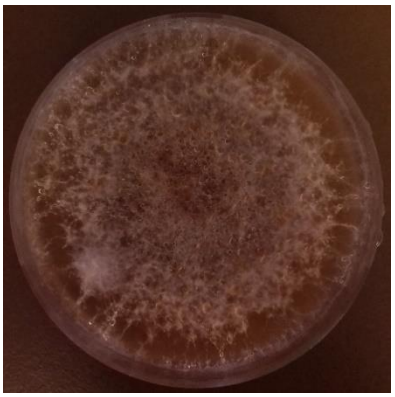
Control of the polyphagous shot hole borer

What is the polyphagous shot hole borer (PSHB)?

The polyphagous shot hole borer *(Euwallacea fornicatus)* is an ambrosia beetle native to Southeast Asia. The beetle has a symbiotic relationship with the fungus *Fusarium euwallaceae*, which causes branch dieback and can kill susceptible trees. In 2017 the presence of this pest was confirmed in South Africa, and it has since been found in all provinces except Limpopo. This makes the PSHB invasion in South Africa the largest geographical outbreak of this beetle in the world. It is affecting trees in all sectors: the agricultural and commercial forestry sector, urban trees (public spaces, streets, gardens), as well as native trees in natural forests.

Polyphagous shot hole borer *(Euwallacea fornicatus)*.



The fungal symbiont of the polyphagous shot hole borer, *Fusarium euwallaceae.*

How does the PSHB kill trees?

- As adult females bore into trees to establish breeding galleries, they introduce the fungus *Fusarium euwallaceae,* which colonizes gallery walls. The fungus is cultivated as a food source for developing larvae and adult beetles, but it invades and kills the tree's vascular tissues, preventing sap flow. This can lead to branch dieback and tree death.

What is the difference between reproductive and non-reproductive hosts?

- The PSHB can attack many species of trees. However, it is not able to breed and multiply on all these tree species.
- **Reproductive hosts:** Trees in which both the beetle and the fungus establish. The beetles construct galleries (tunnels) and breed successfully. In many cases, reproductive hosts will eventually die.
- **Non-reproductive hosts:** Trees that are attacked by the beetle, but in which the beetles do not establish breeding galleries. The fungus may or may not cause disease. Trees are generally not expected to die.

What is a heavily infested reproductive host tree?

A tree is a heavily infested reproductive host if PSHB is actively breeding throughout the tree. You will see many entrance and exit holes, with other signs such as frass or noodles indicating extensive beetle activity. Once a susceptible reproductive host tree becomes heavily infested, it is generally not expected to survive.

What should I do if I suspect I have PSHB in my orchards?

Identification

The PSHB is 2 mm in size. If you observe signs of PSHB such as entry holes, frass, or a beetle of approximately the right size, please collect samples and submit them to the Disease Diagnostic Clinic at FABI.

Click here to view:

FABI Disease Diagnostic Clinic

Click here to view:

How to photograph.

Click here to view:

Sample collection.

Management

Are there any chemicals I can use?

At present no chemical product is registered (legal) to use on PSHB in South Africa. However, research in this regard is ongoing in multiple industries.

Removal of trees

Reproductive hosts of the PSHB serve as reservoirs where the PSHB can breed, and build-up of populations in reproductive hosts will lead to accelerated spread in orchards.

Removal

1. Monitor private gardens, ornamentals, and windbreaks near macadamia orchards.
    - Remove reproductive hosts near macadamia orchards proactively. **Click here to view:** PSHB host list.
    - Affected branches on non-reproductive hosts can be removed to limit Fusarium dieback.
2. If the main stem is infested and shows signs of PSHB reproduction (multiple entries and exit holes, frass, or extensive tunnelling and presence of larval stages) remove the tree.
3. If signs of PSHB reproduction is only visible in lateral branches, cut reproductive side branches as close to the main stem as possible.
4. Do not move infested wood out of orchards. Treat infested wood as close to the source as possible.
5. Chipping and solarization is effective for smaller branches and smaller volumes of wood.
6. Alternatively, wood can be burned in the orchard. This may be more practical if larger volumes of wood need to be destroyed, or if chippers capable of chipping main stems to the required size are not available.

Chipping

1. Chip infested wood to a size of 2 cm or smaller.
2. Piles of chips should be kept as small as possible to allow for maximum heat penetration through the pile. Piles should not exceed 1 m in height and should range between 1 and 2 m wide.
3. Any implements used in pruning should be cleaned and decontaminated before moving it out of the orchard. A 10% bleach solution can be used to sterilize pruning equipment, followed by an oil, e.g. macadamia oil, application to prevent rust. Beetles don't generally emerge out of the wood immediately, and the PSHB is a poor flyer, thus if wood is burned or solarized on the same day and as close as possible to the source spread of the beetle is minimized.

4. However, chippers, tractors etc. can be hosed down with water or high-pressure air.

Solarization

2. Ensure all plant material is covered with plastic sheets and the edges should be secured.

1. Chipped plant material in piles should remain covered for 6 weeks in summer, and 6 months in winter.