



Insect Management in Avocados¹

Jorge Pena² and Freddie Johnson³



Suggested Control Program

Because of variations in the development of harmful insect infestations, it is necessary to determine if and when pesticidal treatments are needed. It is not only unnecessary but wasteful or even harmful on occasions to apply insecticides unless they are needed.



1. December, January, February --
 - Control avocado red mites if needed.
 - Cut out and destroy larvae of the avocado tree girdler.
2. January, February, March --
 - Control bloom infesting insects, mirids, caterpillars if needed.
3. May, June, July --
 - Cut out and destroy larvae of the avocado tree girdler.
 - Control scale insects, mealybugs or insect infestation on fruit if needed.
4. August, September, October --
 - Control greenhouse thrips if needed.
 - Control fruit scarring caterpillars if needed.

List of Insecticides Registered for Use on Avocado

NOTE: The following insecticides are listed by the EPA as being cleared for use on avocados (see Table 1 for details on use):

- *Bacillus thuringiensis* (Biobit, Cutlass, Dipel, Javelin, Vault, XenTari)
- carbaryl (Sevin)
- lindane
- malathion (Cythion)
- metaldehyde (slugs and snails)
- methomyl (Lannate)
- permethrin (Ambush, Pounce)
- pyrethrins + rotenone (Pyrellin)
- oils (Sun Spray, Volck oil)
- rotenone (Rotacide)
- soap, insecticidal (M-Pede)
- sulfur (Thiolux, SuperSul)
- diatomaceous earth + pyrethrin + pbo (Diatect Organic Plus)

These materials are sold under numerous trade names. The individual labels often differ from each

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 2. Jorge Pena, professor, Entomology and Nematology Department, Tropical Research and Education Center, Institute of Food and Agricultural Sciences, University of Florida, Homestead, 33031.
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- Freddie Johnson, professor/district director, Office of District Directors, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

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other. Labels for some of these pesticides were not available at the time of printing. In order to find the individual label that has specific directions for your use, contact the local County Agricultural Extension (agent's) office or local agricultural supply dealers.

Under the FIFRA amendment of 1978 the grower may use a material (insecticide) that is legal and EPA approved for a pest on a crop for other non-listed pests as long as the user follows the label directions and rates for the approved pest.

Precautions and Restrictions

Lannate and Nudrin are especially toxic and are not recommended for dooryard avocado trees. **Lannate should be also handled with great caution.** They should be used only by trained and properly equipped operators. Oil emulsion sprays may injure trees if applied during a very cold, dry period or a hot (90°F) period. Do not mix sulfur with oil emulsion, or apply either material within 3 weeks of the other.

Do not apply malathion within 7 days of harvest. Do not apply Lannate or Nudrin within 7 days of harvest. There is no required waiting period for oil emulsion or sulfur.

General Information on Pests

Avocado Tree Girdlers

The adult is a snout beetle. Small trees up to 6 inches in diameter at the ground level are most susceptible. Reddish colored frass is extruded by the larvae from the feeding burrows and is observed near the ground level.

Control. Two or more annual examinations of the tree bases for frass is recommended. Remove the larvae and paint the wounds with a good tree wound paint.

Caterpillars

Several kinds of caterpillars may infest avocado bloom, clusters and leaves. One is a web-spinning caterpillar that feeds on buds, blooms and leaves. An outstanding characteristic of infestation is masses of bloom webbed together.

Secondly, there are several loopers that feed on avocado leaves in Florida. The most common of these is *Epimeces detexta*. This looper is the larva of a medium-sized grey or greyish-white moth. Young larvae are ¼ inch or less in size and usually grey or greyish black, they grow rapidly to 1½ inches or more in length. Older larvae are generally tan or greenish-yellow in color. Larvae feed also on flower panicles, and even fruit, but prefer the tender growth in the upper part of the tree. Looper infestations appear to be somewhat seasonal and are more severe in spring and summer, generally becoming less of a problem in fall and winter.

Life Cycle. The adult moth is short lived and mates and oviposits soon after emergence from pupa. Eggs are laid in narrow elongated masses preferentially on needles of Australian pine (*Casuarina* sp.) And they hatch in about 5 days. The larvae grow rapidly and pupate 17-22 days after egg hatch. The pupal stage can last 10 days. Thus a full generation is expected to last between 34-37 days. Pupae drop to the ground and the adult emerges in 12 days to start the cycle over. Some avocados are culled because of damage from feeding on the fruit by two or three kinds of small caterpillars.

Control. Apply malathion. Lannate 90 WP, Lannate 1.8 L liquid have been cleared for Avocado Leafroller, Avocado Looper, and omnivorous leafroller. Pyrellin (pyrethrins + rotenone) is legal for use against caterpillars. The WP is applied at 1/2 - 1 lb 90% powder/acre. The liquid 1.8 is applied at 2-4 pints per acre.

Bacillus thuringiensis (B.t.s) is sold under several trade names and has effect on certain types of caterpillars. The grower should discuss labels and specific recommendations with the local pesticide dealers.

Permethrin (Pounce 3.2 EC and Ambush 2 EC) is cleared for use on avocados. See label for specific instructions.

Mirids

A number of species of small sucking insects known as mirids (*Dagbertus fasciatus*, *D. Olivaceous*, *Rhinacloa* sp.) feed and insert their eggs on opening buds, leaves, flowers and small fruit.

Attacks seem to affect especially flowers and recently set fruit causing them to drop. Wounds on fruit may serve as a point of entry for decay organisms. These insects are comparatively small, about 1/8 inch in length, and their nymphs can pass through several instars during which time the size increases greatly. Color patterns change from a variety of green and brown.

Mirids usually appear during bloom and early fruit setting stage. It is suggested that weeds and grass in and around the grove be mowed as closely as practicable in order to reduce harboring places for mirids. Mirid populations are most common from January through April, when avocado flowers are fully open.

Control. Malathion should be the material that can be used on avocados that most likely will have controlling effects on mirids. Spray applications during flowering should be made in later afternoon to reduce losses of honey bees.

Scales

Several kinds of scales, including latania, pyriform, Florida red, dictyospermum and Florida wax, may infest avocado. Check for scales and, if needed, apply control measures during May, June or July.

Control. Apply one of the following in 100 gallons of water: (1) 4-5 quarts of 90-92 percent oil emulsion concentrate (2) 1 1/2 pints of malathion 5 liquid; (3) 3 quarts of 90-92 percent oil concentrate plus 1 pint of malathion 5 liquid; (4) 2.5 fl oz per gallon of insecticidal soap (Safer). Permethrin (Pounce) scale crawlers - use 8 oz of 3.2 EC per acre.

Spider Mites

Oligonychus yothersi (McGregor)

The avocado red mite is a common pest of avocados in Florida. Feeding is first confined to the upper surface of avocado leaves; it is found first along the midrib, then along secondary leaf veins. The areas along the veins become reddish-brown. During heavy infestations leaves can be covered with mite's cast skins. Damage to the leaf area is regularly observed from October through February, causing up to 30% reduction of photosynthetic activity of the leaves. Leaves affected by this mite regularly drop earlier (45-

60 days after infestation) than those leaves that have not been infested. This mite is an occasional pest in some orchards and is seldom observed in others. Periodic inspections are recommended during December, January and February. Control measures may be started when the population reaches 6 or more mites per leaf.

Life Cycle. The eggs are spherical and stalked. Adults have a pinkish color, with their middle area covered by many purplish-brown blotches. The duration of the life stages varies from 14 to 15 days. Females are capable of laying 40 to 50 eggs during their life span.

Control. Few miticides are registered for use on avocados when fruit is present. Apply sulfur dust or spray with sulfur using 10 pounds of wettable sulfur per 100 gallons of water, or use oil emulsion sprays made by mixing 3 quarts of 90-92 percent oil concentrate per 100 gallons of water and apply thoroughly. Also see instructions on labels for various brands of oil. Pyrellin (pyrethrins + rotenone) is registered at 1 - 2 pts/A.

Thrips

Red-banded thrips feed on leaves and fruit. Infested leaves are spotted on the upper surface with dark reddish brown fecal pellets. Heavy feeding on fruit causes a russeted appearance, cracking and decay. Greenhouse thrips damage fruit and tend to feed on the larger and more mature fruit. They are found most frequently where two fruits are in contact or where a leaf contacts the fruit. Fruits are damaged by slight russetting, then by cracks followed by decay.

Control. Make observations on leaves and fruit for red-banded thrips during summer and fall for any developing infestation. Frequent inspections of fruit are recommended for greenhouse thrips beginning in early August and continuing until fruit harvest. The following materials are labelled for use against thrips: malathion (various labels), permethrin (Pounce, Ambush), pyrethrins + rotenone (Pyrellin).

Avocado Bud Mite

Tegolophus perseiflorae (K.)

The avocado bud mite is regularly found on buds but also feeding on developing fruit. The mites cause

necrotic spots, subcircular, irregular openings on apical leaves. Feeding by this mite may cause fruit deformation and discoloration. The adult avocado bud mite has a yellowish appearance. Its life cycle has not been determined. Avocado bud mite populations begin to increase from March to May.

Avocado Lace Bug *Pseudacysta perseae*

The avocado lace bug was considered a minor pest of avocados until severe outbreaks were observed during the 90s. The adults are oblong shaped, brownish with numerous small “lace like cells” in the thorax and wings; they are observed on the leaf underside, where they feed, extracting juices from the plant. They usually live in colonies, depositing eggs in irregular rows in clusters on the lower leaf surface. The eggs are covered with a dark, sticky secretion from the adults. The extraction of juices from the foliage causes a gradual localized destruction of the plant cells. The resulting chlorotic areas will become brown and they are an

indication of the presence of the lace bugs. Lace bugs begin a steady build-up in January and March.

Ambrosia Beetles

Ambrosia beetles, *Xylosandrus* sp., burrow into three trunks, stems and branches. Infested trees are regularly stressed before the attack, but frequently the trees appear to be healthy and vigorous. Fungi accompany the beetles and develop mycelia in tree tissues, which constricts branches and trees. As a result the portion of the tree terminal to the burrow entrance usually dies. White crystals of sap about the burrow entrances are evidence of infestation.

Beetles are brownish to almost black and small, about 1/50 inch in diameter and 1/20 inch long. Eggs and beetle larvae are white and found in the galleries. Larvae feed on the mycelia of “ambrosia” fungi growing in the galleries.

Table 1. Control of Specific Pests in Avocado.

Insecticide	Formulation	Rate/Acre	Days to Harvest
AMORBIA MOTHS			
<i>Bacillus thuringiensis</i> (Biobit, Dipel, Javelin, Vault, XenTari)	See labels	---	0
APHIDS			
pyrethrins + rotenone (Pyrellin)	EC	1 - 2 pts	0
rotenone (Rotacide)	EC	1 gal	0
soap, insecticidal (M-Pede)	49% EC	See label for instructions	
AVOCADO LACE BUGS			
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
AVOCADO LEAFHOPPERS			
oil, insecticide	98.8%	1 - 2 gal	see label for use
permethrin: Ambush	2 EC	12.8 oz	7 - read label
Pounce	3.2 EC	8 oz	for further instructions
pyrethrins + rotenone (Pyrellin)	EC	1 - 2 pts	0
rotenone (Rotacide)	EC	1 gal	0

Table 1. Control of Specific Pests in Avocado.

Insecticide	Formulation	Rate/Acre	Days to Harvest
AVOCADO LEAFROLLERS			
methomyl (Lannate, LV)	2.4 L	1.5 - 3 pts	1
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
AVOCADO LOOPERS			
<i>Bacillus thuringiensis</i> (Biobit, Dipel, Javelin)	See label	---	---
methomyl (Lannate, LV)	2.4 L	1.5 - 3 pts	1
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
AVOCADO TREE GIRDLEERS			
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
BANDED CUCUMBER BEETLES			
rotenone (Rotacide)	EC	1 gal	0
CATERPILLARS			
pyrethrin + rotenone	EC	1 - 2 pts	0
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
DICTYOSPERMUM SCALES See also: Scales			
rotenone (Rotacide)	EC	1 gal	0
soap, insecticidal (M-Pede)	See label for specific directions		
FLORIDA RED SCALES See also: Scales			
rotenone (Rotacide)	EC	1 gal	0
soap, insecticidal (M-Pede)	See label for specific directions		
FLORIDA WAX SCALES See also: Scales			
rotenone (Rotacide)	EC	1 gal	0
soap, insecticidal (M-Pede)	See label for specific directions		
GRASSHOPPERS			
rotenone (Rotacide)	EC	1 gal	0
GREENHOUSE THRIPS			
malathion (Cythion)	5 EC	7½ pt/A 1½ pt/100 gal water	7
permethrin (Ambush)	2 EC	12.8 oz	7 - read label
pyrethrins + rotenone (Pyrellin)	EC	1 - 2 pts	0
rotenone (Rotacide)	EC	1 gal	0
LANTANA SCALES			
malathion (Cythion)	5 EC	7½ pt/A 1½ pt/100 gal water	7
rotenone (Rotacide)	EC	1 gal	0

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Insecticide	Formulation	Rate/Acre	Days to Harvest
soap, insecticidal (M-Pede)	See label for specific directions		
LEPIDOPTEROUS LARVAE			
permethrin (Ambush)	2 EC	12.8 oz/100 gal water	7 - read label
LITTLE FIRE ANTS			
rotenone (Rotacide)	EC	1 gal	0
MIRIDS			
permethrin (Ambush)	2 EC	12.8 oz	7 - read label
(Pounce)	3.2 EC	8 oz	
OMNIVOROUS LEAFROLLERS See also: Caterpillars			
<i>Bacillus thuringiensis</i> (Biobit, Dipel, Javelin)	See labels	---	0
methomyl (Lannate, LV)	2.4 L	1.5 - 3 pts	1
OMNIVOROUS LOOPERS See also: Caterpillars			
<i>Bacillus thuringiensis</i> (Biobit, Dipel, Javelin)	See labels	---	0
malathion (Cythion)	5 EC	7½ pt/A 1½ pt/100 gal water	7
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
ORANGE TORTRIX See also: Caterpillars			
<i>Bacillus thuringiensis</i> (Dipel, Javelin)	See labels	---	0
malathion (Cythion)	5 EC	7½ pt/A 1½ pt/100 gal water	7
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
PYRIFORM SCALES			
rotenone (Rotacide)	EC	1 gal	0
soap, insecticidal (M-Pede)	See label for specific directions		
RED-BANDED THRIPS			
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
(Ambush)	2 EC	12.8 oz	
pyrethrins + rotenone (Pyrellin)	EC	1 - 2 pts	0
rotenone (Rotacide)	EC	1 gal	0
SOFT BROWN SCALES OR BROWN SOFT SCALES			
malathion (Cythion)	5 EC	7½ pt/A 1½ pt/100 gal water	7
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
rotenone (Rotacide)	EC	1 gal	0

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Insecticide	Formulation	Rate/Acre	Days to Harvest
soap, insecticidal (M-Pede)	See label for specific directions		
SPAN WORMS			
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
SLUGS AND SNAILS			
metaldehyde	4% bait	37½ lbs/A	broadcast
TORTRICIDS			
<i>Bacillus thuringiensis</i> (Dipel, Javelin)	See labels	---	0
TWIG BORERS			
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
WEBBING WORMS See also: Caterpillars			
<i>Bacillus thuringiensis</i> (Dipel, Javelin)	See labels	---	0
rotenone (Rotacide)	EC	1 gal	0
WHITEFLIES			
permethrin (Pounce)	3.2 EC	8 oz	7 - read label
pyrethrins + rotenone (Pyrellin)	EC	1 - 2 pts	0
<ul style="list-style-type: none"> • Diatect Organic Plus - a premix composed of silicon dioxide (diatomaceous earth + pyrethrin + piperonyl butoxide) labeled on avocados for aphids, caterpillars, fruit flies, leafhoppers, mites, stink bugs, thrips, weevils, and white flies. See labels for specific instructions. Signal word - Caution. Re-entry - 12 hours. • Petroleum Oil (Saf-T-Side, OmniSupreme) is labeled on avocados for leafhoppers, scales, and thrips. • Fenoxycarb (Logic) - labeled for fire ants on nonbearing trees. 			