



Invasive Shot-Hole Borers + Fusarium Dieback A Pest Disease Complex on Avocado in CA

BACKGROUND



Adult female PSHB is 1.8-2.5 mm long. Photo credit: Gevork Arakelian/LA County Dept of Agriculture.

Invasive Shot-Hole Borers (ISHB), *Euwallacea* spp., are tiny exotic beetles that tunnel into host trees and spread Fusarium Dieback (FD), a disease known to infect over 260 tree species. FD is caused by species of *Fusarium* fungi that disrupt the transport of water and nutrients in the tree, leading to branch dieback on avocado. ISHB refers to two closely related, physically identical beetles: the **Polyphagous (PSHB)** and **Kuroshio Shot-Hole Borer (KSHB)**. They are morphologically indistinguishable, but genetically distinct and carry different species of *Fusarium* and *Graphium*. ISHB has been detected in Los Angeles, Orange, San Diego, Riverside, San Bernardino, Ventura, Santa Barbara, and San Luis Obispo Counties.

HOSTS

ISHB can reproduce and grow *Fusarium* in more than 60 known species, called reproductive hosts. Relative susceptibility among these species is dynamic and varied.

Some of the more susceptible reproductive hosts appear to be box elder; coral; several species of sycamore, willow, and cottonwood; castor bean; valley oak; Engelmann oak; and avocado. See the full list of known reproductive hosts at www.pshb.org.

SIGNS + SYMPTOMS



Attack symptoms (e.g. gumming, staining, sugary exudate) are a host tree's visible response to stress and vary among host species. Recent studies have shown that ISHB only attacks and colonizes the branches of avocado (Eskalen and Lynch). Look for sugary exudate on avocado branches (fig. A-C), which may indicate ISHB attack. Note that exudate may be washed off by rain and therefore is not always present on heavily infested branches.



ISHB entry/exit-holes are ~0.85 mm in diameter, about the size of the tip of a medium ballpoint pen (fig. D). The female beetle's abdomen is sometimes seen sticking out of the hole.

Fusarium dieback pathogens cause brown to black discoloration in infected wood. Scraping away bark over the entry/exit hole reveals dark, discolored tissue (fig E, F). Advanced infections eventually lead to branch dieback and death of the tree.

Dark staining in ISHB galleries shows the extent of infection (fig. G, H).



LOOK-ALIKE SYMPTOMS ON AVOCADO

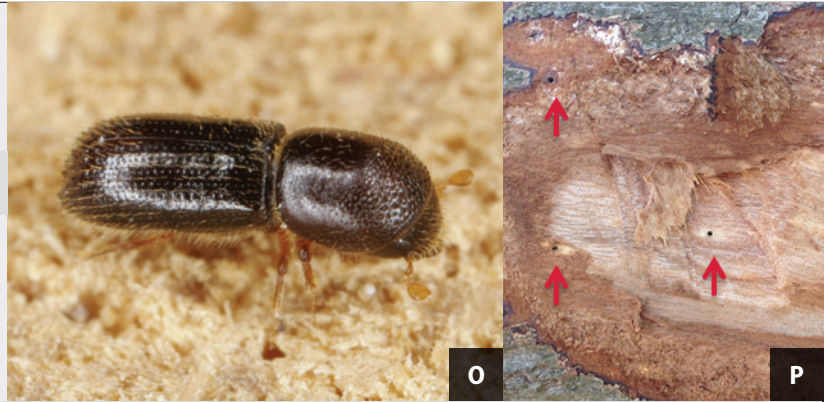
Many other pests can cause staining, sugary exudate, or bark damage on avocado. Look out for signs and symptoms that look similar to those of PSHB/FD.

Other ambrosia beetles may also occur on avocado.

Ambrosia beetle, *Xyleborus saxeseni*

Secondary beetle 2-2.4 mm long (Fig. O), smaller entry holes than those of PSHB (Fig. P); attacks stressed and dying trees

Photo credit: (O) Christoph Benisch <kerbtier.de>



Symptoms of the look-alike organisms below will **all lack an entry-hole.**



Avocado trunk canker, *Phytophthora menzei* (Fig. I, J)

Black streak disease, *Botryosphaeria* spp. (Fig. K, L)



Bacterial canker, *Xanthomonas campestris* (Fig. M, N)

Avocado branch canker and dieback, caused by *Botryosphaeriaceae* (*Neofusicoccum* spp. including *N. australe*, *N. luteum*, *N. parvum*; *Diplodia mutila*; *Dothiorella iberica*; *Fusicoccum aesculi*; *Phomopsis* sp.) (Fig. Q, R)

RESOURCES

Stay up to date on the latest ISHB-Fusarium Dieback research and news:
www.pshb.org - Invasive Shot-Hole Borer, UC Cooperative Extension central
www.ucanr.edu/sites/eskalenlab - Eskalen Lab, UC Davis
www.ipm.ucanr.edu - UC Statewide IPM Program

REPORTING SUSPECTED ISHB

Please visit
www.pshb.org for
 current reporting
 information.



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Images provided by Eskalen and Dimson unless cited otherwise.