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Technical Symposium 2026

Status of two invasive insect pests, PSHB and SWD: where do we stand?

Prof. Pia Addison & Matthew Addison |
Stellenbosch University

STATUS OF INVASIVE INSECT PESTS: Where do we stand?

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Status of Polyphagous Shot Hole Borer: Where do we stand?

Matthew Addison

INTRODUCTION

- PSHB – very small wood-boring ambrosia beetle
- Vectors *Fusarium* fungi: attack many species of trees
- PSHB responsible for tree death in WC
- Invasive and spreading
- Summary of industry-funded research

MSc thesis #1

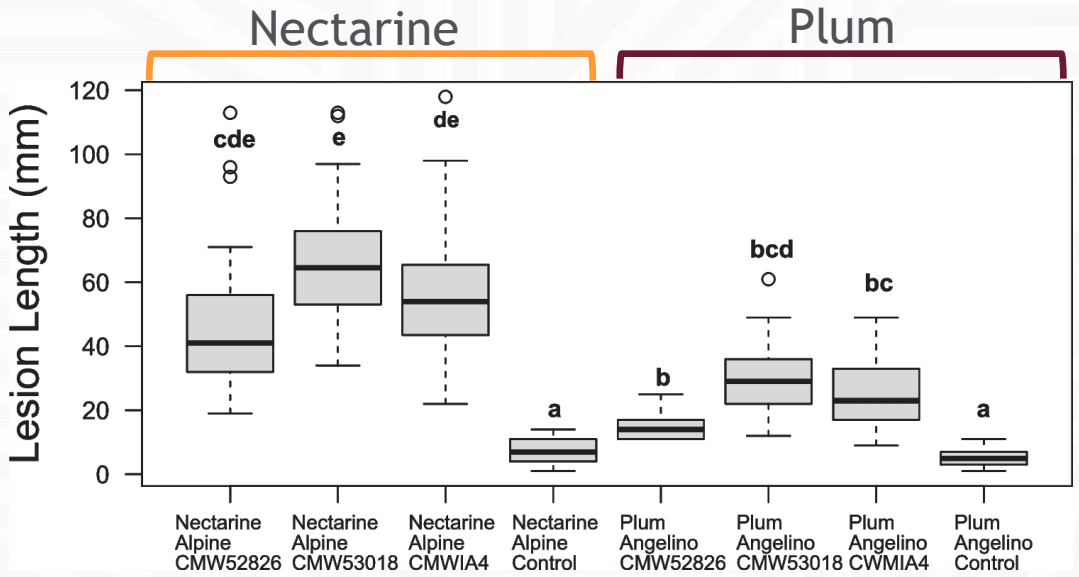
Assessing the threat of PSHB and its symbiotic fungus (*Fusarium euwallaceae*) to deciduous fruit trees in the WC Province of South Africa

M De Jager (2020-2022)

- Preliminary determination of the host status: apple, pear & stone fruit trees to PSHB
- Preliminary studies on characterising the pathogenicity of PSHB to main fruit tree species grown commercially in the WC

Preliminary results

- PSHB can breed in many *Prunus* species in gardens, e.g. almond, nectarine, apricot, cherry plum and black plum
- *F. euwallaceae* is pathogenic to nectarine and plum: susceptibility of nectarine was higher than for plum



Lesion lengths of different isolates of *Fusarium euwallaceae* measured in plum cv. 'Angelino' and nectarine cv. 'Alpine'. Boxes indicate 25–75% data range, whiskers indicate 1.5 times the interquartile range and dots represent outliers

MSc thesis #2

Activity and impact of PSHB and its symbiotic fungus(*Fusarium euwallaceae*) on deciduous fruit trees in the Western Cape Province of South Africa

E Neethling

- To assess impact on fruit quality and water use efficiency in commercial pear trees
- To assess the impact of infestation on phenology of pear trees
- To assess the impact of various levels of PSHB infestations on key physiological processes
- To assess the health of commercially cultivated PSHB-infested fruit trees using vegetation indices

Preliminary results

- Increased PSHB attack density was associated with smaller, duller-toned, sweeter fruit at the time of harvest and
- Data tended toward reduced plant water-use efficiency
- Remote sensing did not detect PSHB infestations
- Effects of infestation did not compound between seasons

MSc thesis #3

Assessing the threat of PSHB and its symbiotic fungus (*Fusarium euwallaceae*) to deciduous fruit trees in the Western Cape Province of South Africa.

K Engelbrecht

- Pathogenicity trials on selected tree species in orchards
- PSHB establishment success in selected tree species
- PSHB preference experiments

Preliminary results

- Plums more susceptible to *F. euwallaceae* relative to pear and windbreak species
- A link between PSHB and *F. euwallaceae* host preferences and beetle colony establishment success is still unclear.
- Beetles cannot differentiate between ‘reproductive’ and ‘non-reproductive’ hosts
- Plants under stress are more susceptible

Research projects

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Towards the monitoring and management of PSHB in deciduous fruit orchards

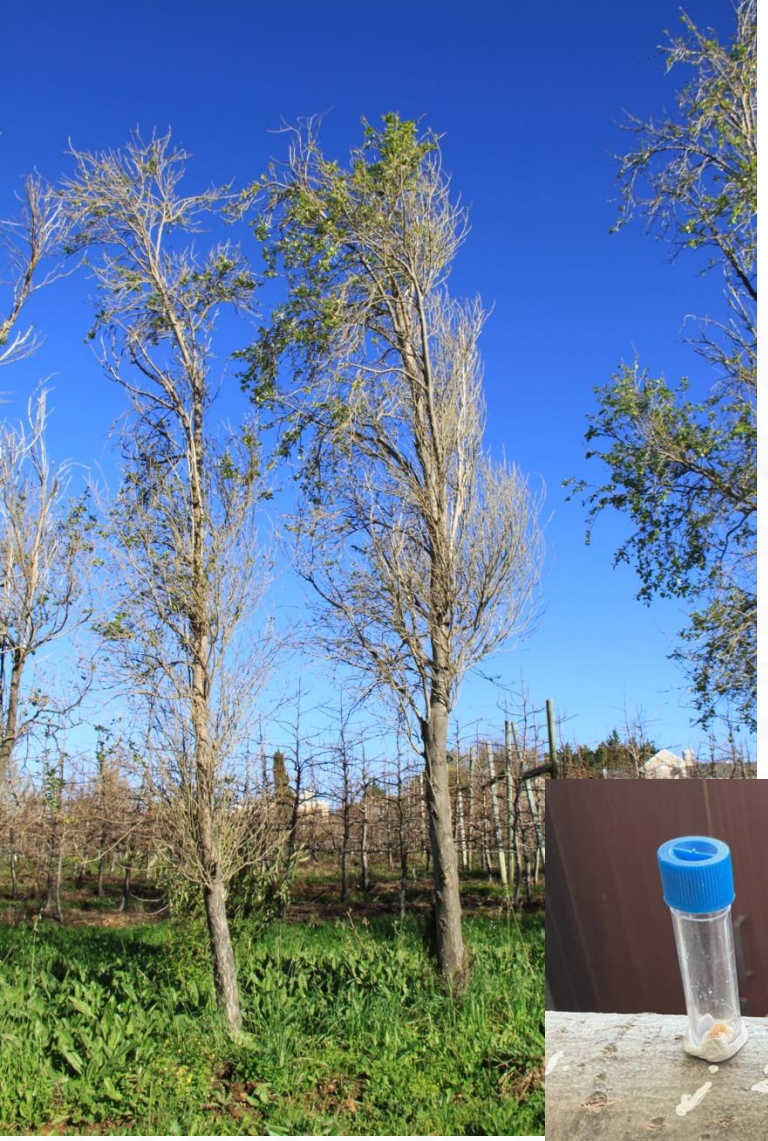
- Establish an area wide monitoring network for PSHB
- Assess and improve trapping methods, attractants, and repellents for PSHB
- Assessment of synthetic and biological pesticides for the control of PSHB and *Fusarium* in orchards
- Assessment of trunk barriers for the control of PSHB
- Post-doctoral research on biological control of PSHB
- Develop a functional trait-based PSHB risk model with spread
- Assess the impact of PSHB attack on important fruit quality measures pre- and post-storage.

Research projects

- Area wide monitoring in place
- Various trapping methods assessed
- Repellant not effective, chemical treatments slowed infestation only
- Trunk barriers may delay/prevent infestation
- Biological control research underway
- Functional model developed
- Fruit quality assessed

Current research

- Biological control of PSHB
  - entomopathogenic fungi and vectors
  - entomopathogenic nematodes
- Reproductive potential of PSHB in various trees
- Trap tree



Primary hosts (non-crop species)

SEE FABI WEBSITE FOR FULL LIST www.fabinet.up.ac.za

Acer negundo	Boxelder
Acer buergerianum	Chinese maple
Quercus rubor	English oak
Platanus x acerifolia	London plane
Acacia melanoxylon	Blackwood
Acacia longifolia	Long-leaved wattle
Acacia mearnsii	Black wattle
Casuarina cunninghamiana	Beefwood
Populus alba	White poplar

Boxelder maple

Further information

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Home Ov

Polyphagous Shot-Hole Borer (PSHB)

The polyphagous shot-hole borer beetle (PSHB), *Euwallacea fornicatus*, is an invasive ambrosia beetle native to Southeast Asia, which has caused significant damage to a wide variety of trees in urban, suburban, natural landscapes, and on farms.

OVERVIEW

MONITORING

RESOURCES

CONTACT

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Status of SWD: Where do we stand?

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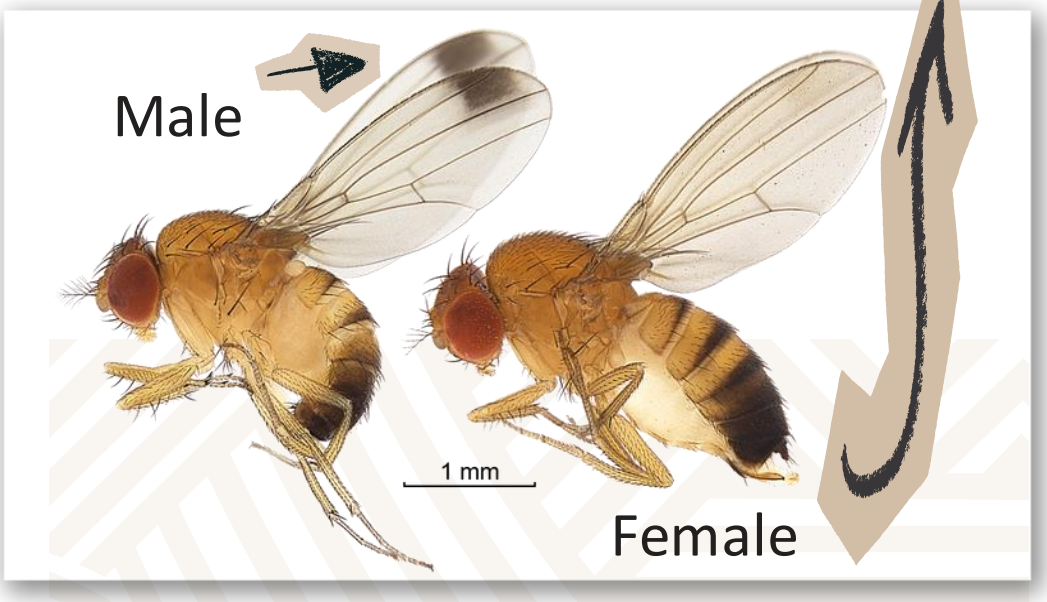
INTRODUCTION



- Spotted wing drosophila (SWD) is native to southeast Asia
- Female infests undamaged, soft-skinned, ripe fruits
- Long-term eradication after outdoor establishment unsuccessful globally
- Significant losses in Europe and North America (up to 80%; 511mill US$ in 2011)
- IPM strategies: insecticides (resistance!), mass trapping, exclusion netting & field sanitation

OBJECTIVES

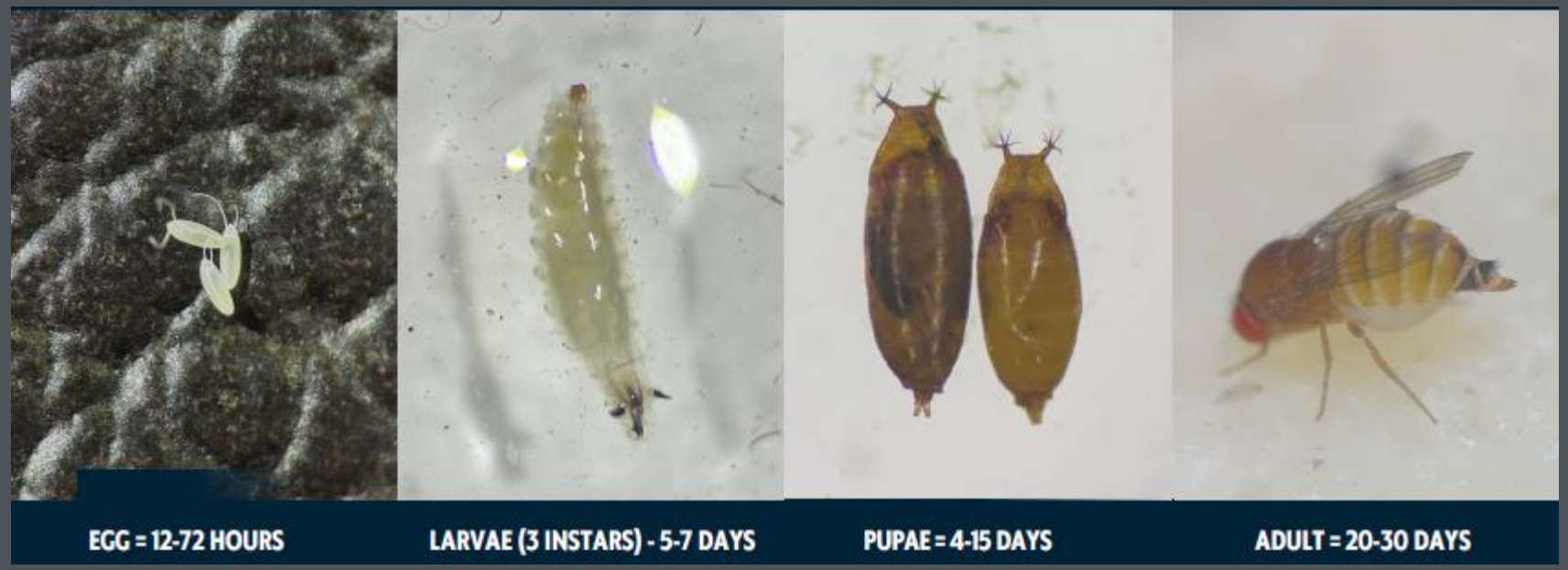
- **PROJECT 1: Explore IPM practices for SWD**
  - Develop attractants using *Hanseniaspora uvarum* (yeast)
  - Assess commercial attract-and-kill products
  - Survey naturally-occurring parasitic wasps (in progress)
  - Screen pathogens in laboratory experiments

- **PROJECT 2: Risk management system for SWD to inform management decisions**
  - Determine fruit type/cultivar/ripeness stage susceptibility
  - Determine SWD population dynamics in the field (crops and alternate hosts)

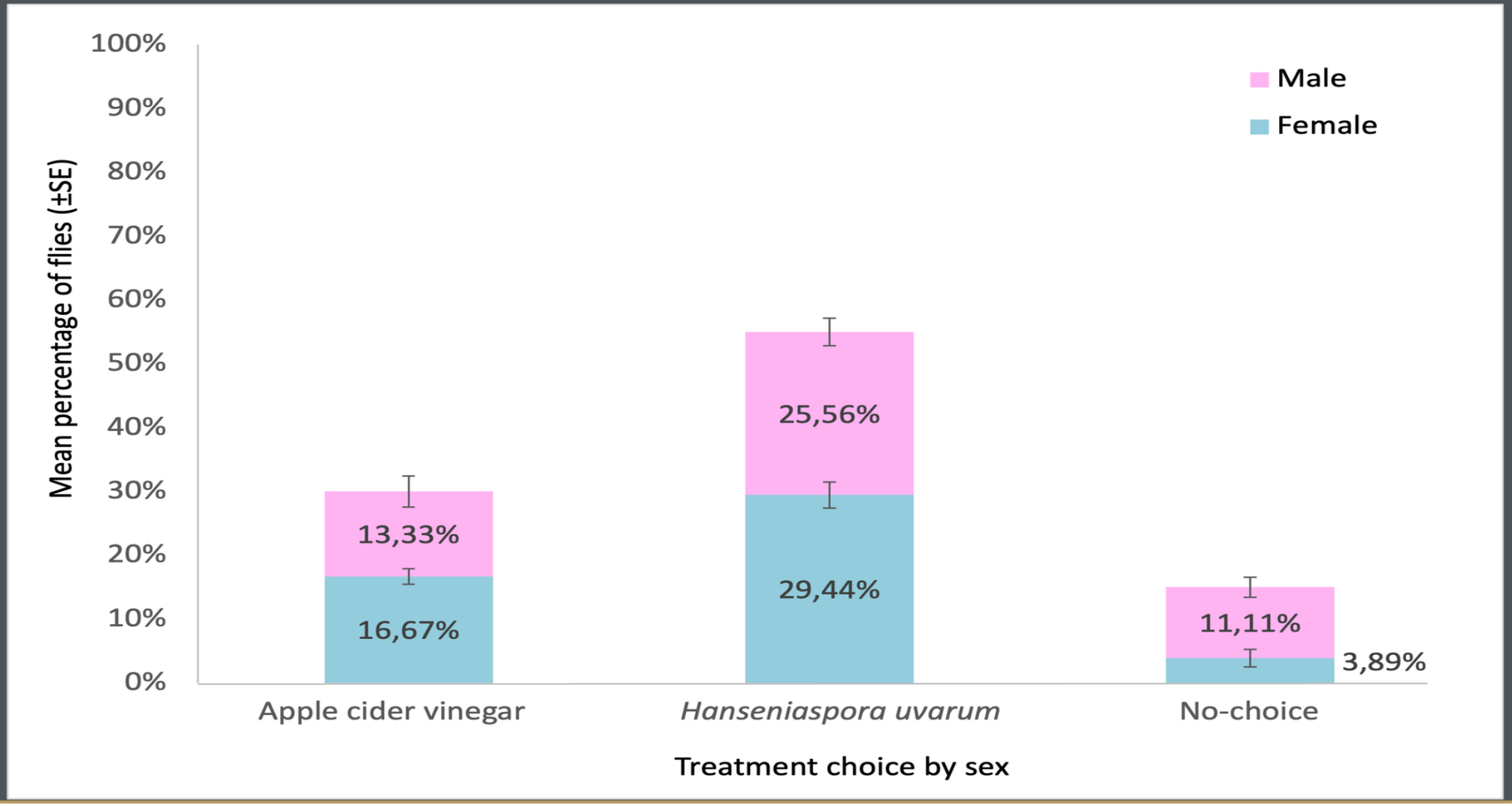
Colony establishment and maintenance

- Abiotic Conditions
  - 20°C
  - 70% Relative Humidity
  - 16:8 Photoperiod
- Artificial Diet
  - Agar
  - Corn meal
  - Sugar
  - Nutritional yeast
  - Preservatives

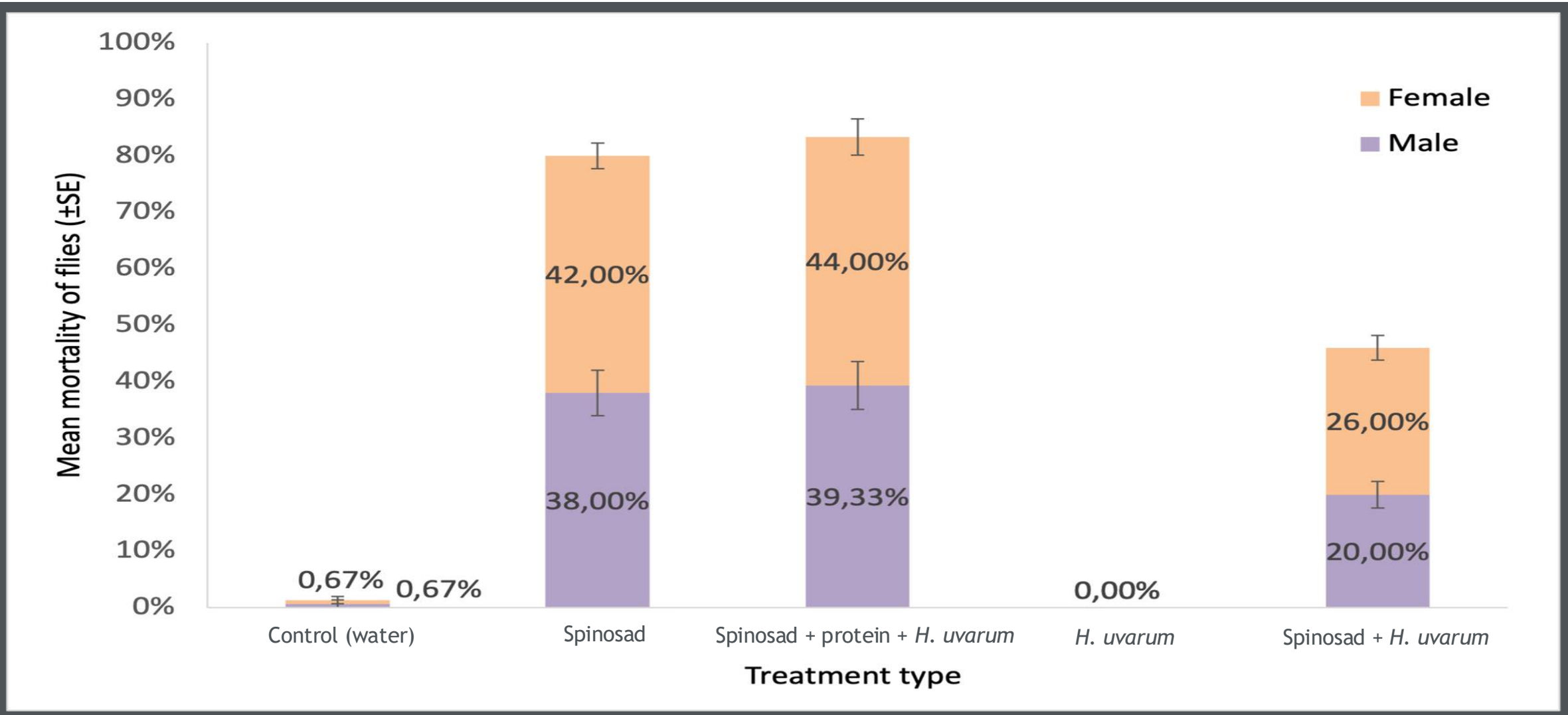
Life cycle



PROJECT 1
Develop attractants using *Hanseniaspora uvarum*



PROJECT 1
Assess commercial attract-and-kill products (bioassay)



PROJECT 1
Screen pathogens in laboratory experiments

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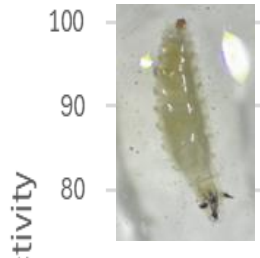
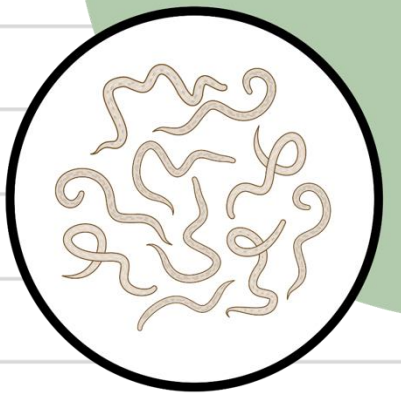


Pathogenic nematodes



PROJECT 1
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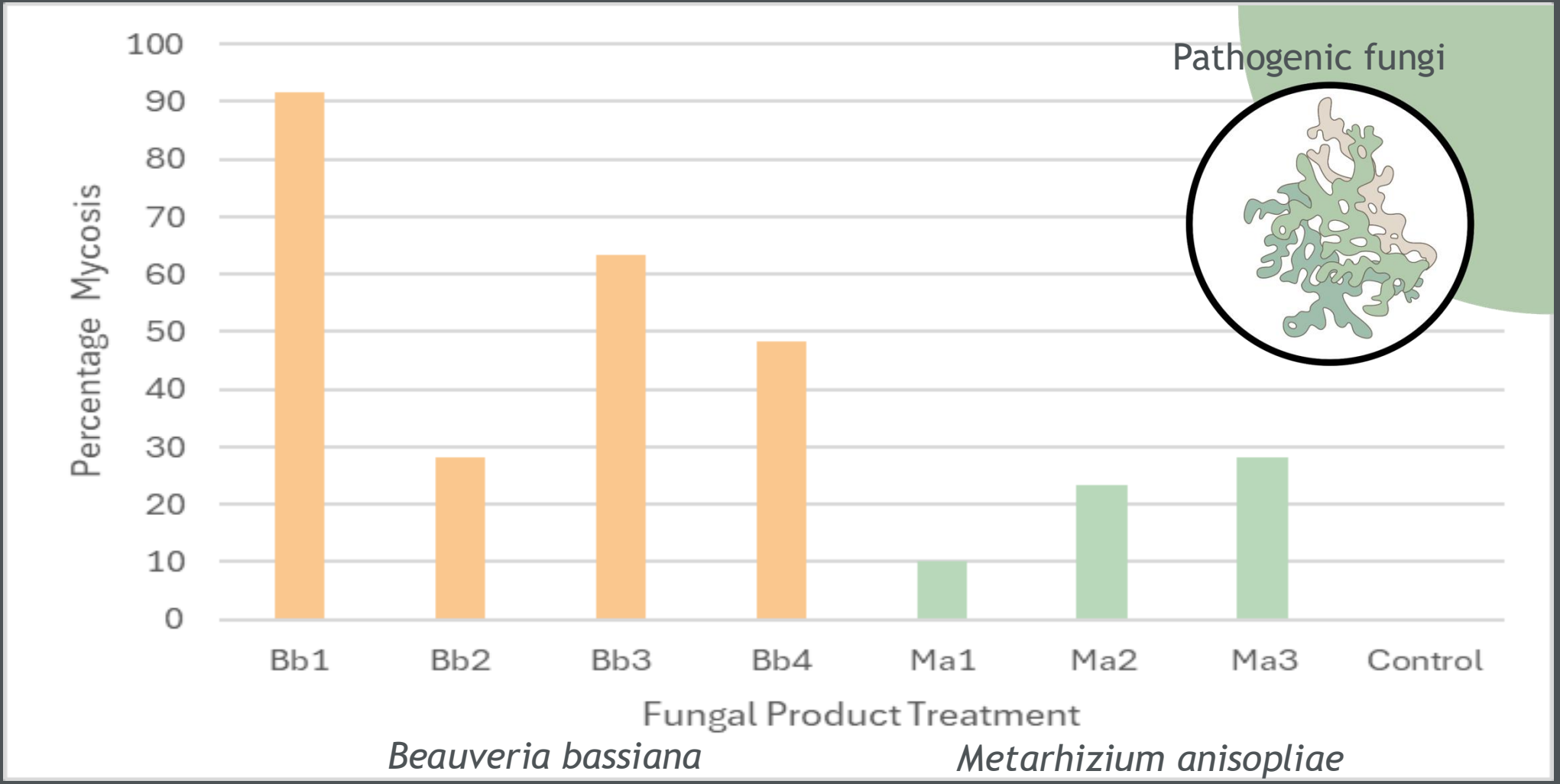
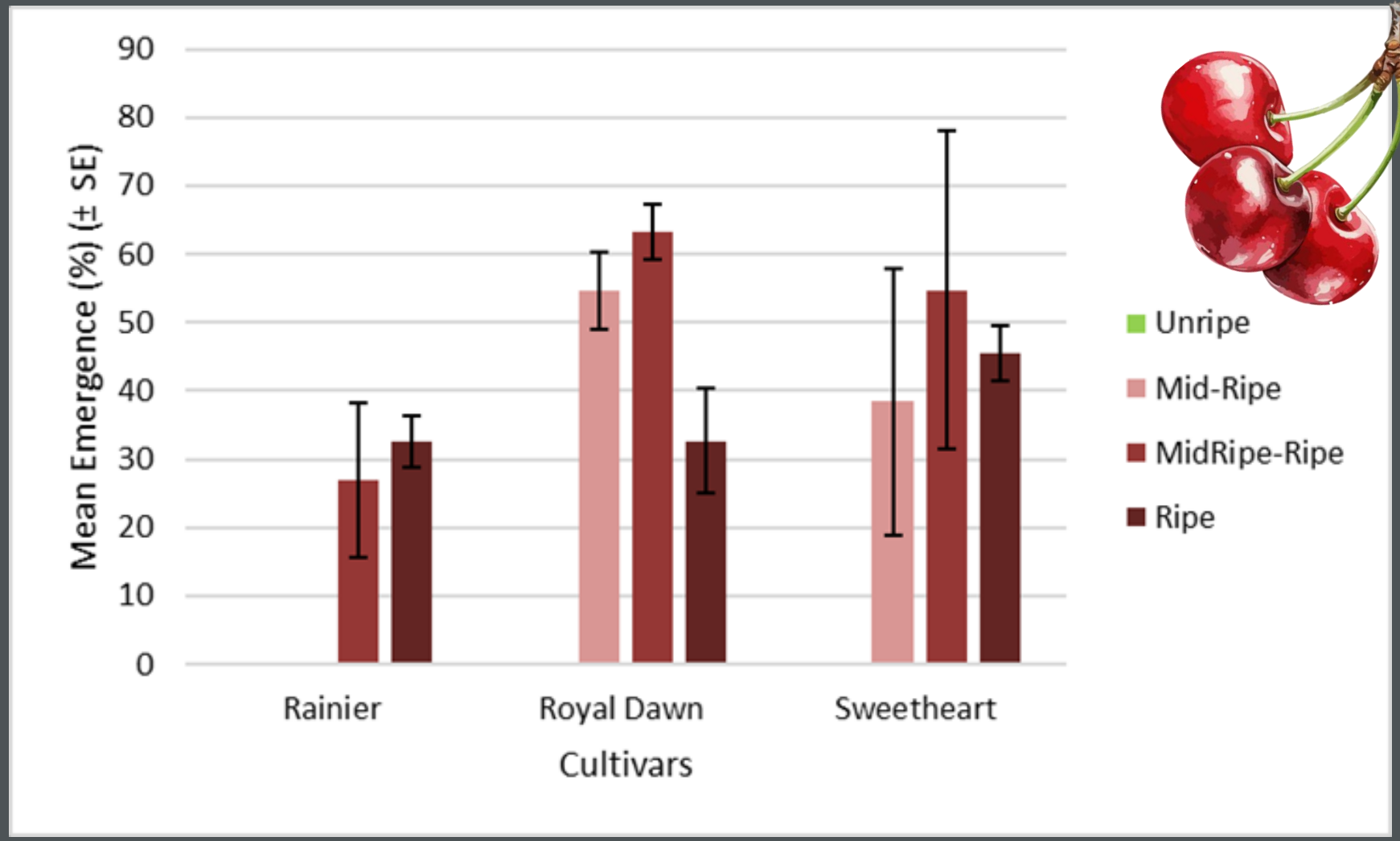
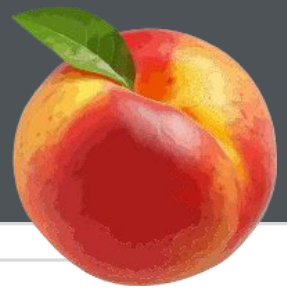


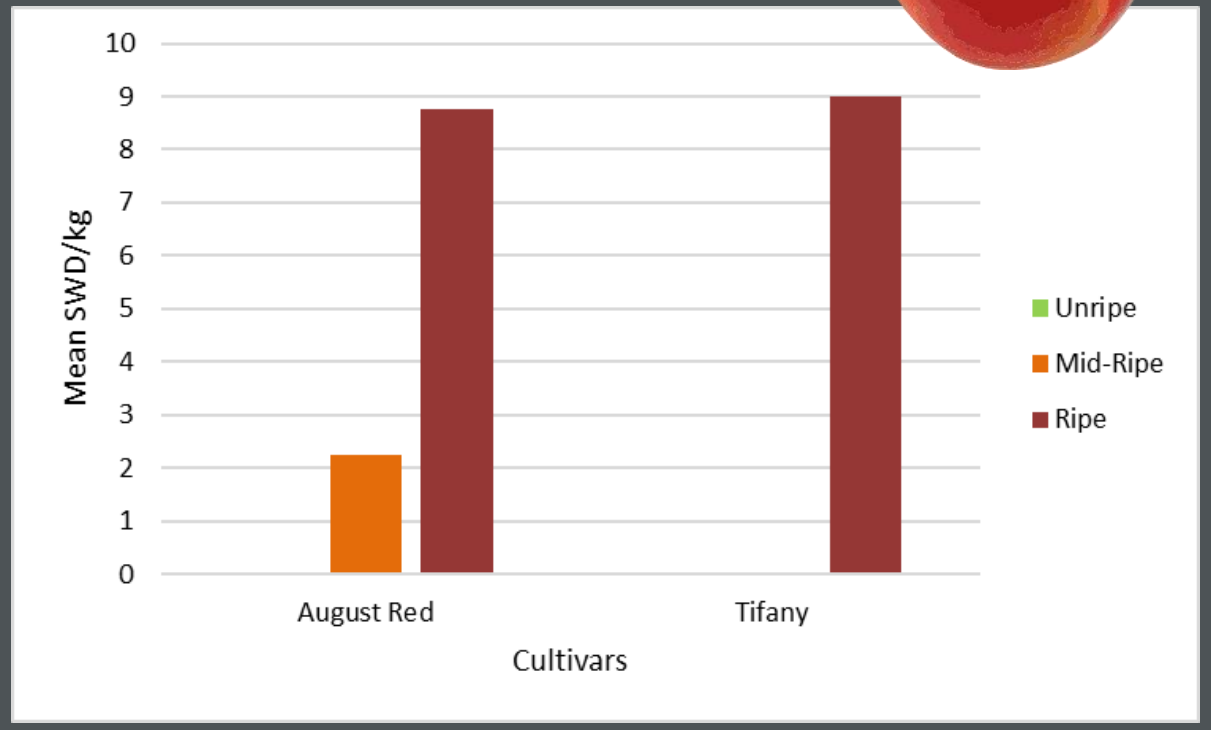
PROJECT 2
Determine fruit type/cultivar/ripeness stage susceptibility



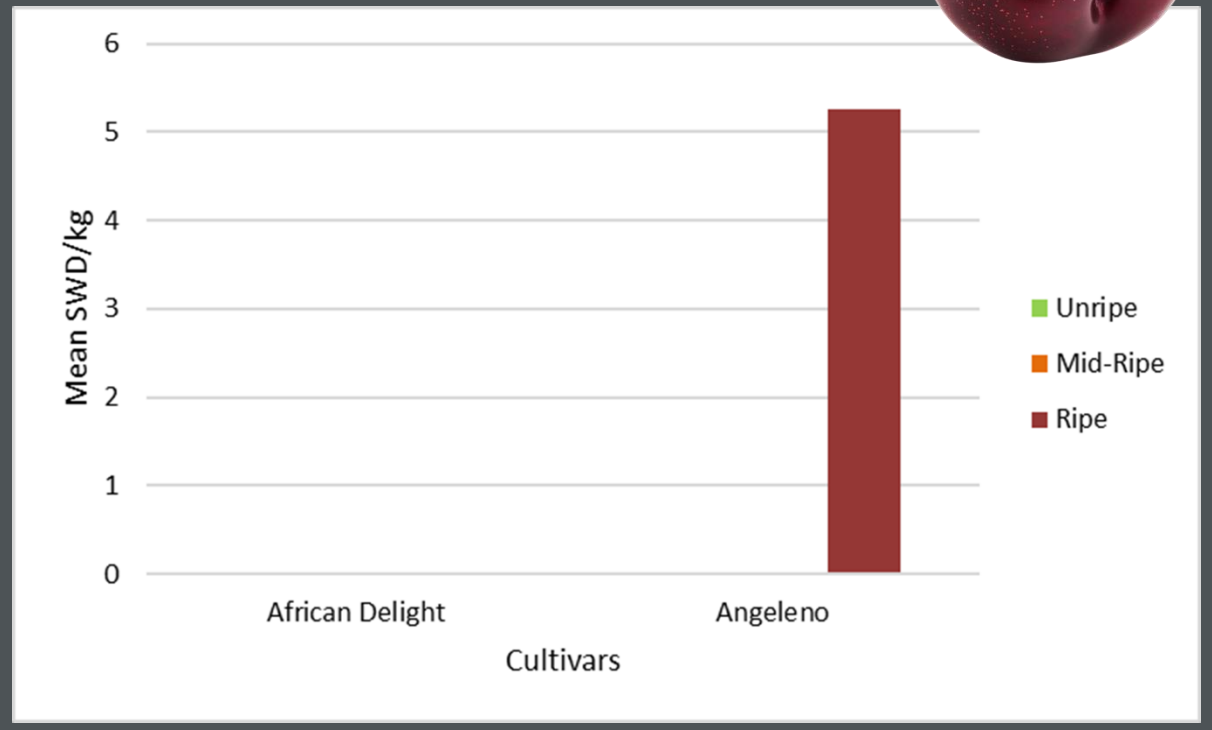
PROJECT 2
Determine fruit type/cultivar/ripeness stage susceptibility

Nectarines





Plums



PROJECT 2
Determine fruit type/cultivar/ripeness stage susceptibility

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Nectarine vs plum

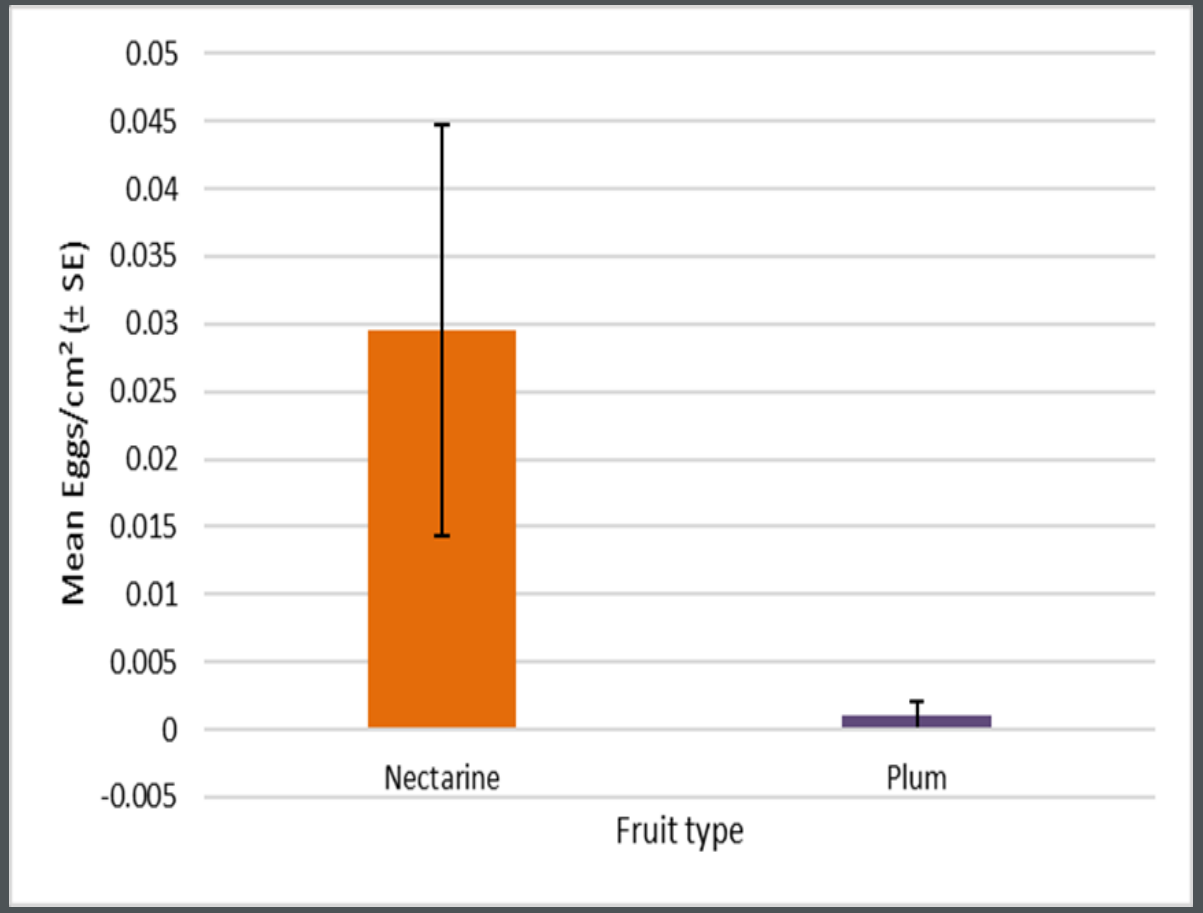
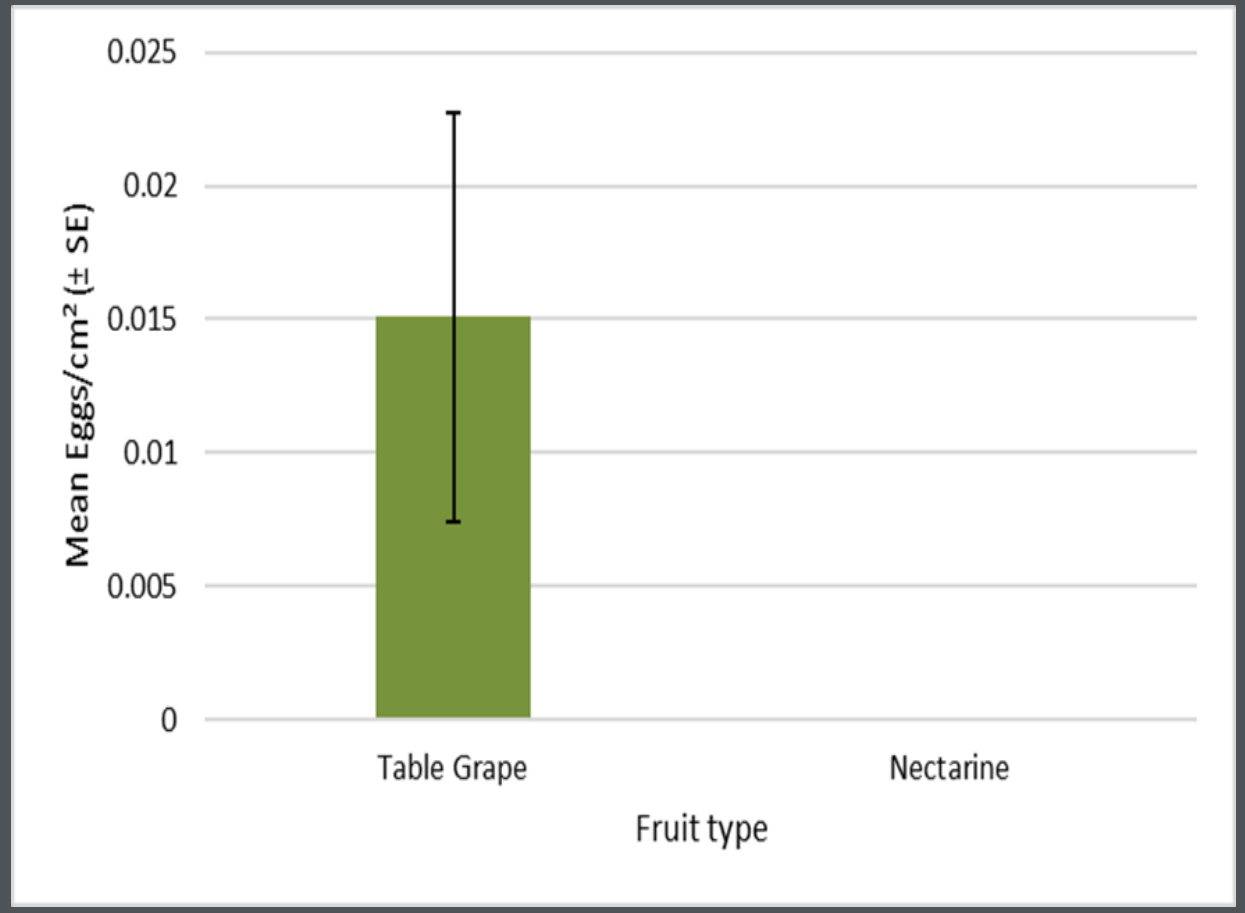
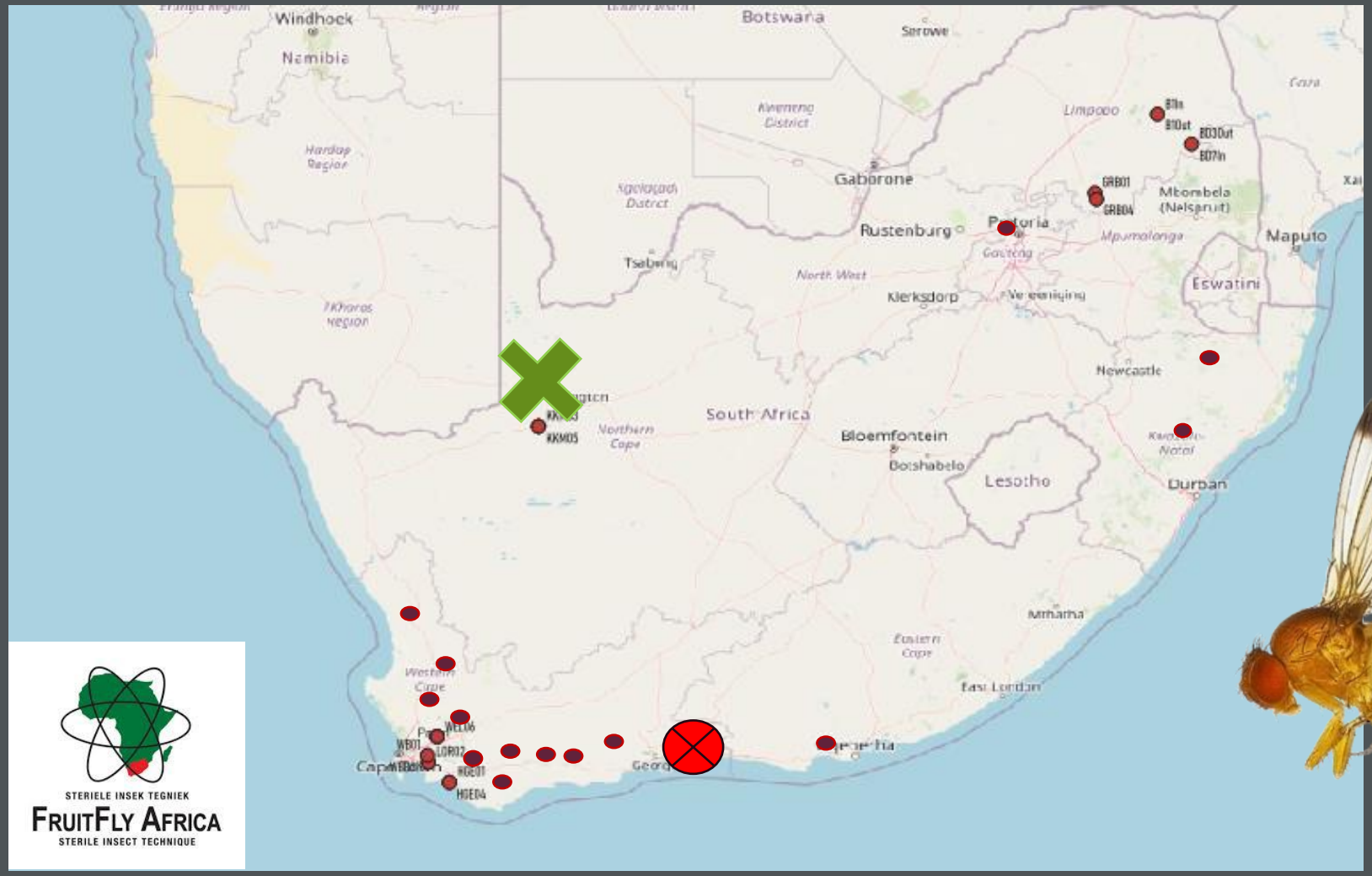


Table grape vs Nectarine



PROJECT 2
Determine SWD population dynamics



PROJECT 2
Determine SWD population dynamics

Potential alternative hosts	Nr of emerged flies so far
Podocarpus latifolius (Real yellowwood)	1
Rhamnus prinoides (Shiny-leaf buckthorn/Gesho)	1
Ekebergia capensis (Cape ash)	?
Dovyalis afra (Kei apple)	0
Euphorbia sp. (Spurges)	0
Ficus rubiginosa (Rusty fig)	0
Ficus sur (Cape fig)	0
Rauvolfia afra (Quinine tree)	0
Solanum linaeanum (Bitter apple)	0
Solanum mauritianum (Bugweed)	0
Syzigum cordatum (Waterberry tree)	0

Thank you
Enkosi
Dankie