Development of *Lygus* Management Strategies for Texas Cotton

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Outline

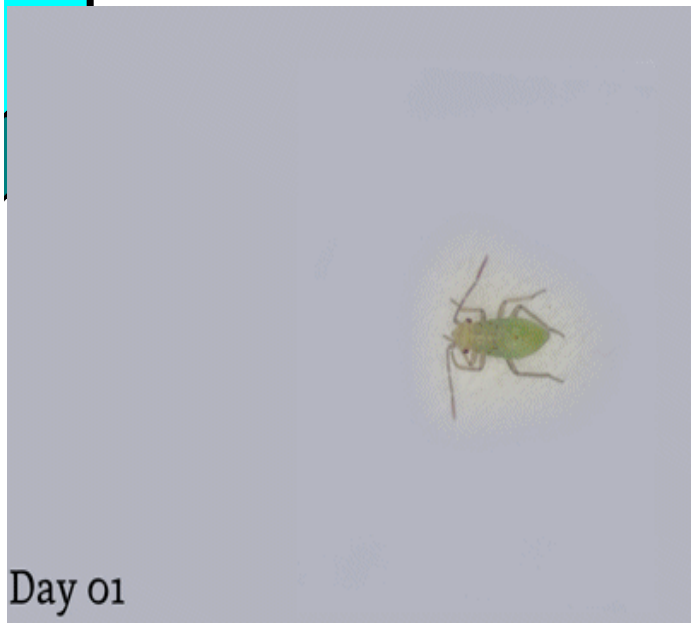
- *Lygus* **pest status in the Texas High Plains**
- **Development of *Lygus* management strategies**
- **Issues in current *Lygus* management**
- **Summary**

Dominant Species: *Lygus hesperus*

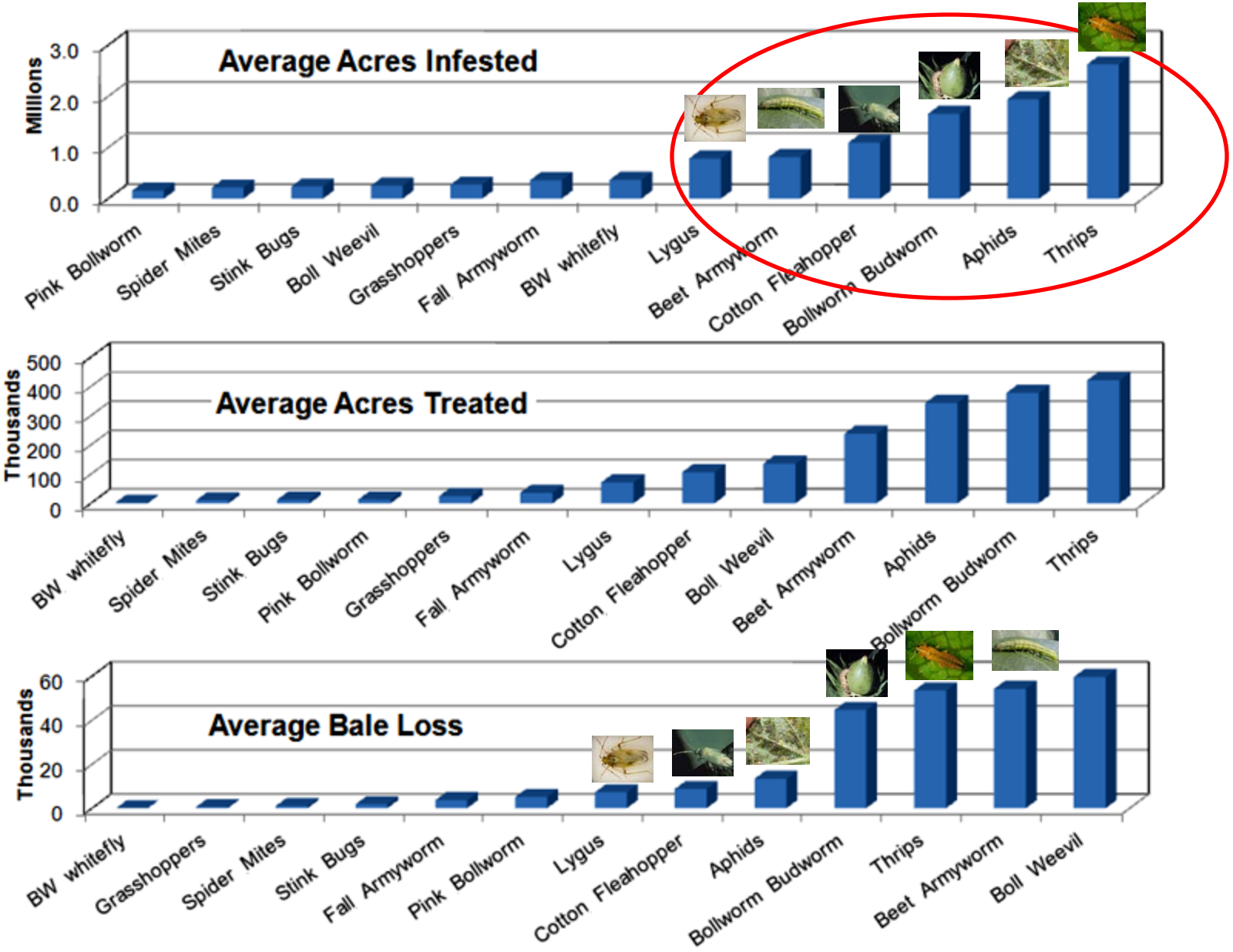
Square

Bloom

Boll



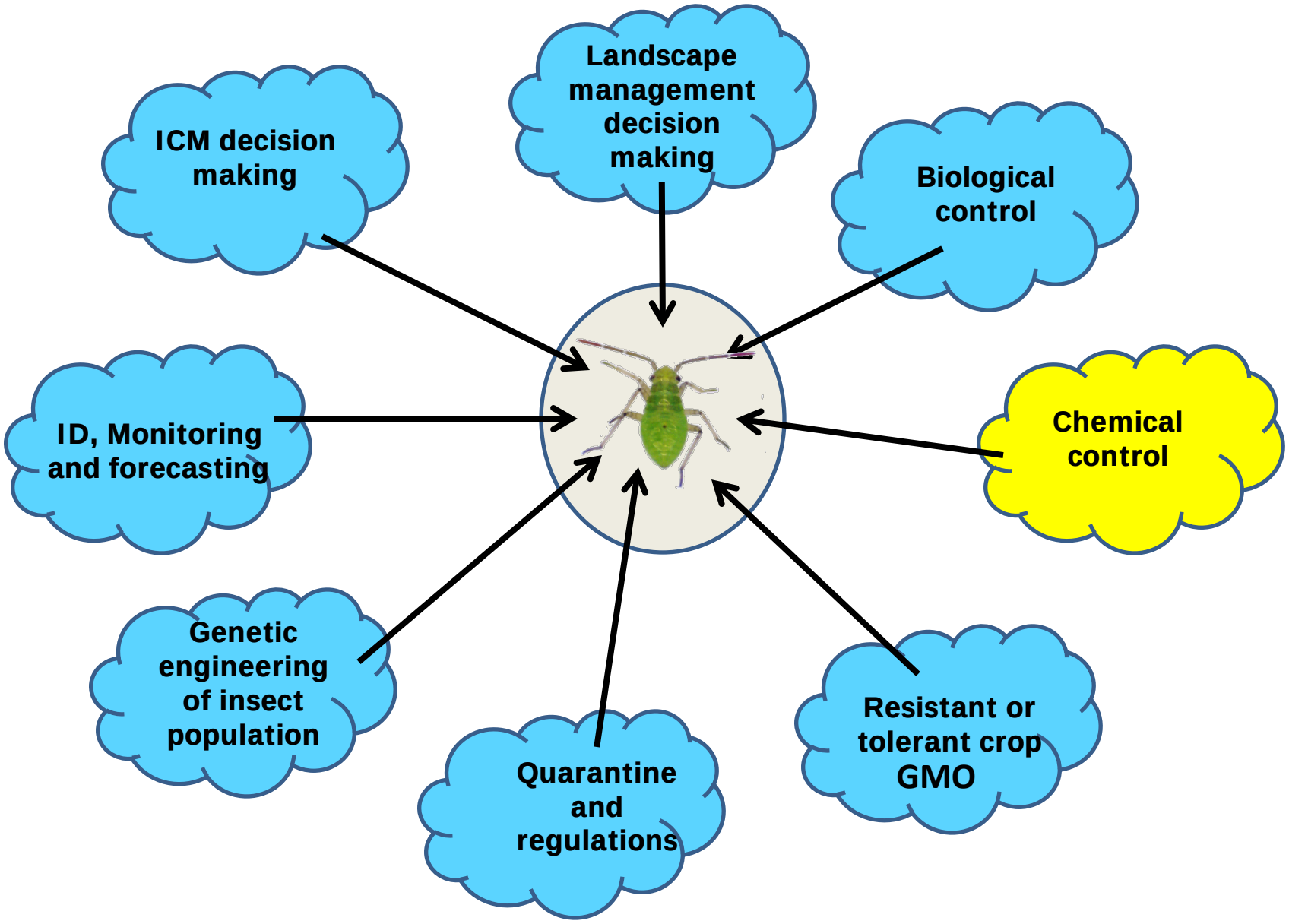
Cotton Insect Pest Problems in Texas (2000-2010)



Lygus Bug Management Strategies

Landscape	Habitat management, movement disruption, sterile technique, genetic control, quarantine, biological control, pest eradication, monitoring and forecasting
Agro-ecosystem	Crop rotation, cropping patterns, biological control, conservation of beneficials, intercrop movement, trap cropping, resistance management
Field	Cultivars, irrigation, planting patterns, planting date,fertilizer, tillage, weed management, insecticides, mating disruption, entomopathogens
Plant	Resistant/tolerant plant, transgenic plant, endophytes, crop phenology, sampling, damage assesment, economic threshold
Molecular	Development and utilization of molecular tools, population genetics, molecular systematics, genomics, proteomics, transcriptomics.

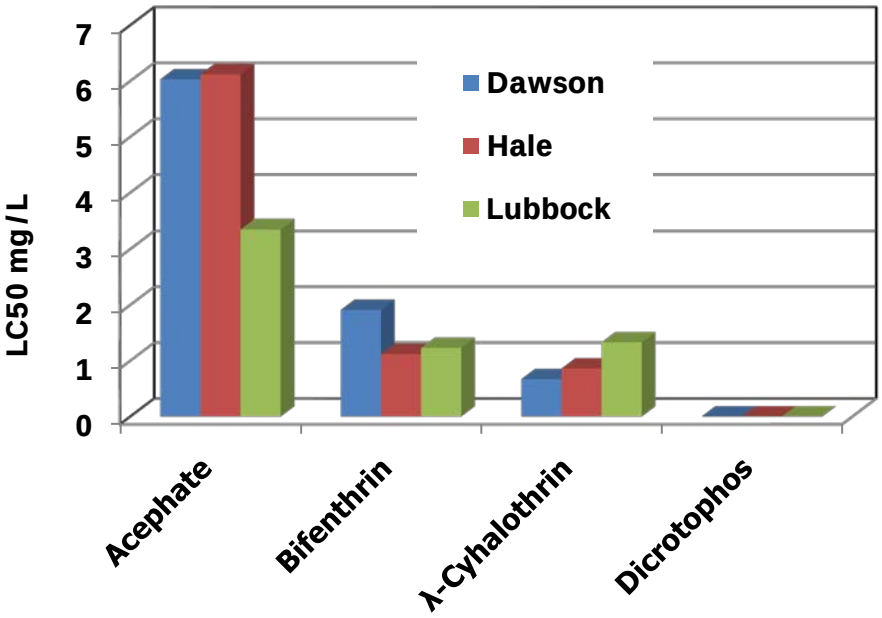
Potential *Lygus* Management Tools

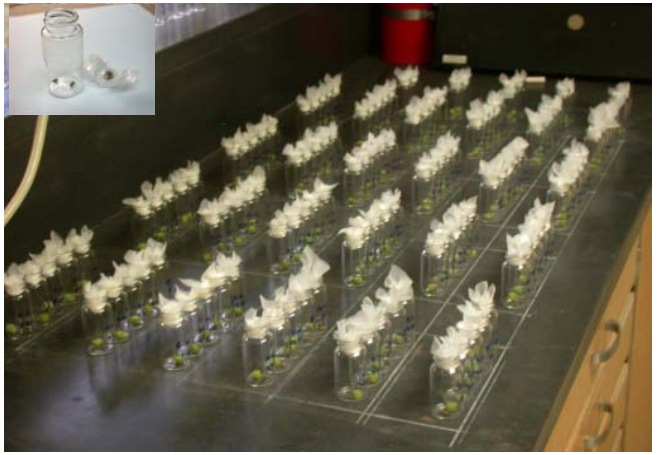


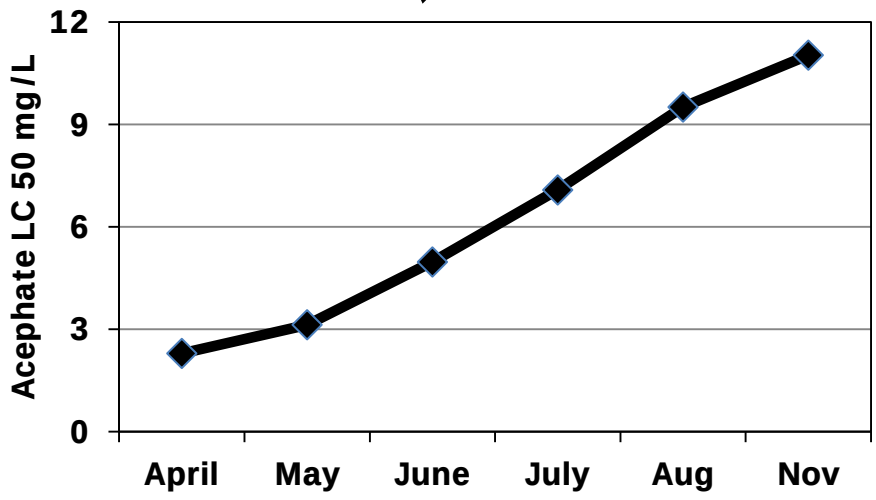
Chemical Control

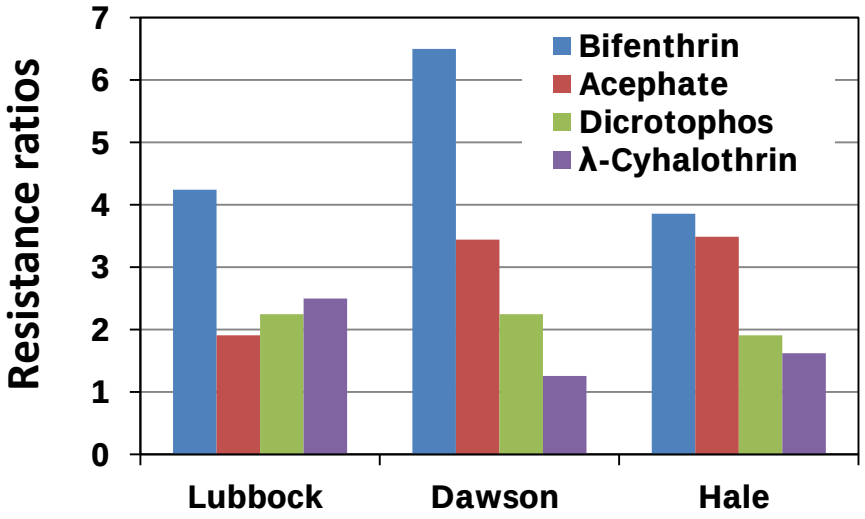
- Insecticide resistance monitoring
- Insecticide evaluation

Toxicity of Selected Insecticides

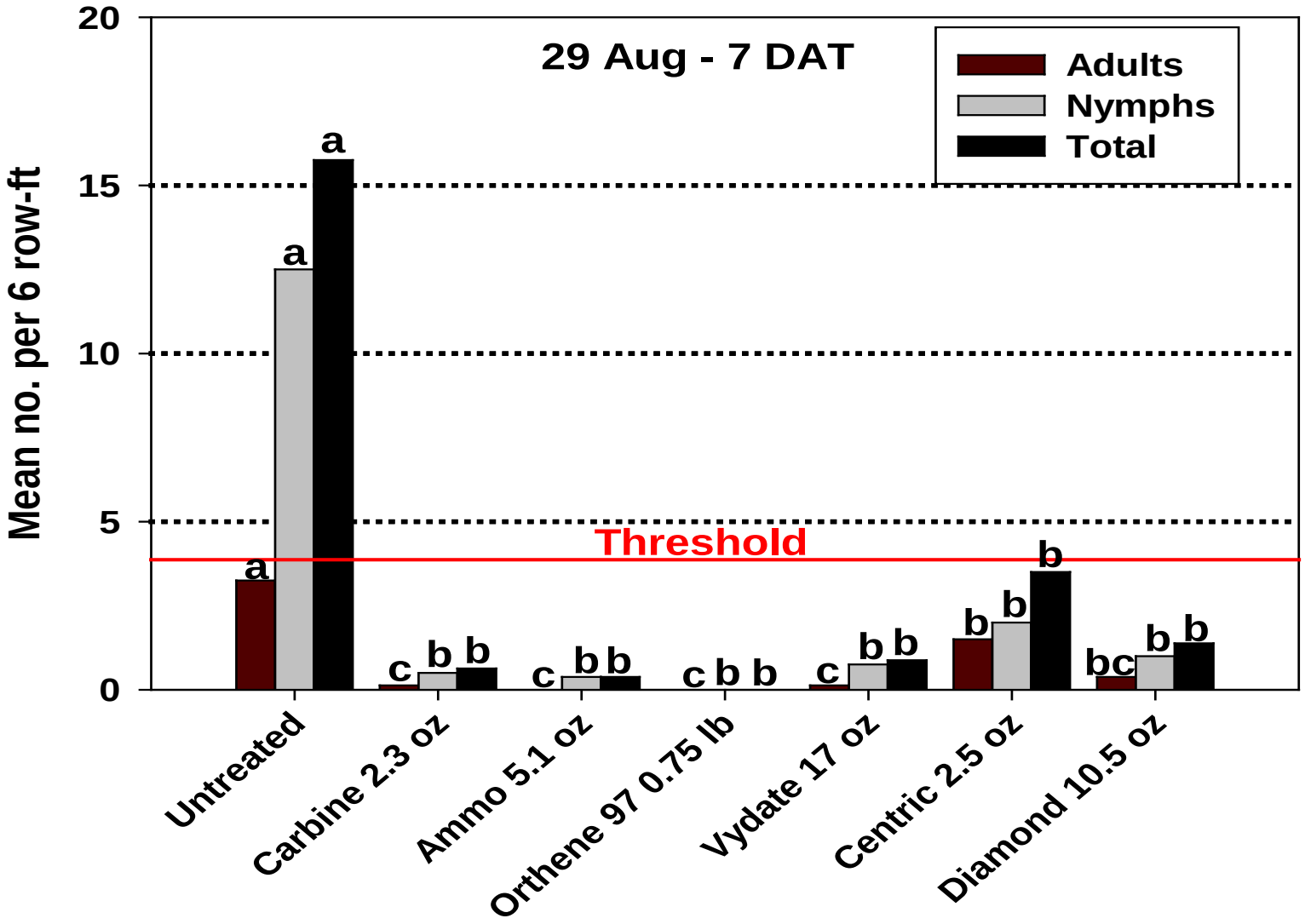








Lygus Population Suppression by Different Insecticides

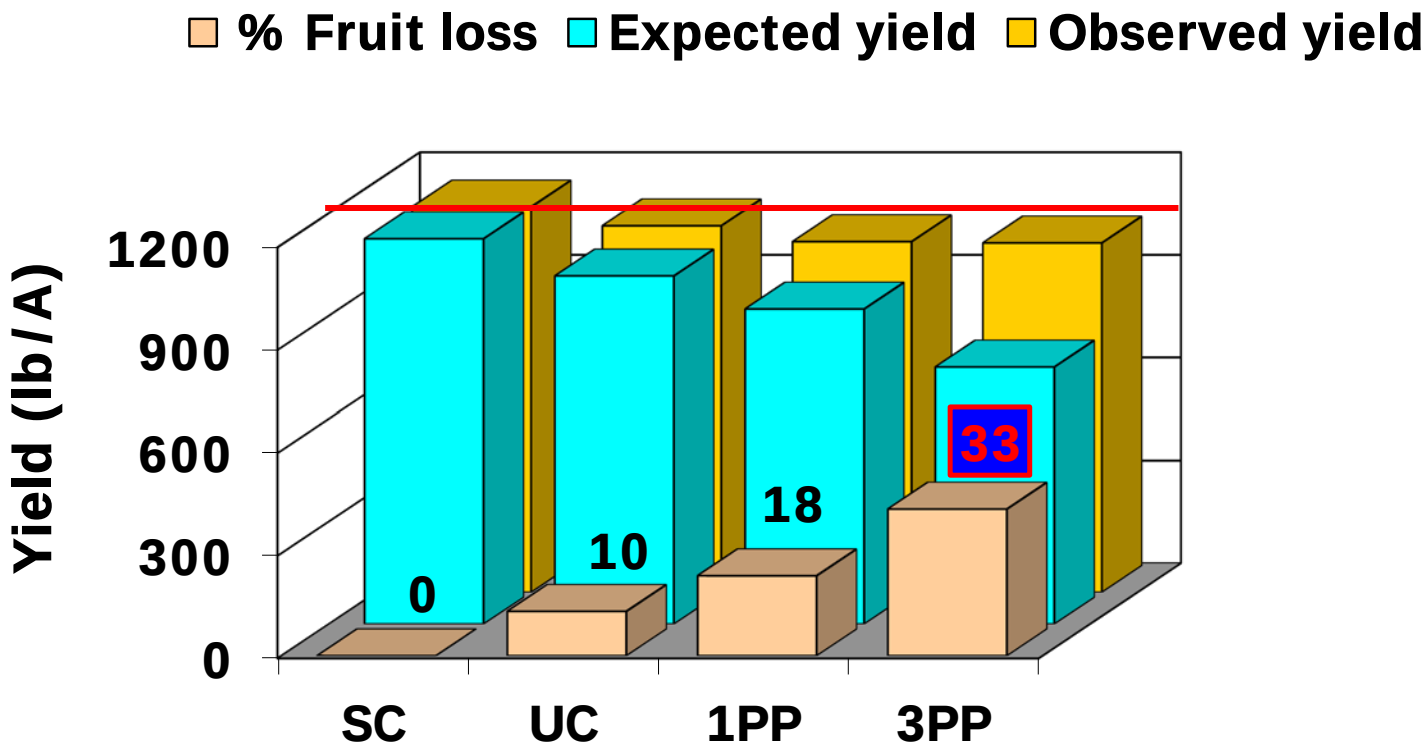


D. Kerns, 2009

Avoiding Unnecessary Insecticide Applications

- *Lygus* boll damage potential
- Cotton crop compensation potential

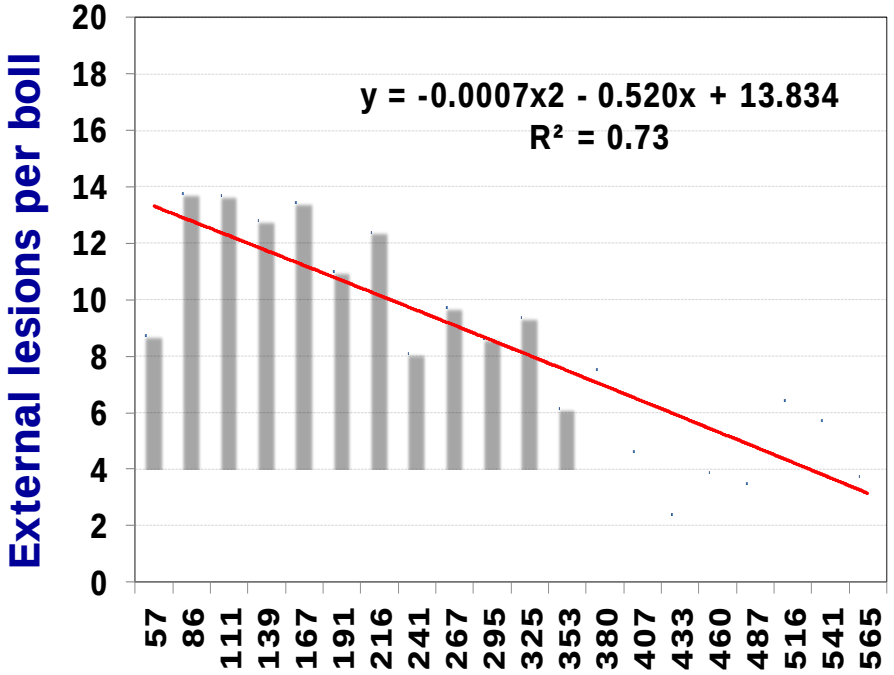
Yield Response to *Lygus*-Induced Square Loss (2005-2007)

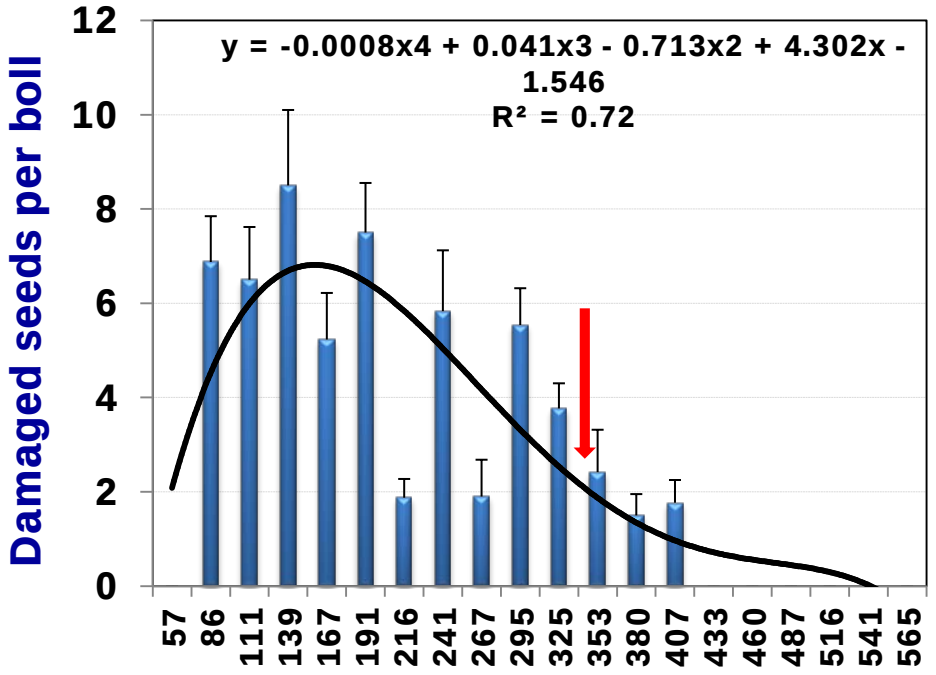


SC=sprayed control; UC=unsprayed control; 1PP=1 bug/plant; 3PP=3 bugs/plant

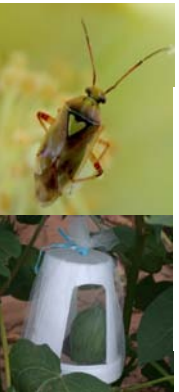
Boll Damage Patterns

External lesions and damaged seeds

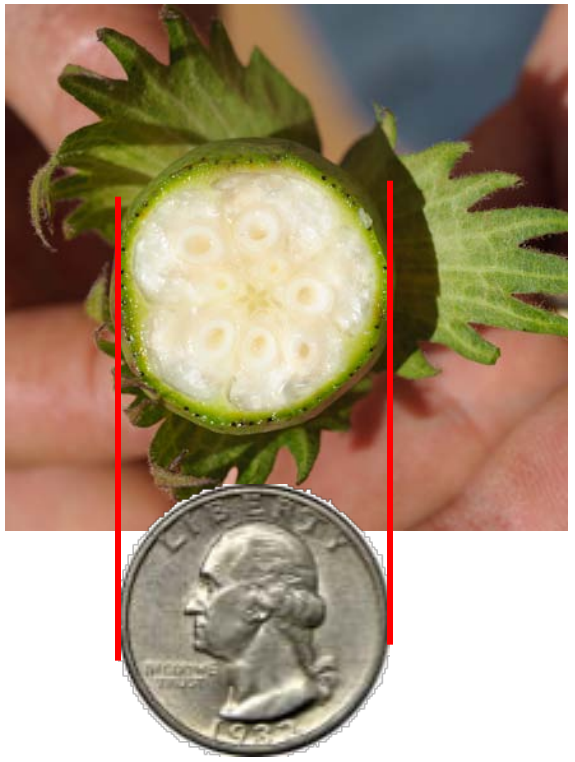




Boll age (Heat units >60 ^{0}F)

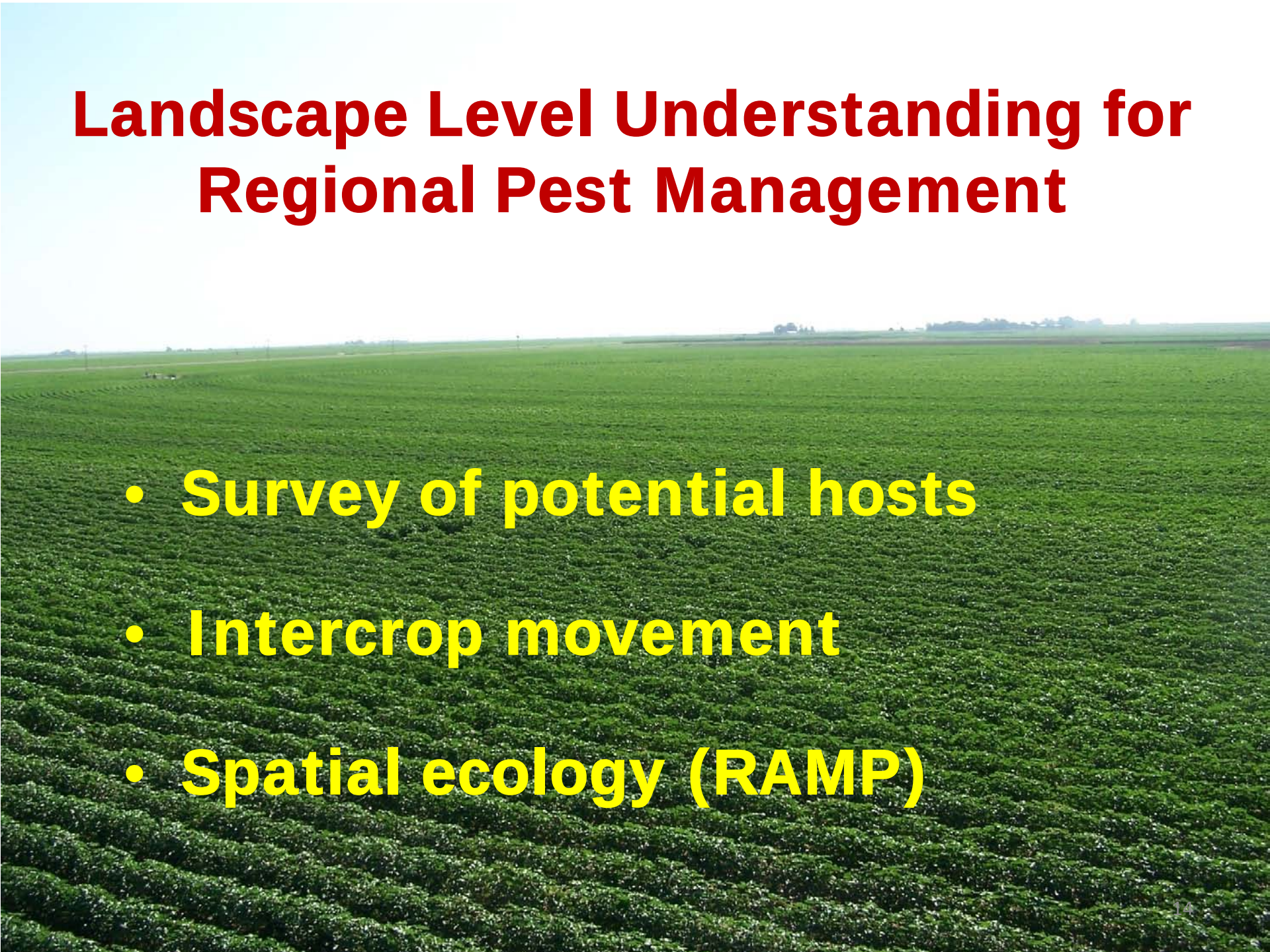


Pesticide Termination Rule



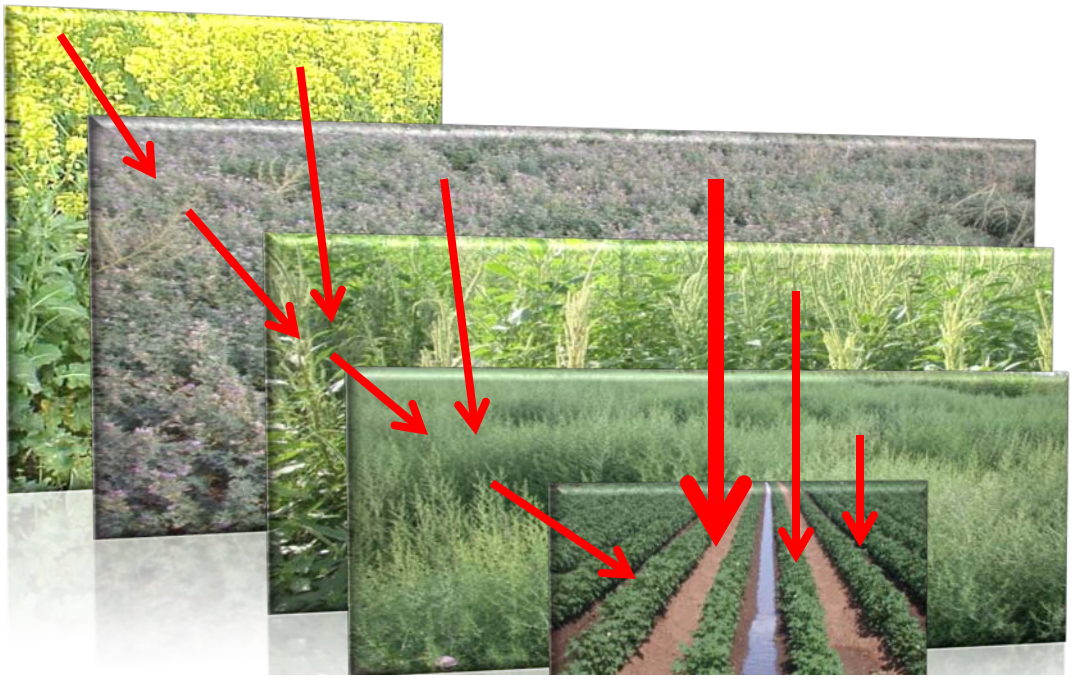
>350 Heat Units or >25 mm Boll Diameter

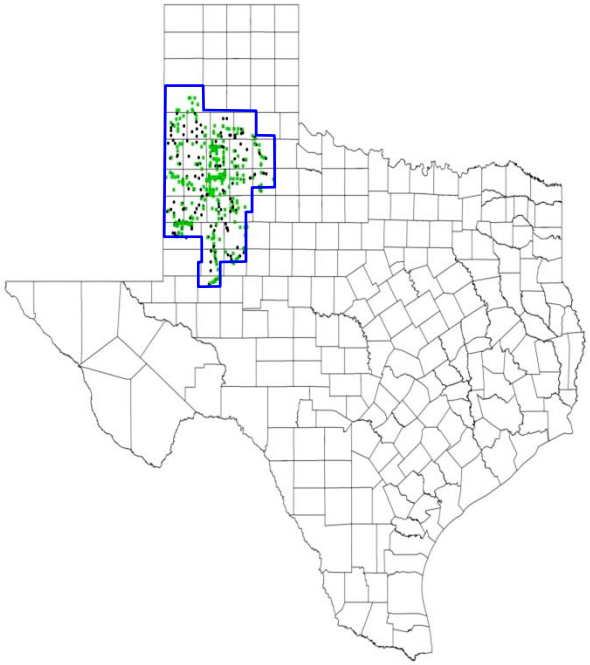
Landscape Level Understanding for Regional Pest Management

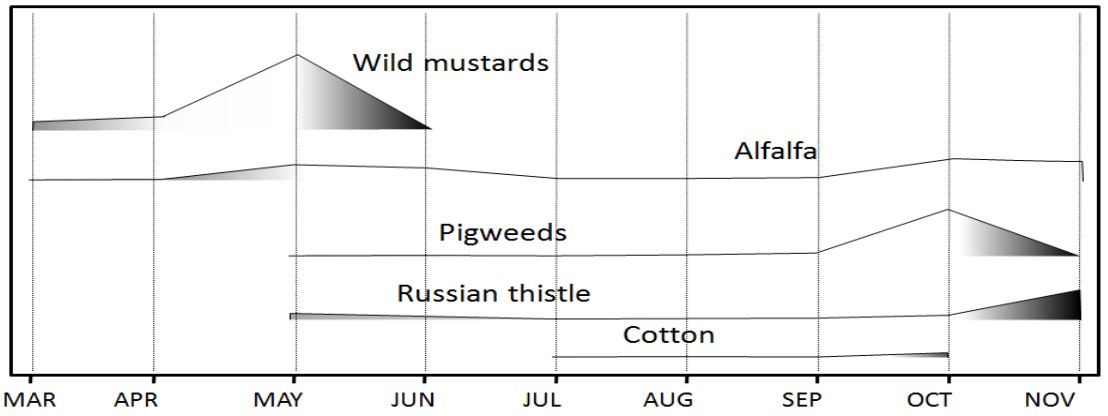


- Survey of potential hosts
- Intercrop movement
- Spatial ecology (RAMP)

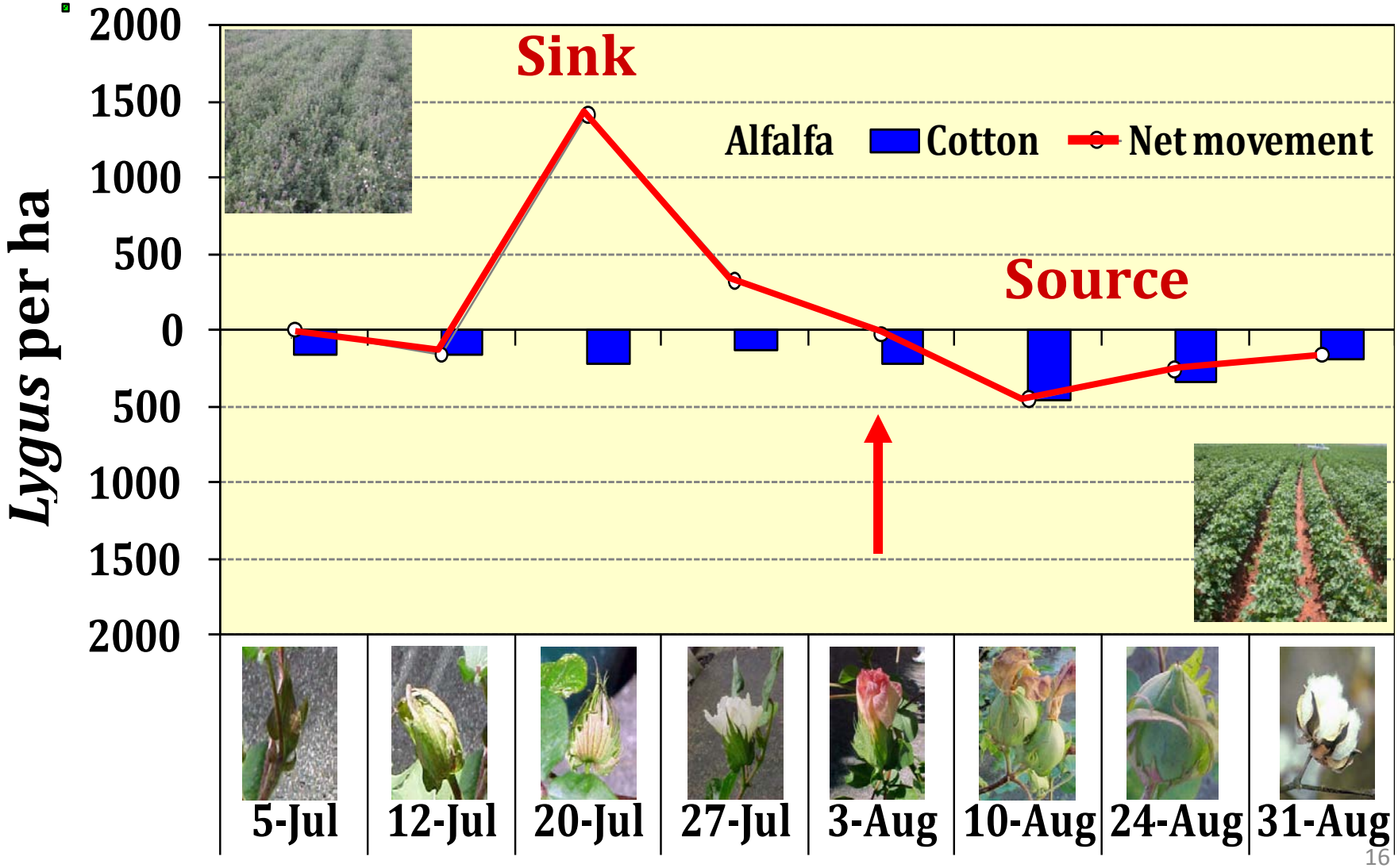
Lygus Survey (2002-2005)





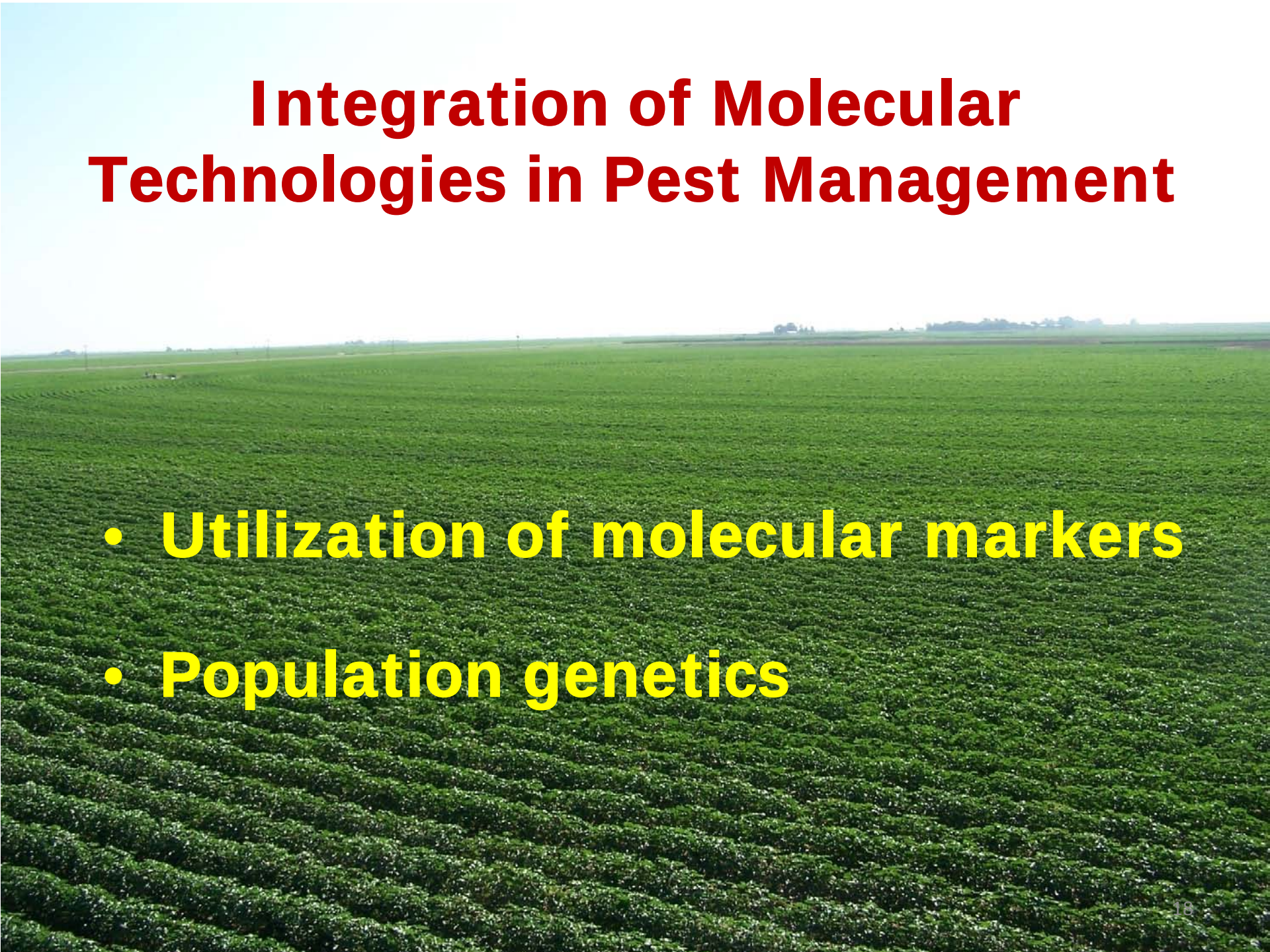


Sink or Source Relationships



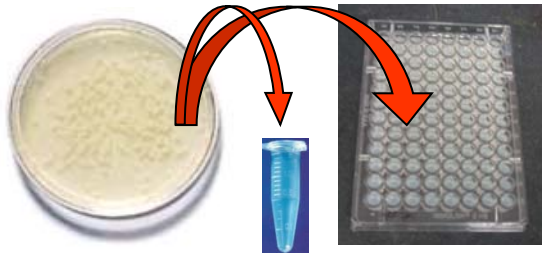
Alfalfa-Cotton System for *Lygus* Management?

Integration of Molecular Technologies in Pest Management



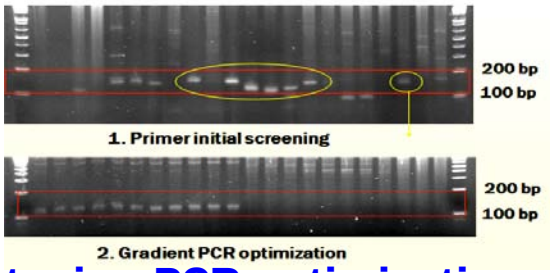
- Utilization of molecular markers
- Population genetics

Microsatellite Marker Development and Population Genotyping

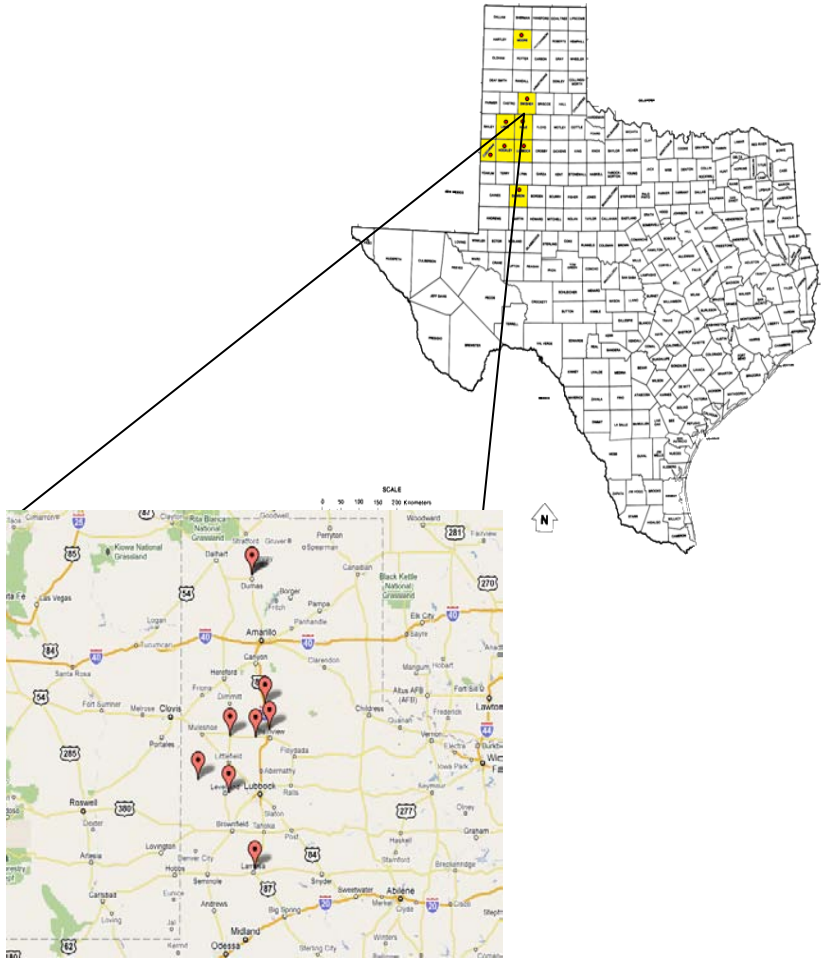


1. Genomic DNA library development

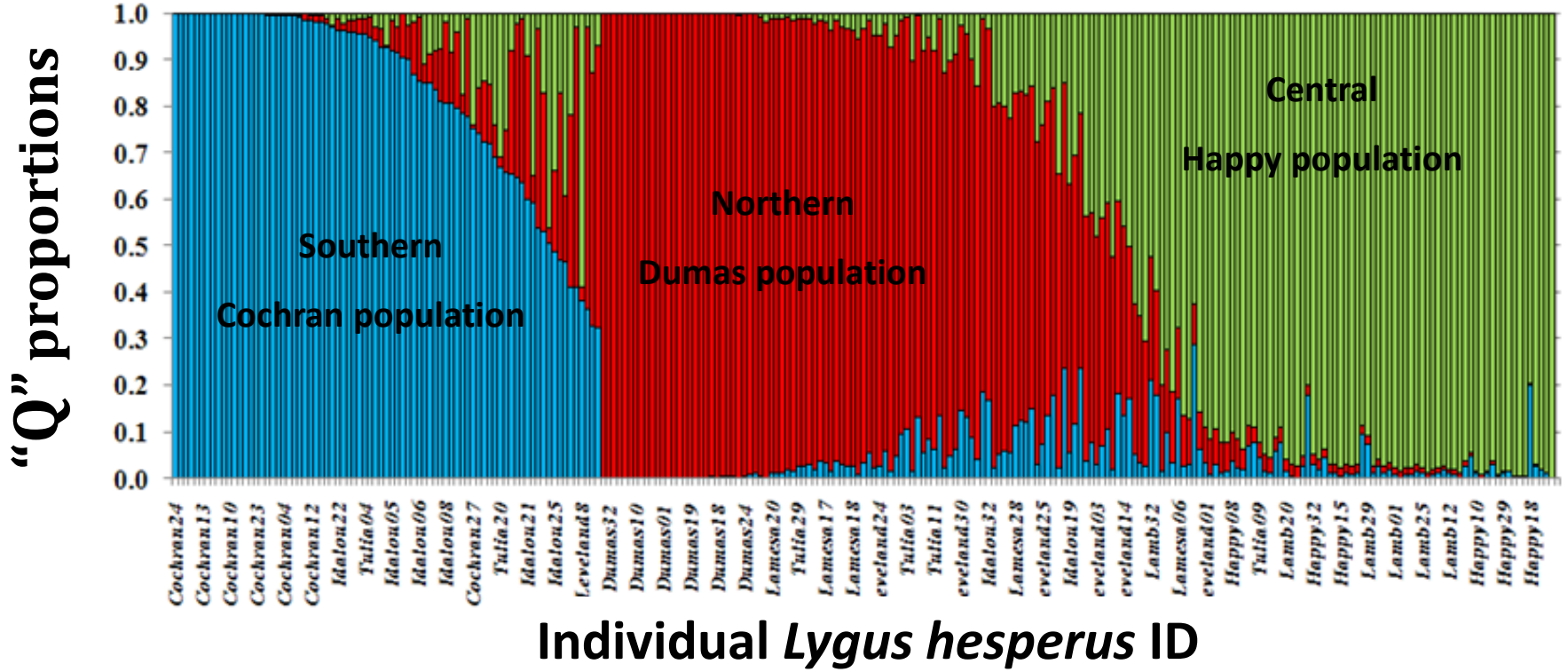
2. DNA sequencing and primer development



3. SSR genotyping PCR optimization



Population Structure of *L. hesperus*



Individuals=256, Loci=10, Populations assumed=1-10, Reps=10000

Current *Lygus* Management Issues (Opportunities?)

- Resistant / tolerant cultivars
- Lack of high throughput cotton line screening technique
- Quantification of the role of natural enemies
- Consolidation and synthesis of *Lygus* information
- *Lygus* monitoring network and forecasting system

Summary

- ***Lygus*** **is an emerging pest in the Texas High Plains**
- **Texas *Lygus* populations are susceptible to all common insecticides**
- **Ecologically intensive management approach is the current *Lygus* management focus**
- **Collaborative efforts are needed for developing regional pest management strategies**

Acknowledgments

Cotton Incorporated

Thank you