Lygus feeding on potatoes: Final report on damage symptomology and potential for impact on yield and quality

Tim Waters, Rodney Cooper, Dave Horton and Carrie Wohleb
WA OR Potato Conference 2020
Thursday January 23\textsuperscript{rd},
8 am 25 minutes
Outline

• Brief Introduction of Lygus
• Species Composition
• Damage Symptoms
• Damage Ratings
• Yield and Quality Impact
Lygus Bugs

- Hemimetabolous
- 5 instars
- Overwinter as adults in crown of plants or other debris
- 3-6 generations/yr
- Native to the Western U.S.
- Very broad host range including flowers, seed, alfalfa, fruits, and potato
Lygus Bugs

- Monitoring done with sweep net, sticky trap or bucket sample
- Economic Threshold (alfalfa seed)
  - 3-5/sweep before seed hardening
  - 15/sweep after seed hardening
- Usually managed w/3 insecticide applications
- **We do not have this type of information on potatoes**
- **Juveniles feed more than adults**
- **Cause damage from feeding and oviposition**
Lygus Feeding

- Lacerate and flush.
- Probe with stylet and macerate plant tissue
- Use proboscis to suck up pre digested plant cells
Aphid or Lygus?

- Slow
- Cornicles
- Filter chamber
- Live birth
- Many species
- Colonies

- Fast
- No cornicles
- 5 black spots on back
- Mostly *L. hesperus* and *L. elisus*
- Loners
Species Composition

• Hypothesis: Lygus species vary by growing location and nearby host crops.
Species Composition

- Collected Lygus from 20 and 15 different sites in 2018 and 2019
- Morphological and a few molecular identifications conducted
Species Composition

2018
• 295 specimens, 20 fields
• 77% *L. hesperus*, 20.5% *L. elisus*, 2.5% *L. robustus*
• 92% of South Basin were *L. hesperus*
• 55% of North Basin were *L. hesperus*

2019
• 386 specimens, 15 fields
• 54% *L. hesperus* and 46% *L. elisus*
• 93% of South Basin were *L. hesperus*
• 86% of North Basin were *L. elisus*
Species Composition

- Mostly *L. hesperus* in South and West
- Mixed assemblage in North (*L. hesperus* and *L. elisus*), but predominantly *L. elisus*
- No difference by potato cultivar
- Surrounding Vegetation?
  - Different crop diversity
- Insecticide sensitivity?
  - Are South fields treated more with insecticides and *L. hesperus* is more tolerant of insecticides?
Damage Symptoms
Oviposition and Feeding Damage
Shortened Nodes
Swollen Nodes
Axillary Buds
Chlorosis and Purpling
Damage Symptoms

• At the WSU Pasco site in 2019, symptoms of Lygus feeding damage were documented on a weekly basis from the middle of June to the end of August.

• Plots scored on a 0-10 scale, where 0 is no feeding damage and 10 is 100% of the plants showing symptoms of Lygus feeding damage.

• Cages that were infested at flowering, tuber initiation, and row closure began exhibit symptoms of Lygus feeding approximately four weeks after the initial infestation.

• Cages infested at early and late tuber bulking began to show symptoms within one week of infestation.
Impact on Yield and Quality

• **Hypothesis:** Lygus cause economic damage to potato crops in the Columbia Basin.

• We evaluated if Lygus impact yield and quality of potatoes grown in the Columbia Basin.
Methods

- **Paterson 2018**
  - Uncaged
  - Caged No Lygus
  - Caged Introduced at flowering (20/ cage 4x)

- **Pasco 2018 and Moxee 2018/19**
  - Caged No Lygus
  - Caged Introduced at flowering (10/ cage 4x)
  - Caged Introduced at tuber bulking (10/cage 3x)

- **Pasco 2019**
  - -Lyg
  - + Lyg Tuber Initiation
  - + Lyg Flowering
  - + Lyg Row Closure
  - +Lyg Early Bulk
  - +Lyg Late Bulk
Yield and Grade

Middle 15 foot of each plot assessed
Paterson, WA

Photo: Tyler Sorensen
Potato quality and yield data from the commercial field plots. Means followed by same letter or symbol do not significantly differ (P=.10, Student-Newman-Keuls).

What would have happened if surrounding field had not senesced?

Commercial potatoes were of higher quality than our research plots...

<table>
<thead>
<tr>
<th>Trt.</th>
<th>Specific Gravity</th>
<th>Fry Col. 0</th>
<th>Fry Col. 1</th>
<th>Fry Col. 2</th>
<th>Fry Col. 3</th>
<th>Fry Col. 4</th>
<th>Ext. Def.</th>
<th>Green Def.</th>
<th>Tot. Def.</th>
<th>Mis-shap</th>
<th>Ton/A</th>
<th>Gross $</th>
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<td>1.583a</td>
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Potato quality and yield data from the USDA Moxee Site. Means followed by same letter or symbol do not significantly differ (P=.10, Student-Newman-Keuls).

This site was planted late and did not receive adequate irrigation.

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<td>1.08853a</td>
<td>6.5a</td>
<td>8.5a</td>
<td>4.0b</td>
<td>3.8a</td>
<td>1.4a</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>30.8a</td>
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<tr>
<td>+ Lyg Bloom</td>
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Moxee Site 2019

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- Potato quality and yield data from the USDA Moxee Site. Means followed by same letter or symbol do not significantly differ (P=.10, Student-Newman-Keuls).
Pasco Site 2018

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Summary

• With the Lygus cage studies, it was apparent that Lygus negatively impact plant health and tuber quality
• There was some variability from one site to another in regard to which factors were most influenced
• Sp. Gravity tends to decrease
• Defects, Malformed and Green Tubers tend to increase
• Further studies hope to better define the impact of Lygus feeding on potato
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• Andy Jensen and Matthew Blua
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Questions?????

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