

S.A. PEEKAN



Research: The Impact of the Polyphagous Shothole Borer on Pecan Trees in South Africa



KWEKERS Vergadering





SA.Pecan



From the Editorial Team

Die 2019 pekanneutoes is alweer op ons en vir die boere wat 'n goeie drag het is ons baie dankbaar en bly. Vir die wat 'n skraal oes het as gevolg van die droogte of die verwoestende hael en stormwinde wens ons sterkte toe, en word ons telkens weer herinner aan die wisselvallige en soms wrede neigings van Moeder natuur. 'n Boer kan moeder natuur nooit onderskat nie en moet altyd sy beplanning doen met die wete dat Sy kan kom inmeng.

Aan ons nuwe opkomende boere met jong boompies – dis weer 'n jaar wat verby is en dit beteken dat julle 'n jaar nader is aan daai eerste oes!! Iets om oor dankbaar en opgewonde te wees. Geduld is nie altyd maklik nie!

This issue of the SA Pecan is full of interesting articles- we hope that you will find them beneficial and that you can implement some of the advice given. Once again keep in mind the six month difference with the American articles.

Met ontvangs van hierdie uitgawe het die “Kursus vir nuwe toetreeders” (16 en 17 April te Cullinan) seker reeds plaasgevind. 'n Baie gewilde kursus wat vir die tweede keer aangebied is. Dis spesifiek op die beginnerboer gefokus. Ook in hierdie uitgawe is artikels geplaas wat fokus op wat belangrik is vir beginnerboere, grond en varieteite, en ook vir die produserende boere word gekyk na gesonde blare asook nabetrugting – waar kan ons verbeter.

We are thankful to Shawn Fell (MSc student) and Wilhelm de Beer (research leader) for writing and sharing the following article “The impact of the Polyphagous Shothole Borer on Pecan trees in South Africa”. This article was presented at SAPPA's 2018 Annual Meeting and we thank Shawn and Wilhelm for presenting it as an article for our magazine. Please contact Hardus if you think you have spotted the Shothole borer in your pecan orchard.

We would like to thank Wollie Burger for sharing his photographic talent with us – the front cover photo's are his! If any of our readers have similar talents or have outstanding photo's and would like to have them featured on our front cover – please contact Mandie at abbymandiebouw@gmail.com!

Groete van die Redaksie span: Albert, Mandie & Ronél

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Sterkte
aan almal vir die besige seisoen wat voorlê



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The Impact of the Polyphagous Shothole Borer on Pecan Trees in South Africa

- a SAPPA funded research project

In May 2017 the Polyphagous Shot Hole Borer (PSHB) was discovered on pecan trees in the Jan Kempdorp area. It has since been detected on pecans on several farms surrounding Jan Kempdorp. In February this year it was also found infesting a few pecan trees in the Nelspruit area.

The PSHB is native to Southeast Asia where it is not really known as a serious pest. However, it gained the attention of farmers and researchers after it started killing trees in Israel and the United States (California) about 15 years ago.

The research team working tree diseases at the Forestry and Agricultural Biotechnology Institute (FABI) in Pretoria was first alerted to the presence of PSHB in South Africa in February 2017. Dr Trudy Paap was doing a survey of tree diseases in the KwaZulu-Natal National Botanical Gardens, Pietermaritzburg, where she found a lane of large London Plane trees infested with PSHB. Following the subsequent discovery on pecan trees later that year, the presence of the PSHB has since been confirmed in Durban, Johannesburg, George, Knysna, Bloemfontein, and Nelspruit.

What is the PSHB? The PSHB belongs to large group of about 3400 beetle species referred to as ambrosia beetles. These beetles bore into dead or dying trees in which they construct a network of tunnels, known as galleries. The beetles cannot digest wood and therefore cultivate their own, specific fungi that grow as mould on the surface in these galleries. The fungi then degrade wood, extracting and concentrating nutrients, and usually forming rather large spores ('seed') that serve as food to the beetles and their larvae.

The life cycle of the beetle starts when a mated female bore through the bark into the living sapwood of a tree. She constructs a gallery and inoculates the sides of the tunnels with the symbiotic fungus, that then starts growing to form a 'garden'. Each female beetle lays an average of 34 eggs in the galleries. These hatch and usually include one male for every 10 females. The larvae mature in the galleries. The male fertilizes the females (his siblings) in the galleries, where they will stay until conditions are right for the the fertilized females

to leave the host in search of a new host tree, where the cycle repeats. Several life cycles can be repeated every year.

The PSHB has been reported to carry three fungal symbionts: *Fusarium euwallaceae*, *Graphium euwallaceae* and *Paracremonium pembeum*. *Fusarium euwallaceae* serves as primary food source for the adults and their larvae. When the tree starts dying and nutrition declines, the abundance of *F. euwallaceae* declines and *G. euwallaceae* eventually becomes the main food source for the beetle. The role of *P. pembeum* is not yet fully understood and requires further investigation.

Fusarium dieback. In susceptible tree species the *Fusarium* fungus causes dieback, that can lead to tree death. This occurs due to the *Fusarium* blocking the flow of nutrients through the vascular system of the trees. External symptoms differ between different tree species, ranging from watery stains, as found on pecans, to sugary fountains, found on avocados. When the bark is removed, staining can usually, but not always, be seen around the tunnel in the cambium. When one removes the cambium and outer layer (about 5 to 10 mm) of sapwood, vertical fungal streaks are present.

It is important to note that firstly, not all infested trees will die, and secondly that the beetle can insert the fungus in many trees, but only reproduces in a much smaller number of tree species. A reproductive host is a tree species where the beetle and fungus establishes successfully and where the beetle breeds and multiply. Non-reproductive host trees are those where the fungus is inserted, but where the beetle either leaves the tree again, or dies in the tree without reproducing (often being trapped in resin that the tree produces as defense). Reproductive host trees are the priority for control measure as they are a reservoir for the beetles, from where they disperse, infesting surrounding trees, resulting in the further spread of the disease.

In South Africa about 80 species of trees, of which 35 are native trees, have thus far been reported as susceptible to PSHB attack and infection by the *Fusarium* fungus. About 20 of these species are reproductive host, including English oaks, various types of maples, willows, planes, and the castor bean weed. A continuously updated list of confirmed host trees in South Africa can be viewed at www.fabinet.up.ac.za/pshb.

To date pecan trees are the only species where the PSHB has been found in commercial orchards. Although it has been found on avocado trees in private gardens in Johannesburg and Knysna, it has not been found in orchards yet. Other fruit and but trees that have been reported to be infested, but without serious disease development, are macadamia, peach, citrus, grapevine, guava and plum trees.

The impact on pecan trees . The long-term impact of *Fusarium* disease on pecan trees remains unsure. It has not caused serious disease on these trees in California. However, we have seen many trees infested in orchards in the

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A new Species Name for the Beetle.
The PSHB was until recently known as *Euwallacea fornicatus*.

However, genetic studies showed that *E. fornicatus* consists of four different beetle species. The real *E. fornicatus* infests tea plantations in Asia, Florida and Australia, and is now referred to as the Tea Shot Hole Borer *A. Euwallacea whitfordiodendrus*, an old species name, that was treated for many years as a synonym of *E. fornicatus*, is now used for the Polyphagous Shot Hole Borer (PSHB).

The other two species in the complex are *E. kuroshio* (Kuroshio Shot Hole Borer) and *E. fornicator* (Tea Shot Hole Borer B). It is important to distinguish between these species as they differ in pathogenicity and infest different host trees and occur in different countries.

The correct name is needed to find the correct and most appropriate information on each species.

Photos - External symptoms on pecan trees are as follows:

Initially

1. a small hole the size of a toothpick, sometimes surrounded by a wet spot. Within the first few weeks after infestation
2. a white powdery stain can develop around the holes, which
3. makes it easier to detect the entrance holes on a distance from the tree.
4. Over time the bark can start cracking. If the bark is carefully removed
5. there is usually a dark spot or short mark in the cambium, sometimes with a hole in the middle.
6. Five millimetres deeper into the sapwood, the *Fusarium* fungus forms long streaks as it starts growing up and down in the xylem.
7. These streaks can sometime become very dark in colour.
8. Three female beetles next to a toothpick: they are about 2 mm long, with a smaller make on the right.
9. Shawn Fell is an MSC student at the University of Pretoria doing the research and field work for the SAPP funded PSHB project.
10. Prof. Wilhelm de Beer is the leader of the SAPP research project, which forms part of a larger group of projects on the PSHB that are coordinated by him.

Burkea africana

Kwekery

* Die SAPPA geregistreerde pekan kwekery word organies bedryf.

* Verkoop slegs goeie gehalte boompies wat aan SAPPA standarde voldoen.

* Variëteite jaarliks gedurende Julie-Augustus beskikbaar: Wichita, Western, Navaho, Pawnee, Choctaw, Oconee, Barton, Mohawk.

* Spoedige plasing van bestellings verseker beskikbaarheid van Alle variëteite soos benodig.

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The Impact of the Polyphagous Shothole Borer on Pecan Trees in South Africa ▶▶

