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CHEMICAL CONTROL OF AVOCADO AND LIME PESTS

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Abstract

Laboratory and field experiments were conducted to test efficacy of insecticides for control of avocado lace bug *Pseudacysta perseae* (Heidemann). The performance of chlorpyrifos, permethrin, pyrethrin and malathion provided satisfactory control of avocado lace bug under field conditions. The effect of weathered residues of different pesticides on *Brevipalpus phoenicis* (Geijskes), *Phyllocoptruta oleivora* (Ashmead), *Panonychus citri* (McGregor) and *Planococcus citri* Risso was determined in limes (*Citrus latifolia* Tanaka). Effect of different pesticides on these lime pests is discussed**.**

The avocado lace bug, *Pseudacysta perseae* (Heidemann) has become the most frequent pest of avocado, *Persea Americana* Miller (Mead and Pena, 1991). Since the time of its description in 1908, the avocado lace bug has been regarded as being of only occasional minor economic importance. Recently, damage has increased in Florida, and within the last two years damaging populations have been reported for the first time in Puerto Rico (Medina-Gaud *et al.,* 1991) and the Dominican Republic (Abud-Antun, 1991). The avocado lace bug causes yellowish or brownish necrotic areas on avocado leaves, and severe infestation may be related with tree defoliation. It has been suggested by Mead and Pena (1991) that injuries from lace bug activities provide the infection court for the anthracnose fungus, *Colletrotichum gloeosporioides* Penz.

The rust mite, *Phyllocoptruta oleivora* (Ashmead), the citrus red mite, *Panonychus citri* (McGregor), the citrus mealybug, *Planococcus citri* Risso, and the flat mite, *Brevipalpus phoenicis* (Geijskes) are recognized as important pests of lime (*Citrus latifolia* Tanaka) (Jeppson *et al.,* 1975; Knapp, 1985). In recent years, the population and importance of the flat mite have escalated from occasional pest to common pest of lime. Research has been done to show the efficacy of insecticides against citrus pests (Knapp, 1987; Pena, 1988); however, very few tests have been conducted in lime. Moreover, to my knowledge, no current work has been done to show efficacy of insecticides against avocado lace bug. My objectives were to compare the efficacy of insecticides on the avocado lace bug and the lime pests mentioned above.

MATERIAL AND METHODS

Avocado lace bug laboratory tests. Avocado lace bug adults were collected from an infested avocado orchard located in Princeton, Florida. Uninfested avocado leaves were dipped for l min in solutions of different pesticides. Leaves were allowed to dry for 10 min and placed individually in 1-liter plastic containers. A single adult lace bug was placed in each container. Subsequently, the container was covered with cheesecloth to allow proper ventilation. Each treatment was replicated 20 times. Lace bug mortality was observed 24 hr after treatment.

Avocado lace bug field test. Trials were conducted to evaluate insecticide treatments for control of avocado lace bug infestation in a 15-year-old avocado orchard. Treatments were applied to four-tree plots replicated three times. One unsprayed buffer tree separated trees within rows and one tree separated trees between rows. Sprays were applied with an airblast sprayer at 170 psi, 2000 rpm. Five leaves were examined at random for adults and nymphs around the canopy 14 days before treatment and 4 and 11 days after treatment.

Lime pests field tests. Impact of field-weathered residues of seven pesticides on lime pests was evaluated from 10 October through 10 December 1991 and from 30 March through 20 May 1992 in a 15-year-old lime orchard. Treatments were applied twice in a 30-day interval to three-tree plots replicated four times. One unsprayed buffer tree separated trees between rows and one tree separated trees within rows. Sprays were applied with an airblast sprayer at 160 psi, ca. 2 gal/tree. Five fruits were examined at random around the canopy of each tree. Treatment effect on survival of pests was evaluated 8 days before treatment and 3 consecutive weeks after treatment.

RESULTS AND DISCUSSION

Avocado lace bug tests. Data from the laboratory test experiment are summarized in Table 1. At 24 hr after treatment mortality of lace bug adults ranged from 70% to 95%. The most effective insecticides were permethrin, methomyl, malathion and chlorpyrifos, followed by pyrellin. During the field test all pesticide treatments significantly reduced the adult population density 4 days after treatment, but with the exception of chlorpyrifos, failed to reduce adult density 11 days after treatment. Only pyrellin reduced the nymphal population 4 days after treatment, and all treatments had significantly lower immature populations 11 days after treatment (Table 2). More laboratory and field experiments must be conducted to determine whether chemicals can be combined with other strategies, i.e., biological and cultural control, to control the avocado lace bug.

Table 1. Mortality of avocado lace bug adults under laboratory conditions.

Treatment	Rate/100 gal	% Mortality	Actual mortality
Permethrin	2.56 fl oz	100	95
Methomyl	2 pt	100	95
Pyrethrin	2 pt	75	70
Malathion	1 pt	100	95
Chlorpyrifos	1 pt	100	95
Check		5	0

Table 2. Survival of avocado lace bug after application of chemical treatments.

Treatment[z]	Days after treatment: −14 Adult	−14 Nymph	+4 Adult	+4 Nymph	+11 Adult	+11 Nymph
Pyrethrin	0.02 b[y]	0.37 b	0.40 b	2.28 bc	0.55 a	0.55 b
Permethrin	0.21 ab	2.13 ab	0.08 b	0.07 d	0.30 ab	0.85 b
Malathion	0.18 ab	1.70 ab	0.20 b	2.91 b	0.12 ab	1.07 b
Chlorpyrifos	0.55 a	1.78 ab	0.17 b	0.42 cd	0.00 b	1.12 b
Check	0.60 a	2.58 a	1.05 a	6.58 a	0.55 a	3.53 a

[z]Pyrethrin, 2 pt/100 gal; Permethrin, 2.56 fl oz/100 gal; Malathion 57 EC, 1 pt/100 gal; Chlorpyrifos 4E, 2 pt/100 gal.
[y]Mean separation within columns by Duncan's multiple range test, 5% level.

Table 3. Effect of pesticides on lime pests and predaceous mites, Fall 1991.

Treatment	Dose/ 500 gal	Average no./fruit: Rust mites	Red mites	Flat mites	Mealybugs	Predaceous mites
Lorsban 4E	2.5 pt	0.21 a[z]	0.003 a	0.17 b	0.16 b	0.03 b
Ethion 4M	2.5 pt	0.08 a	0.000 a	0.15 b	0.35 ab	0.03 bc
Citrus Oil	0.5 %	0.10 a	0.000 a	0.26 b	0.29 ab	0.06 ab
Copper Sulfate 24%	4 lb	0.27 a	0.003 a	0.61 a	0.24 ab	0.02 c
Supracide	2-5 pt	0.18 a	0.002 a	0.42 ab	0.34 ab	0.03 bc
Microflow Sulfur 52%	25 lb	0.03 a	0.000 a	0.14 b	0.43 ab	0.03 bc
Kelthane 1.6 8 C	1 gal	0.19 a	0.005 a	0.05 b	0.46 a	0.01 c
Control		0.04 a	0.000 a	0.23 b	0.18 b	0.08 a

[z]Mean separation within columns by Duncan's multiple range test, 5% level.

Lime tests. Rust mite and red mite density were negligible during the 1991 experiment. Application of copper sulfate appeared to increase flat mite density, whereas mealybug density increased after applications of Kelthane. Lowest populations of predaceous mites were obtained after applications of Kelthane and copper sulfate (Table 3). During the spring 1992, plots sprayed with Supracide and pyrellin had two to three times more rust mites than the control plots (Table 4). The lowest population of rust mites was observed after application of Avid, followed by Ethion and Lorsban. With the exception of Avid, all pesticides reduced red mite density (Table 4). Sulfur, Lorsban and Supracide were ineffective against flat mites (Table 4). Populations of mealybugs were low during the winter and spring of 1992. All pesticides maintained mealybug populations below the control (Table 4). Density of predaceous mites was lower on sulfur and pyrethrin-sprayed plots than on chlorpyrifos, Ethion and oil-sprayed plots (Table 4). More experimentation is necessary to ascertain the rate at which chemicals should be sprayed to obtain control of pests and maintain predator numbers under field conditions.

Table 4. Effect of pesticides on lime pests and predaceous mites, Spring 1992.

Treatment	Dose/ 500 gal	Rust mites	Red mites	Mealybugs	Predaceous mites
Chlorpyrifos	2.5 pts	2.49 b[z]	0.021 b	0.021 b	0.013 a
Ethion	2.5 pts	2.40 b	0.008 b	0.05 ab	0.013 a
Citrus Oil	0.5 %	3.54 b	0.60 b	0.02 b	0.008 a
Agrimek	0.31 pts	0.61 b	1.20 a	0.05 ab	0.004 a
Supracide	2.5 pts	16.02 a	0.04 b	0.08 ab	0.008 a
Microflow Sulfur 52 %	25 lbs	5.13 b	0.05 b	0.04 b	0.00 a
Permethrin	1.25 gal	12.44 a	0.02 b	0.03 b	0.00 a
Control		5.68 b	0.03 b	0.11 a	0.008 a

[z]Mean separation within columns by Duncan's multiple range test, 5% level.

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