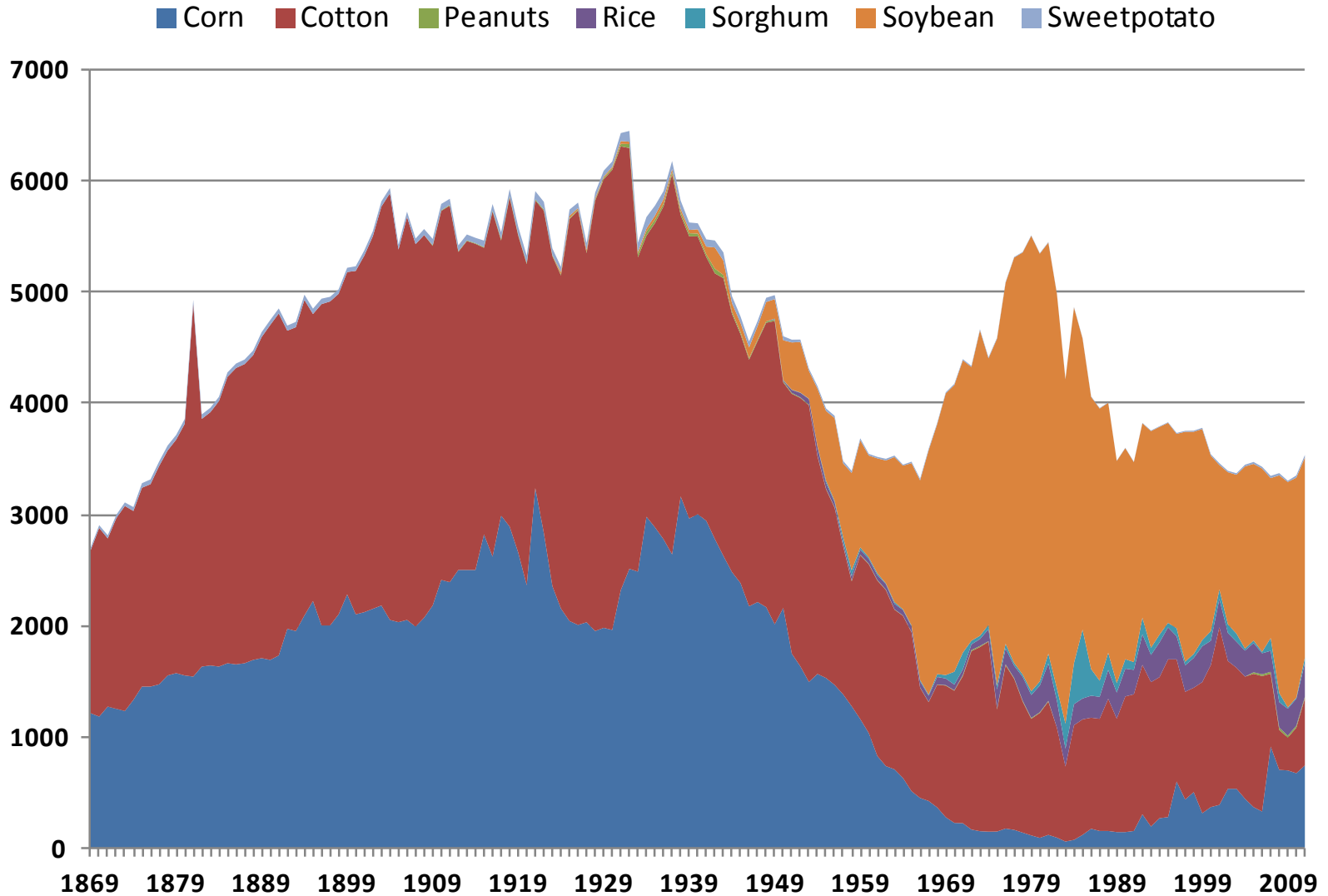


# Landscape Effects on Pest Management

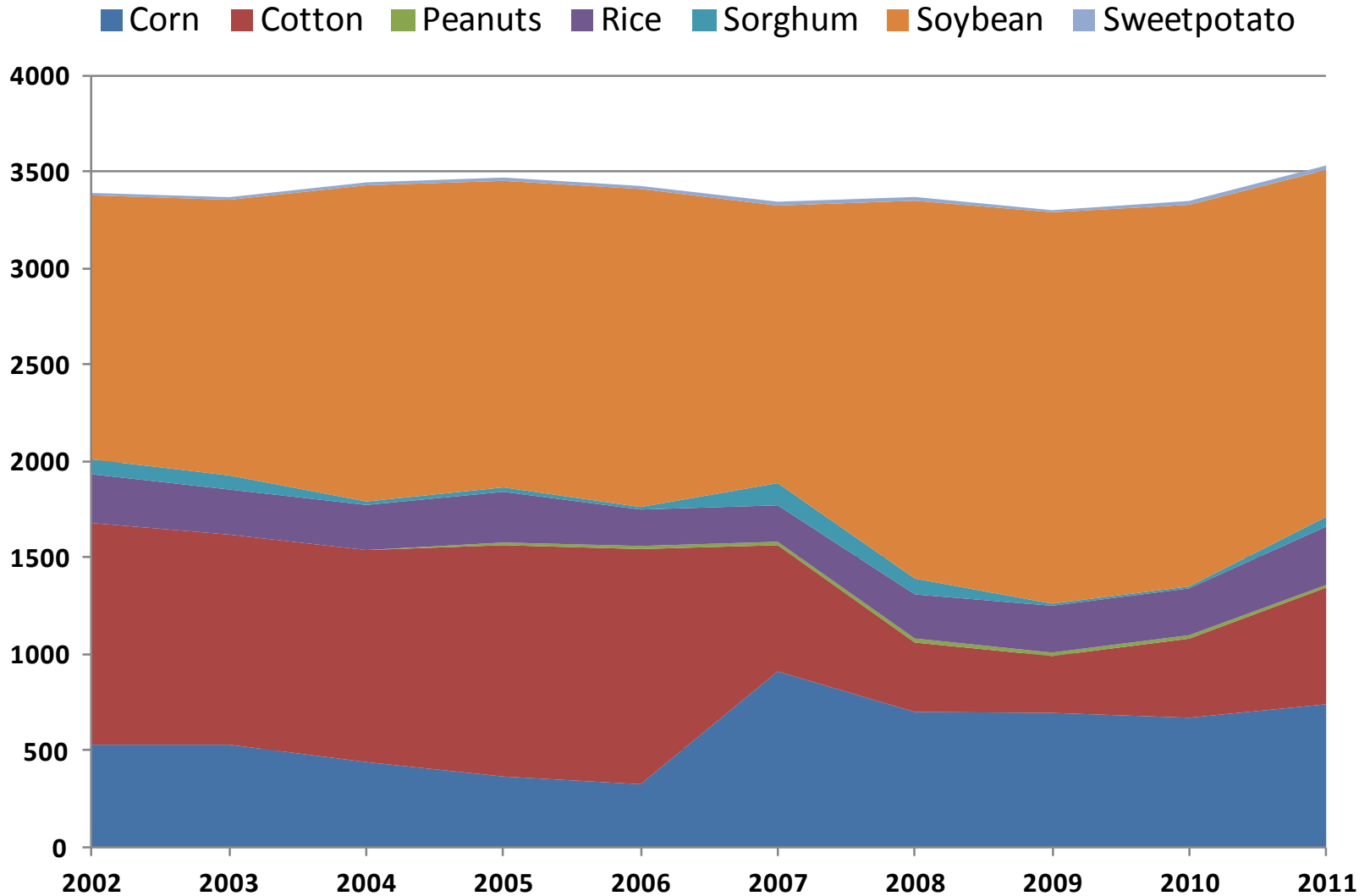


0 0.15 0.3 0.6 0.9 1.2 Miles

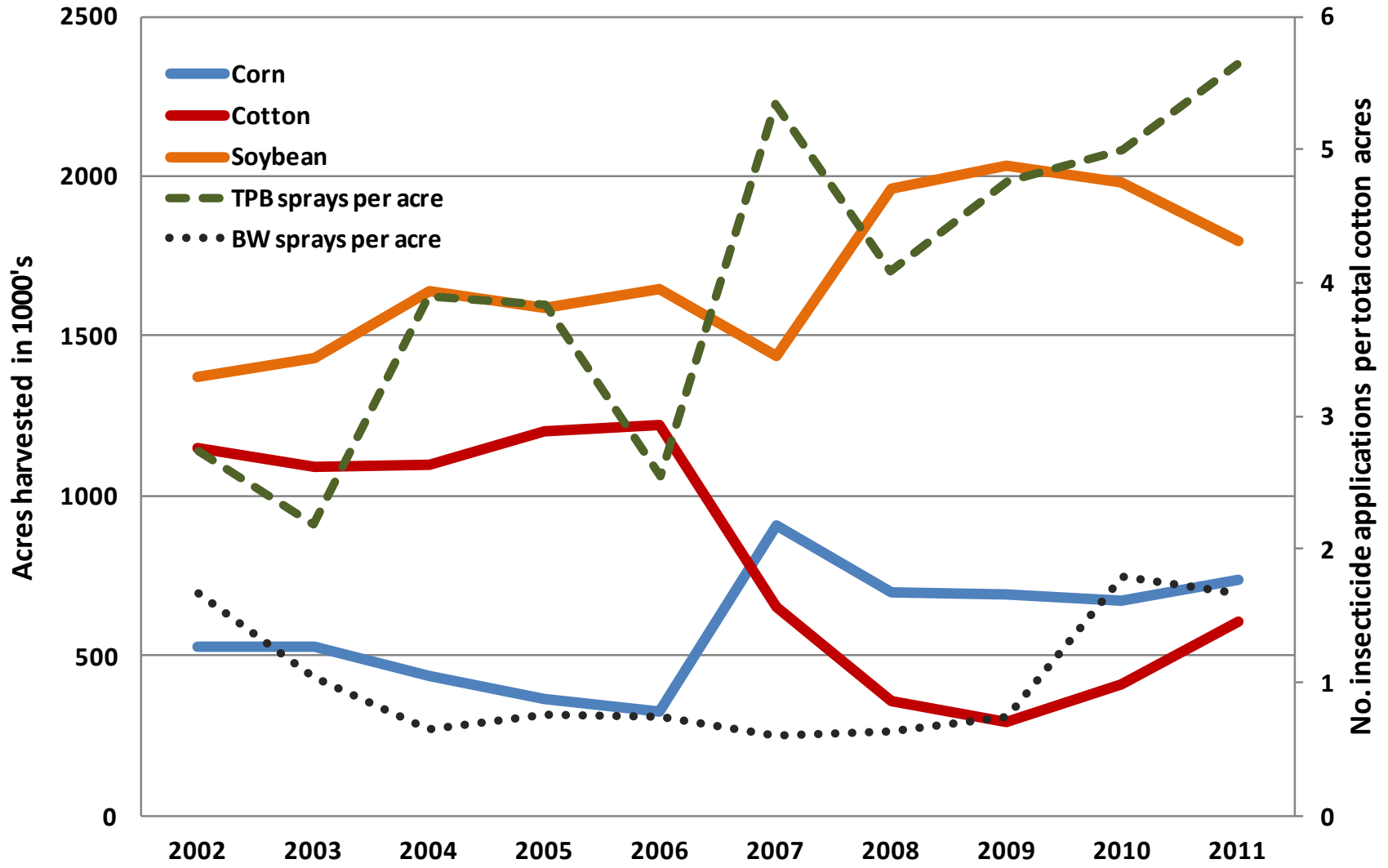
# MS crop acreage harvested



# MS crop acreage harvested



# Insecticide applications targeting bollworms or TPB on cotton in MS



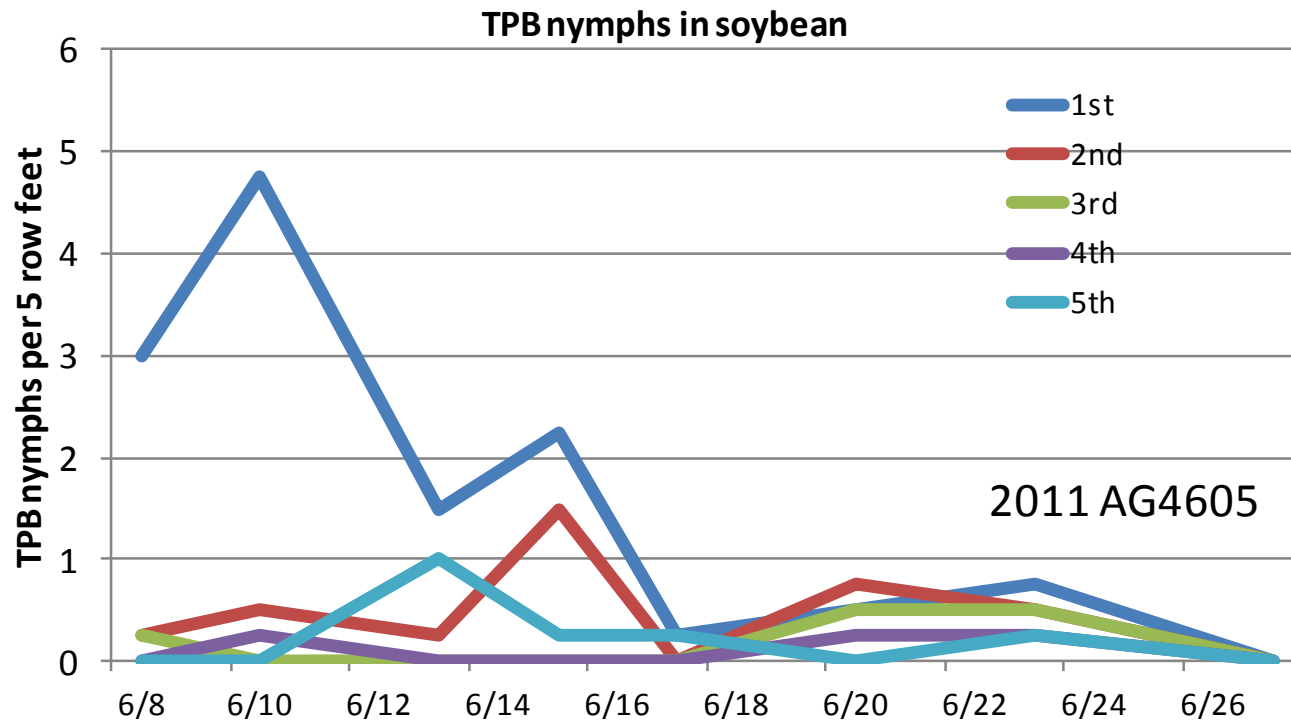
# Host plants

- Bollworms and tobacco budworms > 230 host plants
- Tarnished plant bugs > 320 host plants



# Crop hosts

- Corn favored host of bollworms
- Influx of TPB into cotton from corn during R2-R3 growth stage (Kumar and Musser 2009)





# Influence of local crop on insect populations in cotton fields

- R. A. Pickens and Son Farm (2003-2005)
- Cotton, corn, soybean, rice
- Cotton sampled twice weekly
- 100 plants/field



# Influence of local crop

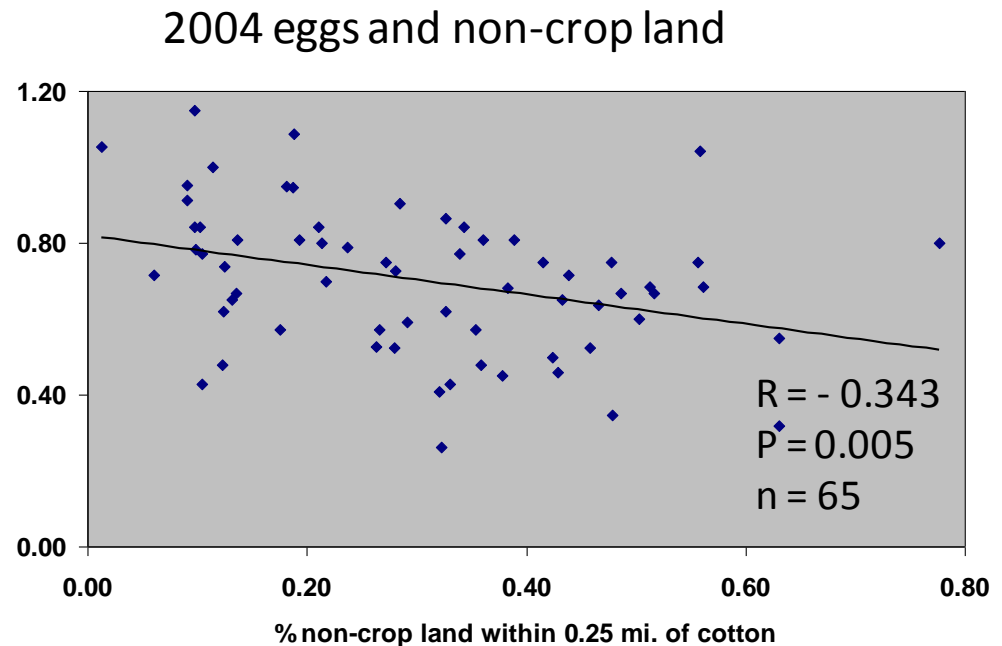
- Crop types within a 0.25 mile buffer around each cotton field were estimated
- Relationships between monthly and yearly average of heliothine eggs and plant bugs and the percentage of various crops within buffer examined





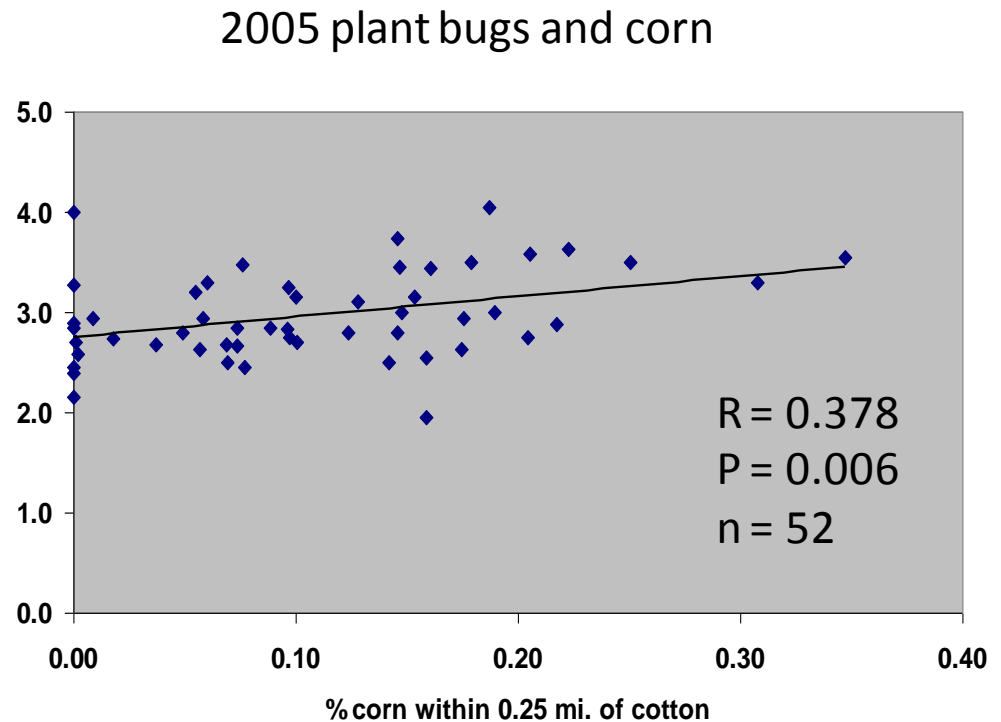
# Relationships between heliothine eggs and surrounding land

- All relationships with non-crop land were negative; yearly average significant in 2 of 3 years
- Significant positive relationship with all corn June 2004 and 2005
- Significant positive relationship with all cotton in August 2004

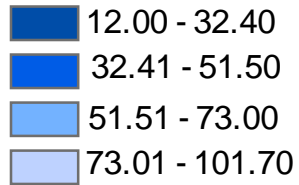


# Relationships between plant bugs and surrounding land

- Relationships with non-crop land mostly positive, only significant in July 2003
- All positive relationships with total corn, significant in 2005
- Significant negative relationship with cotton in 2 of 3 years

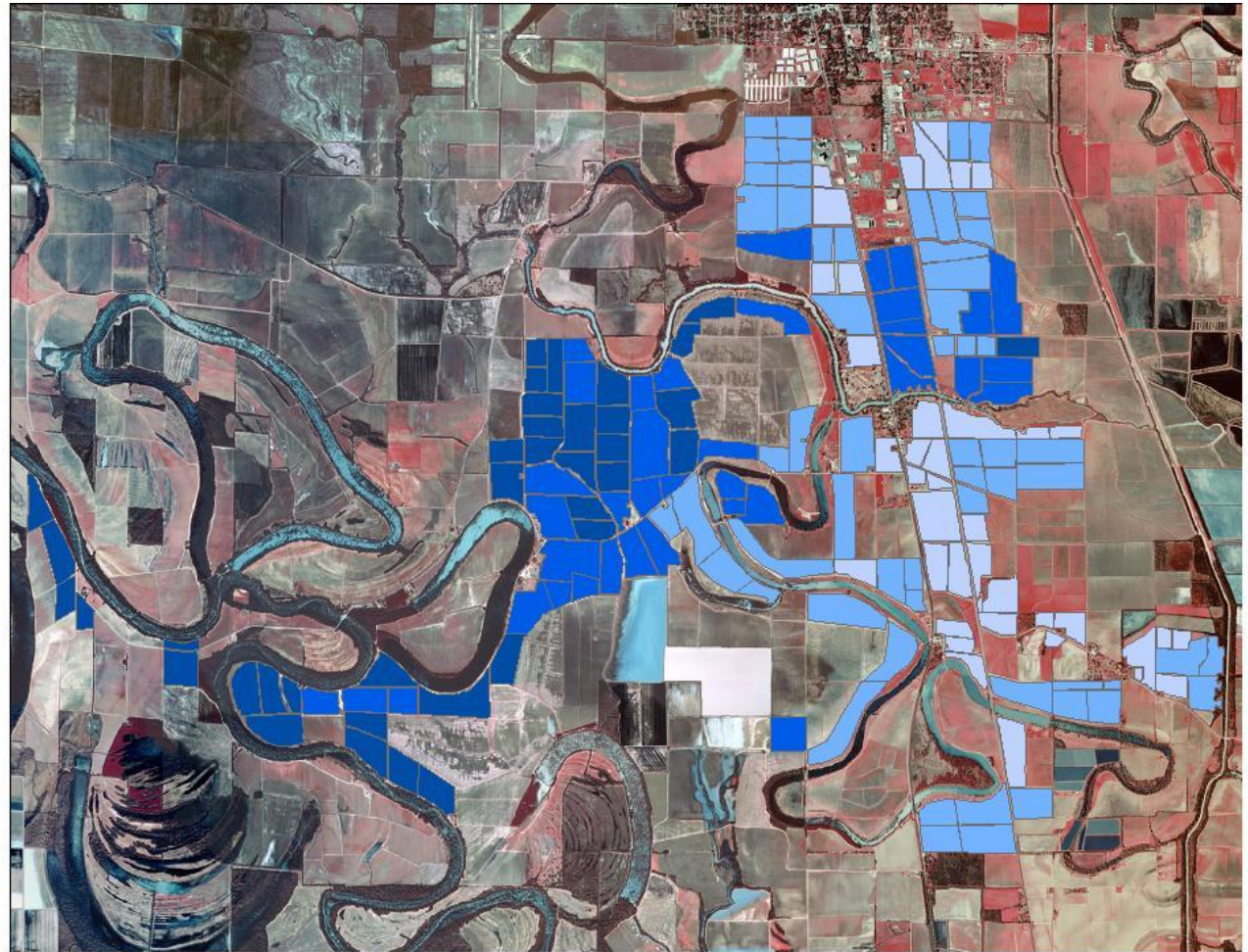


# Mean rankings of heliothine eggs across 125 cotton fields



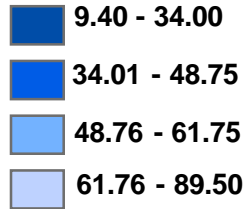
-Field rankings based on eggs per 100 plants

- Lower rankings = greater no. of eggs



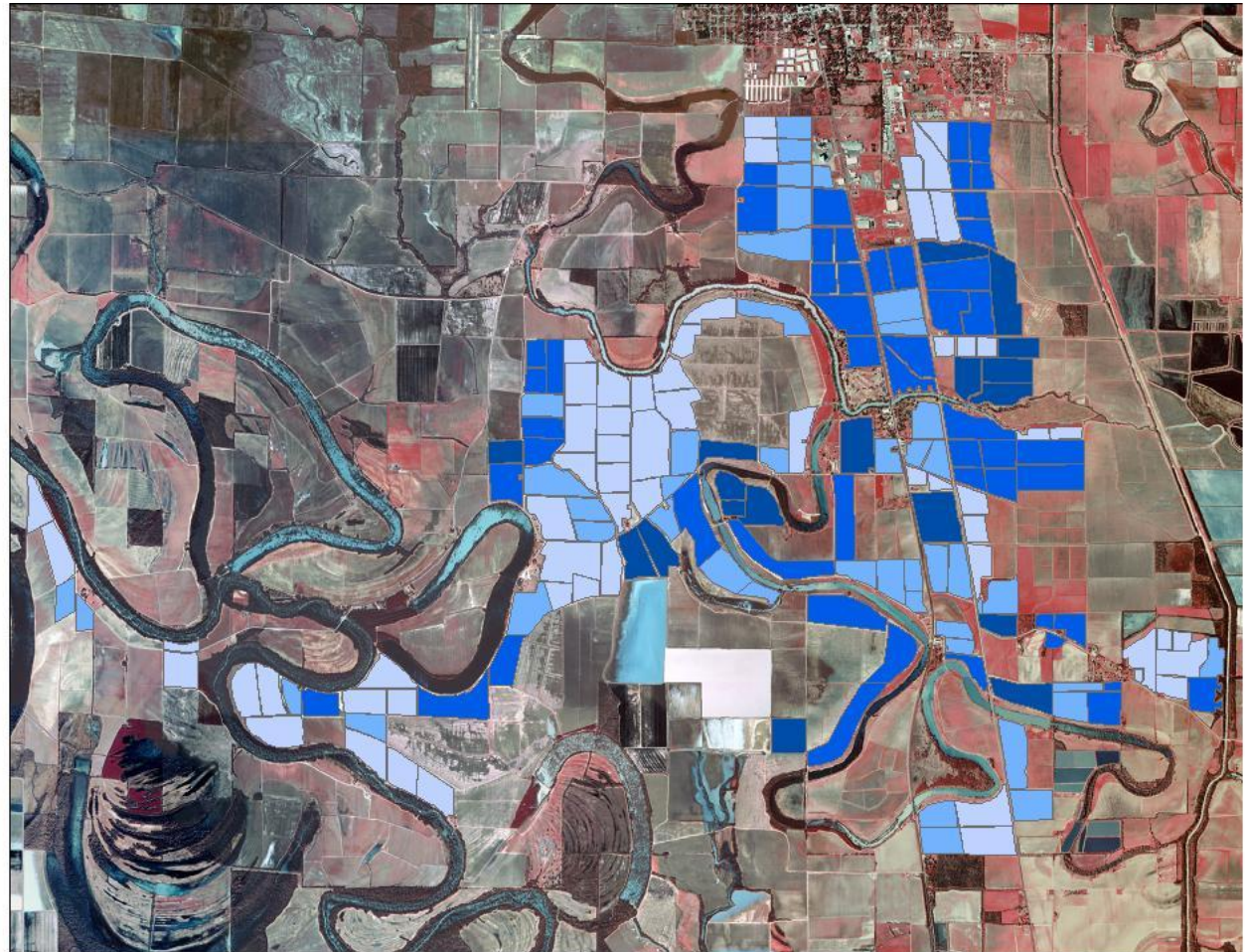


# Mean rankings of TPB across cotton fields



-Field rankings based on TPB per 100 plants

- Lower rankings = greater no. of TPB





# Determination of nymphal hosts of TPB

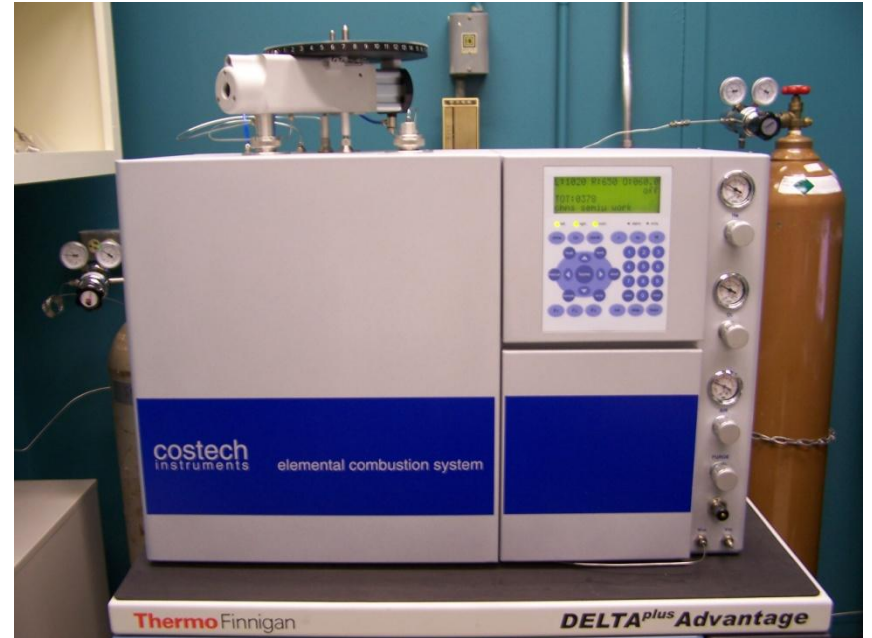
- Plants having C<sub>3</sub> physiology
  - Cotton
  - Soybean
  - Have less <sup>13</sup>C relative to <sup>12</sup>C
- C<sub>4</sub> plants – grasses
  - Corn
  - Sorghum
  - Pigweed
- This ratio within the wings examined for tarnished plant bug host plants



# Stable isotope analysis

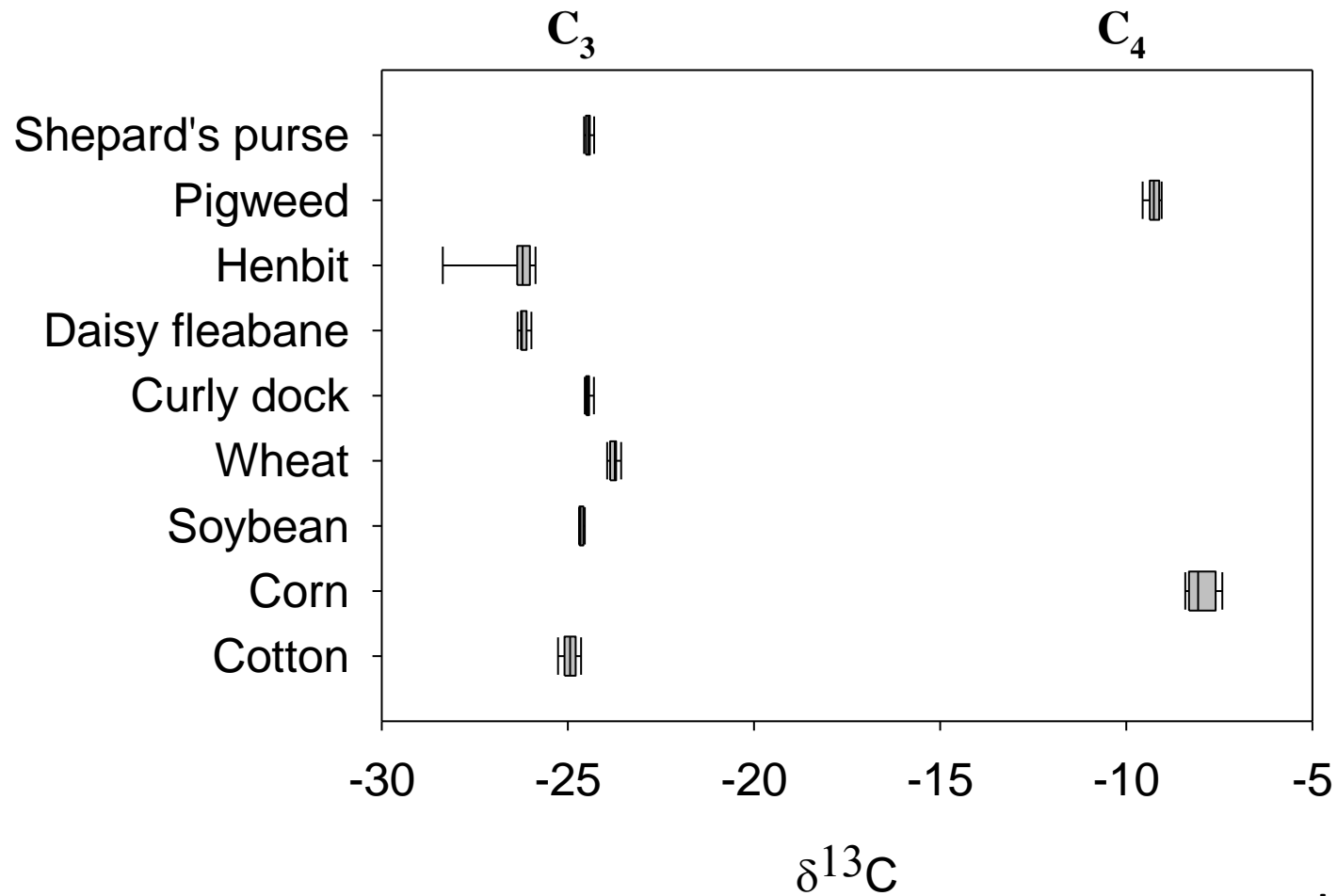


Wings cut and placed in tin capsules

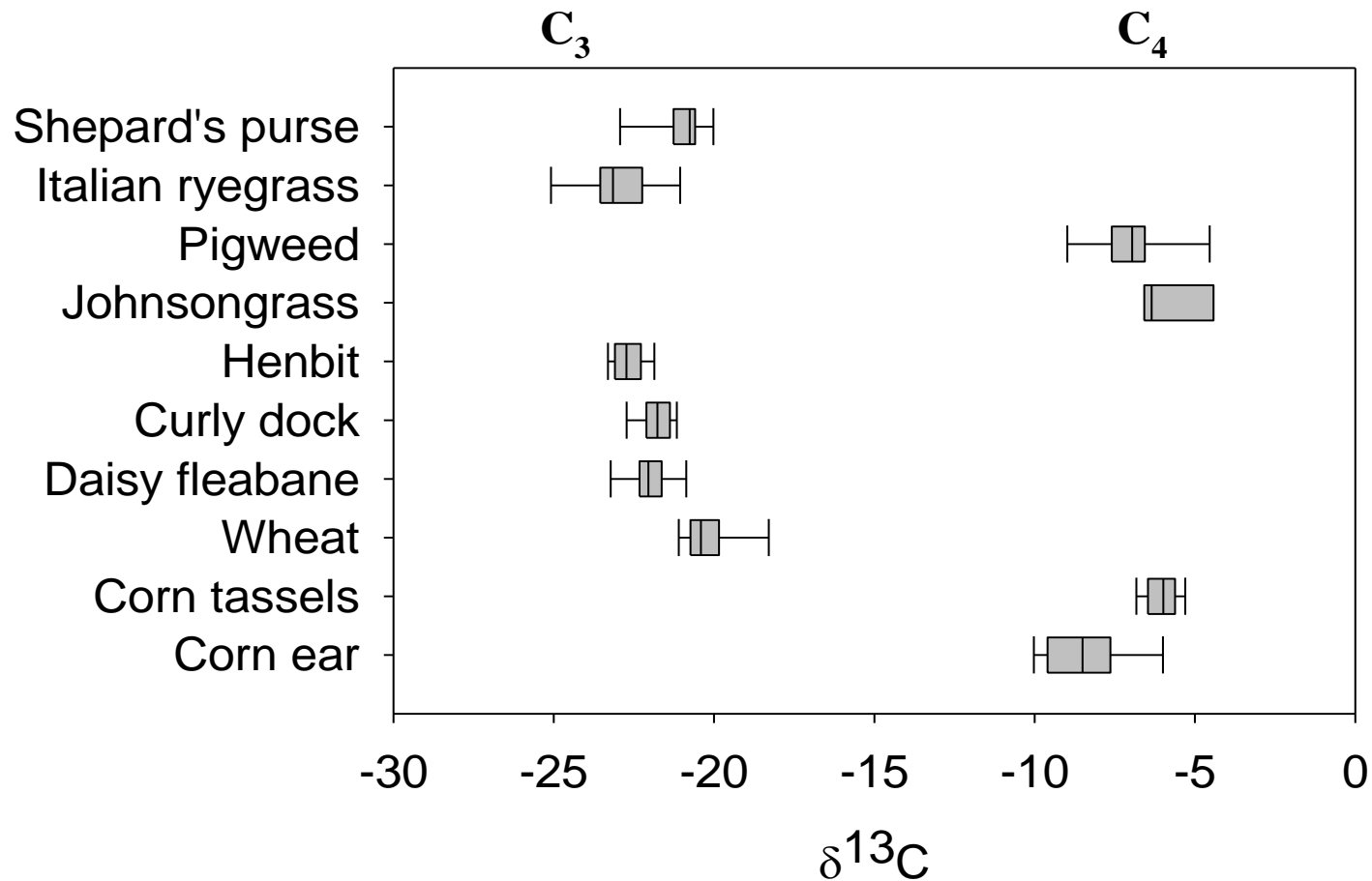


Elemental analyzer with isotope ratio mass spectrometer

# Stable carbon isotopic ratios of host plants of the tarnished plant bug



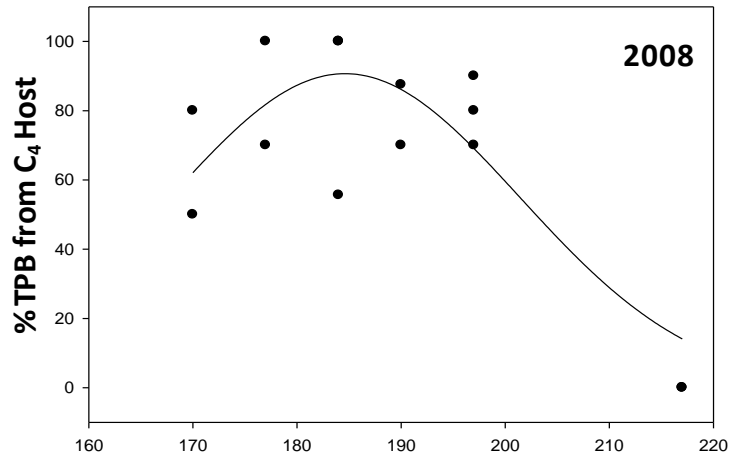
# Stable carbon isotopic ratios of tarnished plant bugs reared as nymphs on various plant hosts



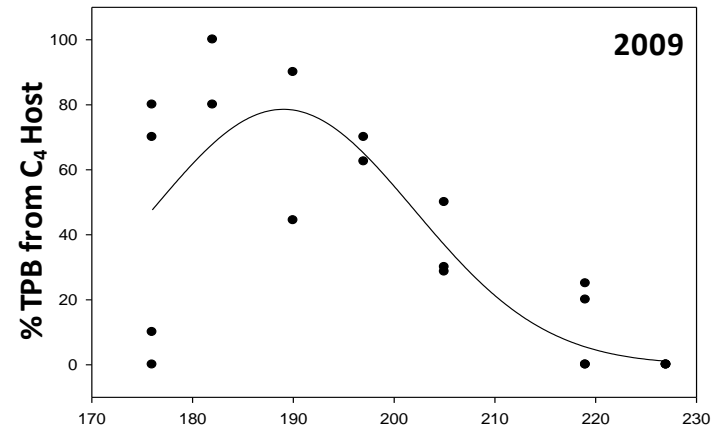
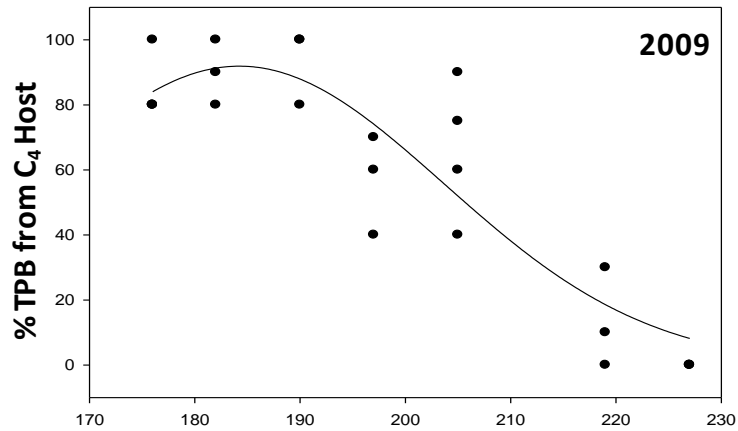
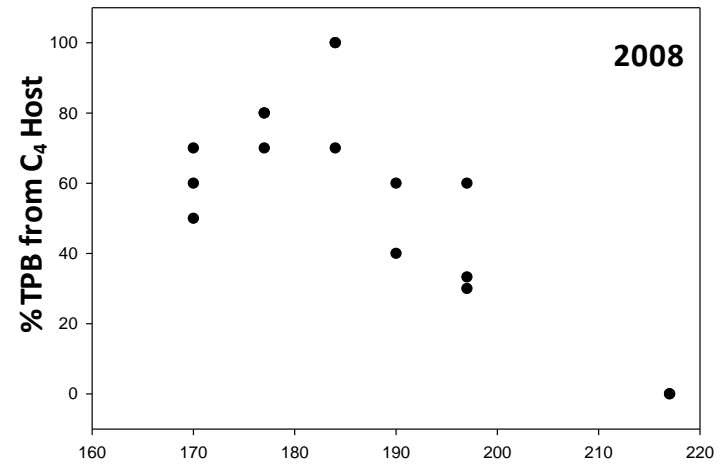


# TPB adults collected from cotton that developed as nymphs on C<sub>4</sub> hosts in MS Delta

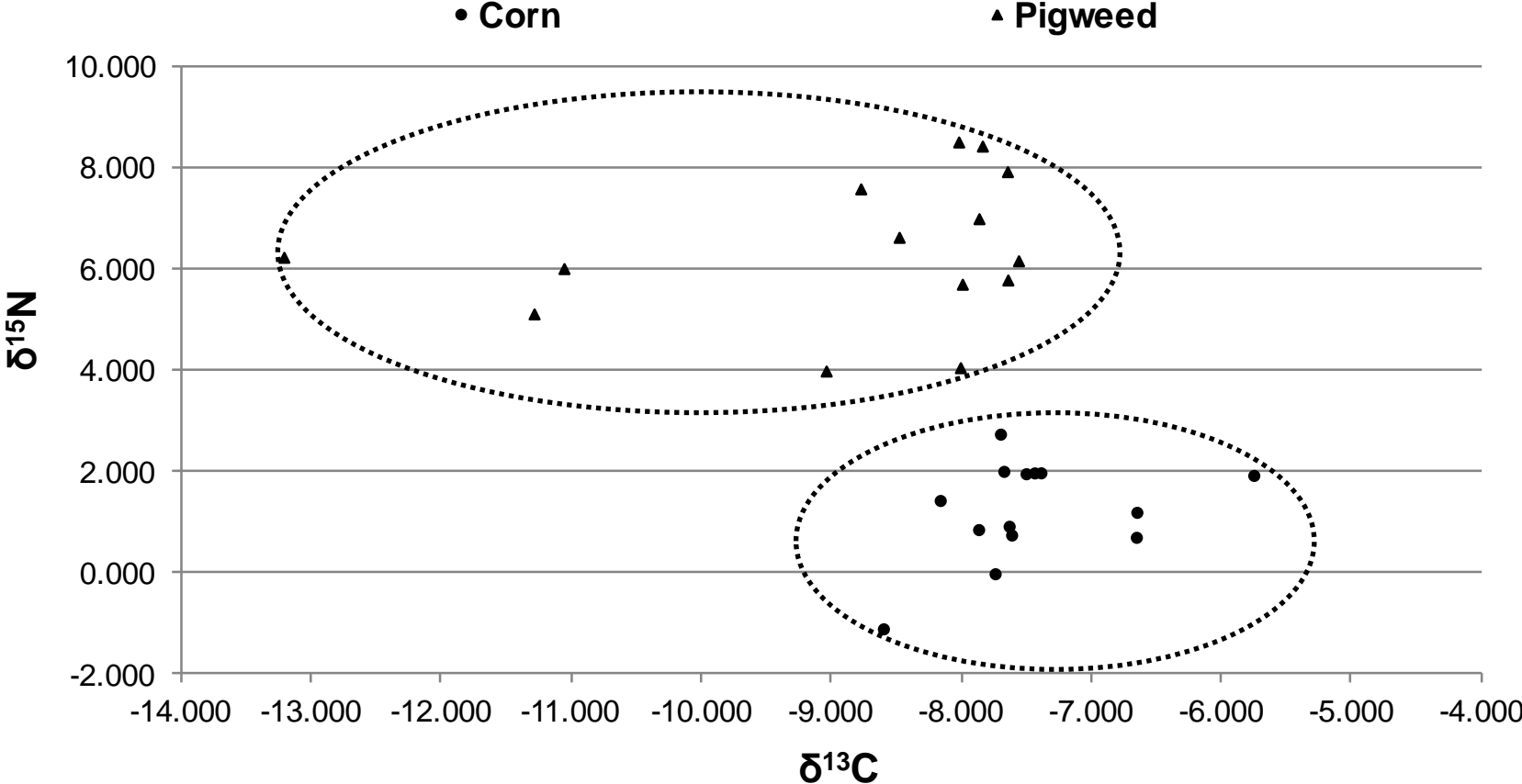
## Cotton adjacent corn



## Cotton >1 mile from corn

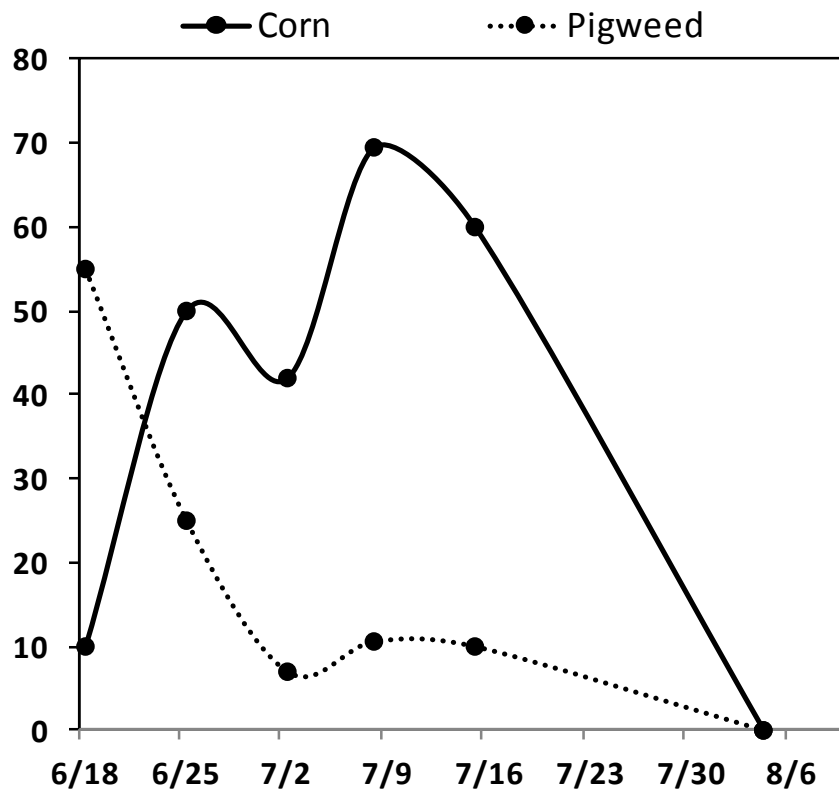


# Stable carbon versus nitrogen isotope ratios for tarnished plant bugs reared as nymphs

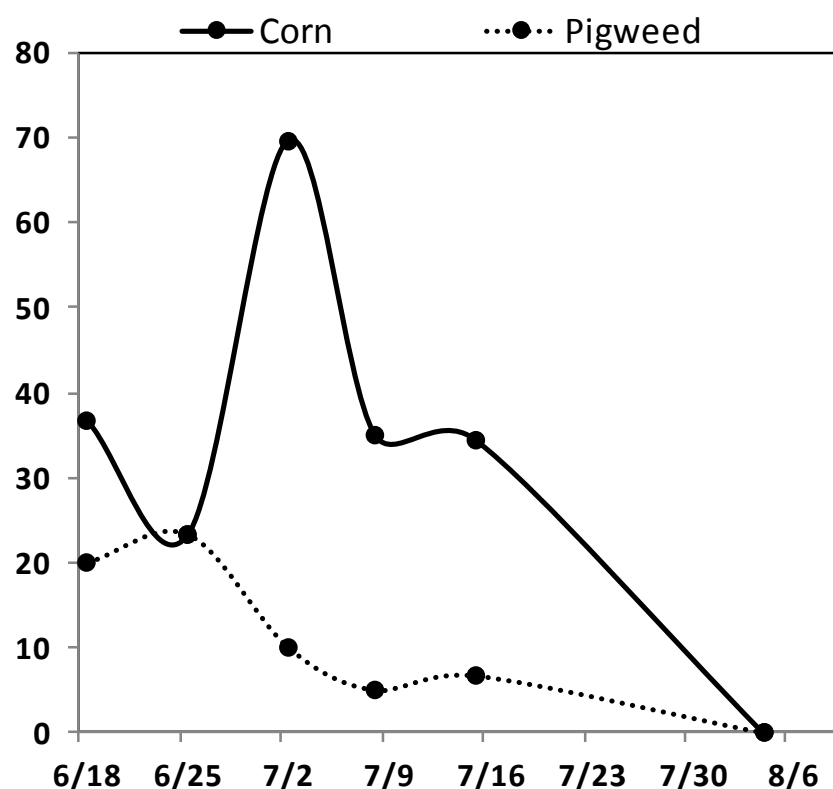


# TPB adults collected from cotton that developed as nymphs on either corn or pigweed in MS Delta during 2008

## Cotton adjacent to corn

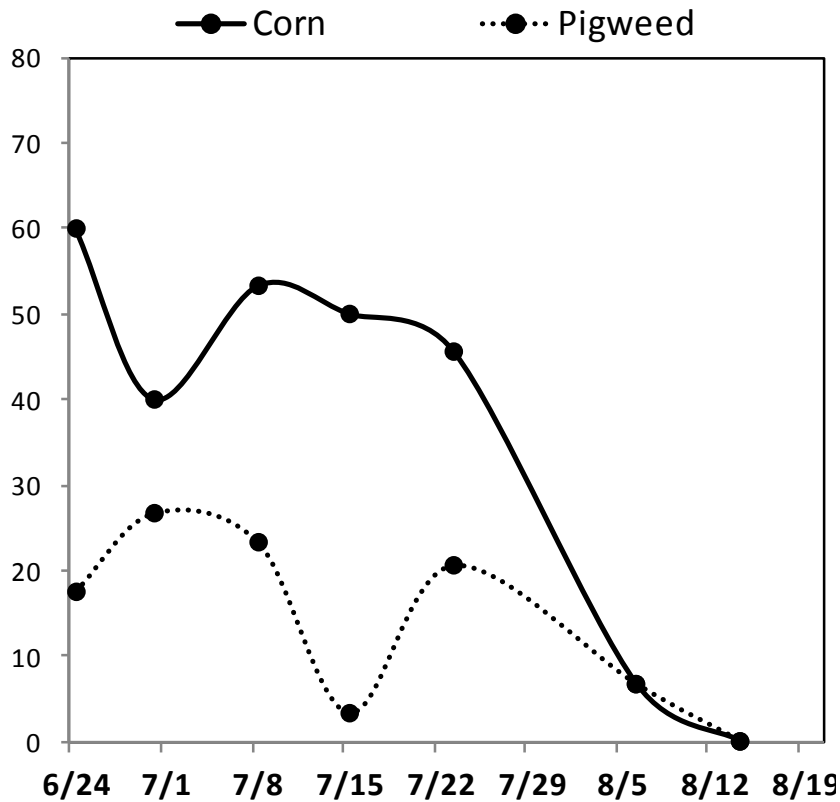


## Cotton >1 mile from corn

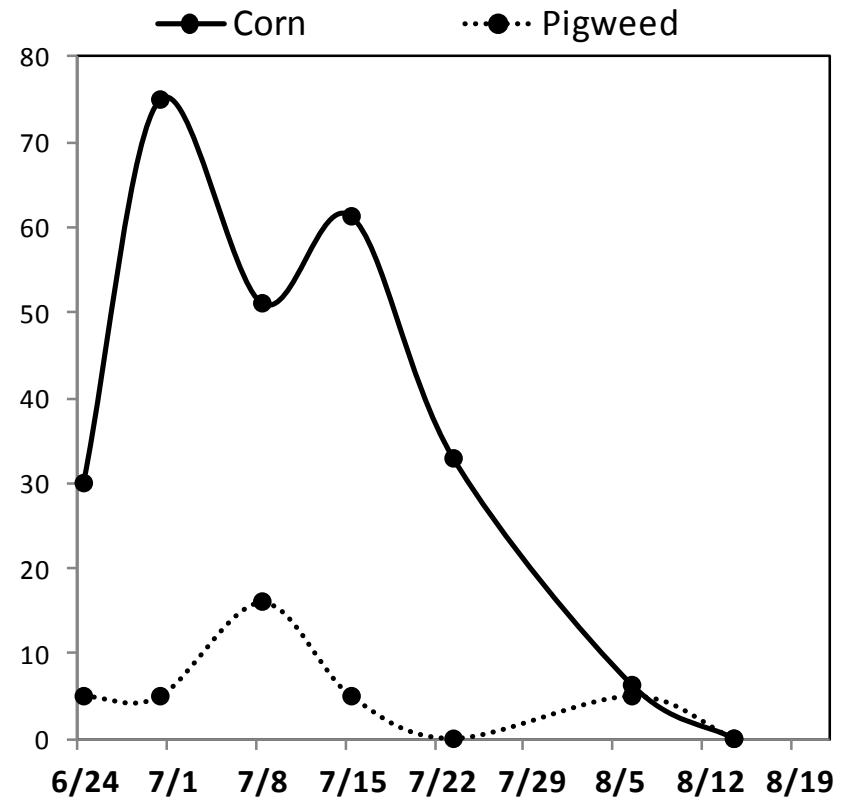


# TPB adults collected from cotton that developed as nymphs on either corn or pigweed in MS Delta during 2009

## Cotton adjacent to corn



## Cotton >1 mile from corn





# Summary

- The landscape may have major influence on populations of some insect pests in cotton
- Difficult to measure influence of the landscape
  - Other variables involved
  - Potential long-range movement of insects
  - Unknown source of insects in cotton
- Tarnished plant bug is a better candidate for local landscape management
  - Increased corn acreage has increased difficulty of management



