

## UC Riverside entomologist helps manage invasion threats posed to California's avocados

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*Stenoma* is an extremely destructive insect, and it is an invasion threat to California because larvae may be accidentally introduced inside of imported avocado fruit that originate from countries where this pest is native. Credit: Hoddle lab, UC Riverside.

California's avocado industry is worth more than \$320 million annually, and has about 6,000 growers farming more than 6,000 acres of land. Indeed, California grows nearly 95 percent of the country's avocados.

University of California, Riverside entomologist Mark Hoddle is in Peru until the end of July 2010 to look for known avocado [pests](#), in particular, the avocado seed moth, *Stenoma catenifer*, that could wreak havoc on California's avocados should the pest make its way to the state.

"[This pest](#) is native to Peru, and is particularly destructive in avocado-growing areas in the Chanchamayo region of the Junin District - a somewhat warm and humid jungle zone," said Hoddle, the director of the Center for [Invasive Species](#) Research, who, like an Indiana Jones of invasive species, travels several times a year to locations around the world in search of invasive pests that could threaten California's agriculture, urban, and wilderness areas.

Hoddle, also a biocontrol specialist in the Department of Entomology, and his research team have collected almost 300 pest-infected avocados from orchards and fruit vendors in Peru, and are rearing out the pests and their natural enemies in their lab. Later, these pests and their biocontrol agents will be identified by taxonomic specialists, and described and named if they turn out to be species new to science.

"As part of the *Stenoma* survey, we are prospecting also for unknown species of avocado fruit pests - those that have not been recorded attacking avocados before," Hoddle said. "These would be the wild cards in invasion biology because we don't know what they are and we don't know how to look for them, or what their tell-tale damage signatures are. This type of information collected in collaboration with overseas trade partners will help us to more confidently identify risky invasive pests."

When an unknown pest shows up, establishes and causes havoc, oftentimes researchers can be left scrambling for information on how best to develop eradication or management plans.

"We have seen this twice before in California with avocado pests, the perseia mite, and the avocado thrips," Hoddle said. "Both were species new to science when they first showed up in the United States, and they are the worst two invasive pests California avocado growers need to manage. The perseia mite, which is native to Mexico, has also spread to Costa Rica, Israel, and Spain where it attacks avocados."

Hoddle explained that in the case of Peruvian avocados, which are already being imported into California, he and his team want to be fully prepared for pests that could be invasive in California.

"We want to get ahead of the curve by proactively identifying any new pests, should they exist, and documenting in detail what damage they cause," he said. "We also want to identify any natural enemies they may have and how effective these biocontrol agents are."

The avocado seed moth can attack close relatives of the avocado, such as greenheart, an important timber tree in South America. The pest could possibly attack and survive on California bay laurel, a plant native to California that is closely related to the avocado.

"We have also found some generalist avocado pests in Peru that eat a variety of plants," Hoddle said. "One of these is the well known native bag worm, *Oiketicus kirbyi*, which can feed on more than a hundred different plants, including eucalyptus!"

Hoddle noted that Peruvian avocados exported to California arrive from export orchards certified by the U.S. Department of Agriculture.

"We have visited some of these orchards during this trip," Hoddle said. "They are impressive in terms of their vast size, the professionalism with which they are managed and the extraordinarily strict entrance procedures which are designed and rigorously enforced to keep pests out."

To monitor *Stenoma* that could be infecting Peruvian avocados, the Hoddle team deployed pheromone traps in certified avocado export orchards and avocado growing areas not certified for export.

"The sex pheromone is very attractive to adult male *Stenoma*," Hoddle

said. "As expected, *Stenoma* has not been trapped in export orchards located in the coastal desert production regions of Peru. In non-certified export areas in the Junin District, where *Stenoma* is known to occur, males have been trapped.

"It is abundantly clear that the sex pheromone we developed for *Stenoma cantenifer* from our recent research in Guatemala works in Peru," Hoddle said. "We have shown that it also works in Mexico, Guatemala and Brazil. It is likely to work in any country with a native *Stenoma* population - Mexico, all of Central America and parts of South America. Countries exporting or wanting to export avocados to the United States should use the *Stenoma* pheromone to monitor their export orchards for this pest to demonstrate that they are pest-free year round."

In California (San Diego, Riverside, Ventura, and San Luis Obispo Counties), Hoddle's team already has set up a proactive monitoring network with the *Stenoma* pheromone to detect the moth early should it ever arrive in the state and, if need be, eradicate it when populations are still small and highly localized.

For the research project in Peru, Hoddle is partnering with [SENASA](#) (Servicio Nacional de Sanidad Agraria), Peru's equivalent of the U.S. Department of Agriculture's Animal Plant Health Inspection Service (USDA-APHIS). SENASA invited Hoddle to Peru to place *Stenoma* pheromone traps in their export orchards, and provided him with staff and laboratory space to rear out the bugs inside avocados collected from non-certified export areas.

"Without SENASA's assistance, we would never have been able to access the orchards or our study sites," Hoddle said. "SENASA has been a first class and extremely cooperative partner in this [avocado](#) pest survey project."

Provided by University of California - Riverside

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