

5th National Integrated Pest Management Symposium
St. Louis, MO
April 5, 2006

Mini-Symposium:
The State of IPM for Corn and Soybean?
Modern Crop Protection Technologies Under Scrutiny

IPM Redux (Insect Management)-Kevin Steffey

Paradox to the IPM Paradigm (Fungicides)-Don Hershman

Matching the Competition (Weed Management)-Chris Boerboom

Discussion

5th National Integrated Pest Management Symposium

Page 40, Symposium Program and Abstracts

- IPM should be a significant contributor to . . .
 - Efficient, economic, and safe production of field crops
- Numerous cost-effective inputs are available for use in IPM programs.
- However, several modern technologies are being promoted and used in manners that are not “IPM friendly.”
 - Inappropriate use of pest control technologies may threaten long-term viability

The State of IPM for Corn and Soybean? Modern Crop Protection Technologies Under Scrutiny

Why do we believe we are veering away from IPM principles?

- False sense of security with modern technologies
 - Considerably lower use rates
 - More selective
 - More toxicologically benign
 - Considerably fewer environmental hazards
 - Relatively low costs
- Increased (and increasing) size of farms

The State of IPM for Corn and Soybean? Modern Crop Protection Technologies Under Scrutiny

Why do we believe we are veering away from IPM principles?

- Consolidations within the agricultural pesticide and seed industries, resulting in more fierce competition
- Fewer extension and research specialists conducting applied research, educating about IPM

The State of IPM for Corn and Soybean?

Modern Crop Protection Technologies Under Scrutiny

- Modern crop protection technologies under scrutiny . . .
 - by academics
 - by pesticide and seed industry personnel
 - by end users (producers, farm managers, consultants)
- No one of these groups has all of the answers. More collaboration might help resolve some of the more complex questions.

Who Needs IPM in the 21st Century? A Critical Point/Counterpoint for Agriculture

- *“Killing Pests or Managing Risks? IPM As a Strategy for Sustaining Pesticide Technology As a Viable Tool”*

Allan S. Felsot, Washington State University

- *“The Devil and Leon Higley: An IPM Story”*

Leon G. Higley, University of Nebraska

2006 Illinois Crop Protection Technology Conference

<http://www.ipm.uiuc.edu/conferences/cptc/proceedings.pdf>

<http://www.ipm.uiuc.edu/conferences/cptc/videos.html>

The State of IPM for Corn and Soybean?

Modern Crop Protection Technologies Under Scrutiny

- ❑ Can IPM practices be economically justified in a technology driven market given current farm demographics and structure?
- ❑ What are the barriers to maintaining IPM in field crops?
- ❑ Is this phenomenon occurring with other commodity crops or in other regions?
- ❑ What programs have been successful in either promoting IPM or encouraging the use of non-IPM practices in this market?
- ❑ What research and education are needed in the future to support field crop IPM?
- ❑ How can academics work more closely with industry to facilitate adoption and use of IPM?

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IPM Redux:

The Costs of Managing Insects in Corn and Soybean

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What is “redux” anyway?

- Redux means “brought back.”
- So, *IPM Redux* means revisiting some of the basic principles of IPM, in the context of current and emerging issues in insect management.
 - Invasive species, e.g., soybean aphid
 - Changing status of some insects, e.g., black cutworm
 - Expanding distributions, e.g., variant western corn rootworm
 - New insect management tools, e.g., transgenic Bt corn, nicotinoid seed treatments

Integrated Pest Management (IPM)

- Economics, Ecology, Environment
- Although IPM advanced primarily as a consequence of environmental concerns, a more simplistic statement is . . .
 - IPM is an ecologically based risk management and decision support system.
- Within this context, the costs of managing insects in corn and soybeans are primarily economic and ecological (which usually become economic).

Managing insects in soybeans in the Midwest has changed from the 20th to the 21st centuries.

- 20th Century
 - Bean leaf beetle was the primary insect pest of concern.
 - Others (GCW, woollybears, TSSM)
- 21st Century
 - 2000
 - Discovery of soybean aphid
 - Bean leaf beetle, bean pod mottle virus
 - 2001—Soybean aphid outbreak
 - 2003—Soybean aphid outbreak
 - 2005—Soybean aphid outbreak



Photo: Marlin Rice
Iowa State University



Photo: Gary Bretthauer
University of Illinois

Changes in soybean pest control products and strategies

- Roundup Ready soybeans
- Relatively cheap and effective pyrethroid insecticides
- Seed treatments
 - Fungicides
 - Insecticides (neonicotinoids)
 - thiamethoxam, a.i. of Cruiser
 - imidacloprid, a.i. of Gaucho
- Foliar fungicides?

The Economics of Managing Soybean Insects

- Will the use of an insect control product provide a reasonable return on investment?

Will the cost of the damage done (yield loss), if the insect is not controlled, equal or exceed the cost of insect control (product + application cost)?
- Economic injury level:

Cost of control = Cost of insect damage
- Economic threshold—Less than the economic injury level

For example, 250 soybean aphids/plant
(EIL = 1,000 soybean aphids/plant)

The Economics of Managing Soybean Insects

- Any potential added costs should be examined carefully for its return on investment.
 - Cruiser Maxx Pak
 - \$10 per acre for 30-inch row soybeans
 - \$12 to \$13 for 15-inch row soybeans
 - \$14 to \$15 for drilled soybeans
 - Foliar-applied insecticide
 - \$9.50 to \$13.50 per acre (product, rate, appl cost)
- For \$5.25 per bu soybeans, a producer would need to protect about 2 to 3 bu of soybeans to pay for one product.

Efficacy of foliar-applied and seed-applied insecticides to control soybean aphids

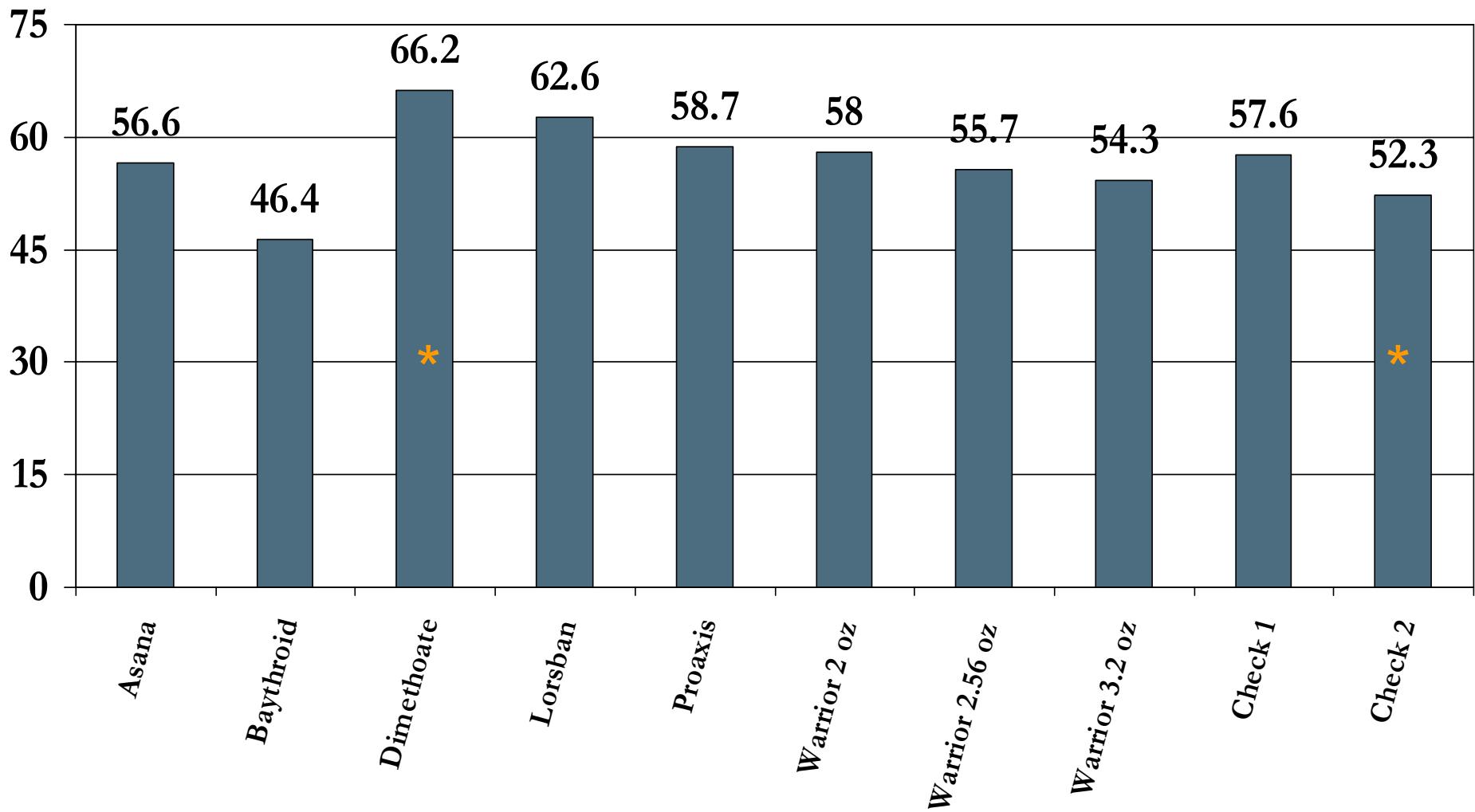
Whiteside County, Illinois, 2005



Soybean Aphid Trial, Whiteside County, 2005

Foliar-applied insecticides

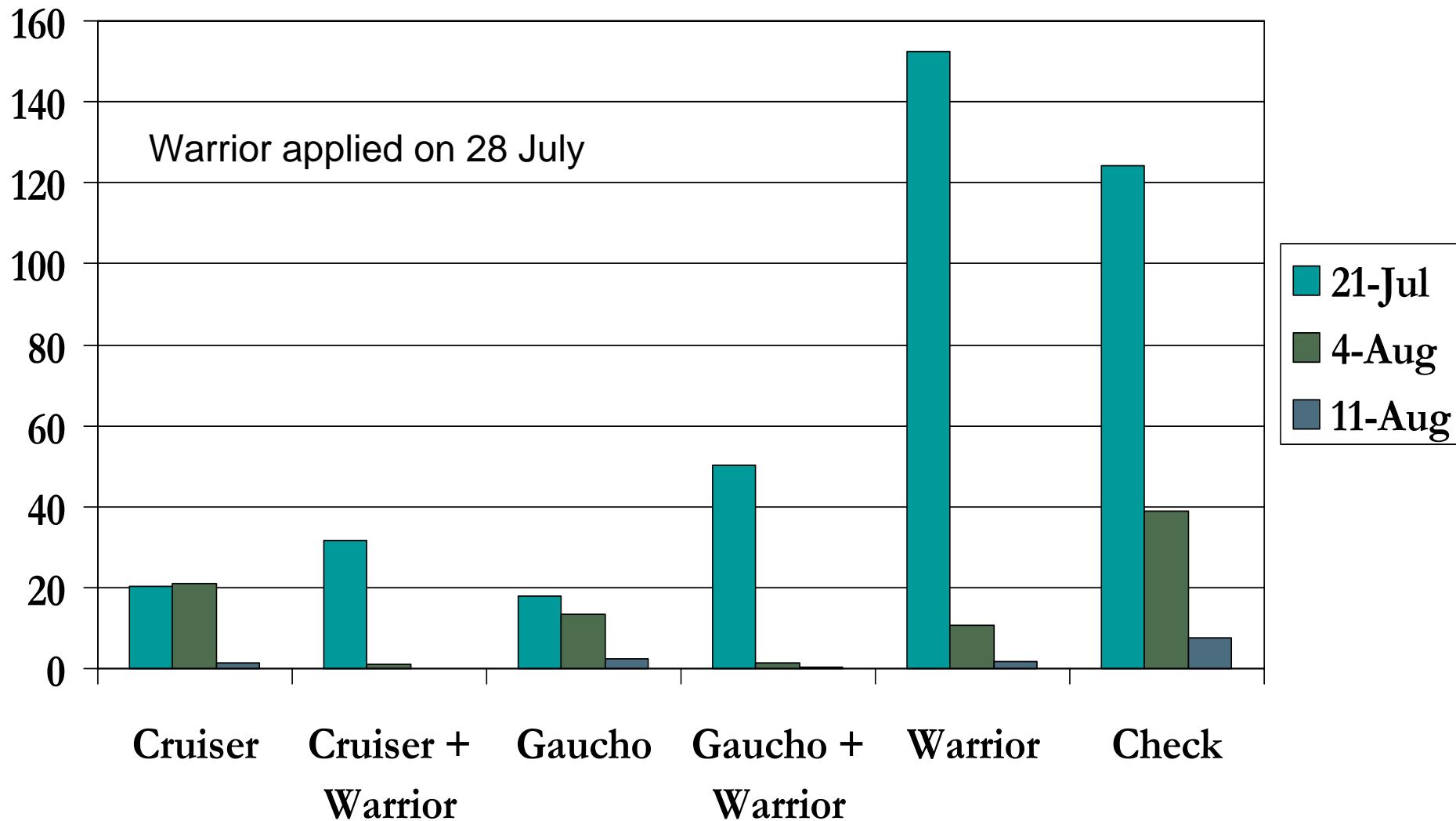
Yield (bushels per acre)



Soybean Aphid Trial, Whiteside County, 2005

Seed treatments, Warrior

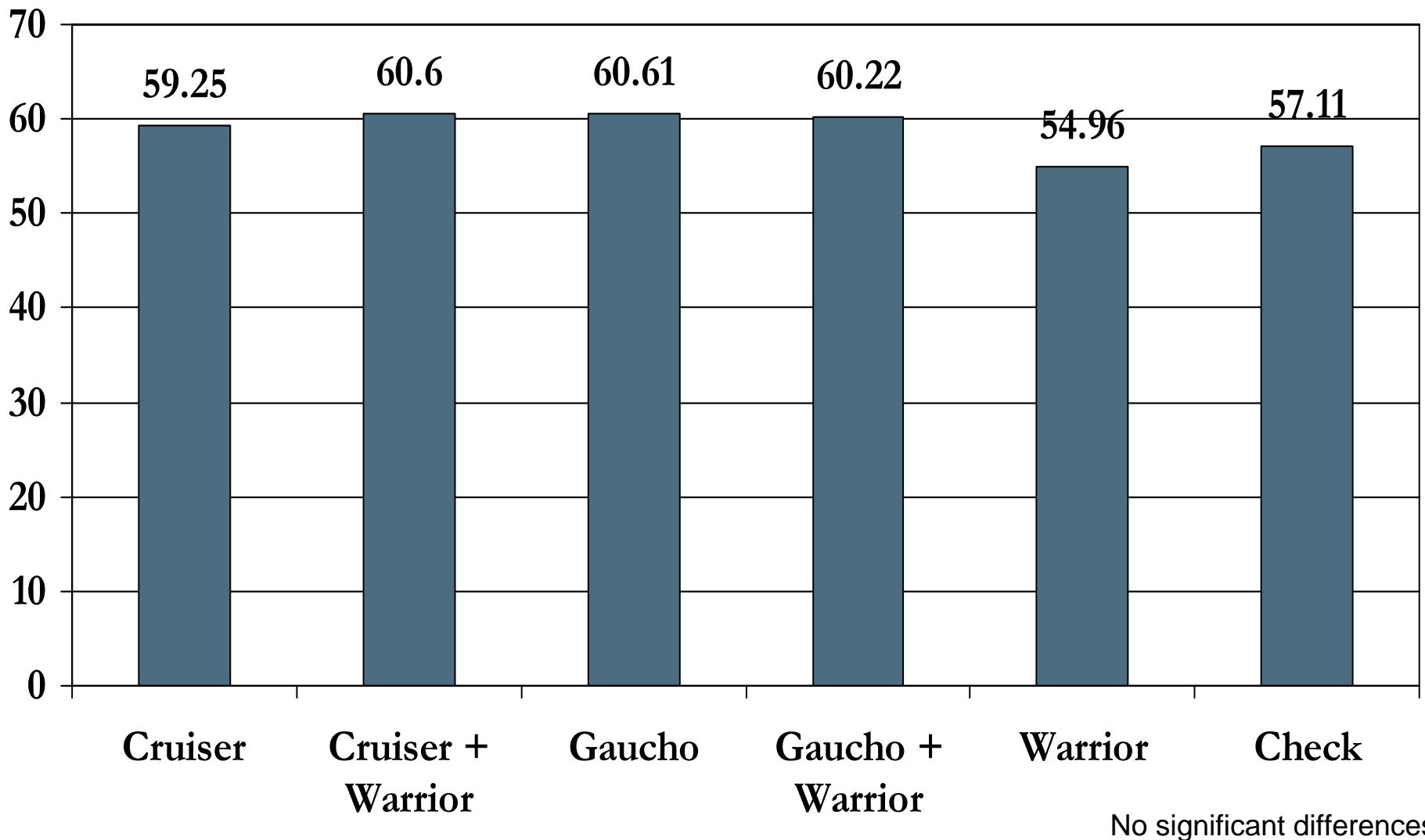
Aphids per 9 leaflets



Soybean Aphid Trial, Whiteside County, 2005

Seed treatments, Warrior

Yield (bushels per acre)



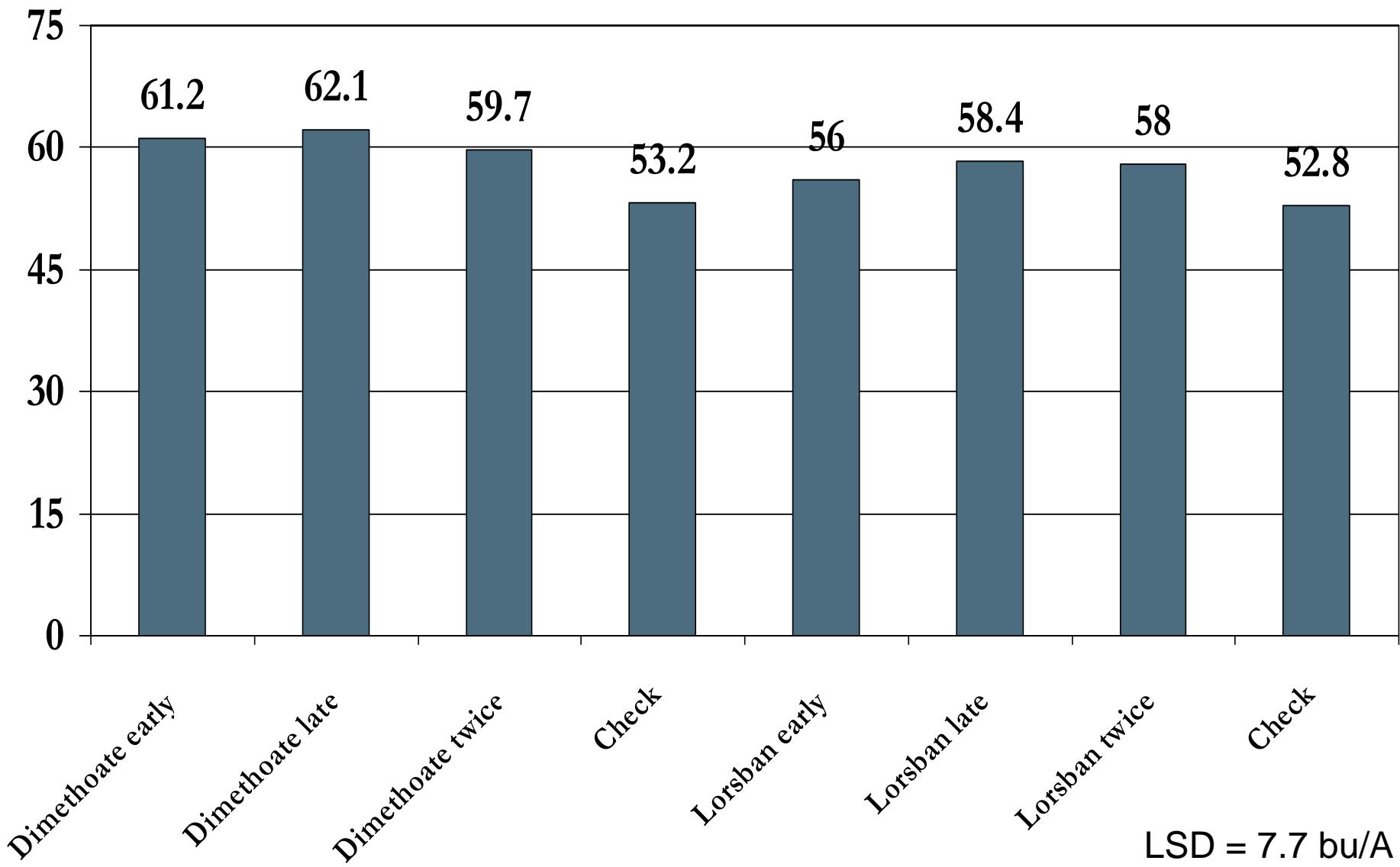
Efficacy of two miticides (Dimethoate, Lorsban) to control twospotted spider mites

Champaign County (near Tolono), IL, 2005



Twospotted Spider Mite Trial, Champaign County, 2005

Yield (bushels per acre)



The Ecological Costs of Managing Insects in Soybean and Corn

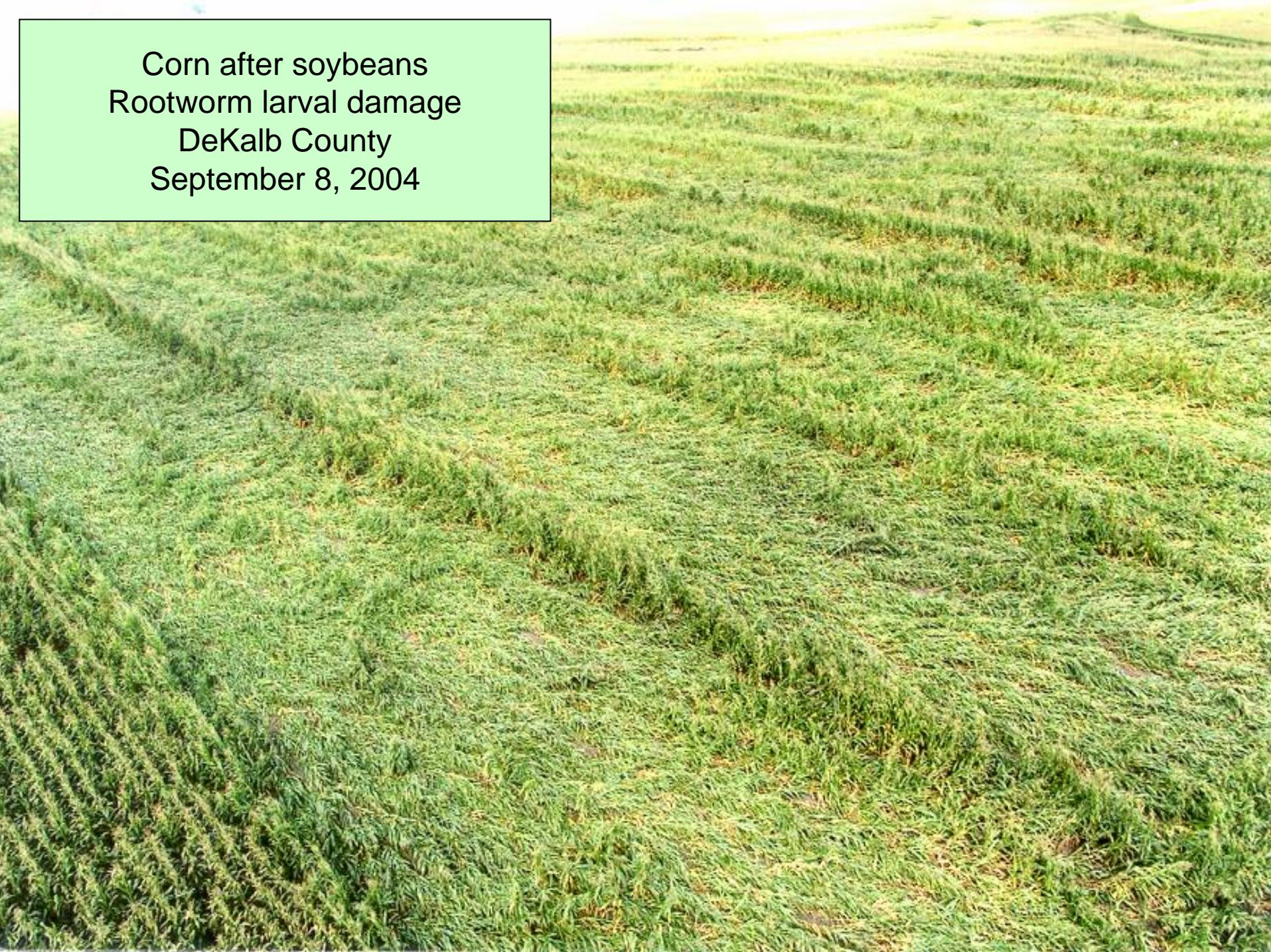
- Development of insects resistant to insecticides
- Destruction of natural enemies (predators, parasitoids, and pathogens) that regulate insect pest populations

In this discussion, I will include insecticides, herbicides, and fungicides.

Current or potential pesticide practices in soybean in Illinois

- Multiple insecticide applications (resistance, e.g., Yang et al. 2002)
- Applying Roundup to Roundup Ready soybeans (fungicidal properties of Roundup, e.g., Morjan et al. 2002)
- Tank-mixing a pyrethroid with Roundup in June
- Use of seed-applied insecticides (combined with fungicides)
- Applying fungicides to control Asian soybean rust

Corn after soybeans
Rootworm larval damage
DeKalb County
September 8, 2004



Corn rootworm management issues

- Performance issues with granular, liquid, and seed-applied insecticides
 - Early planting
 - Windy conditions during planting
 - Soil conditions
 - Application and incorporation
- Performance issues with YieldGard Rootworm corn
 - Late summer root injury
 - Lodging

Overheard and marketed “solutions” to corn rootworm control problems

- Control adults in soybean in late summer, use a rootworm control product in corn the following year.
- Soil insecticide + seed-applied insecticide (Double Down)
- YieldGard Rootworm corn + soil insecticide
- Control adults in soybean

+

YieldGard Rootworm corn

+

Soil insecticide

Insect Management Redux-Summary

- Ecological backlash and the subsequent costs are real, not theoretical.
- IPM practitioners need to understand the long-term consequences of short-term “solutions.”
- Sustaining the use of current and future insect control technologies (by appropriate use) should be in everyone’s best interest.