Spring and fall cankerworm eggs hatch at about the same time in the spring. The larvae are similar except that spring cankerworms have two pairs of prolegs instead of three (figure 2) on the back half of the body.

DAMAGE

A large, mature, vigorous deciduous tree is able to withstand a single season of complete defoliation with no damage; a tree that has been completely defoliated usually leafs out three weeks after the worms stop feeding. Even two seasons of defoliation produce only a slowing of the growth. However, limb dieback and loss of vigor can result if the same tree is completely defoliated for three or more consecutive years. Young, newly transplanted, or weakened trees are more susceptible to the detrimental effects of defoliation. Therefore, a tree's age, size, vigor, and previous history of defoliation should be considered before deciding on control. For example, a young or weak tree should be treated but an older, vigorous tree need not be protected.

Many people are not as concerned about the health of their tree as they are about the nuisance that mature cankerworms cause when they spin to the ground on silken threads, crawling or falling on picnic tables, doors, walks, and house siding. Large numbers can

Figure 4. Wingless female cankerworm moth.

Figure 5. Egg cluster of fall cankerworm. It is recommended that a few such egg masses be monitored early in the spring to determine time of egg hatch. Notice hatched eggs with hollow centers.

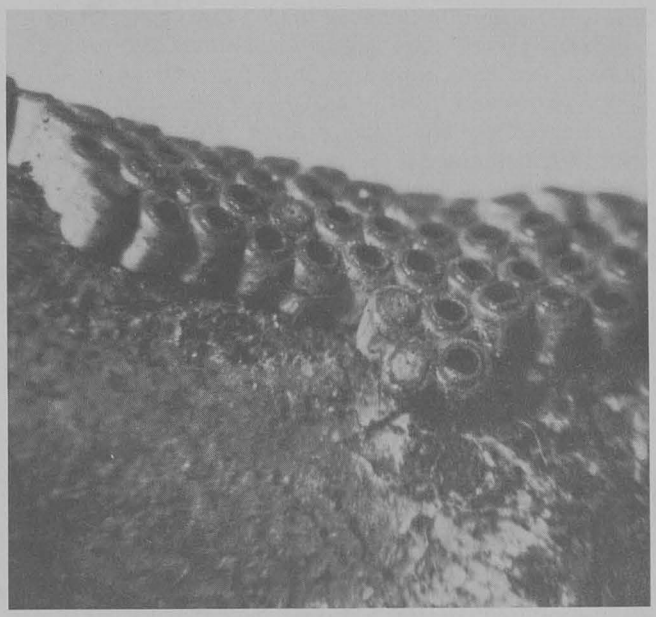
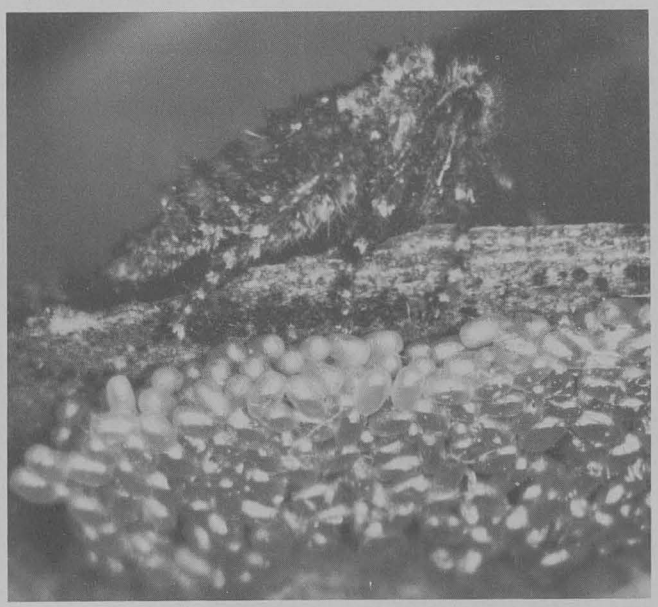


Figure 6. Egg mass of spring cankerworm with female moth.



make being outside extremely unpleasant. Unfortunately, control measures are not effective at this stage of the worms' life cycle, but, fortunately, this behavior usually lasts only one week.

CONTROL

Whether the purpose is to protect trees or to eliminate the nuisance of cankerworms, control needs to be accomplished when the worms are relatively small and inconspicuous. Cankerworm larvae begin to feed on buds or expanding leaves immediately after egg hatch. Normally, feeding during the first two weeks is not noticed by the casual observer. However, a close look will reveal small BB-size holes in the leaves. The best time for chemical control is in the second week of feeding when the damage is minor and the worms are still small enough (less than ½ inch) to be easily killed.

The worms rapidly increase in size during the third and fourth week after egg hatch. During this period damage becomes extensive and very noticeable. In many cases large portions of the leaves have been eaten and only the veins remain. Unfortunately, though the damage is easily noticed, this is the worst time for control because the chemicals are not very effective, the damage to the tree is already done, and the chemical irritates the worms and causes them to drop from the trees in large numbers, creating an even greater nuisance.

Several chemicals are effective for controlling cankerworms when applied at the correct time. These materials are listed in table 1. *Bacillus thuringiensis* has the advantage of being specific for the caterpillars of moths and butterflies and will not harm beneficial insects, wildlife, or humans.

BANDING

One method of controlling cankerworms that has received wide publicity is the use of sticky barriers applied in bands to tree trunks. As the wingless females crawl up the trunk to lay eggs they are trapped in these sticky bands. Despite the publicity, there is little evidence that this method is worthwhile, even in areas where most trees have been banded. The possible exception would be on a tree that is isolated from other cankerworm-susceptible trees.

Although the practice is fine in theory, it generally fails because of one or more of the following reasons: (1) people do not clean and renew the sticky material as often as the bands become crowded with moths; (2) young cankerworms readily blow from tree to tree on silk threads and therefore avoid the band; and (3) people fail to recognize and band for the two species (one moving up the tree in the fall, the other in the spring). Furthermore, the sticky material is expensive, messy to work with, and tends to mar the appearance of the trunk for a long time. Although banding has a certain appeal in that it captures numerous adults, providing a sense of immediate gratification, it does not, as practiced, affect defoliation or the spinning behavior of the larger worms. Its use is not recommended.

STEPS FOR EFFECTIVE CONTROL

Before making a decision to use control measures, be sure to review the preceding information because cankerworm control can be complex. The following steps are suggested when the decision to control cankerworms has been reached.

1. Determine the egg-hatch date by either:
   a. Finding fall cankerworm egg masses (figure 5) and observing them during early spring for signs of hatching. Hatched eggs will have a hole in the center.
   b. Examining foliage of several trees for the first signs of the young cankerworms or their feeding.
2. Add 10 days to the date of hatch as determined in step 1. This will be the best date for spraying.
3. Examine representative trees during the 10-day post-hatch period to determine if development has slowed or quickened because of weather conditions.
4. Modify the spray date as necessary, keeping in mind that the worms should be less than ½ inch in length and that at least 50% of the leaf surface should be intact.
5. Spray with one of the suggested materials.

Table 1. Insecticide suggestions to control the larval stage of cankerworms*

Insecticide†	Amount per gallon of water
Bacillus thuringiensis (Dipel, Thuricide, Biotrol)	Use as directed on the label.
carbaryl 80% W.P.	4 tsp
(Sevin) 50% W.P.	2 tbsp
carbaryl (Sevimol)	1 tbsp
malathion 57% E.C.	2 tsp
25 % W.P.	2 tbsp
methoxychlor 50% W.P.	2 tbsp
25% E.C.	4 tsp
acephate 15.6% E.C. (Orthene)	1½ tbsp
75 % S.P.	1 tsp

**Spray timing is critical; if done at the correct time, only a single application will be needed.*

†W.P. = wettable powder; E.C. = emulsifiable concentrate; S.P. = soluble powder

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