"The **European woodwasp** emits a **pheromone blend** of 4 compounds that can be used to **protect pine trees**"

Pheromone blend investigation of a pine tree killer, the European woodwasp *Sirex noctilio*

Quentin Guignard, Marc Bouwer, Jeremy Allison, Bernard Slippers

Introduction and Aim

The European woodwasp *Sirex noctilio*[1] has been introduced worldwide and is a threat for the forestry industry by infecting and killing pine trees. We aim to identify potential pheromone compounds[2] that can be used as a long range attractant to trap the invasive pest *S. noctilio*.

Methods

Volatile compound sampling: SPME fiber (N=9), PorapakQ extraction (N=34) and glass wash (N=4).

Compounds identification: GC-EAD, GC-MS, GC X GC TOF MS and analytical chemistry.

Antennal responses: Standards at doses from 100 to 100 000 ng were tested by electro-antennography on male (N=10) and female (N=10) antennae.

Origin of the pheromone: Body parts of males were cut into different pieces. The volatile compounds emitted by each piece were collected with a SPME fiber and analyzed by GC-FID.

Results

- **Males produce a pheromone blend of 4 compounds**. The major compound was found in all samples and always elicit an antennal response **(Figure 1)**.
- **Compounds were identified** as the Z-3-octenol, Z-3-decenol, Z-4-decenol, Z-3-dodecenol **(Figure 2)** .
- Both male and female **antennae are sensitive to the four compounds (Figure 3)** .
- The four compounds were found to be **released from the hind legs** of males **(Figure 4 and 5)**. The strong sexual dimorphism of the hind legs indicate that the pheromone might act as an aggregation or sexual pheromone.

Conclusion

A potential attractive pheromone blend made of four identified compounds were confirmed by electro-antennography. This pheromone blend is currently being tested in the South-African pine plantations at different ratios for their effectiveness in trapping *S. noctilio*.

Figure 1: Example of females (N=6) antennal responses (µV) to two volatiles compound released by *Sirex noctilio* males.

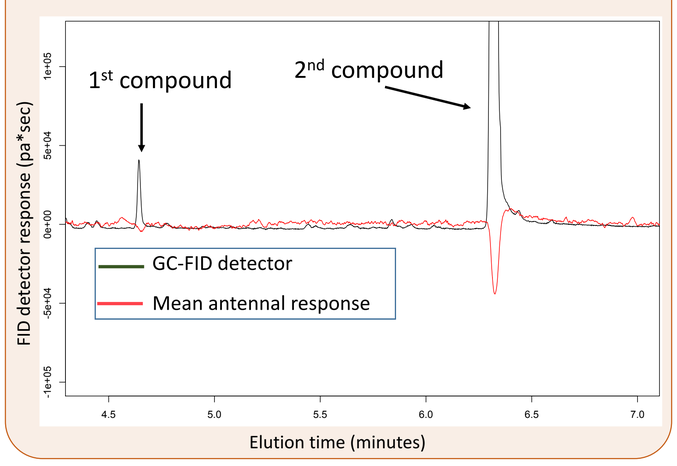


Figure 2: Identification of the first (left) and second (right) suspected volatile compounds. Top : Mass spectrum of the original compound. Bottom: Mass spectrum of the DMDS derivatized compound showing the double bond location.

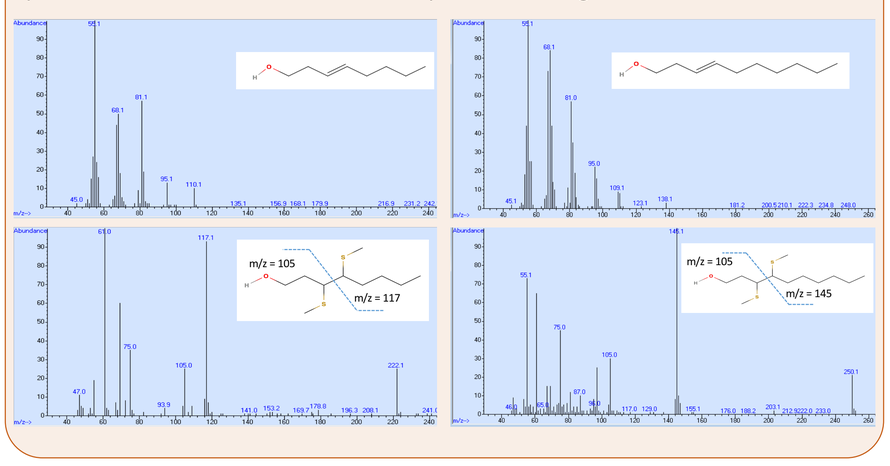


Figure 3: Relative EAG response profiles (mean ± SE) of the four standard compounds puffed on *S. noctilio* antennae (n= 10 males and females) for six different doses. Asterisk (*) indicates significant differences (p<0.05) between male and female.

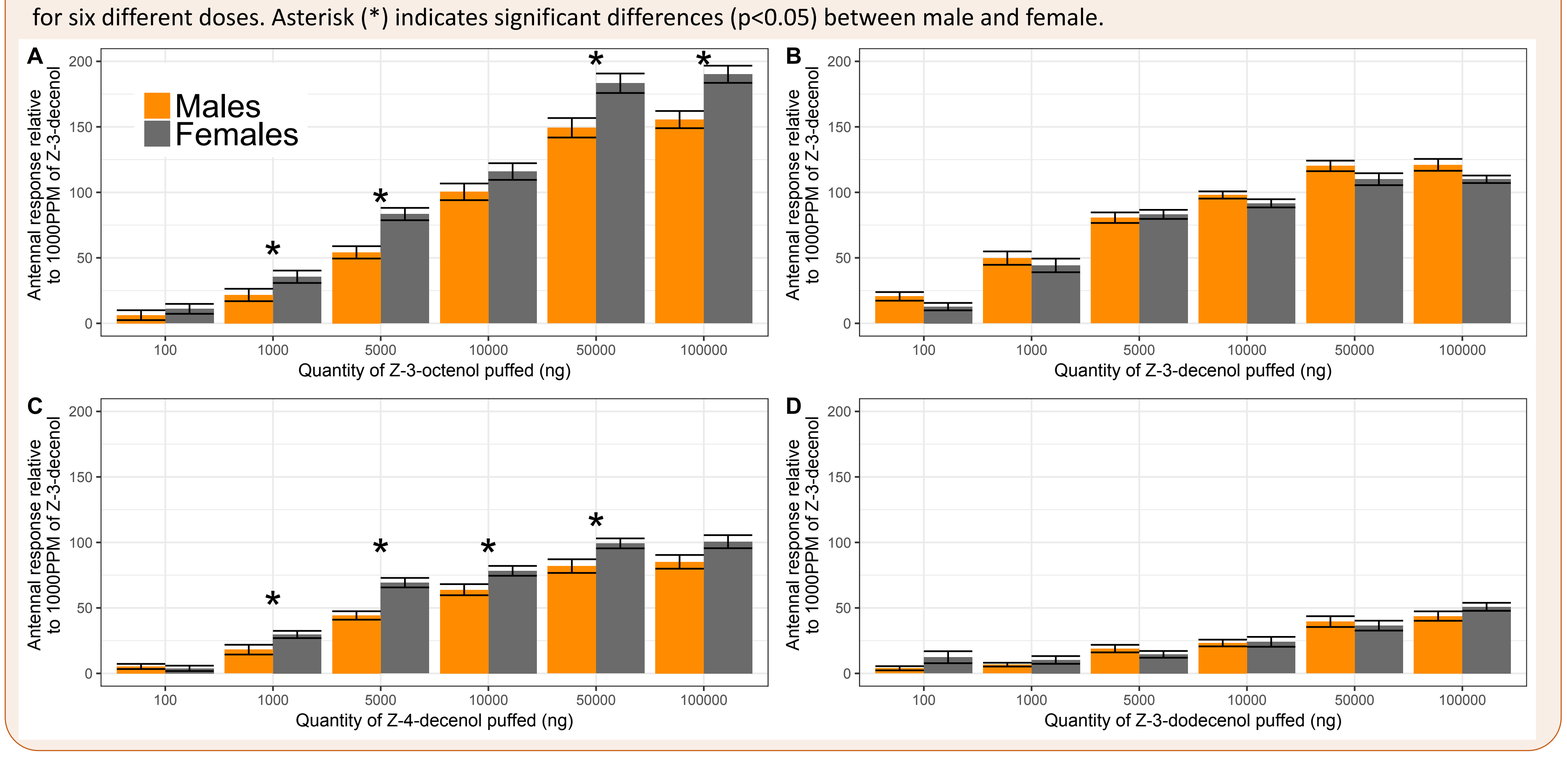


Figure 4: Percentage of pheromone released from the contributing sections of the whole body, thorax and hind legs respectively (N=3 males).

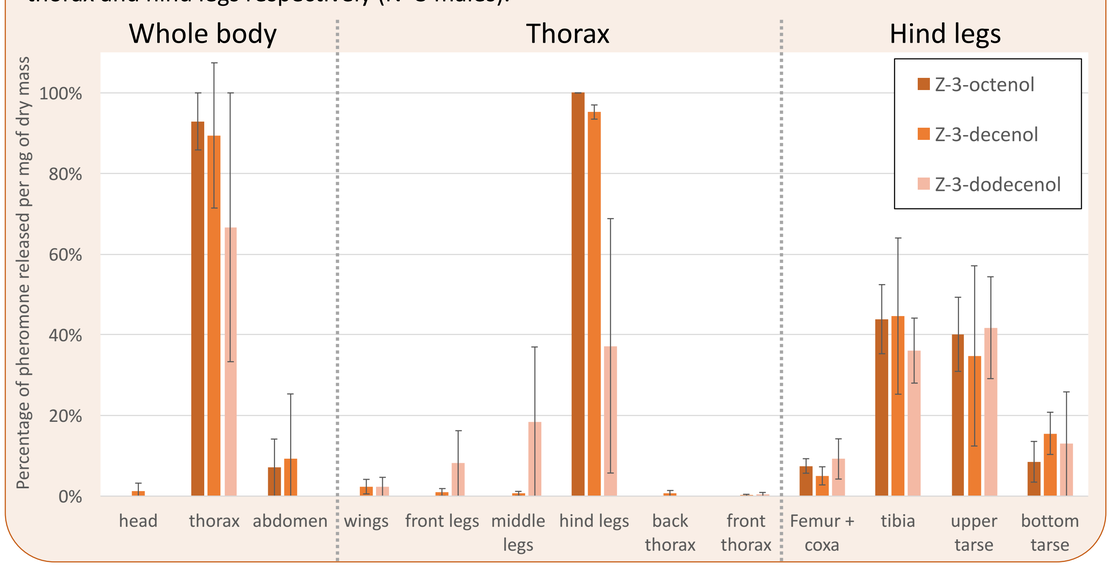
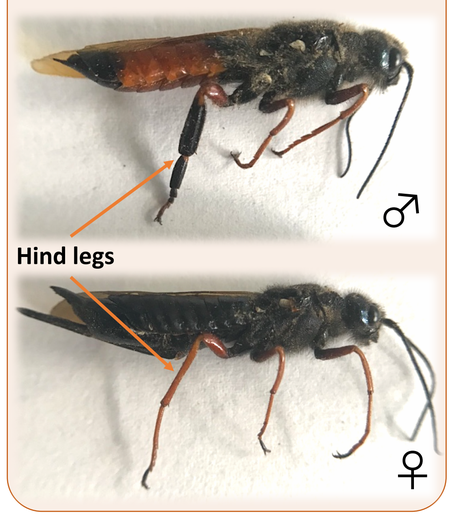


Figure 5: Sexual dimorphism of hind legs in *Sirex noctilio* between male (top) and female (bottom).



References

[1] B. Slippers, P. de Groot, M. J. Wingfield, Eds., *The Sirex Woodwasp and its Fungal Symbiont:* (Springer Netherlands, 2012) (September 23, 2016).

[2] M. F. Cooperband, *et al.*, Male-Produced Pheromone in the European Woodwasp, Sirex noctilio. *Journal of Chemical Ecology* **38**, 52–62 (2012).

Authors affiliation

[a] Department of Zoology and Entomology, Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria 0002, South Africa

[b] Department of Chemistry, Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria 0002, South Africa

[c] Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, 1219 Queen Street E, Sault Ste. Marie, Ontario, P6A 2E5, Canada

[d] Department of Biochemistry, Genetics and Microbiology, Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria 0002, South Africa

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