Evolving pest complexes and IPM strategies for cotton in the Midsouth and Southeast

Lygus lineolaris

UT Extension

Scott Stewart and my colleagues

IPM – Some Factors Causing Shifts

- Technological advances
  - Boll weevil eradication, Bt cotton, New insecticides
- Insecticide resistance, cancellation or regulation
- Changes in production systems
  - Tillage, planting dates, variety maturity, crop ratios, non-crop ratios such as CRP, etc.
- Perception and knowledge - increased “appreciation” for potential impact of emerged pests

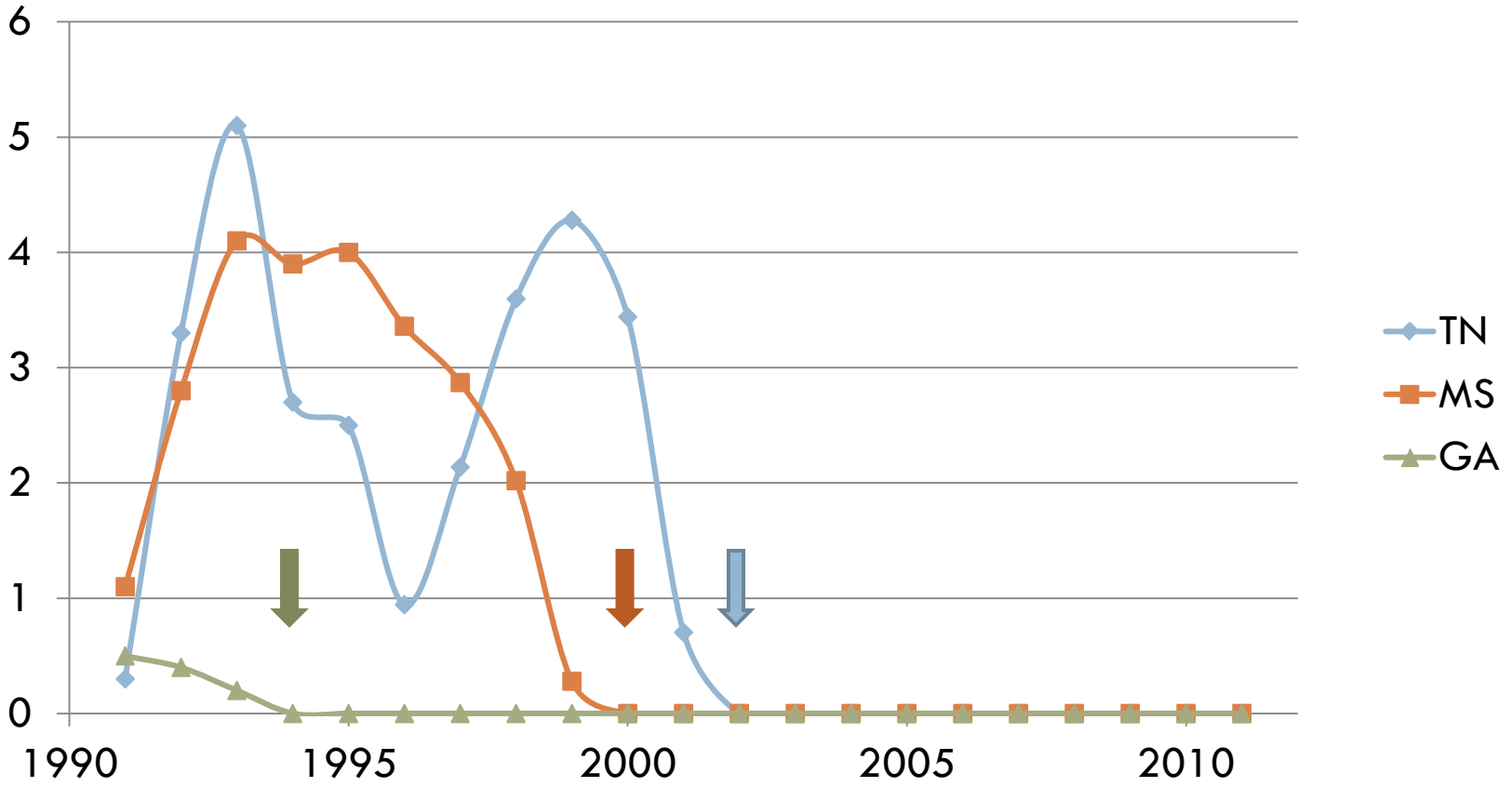
Cotton Insect Losses, 1991 – 2011 (Mike Williams)

http://www.entomology.msstate.edu/resources/tips/cotton-losses/data/

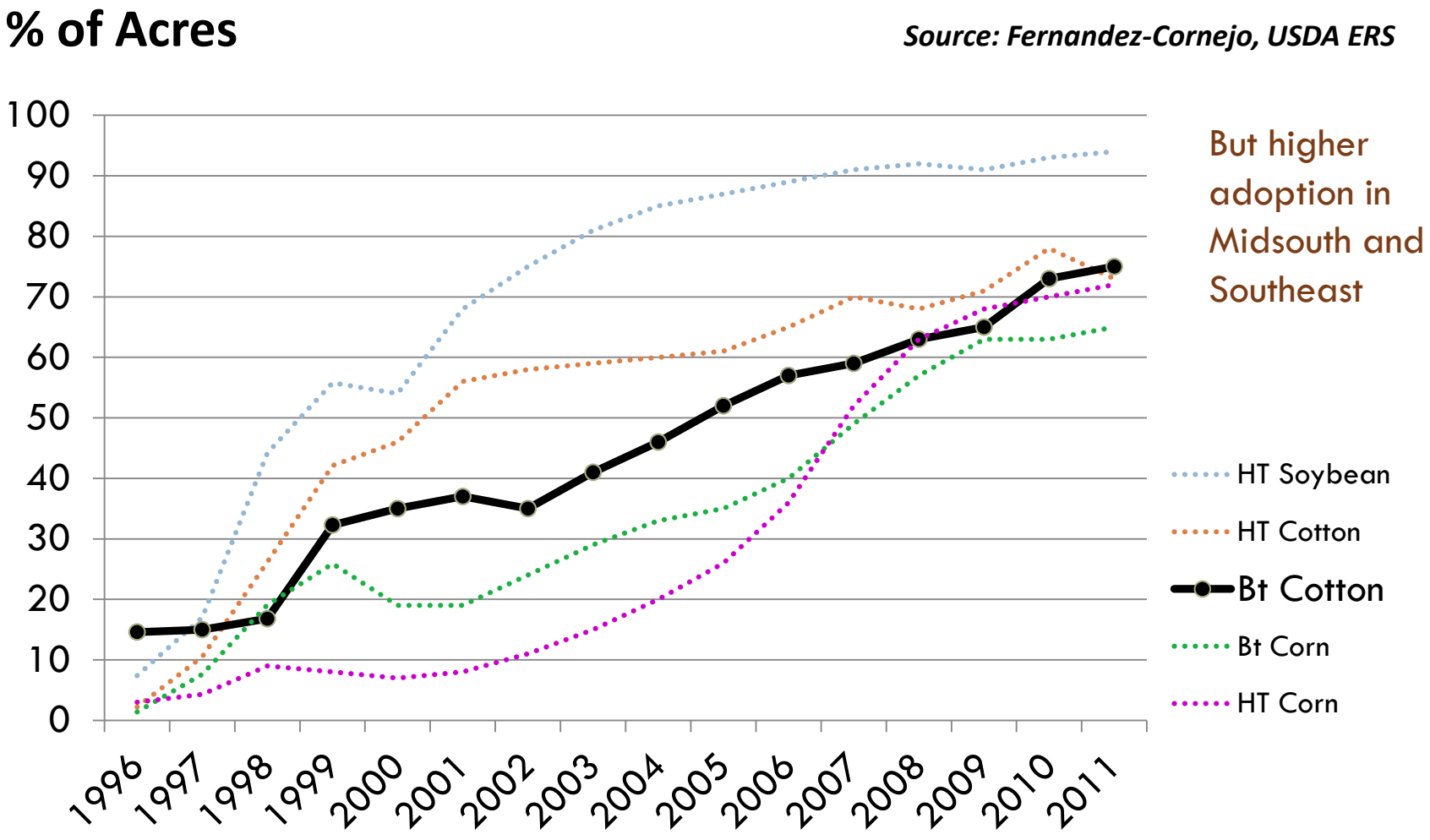
Boll Weevil Eradication

Insecticide Applications by Growers

Number per Acre



Adoption of GMO Technologies, USA

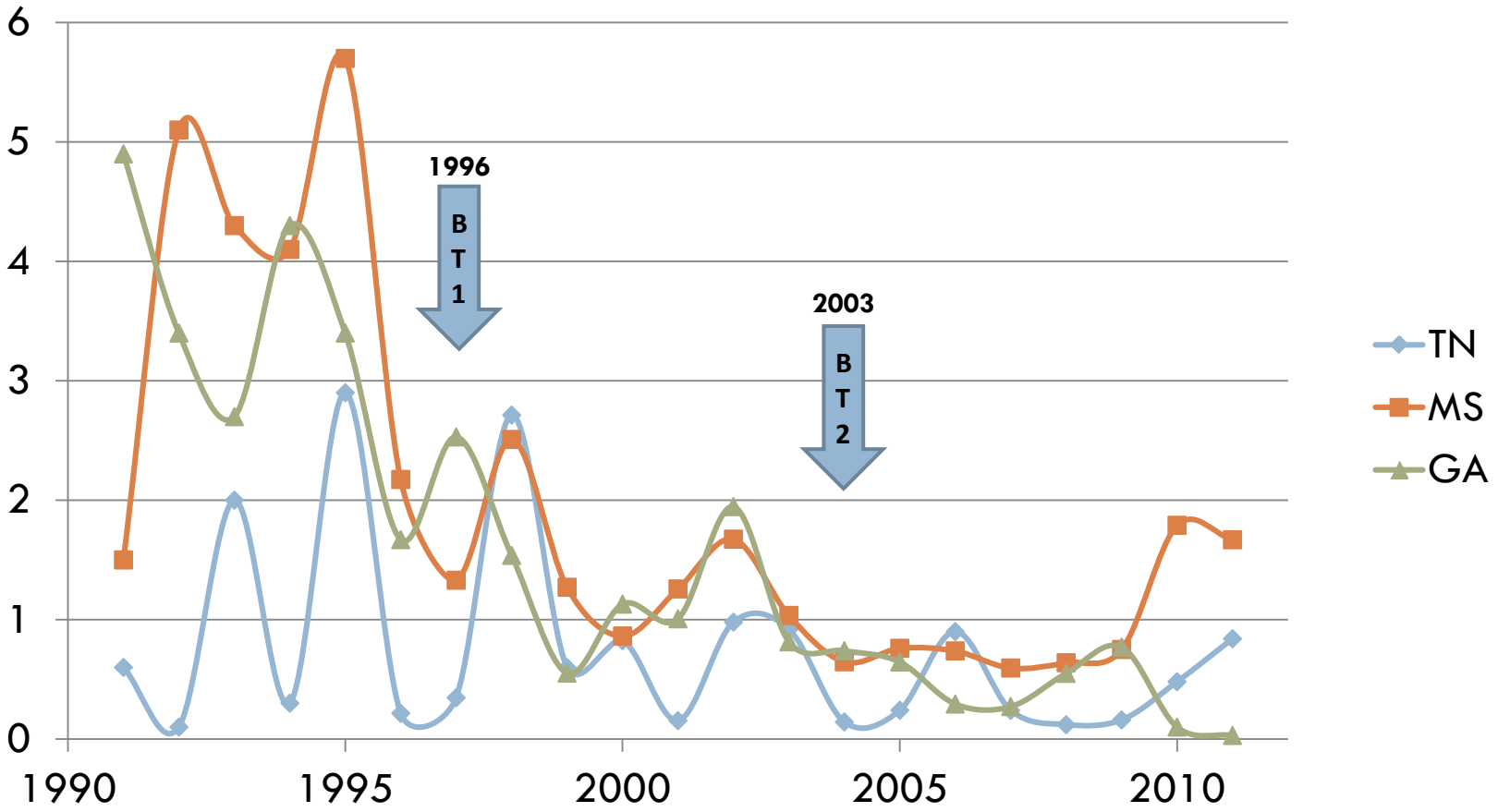


Bt Cotton (WideStrike) vs. Non-Bt

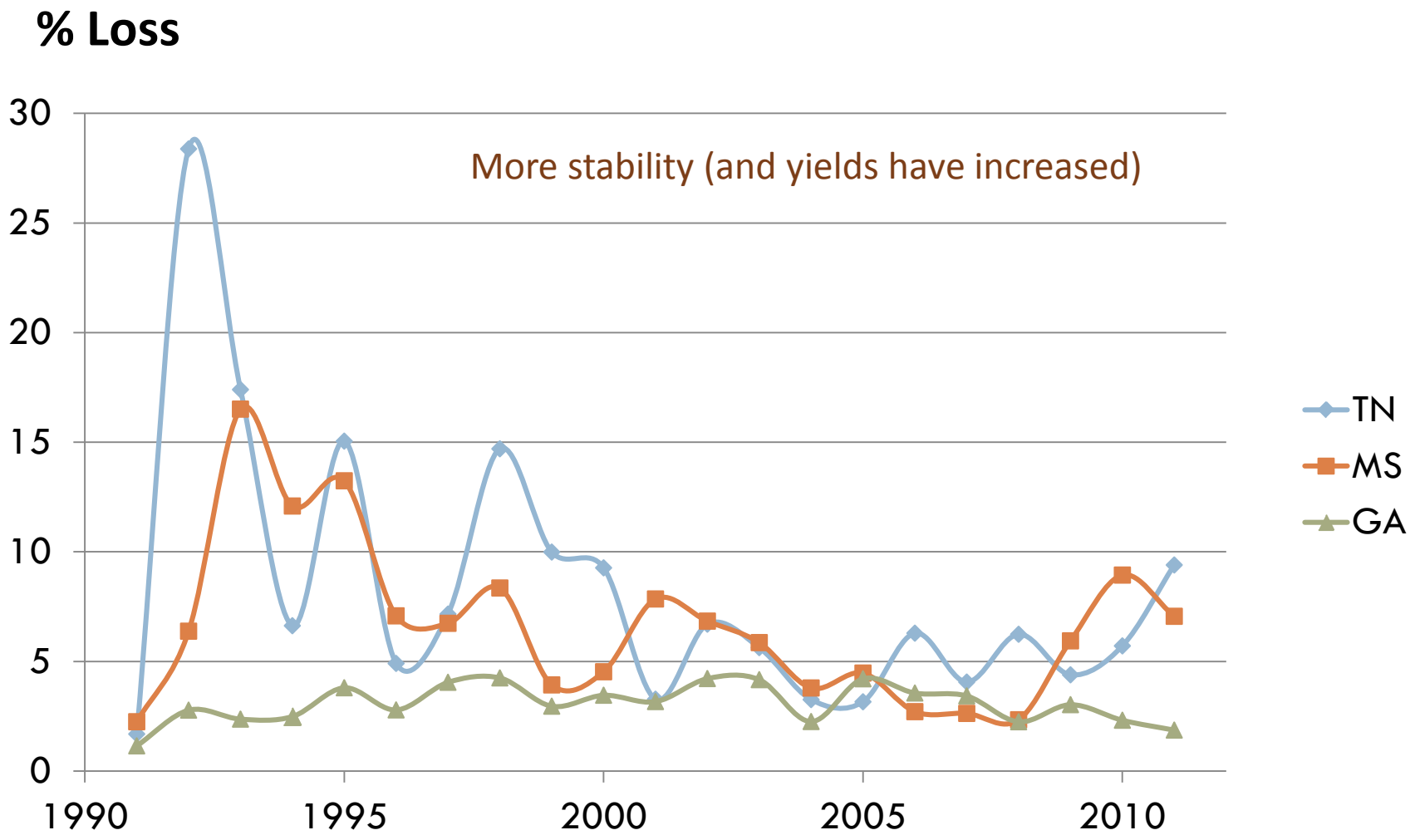
The Heliothine Decline

Insecticide Applications

Number per Acre



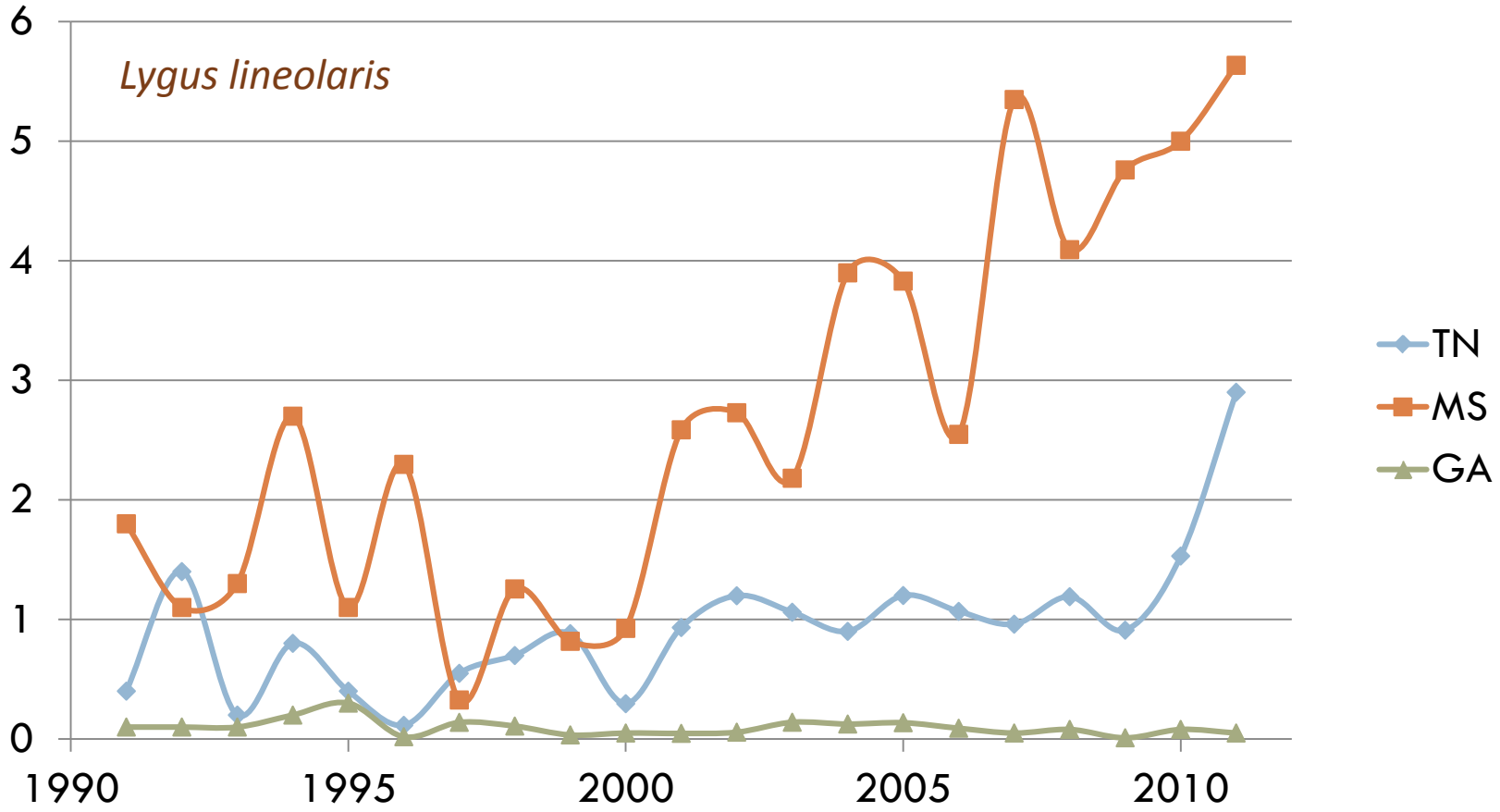
Yield Loss Caused by Arthropod Pests



The Plant Bug Incline

Insecticide Applications

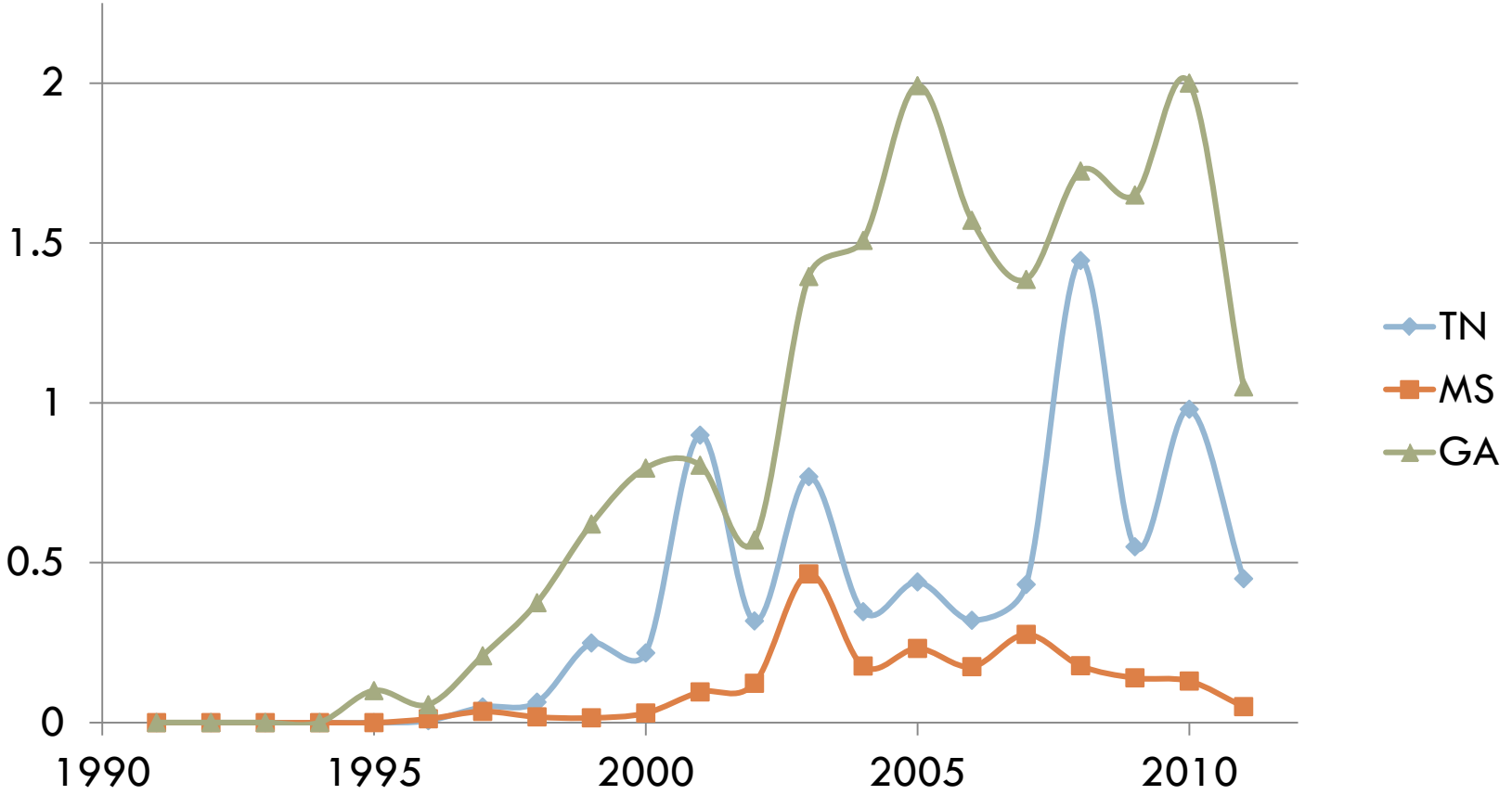
Number per Acre



Stink Bugs Too

Insecticide Applications

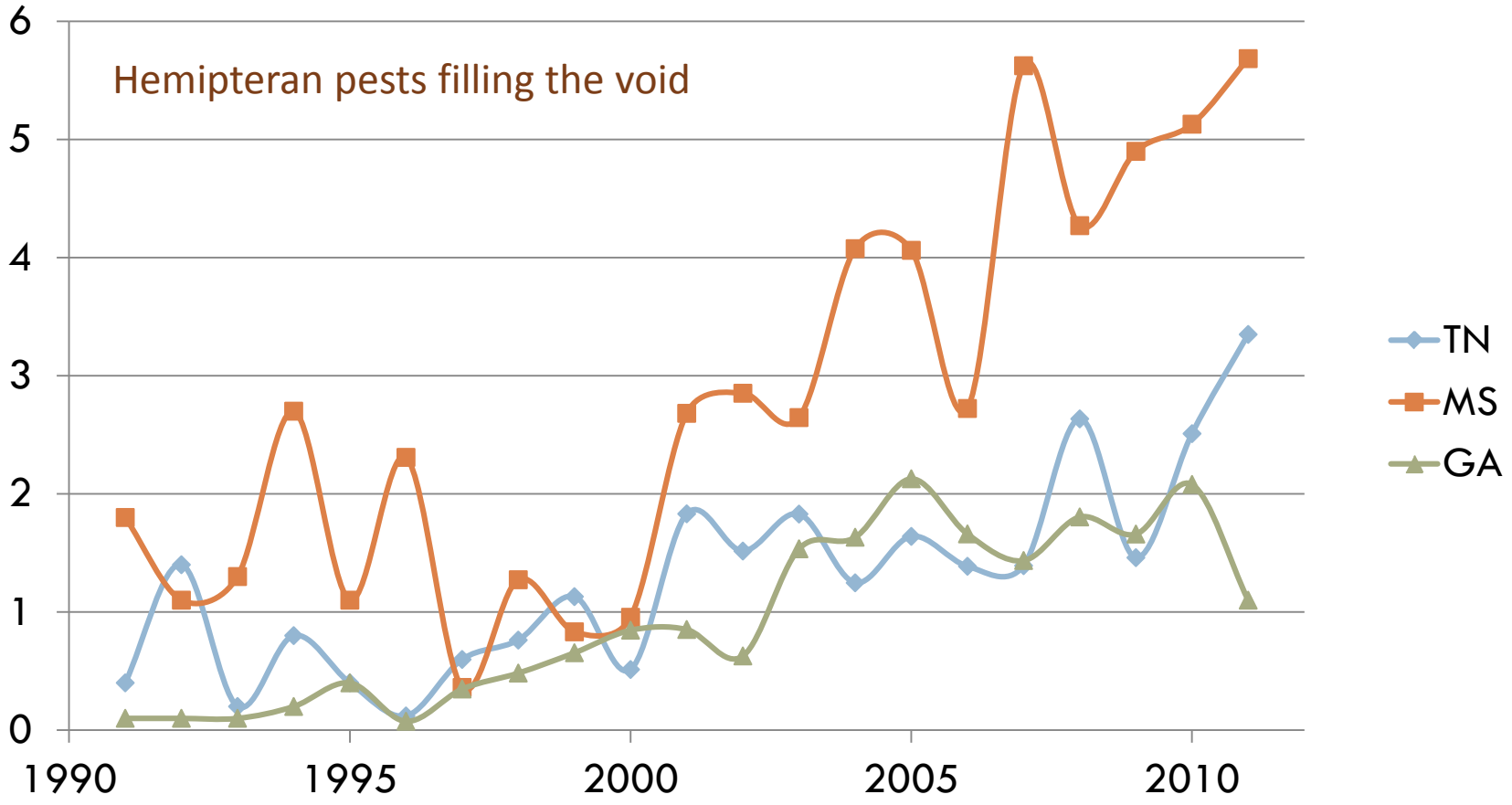
Number per Acre



Plant Bugs and Stink Bugs

Insecticide Applications

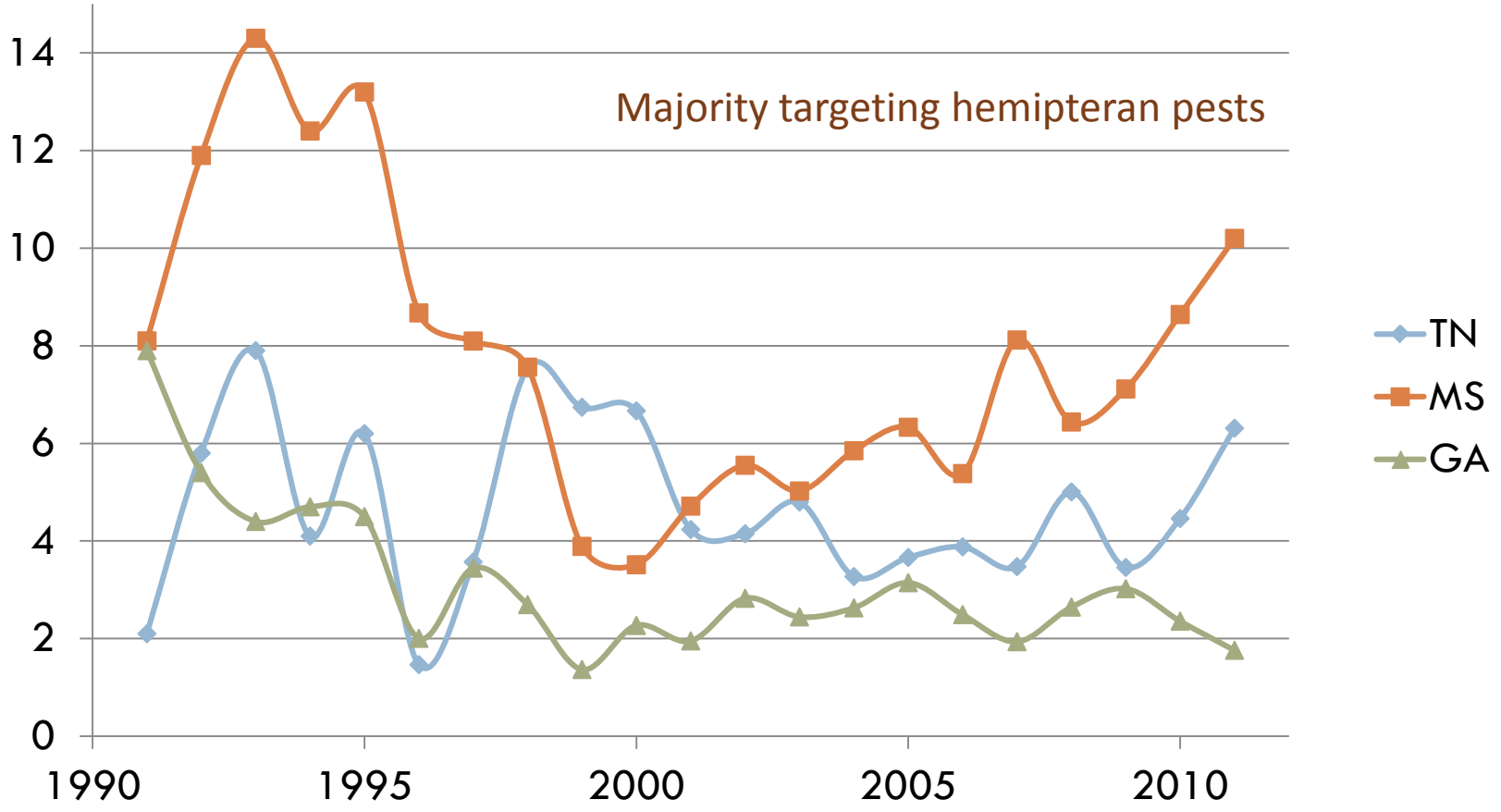
Number per Acre



Total Insecticide Applications

All Pests

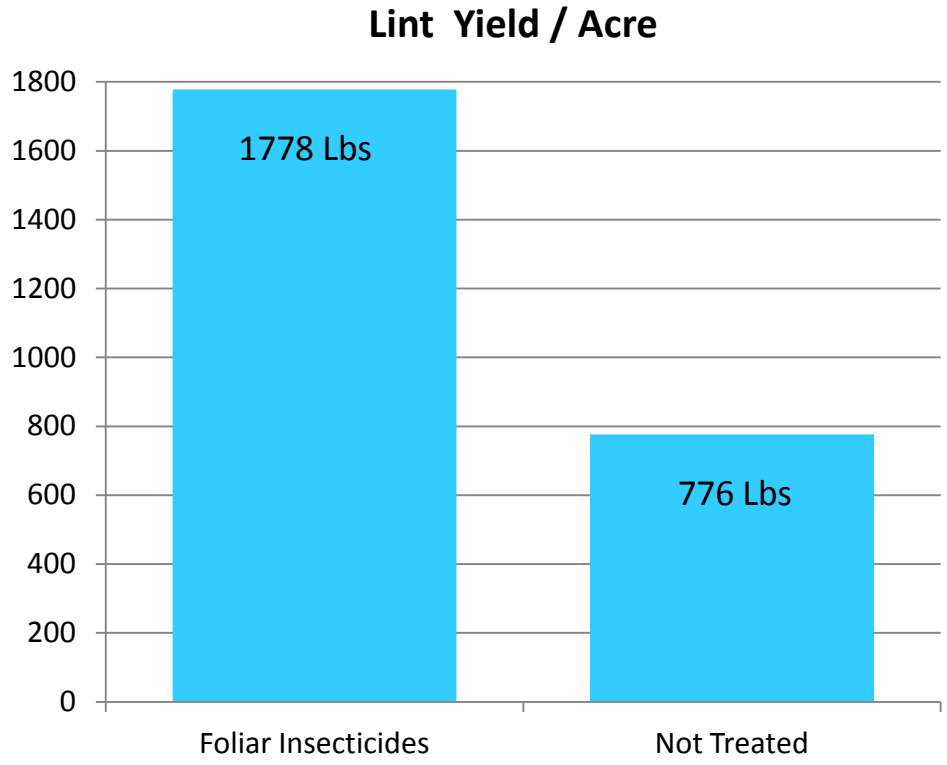
Number per Acre

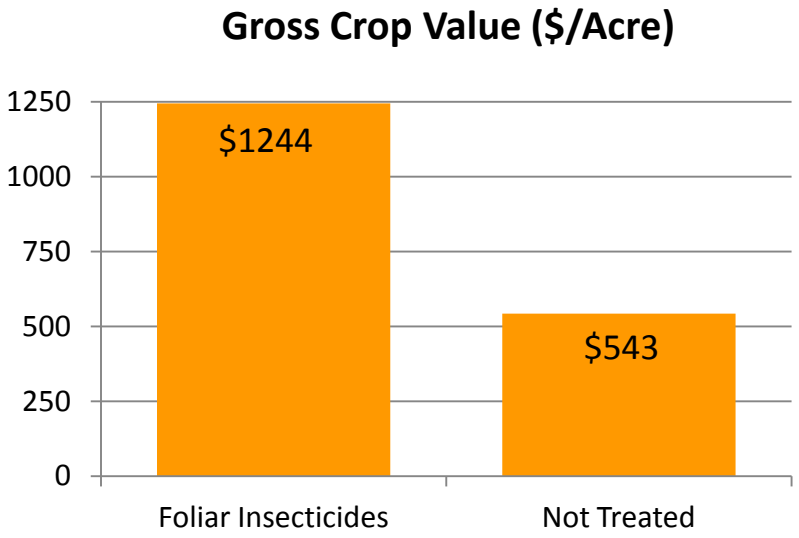


Hemiptera … potential impacts on yield

Tarnished plant bug and stink bugs

5 applications for complex of plant bugs and stink bugs (2010)



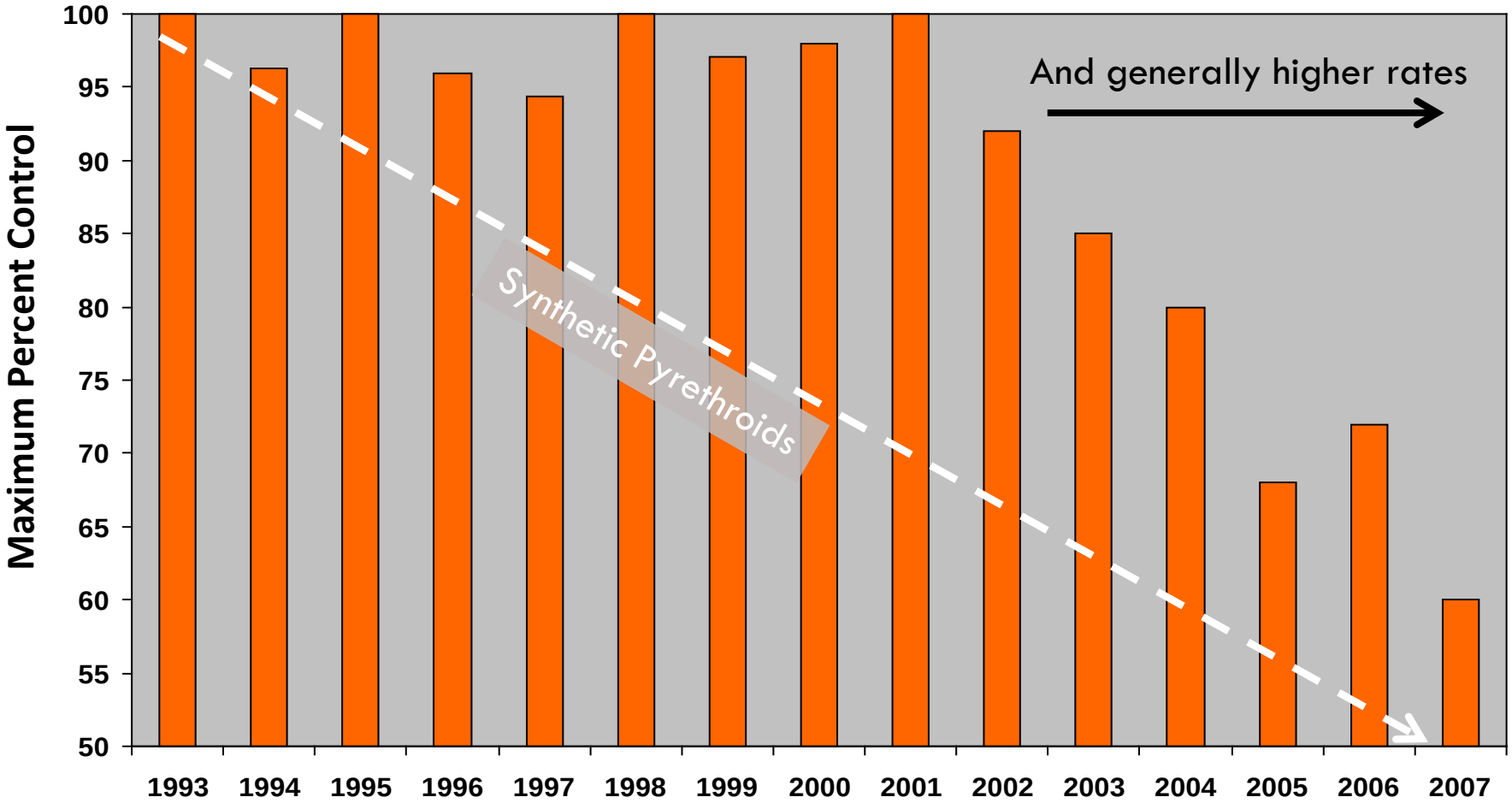


What's the Solution?

- Core of IPM Program will rely on insecticides
  - Must use in the best possible way
  - Increased resistance to existing insecticides
    - Great need for new modes of action
      - Diamond (novaluron), Transform (sulfoxaflor)
- Early planting and early maturing cotton varieties (B. Adams, et al.)
  - Other cultural controls also have some value
- Biological control and host plant resistance have mostly been a bust
  - Transgenic cotton with resistance to Lygus ???

Tarnished Plant Bug Insecticide Resistance

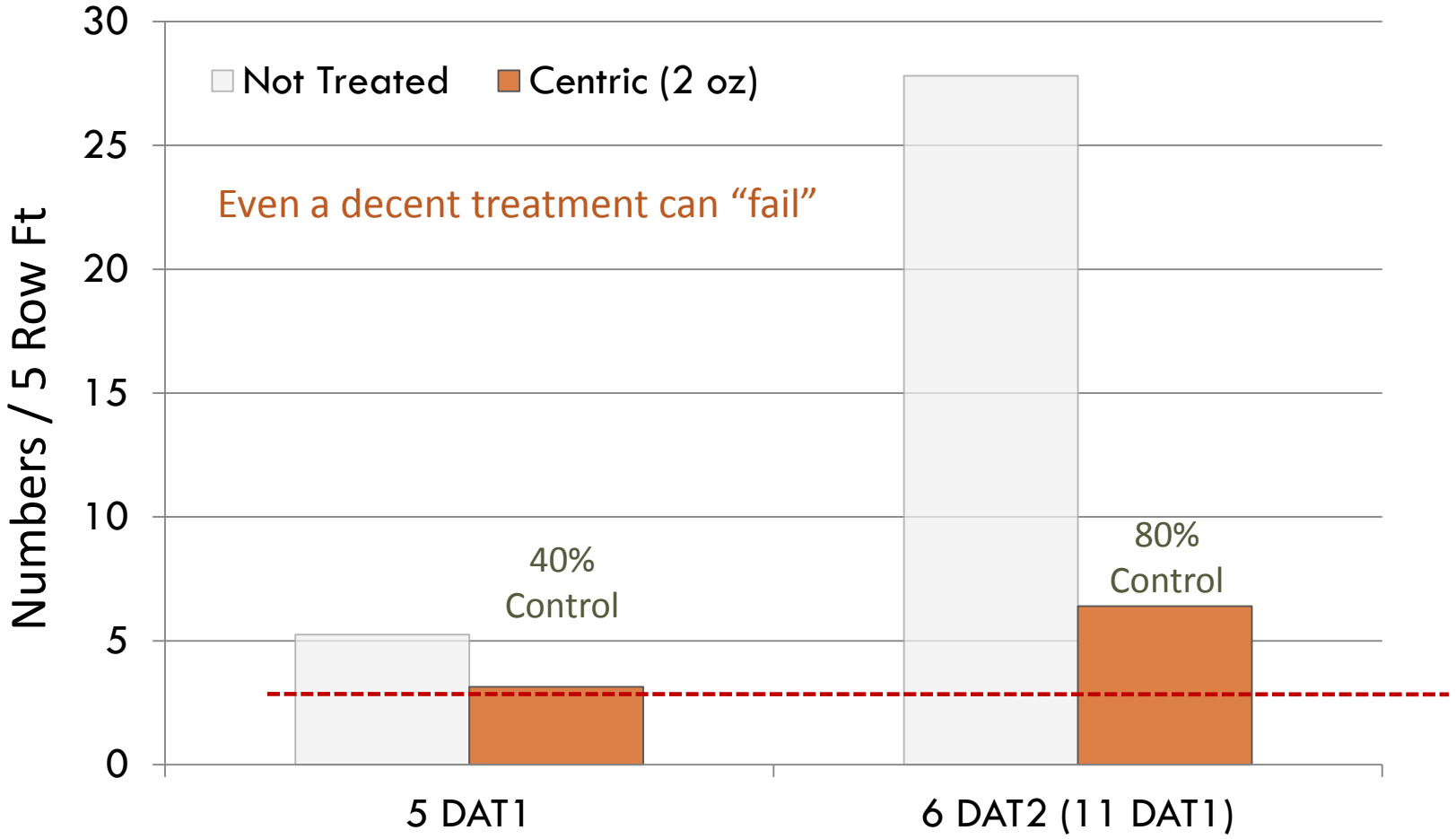
Orthene and Bidrin, Midsouthern states (J. Gore, MSU)



Data from 123 tests from Arthropod Management Tests, 1994-2008

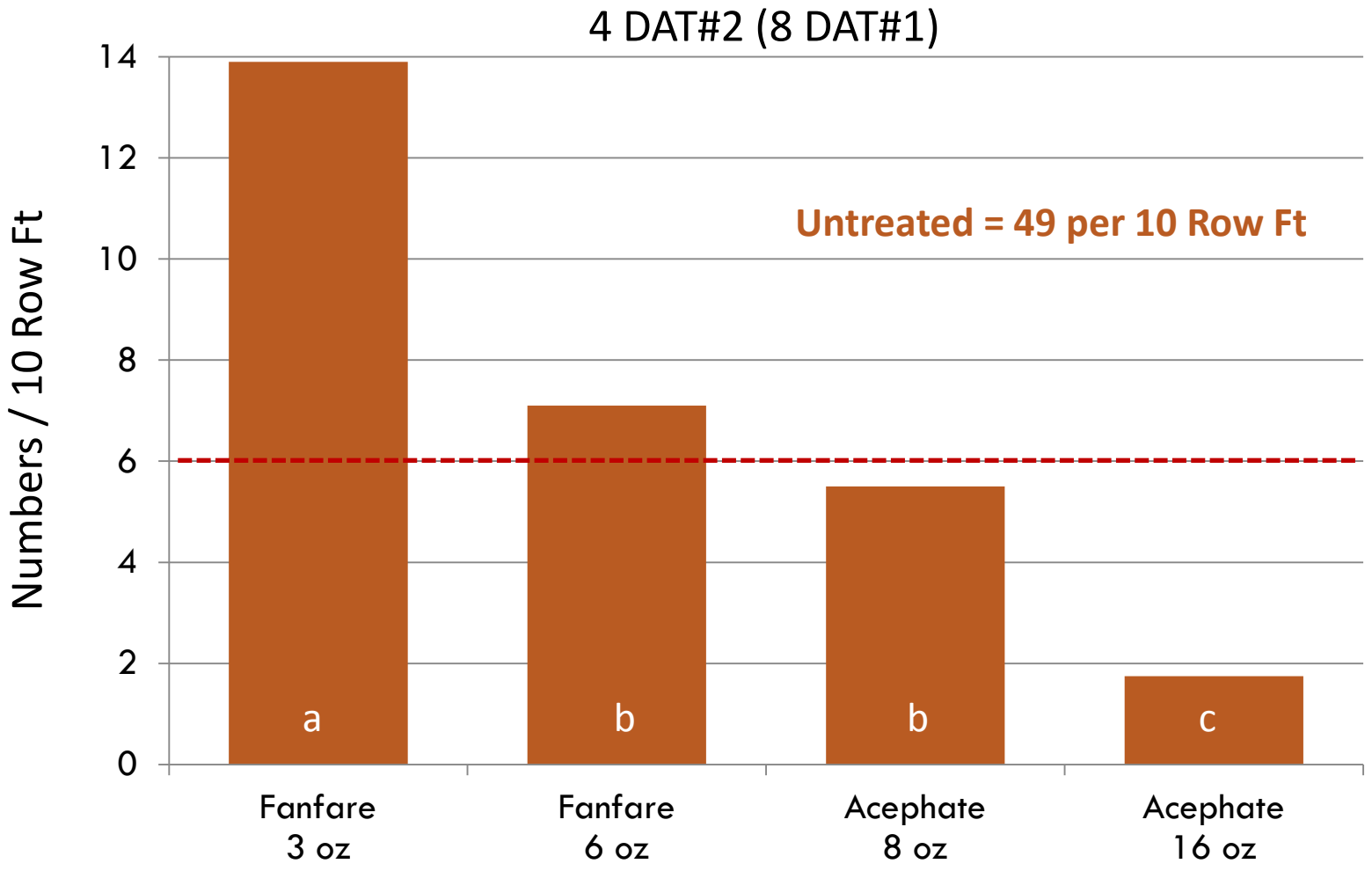
Size matters … Size matters … Size matters … Size matters

Tarnished Plant Bug (Tennessee, 2010)



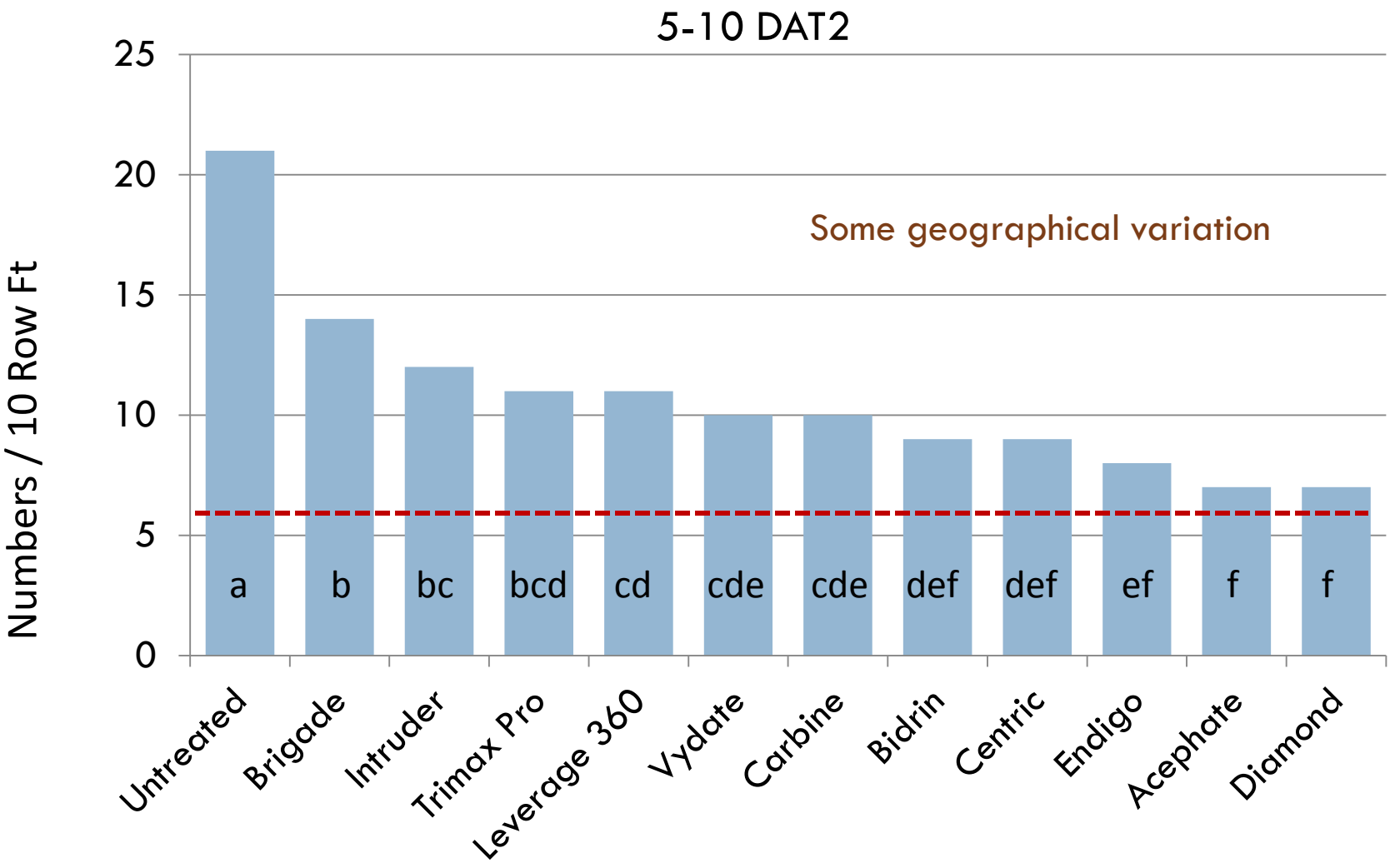
Product Selection and Rates Matter

Tarnished Plant Bug (Tennessee, 2010)



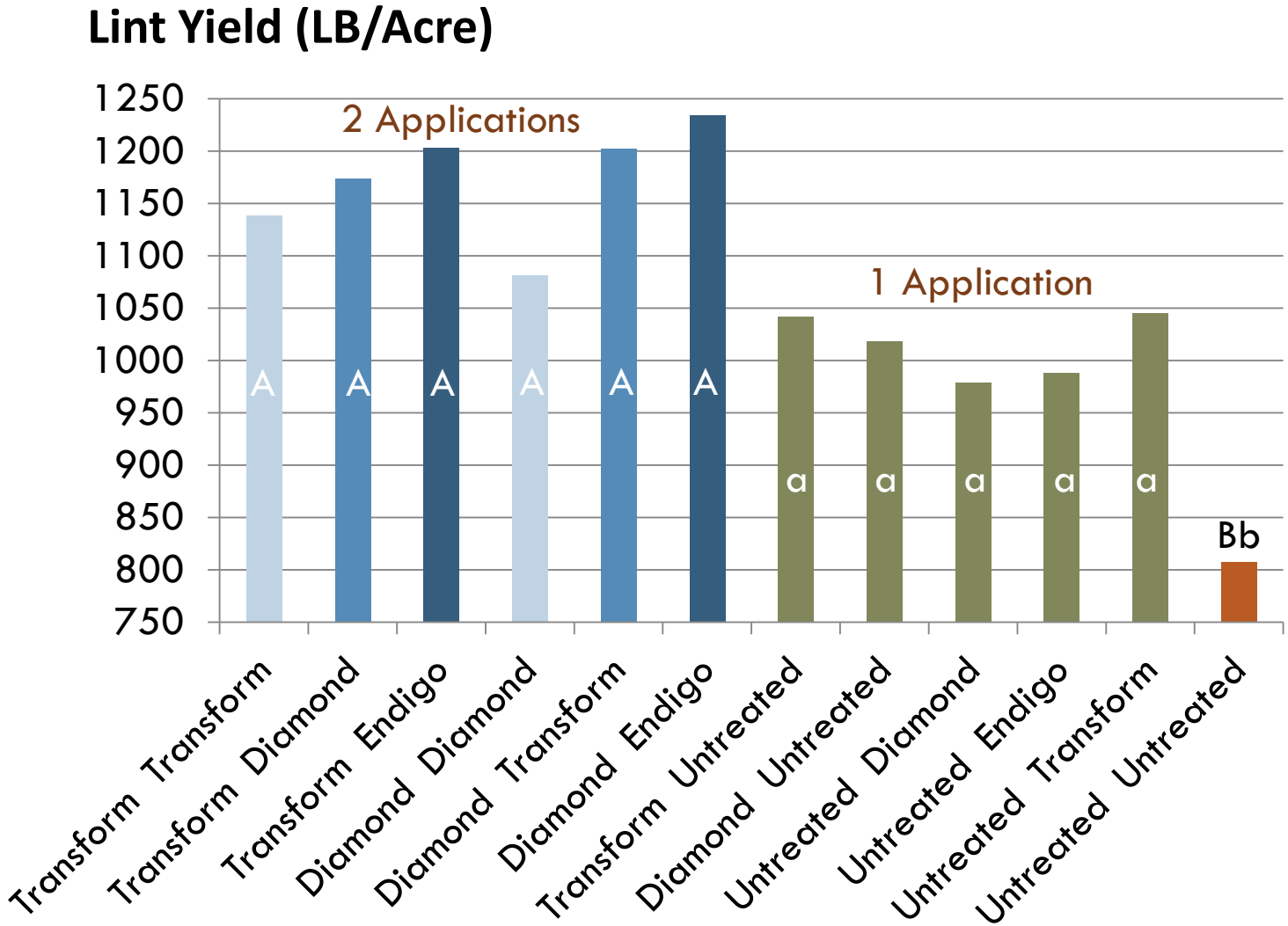
2010 Regional TPB Efficacy Trials

Tarnished Plant Bug, Averaged Across 7 Locations



New Chemistries and Rotation

Tarnished plant bugs + a few stink bugs and CEW (TN, 2012)



1st Insecticide
P = 0.003

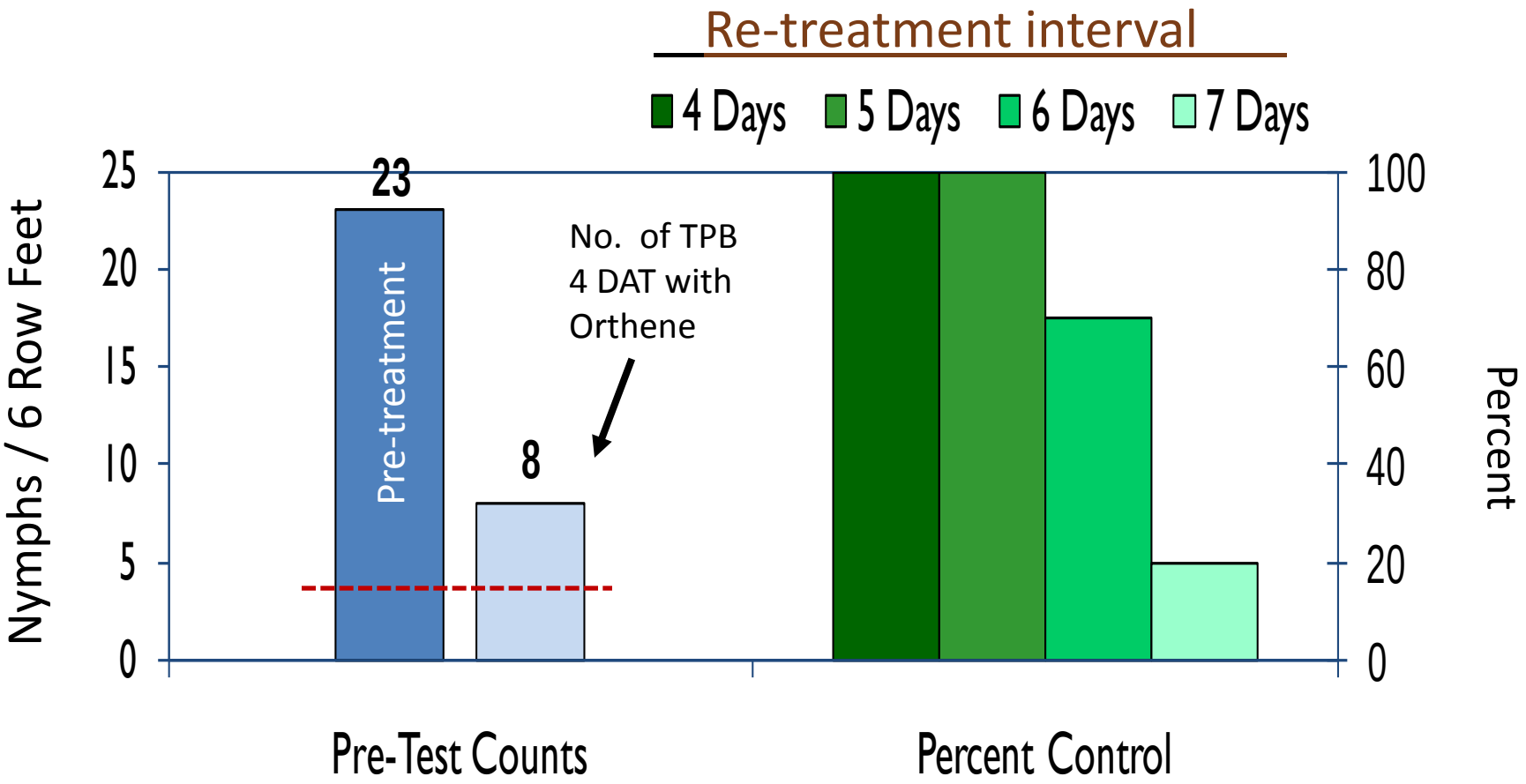
2nd Insecticide
P = 0.0053

Interaction
P = 0.8073

Transform (1.5 oz)
Diamond (9 oz)
Endigo ZC (5 oz)

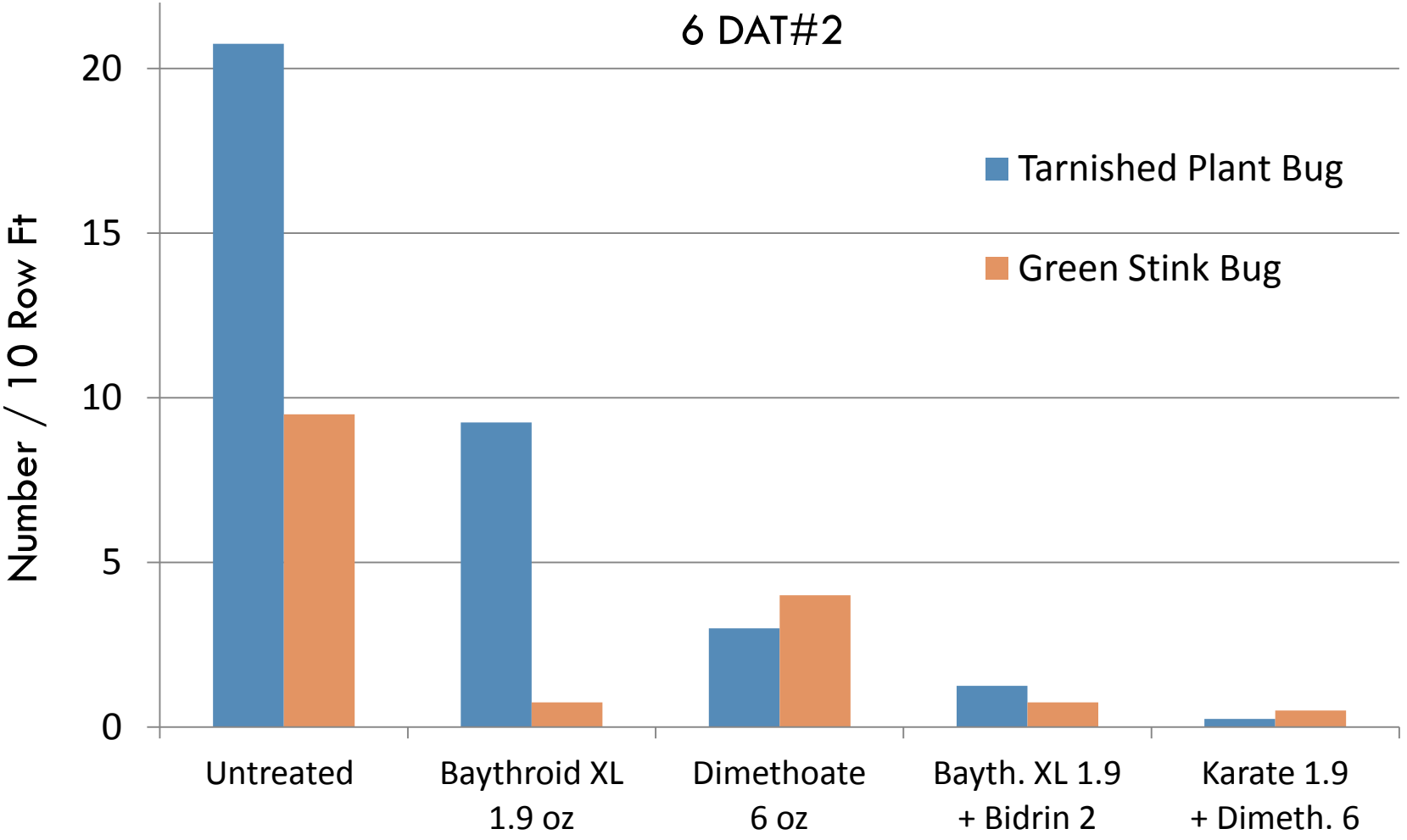
Spray Intervals vs. High Pest Pressure

Tarnished Plant Bug (Jeff Gore, MSU)

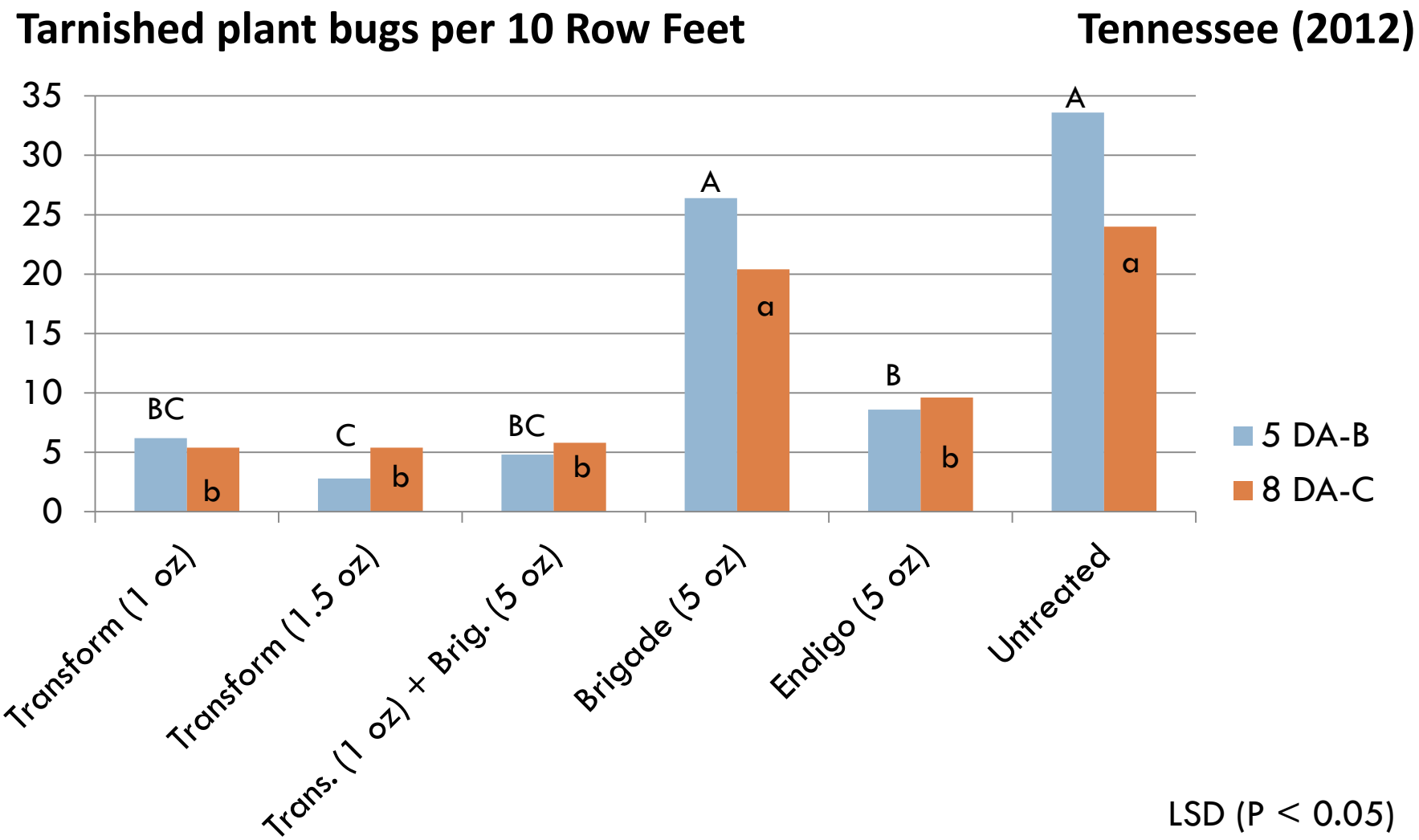


Tank mixes for improved control

Tennessee, 2010



New insecticides will often require a tank mix or rotation strategy

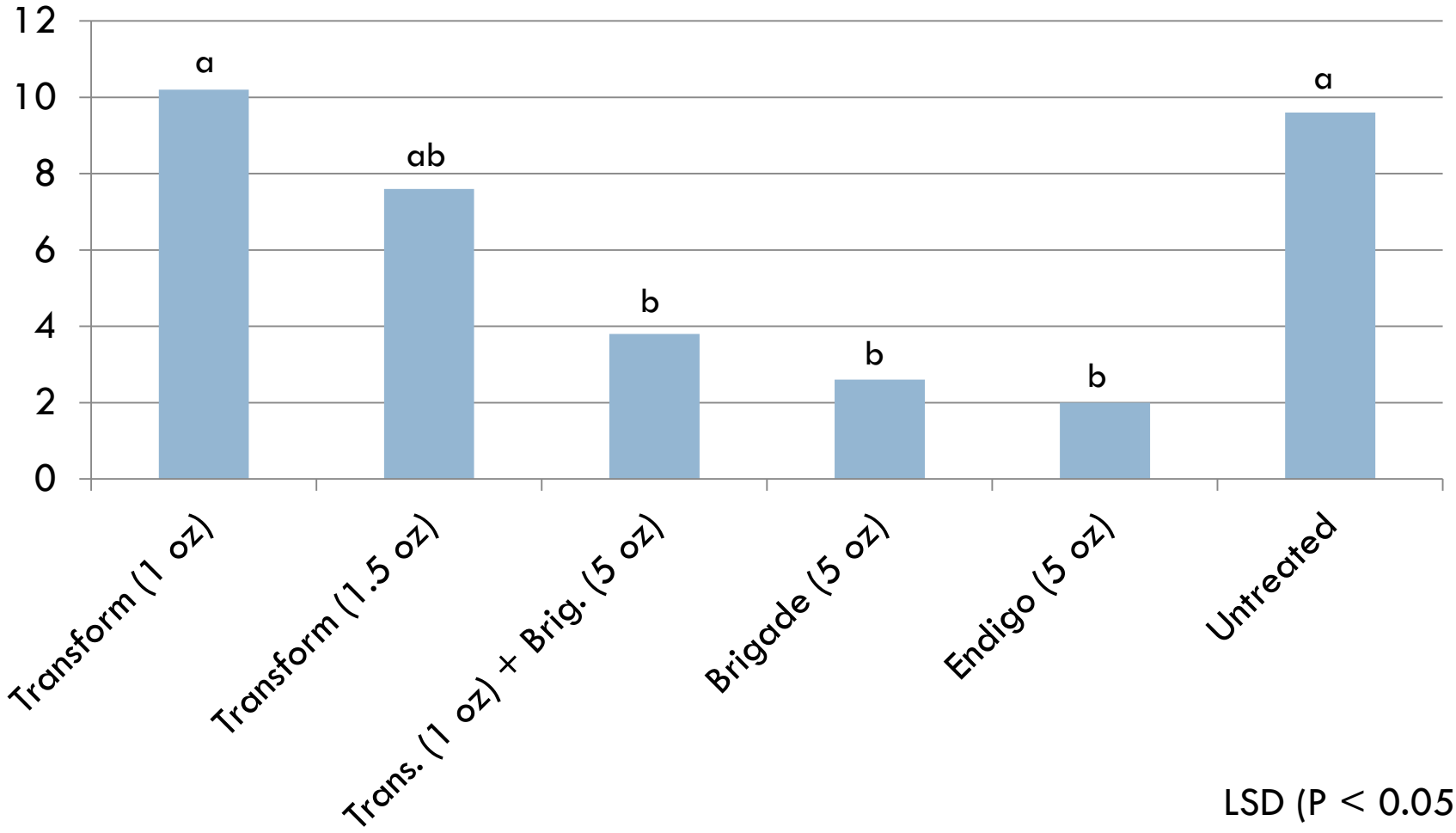


LSD ($P < 0.05$)

Tank mixes for a broader spectrum

Tennessee (2012)

Total Number of Stink Bugs on Drop Cloth Samples

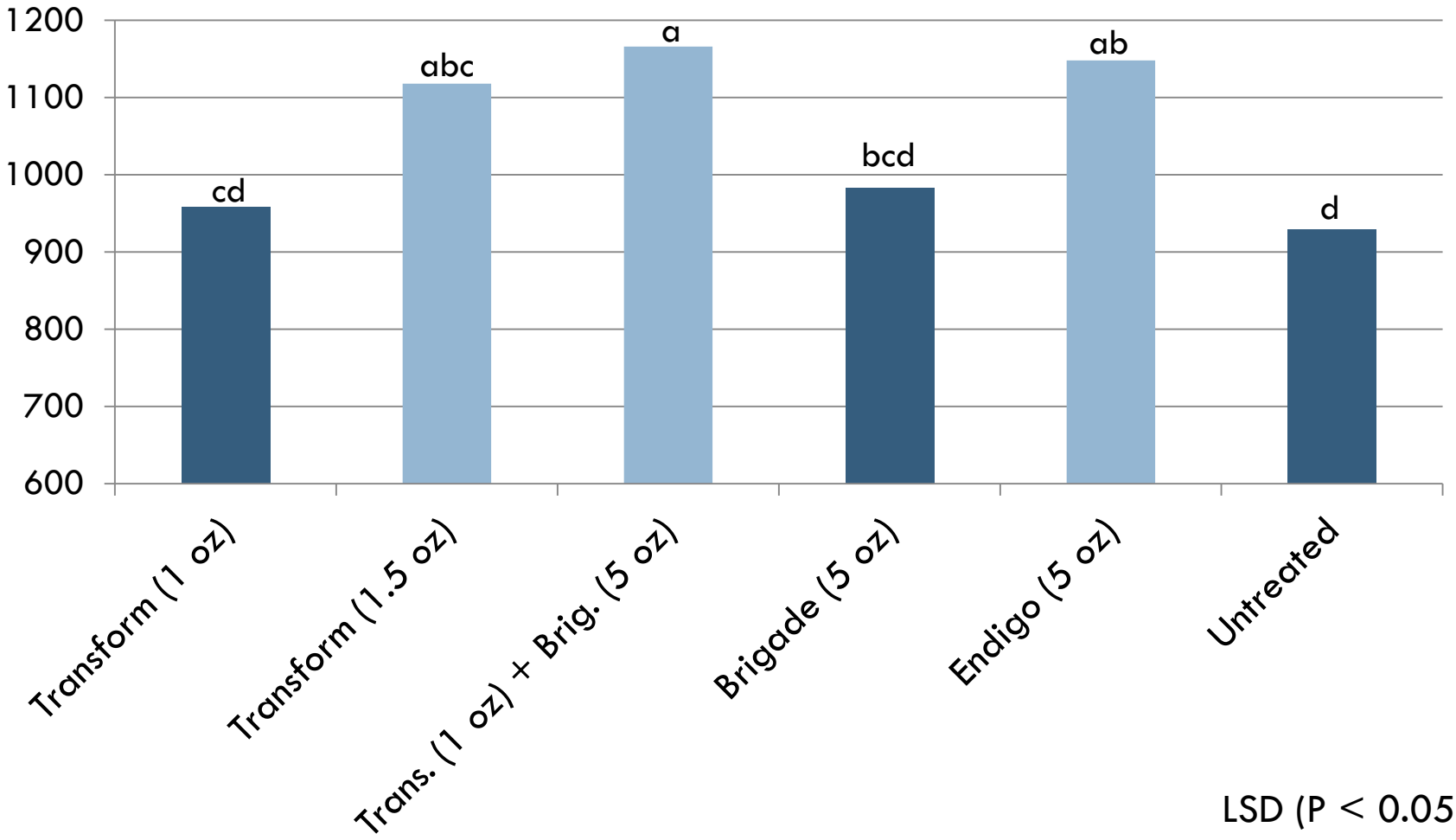


LSD ($P < 0.05$)

Why tank and pre-mixes are used …

Tennessee (2012)

Lint Yield (LB/Acre)



LSD ($P < 0.05$)

Cotton's Future in the Midsouth

- The continued decline of lepidopteran pests?
  - Next generation Bt cottons and Bt corns
  - Bt soybean are being considered
- The tarnished plant bug will remain the key pest of cotton
  - Are we on the pesticide treadmill because of Lygus?
    - Secondary outbreaks of spider mites, aphids, etc.
      - Neonicotinoid resistant aphids
- Shift away from cotton in the Midsouth