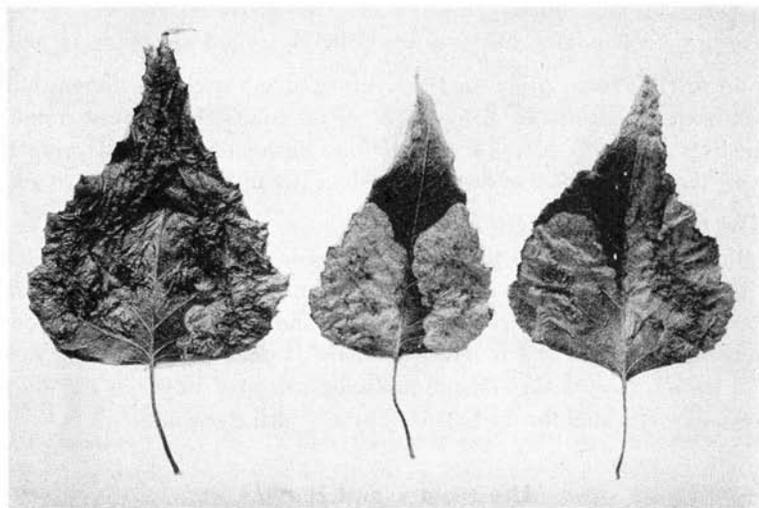


# BIRCH LEAF MINER

## *Control* —

by John C. Schread



THE CONNECTICUT AGRICULTURAL  
EXPERIMENT STATION, NEW HAVEN

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Since the birch leaf-mining sawfly *Fenusa pusilla* was first discovered in this country in Connecticut in 1923,<sup>1</sup> it has been a major pest of gray birch (*Betula populifolia*), white birch (*B. pendula*) and paper birch (*B. papyrifera*). Other birches, notably the red or river birch (*B. nigra*), may show some injury occasionally, but damage is never serious on these varieties.

For several years prior to 1953, susceptible varieties suffered extreme damage from this insect. In many instances the foliage was almost completely browned by the sawfly larvae from mid-May through late June. During 1953, however, the insect was less destructive than it had been for several seasons.

The first brood of birch leaf miners causes more damage than the later generations. In years when the pest is numerous, most of the spring foliage is seriously injured. The second and subsequent broods attack only the newly developing leaves in the crowns of the trees and the tender foliage produced by sucker growth. Old and toughened foliage is unattractive to adult sawflies for egg laying. Leaves that escape infestation during May will for the most part remain uninfested for the balance of the growing season.

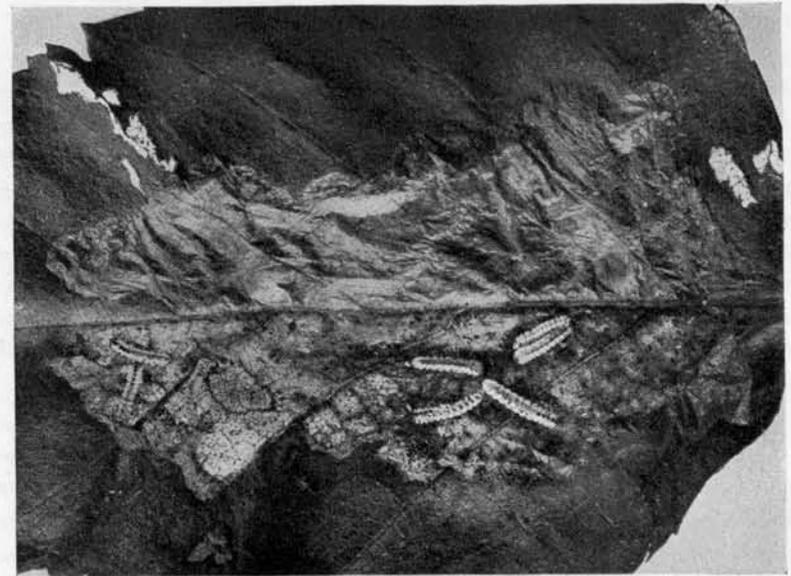
## Life History and Habits<sup>2</sup>

There is some variation in time of emergence of adult sawflies in Connecticut. Individuals appear a few days to a week earlier in the southwestern part of the state than in northern sections. In general, emergence varies with seasonal conditions, the average time being about the beginning of the second week of May. At this time in most years the first leaves of gray birch are 1/2 to 2/3 developed.

The adult leaf miner is black in color and about 1/16 of an inch long. Larvae developing from eggs deposited in the leaves cause the characteristic injury to the foliage. At first a blanched kidney-shaped area appears, later becoming roughly circular and finally blotchy and brown in general appearance. Mature larvae emerge from the damaged leaves and drop to the ground

<sup>1</sup> Britton, W. E. A European sawfly leaf-miner of birch. Conn. Agr. Expt. Sta. Bul. 265:340, 1924.

<sup>2</sup> A complete discussion of the life history and habits of the birch leaf-mining sawfly has been prepared by R. B. Friend in Bul. 348, Conn. Agr. Expt. Sta., 1933. It is now out of print, but may be reviewed in libraries.



Larvae in mines of gray birch leaf. Upper covering of mine removed.

where transformation to the adult stage takes place in the soil. During the summer the life cycle may be completed in five to six weeks. First generation adults appear in late June. The remaining one to two broods are active in mid- to late summer and early autumn. Birch trees completing their annual growth before the final two broods of leaf miner adults appear are not significantly affected by the pest.

## Previous Control Measures

The original control measure<sup>1</sup> called for frequent applications of nicotine sulfate to kill the eggs before the larvae hatched. More recently,<sup>2</sup> 25 per cent lindane emulsion applied to infested foliage at the rate of 1 pint in 100 gallons of water just after the eggs have hatched has given excellent control. In these tests DDT was entirely ineffective and aldrin was intermediate in this respect.

The new material malathion was of special interest because it has been found useful for control of several pests of ornamental and greenhouse plants. Consequently, it was used in experiments to control the birch leaf miner during the 1953 season.

## Experimental Procedure

Sixteen 6 to 9-foot gray birch trees badly infested with birch leaf miner

<sup>1</sup> Friend, R. B. Birch Leaf Mining Sawfly. Conn. Agr. Expt. Sta. Bul. 348.

<sup>2</sup> Schread, J. C. Birch Leaf Miner Control. Conn. Agr. Expt. Sta. Cir. 182.

were selected for the experiment. Malathion was used as a 57 per cent emulsion in dosage series of 1 to 200, 400, 800, and 1600. An additional spreading and sticking agent<sup>1</sup> was used to assure good coverage of the birch foliage. A Potts-Spencer portable mist blower was employed to apply the treatments. The apparatus provided thorough coverage of both the upper and lower surfaces of the foliage.

All of the trees in each of the treated areas were sprayed only once to control the first brood of birch leaf miners. Because of the satisfactory results obtained in this experiment, in addition to similar success achieved with other insecticides in earlier tests, no treatments were made to control the second or subsequent broods.

Obviously, malathion sprays properly timed would give efficient control of the mid-summer broods of the pest. It was demonstrated in earlier tests with other effective insecticides that only one spray is necessary to prevent noticeable injury to birch foliage by the late June and July broods. Hence, malathion could be expected to do the same.

The third and fourth broods of miners were disregarded because, by the time they appeared, the birch trees had hardened off or were in the process of doing so. Consequently there was very little, if any, new foliage developing.

### **Methods of Evaluating Results**

Because of the relatively small number of trees in the experiment, one branch was taken from each of the four trees in a treatment. From these branches 25 leaves were picked at random, making a total of a hundred leaves to be examined for each treatment. The general appearance of the leaves during the infestation by the first brood of miners was recorded. In addition, the presence of larvae, dead or alive, was tabulated. The number of the miners in each leaf was determined by opening the mines with forceps and dissecting needle. A binocular microscope was used to find out how many of these miners were dead.

### **Timing of Experimental Treatments**

An examination of birch leaf miner-infested foliage on May 11, 1953 showed that all of the leaves contained eggs, 22 per cent of which had hatched. Because of weather conditions, experimental treatments with malathion were delayed until May 20. At this time many of the miners were well developed and some browning of the foliage was beginning to show. The experimental sprays were applied in late morning. The temperature and humidity were high and the sky was partly overcast with sunlight appearing intermittently.

<sup>1</sup> Triton B-1956.

## Results

An examination on May 25 of foliage taken from birch trees sprayed with malathion on May 20 showed that birch leaf miner feeding had been stopped. On May 27 careful examination of miners in dissected leaves provided information regarding actual larval mortality. Table 1 shows that at all dilutions malathion provided complete control of birch leaf miners in gray birch foliage. None of the miners (small or large) escaped destruction by the insecticide. A clean-up of the first brood of miners with malathion was thus achieved.

TABLE 1. RESULTS OF FIRST BROOD BIRCH LEAF MINER TREATMENT MAY 20  
(100 Leaves Examined per Treatment)

Concentration of Malathion Emulsion	Larvae	
	Alive (7 Days After Treatment)	Dead
1-200	0	496
1-400	0	543
1-800	0	493
1-1600	0	381
Untreated	225	

In contrast, untreated foliage on the check trees in the near vicinity of the sprayed ones was nearly all brown as a result of miner injury. It showed up strikingly against the foliage on the malathion-treated trees, which was largely a normal green. Browning of portions of some of the leaves sprayed with malathion was due to the relative lateness of the treatments. The lower miner population in the check trees as indicated in the table is due to the completion of larval development in untreated trees.

Earlier work has indicated that birch leaf miner eggs are not easily destroyed by certain insecticides. Furthermore, it is not known if malathion will kill eggs. Failure to ascertain this point resulted from the lateness of the treatments. Eggs were not present in the foliage at the time of spraying. Consequently, if eggs are present in the leaves at the time of treatment, or if they are deposited after the insecticide has lost most or all of its residual toxicity to egg-laying adults, they may hatch normally and the larvae reach maturity unless destroyed later by additional sprays.

This situation is not so important for the first brood of birch leaf miners, which infests the foliage faster and over a shorter period of time than the second brood. However, when a treatment is applied at the beginning of the second brood in late June and not repeated a week to 10 days later, new leaves developing during July as well as some of the leaves sprayed earlier may be infested successfully by leaf miners.

## Suggestions for Control

The first brood of birch leaf miners may be controlled by spraying infested foliage with a 57 per cent malathion or 25 per cent lindane emulsion at the rate of 1/2 to 1 pint in 100 gallons of water (1/2 to 1 teaspoon per gallon). Wettable powders may be substituted for the emulsions at the rate of 1 to 2 pounds per 100 gallons of water (1 to 2 teaspoons per gallon). Treatment should be made between May 12 and 17 in most years; the general rule is whenever birch leaves are fairly well developed. This will vary with seasonal differences. Therefore, critical timing is essential to good control. Leaves found to contain small, grayish or blanched, kidney-shaped areas when held up to the light are ready for spraying. One treatment at this time in May should adequately control the first brood of miners.

A treatment to control the second brood of birch leaf miners effectively should be made during the last few days of June through the first several days of July. Here again, however, the occurrence of the second brood depends in large measure on the development of the first brood and on weather conditions. Under many conditions, a second treatment for the second brood may not be needed. However, if required, it should follow the first in 10 to 14 days. Malathion or lindane used as outlined above for control of the first brood of miners in May and properly timed in late June and July, will prevent noticeable injury to early and midsummer birch foliage by the second brood.

No injury to gray birch (*B. populifolia*) was caused by insecticides used at the levels indicated in the experiments discussed in this circular.

Chlordane has been used successfully for control of birch leaf miner.<sup>1</sup> It has been stated, however, that chlordane has caused some dropping of foliage when applied to the red or river birch (*Betula nigra*). Hence, caution should be exercised in the use of chlordane on *B. nigra*.

<sup>1</sup>Matthysse, John G. Insect Pests of Trees, Shrubs and Nurseries. Cornell Univ. Control Sched. 1951.