



SA·Pecan

Photo taken by Paolo Slaviero

From the Editorial Team

December 2021. Over and out.

It has been a rough year, or rather a rough, tough 2 years. Covid has impacted us all – even the pecan industry. The knock-on effects of lockdowns, loadshedding and political and social turmoil are being felt by all. Loss of loved ones, loss of employment, loss of “normal” routines, loss of freedom – we have all, in some way, been impacted.

And yet.... As we walk through our pecan orchards we can only stand in awe of the resilience and beauty of nature. Without fail the pecan orchards bloom into green forests as soon as spring arrives. Flowers, pollination, nutlets... and eventually trees laden with pecan nuts. When life gets overwhelming it is worth taking that walk through the orchard and opening your eyes to the miracle of nature, of life.

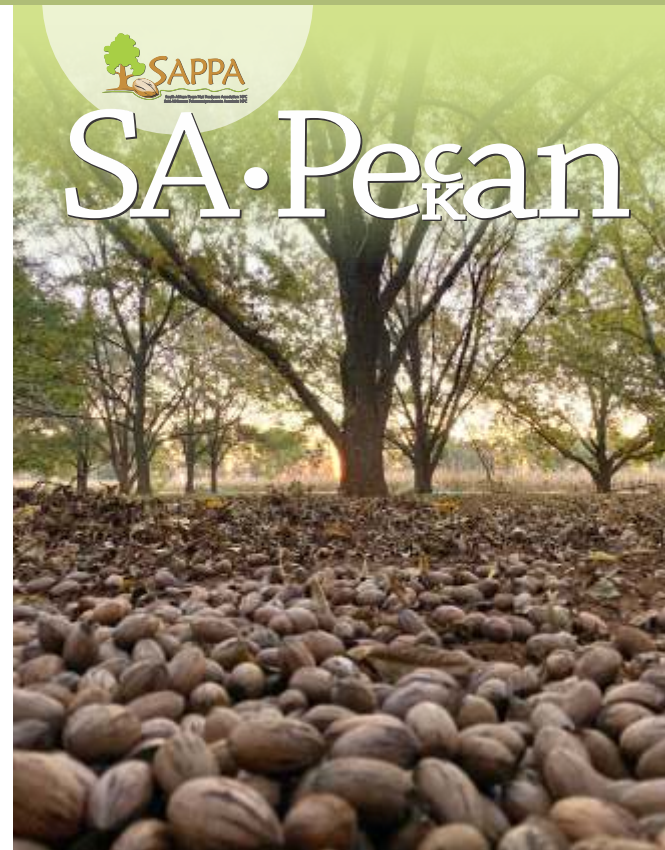
This issue of the SA Pecan is always an exciting one as we get to reflect and share photos of the recent SAPPA AGM! Covid prevented us from having an AGM last year, so we were thrilled to travel to Upington to meet up with some of you. Thank you to Lourens Maass for organizing a hugely successful AGM.

We would also like to take this opportunity to thank Hortgro, our SAPPA chairman Ivan Otto, our manager Andre Coetzee, our admin officer Andriette de Jager, the technical advisors Hardus & Ivan and then all our regional representatives who work hard to better SAPPA for all its members. Thank you for your time and effort – we appreciate all you do.

We would also like to CONGRATULATE **Paolo Slaviero** for sending us the winning photo for our Front Cover Photo Competition. The RUNNER UP is Renier Snyman. Thank you for your contribution – we hope to run the competition again and look forward to receiving more photo's.

We wish you all a very blessed Christmas season!

Regards, The Editorial Team



Suid-Afrikaanse Pekannutproducente Assosiasie NPC Tydskrif | 2021 | Volume 90
South African Pecan Nut Producers Association NPC Magazine

Director's Report AGM 2021.....	4
Algemene Jaarvergadering & Inligtingsdag 2021.....	6
Cost of Advertisements.....	13
Direkteure en Personeel, Sappa Kantoor, Sappa Regions, SA Pecan Redaksiespan.....	14
Insects associated with Pecan Trees: <i>Carya illinoensis</i> : characterisation, impact and control.....	16
Devaluation of Paclobutrazol in Pecan Nut Trees: Growth, Yield and Residues.....	20
Quantifying Water Use of mature pecan orchards in selected irrigation areas of the Northern Cape.....	22
The Threat of the Polyphagous Shot Hole Borer to Pecan Trees is perhaps less than initially expected.....	29
Meganisering help boer vooruit.....	32
Nuwe Direkteur - Streek 9.....	33
Role of Zinc Carriers in Pecan Production.....	35
Winner & runner up of the SA Pecan Photo Competition...	37
Essential Elements in Pecan.....	39
Insight into Alternate Bearing — do Carbohydrates drive it?	44
The Importance of Pecan Rootstocks for semi-arid regions..	47
Recipes: Pecan-Plum 'Meringue-Mess' & Die Ou Huis Pecan Muffins.....	48

Besigtig vorige drie (3) SA Pecan uitgawes op die SAPP Webwerf
View previous three (3) SA Pecan issues on the SAPP Website

die produsente databasis op datum kom, noukeurige oesskatting, prys, vraag en aanbodbewegings op internasionale markte vir die beskikbaarstelling vir besluitneming. SAPPA het ook onlangs begin adverteer vir die aanstelling van 'n inligtingsbeampte en hoop om teen Januarie 'n geskikte persoon aan te stel.

Transformasie komitee. Transformasie, of dalk eerder bemagtiging is 'n fokuspunt vir SAPPA is en ook 'n vereiste in terme van statutêre maatreëls. Die proses is meer geformaliseer met daarstel van 'n transformasie plan, tegniese ondersteuning en implementering. Transformasie sluit in die verskaffing van bome sowel as ander produksie materiale, praktiese evaluasie en bystand op die plaas, opleiding, mentorskap en beurse vir studente.

Die afgelope jaar het SAPPA 22.6% van sy begroting aan transformasie spandeer waarvan om en by 50% (30% bome is 3145 bome) aan bome en ander produksie materiaal, 45% aan opleiding en evaluasie, wat beurse insluit en 5 % vir sosio-ekonomiese ontwikkeling gegaan het.

Bykans 50% van die totale bome, tot op datum geplant, groei nog. Transformasie is nie net 'n boksie wat “getik”, word nie, maar

SAPPA poog om soveel as moontlik suksesvolle projekte te vestig.

Navorsingskomitee. Die navorsingskomitee het ten doel het om navorsingsbehoefte deurentyd te identifiseer, na te gaan en te prioriseer. Die komitee moet ook toesien dat navorsing relevant bly en gereelde terugvoering gee aan SAPPA lede.

Laasjaar met Covid-19 was daar ongelukkig nie terugvoer op die virtuele jaarvergadering nie, maar die verslae is gepubliseer in die SA Pekan tydskrif. Tydens hierdie AJV sal daar weer terugvoer wees oor van die projekte.

My gevoel na daar met verskillende produsente in die verskillende streke gepraat is, is dat die voorlopige waarnemings in boorde baie positief is en ek glo hierdie gaan 'n positiewe jaar wees vir neutproduksie. Ons sit met 'n besonderse produk en alhoewel ons uit 'n moeilike seisoen kom is my oortuiging dat dit goed sal gaan met produksie en pryse. Gaan spandeer tyd in jou boord en sien vir jouself.

*Mag die seisoen DIE seisoen wees
wat almal van praat as “Volgende Seisoen”.*

Algemene Jaarvergadering & Inligtingsdag

5 en 6 November 2021
- Upington @ DIE OUHUIS

SAPPA was able to host a very successful Annual General Meeting on the 5th and 6th of November 2021. The event was held at the Ou Huis in Upington.

On Friday the 5th SAPPA held their Annual General Meeting, which includes feedback on what it has been busy with. Finalization of agenda's, approval of minutes, the Director's report (read the AGM report on page 4), election of directors, the appointment of an auditor, financial oversight and feedback, the budget is discussed as well as SAPPA entry and membership fees.

SAPPA has also initiated numerous research projects and opportunity was given to these entities to report back on what they



have been busy with. We thank the following speakers for their time and the work they have done for the South African pecan industry:

- Dr Elsje Joubert (Cultar Feedback - 20)
- Dr Nicky Taylor (Water Use Research - 22)
- Wian Visser (Zinc Uptake Research - page 35)
- Dr Justin Hatting (Insect Research - page 16)
- Dr Wilhelm de Beer (Polyphagous Shot Hole Borer Research - page 29)

These reports are all summarized and available to read in this issue of the SA Pecan.

Spesiale gassprekers is ook genooi en ons wil graag die volgende drie sprekers hartelik bedank:

- Piet Karsten: Faktore wat ons in ag moet neem vir suksesvolle toekomsgerigte Landbou.
- Kobus Hartman: MRL'e: Wat is dit en hoe raak dit die mark vir pekanneute?
- Deon Joubert: Lesse uit die sitrus industrie vir pekanneut markontwikkeling.

No SAPPA AGM and Information day is complete without exhibitors and a field visit, nor without “lekker” meals and plenty of breaks to catch up and mingle. We would like to thank Lourens Maass for the organising of this event – it was a resounding success!

Thanks to Wollie Burger for the beautiful AGM photographs seen on these pages. We appreciate your eye for detail and the time you set aside to capture special AGM moments.

Also a special thanks to all those who work behind the scenes to organize an AGM. You know who you are and we are grateful for the hard work you put in to make the AGM successful.

We look forward to seeing many (more) of you at our next AGM in Hartswater 2022.



By Registrasiepunt.



Opening Ds. Hennie Pistorius open die Algemene Jaarvergadering 2021 met skriflesing en gebed.

Gasspreker Piet Karsten Mnr. Piet Karsten gesels met die vergadering oor die faktore wat in ag geneem moet word vir suksesvolle, toekomsgerigte Landbou.



Gasspreker Deon Joubert CGA: Lesse uit die sitrus industrie vir pekanneut markontwikkeling.



Dr Wilhelm de Beer Terugvoer oor navorsingsprojek Polyphagous Shot Hole Borer, Dr Wilhelm de Beer ontvang geskenk van Hardus du Toit



Lede wat by die vergadering was: Riaan Botha was een van die gaste op vergadering wat deelgeneem het aan bespreking Alvin Archer Navorsing



Nog SAPPA lede wat die vergadering bygewoon het: Andre Coetzee (SAPPA Bestuurder).

Hendriëtte de Jager (Administratiewe Beampte), Neo Modisa, Dawn Masehali en Dumisani Ndebele (Direkteur van Transformasie).

Albert Bouwmeester in gesprek met Francois de Villiers.



The Threat of the Polyphagous Shot Hole Borer to Pecan Trees is perhaps less than initially expected

By Wilhelm de Beer & Shawn Fell

The tiny Polyphagous Shot Hole Borer (PSHB, or *Euwallacea fornicatus*) is spreading through South Africa, killing thousands of trees. It has been found on more than 140 species of trees in the country, of which a few species like English oaks, boxelders, Chinese maples and London planes, are particularly susceptible to the *Fusarium* fungus that the beetle carries. These trees can die within months or over a period of up to five years, depending on the number of beetle attacks, the size, age and general condition of the individual tree.

PSHB was discovered attacking pecan trees in the Jan Kempdorp area in May 2017, where there is an ongoing outbreak (see SA Pecan Autumn 2019). Although it has been found on several other fruit trees in gardens in South Africa, including avocados, macadamias, citrus and stone fruits, pecans are the only crop tree in South Africa where PSHB has established in orchards. In California and Israel, the beetle and its fungus are also having an impact on crop trees, especially in the avocado industry.

PSHB has not been reported from commercial pecans anywhere else in the world. The discovery of the beetle in South African pecan orchards thus raised immediate concern with the industry. A major problem is that different tree species react very differently to the PSHB and its fungus. The long-term impact of *Fusarium* disease on pecan trees could therefore not be predicted at all. SAPPA requested the research team at the Forestry and Agricultural Biotechnology Institute (FABI) at the University of Pretoria to determine the potential threat of PSHB to the pecan industry in South Africa.



Photo 1: Pecan tree infested with the PSHB

Reproductive host trees are trees that the PSHB beetle infests and where it successfully establishes a breeding gallery in which the fungus grows, where eggs are laid, and larvae develop into mature adults, thus completing its life cycle. The majority of reproductive hosts eventually succumb to the disease symptoms caused by the fungus.

Non-reproductive host trees are attacked by the beetle, but the beetles do not establish breeding galleries. The fungus may, or may not cause disease. Trees are generally not expected to die.

An updated list of the host trees and more information of the PSHB are available at www.fabinet.up.ac.za/pshb

The PSHB research project on pecans

To predict the impact of PSHB on pecans or to recommend treatments, there were several aspects PSHB infestations on pecan trees that we first needed to understand. A research project was thus initiated at the end of 2019 in collaboration with the Pecan Disease Programme at the University of the Free State. The project has various components. Below we report on progress in each of these areas.

Diagnosing PSHB infestations

The diagnostic clinic at FABI assists SAPPA and its members in the identification of potential PSHB infestations. As there are many beetle and fungal species that can be confused with the PSHB and its *Fusarium* fungus, respectively, the identity of the beetle and fungus need to be confirmed by specialists using microscopy and DNA sequencing. Samples of the beetle and fungi were regularly taken from the Jan Kempdorp area, and some samples were received from pecan in other parts of the country. To date, PSHB has only been confirmed on pecan orchards in the Jan Kempdorp area, a few old, stressed pecan trees in the Nelspruit area in early 2019, and in a large old pecan tree in the Durban Botanical Garden in July 2021.



Photo 2: Internal streaking of the sapwood of a pecan tree by the *Fusarium* fungus



» Shot Hole Borer Research

Survey for reproductive host trees in the Jankempdorp area

Apart from one dying pecan tree in 2017, we have not found any other pecan tree in which the beetle reproduced during our monitoring efforts between January 2018 and October 2021. It thus seems as if pecans are not reproductive hosts for the beetle*. We hypothesized that the Jan Kempdorp outbreak is caused by beetles that breed in reproductive host trees close to the pecan orchards.

A survey in and around the outbreak area in Jankempdorp revealed six other tree species infested with the beetle. These included: English Oak/Akkerboom (*Quercus robur*), London Plane/Plataanboom (*Platanus x acerifolia*), Sweet thorn/Soetdoring (*Vachellia karroo*), Camel thorn/Kameeldoring (*Vachellia erioloba*), Wild Olive/Olienhout (*Olea europaea* subsp. *cuspidata*), and Wild fig/Knoppievy (*Ficus sansibarica*). The beetle only reproduced in English Oaks and London plane trees.

A large number of English old oaks, heavily infested with the PSHB, were identified in the outbreak area. Several of these trees have died and the others are in the process of doing so. We believe these were the main source of beetles in the environment.



Photo 3: Oak trees dying from PSHB infestation and in which the PSHB breeds and multiplies, were the primary source of beetles at the centre of the Jan Kempdorp outbreak

Determining the geographical spread and flying seasons of the beetle

To understand the dynamics of an outbreak like this over space and time, it is important to map it carefully. Together

with SAPPA staff and drone maps provided by the Department of Agriculture of the Northern Cape Province, about 10000 pecan trees were individually assessed for infestation with the beetle in the outbreak areas, providing a clear view of the extent of the outbreak area at the beginning of the survey.

To determine whether the outbreak is expanding over time, 60 monitoring traps with a volatile chemical lure (quercivorol) that attracts PSHB beetles were hanged throughout the area. All insects collected in these traps were collected every two weeks and the numbers of PSHB beetles recorded over a one year period.

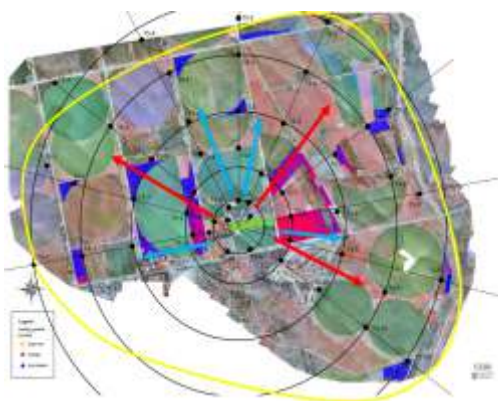


Photo 4: The geographical area of the PSHB outbreak in the Jan Kempdorp area. The yellow line shows the boundaries of the outbreak area, which did not increase over time. The oaks trees that were the main source of the beetles are indicated by green dots. Black dots indicate monitoring traps were placed. Different colours arrows indicated repeated mini-outbreaks when conditions were good for the beetles to fly. However, as there were no other reproductive host trees on the boundaries of the outbreak area, the area did not increase over time.

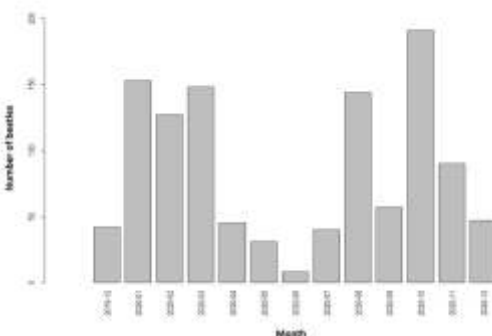


Figure 5: The total numbers of beetles caught within the 50 black panel traps each month over a 1-year period. There is clearly less activity during mid-winter, with most activity during spring and autumn.

Determining the impact of the fungi on pecan trees

The most important part of the project is to determine what the impact of the *Fusarium* and *Graphium* fungi carried by the PSHB are on pecan trees. To determine this we inoculated five living cultures of the fungi (3 *Fusarium*, 2 *Graphium*) into 5 cm thick branches of mature pecan trees.

The 15 year old experimental orchard where we are conducting the experiments, were planted by Dr Nicky Olivier and Prof. John Annandale on the experimental farm of the University of Pretoria. Two varieties (Witchita and Western Schley) in large numbers, and then a few smaller varieties as well. To see the impact of the fungi over time, the trials were read at 3 month intervals over a one year period.

Statistical analyses of these trials are still under way, so final conclusions can only be made once that it done. However, after 3, 6, 9, and 12 months it was clear that the *Fusarium* fungus cause a dark streak in the living sapwood of the tree, but not the *Graphium*. Living cultures of the *Fusarium* fungus were re-isolated from the lesions only after 3, 6, and 9 months, but not after 12 months.

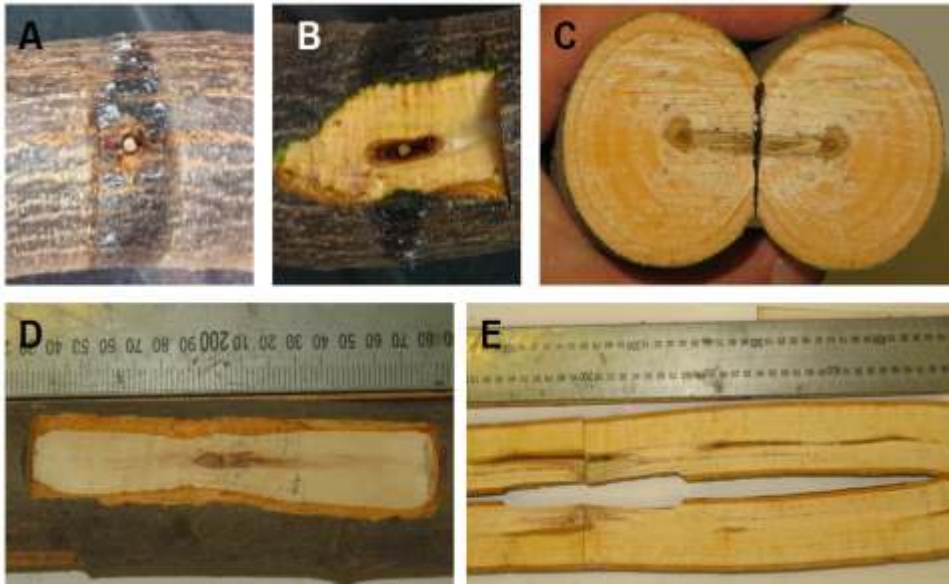
Apart from the fungal streaks in the sapwood of the branches, no other disease symptoms like wilting, dieback or visible yield loss were observed. The fact the fungus was not re-isolated at 12 months suggests that the trees host defences managed to totally suppress or even kill the fungus after 12 months.

The results of the fungal inoculations were very similar to what was observed on attacked trees in the orchards. The points of artificial fungal inoculation with time developed a swelling under the bark similar to what was seen when beetles infested trees in the orchards.

However, the beetles never established and bred in the pecan trees and although bumps were still visible on the bark after even after two years, no other disease symptoms developed. ▶▶



» Shot Hole Borer Research



*Photo 6: Results of inoculations of the *Fusarium* fungus on pecans.*
A: Exterior appearance of inoculation point.
B: Inoculation site showing staining below the first layer of bark.
C: A cross section through the inoculation point presenting fungal streaking.
D: Streaking seen within the cambium.
E: Cross section along the branch showing the spread of the fungus.



*Photo 7: A pecan branch displaying no disease symptoms one year after the *Fusarium* fungus was inoculated at five points on this branch.*

Preliminary conclusions

The preliminary results of the survey suggest that the outbreak area in Jan Kempdorp is not expanding over time. This can be explained by the fact that the beetles do not reproduce in pecans and that very few reproductive host trees are growing among the orchards. However, repeated waves of infestation in the same area will continue as long as the source population of the beetle is still present.

During observations in the Jan Kempdorp orchards during the two year study period, and fungal inoculation trails conducted over a one year period, we have not observed a single pecan tree that developed serious disease symptoms or have died. This indicates that the fungal symbiont does not pose a serious threat to at least healthy Wichita and Western Schley trees. Final conclusions will be made once statistical analyses of the data is completed.

It is clear that there is that there is no reason for panic and that pecans will not be wiped out as some newspaper articles suggested. However, there are three other species of Shot Hole Borer that is not yet present in South Africa that carry different species of fungi. We cannot safely assume that those species will not be introduced into South Africa at some point, nor that they will not be able to cause disease on pecans. Therefore, together with SAPPA, it is important that farmers need to continue monitoring their orchards and reproductive host trees like London plane, oak trees, and castor bean (kasterolie) for symptoms of PSHB attack.

If you suspect that you might have PSHB infestations on your trees, contact Hardus du Toit of SAPPA him and he shall guide you how to take samples and how to send it to FABI.

FUN FACTS ABOUT

PECANS

Pecans are good for so much more than just pie! Rich in antioxidants, pecans are a great source of potassium, fiber, iron, vitamin B-6, and magnesium.

- 1 ALBANY, GEORGIA**
 The pecan capital of the world, boasting more than 600,000 pecan trees.
- 2 TWO YEARS**
 Pecan trees only produce nuts every two years.
- 3 80% OF CROPS**
 Pecan trees are native to North America and over 80% of the world's pecan crop comes from the United States.
- 4 OLYMPIC TORCH HANDLES**
 Georgia pecan wood was selected by the Atlanta Committee to make the handles of the torches for the 1996 Olympic Games. The torches were carried in the 15,000-mile U.S.A. relay and in the lighting of the Olympic flame in Atlanta on July 19, 1996.
- 5 200 YEARS**
 Pecan trees can live to be over 200 years old.
- 6 FIBER RICH**
 One ounce of pecans provides 10% of the recommended daily fiber intake.

SO, GO ENJOY SOME PECANS!

WWW.ELITECURS.COM

**During a survey in October 2021 PSHB were found reproducing in some older pecan trees in one orchard in the Jan Kempdorp area. These trees were 18 years old and the beetles were only found in lower branches stressed and dying back due to an apparent lack of sunlight. We are currently monitoring these trees to gain a better understanding of the phenomenon.*