COOPERATIVE EXTENSION SERVICE
North Dakota State University
Fargo, North Dakota 58102

CIRCULAR E-629
APRIL 1978

CANKERWORM LIFE CYCLE AND CONTROL IN SHELTERBELTS

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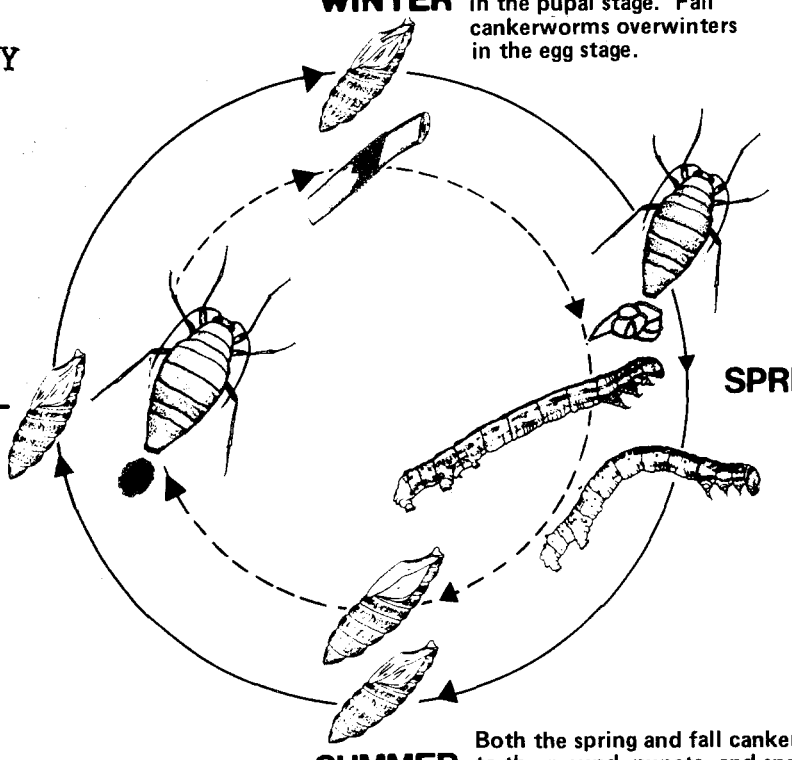
Shelterbelts are highly desirable to protect man, his livestock, crops, soils and recreation areas from the winds so common in our plains environment. Shelterbelts also help control snow and act as habitat and travel lanes for wildlife. A well kept shelterbelt is highly attractive and many are planted for their esthetic value alone.

In North Dakota our harsh climate and competing vegetation makes tree establishment difficult at times. Once established, shelterbelts should be protected from diseases and insects. Cankerworms will defoliate several species of trees and are especially a problem in single row shelterbelts of Siberian elm. Siberian elm is frequently stripped of its foliage for several consecutive years. This repetitive insect defoliation combined with moisture stress and herbicidal damage as refoliation begins causes a reduced growth and a general decline in vigor. These combined stresses may kill the tree directly or increase their susceptibility to diseases.

SEASONAL CYCLES OF CANKERWORMS

The Northern Great Plains have both the spring and fall cankerworm. Adults and larvae of *Paleacrita vernata* (Peck), the spring cankerworm, and *Alsophila pometaria* (Harris), the fall cankerworm, are quite similar in appearance as well as exhibiting some similarities in their life cycles.



Life Cycle of Spring and Fall Cankerworm

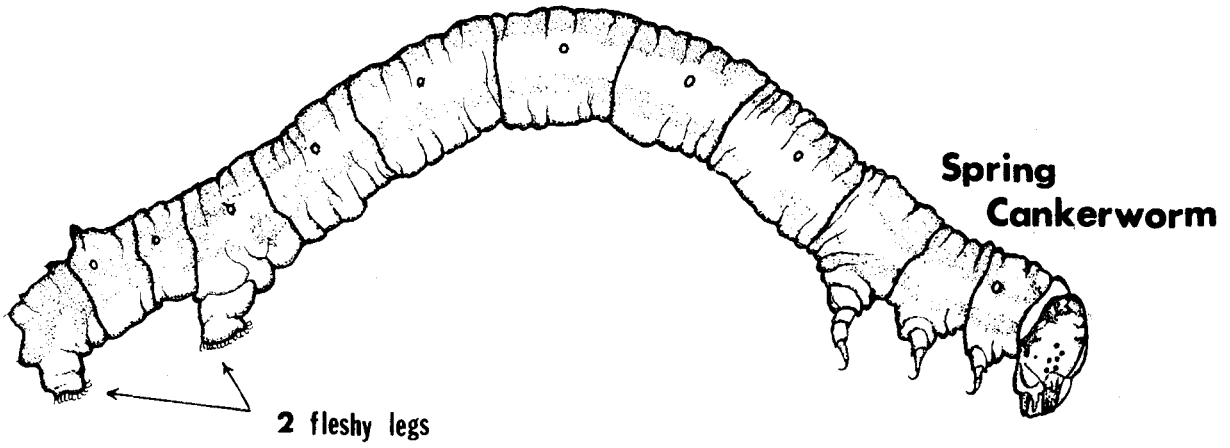
FALL CANKERWORM

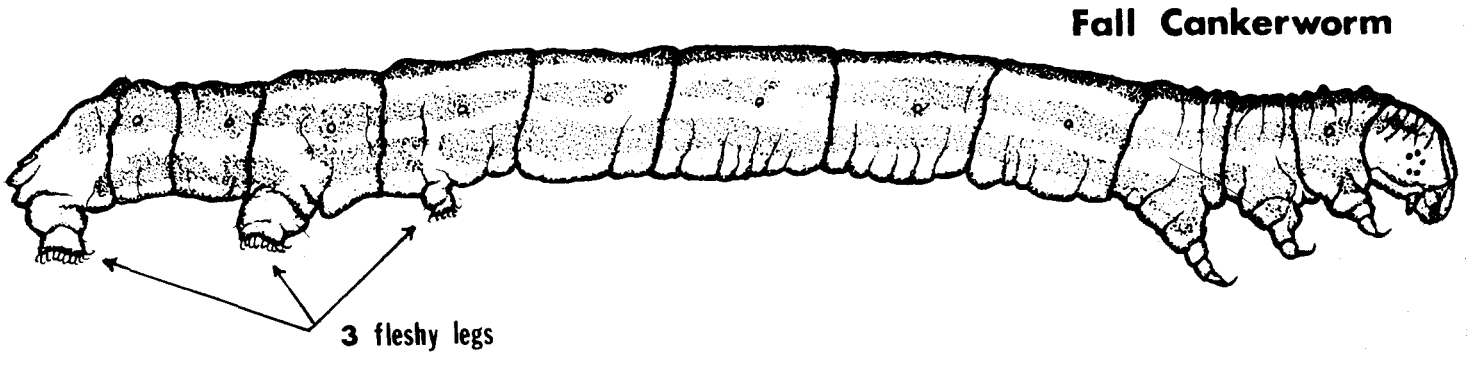
The fall cankerworm passes the winter in the egg stage. In late May through early June the larvae emerge from the eggs and begin feeding. Feeding continues through June into early July. The larvae are apple green to brownish green with a darker stripe along the middle of the back. Some specimens have three narrow white lines along each side of the body. Larvae of the fall cankerworm have three pairs of fleshy legs near the tip of the body, even though the first pair is rudimentary and difficult to see. The fully grown larvae are about 3/4 to 1½ inches long. In late June mature larvae drop to the ground and burrow beneath the surface to a depth of 1-4 inches. Once in the soil the fall cankerworm constructs a pupal cocoon of silk and soil particles. The pupae remain in the soil until late September through mid October. Adults emerge and mate, and the wingless females climb the tree to deposit eggs in compact masses, most often completely encircling small branches or on the trunks. The male moths are about 1 inch long, dull gray in color and the front wings have two light, wavy bands on the forewings. Females are dark gray, and about 3/4 inch long.

SPRING CANKERWORM

The spring cankerworm passes the winter as naked brown pupae in earthen cells 1-4 inches below the surface. As soon as the snow melts and the ground thaws, moths (adults) emerge from the pupae and mate, and females deposit their eggs on or under the bark of tree trunks and branches. Males are brownish-gray moths about 1½ inches long with three dark lines on the front wings. Females are wingless, brown to black with a dark stripe down the middle of the back. The eggs hatch and larvae commence feeding as soon as leaves appear and continue feeding through June. Larvae vary in color from green to brown to reddish brown or black and usually have faint dark lines or a yellow stripe on the sides. When fully grown they are 3/4 to 1½ inches long, and have two pairs of fleshy legs near the tip of the body. In mid June through early July the larvae complete feeding and descend to the ground by spinning a silken strand. The larvae then burrow into the soil, pupate and remain dormant until the next spring.

Cankerworm larvae of both species will often spin down from the tree on a tiny silken thread when disturbed. These threads and larvae may be blown a considerable distance to infest new shelterbelts.



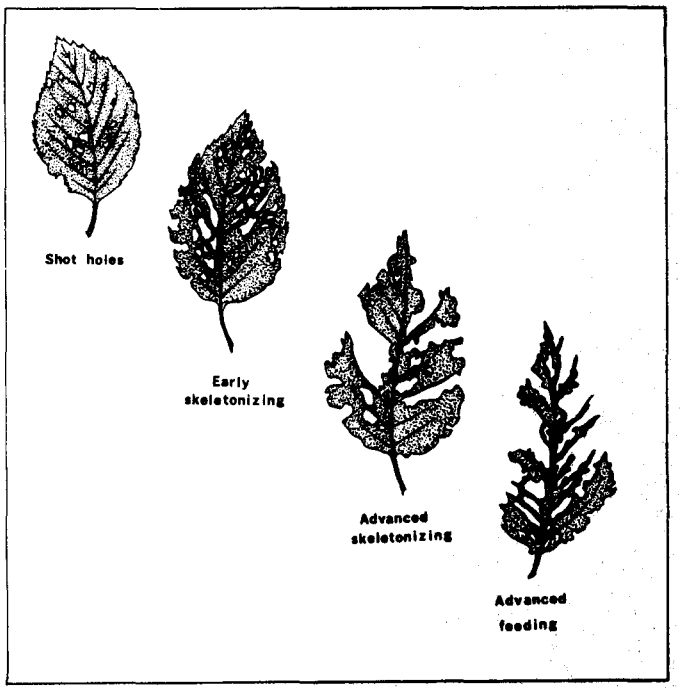


Early detection is important. Often damage is not noticed until larvae are in late stages of development, and control measures initiated at this time are often too late to save the foliage. One early detection technique involves the banding of several trees along the length of a shelterbelt with the adhesive compound Tanglefoot®. As soon as the snow is gone, three or four trees should be selected along the length of the shelterbelt. Band the selected trees several feet above the ground with a 5-inch band of Tanglefoot. After banding, a weekly observation of each banded tree will allow you to detect emergence of the spring cankerworm adults. The presence of adults in the bands will indicate that egg hatch will begin in several weeks, depending on the weather. Both male and female moths will appear on the bands. If large numbers are present, serious defoliation is likely to occur.

Tree Bands for Cankerworms

FEEDING DAMAGE

As the leaves begin to appear, the first sign of damage is tiny holes chewed in the leaves, a condition known as "shot holes." Begin watching for shot holing damage when leaves are 1/2 to 1 inch long. In North Dakota this may be as early as mid May in the southern regions and a week to 10 days later in northern regions. As the larvae mature and enlarge, their food requirements increase. Cankerworms show a preference for the tender leaf material between the leaf veins, producing a type of feeding damage termed skeletonizing. As feeding advances the entire blade of the leaf is consumed leaving only the midrib.



Progression of Cankerworm Feeding

CONTROL APPLICATION

Insecticidal control measures can be applied by either aircraft or ground based equipment, with each method having certain advantages. Aerial application is fast, convenient, and causes no physical damage to crops adjacent to the shelterbelts. However, application from ground based equipment has been shown to give better vertical coverage of foliage in the canopy of the trees.

Bacillus thuringiensis (B.T.) is a selective bacterial disease of lepidopterous insects and quite effective on cankerworms. This selective disease kills the target insect, namely the cankerworm, and has no detrimental effect upon the parasites or predators of the target insect or on beneficial insects such as pollinators, especially the honey bee. Previous research has shown that the best coverage and bacterial survival occurs when the compound is applied with a mist blower.

RECOMMENDED INSECTICIDES

The following compounds may be used for cankerworm control in Siberian elm shelterbelts.

Insecticide	Formulations	Amount Required For 1 Gallon	100 Gallons
*Bacillus thuringiensis**	(Bacterial)	Follow label directions.	
Carbaryl (Sevin)	50% WP	2 tbls.	2 lbs.
Carbaryl (Sevin)	80% S	4 tsps.	1¼ lbs.
Malathion	57% EC	2 tsps.	2 pts.
Methoxychlor	50% WP	2 tbls.	3 lbs.
Orthene	75% WP	1 tsp.	2/3 lb.

**Bacillus thuringiensis* is available under various trade names such as Dipel, Biotrol and Thuricide.

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5M-4/78