



Severe leaf damage caused by avocado lace bugs.

All photos courtesy of Dr. Mark Hoddle, UC Riverside.

Avocado Lace Bug Biology and Control

By Tim Spann, PhD
Spann Ag Research & Consulting

The avocado lace bug (ALB; *Pseudacysta perseae*) is a true bug insect pest of avocados. As a true bug, ALB has sucking mouth parts, which it uses to feed on the internal layers of avocado leaves resulting in their skeletonization. The common name “lace bug” is derived from the pest’s lace-like wings. ALB was first described in Florida in 1908 and was assumed to be native to Florida for many years. In September 2004 ALB was found infesting backyard avocado trees in National City and Chula Vista in south San Diego County.

Origins and Geographic Distribution

Following the original finds in California in late 2004, the California Avocado Commission (CAC) funded research with Drs. Mark Hoddle, Joe Morse and Richard Stouthamer, Department of Entomology, University of California Riverside (UCR), to investigate potential control strategies and determine where ALB came from.

For their research, ALB specimens were collected from Florida, Texas, three locations in Yucatan (Mexico), Veracruz (Mexico), Nayarit (Mexico), Jalisco (Mexico), Guatemala, Dominican Republic, Jamaica, Puerto Rico, St. Thomas and St. John, St. Lucia, St. Kitts, and French Guyana. These samples were subjected to DNA analysis to determine where the California population of ALB originated and where the native



Necrotic "islands" on the upper surface of avocado leaves caused by avocado lace bug feeding on the underside of the leaves.

range of ALB is. Knowing the native range of an invasive insect is important because that is the most likely place to find biological control agents.

The results of the UCR team were quite surprising. Contrary to what had been presumed for more than a century, they discovered that ALB was not native to Florida, but rather to central and southern Mexico. They determined this by looking at the genetic variation among specimens within a given region. In an insect's native range there are many individuals mating and sharing genes, thus the expectation is to find the greatest genetic diversity. However, when a pest is introduced to a new area it is typically through a small number of individuals, from which the population builds, thereby limiting the genetic diversity in introduced populations. The most genetic diversity was found among samples from Jalisco, Nayarit and Veracruz states in Mexico.

So where did the California population in southern San Diego County come from? Genetic analysis showed that the introduction of ALB into southern San Diego County was from Nayarit, since the California samples were nearly identical to samples from Nayarit.

California Distribution

From the original find in late 2004 until late 2017 there was no known movement of ALB out of backyard trees in the National City/Chula Vista area. However, in October 2017, there were several reports of ALB in commercial avocado groves in the Oceanside and De Luz areas of northern San Diego County. Why, after 13 years, had this pest finally decided to move? It turns out, it hadn't.

Because of the work that was done following the original find, researchers at UCR had a DNA library of ALB. Mark Hoddle collected samples from groves in the Oceanside and De Luz areas and discovered that this new ALB population did not match the original population from 2004. Rather,

the population in northern San Diego County was a genetic match to populations in Florida, parts of the Caribbean, and Yucatan, Mexico meaning we were dealing with a second introduction of this pest.

Since its discovery in the Oceanside and De Luz areas, ALB has spread throughout northern San Diego County, affecting groves all along the Hwy 76 corridor, and has moved into southern Riverside County. In addition, a population was found on a backyard avocado tree in Culver City (Los Angeles County) in early 2019. The Culver City population genetically matched the original population that appeared in southern San Diego County in 2004.

Identification

Identification of ALB is quite easy since there are no other pests in California that it can be easily confused with. The first thing that usually draws your attention when looking for ALB is "islands" on the leaves. These necrotic regions develop because of the ALB adults feeding on the underside of the leaves and sucking the leaf juices from between the upper and lower leaf surfaces.

When the leaf is turned over, the adults, although only about 2 mm in length, are easily seen with the naked eye. Adults are oval, appear yellow to pale orange, and have dark heads. Nymphs are smaller than adults, oblong and are black, dark brown or reddish colored depending on their stage of development. Eggs appear as small black dots of varying sizes. What is visible is a dark sticky secretion covering the egg to protect it from predation. Under the sticky secretion, the eggs are oblong and yellowish.

Management

In the CAC work that was funded beginning in 2005, Dr. Joe Morse investigated both chemical and biological control of ALB. It should be noted that during the foreign exploration to determine the origins of ALB no parasitoids or other natural enemies were discovered. Thus, common biological control agents already in California were evaluated.

Franklinothrips, which are predators of avocado thrips and perseia mite, were found to only prey on small nymphs of ALB but could control up to 60% of small nymphs. Green lacewings were found to be much more effective predators against ALB, preying on all life stages. Green lacewings were found to control up to 60% of small nymphs, 95% of medium nymphs, and slightly more than 70% of adults. *Neoseiulus californicus*, a predatory mite found naturally in California that controls various species of spider mites, was found to have no efficacy against ALB.

For chemical control, Dr. Morse looked at both systemic and contact pesticides. An Agrian label search indicates there are 62 products labeled for lace bug control on California



Avocado lace bug adults and eggs surrounding a necrotic “island” on the underside of an infested avocado leaf.



Avocado lace bug adults, larvae, and eggs on the underside of an infested avocado leaf.

avocados. Imidacloprid is the only systemic active ingredient. There are several pyrethrins and permethrins as well as five organic products labeled including one entomopathogenic (insect feeding) fungus. As with any new pest it is going to take time to determine the best control measures. Timing and coverage will need to be figured out. Growers are advised to work closely with their pest control adviser (PCA), and remember, the label is the law. Always read and follow label directions for any pesticide.

CAC and its Production Research Committee are keeping

a close watch on ALB, its spread, and its potential to become a serious pest in California. Efforts are underway to undertake new research to screen more pesticides for efficacy against ALB and pursue registrations for those products that are effective. However, these efforts have been hampered by the COVID-19 situation and restrictions placed on research personnel by the University of California. Be assured that we are pursuing all efforts vigorously and will keep you updated as this situation evolves. 🍷