

Proactive Work on the Large Avocado Seed Weevil, *Heilipus Lauri*

Proactive Biocontrol and Integrated Pest Management Programs have been funded by the California Department of Food and Agriculture's Office of Pesticide Consultation and Analysis. These programs have been initiated, in part, as a response to increasing problems invasive pests are causing for California agriculture.

The concept underlying this CDFA program is the identification of potential pests in advance of their anticipated incursion into California. One example of an imminent invasion threat is the spotted lantern fly. This pest is native to China, is well established in the northeastern U.S., is a known pest of grape and nut crops, and has high potential to be moved accidentally into California from the northeastern region. As a response to possible invasion threats, grants have been issued to develop proactive biocontrol and IPM programs in advance of the establishment of potential new invasive species in California. The idea is to have natural enemies prescreened and approved for release and IPM programs developed for rapid roll out should invasive pest populations be detected in California and determined unfeasible for eradication.

This proactive approach runs counter to the typical response to pest invasions, which tends to be reactive,

management plans are developed after the pest has invaded and established. Often, it takes several years to develop these programs and during this period the pest population is building, spreading, and causing economic or environmental damage. Proactive management may be able to reduce significantly time lost during management program development which, in turn, could reduce the negative impacts resulting from the invasion event. Consequently, these proactive programs can be viewed as insurance policies, you hope you don't need to use them, but they are really helpful to have in place should you require it.

The avocado industry in California has been supportive of this proactive management approach. Grower funded research resulted in the identification of the sex pheromone of a highly destructive pest, the avocado seed moth, *Stenomma catenifer*. This pheromone is used widely in parts of Mexico from where fruit are exported to California. Further, U.S. Department of Agriculture - Animal and Plant Health Inspection Service is now requiring the use of the pheromone for monitoring orchards in other countries (e.g., Ecuador) where this pest is native and from which fruit are exported to California. Additionally, the natural enemy fauna, especially

larval and pupal parasitoids attacking *S. catenifer*, were extensively studied in Guatemala and Peru, two other countries where this pest is native. This information may be very valuable for bio-



Heilipus lauri, the large avocado seed weevil.

control programs in California should they be needed.

One insect pest that was identified as a potential invasion threat to California avocado growers was the large avocado seed weevil, *Heilipus lauri*. This avocado pest is native to parts of Mexico and Central America. Around 60% of Hass fruit have been reported as being damaged by *H. lauri* in unmanaged orchards in Morelos, Mexico. It is particularly destructive in Colombia, South America, where it may have been accidentally introduced inside of seeds imported from Mexico for germination and use as root stocks. Damage levels to fruit in heavily managed Hass orchards



Feeding damage to a Hass avocado caused by a *Heilipus lauri* larva.

in Colombia can reach ~4-8%.

Female weevils use their long snout or rostrum to drill holes into fruit. Females lay eggs in these holes and weevil larvae that hatch from eggs burrow through the avocado pulp to feed on the seed. This feeding damage results in unmarketable fruit. Because weevil larvae are protected within fruit this life stage is difficult to control with insecticides.

With support from the CDFAs program and the California Avocado Commission a three-year project has been undertaken to proactively develop management tools for *H. lauri*. The goals of this project are to: (1) Identify the aggregation pheromone used by these weevils to recruit male and female weevils to feeding and mating sites. Identification of a pheromone that is efficacious would be a very powerful tool for monitoring incursions into California and for use in certifying Hass avocado orchards in Mexico and Colombia, for example, as being weevil free. The pheromone also may be useful as a pest management tool and could be used for mating confusion or in mass trapping programs. (2) Identify natural enemies, especially parasitoids, associated with eggs, larvae, and pupae. If discovered,

these natural enemies may be useful for future biocontrol programs targeting this pest in California should it be necessary. (3) Aspects of the basic biology of this pest also are being investigated. These include flight mill studies to determine how far weevils can fly, their preferences for fruit of different avocado varieties, and effects of seed sizes on weevil development.

Field work in Mexico is being done in collaboration with colleagues from the Colegio de Posgraduados, Posgrado en Fitosanidad, Entomología y Acarología, in Texcoco near Mexico City. One field survey was successfully conducted in February 2020 and resulted in the collection of infested Hass avocado seeds. These infested seeds were moved under USDA-APHIS permits back to the quarantine facility at UC Riverside where weevils have been used for experiments (e.g., pheromone isolation and identification and flight mill studies).

As results from this project on the large avocado seed weevil come to hand, they will be shared with avocado growers in California. Please stay tuned, there will be more to come in future issues of *From the Grove*. 🥑



Oviposition holes drilled into Hass fruit by female *Heilipus lauri*.