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AVOCADO LACE BUG • SPRING 2005

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Historical Review. Avocado lace bug, *Pseudacysta perseae* (Heidemann), was first described in Florida in 1908 from specimens collected in this state over the period 1897-1907. Avocado lace bug is a true bug with sucking mouth parts in the insect order Hemiptera, family Tingidae. The common name “lace bug,” is derived from the highly reticulate “lace-like-patterning” of the thorax and wings of adults. There are around 1,820 species of lace bug and 154 species are found in North America. Some lace bug species in the U.S.A. are important ornamental pests attacking azaleas and rhododendrons. Avocado lace bug is known from Florida and Georgia (U.S.A.), Bermuda, Puerto Rico, the Dominican Republic (all in the Caribbean), and the east coast of Mexico. Avocado lace bugs were first detected in California on backyard avocado trees in the Chula Vista and National City areas south of the City of San Diego in September 2004.

Description and Life Cycle. Adult avocado lace bugs are small-winged insects about 2 mm in length (slightly longer than 1/16 inch) with black bodies, yellow legs and antennae, and are visible to the naked eye. The insects live in colonies on the lower surfaces of leaves, often with adults, eggs and nymphs together (Fig. 1). Eggs are laid in an irregular pattern, sometimes in loose rows, stuck to the lower leaf surface; and are covered with irregular globules of a black, sticky, tar-like substance excreted by adults. These sticky exudates may protect eggs from attack by natural enemies. To the naked eye, eggs will appear like grains of black pepper. The eggs hatch into wingless young called nymphs. The nymphs go through gradual metamorphosis shedding their exoskeleton several times as they grow in size, finally developing wings and becoming flying adults. The nymphs are dark red-brown to black and covered with spines. They feed for approximately two to three weeks before maturing into winged adults, which lay eggs, restarting the life cycle (Fig. 2). In Florida, avocado lace bug outbreaks typically occur from October through March and decline sharply over April through August. These observed population trends in Florida are thought to be strongly influenced by the development of the leaf canopy following bloom. It is too early to predict the times of the year when lace bug populations will peak in California and how far it might be able to extend its range.

Feeding Injury. Lace bugs restrict their feeding to the undersides of leaves, inserting their needle-like mouthparts into leaf tissue cells to extract cell contents. Feeding initially causes small white or yellow spots on the surface of the leaves as individual cells dry out (Fig. 3). It is suspected that feeding damage can provide entrance for pathogenic fungi, in particular *Colletotrichum* spp., which are leaf anthracnose fungi. As lace bug colonies grow, brown necrotic (dead) areas develop where there has been heavy feeding damage. These necrotic areas look like tip-burn caused by salt damage, but in this case the necrotic areas are islands of dead tissue in the interior of the leaf surrounded by living tissue (Fig. 3). Heavy feeding can cause striking leaf discoloration and early leaf



Figure 1. Avocado lace bug colony on the underside of a leaf with winged adults, globular black eggs, and reddish-brown nymphs at various stages of development.



Figure 2. Adult avocado lace bugs laying eggs on the underside of an avocado leaf to initiate a new colony adjacent to damage caused by previous feeding (brown leaf area on the left of the photograph). Adult avocado lace bugs seldom fly from the surface of the leaf even when disturbed.



Photo: Guy Whitney

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drop (Fig. 4). Other signs of lace bugs are dark, varnish-like excrement and shed white nymphal skins on the undersides of leaves. Avocado lace bug nymphs and adults do not feed on fruit, but will likely have a detrimental effect on yield resulting from the loss of photosynthetic capacity in damaged leaves. In recent years, avocado lace bugs have become an economic problem in Florida and the Dominican Republic, with occasional severe infestations causing defoliation and reduced yields.

Hosts. Avocado lace bugs have only been reported feeding on avocado, red bay, and camphor, all members of the Lauraceae family. Experimental evidence from Florida indicates that avocado varieties vary in their susceptibility to feeding damage. West Indian x Guatemalan avocado hybrids appear to be particularly resistant to attack in Florida. Observations in the Dominican Republic indicate that Hass avocados (a Mexican-Guatemalan hybrid) can be severely damaged by lace bug outbreaks.

Biological Control. The most important biological agents reported in Florida are two egg parasitoids including *Oligosita* sp. (a trichogrammatid wasp) and an unidentified mymarid wasp. Egg parasitoids lay their eggs inside the egg of the lace bug. The parasitoid larva that hatches from an egg feeds on the internal contents of the lace bug egg, killing it. Green lacewings and other generalist predators are also thought to be important natural enemies because populations of these predators increase in response to the pest. A predatory thrips, *Frankliniopsis vespiformis*, has been observed in high numbers feeding on avocado lace bugs on Hass avocados in the Dominican Republic. The natural enemies attacking avocado lace bug in California are unknown, but are likely to include green lacewings and predatory thrips. In a trial reported in 1998, Mycotrol, an insect-killing fungus, (*Beauveria bassiana*), was trialed by Dr. J. E. Peña, University of Florida and Mycotrol provided some control of avocado lace bug. However, conditions are much more humid in Florida than California, and historically insect-killing fungi have not been effective at controlling pest insects in arid environments.

Chemical Control. Pesticides used for controlling sucking insects may be effective against avocado lace bug and research at UCR is underway to identify the best insecticides for lace bug control. In a trial reported in 1998, Dr. J.E. Peña, University of Florida, showed that citrus oil, M-Pede (an insecticidal soap) and Mycotrol (the active ingredient is an insect-killing fungus, *Beauveria bassiana*) provided short-term lace bug control.

The Current Management Strategy. At the time of writing (March 2005), avocado lace bug populations were restricted to backyard trees in southern areas of San Diego County. There have been no reports of infested commercial orchards. California Department of Food and Agriculture officials have indicated that eradication is unfeasible for the following three reasons in combination: (1) The 250-square-mile area that is infested is too large to treat effectively with insecticides; (2) There are no efficient monitoring systems to detect very low-density populations enabling rapid determination of the success of pesticide applications within an eradication program; and (3) There are few good data on the efficacy of pesticides that could be used to eradicate avocado lace bug populations. Following an emergency meeting with UCR scientists, the CDFA, representatives of the San Diego County Agricultural Commissioner's office, UC Cooperative Extension Farm Advisors, and California Avocado Commission representatives, several simultaneous management strategies are likely to be implemented: (A) Restrictions placed on the movement of host plant materials out of infested areas in San Diego County, in particular, movement of live avocado and camphor trees that could harbor avocado lace bugs and assist in rapid, large-distance spread; (B) Adoption of a Voluntary Code of Compliance by commercial growers will be requested to prevent the movement of avocado foliage in packing bins to areas outside of the currently infested zone; (C) Insecticide screening trials and evaluation of natural enemy releases are to commence in San Diego County; (D) The area of origin of avocado lace bug is to be determined using genetic analyses and natural enemies are to be searched for in the exact area of origin of the avocado lace bug; and (E) Immediate identification and cataloging of natural enemies, especially egg parasitoids, that attack avocado lace bug in San Diego County will be initiated.

More information on avocado lace bug can be found on the web at:

http://creatures.ifas.ufl.edu/fruit/avocado_lace_bug.htm

<http://growers.avocado.org/growers/pdf/AvoResearchWinter05.pdf>



Photo: Guy Whitney

Figure 3. Feeding by avocado lace bug initially causes stippling and bleaching of the leaf because the insect removes the contents of individual leaf cells. Feeding damage is visible from the upper leaf surface. Eventually this damage results in islands of completely dead (necrotic) leaf tissue.



Photo: Guy Whitney

Figure 4. Heavy feeding by avocado lace bug will eventually cause striking discoloration of the entire tree and heavy leaf drop (defoliation).

