



A GROWERS' GUIDE TO AVOCADO THRIPS MANAGEMENT 2001

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Avocado thrips, *Scirtothrips perseae*, has established itself as a significant pest of California avocados. Foreign exploration efforts have shown that *S. perseae* has a narrow geographic distribution, and is found indigenously

between Michoacan in Mexico and central Guatemala.

Avocado thrips larvae and adults build to high densities over the fall and spring on young leaves. High populations can cause premature leaf drop. The main source of economic loss results from scarring of immature fruit in spring. Scarring can be severe enough to render the entire fruit surface brown,

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A New Grower Resource

Dr. Guy Witney, CAC Production Research Manager

Welcome to the first issue of AvoResearch, a newsletter devoted to reporting the latest research results from the California Avocado Commission Production Research Program and from scientists around the world. The newsletter will also carry important issues affecting local production and profits. AvoResearch will be published bimonthly, both in printed form and on the World Wide Web.

In this first issue we have concentrated on getting you the latest information on thrips control, just in time for growers to take action before fruit damage occurs. Two of the important messages from this research program are: be sure thrips populations are controlled before the period of major fruit set and early growth when most economic damage occurs; and that excellent control can be afforded using forced-air backpack sprayers at fairly low applied spray volumes.

The Production Research Committee (PRC) is investing considerable effort in providing growers the option of going on-line to get information. In this issue, we discuss the reasons growers

may consider going to the Internet for the most up-to-date material and we suggest a few Web sites of interest.

If you are unable to access the Commission Web pages, and would rather receive AvoResearch via email notice, please contact Michelle Spelman at: mspelman@avocado.org or call 800-344-4333.

As a grower of California avocados, this is your newsletter and I would encourage you to contact me with your suggestions and comments at: gwitney@avocado.org or call 818-761-4198.

RESEARCH UPDATE

- ▶ Joe Smilanick, Dennis Margosan and Mary Lu Arpaia examined over 2100 fruit in January to determine the postharvest performance of snap harvested versus clipped fruit. Results are currently being analyzed.
- ▶ Mike Mickelbart and Bob Heath are well on the way to developing a photosynthetic model for the avocado. This model will help predict the impact of pests on production, the maximum yield of varieties and ideal growing conditions for maximum production.
- ▶ Pollination field days planned for Feb 26 (south) and Feb 27 (north). Betty Fetscher and other researchers will show the latest in pollination research and honey-bee hive evaluation.

Watch for meeting notices in the Avocado Greensheet or log onto www.avocado.org/growers for more information.

In This Issue

- Growers' guide to avocado thrips management
- Avocado thrips and their natural enemies
- Biology of avocado thrips
- Information in the information age



GUIDE TO THRIPS MANAGEMENT

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and a characteristic “alligator skin” appearance results.

Results from an economic study at the University of California, Davis showed an annual short-run loss to growers in 1998 of between \$7.6 and \$13.4 million from the combined effects of losses in quality and increased pest control costs.

AVOCADO THRIPS AND FRUIT SCARRING

Female avocado thrips oviposit (lay eggs) into young avocado fruit and leaf tissue. Subsequent feeding by the emerged larvae damages fruits and leaves. Studies indicate that females will lay eggs in fruit ranging from match head size until 3.0" in length. However, once fruit exceeds 2" in length, most avocado thrips (adults and larvae) are found on young leaves. Observations indicate that fruit 0.8-1.6" are most preferred by avocado thrips, while the majority of larvae will emerge from fruit 0.5-2.5" in length, with highest numbers emerging from fruit 1.5-1.7" in length. In the field, fruit are most susceptible to damage when fruit are 0.2-0.6" in length.

MANAGEMENT OF AVOCADO THRIPS WITH INSECTICIDES

Veratran D (sabadilla), Agri-Mek 0.15 EC (abamectin), and Success 2SC (spinosad), have been used to control avocado thrips in California. Decisions to spray should be based on thrips population monitoring. Before applying insecticides, a local pest control advisor should be consulted for current advice on how and when to use available chemicals for avocado thrips control.

► Sabadilla

A formulated bag of Veratran D is 70% sugar. Additional sugar or molasses is mixed with this product to bait thrips to feed on applied spray droplets. Sabadilla has no discernible adverse effects on natural enemies of thrips.

Several aerial trials using sabadilla at a range of rates and coverage volumes were conducted over the past two seasons. Applying sabadilla at 40 gallons per acre (gpa) on small trees and

80-125 gpa on large trees gave 6-13 days control of avocado thrips. Spraying sabadilla at more than 40 gpa on small trees and greater than 125 gpa for large trees did not improve avocado thrips control. At the above application rates, leaves received adequate coverage and the concentration of sabadilla was high enough to kill thrips after ingestion. In all trials, the spray tank pH was adjusted to 4.5, as recommended by the manufacturer.

► Abamectin

Abamectin has a conditional (Section 18) registration for use in California against avocado thrips. Permanent registration by the California Avocado Commission is being pursued. Unlike sabadilla, abamectin mixed with oil is absorbed into the leaf and has a long residual activity (>30 days).

Aerial trials using abamectin at various label rates, tree sizes, and helicopter speeds have been conducted. Generally, applying abamectin at 20 oz/acre at 50 gpa on small, medium, or large trees results in a satisfactory reduction in thrips numbers.

Field experiments with aerial applications of abamectin covering only 20-40% of the undersides of leaves indicated that avocado thrips control may take three to five weeks after spray application. This long time delay in control may explain why some growers have reported control failures with aerial abamectin applications. It is plausible that several weeks may be needed for most of the resident avocado thrips to encounter small, concentrated drops of abamectin absorbed inside leaves. Thus, when spray coverage results in small scattered droplets on leaves, populations of avocado thrips larvae and adults may take several weeks to fall.

► Spinosad

Spinosad is produced by a bacterium, *Saccharopolyspora spinosa*, under aerobic fermentation conditions. Spinosad is translocated into leaves when mixed with oil and acts on the pest's nervous system after ingestion. In March 2000, spinosad (Success) received full registration for use against avocado thrips in California.

► Comparing Spinosad to Abamectin

During the 2000 field season, we conducted three spray trials in Santa Paula

to compare treatments of abamectin versus spinosad. In Trial 1, small trees were used (three years old, seven feet in height) and the maximum rate of abamectin (20 oz/ acre) and spinosad (10 oz), both with 1% NR 415 oil, were applied using a helicopter at either 50 or 100 gpa. In this trial, all treatments were equally effective in reducing avocado thrips levels.

In Trial 2, we compared helicopter applications of spinosad (5 versus 10 oz/acre), abamectin (10 versus 20 oz/acre), and ground application of spinosad (10 oz/acre). All aerial treatments included 1% NR 415 oil and were applied at 75 gpa to trees 14-16 ft. in height. Spinosad backpack applications were made with a Pacific Stihl low volume mist sprayer (Model SR-400) applied at 10 oz/acre and a rate of 19 gpa (at this rate it took 30 seconds to apply 0.22 gallons per tree). Sprays were applied two weeks before fruit set.

In Trial 3, helicopter applications of spinosad at 10 oz/acre in 100 gpa were compared to 20 oz/acre of abamectin at 100 gpa and to backpack sprays of spinosad at 10 oz/acre applied with 53 gpa (1 gallon per tree). Treatments were applied to large trees, 18-24 ft. in height. In this trial, fruit were too large to be scarred by avocado thrips and treatment efficacy was evaluated based on impact of treatments on thrips levels on leaves.

In Trials 2 and 3 using larger trees, spinosad by backpack was the most effective material for the first 1-2 weeks after treatment. For the period 2-5 weeks after treatment, abamectin by air and spinosad by backpack were equally effective; the air spinosad treatment was less effective. Following this period, treatment efficacy could not be separated statistically.

In general, there were not large differences in comparing the efficacy of the low versus the high rate of each material. Air applications of abamectin resulted in fewer thrips feeding and less economic scarring to fruit in comparison to trees treated with spinosad by air. Aerial applications of abamectin and backpack applications of spinosad were of similar efficacy in reducing fruit scarring when applied

two weeks before major fruit set with the former being slightly better.

Because fruit are most susceptible to damage when 0.2-0.6" in length, thrips populations should be controlled before fruit reaches this size range. Consult your local pest control advisor for the best strategy for your grove.

More research is needed with both of these pesticides. In general, it appears that spinosad gives a somewhat quicker knockdown of thrips levels but abamectin is more persistent in control. Backpack sprays (using a forced air low-volume sprayer) provided a very effective alternative to aerial application.

► Insecticides and Beneficial Insects

All spinosad and abamectin applications had a limited adverse impact on natural enemies (predatory mites and thrips). This impact was short-lived and within 1-2 weeks after treatment, natural enemies had recovered to levels seen in the untreated control plots. Reductions in natural enemies may have occurred by initial direct contact with material or via ingestion of treated avocado thrips that then had a toxic effect on predators.

Labels limit the use of insecticides while bees are in the grove or during conditions when bees are working flowers. Trials are planned for 2001 to determine the best rates and timing of insecticides for thrips control with minimal impact on bees.

► Resistance Management

Rotation of sabadilla, abamectin, and spinosad in a control program may be of great benefit in delaying the development of insecticide resistance. Preliminary field data indicate that avocado thrips can develop resistance to sabadilla when this material is used repeatedly. Growers should seek the

advice of licensed pest control advisors, their county agricultural commissioner, or UC farm advisor regarding specific issues relating to pesticide treatments for avocado thrips control. Statements made in this article for avocado thrips control may not be applicable to all situations.

MANAGEMENT OF AVOCADO THRIPS WITH NATURAL ENEMIES

Several species of predacious insects eat avocado thrips in California avocado groves. These natural enemies include green lacewing larvae, and a predacious thrips called *Franklinothrips*. Predatory mites, in particular *Euseius hibisci*, have also been observed feeding on avocado thrips larvae.


Small-scale field trials releasing green lacewing larvae onto top-worked trees 10 ft. in height with 12 avocado thrips larvae/leaf at a low (325 lacewing larvae/tree) and high release rate (5,045 lacewing larvae/tree) did not provide significant control of avocado thrips. However, in this trial lacewing larvae were used only when thrips populations were high and adequate thrips control over a six-week period may have been an unrealistic expectation. An alternative approach could be to use lacewing larvae early in the season and allow them to increase in density in response to increasing avocado thrips numbers.

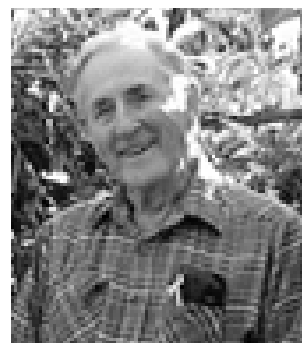
Laboratory work on *Franklinothrips* has identified the optimal temperatures, diets, and harvesting techniques for mass rearing this predator. These technologies are being transferred to California insectaries and it is hoped that trials with inoculative releases of *Franklinothrips* will be conducted in 2001.

FOR MORE HELP

For further information on biological control and research on avocado thrips, visit the Web site: www.bicontrol.ucr.edu.

ACKNOWLEDGMENTS

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Art Schroeder

The avocado industry lost a great friend on Monday, January 15 when UCLA Professor Emeritus, Charles A. Schroeder (Art), passed away at the age of 87. Art spent his career conducting research on avocados, cherimoya and many other subtropicals as well as working on topics such as flower development, fruit growth, tissue culture and germplasm preservation. Early in his career, Art headed up the avocado breeding program before the program was transferred to UCR. He remained active even after retirement and was a common participant at industry avocado meetings throughout Southern California. His interest in on-going research was inspiring to those who work on subtropicals. Even in his last months, he remained active in offering suggestions for on-going research projects. Those who knew him will sorely miss his presence.

Mary Lu Arpaia
Extension Subtropical Horticulturist

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AVOCADO THRIPS AND THEIR NATURAL ENEMIES



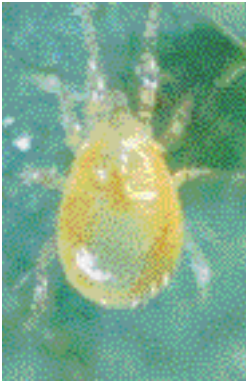
Avocado thrips,
Scirtothrips perseae



An adult female
Frankliniothrips n. sp.



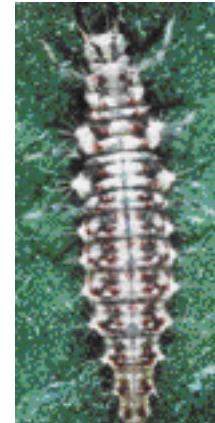
A larval
Frankliniothrips n. sp.



The predatory mite
Euseius hibisci



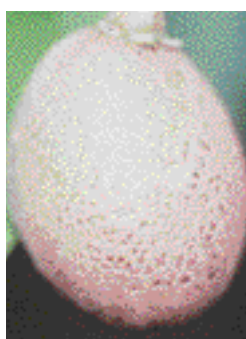
A minute pirate bug,
Orius sp.



A predatory green
lacewing larva



Elongate scars on large avocados
result from partial feeding damage to
young fruit by avocado thrips



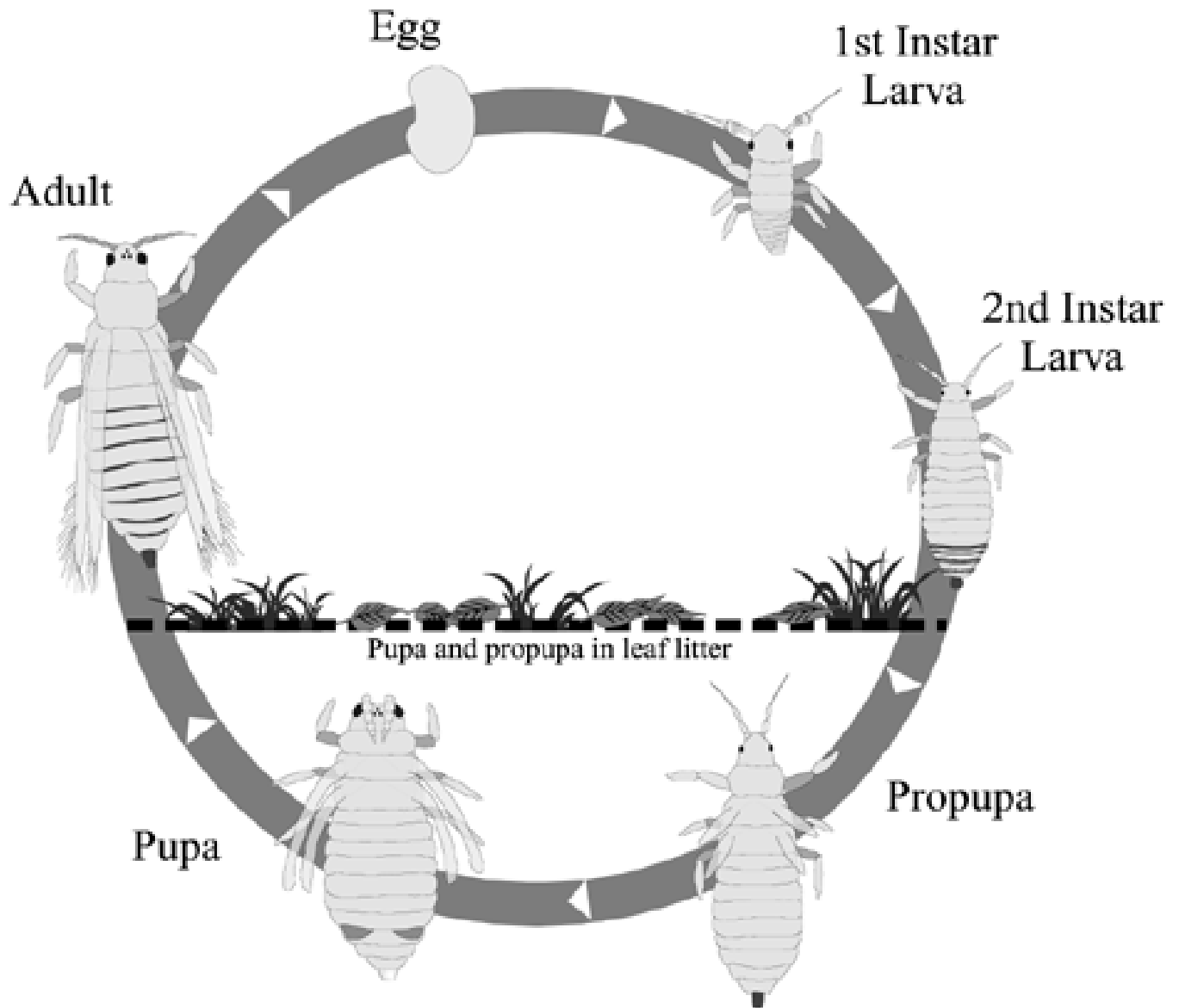
Alligator skin on immature
fruit caused by avocado
thrips feeding



Avocado Thrips

(*Scirtothrips perseae* Nakahara [Thysanoptera: Thripidae])

Life Cycle



BIOLOGY OF AVOCADO THRIPS

Avocado thrips has six distinct life stages. Females lay eggs inside young leaves or fruit. Two larval stages subsequently develop and feed on young leaves or fruit. The two pupal stages are non-feeding and complete pupation development either in cracks or trees or in leaf duff below trees. Adults, which emerge from the pupal stage, feed on leaves and fruit, and can fly.

Laboratory studies have indicated that avocado thrips larvae and adults exhibit highest survivorship, longevity and fecundity at moderately cool temperatures (67-76°F). Moderately hot temperatures (86°F) cause high larval mortality and reduced adult longevity.

Information In The Information Age

The California Avocado Commission Production Research Committee (PRC) recently committed to using the World Wide Web as a vehicle to post important information for growers. While this will mirror most printed material available to growers, it will provide an easy "paperless" alternative to those who have access to the Internet. This will not only include the latest research results from the PRC research program and from around the globe, but also general cultural information, meeting notices and important issue pieces. Access will be through the California Avocado Commission's homepage at: <http://www.avocado.org>.

It has been estimated that less than 30% of growers use the Internet as a source of cultural information. However, the main reason for this low receptivity has likely been the lack of useful information available on-line. Using the Web as a clearinghouse for grower information has many

advantages. It provides growers with an easily accessible virtual filing cabinet full of organized information when it is needed. Also, instant updates can be posted as information changes and material can be printed out if needed.

At this point the California Avocado Commission Web site offers several really useful features for growers. For example: growers can access reports in the Greensheet, AvoResearch, the proceedings of the 2000 CAC Research Symposium, and the proceedings of the 1999 Avocado Brainstorming meeting. There is a wealth of other resources including an irrigation calculator for local avocado groves.

Below we list some useful links for avocado growers (and this is by no means complete):

To search for information on any topic try:

<http://dir.yahoo.com/Science/Agriculture/>

<http://www.google.com/>

<http://www.altavista.com/>

<http://www.metacrawler.com/>

For fruit growers' information try:

<http://fruitsandnuts.ucdavis.edu/>
UC Fruit and Nut Information Center

<http://www.ifas.ufl.edu/>
The University of Florida, Institute of Food and Agricultural Sciences


<http://www.hortresearch.co.nz/>
HortResearch, New Zealand

<http://www.tfrec.wsu.edu/links.html>
The Washington State University Tree Fruit Research and Extension Center

<http://www.crfg.org/>
California Rare Fruit Growers

<http://www.nass.usda.gov/>
USDA National Agricultural Statistics Service

<http://www.ucavo.ucr.edu/>
UC Riverside avocado information pages

<http://www.citrusresearch.com/>
CA Citrus Research Board and back issues of Subtropical Fruit News 

Subscription queries should be addressed to:

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