

PSHB Activities Continue to Ramp Up

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With the confirmation last summer that the polyphagous shot hole borer (PSHB) and fusarium dieback (FD) had been discovered in a handful of California avocado groves, the California Avocado Commission immediately sprang into action and began field research in an infested commercial environment for the identification of possible treatment options.

Late last year, the Commission, in collaboration with The Center for Applied Horticultural Research in Vista, set up a quarantine greenhouse for conducting the pesticide bioassays. Treated avocado branches were placed in beetle dorms along with live PSHB, and beetle mortality was observed to determine efficacy. Field studies like this can be difficult since you can't necessarily guarantee an adequate supply of healthy beetles at the right time. Nonetheless, efforts continue to ensure the necessary population levels exist through live field capture, extraction from infested wood and lab rearing. Recently, the Commission set-up a field lab in an infested grove to conduct the bioassays. By plac-



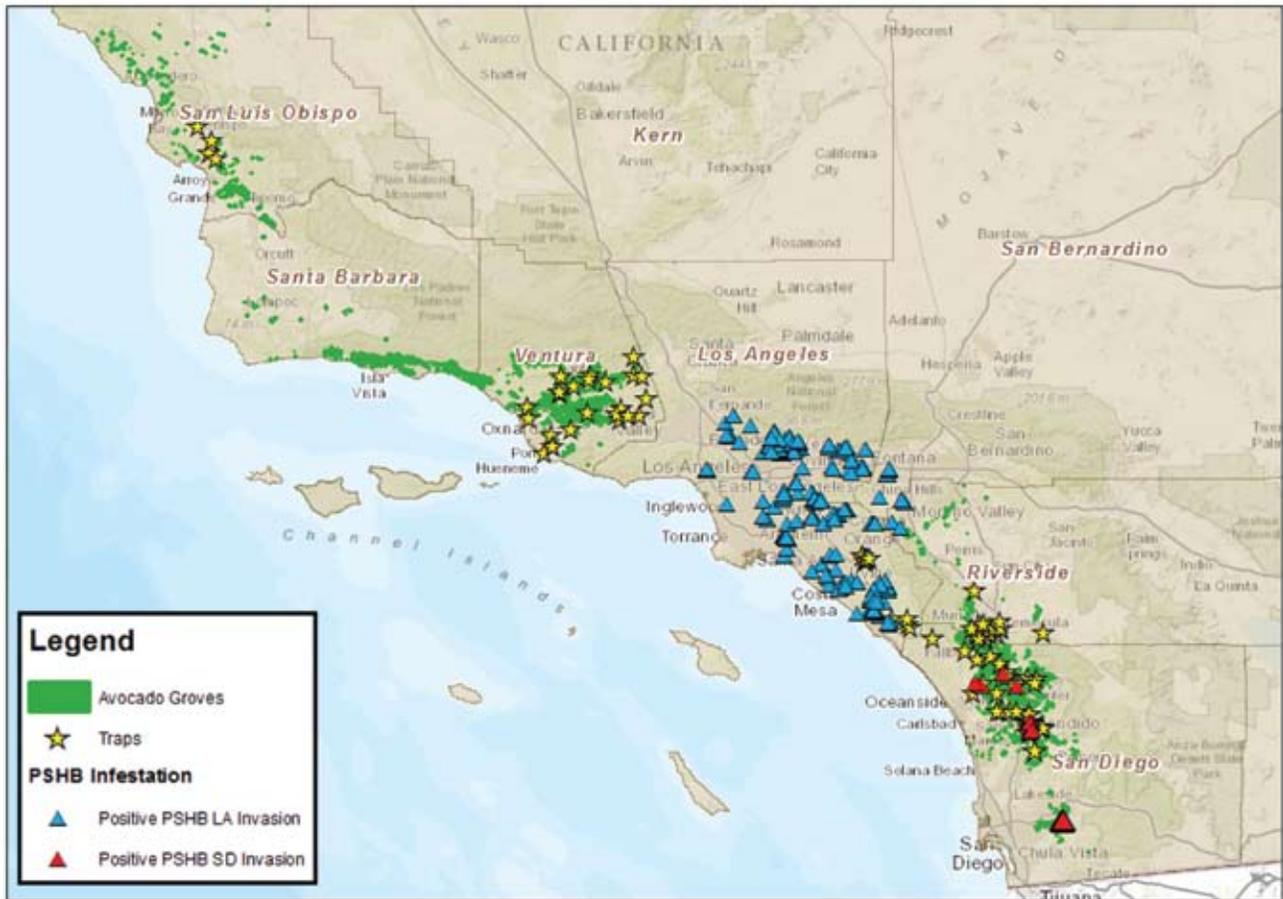
Bryan Vander Mey, University of California Cooperative Extension, San Diego County, examines PSHB specimens used in bioassays to assess pesticide efficacy.

Field Trials

The previous Commission-funded research provided a good platform to build on and we began the process of determining if any currently-registered materials for avocado may prove efficacious in the field. At the same time, field testing of non-registered materials began, with a goal of identifying possible pesticide and/or fungicide materials that may provide either curative or prophylactic benefit.



"Bug Dorm" used to house treated avocado wood for PSHB bioassays



0 10 20 30 40 Miles

Data source: Eskalen lab, Dept. of Plant Pathology and Microbiology, University of California, Riverside. www.eskalenlab.ucr.edu

ing a lab directly in an infested grove, the quarantine steps required for movement of the PSHB aren't required, helping to optimize efficiencies.

Based on our initial trial results, and coupled with research in both Florida on the Redbay Ambrosia Beetle and in Israel on the PSHB, there appear to be no easy answers to control this pest complex. Commission field studies are ongoing, and although a couple of materials have shown some promise, it is unlikely a "silver bullet" will be identified. If any materials show efficacy, the Commission stands ready to pursue a Section 18(s) (Emergency Registration) or Section 24(c) (Special Local Need Registration) with the Environmental Protection Agency and the California Department of Pesticide Regulation. Any possibility for control will likely include a suite of treatment options: chemical (sprayed and/or injected), chipping, solarization, biological, and cultural practices that mitigate the risk for the spread of the PSHB/FD. Ultimately, it will be up to individual growers to decide which control strategies make sense for their operation.

Trapping and Monitoring Grid

As you can see in the most recent distribution maps, 13 avocado groves in northern San Diego County are infested. Those groves represent a total of 1,000 acres, but not all of that acreage is impacted. In October, the Commission began deploying traps and lures to develop a monitoring and tracking grid. Within San Diego and Riverside counties, there are more than 100 traps in avocado groves. An additional 24 traps have been deployed in Ventura County and another 10 in Santa Barbara and San Luis Obispo Counties, with more traps coming online soon. These traps have been placed primarily in areas where it is likely PSHB will first be introduced. For example, due to the utilization of firewood, campgrounds have been selected based on the likelihood of campers from Los Angeles and San Diego Counties bringing in infested wood; nurseries and mulch operations that might import infested materials are also being targeted.

The purpose of these traps is three-fold: first, as sentinel traps for the early identification of PSHB in currently uninfested groves; second, growers will know if they are



A field trailer where PSHB research is being conducted

near an infestation and will become more vigilant in their PSHB scouting activities; and third, by gathering data University of California at Riverside (UCR) researchers will be able to develop life-cycle and beetle movement models. As an example, during January as UCR researchers monitored 15 traps, the average total number of beetles was around 100. But, in early February, when the temperature warmed, those same 15 traps had more than 1,000 combined beetles in one day. Although this data is preliminary and needs to be further developed, it indicates how quickly the beetle movement can increase and population numbers explode.

Collaboration and Pursuit of Outside Funding

To ensure the infrastructure necessary to support such a robust trapping and monitoring grid, the Commission has entered into agreements with multiple cooperators. In San Diego County, the University of California Cooperative Extension (UCCE) is responsible for the deployment and monitoring of traps, along with some of the field trial activities. In Ventura County, the agricultural commissioner is providing the personnel and expertise for the trap deployment and monitoring, with support from the UCCE. In San Luis Obispo and Santa Barbara counties, both the UCCE and Cal Fire are providing the necessary boots on the ground.

All of these increased activities come with a price tag as the Commission, with this year's funding, has committed more than \$1.4 million to combat this pest complex

since 2012. In an effort to help offset some of these increased costs, two grant proposals have been submitted. The first proposal was submitted to the U.S. Department of Agriculture Animal and Plant Health Inspection Service for funds made available through the Farm Bill, in the amount of \$260,000. The submission occurred in December 2014 and the final awards won't be announced until this summer. In addition, CAC Research Program Director Tim Spann is working with the California Department of Food and Agriculture (CDFA) on an emergency funding request of \$30,000.

Earlier this year, prior to the start of harvest, the Commission convened a meeting of handlers and worked to develop a set of protocols regarding the harvesting and movement of fruit to minimize the risk of PSHB/FD spread. And finally, the Commission remains an active member of the California Firewood Task Force, and continues to voice concerns with CDFA and county leaders of the dangers surrounding the movement of firewood, green waste, and nursery material.

The Commission board and staff continues to take the threat from PSHB to California's avocado industry very seriously. We are committed to leaving no stone unturned as we vigorously pursue solutions and will continue to provide updates as new information becomes available. 🥑

On the following two pages, in English and then Spanish, are the best practices protocols for harvesting avocados with regard to PSHB/FD spread.



GROWER-HARVESTER-HANDLER BEST PRACTICES PROTOCOL TO MINIMIZE SPREAD OF *EUWALLACEA* SP. SHOT HOLE BORERS



FOR GROWERS, HARVESTERS:

- Once bins are received, take measures to ensure that bins stay free of stems, twigs, debris and any other material that may harbor beetles
- Do not cover bins with branches, leaves or other plant material that may harbor beetles
- Be careful transporting bins into, around, and out of the grove. Avoid contact, where possible, with low-hanging branches to reduce the possibility of beetles falling into bins
- Inspect picking bags for possible beetle contamination
- Sterilize harvest clippers, pruning tools to prevent spread of fungi. Use Lysol® cleaning solution or household bleach solution with an active ingredient level of 5%
- Stage fruit outside of the grove for pick up
- Notify your packinghouse prior to fruit pick up if the beetle has been confirmed as being present in your grove
- Avoid movement of any plant material such as cut avocado branches, firewood, pruning debris and chipping
- Mark any infested trees in your grove for easy identification and for treatment

FOR HANDLERS:

- Take measures to ensure that harvest bins are clean when delivered to growers
- Place traps where bins arrive from the field, in the bin cooler, and by the bin dump
- Branches, twigs and other plant material coming in from the field should be collected and either: 1) double-bagged in plastic or 2) submerged in soapy water and then disposed of in a sealed container
- Pick up fruit from known, beetle-infested groves *last* when collecting fruit from multiple groves



PROTOCOLO DE MEJORES PRÁCTICAS PARA PRODUCTORES, COSECHADORES Y EMPACADORES PARA MINIMIZAR LA PROPAGACIÓN DE *EUWALLACEA* SP. ESCARABAJOS BARRENADORES



PARA PRODUCTORES, COSECHADORES:

- Una vez se reciban las cajas, tome medidas para asegurarse de que las cajas se mantienen libres de tallos, ramitas, restos y cualquier otro material que pueda contener escarabajos
- No cubra las cajas con ramas, hojas o cualquier otro material vegetal que pueda contener escarabajos
- Tenga cuidado al transportar cajas, tanto en la entrada y salida del huerto, como dentro del mismo. Siempre que sea posible, evite el contacto con ramas bajas para reducir la posibilidad de que caigan escarabajos dentro de las cajas
- Revise las bolsas de recogida para detectar posible contaminación por escarabajos
- Esterilice las tijeras de cosecha y herramientas de poda para evitar la propagación de los hongos. Utilice la solución limpiadora Lysol® o una solución de lejía de hogar con una concentración de ingrediente activo del 5%
- Coloque el fruto fuera del huerto para su recogida
- Avise a su casa empacadora antes de la recogida del fruto si se ha confirmado que está presente el escarabajo en su huerto
- Evite el movimiento de cualquier materia vegetal, como ramas de aguacate cortadas, leña, restos de poda y astillas
- Marque cualquier árbol infestado en su huerto para identificarlo con facilidad y para su tratamiento

PARA EMPACADORES:

- Tome medidas para asegurarse de que las cajas para cosecha estén limpias cuando se entreguen a los productores
- Coloque trampas en el lugar de llegada de las cajas del campo, en la refrigeradora de las cajas, y junto al vertedero de cajas
- Las ramas, ramitas y demás materia vegetal procedente del campo deben recogerse, y bien: (1) introducirse en bolsas dobles de plástico, o (2) sumergirse en agua jabonosa y luego eliminarse en recipientes sellados
- Si recoge fruta de varios huertos, recoja la fruta de los huertos que sabe que están infestados por el escarabajo *en último lugar*