Lygus Control, New Chemistry & Crop Loss Reporting

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Lygus Management
- Review of status of Lygus IPM
  - What do we know & need to know?
- Ask and answer (?) two questions
- Review chemical control
- Introduce new chemistry
  - Selective options for Lygus control?
  - Big impact?
- Crop Loss Reporting
  - Insecticide use trends, historical review
  - Focus of breakout in afternoon

Lygus IPM...
...depends on 3 basic keys

1. Lygus Action Thresholds
2. Effective & Selective Chemistry
3. Sampling, Detection, & Plant Monitoring

Lygus Can Be Managed!
Even side-by-side

Lygus Can Be Managed Better!
**Lygus hesperus**

**Adult**
- Can cause damage
- Cannot be reliably controlled
- Key to movement & reproduction

**Two Scales for Questions in Lygus Management**

- **Field**
  - When should managers discontinue any further Lygus chemical controls in cotton?

- **Landscape**
  - Can we estimate & characterize inter-crop effects of Lygus spatially?

**Extension Program**

- Initiated in 2000 in response to extreme and negative interactions among producers of different crops
- Communication / Awareness
- Education
- Systematic Survey / Research

**Spatial Study**

- Two townships, spring & early summer hosts (April - July)
- Cotton, alfalfa, seed alfalfa, fallow, weeds, and small grains; georeferenced
- Sweeps (15 in. diam.) from each potential host weekly
- Examine source / sink relationships among crops

**Ring Analyses to Determine Range of Impact of Lygus**

- Around each focal cotton fields, calculate crop densities in concentric rings
- Multiply that crop density by the mean density of Lygus in each ring = Estimate of source potential
- How are Lygus densities in focal fields related to source potential of surrounding crops?
Focal Cotton Fields (50)

Spring Lygus Densities
(adults & nymphs)

- Significantly more Lygus were found in Seed Alfalfa, Forage Alfalfa, and fallow fields (weeds), than in cotton

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>N</th>
<th>Lygus Density (log D + 1)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Alfalfa</td>
<td>9</td>
<td>1.50a</td>
</tr>
<tr>
<td>Forage Alfalfa</td>
<td>34</td>
<td>1.45a</td>
</tr>
<tr>
<td>Fallow</td>
<td>3</td>
<td>1.44a</td>
</tr>
<tr>
<td>Cotton</td>
<td>72</td>
<td>0.69b</td>
</tr>
</tbody>
</table>

*Values in same letter not significantly different (P > 0.05)

Lygus Associations

- Seed alfalfa fields are sources of Lygus for cotton fields. This effect does not extend beyond 1 mile.
- Cotton fields are sinks for Lygus. This effect disappears beyond 0.5 miles.
- Strategic placement of crops could help alleviate Lygus problems.

Strategic Planting

Adults move; Nymphs don’t

Adults move; Nymphs eat!
Avoid Adults; Control Nymphs!

Yield & Revenue : Density

- Maximum Yield @ 1.7 nymphs / 100
- Maximum Revenue @ 5.2 nymphs / 100
- Recommendation: 4 nymphs with at least 15 total Lygus per 100 sweeps ("15:4")

Sampling & Thresholds

- 13 Adults + 4 Nymphs (17:4) is over "15:4" Spray
- 13 Adults + 3 Nymphs (16:3) is under "15:4" Not Yet
### Two Scales for Questions in Lygus Management

- **When should managers **discontinue** any further Lygus chemical controls in cotton?**

- **Can we estimate & characterize inter-crop effects of Lygus spatially?**
  - Seed alfalfa can be a source for Lygus in cotton
  - Lygus can apparently move from a source and affect fields up to 1 mile away

### Timing Late Season Controls

*(when should you stop spraying?)*

<table>
<thead>
<tr>
<th>Lygus Termination (LT)</th>
<th>5-Aug</th>
<th>16-Aug</th>
<th>23-Aug</th>
<th>6-Sep</th>
<th>20-Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT4</td>
<td></td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>LT3</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td></td>
<td>⬤</td>
</tr>
<tr>
<td>LT2</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LT1</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
</tbody>
</table>

*c.o. = cut-out or nodes above white flower = 5*

### Large Yield Difference

**LT1 < LT2**

<table>
<thead>
<tr>
<th>Lygus Chemical Termination X Variety</th>
<th>DP422BR early</th>
<th>DP33B medium</th>
<th>DP655BR full</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>LT2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>LT3</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>LT4</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

### Every Year is Different!

*You should have quit while you were ahead!*

### 2003 Experiment

- Two planting dates: April 30 & May 28
- Three varieties: SG215BR, DP449BR, DP555BR
- Two irrigation termination timings: Aug. & Sept.
- Four Lygus chemical control terminations
  - High heat stress & fruit shed July-August
  - Extremely productive “fall”, long, open and dry
Studies Identified Effective Compounds
(5-fold increase in yield)

2002 Lygus Screening Trial (02F4L)

High Populations Late Season

Yield : Nymphs Relationship

50c Cotton Returns

Effective & Selective Chemistry

- Effective chemistry is available, but limited to broad spectrum materials (I.e., Orthene or Vydate)
- Selective technologies have been key to managing whitetlies and pink bollworm
- Can selective agents be found for Lygus?
Adults Unaffected (02F4L)

Adults per 100 sweeps (seasonal ave.)

2002 Lygus Screening Trial (02F4L)

Yield in bales per acre

> 10-fold Increase in Yields (02F4L)

Yield in bales per acre

Selective Chemistry?

New Chemistry: Selective Options for the Future?

- Novaluron (Diamond)
  - Makhteshim-Agan
  - Uniroyal / Crompton
  - Benzoylurea
  - Chitin inhibitor
  - Contact only
- Flonicamid
  - ISK Industries
  - FMC Corporation
  - Pyridine carboxamide
  - Feeding inhibitor
  - Systemic

Yield (03F4Eff)

- Orthene (5 Sprays)
- Vydate (5 Sprays)
- Regent (5 Sprays)
- Control (0 Sprays)
- Fronicamid (4 Sprays)
Major Threat to Cotton Production in AZ

- Over the last 5 years...
  - 45% of all insecticide sprays have been targeted at Lygus
  - 41% of the entire insecticide budget has been invested against Lygus
  - 66% of the yield loss has been attributed to Lygus

Insecticide Use in AZ Cotton

- Selective technologies stabilized usage (i.e., Bt & IGRs)
- However, current usage reflects the importance of Lygus

Acknowledgments

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- ACGA and Cotton Incorporated who supported (pce) the Lygus termination studies

Information

- All University of Arizona crop production & crop protection information is available on our web site.
  - Arizona Crop Information Site (ACIS), at
  - http://ag.arizona.edu/crops