

Current and Emerging Issues in Field Crop Insect Management

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Current and emerging issues in field crop insect management

- Invasive species
- Changing status of some insect pests
- Distribution of insect pests

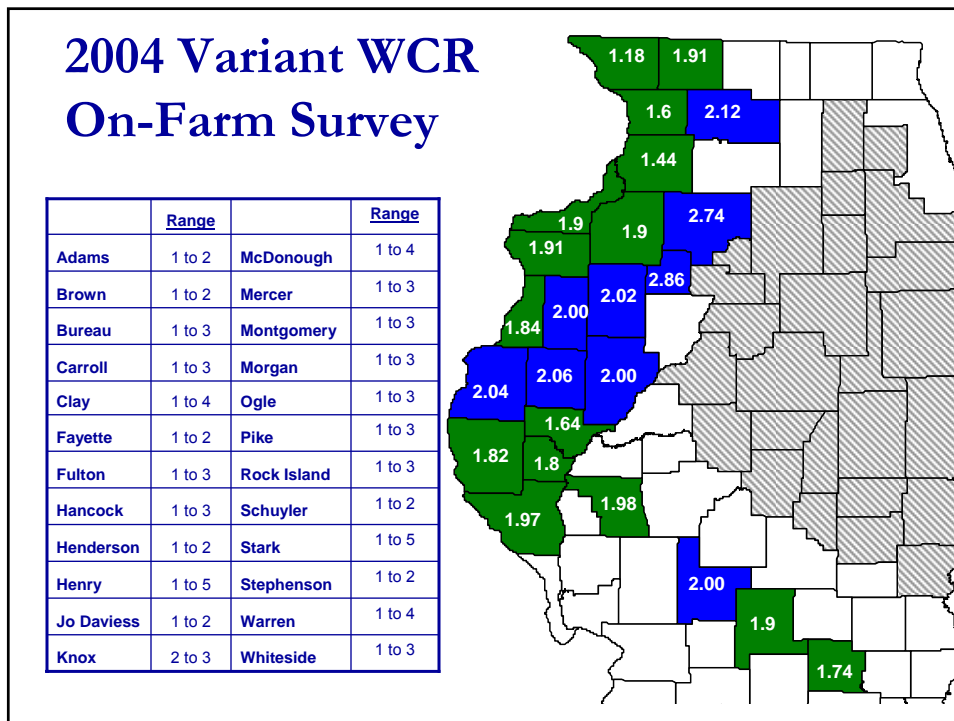
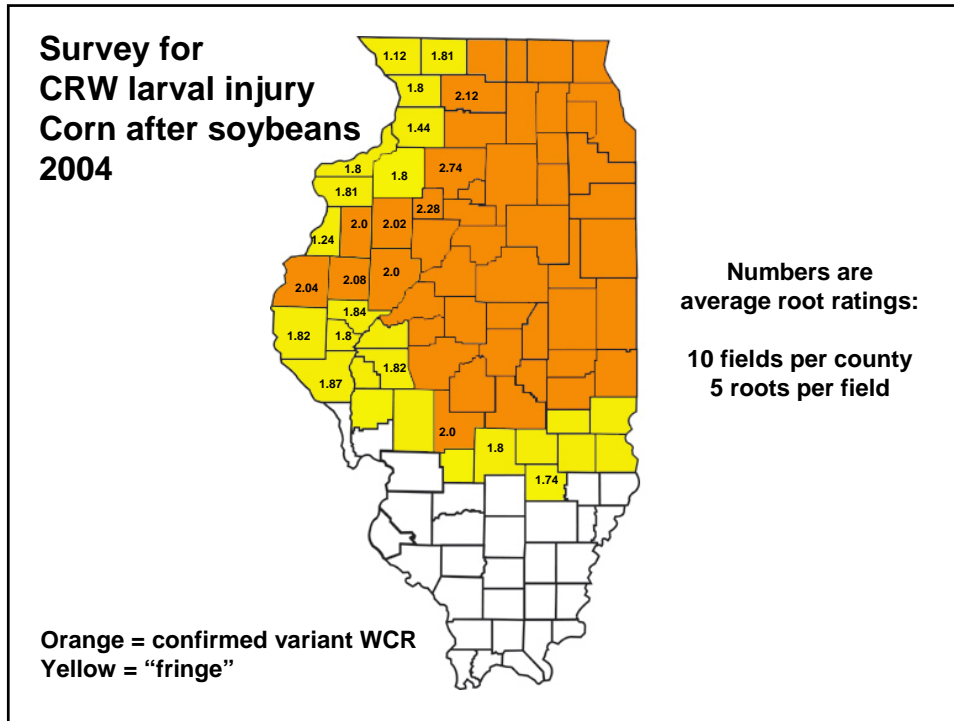
- Insect management tools
 - Transgenic crops
 - Insecticidal seed treatments (systemic nicotinoids)

- IPM (and insect management) redux
 - Economics
 - Ecological disruption
 - Insect resistance

Corn rootworm management issues Illinois, 2004

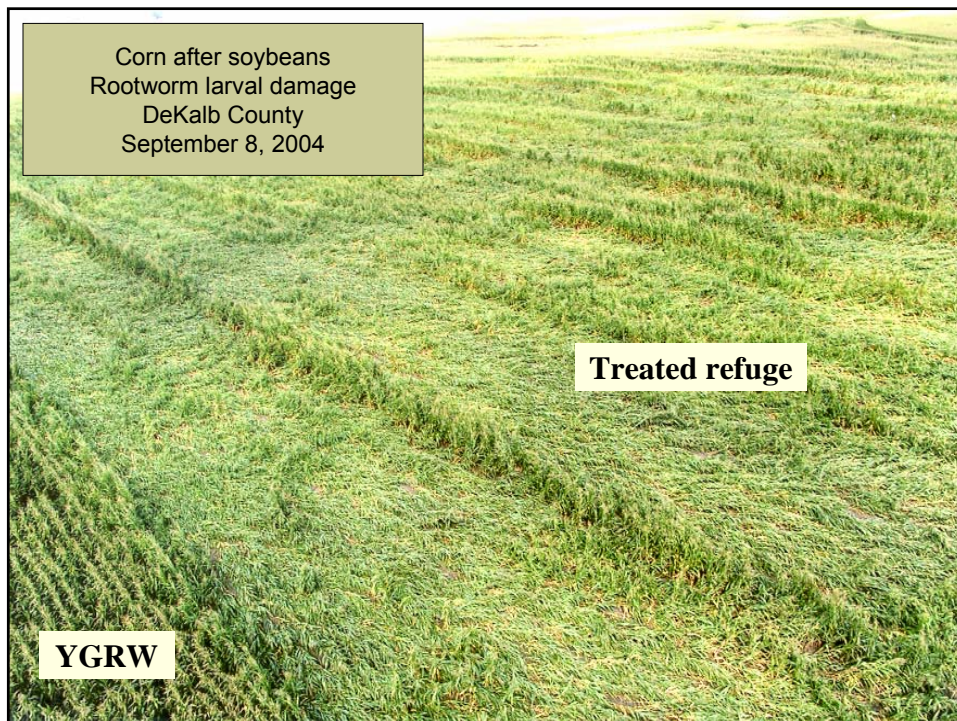
- Severe rootworm larval damage (northern half of Illinois)
 - June—reports of poor performance of granular and liquid insecticides, insecticidal seed treatments
 - July, August—corn rootworm control trials; numerous reports of lodging; reports of greater-than-expected damage in YieldGard Rootworm corn
- More widespread distribution of variant western corn rootworm—distribution extended west and south





Corn rootworm management issues Illinois, 2004

- Performance issues with corn rootworm control products
 - Granules, liquids, seed treatments
 - Planting time
 - Windy conditions during planting
 - Soil conditions
 - Application and incorporation
 - YieldGard Rootworm Corn?
 - Low dose
 - Planting time (declining expression of Bt)
 - Hybrid and environmental interactions



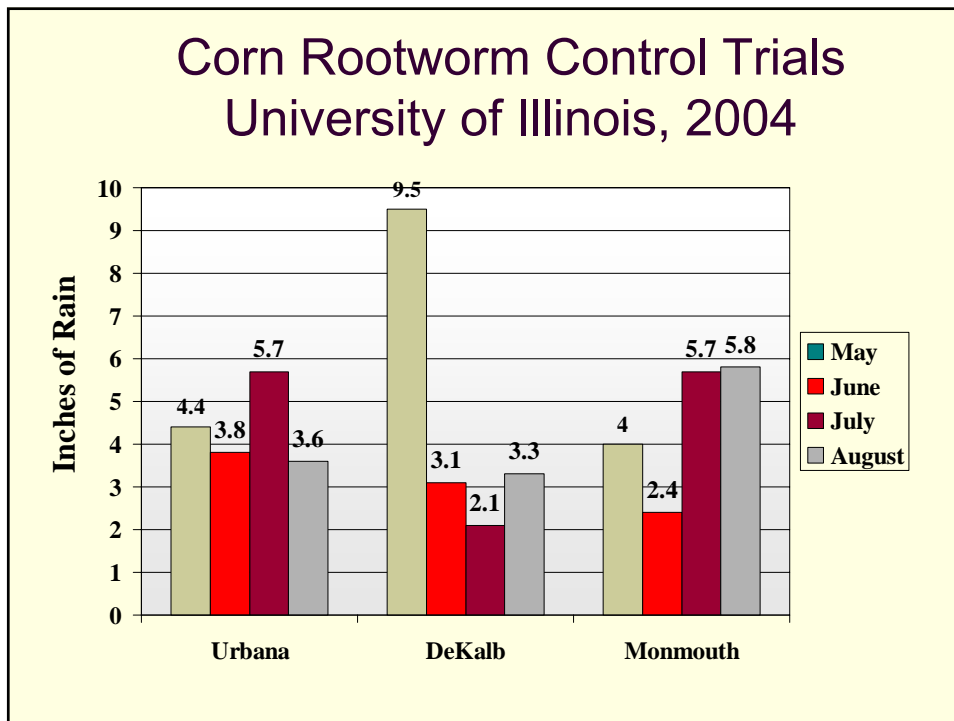
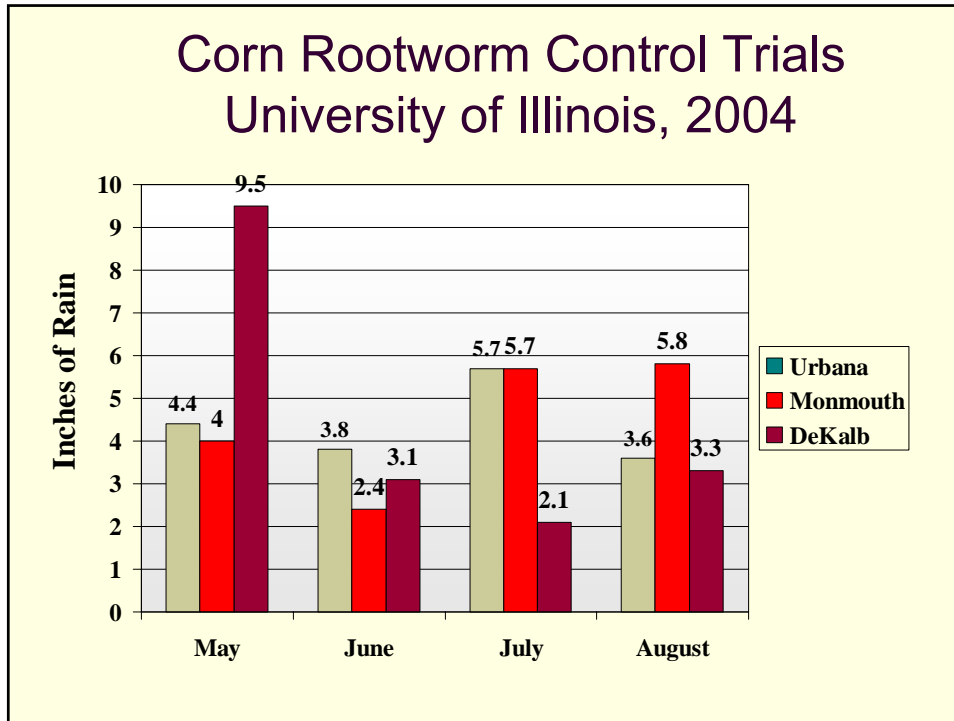


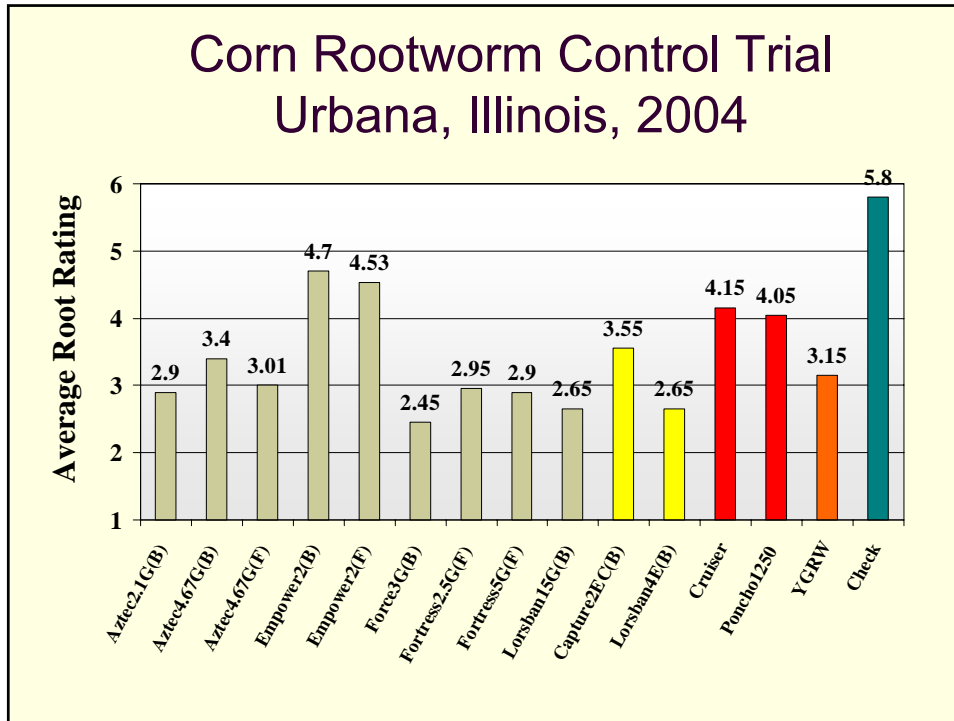
Corn Rootworm Control Trials University of Illinois, 2004

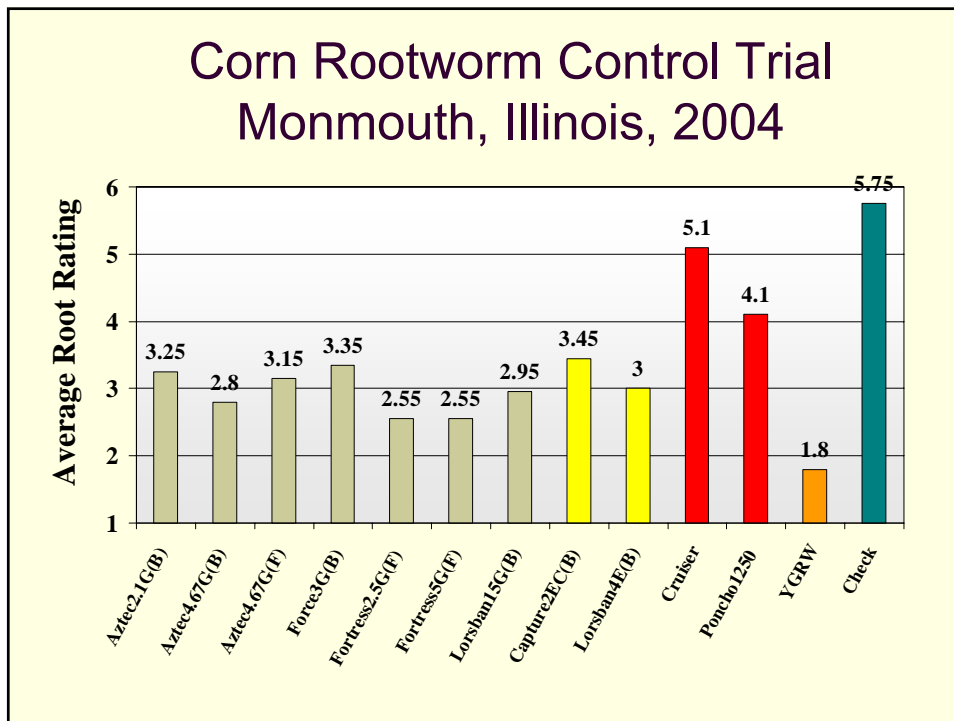
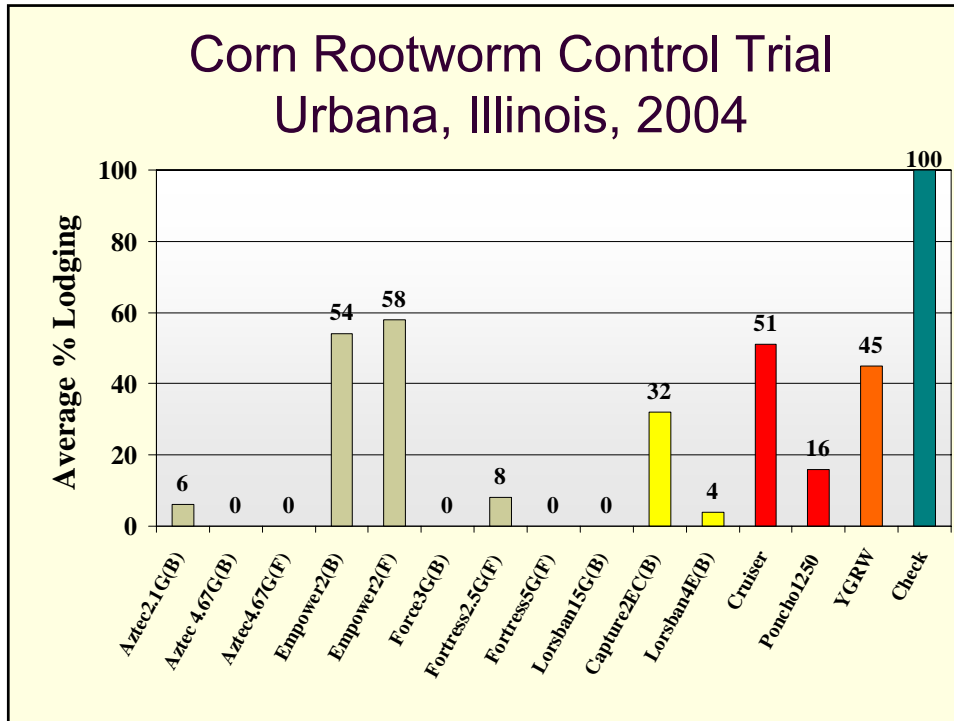
- Urbana
 - Planting date April 19
- DeKalb
 - Planting date April 27
- Monmouth
 - Planting date April 28

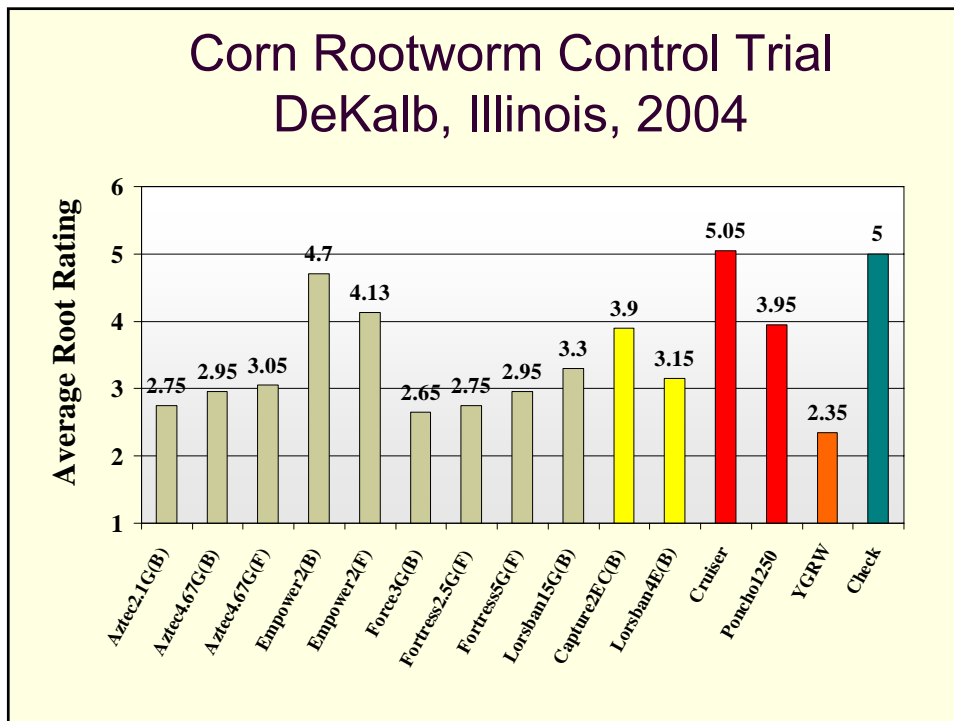
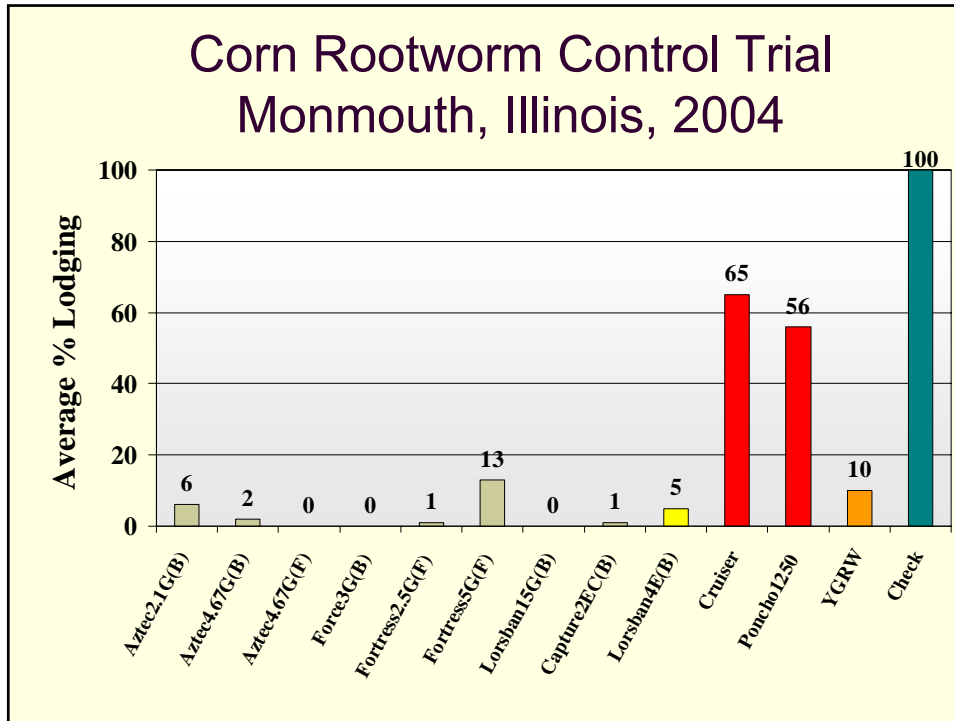
All trials planted with a Golden Harvest corn hybrid.

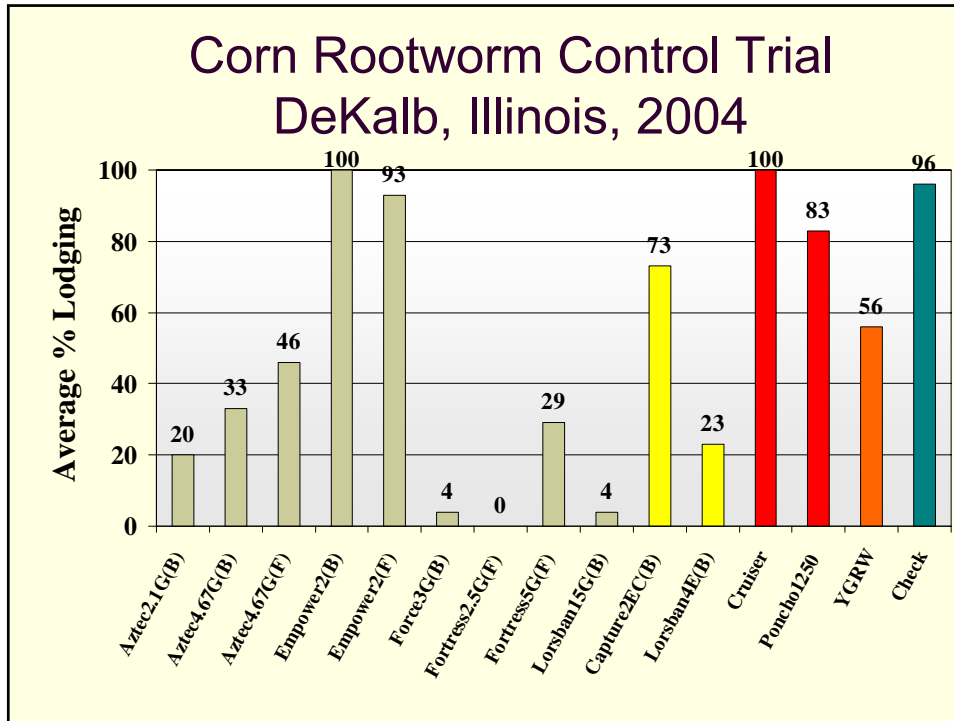
Rainfall amounts (May, June, July, August) on following slides:









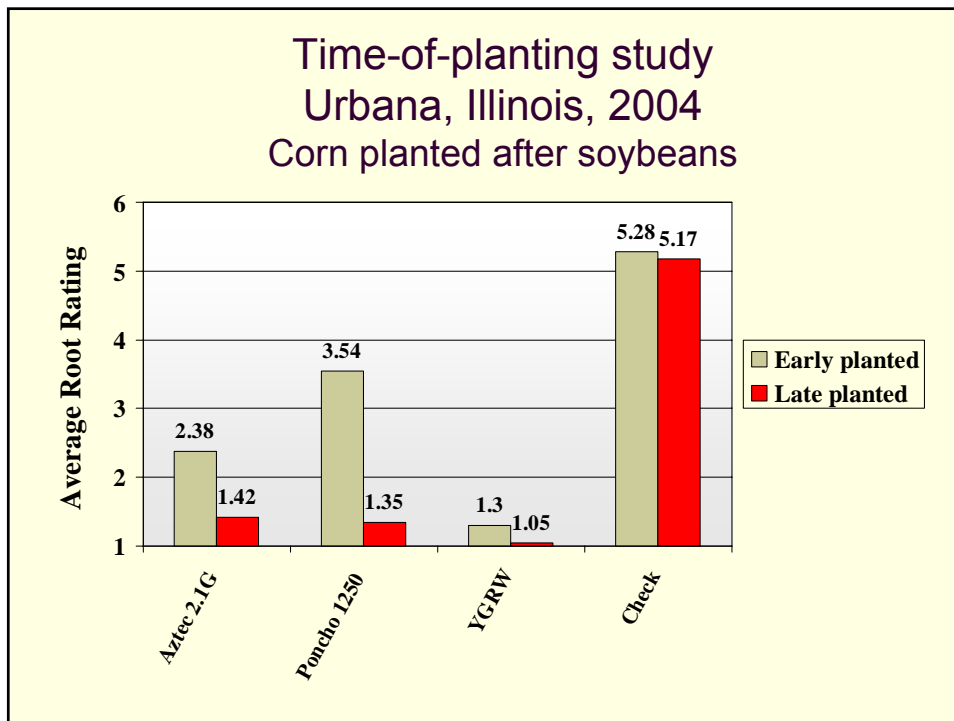
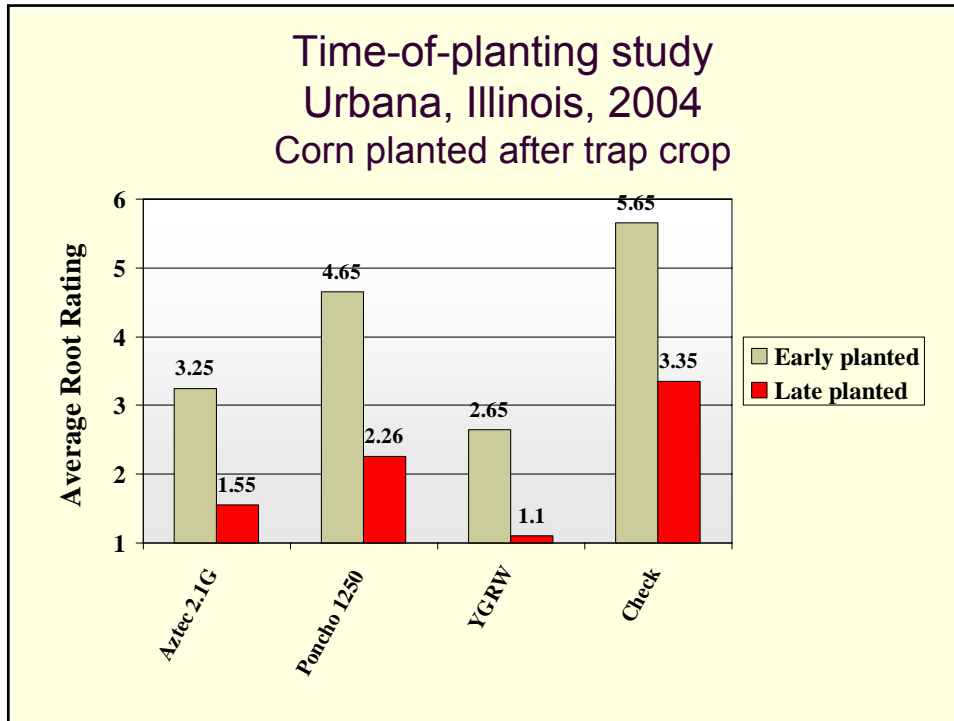


Time-of-planting study (2nd year) Urbana, IL, 2004

- Four treatments
 - Aztec 2.1G
 - Poncho 1250
 - YieldGard Rootworm corn
 - Untreated check

} DeKalb hybrid

- Two planting dates
 - April 15
 - May 15
- Two cropping sequences
 - Corn planted after trap crops (corn + pumpkins)
 - Corn planted after soybeans



Corn rootworms: Lessons (re) learned in 2004

- No corn rootworm control product is “bulletproof.”
- Despite our best expectations, environmental conditions have the final say.
- Some products do not perform well when corn rootworm larval pressure is heavy.
- Accurate granular insecticide application and incorporation is particularly important in early planted fields.

What did we learn about YieldGard Rootworm corn issues?

- Isolated no. instances of greater-than-expected rootworm damage (IL, IN, IA, KS, NE).
- MON 863 is a low-dose event.
- Level of expression of Bt protein varies among hybrids.

What did we learn about YieldGard Rootworm corn issues?

- Expression of Bt protein declines from V4 to V9.
 - Time of planting?
 - LC₅₀ for first instar CRW ~75 ppm
 - LC₅₀ for second instar CRW >200 ppm
- First instars take bite, stop feeding ↗
- Environmental effects—unpredictable
 - Affect phenology of insects
 - Affect hybrid

Overheard “solutions” to CRW problems

- Control adults in soybeans, use rootworm control product in corn the following year
- Low-rate insecticidal seed treatment + soil insecticide
- YieldGard Rootworm corn + soil insecticide
- Control adults in soybeans
 - +
YieldGard Rootworm corn following year
 - +
High-rate insecticidal seed treatment

Misuse of, over-reliance on corn rootworm control products

- Corn rootworm resistance
 - Widespread use of two “active ingredients”
 - Nicotinoid seed treatments
 - Bt corn
 - Exposing two life stages to chemical insecticides
- Ecological disruption
 - Negative effects on natural enemies

Ecological disruption

- Replacement
 - Grasshoppers worse in areas where soybeans were sprayed the preceding year.
 - Western bean cutworm “invades” a niche vacated by European corn borer.
- Resurgence
 - Pest species numbers “bounce back” after natural enemies are killed.

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- Insect management tools

- IPM
 - Economics
 - Ecology
 - Environment