Wheat Residue Suppression of Soybean cyst nematode

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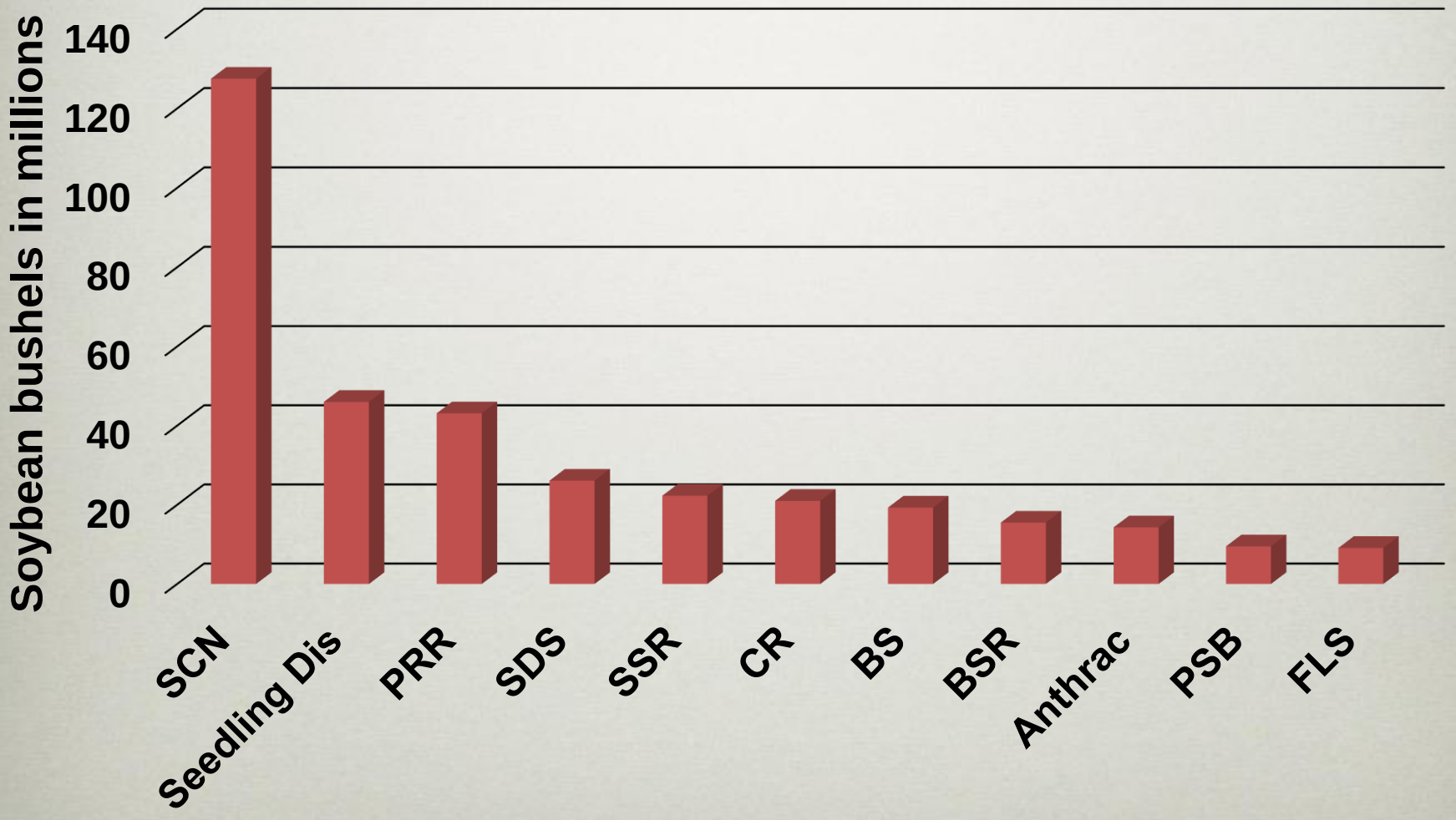
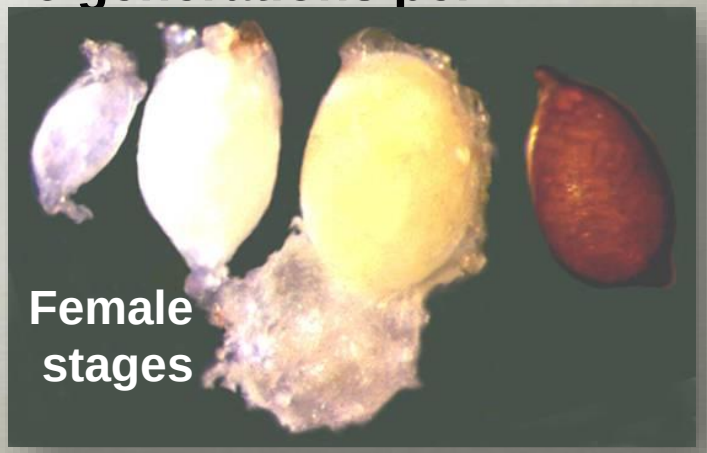
Impact of SCN on US Soybean Production



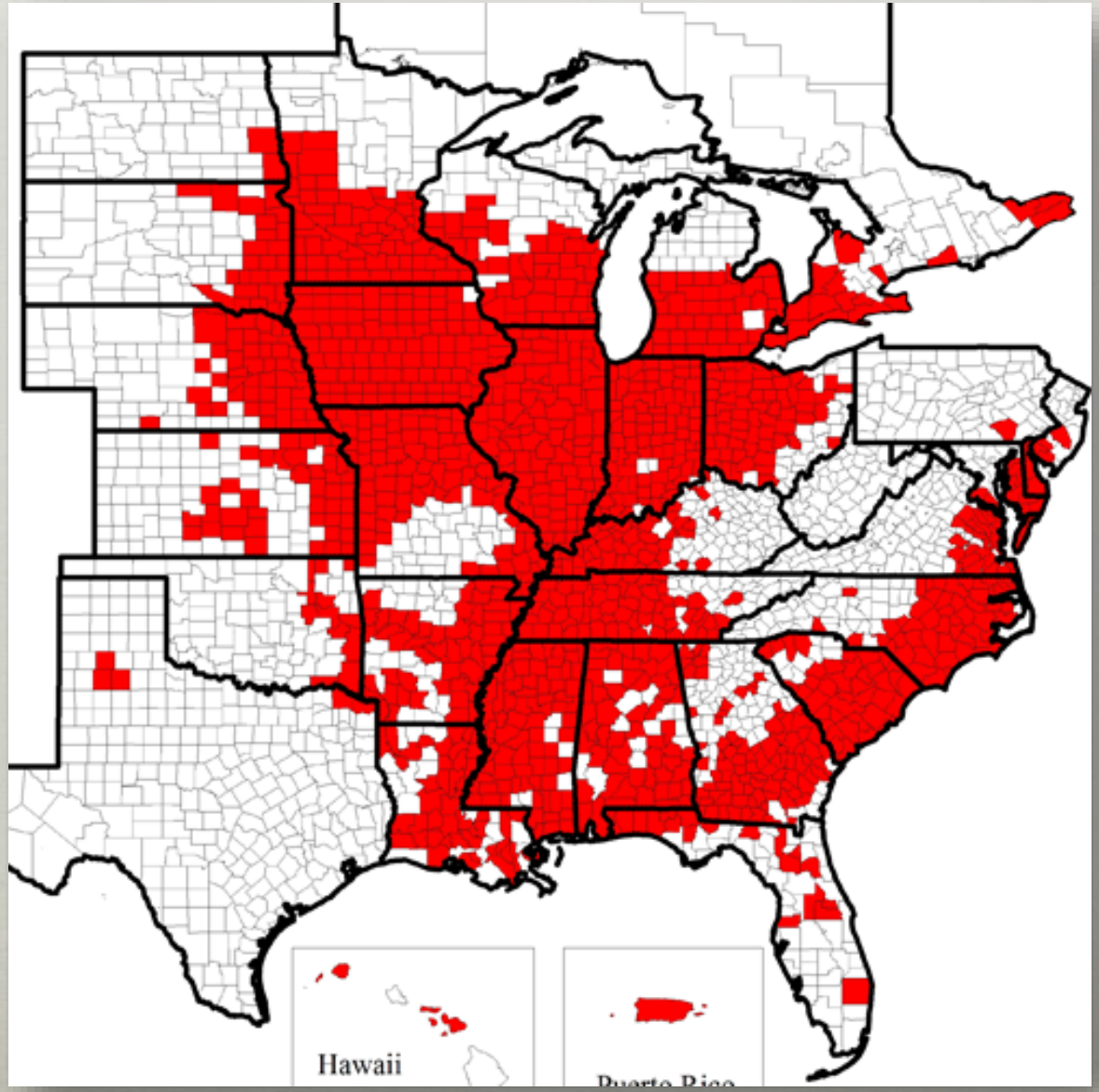
Koenning, S. R., & Wrather, J. A. (2010). Suppression of soybean yield potential in the continental United States by plant diseases from 2006 to 2009. *Plant Health Progress.*

Lifecycle - *Heterodera glycines*

- Males and females are produced in a 1:1 ratio.
- Juvenile stage hatches from egg, enters the root and establishes a feeding site.
- After the juvenile becomes an adult, males leave the root to fertilize the females that have protruded through the root.
- The female will swell upon maturity producing several hundred eggs outside and inside of her body. When she dies (4 wks. old) her body will become a protective cyst for her young.
- **Some eggs will hatch immediately, some later in the season, next year or years, or never.**
- **Typically SCN populations will have 4 - 6 generations per season**



Counties Infested with SCN



Current SCN Management

- Rotation with corn
  - Generally reduces the population density by half in the 1st year of corn,
  - 2nd and 3rd non-host years reduce SCN by less amounts
  - Usually better in the southern regions and less in the upper Midwest
- Rotation of SCN resistant varieties
  - Rotation of PI88788 resistant varieties
  - Differing sources of resistance?
    - Limited now and probably for years
- Cultural Practices
- Seed treatment options

COVER CROPS: IMPACT ON SCN

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Summary of 10+ years

- SCN populations are reduced by ~ 25% in cereal rye and ryegrass
- Soybean yield increased by 10–12 bu/A
- Soil physical and chemical properties are improved
  - Corn yield increased 15-18%, drought years 25–30%

Planting of cover crops

- Corn or soybean that precedes, need earlier maturity date
- Planting by Oct 1 for annual ryegrass and Oct 20 for cereal rye

Mike Plummer

Impact of wheat stubble on population densities of SCN

Effect of Wheat Residue and Tillage on *Heterodera glycines* and Yield of Doublecrop Soybean in Kentucky

D. E. Hershman and **P. R. Bachi,** Department of Plant Pathology, University of Kentucky, Princeton 42445

ABSTRACT

Hershman, D. E., and Bachi, P. R. 1995. Effect of wheat residue and tillage on *Heterodera glycines* and yield of doublecrop soybean in Kentucky. Plant Dis. 79:631-633.

in a field of Crider silt loam (3.6% sand, 80% silt, 16.4% clay, 3.2% organic matter, pH 7.3). The 1991 and 1992 studies were conducted in fields of Pembroke silt loam

- Tillage did not impact SCN
- SCN egg counts were reduced by half in plots with wheat residue compared to non-wheat residue plots
  - Differences were detected in the counts taken after soybean harvest

Impact of wheat stubble on population densities of SCN

D. Davidson, J. Bailey, T. Wyciskalla, D. Blouin, and J. Bond

ILLINOIS SOYBEAN ASSOCIATION

PRODUCING RESULTS

Wyciskalla Consulting

Soil Sampling & Precision Ag Mgt

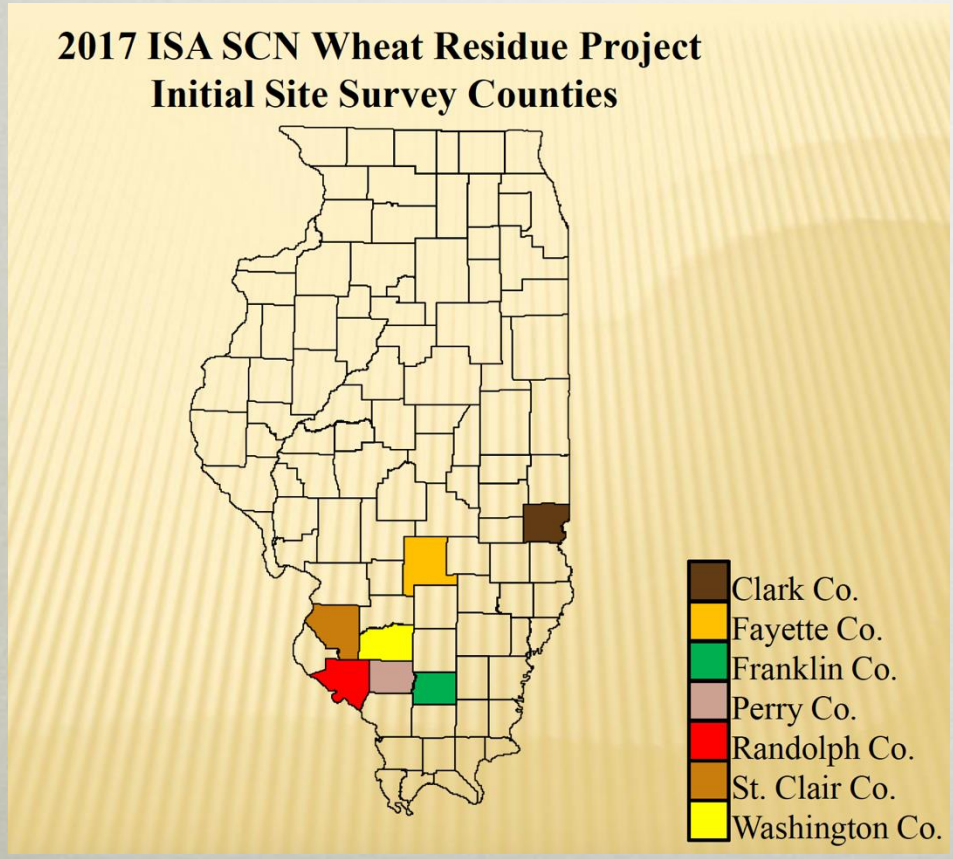
618-314-0578

JCB Ag Research

John Bailey

Effingham, Illinois

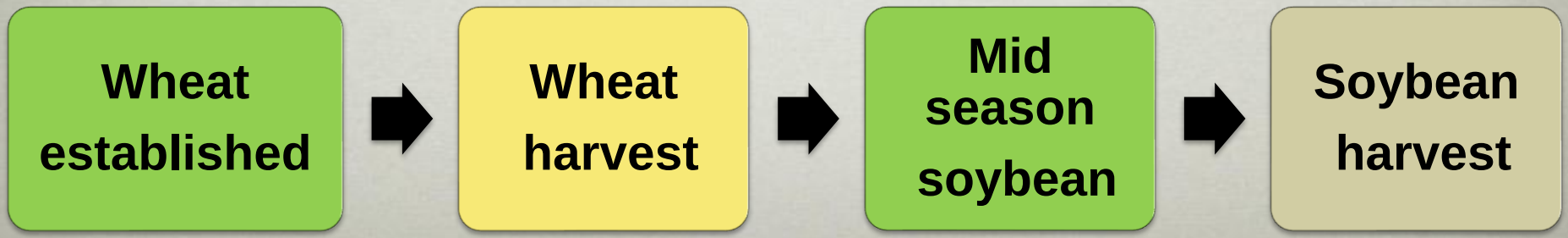
Illinois Soybean Association Survey October 2017



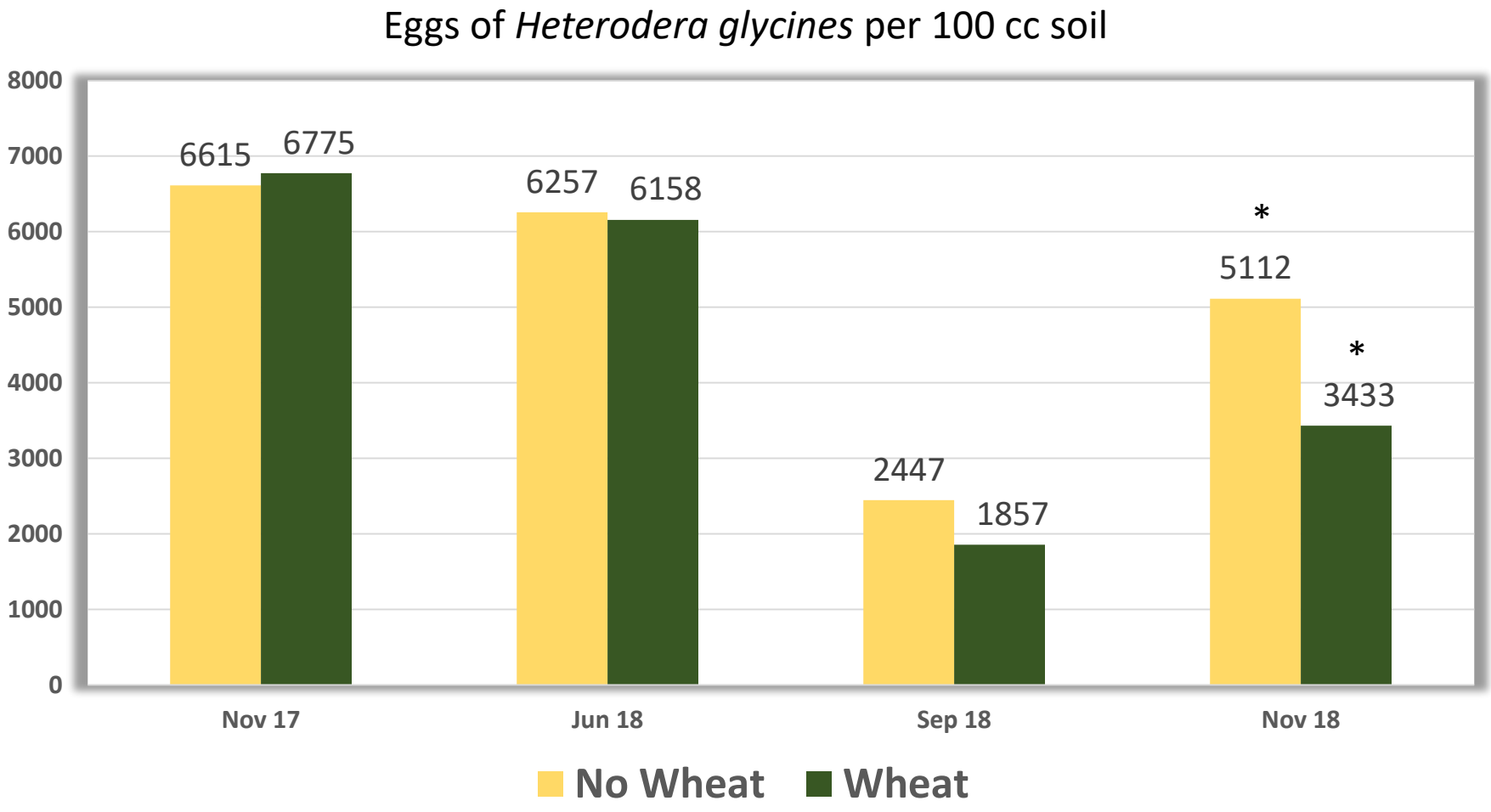
County	SCN eggs/100cc
Randolph	0
Clark	120
Franklin	120
Perry	160
Perry	160
Clark	200
St. Clair	520
Fayette	600
Washington	2,120
Fayette	2,200
Washington	3,160
Perry	3,510
Franklin	4,640
Washington	7,080
Fayette	7,160
Washington	8,280
Washington	9,720
Washington	12,320
Washington	12,640
Washington	16,800
Perry	18,030
Randolph	37,600

Impact of Wheat On SCN

- Nine locations selected with varying SCN infestation levels
  - high > 6,500 eggs/100 cc soil
  - moderate 2,000 – 4,500 eggs/100 cc soil
  - low < 1,500 eggs/100 cc soil
- Wheat and no wheat strips were established (30’ x 200’) with 3 replications at each site
- SCN egg counts determined at

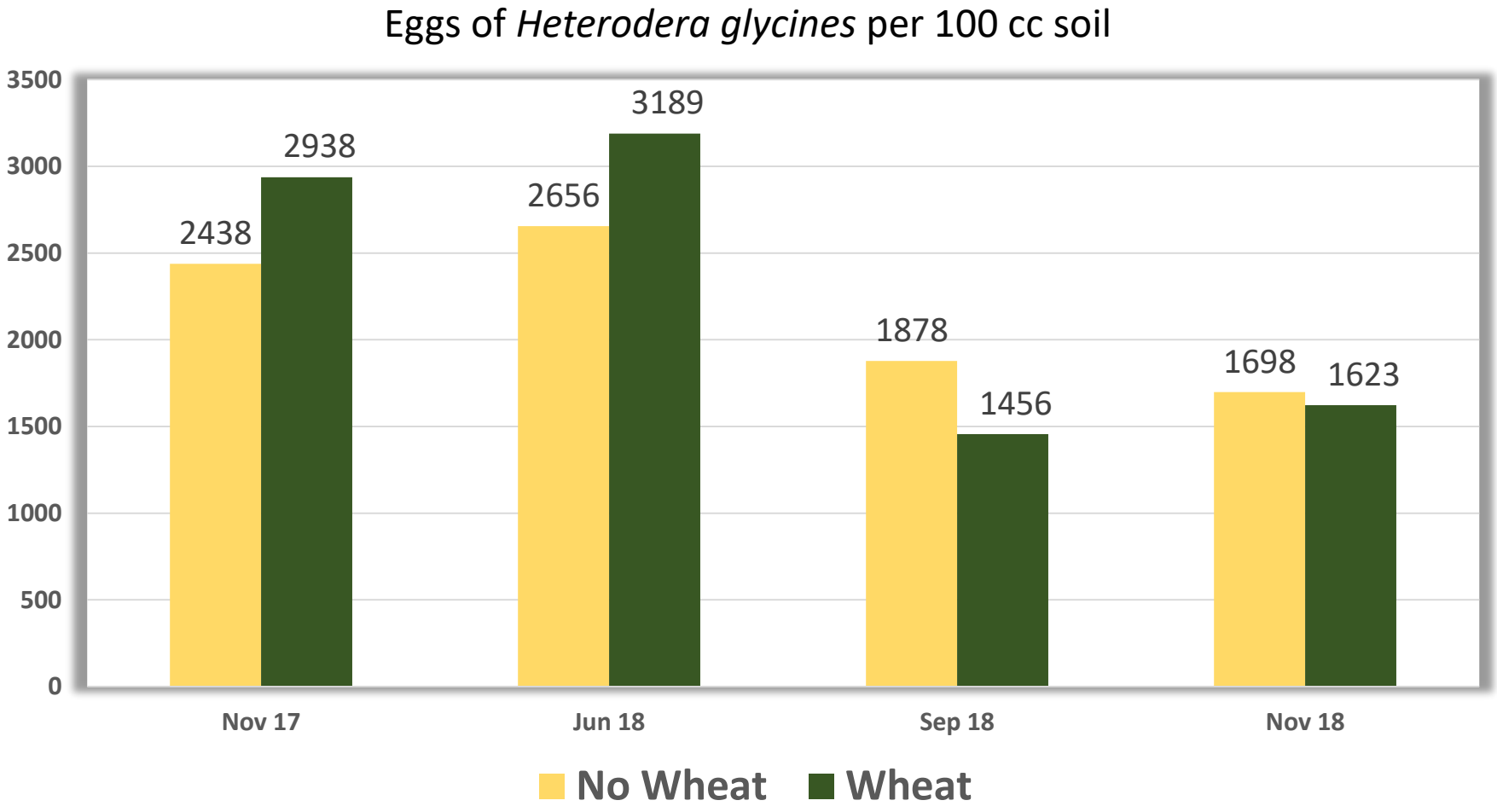


Highly Infested Locations



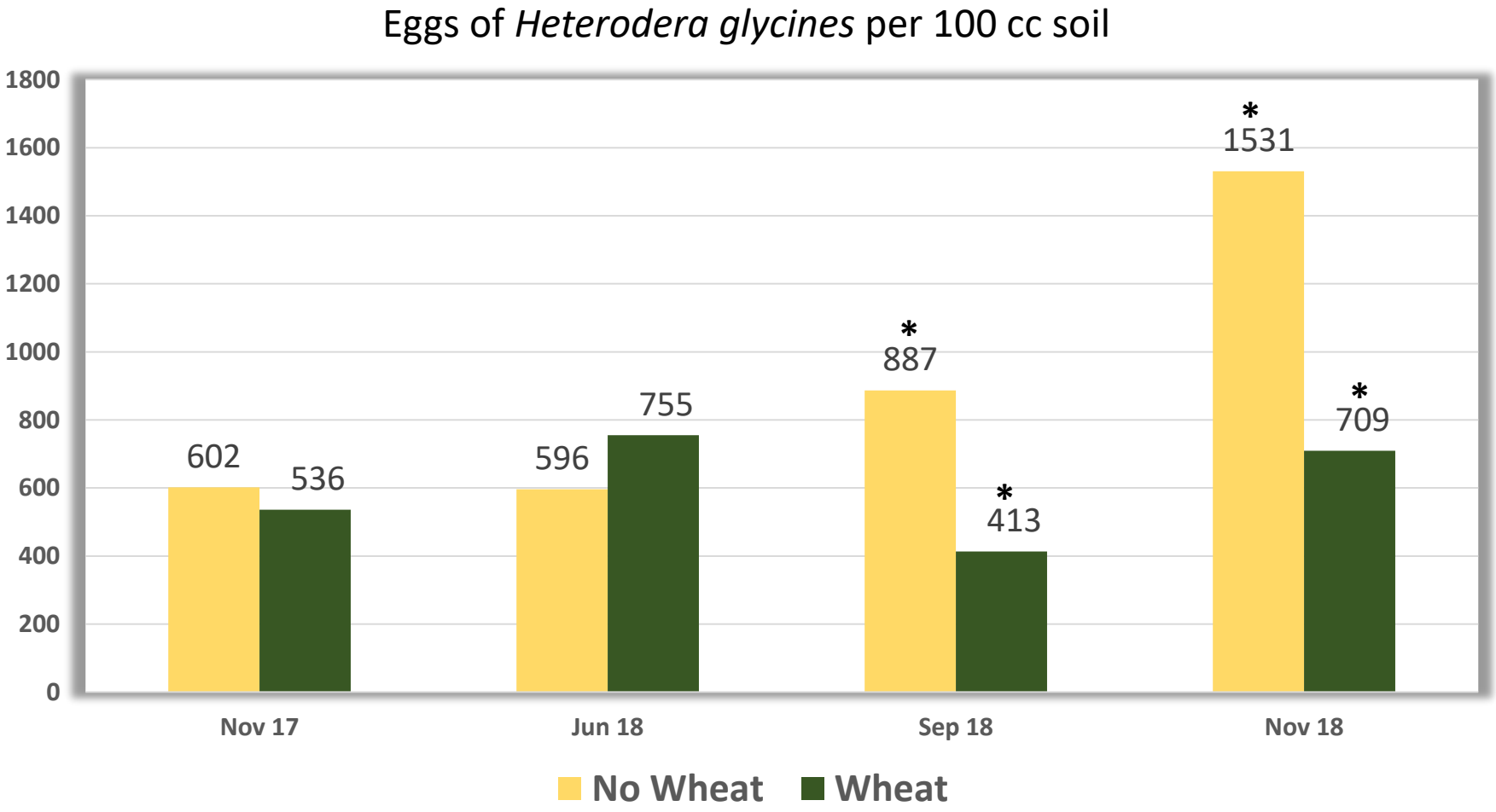
* Denotes significant differences between No Wheat and Wheat Treatments at $P < 0.05$

Moderately Infested Locations



No significant differences between No Wheat and Wheat Treatments at $P < 0.05$

Low SCN Locations



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What is causing the impact on SCN?

Is this factor exploitable?

How are the nematicidal effects of this factor affected by other management practices?

Is the impact on SCN populations caused by potential biological control agents?

Next steps -

- Use metagenomics techniques to determine if the impact on SCN populations correlates with changes in the microbial profile of the soil
- Identify soil microbial fingerprints reflective of suppressiveness to SCN
- Isolate and characterize potential biocontrol agents with nematicidal activity

Thank you!

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Questions?
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