

NOTE: Effectiveness of Some Environmentally Friendly Chemicals against the Pear Psylla *Cacopsylla pyricola*

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The effectiveness of Vivere + Vivo phyto, AVA + vinegar, AVA + urea, Vivere + Vivo urticae, calcium oxide, and Surround WP against pear psylla *Cacopsylla pyricola* (Foerster) was evaluated by recording the number of eggs, the number of nymphs, and the amount of honeydew produced by the psylla. Very promising results were obtained with all chemicals used. The effectiveness against psylla of the AVA + urea combination was the best and similar to that achieved with conventional chemical treatments. Moreover, trees treated with the above chemicals showed a lower percentage of natural infection by the fire blight pathogen *Erwinia amylovora* than the untreated control trees.

KEY WORDS: Control; eggs; honeydew; nymphs; pear trees; *Cacopsylla pyricola*.

Pear psylla, *Cacopsylla pyricola* (Foerster), is one of the most important pests of pears in all regions where the fruit is grown (3). A member of the family Psyllidae of Homoptera, it exhibits five immature stages in four to six generations per year (2). Apart from the direct damages it causes to pear trees, this pest can vector diseases in pears (3). Applications of chemicals, such as fenoxycarb (5), are widely used against *C. pyricola*, but most of the chemicals are expensive and leave detrimental residues (8). In addition, the pear psylla has an unusual ability to develop resistance to chemical compounds (4). Preliminary studies of insect control by using environmentally friendly products have been conducted (6), but they require more research for the target insect. The aim of the present study was to evaluate the effectiveness of Vivere (Geovet Hellas, Imathia, Greece; foliar fertilizer containing plant extracts) + Vivo phyto (Geovet Hellas; foliar fertilizer), AVA (Rolco Bianil, Athens, Greece; dish-cleaning liquid with 5% active ionic Mn) + vinegar (6% acidity), AVA + urea (46% nitrogen), Vivere + Vivo urticae (Geovet Hellas; foliar

fertilizer containing plant oils), calcium oxide, and Surround WP (Hellafarm, Athens, Greece; 100% kaolin) against pear psylla.

All the experiments were conducted for two consecutive years (2002, 2003) on 8-year-old pear trees (cv. Kontoula 1/6 grafted on wild quince rootstock) of the Pomology Institute, Naoussa (prefecture of Imathia), Greece. The distance between trees was 2 x 4 m; the trees were 3–3.5 m tall, and they were trained into spindle bush shapes. The orchard was 120 m above sea level, and ~40 km distant from the sea. Pear trees were sprayed at a rate of 3 l per tree with one of the following: Vivere (0.2%) + Vivo phyto (0.2%), AVA (0.4%) + vinegar (0.8%), AVA (0.4%) + urea (0.4%), Vivere (0.2%) + Vivo urticae (0.1%), calcium oxide (1%), and Surround WP (1%). Three sprays were applied each year (on the same dates) beginning on 22 April and repeated every 15 days. In addition, trees were sprayed with the insecticide Mitac (0.1%) (amitraz 20%) two times per tree, on 18 April and 21 May in 2002 and on 16 April and 20 May in 2003 (conventional applications); trees sprayed

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with water served as controls. The number of psylla eggs was recorded on 30 leaves per tree. A rating scale was used to record honeydew (0 = no honeydew to 5 = large amounts of honeydew) on 30 leaves per tree. The number of nymphs was also recorded on ten fully expanded leaves

per treated and untreated tree. Finally, a rating scale from 0 to 10 was used, where 0 = healthy tree and 10 = dead tree, to determine the effects of pear psylla infestation on fire blight caused by *Erwinia amylovora*. All measurements were performed on 10 June 2002 and 12 June 2003.

TABLE 1. Effect of some chemicals on the numbers of eggs and nymphs, and amount of honeydew, produced by *Cacopsylla pyricola*

Treatment	Eggs ^z	Honeydew ^y	Nymphs ^x	<i>Erwinia amylovora</i> ^w
Control (no chemical)	2.50 ^v	2.75	1.70	4.56
Vivere + Vivo phyto	1.30	1.29	0.90	2.23
AVA + vinegar	1.30	0.58	0.50	2.56
AVA + urea	0.60	0.34	0.40	2.11
Vivere + Vivo urticae	1.40	0.80	0.50	2.44
Calcium oxide	1.90	0.69	0.50	2.50
Surround WP	1.70	0.56	0.60	2.38
Mitac (conventional pesticide)	0.80	0.55	0.60	2.40
LSD	0.23	0.12	0.21	0.48

^zNumber of eggs per leaf.

^yIndex on a rating scale of 0 = no honeydew to 5 = large amount of honeydew.

^xNumber of nymphs per leaf.

^wIndex on a rating scale of 0 = healthy tree to 10 = dead tree.

^vEach value is the mean of two consecutive years.

The experimental design was a completely randomized block, with five replications per treatment, each replication consisting of three trees. Data were analyzed by one-way analysis of variance (ANOVA). To combine experiments, Bartlett's test of homogeneity of variance was used and treatment means were separated by the least significant difference at $P = 0.05$.

As reported above, chemical control using insecticides has been the most effective method against pear psylla. The introduction of integrated production systems requires the replacement of pesticides that leave high residues with other products friendly to the environment. This study showed that AVA + urea, AVA + vinegar, calcium oxide, Surround WP, Vivere + Vivo phyto and Vivere + Vivo urticae were effective against pear psylla. The most effective of the compounds tested, in reducing the numbers of eggs and nymphs, and the amount of honeydew, was the combination of AVA + urea (Table 1). The effectiveness of this treatment was similar to that of the conventional sprays with the insecti-

cide Mitac. The chemicals tested in this study are friendly to the environment and probably could be included in an integrated pest management approach. However, more investigations must be conducted to evaluate the effectiveness of the above treatments combined with biological methods, such as using *Anthocoris nemoralis*, which is a natural enemy of *C. pyricola* (7). In addition, the effectiveness of the environmentally friendly compounds used in this study must be evaluated also under higher levels of *C. pyricola* infestation than those occurring on the pear trees in this study, in 2002 and 2003.

The results also showed that untreated trees had the highest percentage of infection by fire blight. No significant difference was observed among trees sprayed with any of the following: Vivere + Vivo phyto, AVA + vinegar, AVA + urea, Vivere + Vivo urticae, calcium oxide, Surround WP, or the conventional Mitac (Table 1). It was reported that insects can become smeared with various kinds of bacteria as they move among plants. Insects can carry these pathogens exter-

nally from plant to plant and deposit them on the plant surface or in wounds they create on plants during feeding (1). More investigation should be done to determine the exact role of *C. pyricola* in the dissemination of *E. amylovora*.

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