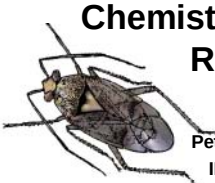
Lygus Control, New Chemistry & Crop Loss Reporting



Peter C. Ellsworth
IPM Specialist
Maricopa Agricultural Center
University of Arizona

Desert Ag Conference
12 May 2004

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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

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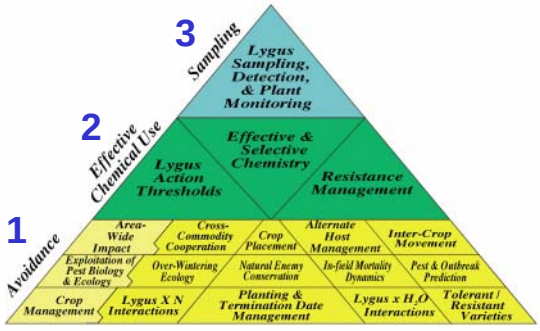
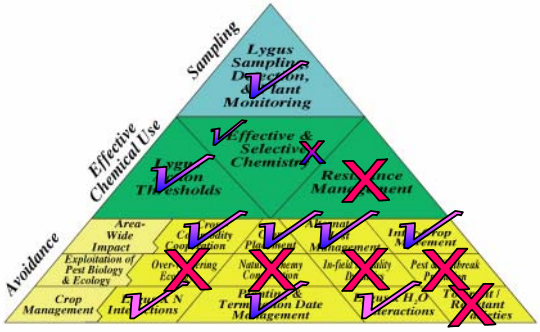
Lygus IPM…

…depends on 3 basic keys



Key Elements…

…what have we got?



Lygus Can Be Managed!

Even side-by-side

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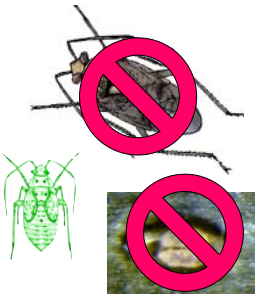
Lygus Can Be Managed Better!



Lygus hesperus Adult

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

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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?

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Cooperative Extension

Community-Wide Lygus Action Plan

Extension Program

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

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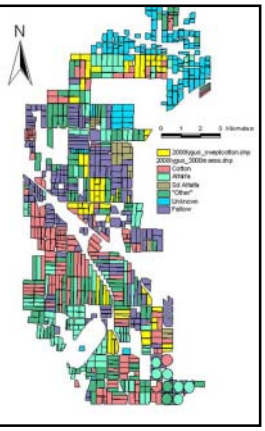
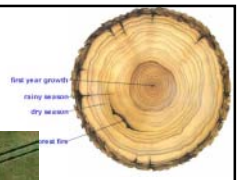
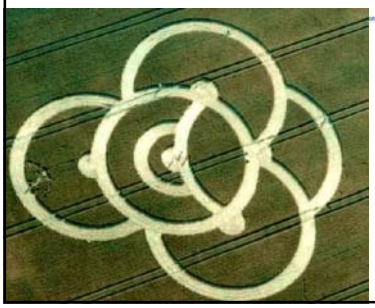
Spatial Study

- 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 Analysis?





Tree Rings?

Crop Circles?

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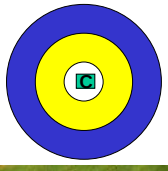
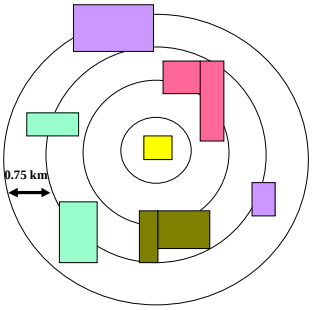
Ring Analyses to Determine Range of Impact of Lygus

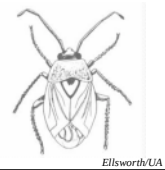
- Around each focal cotton fields, calculate crop densities in concentric rings
- Multiply that crop density by the mean density of Lygus in each ring = Estimate of source potential
- How are Lygus densities in focal fields related to source potential of surrounding crops?



Focal Cotton Fields (50)



- Focal cotton field
- Seed alfalfa
- Forage alfalfa
- Cotton
- Fallow



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Spring Lygus Densities

(adults & nymphs)

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

Crop Type	N	Lygus Density (log D + 1)*
Seed Alfalfa	9	1.50a
Forage Alfalfa	34	1.45a
Fallow	3	1.44a
Cotton	72	0.69b

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

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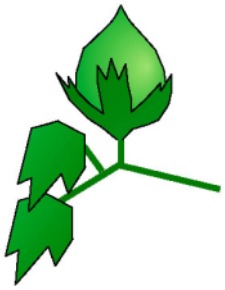
Lygus Associations

- 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.



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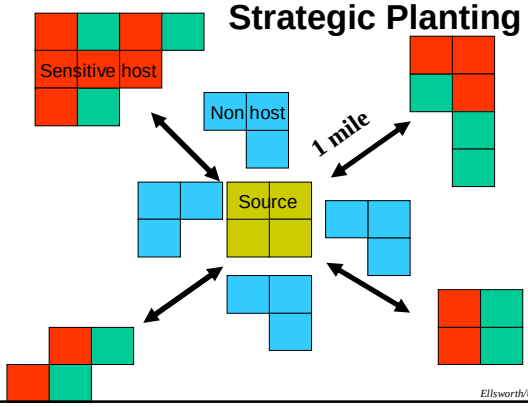
Strategic Planting



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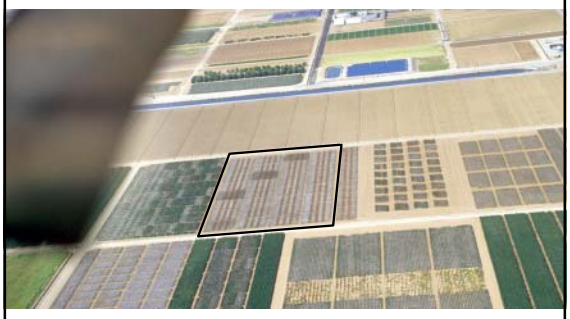
Adults move; Nymphs don't



00F3threshold

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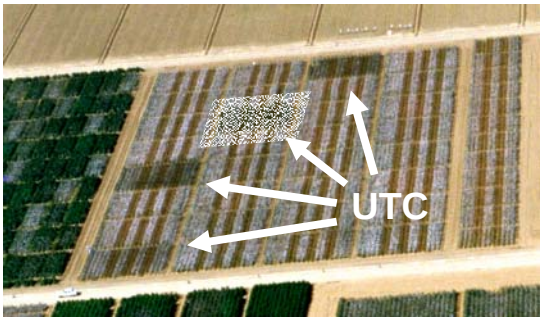
Adults move; Nymphs eat!



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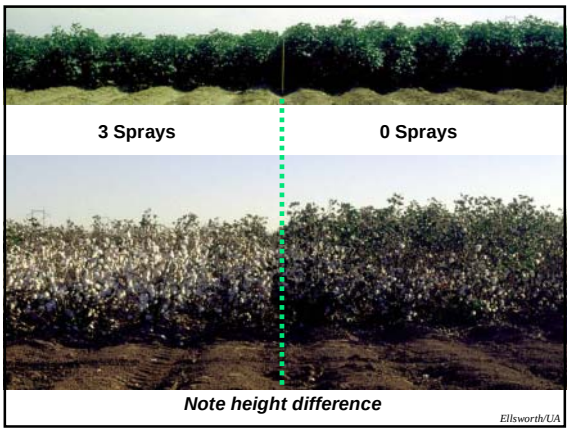
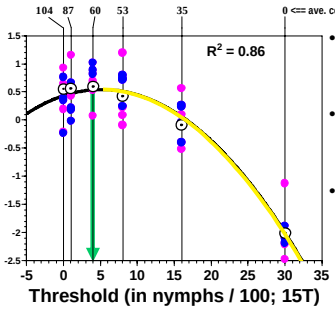


Avoid Adults; Control Nymphs!

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')

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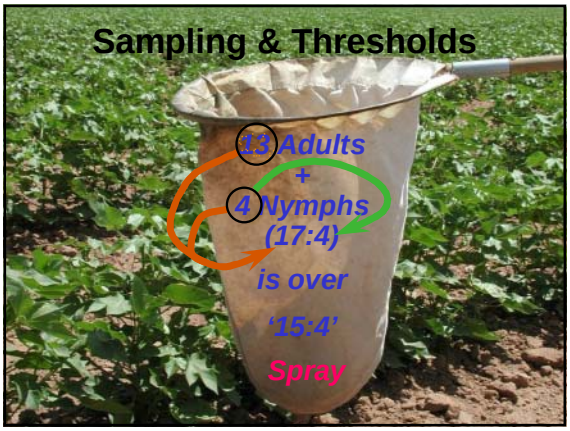

Two Scales for Questions in Lygus Management

Field

- When should managers <u>discontinue</u> any further Lygus chemical controls in cotton?

Landscape

- 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

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Timing Late Season Controls

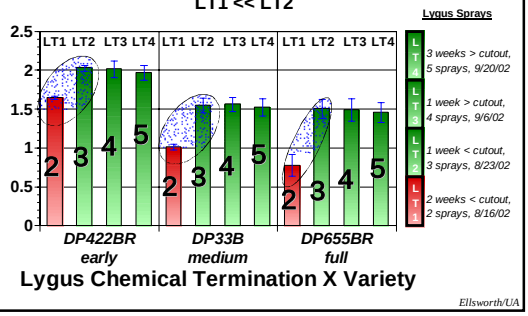
(when should you stop spraying?)

Lygus Termination (LT)	Spray Dates 5-Aug	16-Aug 2 wk < c.o.	23-Aug 1 wk < c.o.	6-Sep 1 wk > c.o.	20-Sep 3 wk > c.o.
LT4	•	•	•	•	•
LT3	•	•	•	•	
LT2	•	•	•		
LT1	•	•			

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

Large Yield Difference

LT1 << LT2



Lygus Chemical Termination X Variety

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Every Year is Different!

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

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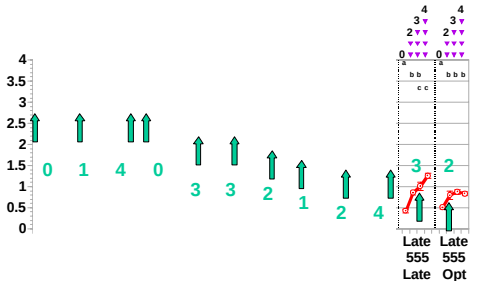
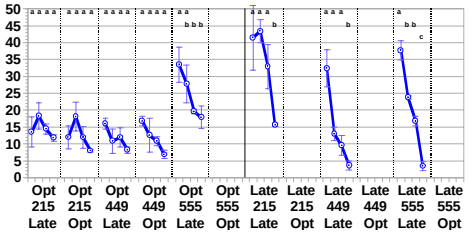


High Populations Late Season



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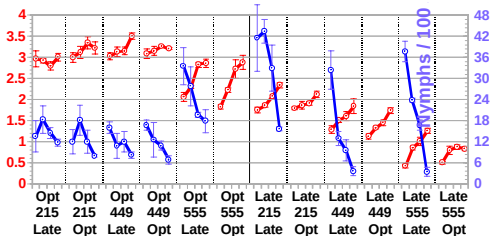
Yield : Nymphs Relationship



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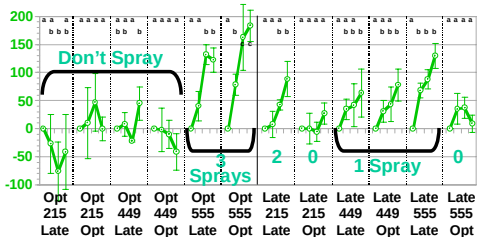
50¢ Cotton Returns



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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?

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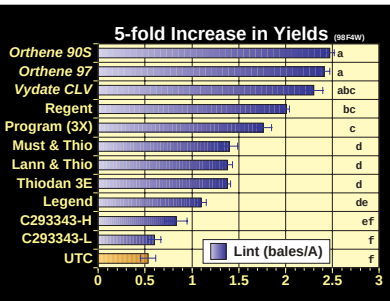
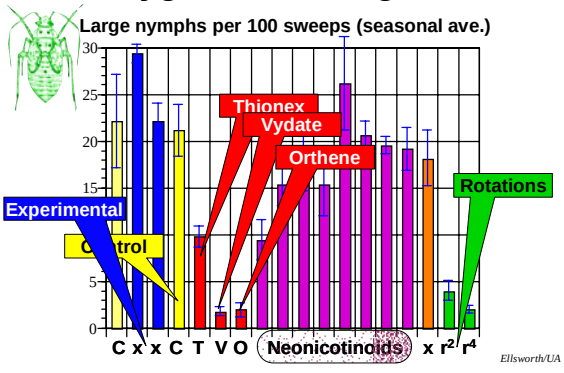
Studies Identified Effective Compounds

(5-fold increase in yield)



2002 Lygus Screening Trial (02F4L)



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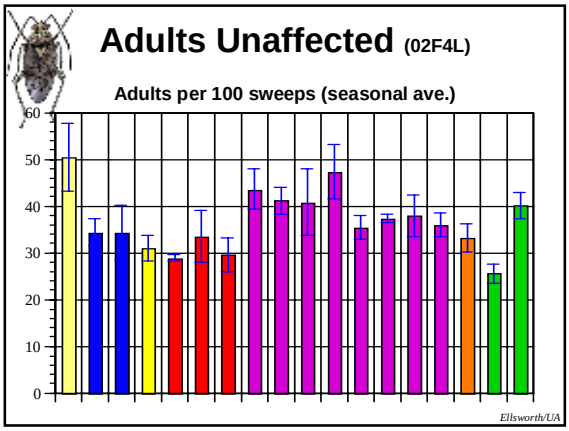
Adults Unaffected (02F4L)
Adults per 100 sweeps (seasonal ave.)
60
50
40
30
20
10
0
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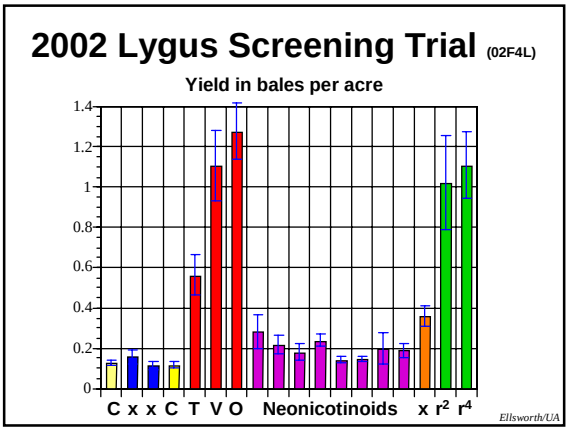
2002 Lygus Screening Trial (02F4L)
Yield in bales per acre
1.4
1.2
1
0.8
0.6
0.4
0.2
0
C x x C T V O Neonicotinoids x r2 r4
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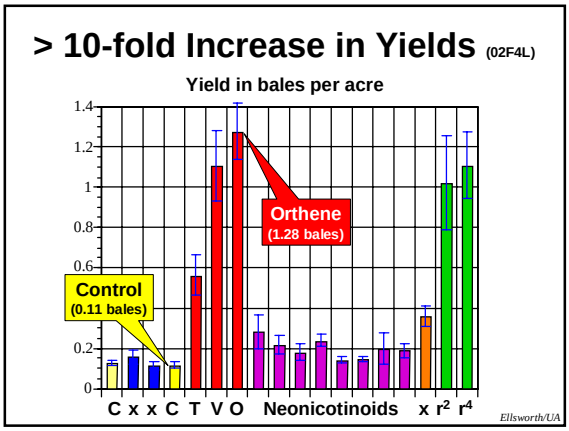
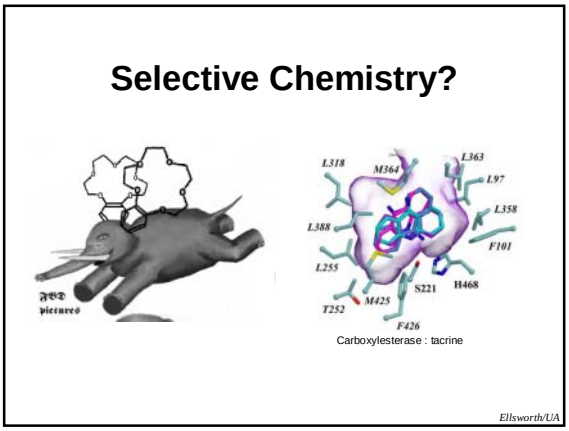

> 10-fold Increase in Yields (02F4L)
Yield in bales per acre
Orthene
(1.28 bales)
Control
(0.11 bales)
C x x C T V O Neonicotinoids x r2 r4
Ellsworth/UA


Selective Chemistry?
L318
M364
L363
L97
L358
L388
F101
L255
S221
H468
T252
M425
F426
Carboxylesterase : tacrine
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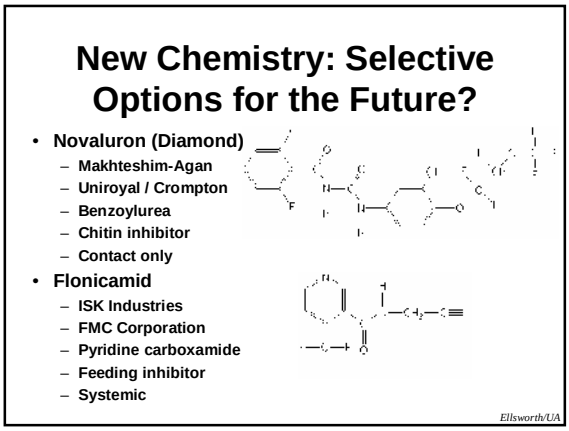
New Chemistry: Selective Options for the Future?
• Novaluron (Diamond)
– Makhteshim-Agan
– Uniroyal / Crompton
– Benzoylurea
– Chitin inhibitor
– Contact only
• Flonicamid
– ISK Industries
– FMC Corporation
– Pyridine carboxamide
– Feeding inhibitor
– Systemic
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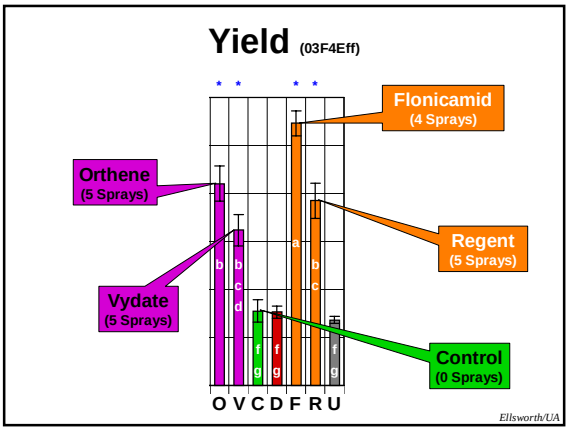
Yield (03F4Eff)
Flonicamid
(4 Sprays)
Orthene
(5 Sprays)
Regent
(5 Sprays)
Vydate
(5 Sprays)
Control
(0 Sprays)
O V C D F R U
Ellsworth/UA

Lygus Nymph Control, 7DAT (03F4Eff)

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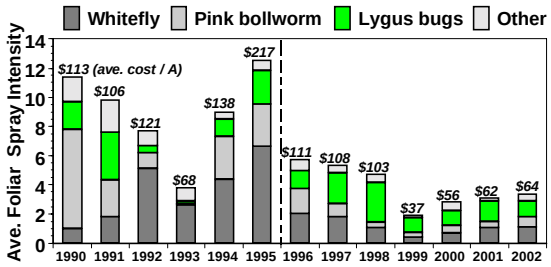
Insecticide Use in AZ Cotton

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



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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

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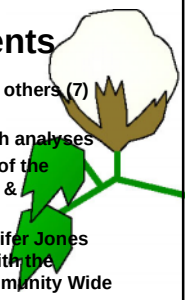
Acknowledgments



- Virginia Barkley who supervised and others (7) who conducted the sampling
- Christa Ellers-Kirk for assistance with analyses
- Larry Antilla, Jerry Kerr and the rest of the ACRPC staff who provide crop maps & coordinates
- Steve Husman, Dave Langston, Jennifer Jones and cooperating growers involved with the implementation of the Maricopa Community Wide Lygus Action Plan
- ACGA and Cotton Incorporated who supported (pce) the Lygus termination studies

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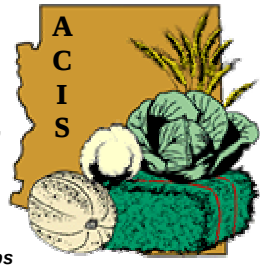
Information

- 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*



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