Identifying and quantifying the damage of mirid bugs in raspberry (*Rubus idaeus*) crops in Tasmania.

By Emma Nightingale
Importance

- Raspberry producers reporting ‘unknown plant bug’
- Potentially causing fruit deformation
- Results in reduced yield
- Mirids thought to be potential culprit
- Confirmed by Dr. Mali Malipatil (DPI, Vic)
Miridae Background

- Sap feeding insects
- Large host range
- Shown to cause damage to buds, flowers and growing points through feeding

The Problem...
- No previous research
- Number of species unknown
- Impact on raspberries not proven
# Research Questions

| **Who** | What species are there? |
| **When** | When are they a problem? |
| **What** | What impact does mirid feeding have on *Rubus* crops? |
| **Where** | Where are they coming from? |
| **How** | How can mirids potentially be controlled? |
Best method for sampling mirids?
- Technique: Sweep net worked best to catch adults and juveniles
- Best time of day
- Best area in crop canopy
**Sampling Methodology**

### Canopy Height

- Data shows a significant effect of canopy height on the mean number of mirids per sweep.
- **ANOVA:** $F^2 = 109.403, p < 0.001$
- Post-hoc Tukey HSD test indicates:
  - Different letters (a, b, c, d) represent significant differences.

### Time of Day

- Data also shows a significant effect of time of day on the mean number of mirids per sweep.
- **ANOVA:** $F^2 = 68.538, p < 0.001$
- Post-hoc Tukey HSD test indicates:
  - Different letters (a, b) represent significant differences.
Temporal Monitoring

- 3 sites
- Total 5 berry blocks
- 3 replicates in each block
- Sampling weekly
- 8\textsuperscript{th} Dec. 15 to 30\textsuperscript{th} May. 16
- Total mirids collected = 2,553
Species Identification

- Taxonomic identification undertaken by Dr. Mali Malipatill (Vic DPI)
- 3 main species between December and May

**POTATO MIRID**

(Closterotomus norvegicus)

**AUSTRALIAN CROP MIRID**

(Sidnia kinbergi)

**BROKEN-BACKED MIRID**

(Taylorilygus pallidulus)
Temporal Variation in Species

Mean mirid number per sweep ± SE

Dec. '15 | Jan. '16 | Feb. '16 | March '16 | April '16 | May '16

Potato Mirid | Crop Mirid | Broken-backed Mirid

(\(F^2=1392.123, p < 0.001\))

*= Not Significant
Findings:

- Adult and juvenile mirids can be found both male and female.
- Juveniles cannot move around the crop as flightless and therefore must be feeding on the crop.
- Dissection should reveal information about generation and reproductive stuff.

Temporal Monitoring

- Proportion of male and female mirids per sweep
  - Males
  - Females

- Proportion of adult and juvenile mirids per sweep
  - Adult
  - Juvenile
**Aim:** To determine the impact mirid feeding had on fruit quality, by:

- Comparing the impact of adult and juvenile mirid feeding
- Comparing mirid feeding at three fruit development stages
- Assessed ripe berry weight and level of drupelet distortion
Drupelet Distortion

1. <10% distortion
2. 10-25% distortion
3. 26-50% distortion
4. >50% distortion

REJECTED
Methods:

- Assessed impact of the Crop mirid as most prevalent at time of trial

- Closed buds selected
- Buds bagged
- Vials + mirids added for 48h.
- Flowers hand-pollinated
- Fruit remained bagged while developing
- Ripe fruit hand harvested
Impact on Berry Distortion

(F = 3.68, p = 0.0304)
Impact on Berry Weight

(F=7.46, p = 0.0012)
Aim:
• To investigate whether weed, pasture or other crop species may be sources of mirids.

Methods:
• 2-minute sweep, fortnightly between Dec.15 and Feb.16

Areas Monitored:
• Lucerne
• Pyrethrum crop border, containing thistle and grass spp.
• Carrot crop border, containing predominately Wild Radish
• Clover and grass
Alternate Mirid Sources

Mean mirid number per sweep ± SE

- Berries
- Pye Border
- Carrot Border
- Clover
- Lucerne

Dates:
- 28th Dec
- 11th Jan
- 25th Jan
- 8th Feb
- 15th Feb
Lucerne
• Both adults and juveniles observed
• Abundance of flowering weeds
• Previously used as trap crop
• Potential control strategy

Weed Management
• Removal or control of weed species surrounding crops
• Sweep netting most efficient method for collection
• Predominately 3 mirid species identified
• Varied throughout the season
• Mirid feeding on flowers resulted in
  • Reduced berry weight (57%)
  • Increased fruit distorted (23%)
• No difference in feeding impact from adults to juveniles
• Weed, pasture and other crops all sources for mirids
• Lucerne = potential trap crop
Acknowledgements

Many thanks to:

**Supervisors:**
- Rebecca Clarkson
- Dr. Geoff Allen
- Dr. Stephen Quarrell

**Support & Assistance:**
- Phil Andrews – Glasshouse Support
- Tom – Construction of Vacuum
- Brett, Blaine & Chris – Farm assistance
- Cam – Lucerne Trap crop & Farm assistance
- Dianne – photos
- Dave – Support & assistance
- Paul Horne – Mirid assistance
- Mali Malipatil – Mirid Identification
- Lionel Hill – Biosecurity Tas

With support from: