

The Polyphagous Shot Hole Borer and *Fusarium* dieback

Fact Sheet (January 2023)

Hartley, J, Gill, C & van den Berg, N, Avocado Research Programme (FABI), University of Pretoria

Background

Euwallacea nr. *forficatus* (PSHB) is an ambrosia beetle native to Asia that has a symbiotic relationship with *Fusarium euwallaceae*. This fungus has emerged as a problem in Israel, California and Florida in the United States and is responsible for Fusarium dieback on avocado [1,2]. The beetle and its symbiont pathogen have been confirmed to be present on London Plane trees in KwaZulu-Natal [3], as well as on avocado in the Gauteng and Western Cape Provinces, South Africa [4].

Symptoms

A host's visible response varies among species. On avocado, sugary exudate (sugar volcano) and frass pinpoint the single beetle entry/exit hole (Fig. A). The hole can be dry or surrounded by wet discoloration of the outer bark. Examination of the cortex and wood underneath the hole reveals brown discoloured necrosis caused by the fungus (Fig. B). *Fusarium* invades the vascular tissue, causing necrosis of the cambium that results in branch dieback and tree death [5].

Biology

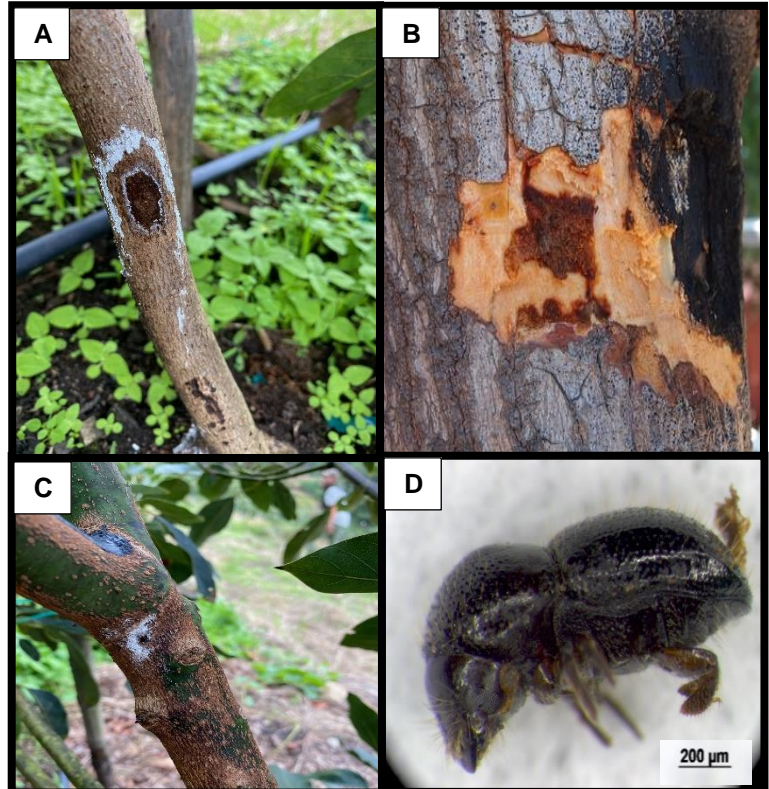
Euwallacea nr. *forficatus* beetles are very small and difficult to see. The entry and exit holes, which are about 0.85 mm in diameter, can be located on the branches and trunk of infested trees (Fig C) [6]. Female beetles are black and approximately 1.8-2.5 mm long (Fig. D), males have a brown colouring and are about 1.5 mm long [7]. Beetles colonize living and dead wood [6]. The beetle carries spores within a mandibular mycangium (specialized mouthparts). The adult females burrow into trees to establish brood galleries while depositing the fungi which colonize the gallery walls to provide a food source for the developing larvae and adult beetles [1,8].

Known Hosts

The host range for the beetle-fungus complex in South Africa includes 144 trees species that are attacked by the beetle, with 62 of those species that the beetle can use as a reproductive host [9]. Hosts include avocado, box elder, castor bean, oak, citrus, tea and London plane, litchi, mango, cacao and macadamia [3,10]. Common trees to be killed are English oak, Coral tree, Keurboom, Cape willow, Chinese maple, Japanese maple, Boxelder and Sweetgum [11].

Control

Management options are limited. The main approach for reducing damage is monitoring for the presence of the beetle (visual inspection and trapping) and sanitation. Removal of branches, chipping and solarization of the infested material in the orchard for at least 1 week is advisable. Avoid moving infested material between orchards and sterilize tools with household bleach. There are no chemicals that are effective in controlling the beetles or the pathogen [11]. Querciverol can be used in beetle traps to monitor shot hole borer invasions and dispersal.



Photos by South African avocado growers, Casey Gill, California avocado growers and the Eskalen Lab, University of California Riverside.

What to do?

1. Look for the exit hole surrounded by white exudate.
2. Scrape off the bark to see the canker.
3. Follow the gallery to look for the beetle (not always present).
4. Look for alternative host plants in the area.
5. Fill out a FABI diagnostic clinic form, available at app.informationhub.io/form/cl3cy217x00674ts66dcfz1n1 or email diagnostic.clinic@fabi.up.ac.za.
6. Chop the infested branch off, place in a plastic cooler box, seal properly and send to the ARP Diagnostic Clinic.

Contact Address

Avocado Research Programme, Prof. Noëliani van den Berg, Diagnostic clinic, FABI, 74 Lunnon street, University of Pretoria, Pretoria, 0083
Dr. Lieschen De Vos: +27 12 420 3938/5826

References

1. Eskalen *et al.* 2012. *Plant Disease* 96 (7): 1070.
2. Carillo *et al.* 2016. *Insects* 7 (55): 1-11.
3. Paap *et al.* 2018. *Australasian Plant Pathology* doi/org/10.1007/s13313-018-0545-0.
4. Van den Berg *et al.* 2019. *Plant Disease* 103 (7): 1774.
5. Eskalen *et al.* 2013. *Plant Disease* 97 (7): 938-951.
6. Eskalen *et al.* 2015. UC Riverside. <http://eskalenlab.ucr.edu/handouts/>
7. Eskalen & Stouthamer. 2012. Pest Alert: Fusarium dieback of California avocado trees vectored by Tea Shot Hole Borer (*Euwallacea forficatus*). University of California Riverside.
8. Mendel *et al.* 2017. *Phytoparasitica* 45 (3): 341-359.
9. Umeda *et al.* 2016. *Insects and Diseases of Mediterranean Forest Systems* pp. 757-767, Springer.
10. Freeman *et al.* 2016. *Symbiosis* 58: 245-251.
11. Paap & de Beer. 2021. Forestry and Agricultural Biotechnology Institute. www.fabinet.up.ac.za/pshb.