NSW GOVERNMENT | Department of Primary Industries

Lucerne Seed Wasp 2019 report

Dr. Ainsley Seago
Orange Agricultural Institute
NSW Department of Primary Industries

Lucerne Seed Wasp project 2016-1019

Project Goals:

- Perform literature review
- Assess lifecycle/ behaviour of seed wasp in controlled environment
- Develop PCR test for LSW
- Assess feasibility of soil testing

...plus a few bonus features

Literature review findings

- Clarity around LSW literature (LSW = Chalcis fly = Alfalfa seed chalcid)

- Methods of control for ecologically similar pests:
  - Spray with horticultural oil (citrus gall wasp)
  - Systemic insecticides (only used for seed parasites of trees)
  - Entomopathogenic fungi (being developed for macadamia industry)
  - Biocontrol using parasitoid insects (used in chestnut industry)
  - Elaborate cultivation methods in USA

Literature review findings

-Specific details of US management strategy: combination of…

- bloom synchronization with clipback
- (leafcutter) bee-bomb
- post-pollination insecticide application
- postharvest tilling/flooding

…how feasible is this for SA lucerne production? Depends on how much you want to spend on bees and water

Glasshouse trial

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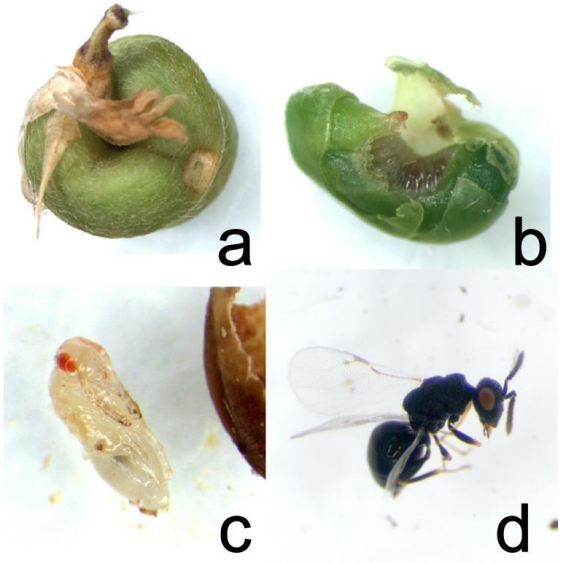
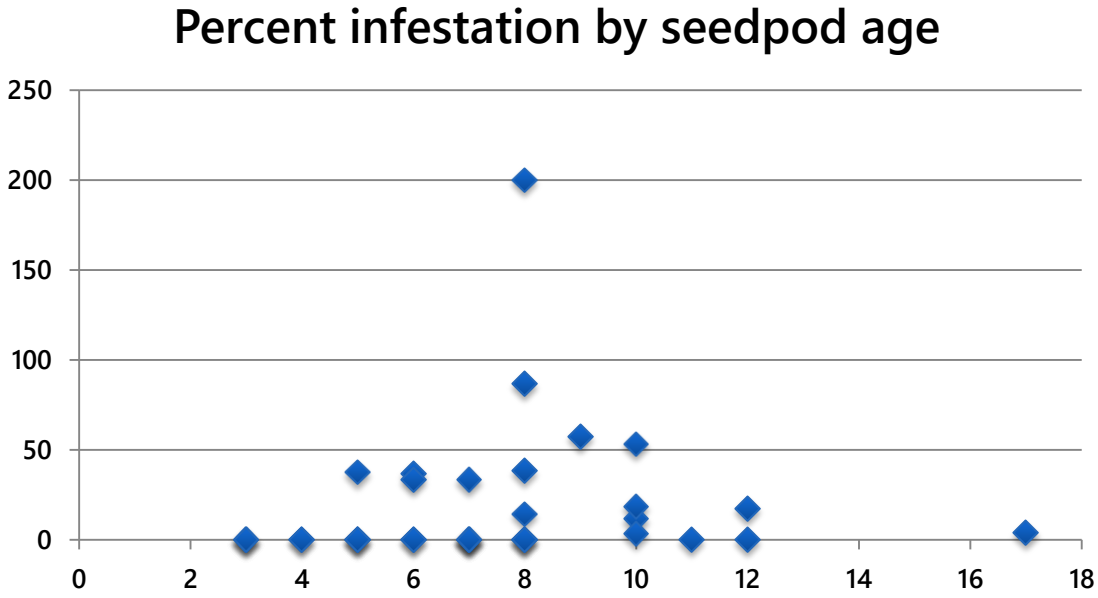




PCR test for LSW

Yes, we have one.

Primers = LCO1490-HCO2198

Successfully amplifies *Bruchophagus roddi*

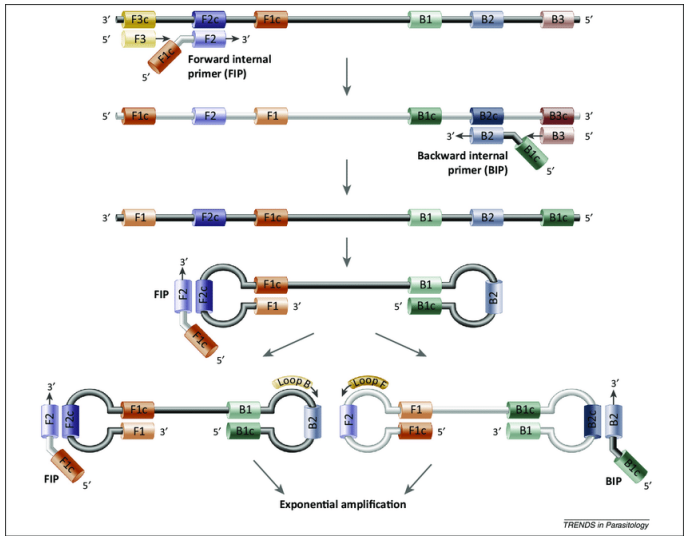
Prospects for soil testing

Possible methods:

1. PCR test (will determine presence/absence of desired spp)

2. LAMP test (like PCR, but faster, cheaper, and portable)– requires preselected probe(s), 1 pair per species

3. Manual soil test (extract seeds via centrifuge or flotation, crush to reveal wasps)– this is the only quantitative option



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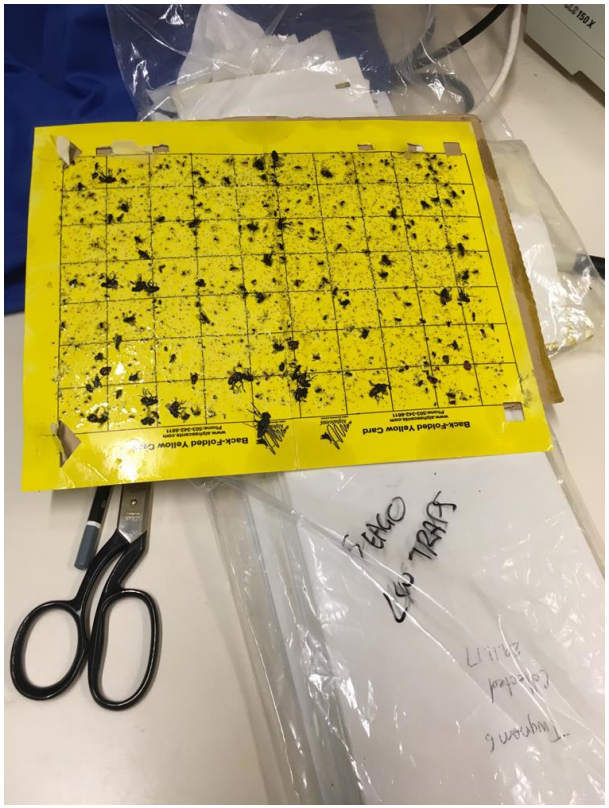
Challenges:

- Presence/absence tests won't tell you HOW MANY wasps are there
- Even if you assess post-harvest quantity of wasps in soil, winter climate has a huge effect on their survival rate.
- Late winter/ early spring testing would be better, but may be too late to make cropping decisions?

Bonus features: sticky traps

Sticky trap survey = gauge LSW numbers in selected sites at different operations (2017-2018)- thanks to Guy, Scotts, and James de Barro



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Still in progress but here's what we've got so far

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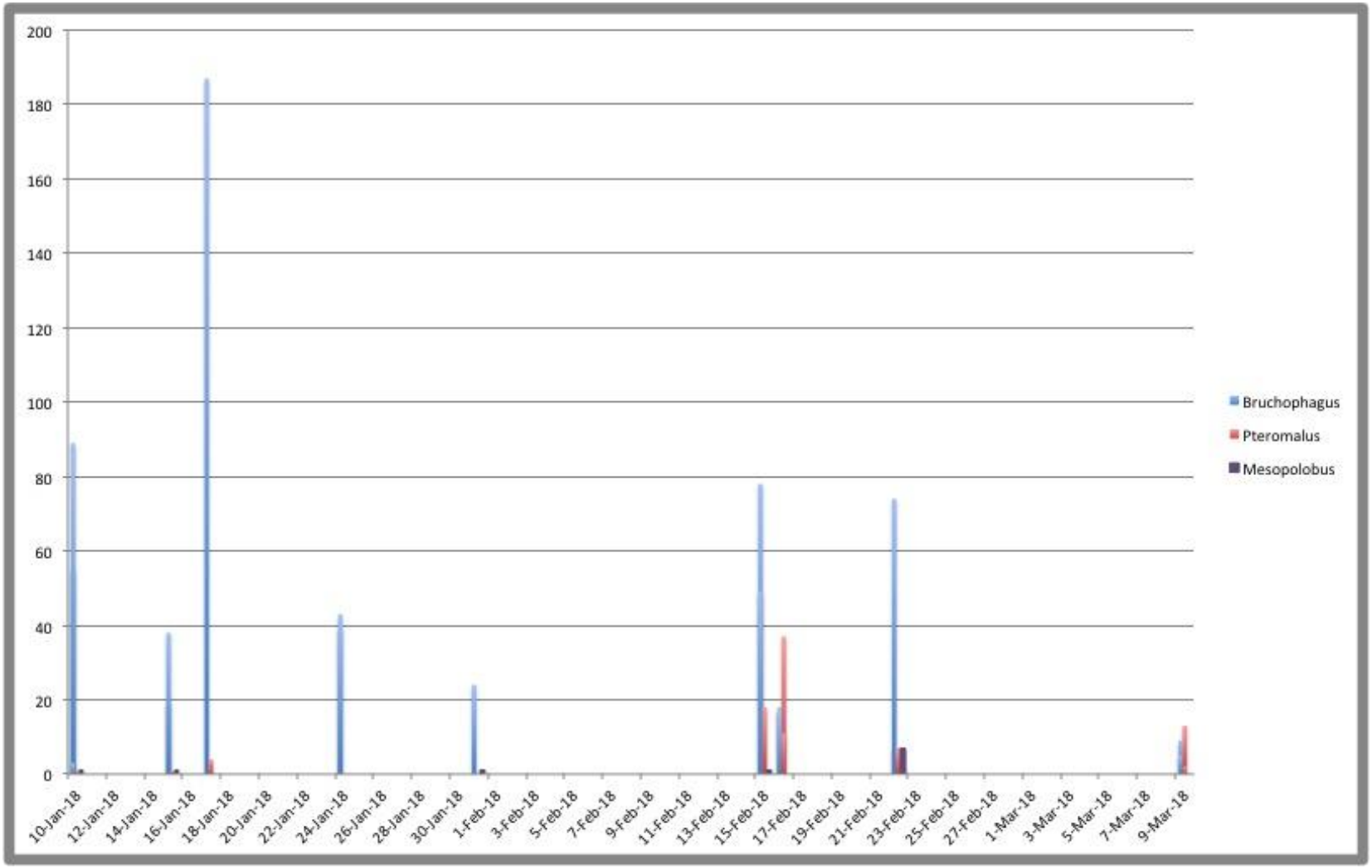
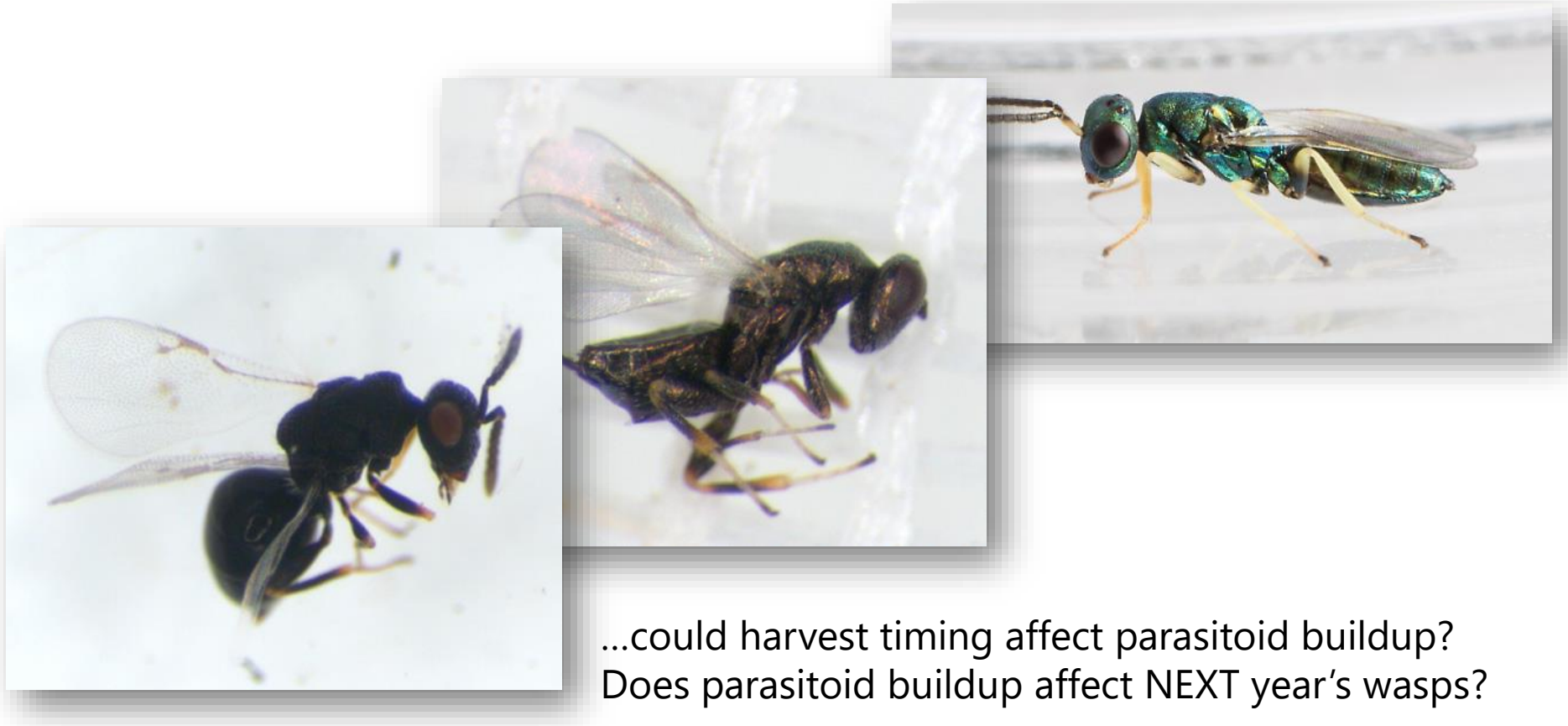


Bonus features: sticky traps

LSW peak in late Jan- Feb; parasitoids peak in late Feb and March, eventually outnumbering LSW (different timing for *Mesopolobus* and *Pteromalus*?)



…could harvest timing affect parasitoid buildup?
Does parasitoid buildup affect NEXT year's wasps?

Bonus features: sticky traps

Value-added opportunity: collect data on pollinator species and abundance

Bonus features: sticky traps

Sticky traps ALSO capture pollinators (yellow colour attracts most Hymenoptera, incl. ants)

Opportunity to augment existing pollination research with additional data

So far we see Halictidae (sweat bees), Colletidae (cellophane bees or masked bees), and Apidae (honeybees, reed bees)

Bonus features: sticky traps

Previous research shows that:

- Halictids and colletids outperform honeybees at pollinating lucerne (Case 2002– trip rate more than doubled)

- Halictids respond positively to cropping on a landscape scale (Lentini et al 2012)

- "Alkali bees" used for pollination in NW USA are halictids

- - Halictids are easier to cultivate than leafcutters, esp. in Australia (so are resin bees, a different type of *Megachile*; Bray 1973)

Pollinator potential: Halictidae

Candidates: *Homalictus, Lipotriches, Lasioglossum*

Australian halictid nests

Bonus features: climate variables

Used statistical analyses of long-term local weather data + long-term loss at cleanout to see if seed losses follow the same pattern as Canadian researchers found (summer weather drives wasp infestation levels, via HTQ)

Result: turns out cold, wet winters are significantly correlated with lower seed loss during cleanout the following year

Why? Damage to overwintering LSW in soil; may also favor lucerne over weed growth in drier seasons

What have we learned?

- Australian LSW life cycle and behavior are identical to US populations, so we can apply their research/management

- US management system: works really well; how can we approximate this in Australia?
  - Synchronize bloom if possible?
  - Augment honeybees with native pollinators (Halictidae)
  - Post-harvest irrigation to drown overwintering LSW

Climate results: cold, wet winters = lower wasp damage later

Candidates for biocontrol: *Pteromalus* spp; *Mesopolobus bruchophagi*