

Control of the Pear Psylla In Connecticut

PHILIP GARMAN and J. F. TOWNSEND

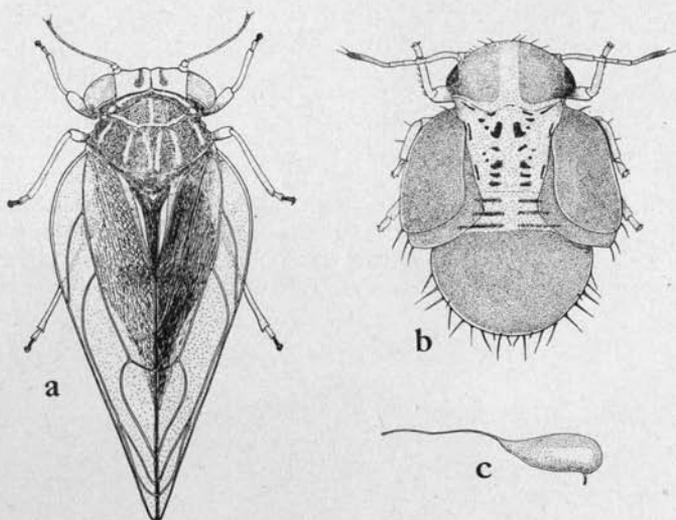


Figure 1. The Pear Psylla, *Psylla pyricola*. a. adult; b. nymph;
c. egg. Enlarged about 25 times.

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INTRODUCTION

THE pear psylla (*Psylla pyricola* Foerst) is probably the most important insect pest of the pear in Connecticut today. It occurs wherever pears are grown and is well distributed over the northeastern United States. Recently it has become established in one of the pear growing districts in Washington.

The various life stages consist of: (1) a peculiarly shaped, shiny, cream colored to pale yellow to orange egg (Fig. 1 c); (2) five nymphal instars, the earlier stages of which are yellow, the later stages brown or greenish in color (Fig. 1 b); (3) the adult (Fig. 1 a), a minute, clear-winged, brownish insect about one-tenth of an inch in length which resembles a small cicada in appearance. The nymphal stages, except the last, secrete a protective, viscous, gummy material which may cover the insect entirely. Adults are not usually seen except when numerous. They are very quick in their movements, flying readily from one tree to another when disturbed.

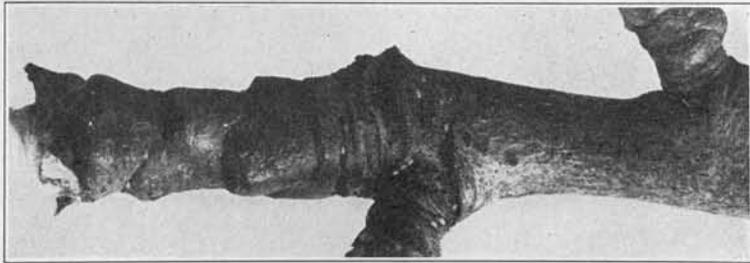


Figure 2. Eggs of pear psylla on twig, about twice enlarged.

There are known to be three generations of the pear psylla in Connecticut. The final generation matures in the fall, overwinters under rough bark or in other suitable places in or near the orchard and emerges when favorable temperatures prevail early in spring. Eggs are deposited on the smaller twigs and bud scars or in crevices when the temperature rises to 50 degrees F. or above. Egg laying has been observed in Connecticut as early as April 2 and the process is known to continue for about a month. The egg hatches in about 30 days in the spring and 11 days in midsummer. The nymphs mature in about 30 days and the adults of the first two generations

mate and lay eggs a few days after emergence. The last generation does not lay eggs until spring. After the second generation adults appear, the generations may overlap so that eggs, nymphs and adults are all present at one time. The different generations are shown graphically in Figure 6.

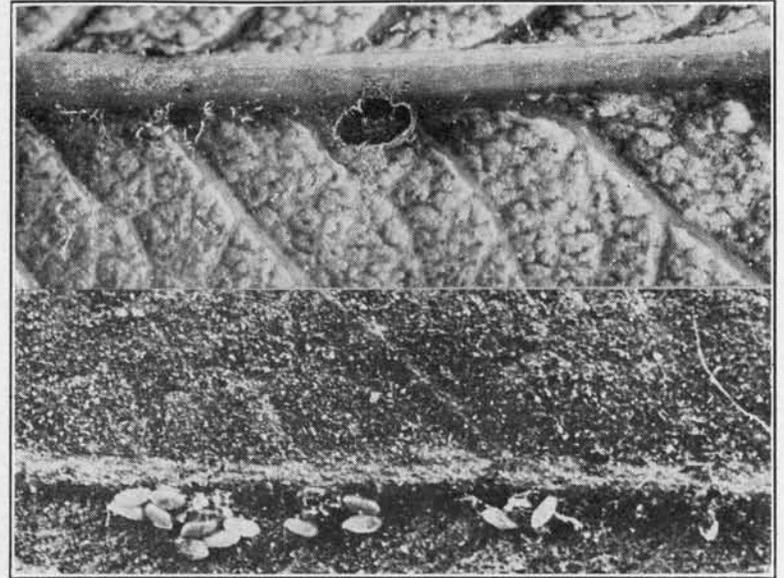


Figure 3. Full grown nymph (upper), eggs along the midrib of a pear leaf (lower).

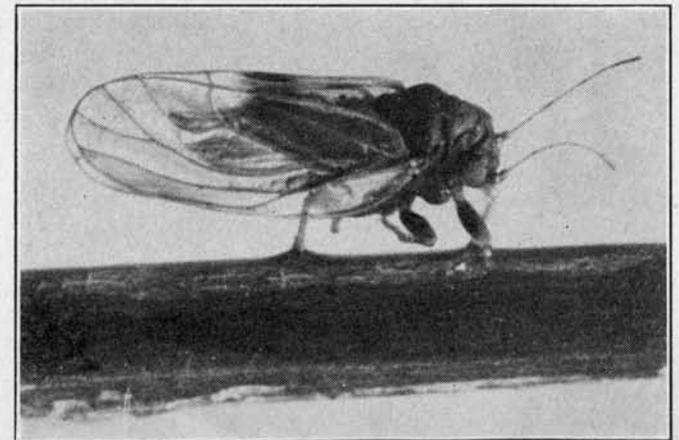


Figure 4. Adult psylla greatly enlarged.

Injury

By the first week in May, eggs begin to hatch and, by the first of June, leaves may become spotted due to feeding of the nymphs and the appearance of the sooty fungus already mentioned. Due to removal of sap from the leaves by nymphs and adults, the trees will show increasing leaf drop and decreasing vitality as the season advances, unless the insect is brought under control. Lowered production and decreased sale value of the fruit are the inevitable results of continuing infestations.

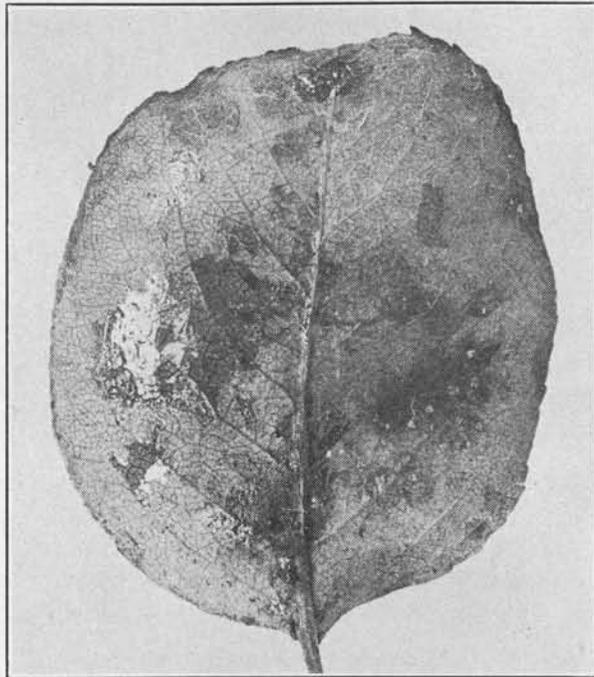


Figure 5. Discoloration of a pear leaf caused by infestation by the pear psylla.

Natural Enemies

Not much is known about the natural enemies of the pear psylla and very little importance is commonly attached to them. However, in view of the wide variations in abundance from season to season we suspect that natural enemies may be more important than is generally realized. So far only one parasite is known in this region. This species, which attacks and destroys the nymphs, is known by its scientific name only, *Psylledontus insidiosus* Crawford. It was discovered by Parrott and described by Crawford in 1910.

Control Measures

It is always important in insect control to know what weather or other environmental conditions are favorable to the insect. One of the worst outbreaks that we have witnessed occurred in 1927 when there was very heavy rainfall early in the growing season. In general there seems to be more trouble from the insect in wet seasons than in dry, but there are probably other factors besides rainfall that influence abundance. What these are can only be surmised, since little is known about them.

Pear Psylla Seasonal History

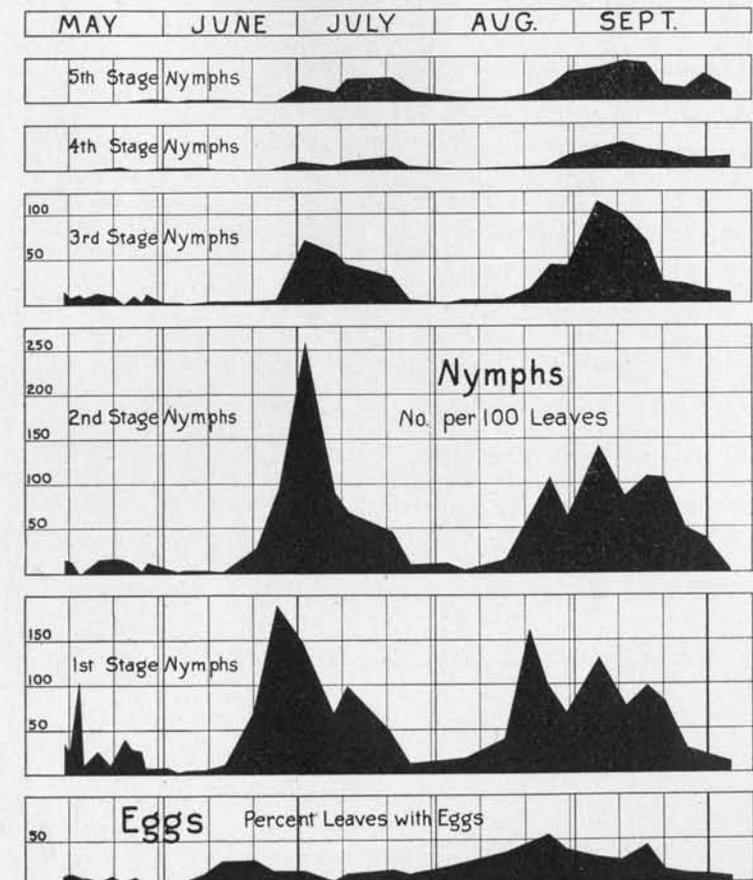


Figure 6. Showing seasonal abundance of the various stages of the pear psylla as determined by field counts.

Sprays may be used against all stages of the pear psylla but for practical reasons those directed against the eggs and nymphs are commonly employed. The nymphs are easily killed by contact

sprays except when protected by their viscous secretion or gum. However, by spraying shortly after rains, which remove the gum, the orchardist can overcome the insect's advantage. Adults may be knocked down with suitable dusts. Overwintering adults may be killed by sprays during cool weather in early spring. It is important to apply delayed dormant sprays before the temperature rises much above 50 degrees since the insects fly less readily then and the chances of hitting them are better. Of the various control periods, the delayed dormant (as the buds are pushing out and before the leaves unfold) may be utilized perhaps to better advantage than others. After the foliage becomes dense, it is not so easy to obtain good coverage with insecticides, although it is still possible to keep the psylla in check by spraying.

The delayed dormant spray. This spray consists of 3 percent lubricating oil (3 percent actual oil in each 100 gallons of spray). Either tank mixed or commercial preparations have given consistent results throughout Connecticut. These materials appear to be most effective when applied from the first to the middle of April as the buds are pushing out. The action on the psylla is not altogether by contact and there seems to be some effect for a considerable length of time after applications. This may possibly be due to absorption of toxic materials by the tree itself, the insect getting it by sucking the plant juices. In moderate to light infestations, the dormant spray alone is frequently all that is needed for psylla control. If the infestation is heavy, additional sprays in July are usually necessary.

There are some objections to the use of delayed dormant oils. It is the feeling of some orchardists that these oils injure pear trees and should, therefore, be omitted, or the trees allowed to recuperate by omission of the spray once in three or four years. Because of wet soil, too, it may be impossible to get on the land with the spray

NOTE: Following are specifications for dormant or delayed dormant oils, given by the New York (Geneva) Agricultural Experiment Station, Circular No. 129, page 2, 1937.

Visc. at 100° F.	90 - 120 secs. ¹
Specific gravity	86 - 90
Beaumé gravity	29.1° - 25.5°
Flash point	350° - 380° F.
Fire Point	400° - 435° F.
Cold test	not higher than 18° F.
Unsolonatable residue	60 - 70%
Volatility after 4 hours at 220 - 230° F.	not over 0.25%

¹Commercial oils on the market are frequently of higher viscosity and lower in unsolonatable residue than the figures given. In view of the danger to pear trees, it is advisable to adhere to these specifications within reasonable limits. There are some newer type oils being developed which differ from the specifications given but these have not been sufficiently tested for consideration here. Also the older miscible oils are quite different from the specifications in the oil that they contain but may be considered fully as safe as the oil recommended for dormant use.

rig at the time when the delayed dormant spray should be applied. It is believed that weak trees are more susceptible to oil injury than those in a vigorous growing condition and that old trees are more susceptible than young. There is also a question of safety to fruit buds when oil is followed too closely by lime sulfur. Strong lime sulfur has largely been replaced by wettable sulfur, or the sulfur omitted entirely from the schedule whenever disease control is not a problem.

Tar oils and oil containing so-called "dinitro" products have been substituted for lubricating oil, or products containing 3.5 dinitro-o-cresol have been used without any oil. Some of these, particularly the "dinitro" products, are proving successful, though they are as yet too new to warrant recommendation.

Summer sprays. In view of the aforementioned inability to get on the land with the sprayer in time to make a delayed dormant application, it becomes important to provide a successful summer schedule which will work independently of the so-called dormant treatment. By referring to Figure 6, it will be seen that the first generation of nymphs, relatively small in numbers, is present on the trees from May 10 to about the first of June. Consequently, contact sprays applied during that period should be successful if the popula-

Effect of Sprays on Pear Psylla

Wallingford 1935

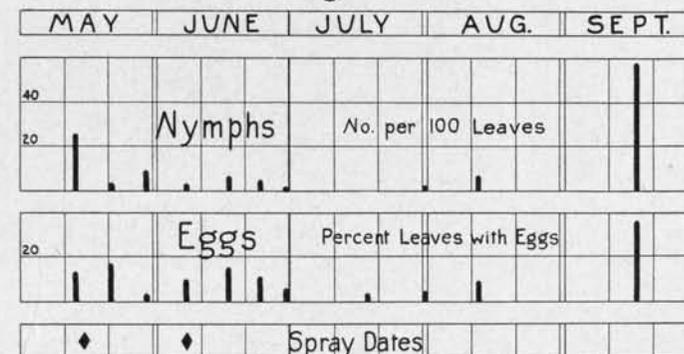


Figure 7. Effect of two summer oil nicotine sulfate sprays on abundance of the pear psylla, 1935.

tion is thereby reduced to a point where the insect cannot build up until the fruit is harvested. Some of our results with summer oil and nicotine sulfate are shown in Figures 7, 8, and 9. The subsequent drop in nymph population after the oil-nicotine applications will be readily noted from these charts. Similar results have been obtained by the Barnes Nursery and Orchard Company in Walling-

ford. It has sometimes been necessary to make a third application about the first of July when the first and second stage nymphs of the second generation have reached their peak of abundance and the majority of the eggs of the second generation have hatched. Even where dormant oils are used, which alone ordinarily control the psylla satisfactorily, supplementary measures should be held in readiness in case the psylla develops enough to threaten damage after the first of July. As will be noted from the charts, a third period of abundance occurs in August. For that reason an additional spray may be advisable, as indicated in the calendar on page 11, though ordinarily this will not be necessary.

For summer sprays such as have been outlined, white summer oil emulsions with nicotine sulfate are quite satisfactory. The oils may be either tank mixed¹ (emulsified by pumping through the engine and spray nozzles turned back into the tank) or commercial, ready-

Effect of Sprays on Pear Psylla

Hamden 1935

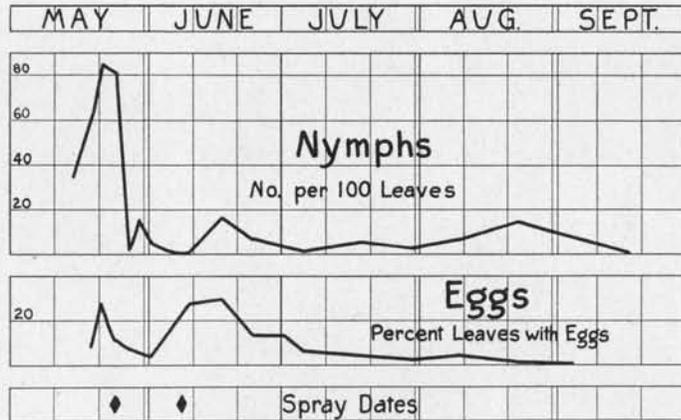


Figure 8. Replica of Figure 7 under different conditions and with slightly different spray dates (indicated by diamonds on lower section).

to-use preparations. The white oils are considered safer for the trees than the delayed dormant oil, but where several oil sprays have already been applied, or where sulfur is being used, it is advisable to omit oil and substitute soap or other suitable spreader. This would apply mainly to July or later sprays where there have been two or three oil sprays applied earlier in the season. The white summer oil spray should contain 1.5 gallons 60 to 80 viscosity white

¹For tank mix preparations, use 1 pound of skim milk powder for every gallon of white oil placed in the tank. Add a small amount of water and emulsify by pumping through the spray nozzles turned back into the solution until emulsification is complete. The mix is then ready to dilute and apply. **Clear the tank and hose of sulfur before making the emulsion.**

oil¹ and one pint of nicotine sulfate in each 100 gallons of spray mixture. Lead arsenate may be successfully combined with oil-nicotine sprays in May or early June but should not be used in July sprays unless the oil is omitted. Sulfur should not be mixed with any oil spray.

Effect of Sprays on Pear Psylla Yalesville 1936

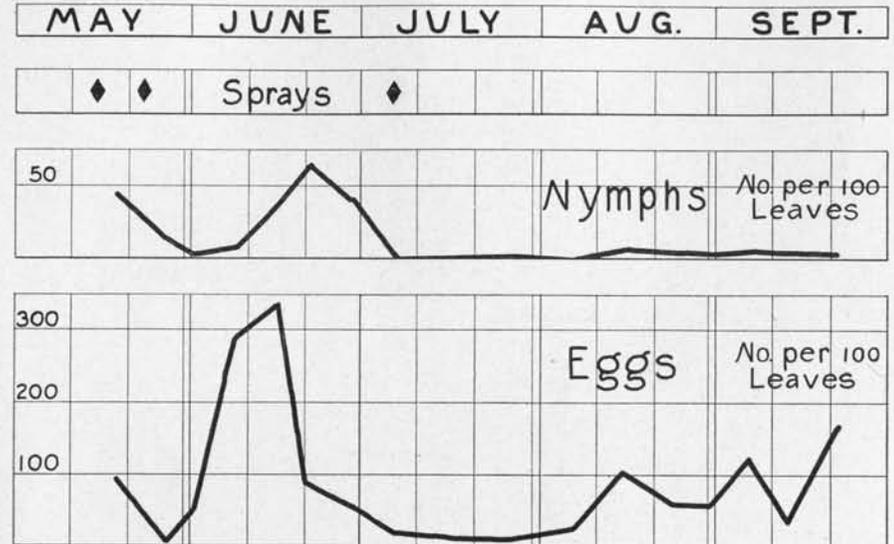


Figure 9. Conditions under which it appeared to be necessary to make use of a third spray about July 1. Successful control with three sprays of summer oil and nicotine sulfate. Spray dates indicated by diamonds in the upper section.

¹For summer use we suggest the following specifications for white oil.

Viscosity @ 100° F.	60 - 80 secs.
Unsulphonatable residue	90 - 100 percent.
Baume gravity	30°

THREE SPRAY SCHEDULES DESIGNED PRIMARILY FOR PEAR PSYLLA CONTROL

Time of spray	Pests to be controlled	I For varieties not subject to scab; and in vigorous condition FOR 100 GALS.	II For non-scabbing varieties; weak trees. Where dormant oils have been omitted FOR 100 GALS.	III For varieties that scab FOR 100 GALS.
Delayed dormant (as buds are pushing out. Usually April 1 to 15)	Psylla Scale Thrips	Dormant oil:* Commercial or tank mix. 3% actual oil		Dormant oil: Commercial or tank mix. 3% actual oil. Omit if trees are weak.
Cluster bud (as blossom buds are separating in clusters)	Midge Psylla	Nicotine sulfate 1 pint Soap flakes 1 pound	Summer oil** 1.5% actual oil. Nicotine sulfate 1 pint	Wettable sulfur mfrs. recommendation or 2-10-100 Bordeaux and Nicotine sulf. 1 pt.
Calyx (soon after petals have fallen)	Curculio Codling moth Leaf roller Plant bugs	Lead arsenate 3 lbs. Nicotine sulfate 1 pint	Summer oil** 1.5% actual oil. Nicotine sulfate 1 pint Lead ars. 3 lbs.	Wettable sulfur mfrs. recommendation or 2-10-100 Bordeaux and Nicotine sulf. 1 pt.
Two weeks after calyx	Curculio Codling moth Leaf roller	Lead arsenate 3 lbs.	Lead arsenate 3 lbs.	Lead arsenate 3 lbs.
About July 1 (if psylla becomes abundant)	Psylla	Summer oil 1.5% actual oil Nicotine sulfate 1 pint	Summer oil 1.5% actual oil Nicotine sulfate 1 pint	Summer oil 1.5% actual oil Nicotine sulfate 1 pint
About Aug. 15 (only if psylla becomes abundant)	Psylla	Nicotine sulfate 1 pint Soap flakes 1 pound	Nicotine sulfate 1 pint Soap flakes 1 pound	Nicotine sulfate 1 pint Soap flakes 1 pound

Connecticut Experiment Station

Circular 143

Control of the Pear Psylla in Connecticut

NOTES: Schedule III may be used on any variety but does not usually give quite as good control of psylla as I and II. Good fruit has been produced in some orchards with schedules similar to those used for apple only substituting wettable sulfurs for lime sulfur throughout and adding nicotine sulfate for psylla control.

*Dormant oils are red or straw-colored lubricating oils.

**Summer oils are white or clear lubricating oils similar to medicinal oils (see specifications on p. 9).

Summary of Control Measures

Sprays

(1) Spray with a dormant oil, preferably a 3 percent emulsion (3 percent in the final mixture), during the first two weeks in April or just as the buds are pushing out in case the season is later or earlier. Select fairly cool days (40 to 50° F.) and spray from both sides of the tree in order to do a thorough job. Omit dormant oil on weak trees, or, if the orchard is old, omit the oil every third year.

(2) If for any reason the dormant oil spray has been omitted, spray twice during May, or once during May and once in early June (see Figures 8 and 9), with nicotine sulfate and summer oil emulsion; or, if sulfur is being used, omit the oil. Dilute the oil to contain 1.5 gallons oil to 100 gallons finished spray. Nicotine sulfate should be diluted to contain 1 pint to 100 gallons.

(3) Watch the trees during June, and if the insect shows sign of becoming abundant, spray again with nicotine sulfate about July 1, or shortly thereafter. If necessary, repeat about August 15 without oil.

Methods of application

(1) Direct summer sprays upwards so as to cover the lower surfaces of the leaves.

(2) Nicotine sulfate sprays following a rain are often more successful than those made in dry periods because the protective gum is washed from the leaves.

Other measures

(1) Select sites for new plantations preferably on high ground or sloping land with good air drainage, avoiding pockets or low damp areas as much as possible.

(2) Plant and prune trees to avoid dense growth which provides excellent quarters for pear psylla.