HOVERFLY USE FOR POLLINATION OF COMMERCIAL SOFT FRUITS

Safinatu Ameen[1], Dylan Hodgkiss[2], Tashia Tucker[2], Daniel Bray[1], Sarah Arnold[3], Mandela Fernandez-Grandon[1], and Steven Harte[1]

[1]Natural Resources Institute, University of Greenwich, United Kingdom
[2]Pollinator and Orchard Management Ltd T/A Olombria, United Kingdom
[3]NIAB East Malling, Kent, United Kingdom

Introduction

European horticulture suffers from pollination limitation and often growers supplement with managed pollinators but using a single species e.g. bumblebees does not always provide optimised services[2].

This leads to the use of wild pollinators such as aphidophagous hoverflies which offer dual ecosystem services as the larvae are predators, and the adults are pollinators[1].

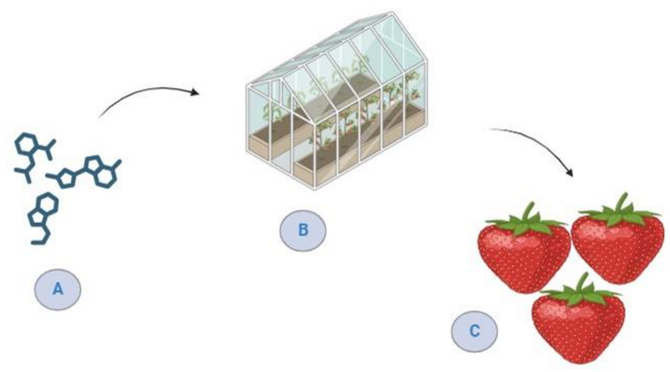
Bumble bee

Hoverfly larva

Hoverfly

Aims

Development of semiochemicals to attract hoverflies

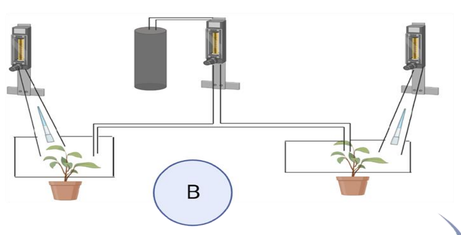


Benefit

The use of semiochemicals (A) in the crop (B) could improve the efficacy of both wild and potentially commercial hoverfly pollination services. Greater pollination services lead to increased fruit quality and marketability (C)[1].

Identification of Attractive Semiochemicals

A

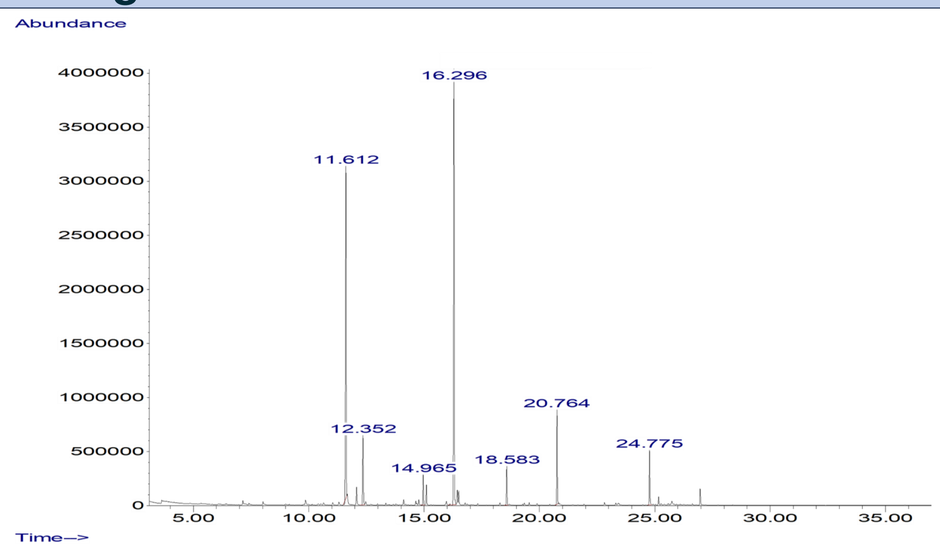


B

C

Volatiles are collected in the greenhouse (A) using the push-pull collection method (B) where air passes over the plant sample enclosed in a chamber that is purified through a charcoal filter and then passed through an adsorbent volatile trap at a controlled rate[3]. Volatiles are identified by gas chromatography and mass spectrometry (C).

Chromatogram of Odour Blend



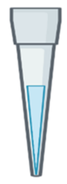
This is a chromatogram obtained during the analysis of the volatile organic compounds with the retention time in seconds on x axis and abundance of volatiles on y axis.

Slow-release Dispensers

Sachet

Pasteur pipette

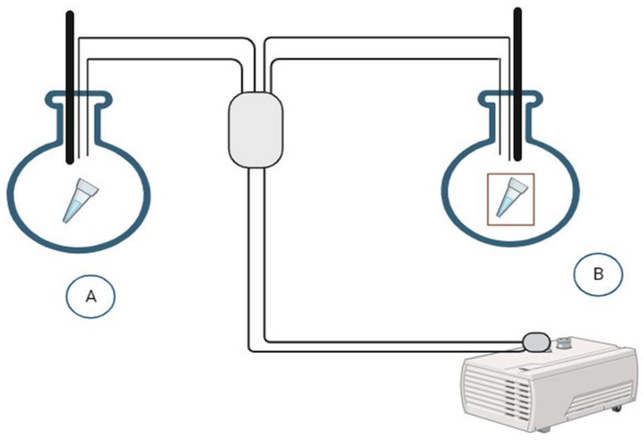
Pipette tip



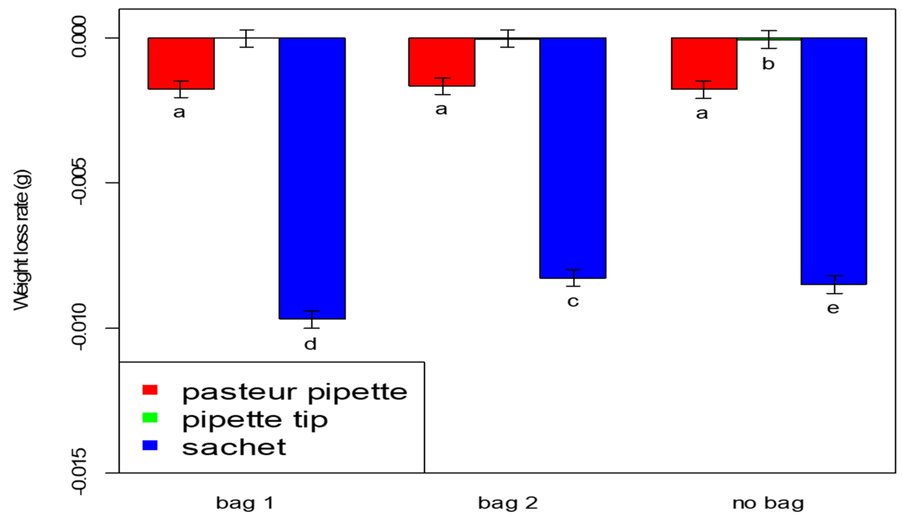
We tried different release dispensers with our novel odour blend to measure the release rate and lure longevity.

A. Volatile collection from pipette tip dispenser.
B. Volatile collection from pipette tip dispenser in Hessian bag. The use of hessian bag is to achieve a constant release rate of the semiochemicals .

Volatile collection from dispensers

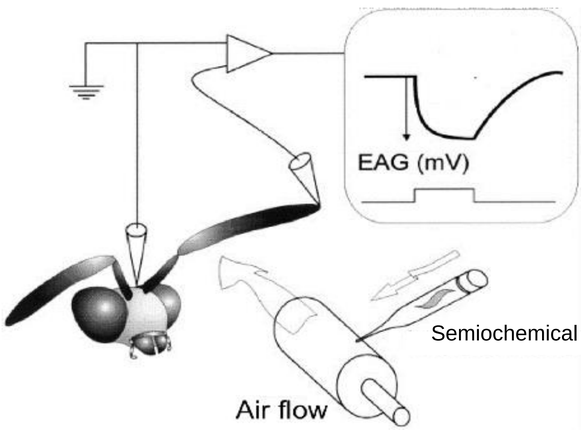


Gravimetric Method for Slow-release Rate Studies



Effect of bag on the release rate of volatiles. Hessian bags 1 and 2 are different in terms of colour and texture with bag 1 lighter in texture than bag 2. Bag types are shown on x axis and weight loss rate (in g) on y axis. The results show the Hessian bag 1 releasing more volatiles over time.

Future Work



- Electrophysiological response of hoverflies to odour blend; this method is used to measure insect volatile reception.
- Bioassays of hoverflies to odour blend using Y-tube olfactometer and cage trials.

References

1. Hodgkiss, D., Brown, M.J.F. and Fountain, M.T. *Journal of Pollination Ecology* (2018).
2. Perez-Mendez, N., Anderson, G. K. S., Requier, F. et al., *Journal of Applied Ecology* (2019).
3. Tholl, D., Boland, W., Hansel, A., et al., *The plant Journal* (2006).

Acknowledgements

Many thanks to Dudley Farman for his contribution to the GC-MS chemical analysis.
Further to BBSRC and LIDo for funding this work and Olombria Ltd for in-kind contributions and providing invaluable knowledge and access to their hoverfly-rearing facilities.