

AVOCADO LACE BUG

Integrated Pest Management for Home Gardeners and Landscape Professionals

The avocado lace bug (*Pseudacysta perseae*, family Tingidae) occurs in the Caribbean, French Guyana, Mexico, and southeastern United States. As of 2006, in California it occurs only in San Diego County. Also known as the camphor lace bug, this pest feeds on certain plants in the family Lauraceae. Hosts are the avocado fruit tree (*Persea americana*), other *Persea* species such as red bay (*P. borbonia*), and camphor tree (*Cinnamomum camphora*), which is grown as a landscape ornamental and commercially for its aromatic extracts.

IDENTIFICATION

Adult lace bugs have an elaborately sculptured thorax and forewings that form an expanded cover over their body (Fig. 1). The adult thorax and forewings have tiny clear cells that form a lacelike covering, hence the name "lace bugs." Adults are about $1/12$ inch (2 mm) long, oval-shaped insects with a dark (black or brownish) head

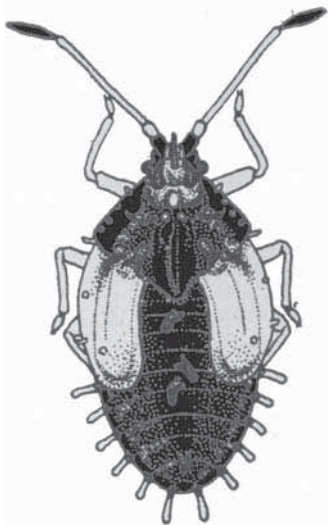


Figure 2. Last-instar nymph avocado lace bug.

and thorax. Their abdomen, antennae, legs, and wing covers have both dark and light (brown, orangish, or white) areas. Eggs occur on the lower leaf surface, covered with black, sticky excrement. To the naked eye, eggs may resemble grains of black pepper. Beneath the excrement, eggs are oblong, yellowish, and have a white rim around the cap from which nymphs emerge. Nymphs are mostly black or dark brown with elaborate spiny projections, pale appendages, and (on the back of older nymphs) pale areas where wings are developing (Fig. 2).

Many landscape plants and some crops are attacked by other species of lace bugs. Most lace bug species feed on only one or a few closely related plants. Consult UC IPM *Pest Notes: Lace Bugs* for information and management of other species.

LIFE CYCLE

Females lay tiny eggs, often hidden under black, tar-like globs of excrement. After about 5 molts, nymphs mature into adults. Egg to adult development ranges from about 3 weeks during warm weather to several months when temperatures are cool (Fig. 3). Avocado lace bug has several generations a year. All stages can be present throughout the year.

DAMAGE

Lace bugs do not feed on fruit. They suck leaf sap, feeding in groups on the underside of leaves. A colony of lace bugs feeding causes faint pale green to yellowish blotches visible on both the lower and upper leaf surfaces. Black, shiny specks of excrement appear on the under leaf surface where lace bugs occur. As lace bugs

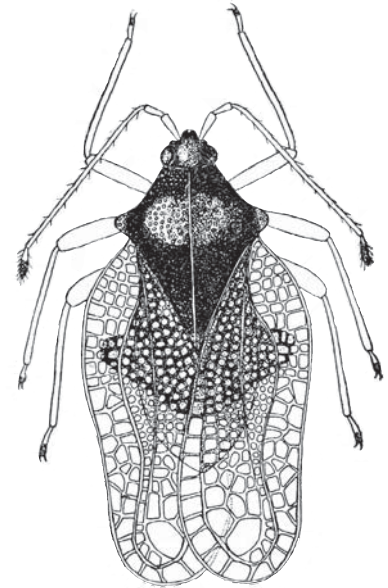


Figure 1. Adult avocado lace bug.

continue feeding, large brown or tan dead blotches develop on leaves. Heavily damaged leaves become dry, may curl, and drop prematurely.

Low lace bug populations do not damage trees. Severe leaf damage results in sunburned limbs and fruit when leaves fall from trees. Tree stress from defoliation reduces subsequent fruit yields. Severe lace bug damage has not been a reported problem on camphor trees.

Other Causes. Be sure to distinguish avocado lace bug from other causes of damage so that you can take effective action. Thrips, mites, and certain diseases and disorders such as salt damage and sunburn can cause leaf damage superficially resembling that of lace bugs. For example, the pointed

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end of leaves often turns brown and dies from irrigating with salty water. This salt damage occurs primarily at the tip and margins of leaves, not in the middle of leaves and between the leaf veins as is common with lace bug damage.

Thrips. Avocado thrips (*Scirtothrips perseae*) and greenhouse thrips (*Heliothrips haemorrhoidalis*) also feed on avocado leaves. Avocado thrips cause irregular bronzing or brown scarring on both sides of leaves, but this leaf scarring is harmless and not as apparent as that caused by avocado lace bug. Greenhouse thrips cause bleached or pale blotches and dark excrement on leaves, usually where leaves touch other leaves or fruit. Unlike lace bugs, thrips also feed on fruit, leaving scabby or leathery brown scars, whitish discoloration,

or dark specks of excrement on fruit skins.

Mites. Several species of mites discolor leaves, including avocado brown mite (*Oligonychus punicae*), persea mite (*Oligonychus perseae*), and sixspotted mite (*Eotetranychus sexmaculatus*). Depending on the species and abundance of mites, discoloring can be brown, silvery, or yellow roundish patches, brown to purplish irregular blotches, or browning or bronzing of leaves. Mite feeding can be distinguished from lace bugs by the absence of dark excrement, and sometimes by the presence of cast mite skins and fine silk webbing. Use a magnifying lens to examine leaves and determine whether tiny mites are abundant on the bottom side of leaves.

More than one cause of damage can

occur together on leaves. Learn to recognize the differences among these causes. Inspect plants carefully to correctly diagnose the cause of damage.

MANAGEMENT

Tolerate low populations of lace bugs, which are harmless to trees and provide food for predaceous insects that may help to prevent pest outbreaks. Keep trees healthy, primarily by providing good soil drainage, maintaining a thick layer of organic mulch beneath canopies, and applying appropriate amounts and frequency of irrigation. Conserve natural enemies by choosing “soft” materials such as insecticidal soaps or oil if pesticide application is warranted.

Learn what pests and disorders can damage avocado. Check trees regularly for these pests, their damage symptoms, and any conditions and practices that can injure fruit or trees. Consult publications listed in Suggested Reading for more information.

Exclude Foreign Pests

Many of our worst pests were carelessly introduced. Until the 1990s when avocado thrips and persea mite were inadvertently introduced into California, invertebrates only occasionally damaged avocado fruit and leaves. The Caribbean, Central America, Florida, and Mexico have many avocado pests that do not occur in California.

Do not bring uncertified budwood, fruit, plants, or soil into California. Buy plants and other garden and landscape products from reputable local sources. Do not move avocado or camphor plants or host foliage from infested areas to locations where avocado lace bugs do not occur. Take unfamiliar pests to your county agricultural commissioner or Cooperative Extension office for identification. For more information on exotic pests, telephone the California Department of Food and Agriculture, 1-800-491-1899, or visit the Website, www.cdfa.ca.gov/phpps/.

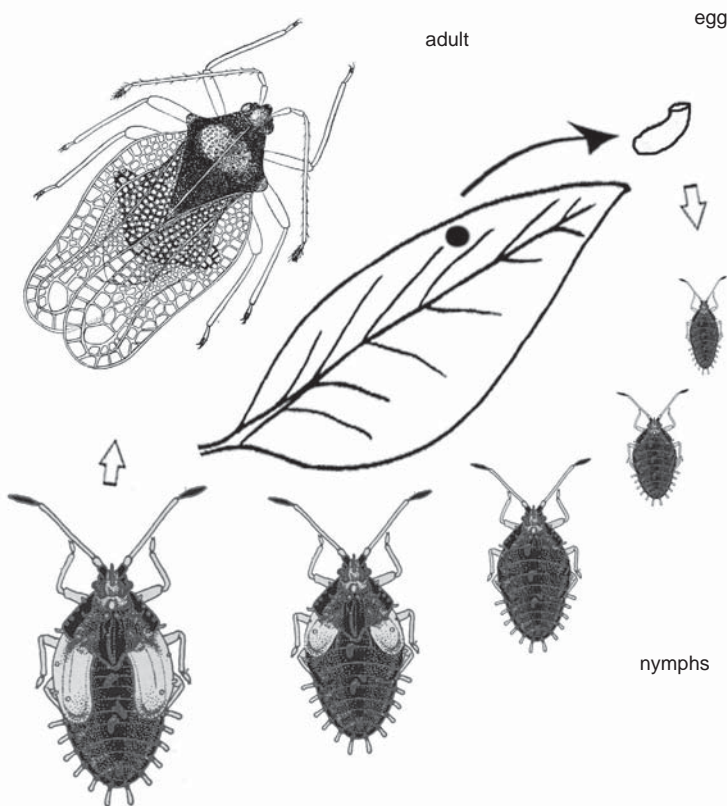


Figure 3. Life cycle and stages of a lace bug. The adult lace bug is approximately 1/12 inch long.

Cultural Control

Provide trees with good growing conditions and appropriate cultural care. Well-cared for trees bear more fruit and are better able to tolerate and recover from any pest damage. Avocado trees are less tolerant of cold, salinity, and water-logged soil than most other fruit trees. Avocados do best where soil is well-drained and not too alkaline, and where they are irrigated with water low in salts. Retaining dropped leaves as mulch and applying additional coarse organic mulch beneath trees will improve avocado tree health and fruit yield. Modest amounts of nitrogen and occasional applications of potassium, phosphorus, and zinc are generally the only fertilization needed by California avocados. The appropriate frequency and amount of irrigation water is especially important to keep trees healthy.

Biological Control

Natural enemies are very important in controlling some species of lace bugs. Predators of lace bugs include lacewing larvae, lady beetles, jumping spiders, predatory thrips, and predaceous mites (Fig. 4). No parasites have as yet been reported to attack avocado lace bug in California. Because it is an exotic, introduced pest, native parasites and predators are not expected to provide adequate control in many situations. However, preservation (conservation) of natural enemies is an essential part of a long-term integrated pest management program.

At least two species of tiny parasitic wasps kill avocado lace bug eggs in Florida, an unidentified species in the family Mymaridae and an *Oligosita* sp. (Trichogrammatidae). Predatory thrips attack avocado lace bug in the Dominican Republic. Several species of predatory thrips occur in California avocado, including *Franklinothrips orizabensis*, which preys on small (early-instar) lace bug nymphs. For potential release in California, University of California scientists are searching in this pest's native range for natural en-

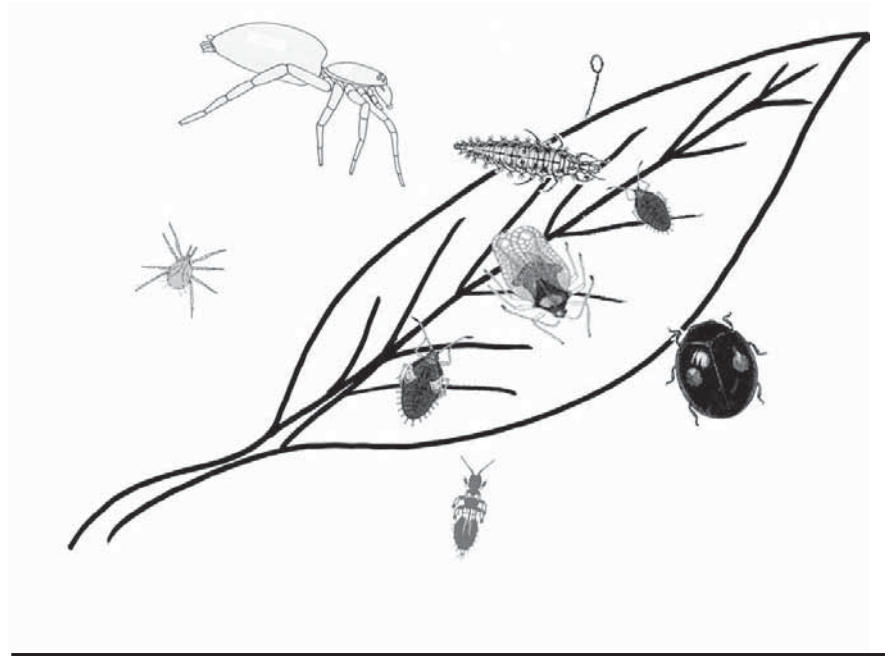


Figure 4. Many predators feed on lace bugs. These can include (clockwise around the leaf beginning at the top left) jumping spider, lacewing egg and larva, lady beetle, predatory thrips, and predaceous mite.

emies that feed only on avocado lace bugs. Certain predators may be commercially available, but preliminary research indicates that purchasing and releasing predators is unlikely to be very effective.

Chemical Control

Do not treat low populations of lace bugs with an insecticide. If populations are increasing and are anticipated to cause intolerable damage (such as lace bugs caused defoliation in previous seasons) rely on "soft" or short-persistence materials such as insecticidal soaps or oils. Most contact insecticides kill avocado lace bugs if sprayed directly onto the insects. Insecticidal soap (M-Pede, Safer), narrow-range oil (Green Light, SunSpray, Volck), and the beneficial fungus *Beauveria bassiana* (BotaniGard) temporarily control lace bugs if the insecticide is thoroughly sprayed to cover the underside of infested leaves. These IPM-compatible insecticides have very low toxicity to humans and relatively low adverse impact on naturally occurring parasites and predators. Avoid broad-spectrum, per-

sistent insecticides, which kill many natural enemies and are contaminating urban surface water runoff and municipal wastewater because of their use around homes and in landscapes.

Do not apply any pesticide when plants are drought-stressed, when it is windy, or when temperatures are over 90°F or below freezing. Any pesticide applied repeatedly or under adverse conditions may damage foliage. Use only oils that say "supreme" or "superior" or "narrow-range" on the label. These have a minimum unsulfonated residue (UR) of 92 and a minimum percent paraffin (% Cp) of 60%, characteristics that make an oil relatively safe for plants. Before applying insecticidal soap, consider making a test application to a portion of the foliage and observing it for damage over several days before spraying it further.

Certain systemic insecticides (imidacloprid, the active ingredient in Bayer Advanced Garden Tree and Shrub Insect Control Concentrate), may provide the most effective control. Such treatments should have minimal im-

pact on natural enemies that do not feed on treated plants. Be sure that avocado or "fruit trees" are listed on your product label. Some insecticides that can be applied for lace bugs infesting ornamental plants are not registered (not permitted) for use on avocado fruit trees.

It may be unrealistic to expect good control when treating populations of pests that are already very abundant

For more information contact the University of California Cooperative Extension in your county. See your telephone directory for addresses and phone numbers.

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 ILLUSTRATIONS: **Fig. 1, 3, & 4:** avocado lace bug adult: Moznette, G. F. 1922. The Avocado: Its Insect Enemies and How To Combat Them. USDA Farmers' Bull. 1261; **Fig. 2, 3, & 4:** lace bug nymph adapted from: Heidemann, O. 1908. Two New Species of North American Tingidae. Proc. Entomol. Soc. Washington. 10: 103-9; **Fig. 4:** lacewing larva: by Celeste Green in Smith, R. F., and K. S. Hagen. 1956. Enemies of spotted alfalfa aphid. *Calif. Agric.* 10(4):8-10; lady beetle: Simanton, F. L. 1916. *Hyperaspis binotata*, a predatory enemy of the terrapin scale. *J. Agric. Res.* 6:197-204; spider: Costello, M. J., M. A. Mayse, K. M. Daane, W. A. O'Keefe, and C. B. Sisk. 1995. *Spiders in San Joaquin Valley Grape Vineyards*. Oakland: Univ. Calif. Div. Agric. Nat. Res. Leaflet 21530; predatory mite: Denmark, H. A., and E. Schicha. 1983. Revision of the genus *Phytoseiulus* Evans (Acarina: Phytoseiidae). *Internat. J. Acarol.* 9:27-35

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

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and high up in the tree canopy. Severely stressed or extensively damaged plants are more susceptible to being damaged by pesticides (phytotoxicity), especially if applications are made during adverse conditions such as hot weather or when trees are drought-stressed. Consider delaying any pesticide application until early the next season, when populations begin to increase and before damage becomes extensive. No treatment will restore damaged foliage, which remains until pruned off or replaced by new growth.

SUGGESTED READING

Avocado Information Home Page. University of California, Riverside.

Available online, www.ucavo.ucr.edu/. Accessed March 13, 2007.

Avocados. 2002. D. Silva, C. Lovatt, and B. O. Bergh. In *California Master Gardener Handbook*, D. R. Pittenger, ed. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3382.

Pest Notes: Lace Bugs. S. H. Dreistadt and E. J. Perry. Aug. 2006. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 7428. Available online, www.ucipm.ucdavis.edu.

Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide. 2004. S. H. Dreistadt, J. K. Clark, and M. L. Flint. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3359. ♦

WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down sink or toilet. Either use the pesticide according to the label or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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