Update and New Considerations in Cotton Insect Management

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Early Season Cotton Management Meeting
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Insect Management

• Review of status of Lygus IPM
  – What do we know & need to know?
  – Address two questions; Spatial & chemical control
  – Selective options for Lygus control?

• Whitefly Management
  – Review basic guide for cotton
  – New information on Knack
  – Historical performance
Lygus IPM... depends on 3 basic keys

1. Avoidance
   - Exploitation of Pest Biology & Ecology
   - Crop Management
2. Effective Chemical Use
   - Cross-Commodity Cooperation
   - Over-Wintering Ecology
   - Lygus X N Interactions
3. Sampling
   - Lygus Sampling, Detection, & Plant Monitoring
   - Crop Placement
   - Natural Enemy Conservation
   - Planting & Termination Date Management
4. Resistance Management
   - Alternate Host Management
   - In-field Mortality Dynamics
   - Pest & Outbreak Prediction
   - Lygus x H$_2$O Interactions
   - Tolerant / Resistant Varieties
Key Elements... ...what have we got?
Lygus Can Be Managed!

Even side-by-side
Avoid Adults; Control Nymphs
**Lygus hesperus**

**Adult**

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

Spray all you want!
Ring Analyses to Determine Range of Impact of Lygus

- How are Lygus densities in focal fields related to source potential of surrounding crops?
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.
Adults move; Nymphs don’t
Adults move; Nymphs eat!
3 Sprays

0 Sprays

Note height difference
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

100 sweeps
Sampling & Thresholds

13 Adults + 4 Nymphs (17:4) is over ‘15:4’ Spray
Sampling & Thresholds

13 Adults + 3 Nymphs (16:3) is under ‘15:4’

Not Yet!
# 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>
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<tbody>
<tr>
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$c.o. = cut-out or nodes above white flower = 5$
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
High Populations Late Season
Yield : Nymphs Relationship

![Graph showing the relationship between yield and nymphs.]
50¢ Cotton Returns

Don’t Spray

Sprays

0

1 Spray

2

3

Opt 215  215  449  449  555  555  Late  Late  Opt  Late  Opt  Late  Opt  Late  Opt

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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 whiteflies and pink bollworm

- Can selective agents be found for Lygus?
Yield (03F4Eff)

Orthene (5 Sprays)

Vydate (5 Sprays)

Regent (5 Sprays)

Flonicamid (4 Sprays)

Control (0 Sprays)

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Whitefly IPM…

…depends on 3 basic keys

1. Avoidance
   - Area-Wide Impact
   - Exploitation of Pest Biology

2. Effective Chemical Use
   - Cross-Commodity Cooperation
   - Over-Wintering Ecology

3. Sampling
   - WF, Virus, Stickiness Sampling, Detection, & Monitoring
   - Effective & Selective Chemistry
   - WF Action Thresholds
   - Alternate Host Management
   - Natural Enemy Conservation
   - In-field Mortality Dynamics
   - Pest & Outbreak Prediction

Inter-Crop Movement

WF X N Interactions

Planting & Termination Date Management

WF X H_2O Interactions

Tolerant / Resistant Varieties
Snow in Phoenix?

QuickTime™ and a Cinepak decompressor are needed to see this picture.
Basic Guide

• Initiate WF control with IGRs!
  – Consider either IGR, if Courier (= Applaud) is not used locally in melons; Use Knack, otherwise.
  – Use full rates (8 oz product); DON’T CUT RATES!

• Avoid neonicotinoids in cotton, where they are depended on locally for melon & vegetable production
  – I.e., Intruder or Centric

• Follow timing guidelines
  – 40% of leaves infested with 3 or more adults plus
  – 40% of leaf disks infested with 1 or more large nymphs

• Don’t Get Distracted
The Penalty is Severe & Lasting

QuickTime™ and a Cinepak decompressor are needed to see this picture.
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Major Points of Insect Growth Regulation

Knack®

Adult

2nd

3rd

4th, ‘pupa’

Courier™
buprofezin

Egg

Craw/Craw

pyriproxyfen
IGR-treated  Untreated
Bioresidual v. Chemical Residual

Recent studies on field residues of pyriproxyfen (Knack) to understand where and when Knack is capable of killing whiteflies

How long does Knack sterilize females for?

How long does Knack last on or in cotton leaves?
Females Sterilized for 4 d

1 feeding bout

Even males can ‘sterilize’ females
Knack Sterilized Eggs on Treated Leaves for 30 Days

% Dead Eggs

Days after Spray on Cotton

Fourth Leaf on day 0

Knack

Water

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Field Decay of Knack Residues

Don’t Cut Rates!

$y = 6.9867e^{-0.1072X}$

$R^2 = 0.8986$

Ca. 7 d half-life

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2003 WF Management Demonstration
Real World Example (03F22)

YIELD LIMITING

Defoliated

Intruder (2.3 oz)
Courier 70WP (8 oz)
Knack (8 oz)
UTC

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Historical Comparisons
Knack 1996

June July August September 1996
Knack 1997
UTC > 12.8 (9/16)

June July August September

1997

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Knack 1998
UTC > 3.0 (8/10)

June July August September 1998

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Knack 1999
UTC > 3.3 (8/16)
Knack 2000
UTC > 10.6 (8/3)
Knack 2002
UTC > 6.4 (9/18)
Knack 2003
UTC > 18.0 (9/18)

Application made 10 d late
Historical Performance of Knack, 1996–2002

Consistent timing, consistent results

Incorrect timing, less effective results
Don’t Forget! (1992)

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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://cals.arizona.edu/crops

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