

Fig. 1. Gall caused by lettuce root aphid on leaf petiole from Lombardy poplar tree.

# Insecticides evaluated for lettuce root aphid control

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The lettuce root aphid, *Pemphigus bursarius* L., can cause considerable damage to crops of summer head lettuce. Its primary host is the Lombardy poplar, *Populus italica* var. *nigra*. The aphids, or "stem mothers," which hatch in the spring from eggs that have overwintered on the poplar, cause hollow, flask-shaped galls to develop on the leaf petioles (fig. 1). The stem mother becomes enclosed within the gall, where it matures and gives rise to between 100 and 250 young.

During the summer, as the galls open, the new generation of winged let-

tuce root aphids migrates from the poplar trees to nearby fields and feeds on the lettuce roots. When lettuce foliage first shows evidence of the root aphid infestation (yellowed and wilted leaves), damage has already taken place. The aphids are so numerous and so widely distributed throughout the soil that control measures at this stage are impractical (fig. 2).

In 1974 and 1975 field experiments in Lompoc, all insecticides were applied as a preventive measure in anticipation of an aphid attack. Insecticides were applied in 1974 to aphid-infested Lombardy poplar trees before the main migration



Fig. 2. White arrows indicate uninfested lettuce roots. Black outline indicates roots infested with aphids.

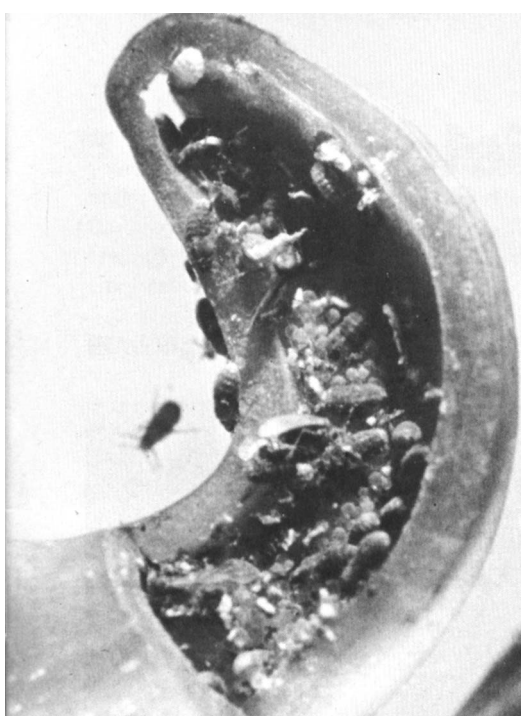


Fig. 3. Cross-section of gall exposing aphids.

had begun. In 1975, granular formulations of insecticides were sidedressed in lettuce fields.

### Control on trees

Three types of insecticide applications on poplar trees were made on April 5, 1974 (table 1). In the spray applications, all trees were completely sprayed by hydraulic equipment at 200 psi, with four replications of all treatments on single tree plots. Paint-on applications consisted of a 1-foot-wide encircling band of undiluted insecticide formulations applied with a paint brush at ground level; three replications were made of each treatment on single tree plots. In the trunk implantations, 1- and 2-ml Mauget units were used; implantations were 6 feet below the point of first branching at 6-inch intervals around the tree trunks. Two replications were made of all treatments on single tree plots.

All treatments were evaluated on May 16, 1974. Trees that had received spray applications were reassessed on June 11, 1975, for aphid galls. Orthene 75 SP gave the best control, and the Meta-Systox-R spray was almost as effective in controlling the aphid (table 1). All treatments reduced the percentage of galls with live aphids. No aphids were alive in the Orthene-treated galls. After one year, Orthene-treated trees had significantly fewer galls. Thus, aphid resurgence on the trees can be drastically reduced for at least a year when good control is achieved with a

spray application.

Apparently, not all the aphids leave poplars and migrate to the lettuce in the summer. Apterous (wingless and non-migrating) forms are abundant in galls throughout the season (fig. 3 and 4). Destruction of this apparent reservoir of nonmigrants on the poplar may account for the reduced gall formation on trees that had been sprayed with Orthene the preceding year.

### Control on lettuce

On August 22, 1975, five granular insecticide formulations were sidedressed in two commercial lettuce fields in randomized treatments replicated four times (table 2). All the plots were 100 feet long by four beds wide (40-inch bed with double-row planting). Each material was sidedressed to a 2- to 3-inch depth with a Chem-Junior granular applicator mounted on a tractor when the lettuce plants were in the three- to five-leaf stage.

The chemicals were evaluated for their effectiveness against root aphids about two months after treatment. Twenty-five plants were removed at random from each plot; each plant was examined for three minutes and the number of aphids infesting it was recorded. Pirimor was the only material tested that gave some reduction of lettuce root aphid populations.

### Conclusions

None of the treatments can be recommended at present for lettuce root aphid control. Granular insecticides applied in lettuce crops gave inconclusive results. It is possible to control the lettuce root aphid on Lombardy poplar and thereby prevent the production of winged forms that migrate to lettuce. At present, however, the feasibility of this approach is questionable. The root aphid is only occasionally a serious pest of lettuce, and most Lombardy poplar trees are not owned by lettuce growers. These trees are usually grown as ornamentals or wind-breaks around private dwellings and public parks—areas in which pesticides must be used with extreme care. Also, the levels and persistence of residues have not been determined for the insecticides evaluated.

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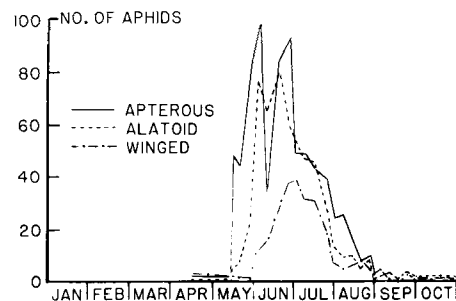


Fig. 4. Root aphid in petiole galls on poplar trees, Lompoc, California, 1975. Apterous—wingless, nonmigrating aphids. Alataid—nymphs that will develop into alatae (winged, migrating forms). Winged—alatae.

TABLE 1. EFFECTIVENESS OF THREE TYPES OF INSECTICIDE APPLICATIONS MADE APRIL 5, 1974, TO CONTROL LETTUCE ROOT APHID ON LOMBARDY POPLAR, LOMPOC, CALIFORNIA

Insecticide	Active ingredient lb/acre	Evaluation, May 16, 1974		
		Galls counted in 2 minutes number/tree	Live aphids in galls number/gall	Galls with live aphids percent
<b>Spray applications</b>				
Thiodan (50 WP)	0.5	67	1,048	24
Orthene (75 SP)	1.0	28	0	0
Meta-Systox-R (2 EC)	0.375	41	47	3
Untreated control	---	128	4,953	99
<b>Paint-on applications</b>				
Meta-Systox-R (2 EC)	---	38	501	27
Orthene (2.67 EC)	---	31	538	34
Untreated control	---	63	2,588	89
<b>Trunk implantations</b>				
Bidrin (86 Technical, 1-ml units)	---	109	876	55
Bidrin (86 Technical, 2-ml units)	---	129	787	33
Untreated control	---	188	2,097	98

Insecticide	Active ingredient lb/acre	Evaluation, June 11, 1975	
		Mean number galls counted in 2 minutes*	
<b>Spray application</b>			
Thiodan (50 WP)	0.5	24.25 a	24.25 b
Orthene (75 SP)	1.0	3.25 b	3.25 b
Meta-Systox-R (2 EC)	0.375	73.00 a	73.00 a
Untreated control	---	73.50 a	73.50 a

\* Means followed by the same letter are not significantly different at the 5 percent level of significance using Duncan's Multiple Range Test.

TABLE 2. EFFECTIVENESS OF GRANULAR INSECTICIDES APPLIED AUGUST 22, 1975, IN TWO LETTUCE FIELDS TO CONTROL ROOT APHIDS, LOMPOC, CALIFORNIA

Insecticide	Active ingredient lb/acre	Del Mar Farms, October 14, 1975*		Santa Clara Farms, October 15, 1975*	
		Aphids per 100 plants	Infested plants	Aphids per 100 plants	Infested plants
Diazinon (14G)	2.0	472.00 a	5.00 a	4,355.25 a	17.5 ab
Thimet (10G)	2.0	309.25 a	2.75 a	2,922.75 a	15.8 ab
Pirimor (5G)	1.0	102.00 a	2.00 a	1,894.25 b	10.8 c
Orthene (10G)	1.0	1,274.75 a	6.50 a	4,594.75 a	16.3 ab
Di-Syston (15G)	1.5	654.00 a	5.0 a	3,532.50 a	14.8 b
Untreated	---	522.25 a	3.0 a	4,818.00 a	18.5 a

\* Results are means obtained from 25 plants per plot examined for a three-minute period during which aphids were counted. Means followed by the same letter are not significantly different at the 5 percent level of significance using Duncan's Multiple Range Test.