



How to Manage Pests

UC Pest Management Guidelines

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Avocado

Avocado Thrips

Scientific name: *Scirtothrips perseae*

(Reviewed 1/07, updated 2/14)

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DESCRIPTION OF THE PEST

[Avocado thrips](#) (order Thysanoptera) is a key pest that scars fruit. Adults lay eggs hidden inside the underside of leaves, in young fruit, and in fruit petioles. The thrips then develop through two larval and two pupal stages. The first instar is white to pale yellow. The second instar is larger, more robust, and bright yellow. Larvae are typically found along major veins on the underside of younger leaves and anywhere on the surface of young fruit. Although some pupation occurs on the tree in cracks and in crevices, about three-fourths of avocado thrips drop from trees to pupate in the upper layer of dry, undecomposed leaf litter. Pupae are rarely seen and they do not feed. Adults are 0.03 inch (0.7 mm) long and have fringed-tipped wings. Adults are orange-yellow with distinct thin brown bands between segments of their abdomen and three small red dots (ocelli) on top of the head.

Neohydatothrips burungae, a new species of unknown importance, closely resembles avocado thrips, and may reliably be distinguished only by an expert. *Neohydatothrips burungae* often is darker brownish and has bands only on upper side of its abdomen. Adult avocado thrips can closely resemble citrus thrips and to a lesser degree, western flower thrips, which occur on, but do not damage, avocado. Citrus thrips has no abdominal bands on its light orangish yellow to white body. Western flower thrips color is highly variable and some individuals have abdominal banding. Western flower thrips are most often found in flowers. Western flower thrips adults have thick, bristlelike hairs at the tip of the abdomen, which the other species lack. When at rest, avocado thrips' wing tips extend beyond its abdomen, while the abdomen of western flower thrips extends beyond the tips of its wings. Avocado thrips larvae resemble those of several other species, including certain beneficial predaceous thrips. [Predatory thrips](#) are seldom seen at high levels as can be common with avocado thrips larvae.

Avocado thrips develops well under cool temperatures. Populations typically begin increasing in late winter and spring, when avocado thrips feed on young leaves. Abundance peaks in late spring and early summer, when most fruit are young and after the growth flush when hardening of leaves induces thrips to move from foliage to feed on young fruit. Populations are suppressed by warm, dry conditions, but this weather usually occurs later in the season, when most fruit are larger and no longer susceptible to new damage.

Avocado thrips has 6 or more generations a year. Egg to adult development occurs in about 20 to 30 days when temperatures average 65° to 75°F. Actual development time can be predicted by monitoring temperature using degree-days.

DAMAGE

Although it has little effect on tree health, avocado thrips feed directly on immature fruit. Internal fruit quality is not affected, but obvious feeding scars cause severe downgrading or culling of damaged fruit. Severe scarring when fruit are young can slow or stunt fruit growth. As fruit grow, this early feeding becomes apparent as scabby or leathery brown scars that expand across the skin. Thrips scarring is sometimes called "alligator skin." Mechanical injury or abrasion, such as from strong winds, also causes [fruit scarring](#) that can be confused with injury from thrips.

Avocado thrips prefer to feed and lay eggs in succulent leaves. Feeding on young leaves causes irregular bronzing or scarring on both sides of the leaf. Discoloration is typically concentrated along the midrib and lateral leaf veins, and then

appears in scattered patches between veins as populations increase. Foliar feeding is usually unimportant, except when very high populations cause premature leaf drop.

Thrips move to young fruit when leaves harden after the growth flush has finished. Almost all damage occurs when fruit are 0.2 to 0.6 inches (5–15 mm) long. Although Hass fruit are susceptible to feeding until they reach about 2 inches, thrips feeding rarely causes scars on fruit larger than about 0.75 inches. This scarring on young fruit may not become obvious until fruit enlarge.

MANAGEMENT

Importation of new species of natural enemies and modifications of cultural practices are being investigated for controlling avocado thrips. If insecticides are applied, choose selective materials whenever possible to minimize adverse impacts on the natural enemies that usually provide good control of other avocado pests, including caterpillars, certain mites, scales, whiteflies, and other thrips.

Biological Control

Natural enemies may suppress avocado thrips, but sometimes do not reduce populations below damaging levels. Predatory thrips are the most important natural enemies, especially *Franklinothrips orizabensis*. At mild temperatures, about 77°F, *F. orizabensis* populations can increase readily if avocado thrips populations are increasing. This predator also eats other thrips, mites, and whiteflies, and feeds on avocado pollen and leaf juices. The adult *F. orizabensis* is mostly black with white or pale bands on its body, especially near its thin waist. Females lay eggs into plant tissue. Immatures develop through two larval and two pupal stages. First instars are yellowish with relatively long legs. Second instars have a distinctly swollen, bright orangish or red abdominal area. Pupation occurs in a silken cocoon.

Franklinothrips vespiformis, black hunter thrips (*Leptothrips mali*), and several banded-wing thrips (*Aeolothrips* spp.) also feed on avocado thrips, other pest thrips, and mites. Banded-wing thrips supplement their diet with pollen and plant juice, and can complete their life cycle and persist even when their prey are uncommon. Other general predators (especially green lacewings) and at least one parasitoid (*Ceranisus menes*) also attack avocado thrips.

Cultural Control

Avocado thrips damage is affected by practices that increase or decrease the abundance of succulent foliage during set and growth of young fruit. Modifying fertilization (amount, application method, formulation, and timing) and pruning (the extent and time of branch removal) alters the extent to which trees continue to produce tender foliage during about May and June. Research indicates that in comparison with pruning during February through April, pruning during January does not affect yield. January pruning may also induce additional growth flush during fruit set, which may reduce thrips tendency to move from hardening leaves to young fruit.

Adding coarse organic mulch beneath trees and maintaining a mulch layer 6 inches thick may reduce survival of avocado thrips that drop from trees to pupate. The effectiveness of mulching to control thrips is uncertain and labor costs of adding mulch may not be justified solely for thrips control. However, applying coarse organic material such as composted yard waste beneath trees helps control *Phytophthora* root rot and weeds, and thrips reduction might be an additional benefit.

Organically Acceptable Methods

Biological and cultural controls along with sprays of the Entrust formulation of spinosad are acceptable for use in an organically certified crop.

Monitoring and Treatment Decisions

Adults and second instars can be found anywhere on fruit or leaves, including on the upper leaf surface. Avocado thrips most often occur on the underside of tender, reddish foliage before or soon after leaves reach full expansion. Examine newly flushed leaves during February and March to get an indication of whether thrips are abundant enough to be a likely problem later when young fruit occur.

Monitor regularly every 7 to 10 days beginning as early as April, looking for both mites and thrips. Begin regular thrips monitoring before young fruit are present and continue monitoring until most fruit exceed 0.75 inch in diameter. Look for thrips on 10 young leaves on at least 10 trees per grove. Use a magnifying lens to inspect the underside of these leaves and count the number seen. (Avoid leaves that are fully hardened and dark green, that touch fruit or other leaves, or are very close to flowers and fruit. Thrips on hardened leaves, touching leaves and fruit, and in flowers are often other species.) Calculate the average number of thrips per leaf: divide the total number of thrips counted by the number of leaves sampled (100). Young fruit can be monitored by clipping or pinching stems and examining the entire fruit surface for thrips, especially under the calyx. Be sure to correctly identify the thrips present, and record the results on a [monitoring form](#) (PDF).

Depending on thrips densities, treatment decisions are sometimes made based on thrips abundance on succulent leaves. A treatment decision generally should be made before most new fruit are set or before most thrips move from leaves to

young fruit. Before making a treatment decision, consider factors that influence the likelihood of thrips damage. These include thrips damage history, natural enemy abundance, weather, fruit load, and age or size of fruit. If extensive leaf flush continues through fruit set, treatment need may be reduced because more of the thrips population will remain on tender foliage. Conversely, little or no succulent foliage during fruit set increases the extent to which thrips will feed on and damage young fruit. Treatment decision-making is also influenced by grower tolerance for scarring, treatment feasibility and equipment availability, and the possibility that treatments will disrupt natural enemies or promote the development of pesticide resistance. A general guideline is that an average of three to five thrips per leaf at fruit set warrants treatment.

Coordinate treatment decision-making with any persea mite management. Certain materials applied to control avocado thrips (usually earlier in the season) can reduce the need for persea mite treatment (which usually is applied later in the season). Only one application per season may be permitted or recommended for certain materials (e.g., abamectin) to reduce the development of pesticide resistance. Rotate among chemical classes when making multiple applications to reduce the development of pesticide resistance.

Common name (example trade name)	Amount to use	R.E.I.‡ (hours)	P.H.I.‡ (days)
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When choosing a pesticide, consider information relating to the impact on natural enemies and honey bees and environmental impact. Not all registered pesticides are listed. Always read label of product being used.

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|--|-------------|-----------|-----------|
| A. ABAMECTIN*
(Agri-Mek 0.15 EC and others) | Label rates | 12 | 14 |
| MODE-OF-ACTION GROUP NUMBER ¹ : 6
. . . plus . . . | | | |
| NARROW RANGE OIL
(415) | 1% | See label | See label |
| MODE OF ACTION: Improves translaminar movement and persistence of insecticide.
COMMENTS: Use with 1-2% narrow range (415) oil in a minimum of 50 gal water/acre for aerial applications and 100 gal water/acre for ground applications. On large trees aerial applications may require larger volumes of water to achieve desired efficacy. Control may last 4 or more weeks. Only use in an alkaline or slightly acidic solution. Do not tank mix with nutrients. To avoid promoting pesticide resistance, do not make more than one application of any abamectin product every 2 years. | | | |
| B. SPINETORAM
(Delegate) WG | 4–7 oz | 4 | 1 |
| MODE-OF-ACTION GROUP NUMBER ¹ : 5
. . . plus . . . | | | |
| NARROW RANGE OIL
(415) | 1% | See label | See label |
| MODE OF ACTION: Improves translaminar movement and persistence of insecticide.
COMMENTS: To delay resistance, do not apply spinetoram more than once per year. Trials against avocado thrips have shown that spinetoram provides more persistent control than spinosad. Choose a lower rate for light infestations and/or small trees and a higher rate for heavy infestations and/or large trees. Toxic against some natural enemies (e.g., <i>Franklinothrips orizabensis</i> predatory thrips) when sprayed and for 8-24 hours after. The short residual persistence of this pesticide, however, allows most populations of natural enemies to survive quite well. Apply in a minimum of 50 gal water/acre. On larger trees, aerial applications may require larger volumes of water to achieve desired efficacy. Control may last 3 or more weeks. Only use in an alkaline or slightly acidic solution. Do not tank mix with nutrients. | | | |
| C. SPIROTETRAMAT
(Movento) | 8–10 fl oz | 24 | 1 |
| MODE-OF-ACTION GROUP NUMBER ¹ : 23
COMMENTS: Spirotetramat is in the same chemistry class as the miticide spiroidiclofen (Envidor). We are still learning how to best time the application of spirotetramat but the presence of young leaves or bloom appear to greatly assist in plant uptake and conversion in the plant to the active form (spirotetramat enol), which is highly systemic. Plant uptake is also improved by the addition of oil (e.g., 1% narrow range oil NR-415) or a surfactant. | | | |

- D. FENPROPATHRIN*
(Danitol) 2.4 EC 16–21.33 fl oz 24 1
MODE-OF-ACTION GROUP NUMBER¹: 3
COMMENTS: Fenpropathrin is a contact miticide (not translaminar or systemic). There is no evidence that the addition of oil improves efficacy. Very effective against both avocado thrips and perseas mite. Limit use to once every 3 years to reduce the rate that pyrethroid resistance evolves. Because of past worker exposure concerns, do not add more than 1% oil to fenpropathrin applications and within 7 days of application, any workers that re-enter the orchard should wear coveralls, chemical resistant gloves, socks plus shoes, face protection, and protective eyewear.
- E. SABADILLA
(Veratran-D)# 10–15 lb PLUS up to 10 lb sugar-based spray 24 Do not apply at
adjuvant in 50-200 gal water harvest
MODE OF ACTION: Stomach poison
COMMENTS: Must be ingested to be effective. Thrips feed more actively and are killed to a greater degree in warm weather. Acidify water in the spray tank to a pH of 4.5 before adding sabadilla; use a registered citric acid adjuvant or other approved acidifying agents. Re-treat when thrips populations reappear, usually every 2-3 weeks or so. Resistance to sabadilla has been detected in some avocado thrips populations.
- F. SPINOSAD
(Entrust SC)# 4–10 fl oz 4 1
(Success) 5–10 fl oz 4 1
MODE-OF-ACTION GROUP NUMBER¹: 5
. . . PLUS . . .
NARROW RANGE OIL
(415) 1% See label See label
MODE OF ACTION: Improves translaminar movement and persistence of insecticide.
COMMENTS: To delay resistance, do not apply spinosad more than twice per year; apply only once per year if spinetoram is used. Trials against avocado thrips have shown that spinetoram provides more persistent control than spinosad. Choose a lower rate for light infestations and/or small trees and a higher rate for heavy infestations and/or large trees. Toxic against some natural enemies (e.g., *Franklinothrips orizabensis* predatory thrips) when sprayed and for 8-24 hours after. The short residual persistence of this pesticide, however, allows most populations of natural enemies to survive quite well. When applying to organically grown produce, be sure that the oil used is also organically acceptable. Apply in a minimum of 50 gal water/acre. On larger trees, aerial applications may require larger volumes of water to achieve desired efficacy. Control may last 3 or more weeks. Only use in an alkaline or slightly acidic solution. Do not tank mix with nutrients.
- ‡ Restricted entry interval (R.E.I.) is the number of hours (unless otherwise noted) from treatment until the treated area can be safely entered without protective clothing. Preharvest interval (P.H.I.) is the number of days from treatment to harvest. In some cases the REI exceeds the PHI. The longer of two intervals is the minimum time that must elapse before harvest.
- # Acceptable for use on organically grown produce.
- 1 Rotate chemicals with a different mode-of-action Group number, and do not use products with the same mode-of-action Group number more than twice per season to help prevent the development of resistance. For example, the organophosphates have a Group number of 1B; chemicals with a 1B Group number should be alternated with chemicals that have a Group number other than 1B. Mode-of-action group numbers are assigned by IRAC (Insecticide Resistance Action Committee). For additional information, see their Web site at <http://www.irc-online.org/>.

IMPORTANT LINKS

- [Photos of causes of fruit damage](#)
- [Photos of predatory thrips](#) (natural enemies)
- [Avocado thrips density example monitoring form](#) (PDF)

Precautions

PUBLICATION



UC IPM Pest Management Guidelines: Avocado
UC ANR Publication 3436

Invertebrates

- B. A. Faber, UC Cooperative Extension, Santa Barbara/Ventura counties
J. G. Morse, Entomology, UC Riverside

M. S. Hoddle, Entomology, UC Riverside

Acknowledgment for contributions to Invertebrates:

P. A. Phillips, UC IPM Program, UC Cooperative Extension, Ventura County

M. Blua, Entomology, UC Riverside

P. Oevinger, UC Cooperative Extension, Ventura County

D. Machlitt, Consulting Entomology Services, Moorpark, CA

T. Roberts, Integrated Consulting Entomology, Ventura, CA

B. B. Westerdahl, Nematology, UC Davis

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