Avocado pest management in Australia: the current and future research, technology and management challenges

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Queensland Government

AV19001 – Review and extension of avocado pests and their management

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Hort Innovation
Strategic levy investment

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IPM TECHNOLOGIES PTY LTD

GOVERNMENT OF WESTERN AUSTRALIA
Department of Primary Industries and Regional Development

Queensland Government

Most common pests

	1	2	3	4	5	6
Nth Qld	Fruit- spotting bug 97%	Leafroller 95%	Thrips 87.2%	Chewing caterpillars 72%	Banana-spotting bug 56%	Other mites 51%
Sth & Central Qld	**Fruit spotting bug 88%**	**Qld. Fruit fly 48%**	**Chewing caterpillars 44%,**	**Banana spotting bug 40%**	**Mites 36%.**	**Leaf beetle 24%**
Central NSW	Fruit spotting bug 80%	Citrus blossom bug 60%	Thrips 60%	Scale 60%	Leafroller 40%	Qld. Fruit fly, Leaf beetle, None 20%
Nth Rivers/ Tamborine	None 67%	Fruit spotting bug 33%	Avocado dimpling bug 33%	Leafroller 33%	Chewing caterpillars 33%	Thrips + Qld. Fruit fly 33%
Tristate /Vic/Tas	None 70%	Light brown apple moth 20%	Chewing caterpillars 10%	Mites 10%	Mealybugs 10%	Thrips 10%
WA	Garden weevil 73%	Six-spotted mite 33%	Scale 24%	Thrips 24%	Other mites 16%	Light brown apple moth 14%

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Most common chemical controls

	1	2	3	4	5	6
Nth Qld	Bulldock 92%	Transform 85%	Suprathion 85%	Lannate 85%	Prodigy 74%	Lepidex 72%
Sth & Central Qld	Bulldock 76%	Lepidex 72%	Transform 68%	Trivor 36%	Bugmaster 36%	Prodigy 36%
Central NSW	Bulldock 60%	Transform 60%	Lepidex 60%	Success Neo 40%	Lannate 40%	Trivor 20%
Nth Rivers/ Tamborine	50% None	PyGanic 25%	Dipel 25%	-	-	-
Tristate /Vic/Tas	60% None	Dipel 14%	Lannate 10%	Paraffinic oils 10%	Paramite 10%	Success Neo 10%
WA	Avatar+ Dominex 27%	Torque 27 %	Lorsban 22%	Paramite 22%	Paraffinic oils 13%	None 13%

Pyrethroids used most!

Broad Spectrum Chemicals

Emerging pests Thrips

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Emerging pests Scale/Mealybugs/Caterpillars

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Emerging Resistance in Australian Avocados?

Overused Broad-spectrum Pesticides:

- **Pyrethroids** (Bulldock, Dominex, PyGanic)
- Organophosphates (Lepidex/Dipterex, Lorsban, ~~Suprathion~~)
- Carbamates (Bugmaster, Lannate)

Emerging pests that breed rapidly within Avocados:

- Mites
- Thrips
- Scale & Caterpillars

Key east coast pests

Banana Spotting Bug: Amblypelta *lutescens* (Northern)

Fruit Spotting Bug: Amblypelta *nitida* (Southern)

- FSB/BSB are difficult to monitor & control
- Polyphagous, adults fly in from other crops and the bush
- One bug does a lot of damage
- Ltd IPM chemical options, expensive, not always effective
- Very difficult to detect, often only see the damage

Banana Spotting Bug

Amblypelta lutescens (Northern)

1st instar

2nd instar

3rd instar

4th instar

5th instar

adult

Fruit Spotting Bug

Amblypelta *nitida* (Southern)

1st instar

2nd instar

3rd instar

4th instar

5th instar

adult

Dane *et.al.* 2003

Amblypelta Distribution

From Govender 2015 (PhD Thesis)

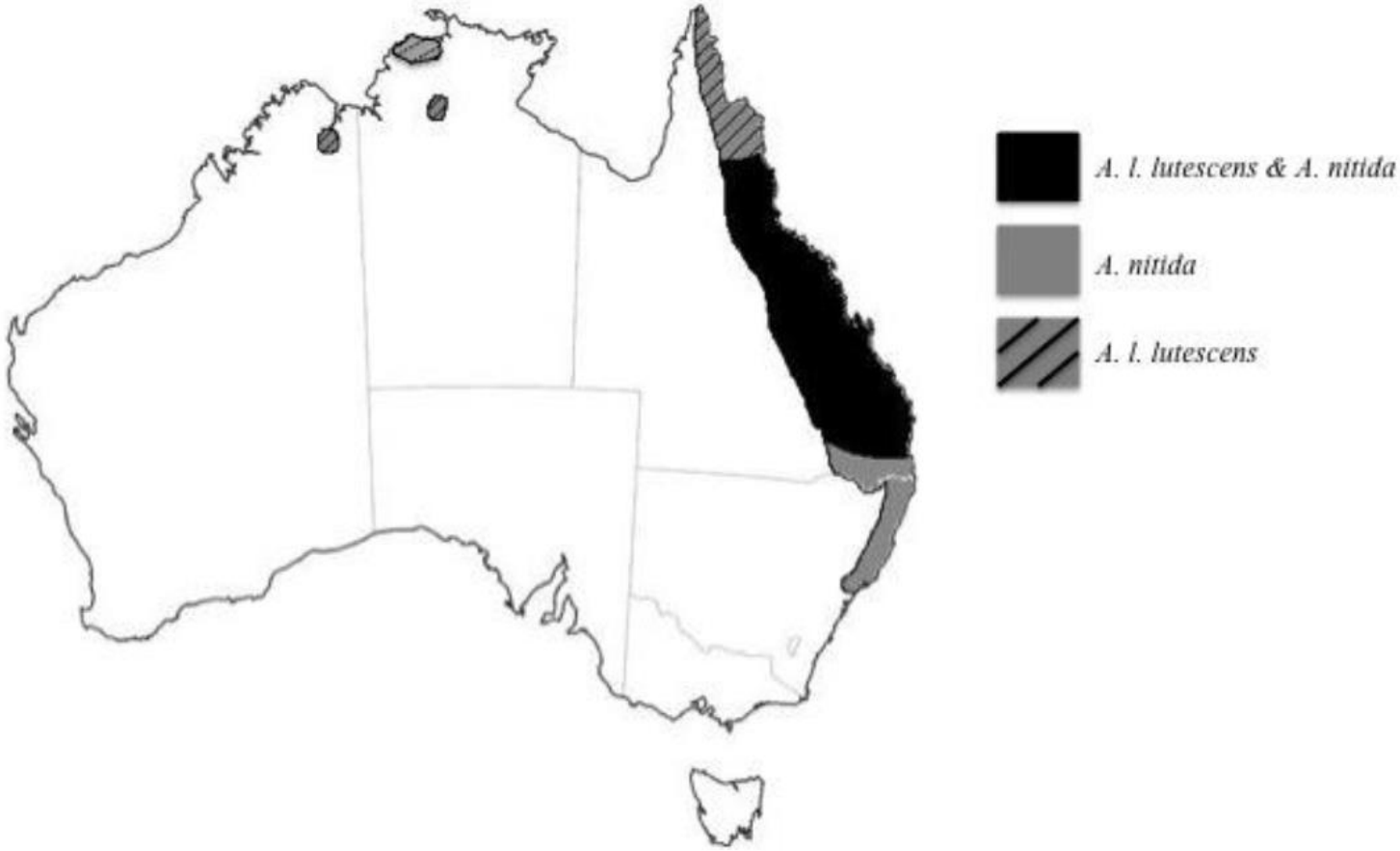

Figure 2.1. Confirmed distributions of *Amblypelta nitida* and *A. lutescens lutescens* in Australia (adapted from Donaldson (1983) and Lever (1982)).

BSB pheromone trap

- 2009 Harry Fay / USDA identified the last BSB *A. lutescens* component (ACIAR Funded).

- HAL 10049: Lure optimized:
- Lure lasts 6 weeks in field
- **Catches adult ♂,♀ & nymphs**
- Trap: Corflute with double-sided adhesive
- **Loses stick in direct sunlight**

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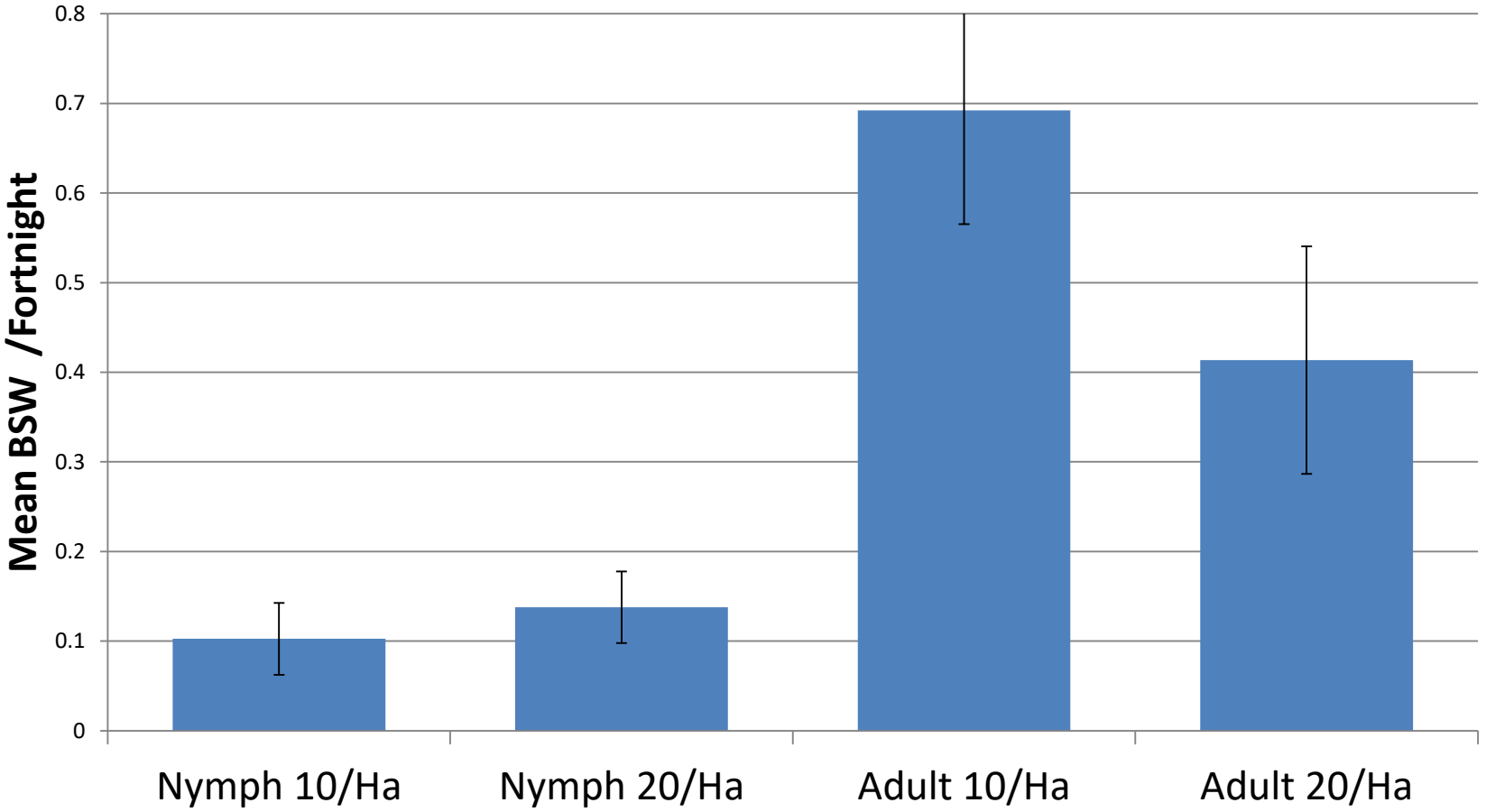
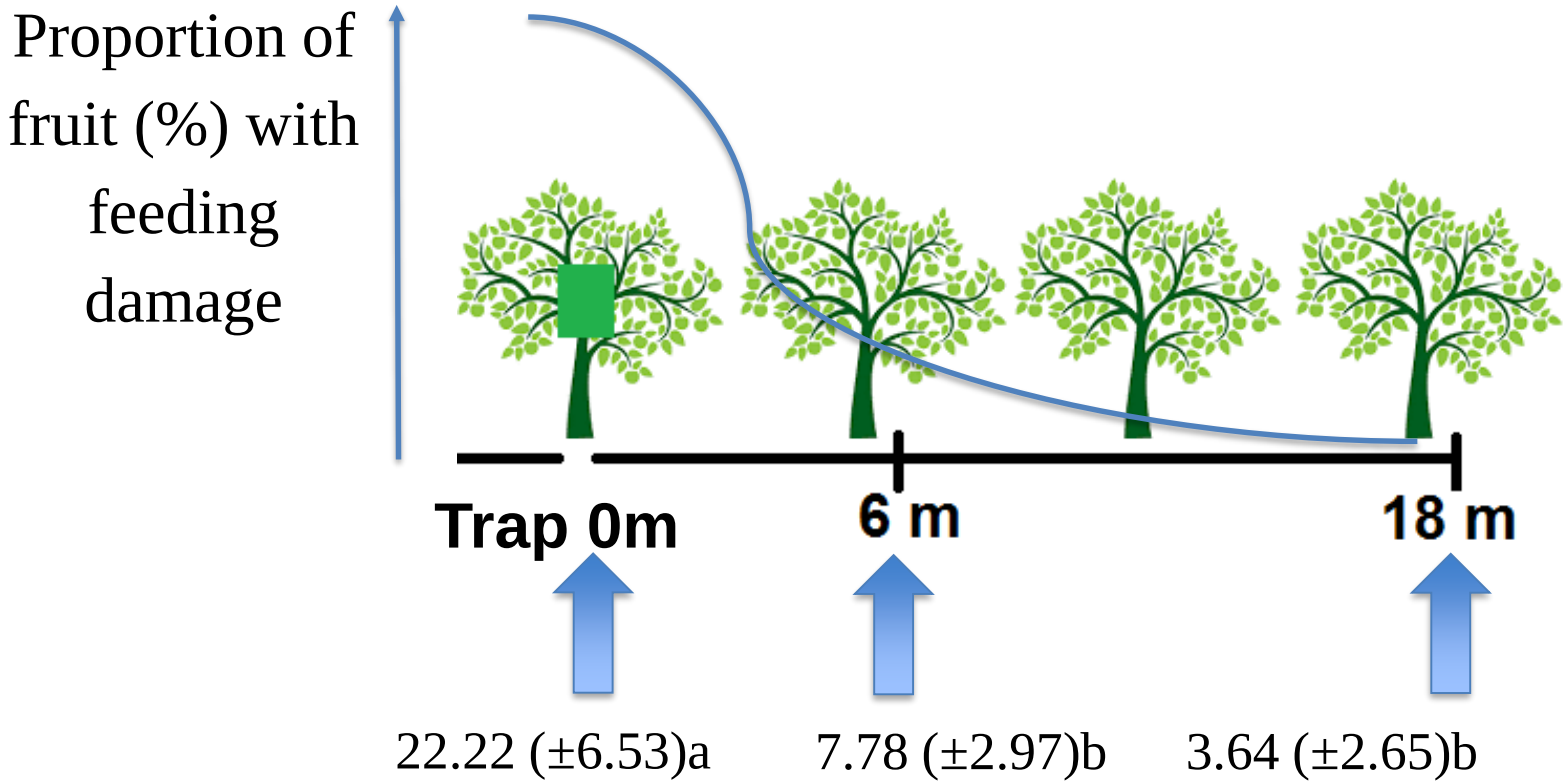
Number of BSB per Trap (2014-2015)



The 10 traps/Ha pattern caught significantly more Adults **per Trap** (P=0.001*), but did not catch more nymphs (Bars=95%LSD)

Damage on Neighbouring Trees

From Karel Lindsay PhD Thesis (2017)



Damage is significantly less on neighbouring trees

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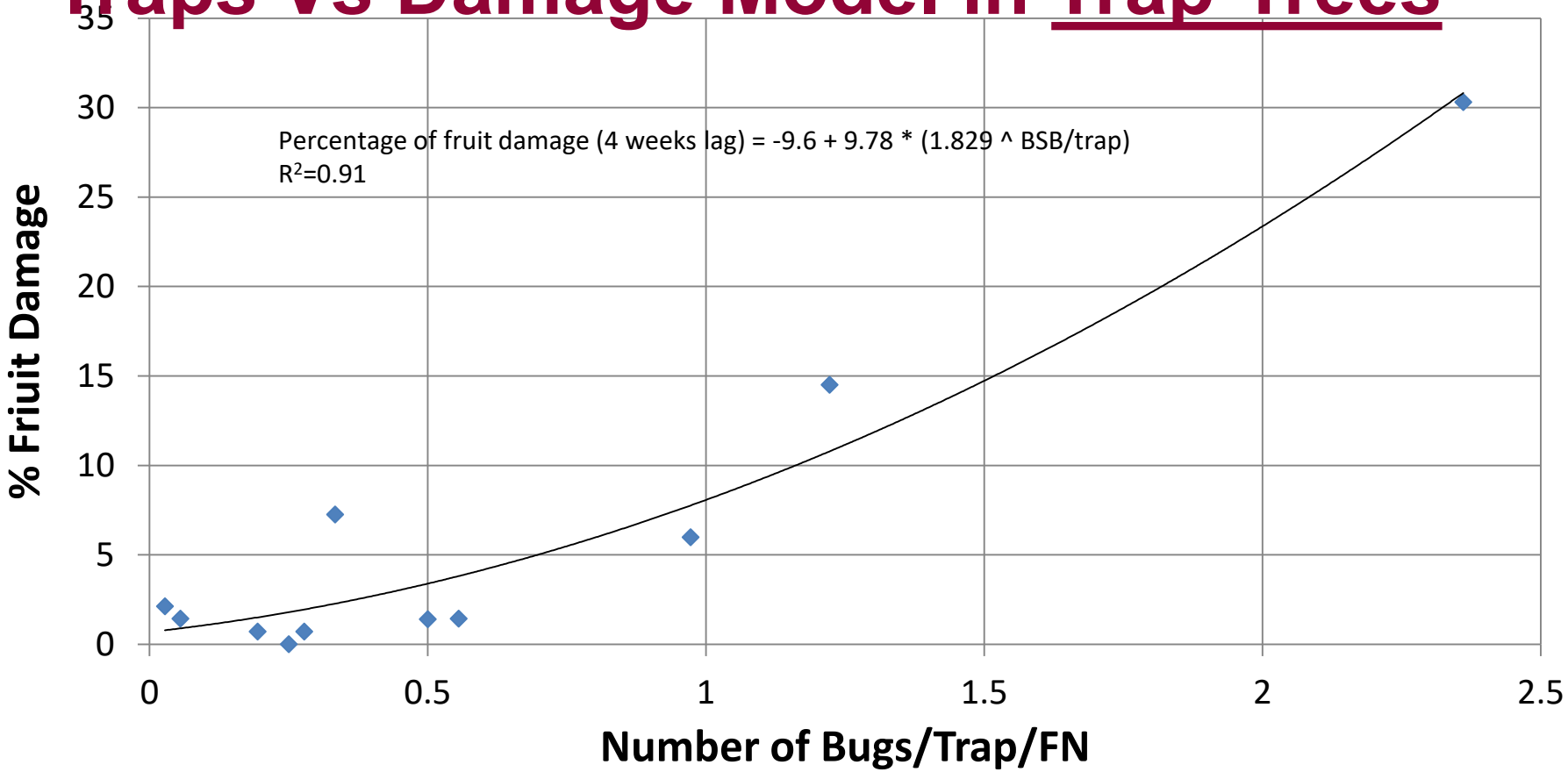
Traps Vs Damage Model in Trap-Trees



- The relationship between the mean *BSB* caught (per trap per fortnight) and the percentage of avocado fruit in **trap-trees** with new visible damage **four weeks later**.
- Out of several models, the exponential model explained 91% of the variation (the best correlation).

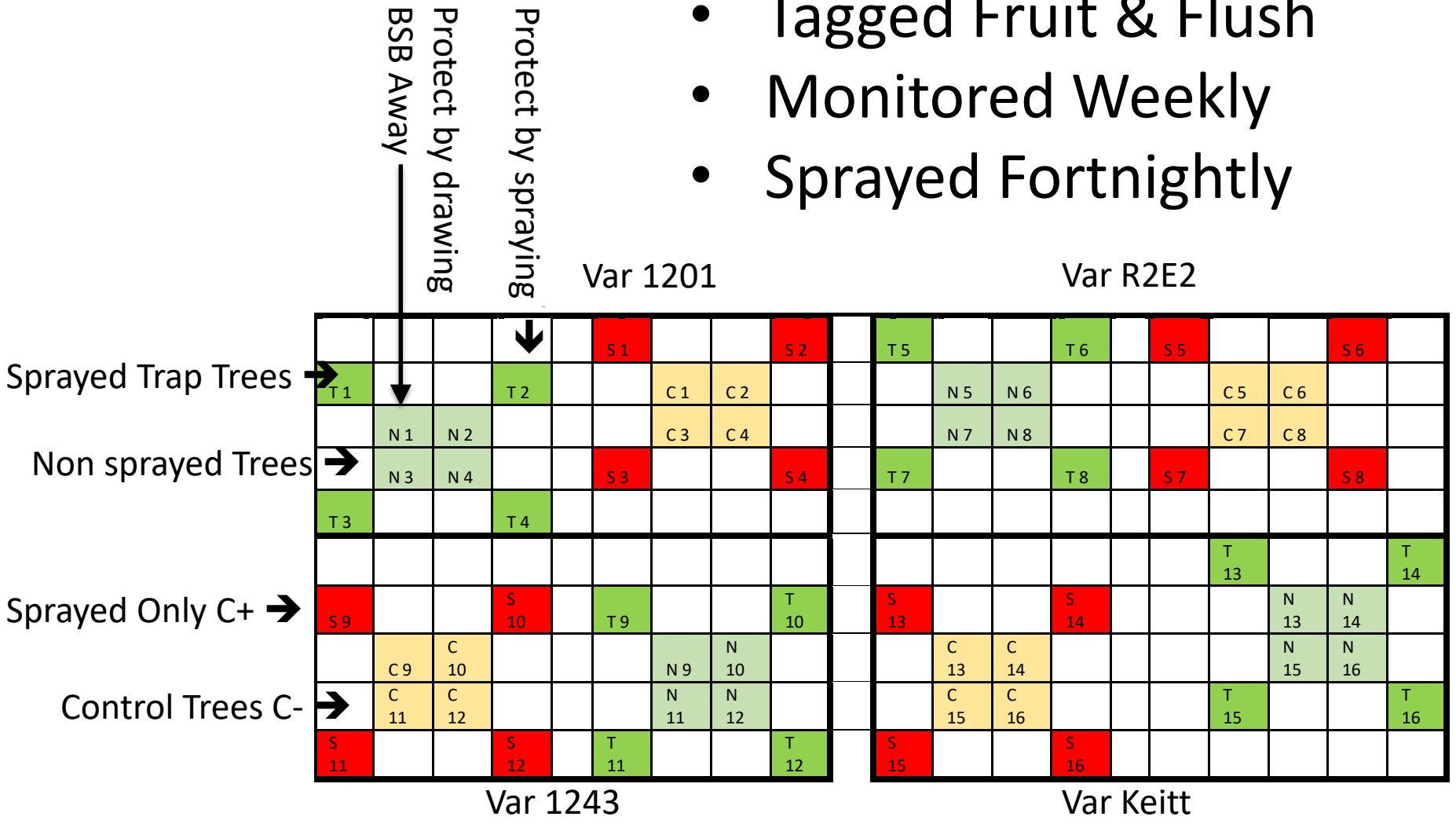
Pheromone Trap works for BSB Only!

No Pheromone Trap for FSB

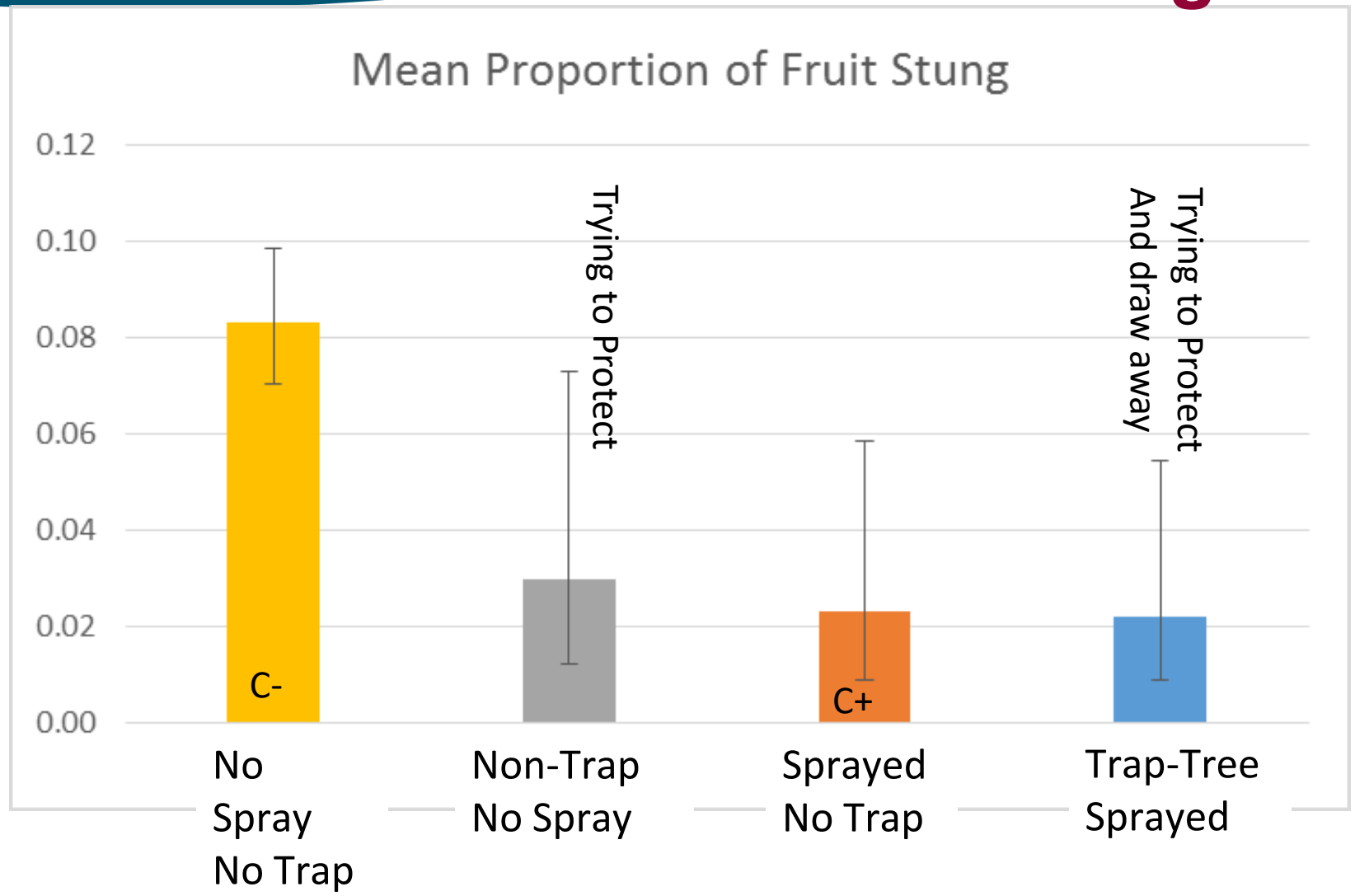
Number Bugs Per Trap	Number Bugs Per 10 Traps	Fruit Damage in Trap-Trees	Fruit Damage in Non-Trap Trees	Action to take by grower
Less than 0.5	Less than 5	Less than 5%	Less than 1%	Continue to Monitor
0.5 to 1.5	5 to 15	5 to 15%	1 to 2%	Apply Pesticide & Monitor
Above 1.5	Above 15	Above 15%	Above 2%	Apply Regular Pesticides

Monitoring Integrated Lure & Kill Trial in Mangoes

- Tagged Fruit & Flush
- Monitored Weekly
- Sprayed Fortnightly



Results: Lure & Kill Trial in Mangoes



No significant Diff, P = 0.144*
(bar = SE)

*Analysed using a generalised linear mixed model (GLMM) assuming a binomial distribution and logit link function

Current ACIAR/DAF Fungi Work

- Managing Coffee Berry Borer in PNG, IPM extension & research (HORT 2018/194)
- *Beauveria bassiana* biopesticides (PNG)
- Australia:
  - **Fungal based Biopesticides**,
  - for Fruit Spotting Bugs, Fruit fly, Lepidoptera, others
  - Lure& kill

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Lure& kill for Fruit fly and Fruit Spotting Bugs

New / Future R&D

- Improving Fruit and Banana Spotting Bug control (MT21017)
  - Produce an improved trap design for BSB (*A. lutescens*)
  - Produce a pheromone lure for FSB (*A. nitida*)
- Future R&D
  - Monitoring Integrated Lure & Kill
  - Combined with, Chemical &/or Biological (fungal)
  - Thrips, mites etc.. Resistance/ IPM

Acknowledgments

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Carol Wright (DAF)

Jessica Page (IPM Technologies)

Alison Mathews (DPIRD)

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