Pea Leaf Weevil Update

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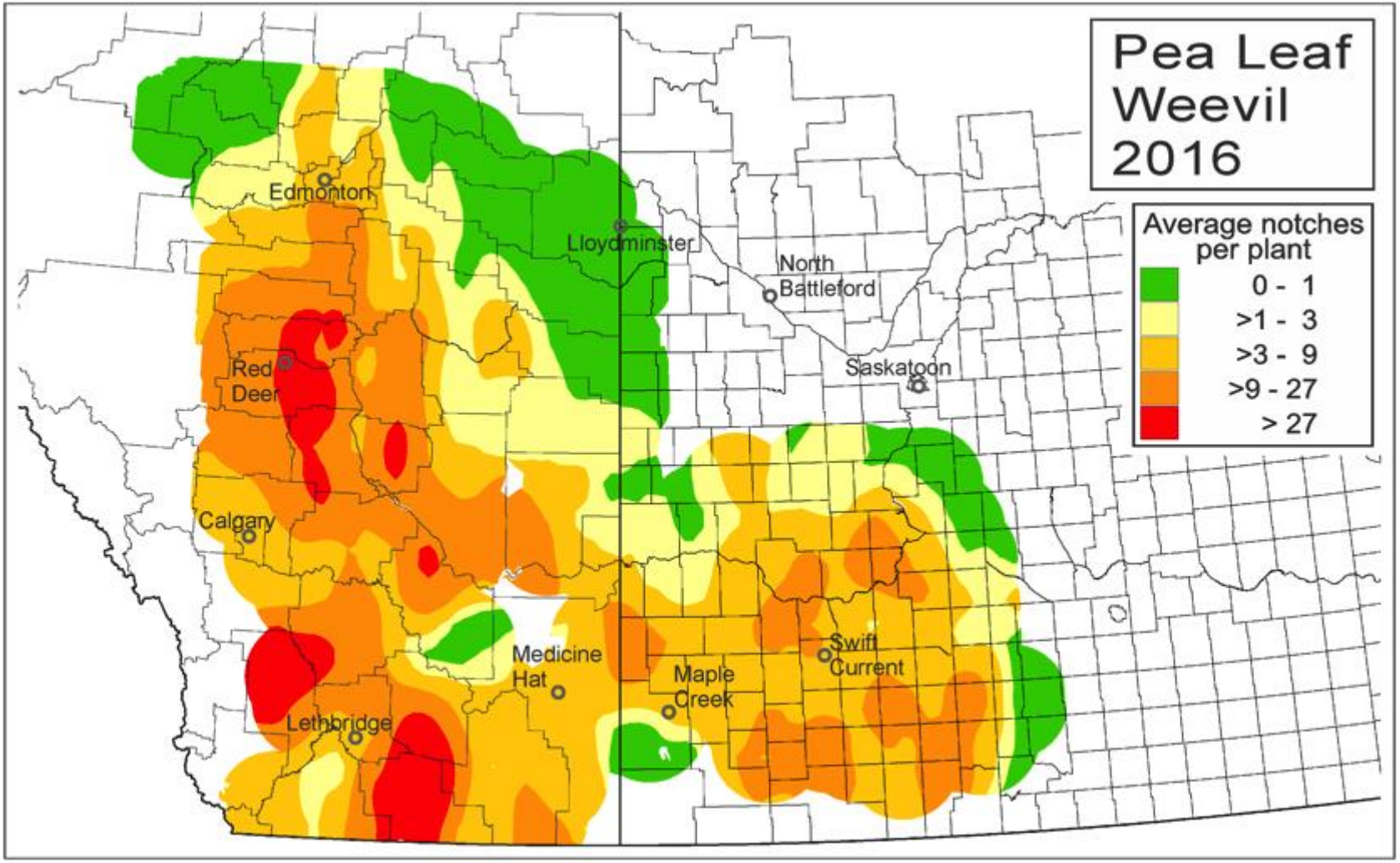
Outline

1. Distribution
2. Biology and Impact
3. Management
4. Ongoing Work

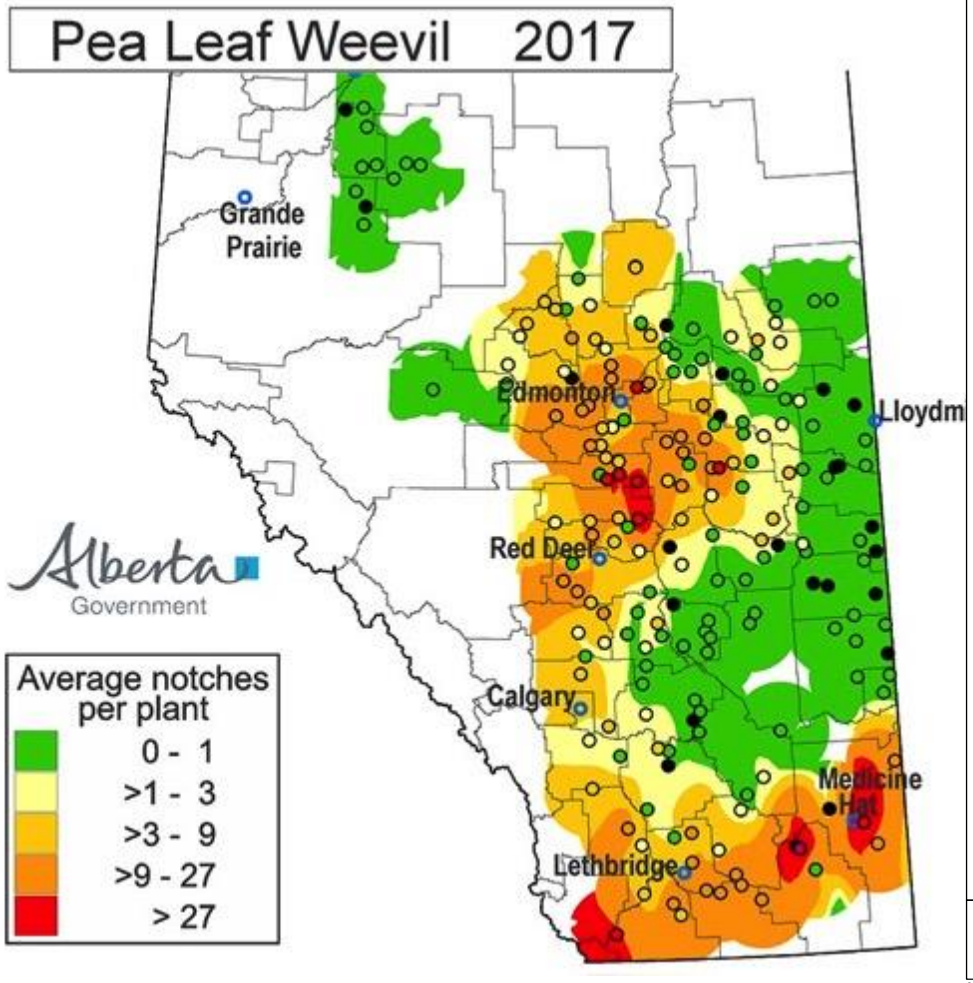
Image: Shelley Barkley, Alberta Agriculture and Forestry

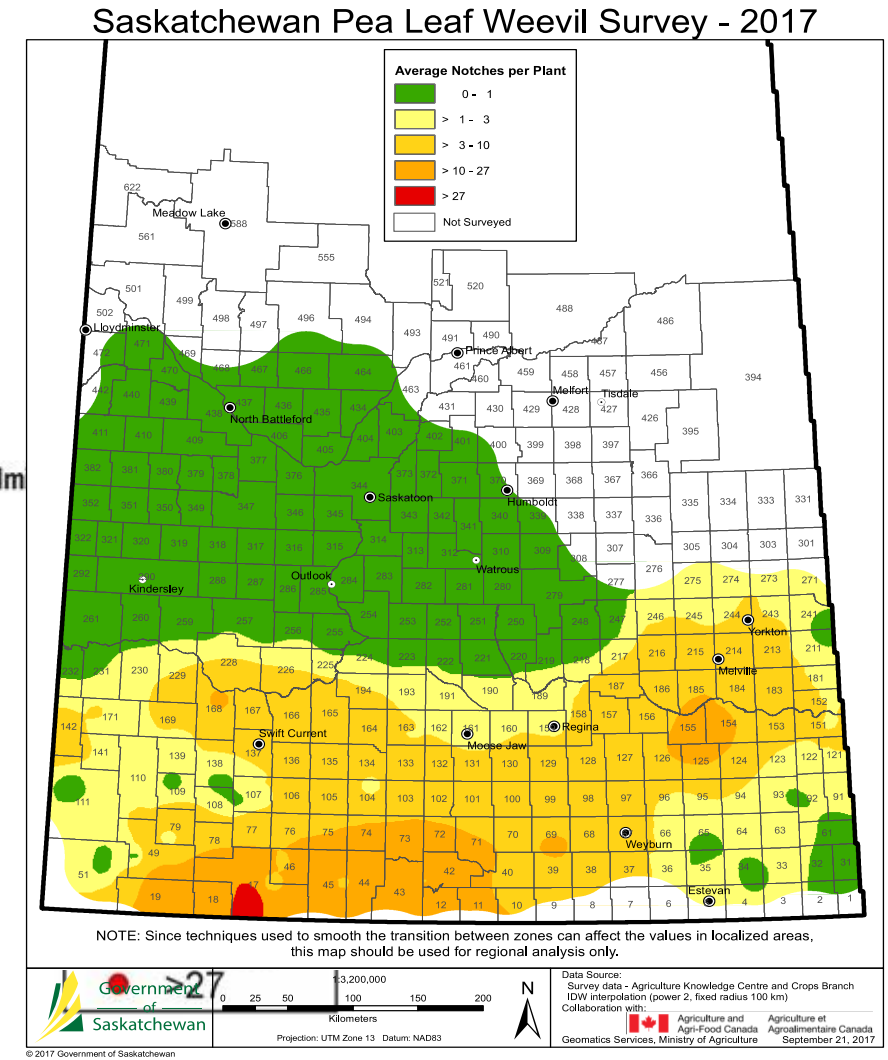
1. Distribution: Spring 2016



(Vankosky et al. 2016)

1. Distribution: Spring 2017





(Alberta Agriculture and Forestry 2017; Government of Saskatchewan 2017)

1. Distribution: Surveys

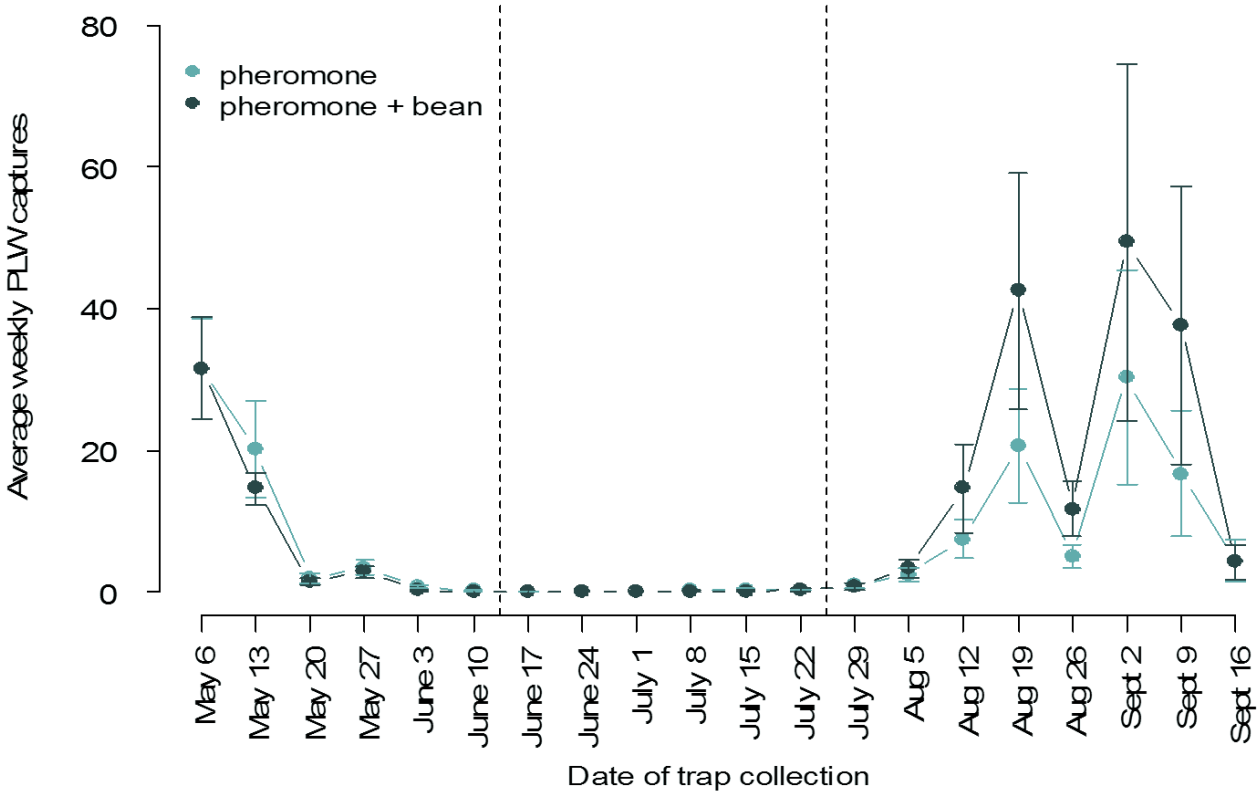
- Driving survey of randomly selected pea fields in May-June

- Pheromone-based survey and monitoring
  - Dr. Maya Evenden in AB and Dr. Vankosky in SK

Images: M. Vankosky and E. Willenborg

1. Distribution: Pheromone Monitoring

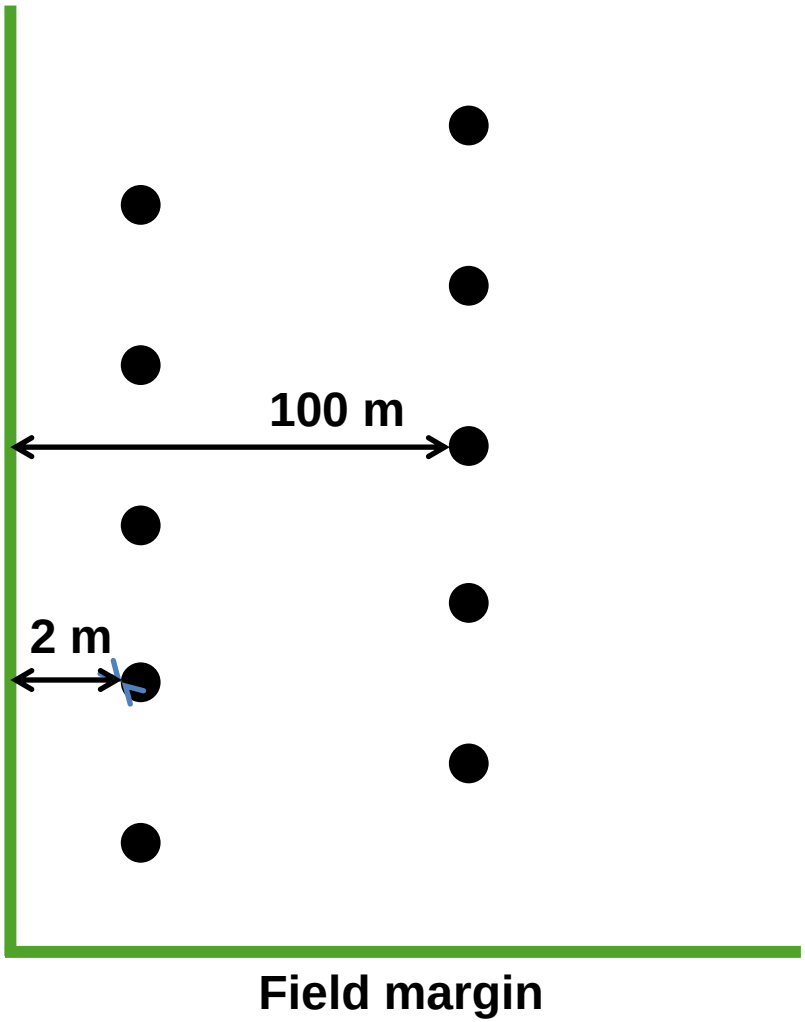
- Attractive to males and females
- Attractive in **Spring** and **Fall**



(St. Onge 2016)

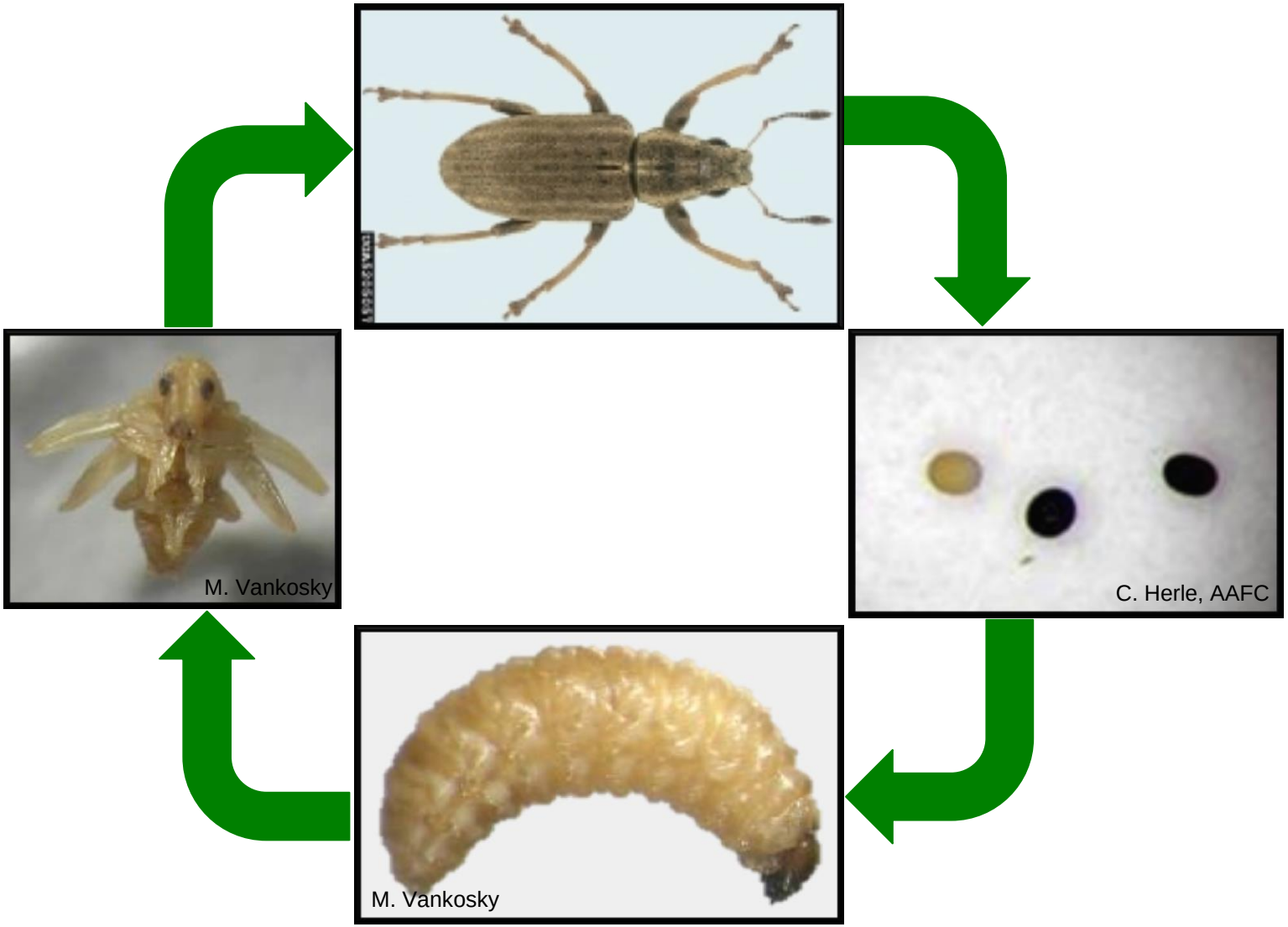
1. Distribution: Scouting

- 3rd – 6th node stage
- 10 locations in field
- 10 seedlings per location
- Look for terminal leaf damage



(prairiepestmonitoring.blogspot.ca)

2. Biology and Impact



Adult image: Natasha Wright, Cook's Pest Control, bugwood.org

2. Biology and Impact

- Primary hosts:
  - Field pea (*Pisum sativum*)
  - Faba bean (*Vicia faba*)

- Secondary hosts:
  - Other legumes
  - **Do not support larval development**

2. Biology and Impact

Adult foliar damage:

- May kill seedlings
- Reduces pod production
- Cumulative foliar damage = 28% yield loss

(Jackson 1920; Nielsen 1990)

2. Biology and Impact

Larval damage:

- Consumption of *Rhizobium leguminosarum* bacteria in root nodules
- 98% nodule loss = 27% yield loss
- ↑ nodule loss = ↓ nitrogen from fixation

(El-Dessouki 1971; Corre-Hellou and Crozat 2005)

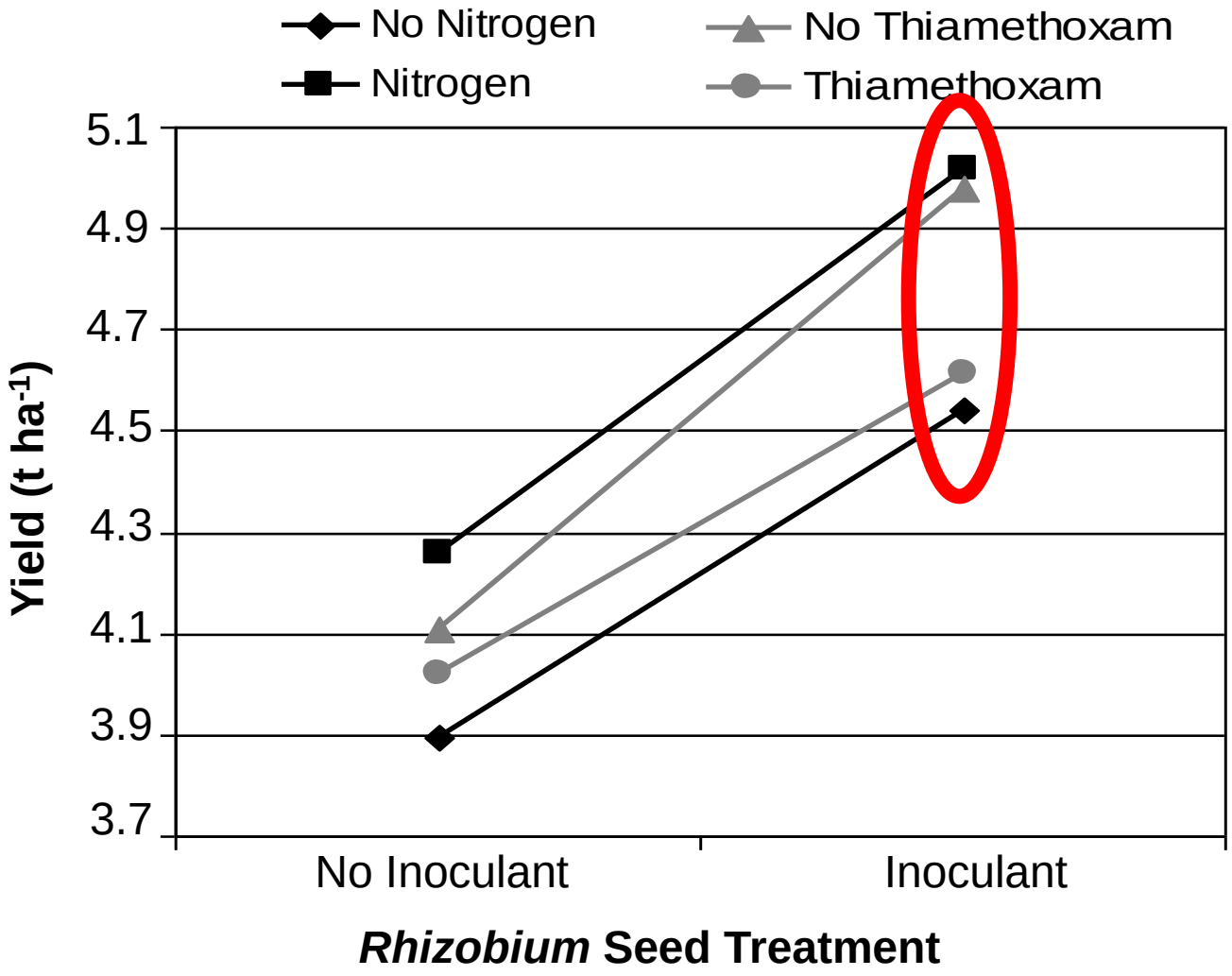
3a. Cultural Control

- Rotate crops
- Plant in high N soil
- Plant in no-till fields

	Colonization	Adult Emergence
Conventional Till	**18 plw m^{-2}**	**32 plw m^{-2}**
No-Till	**16 plw m^{-2}**	**13 plw m^{-2}**

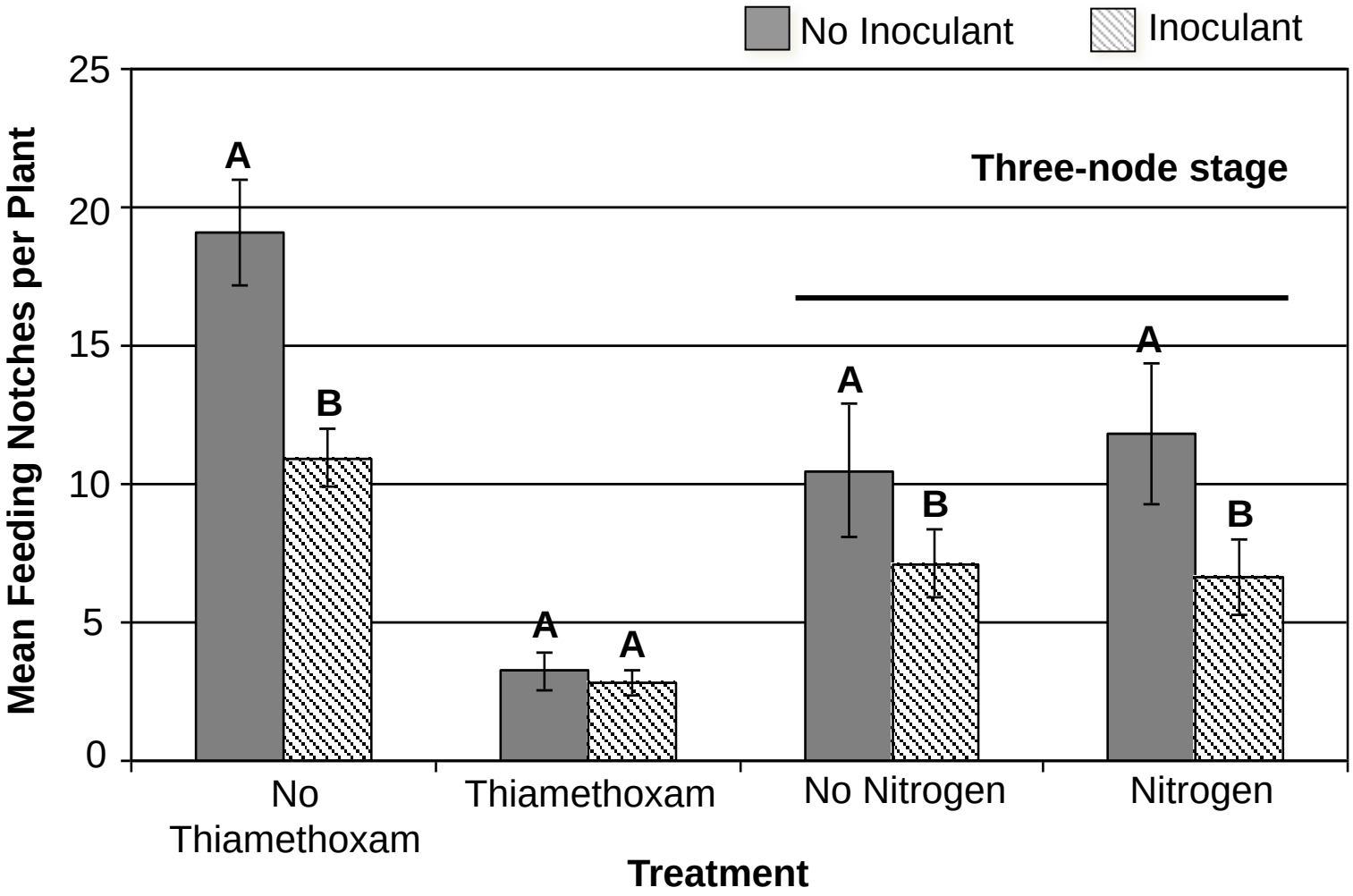
(Data in table from: Hanavan et al. 2008, 2010)

3a. Cultural Control: Inoculation



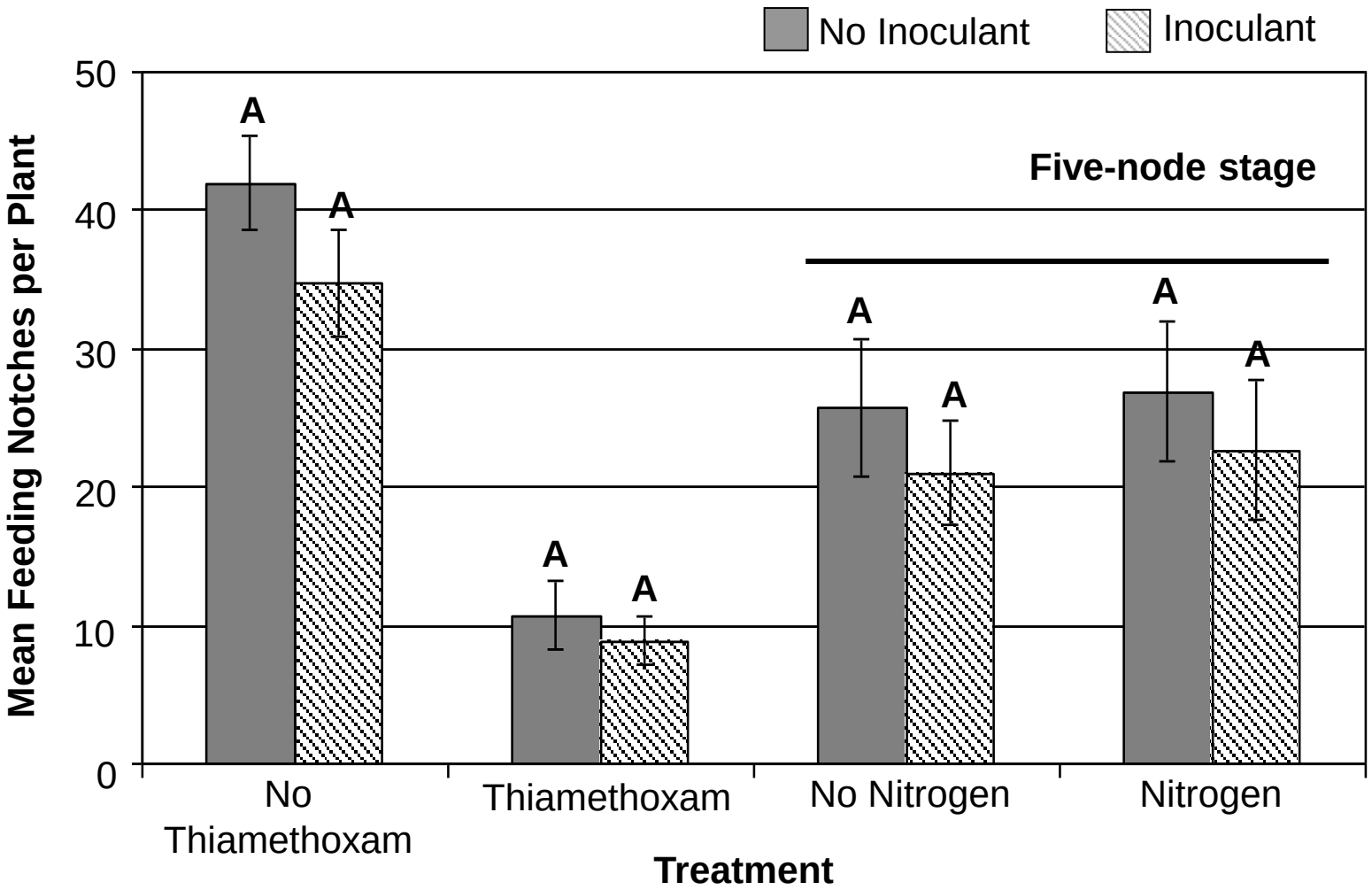
Rhizobium: $p = 0.0039$; Nitrogen: $p = 0.0405$ (Vankosky et al. 2011)

3b. Chemical Control in AB



***Rhizobium* inoculant: *p* = 0.0007; Thiamethoxam: *p* < 0.0001 (Vankosky *et al.* 2011)**

3b. Chemical Control in AB



Thiamethoxam: *p* < 0.0001 (Vankosky *et al.* 2011)

3b. Chemical Control in SK

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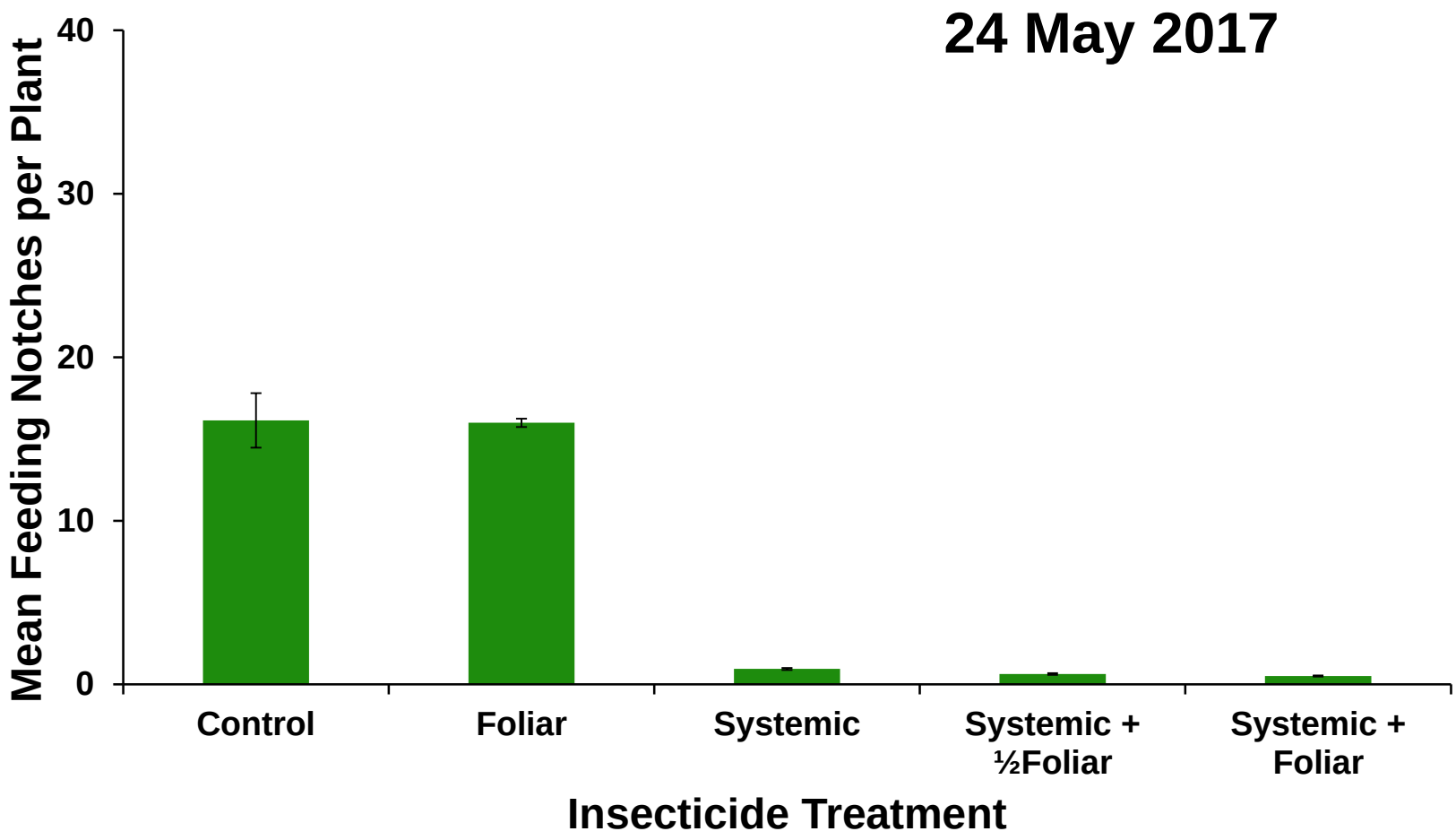
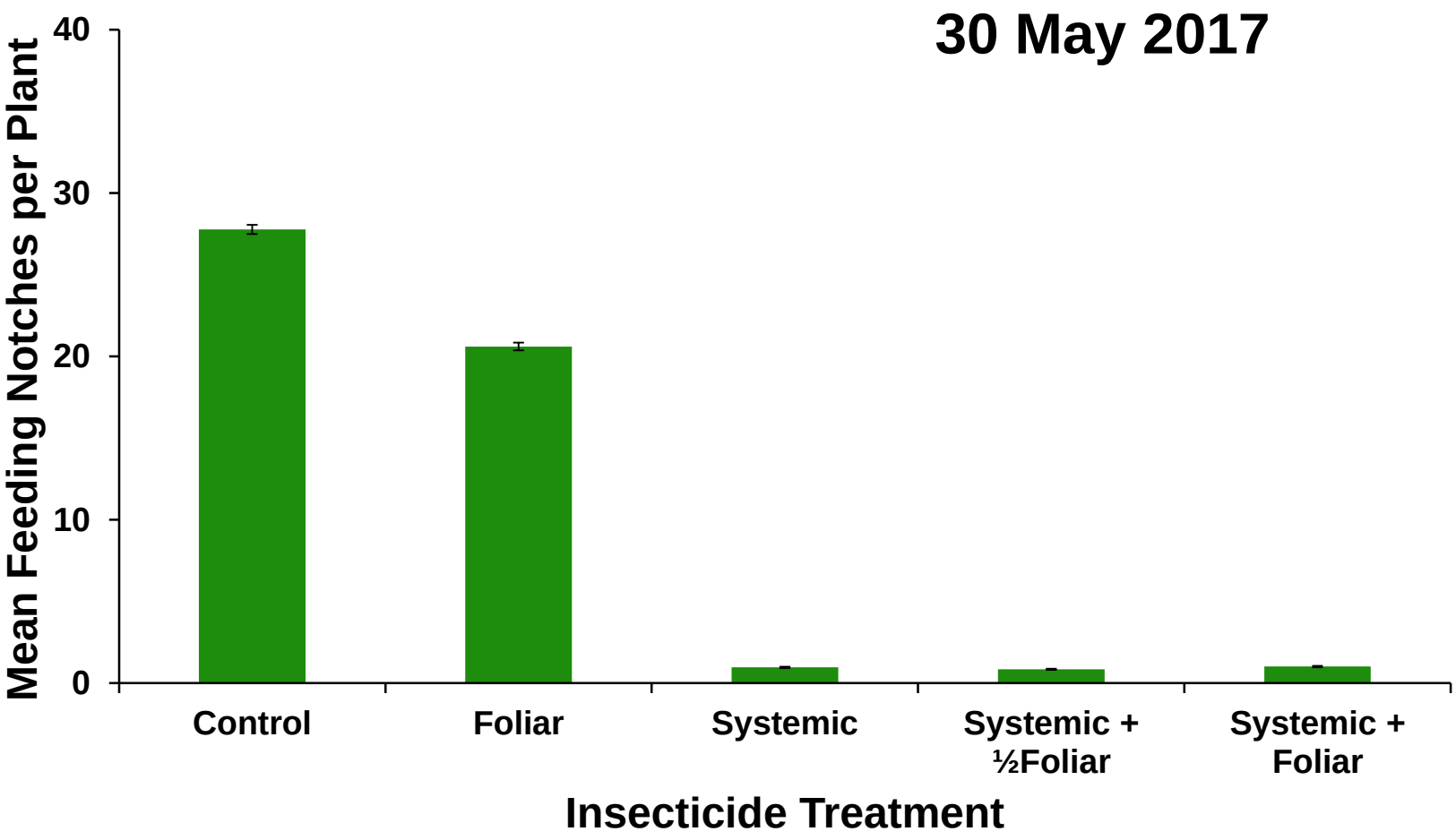


(Vankosky et al. 2017; preliminary data)

3b. Chemical Control in SK



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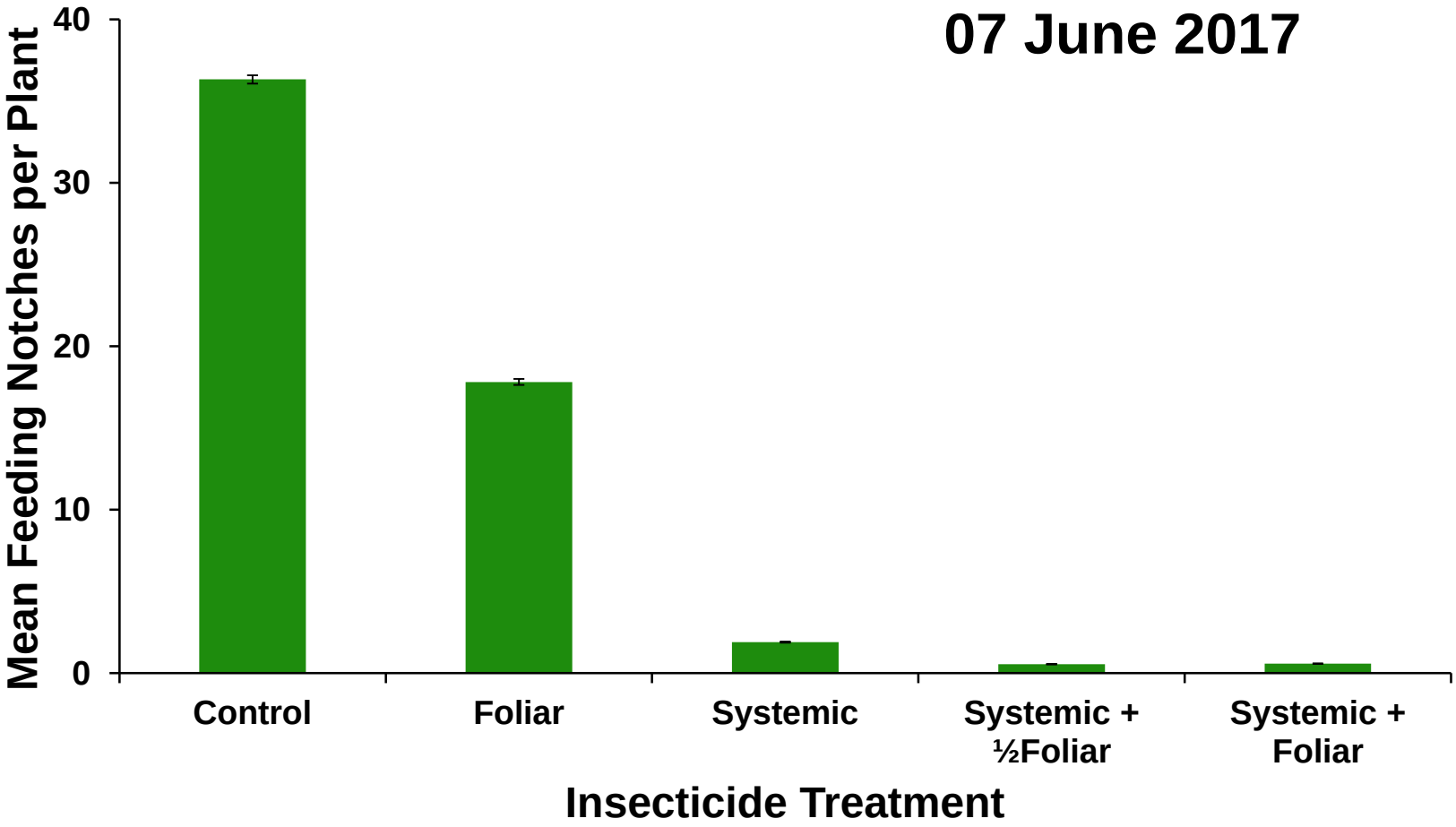
3b. Chemical Control in SK



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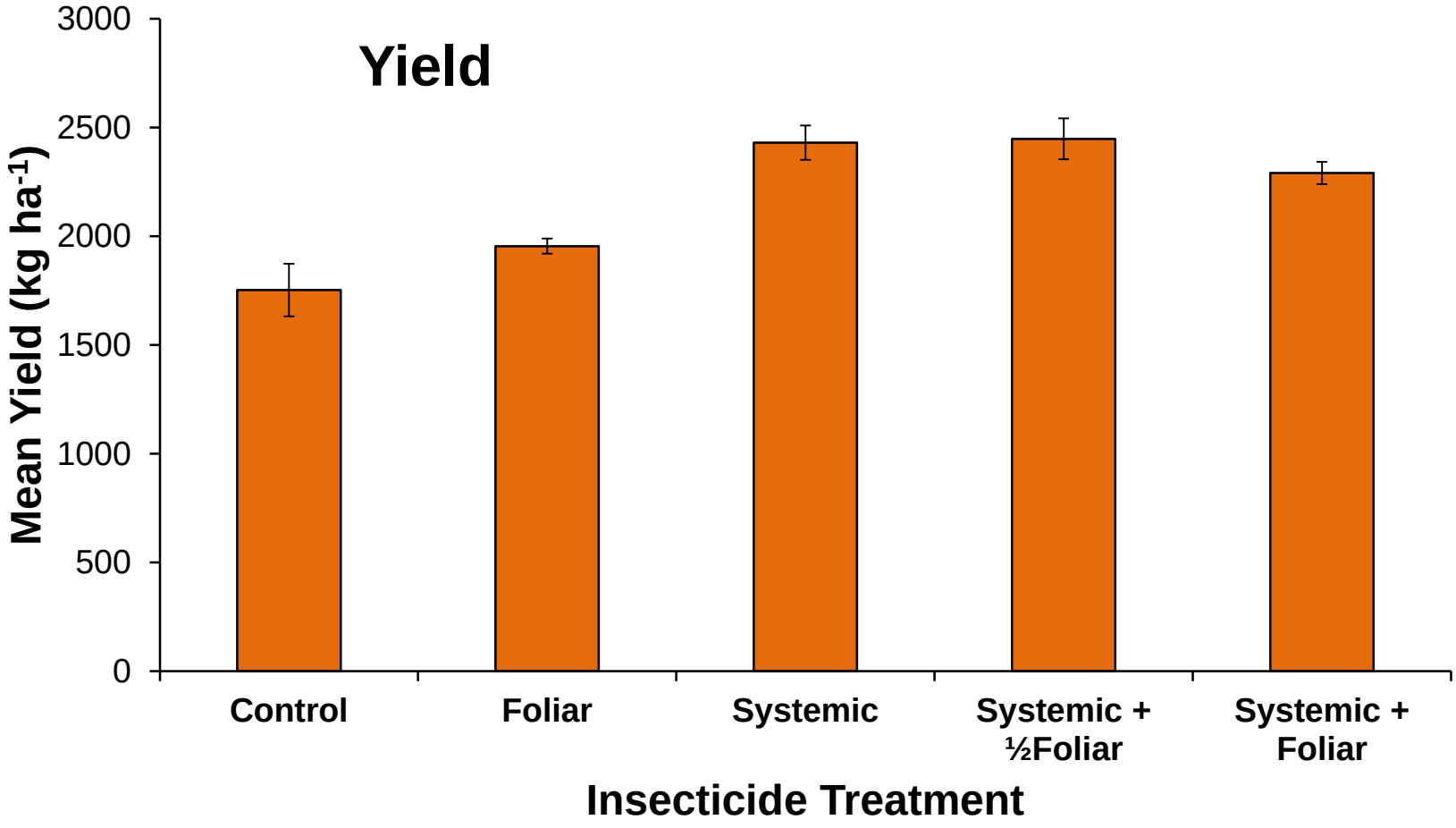
3b. Chemical Control in SK



(Vankosky et al. 2017; preliminary data)

3b. Chemical and Cultural Synergy

	Rhizobium	*Rhizobium* + Thiamethoxam
Total Nodules*	25.08 ± 2.80	35.22 ± 4.99
Tumescent Nodules**	10.00 ± 1.63	23.70 ± 4.00
Leghaemoglobin ** Expression	19.45 ± 2.48	30.26 ± 4.31
Damaged Nodules	16.83 ± 3.98	17.77 ± 5.73

*$p < 0.01$
**$p < 0.001$

(Vankosky et al. 2011)

3c. Biological Control

- Small ground beetles can eat PLW eggs
- Large ground beetles are reported predators of adults and larvae
- No parasitoids reported in Canada yet

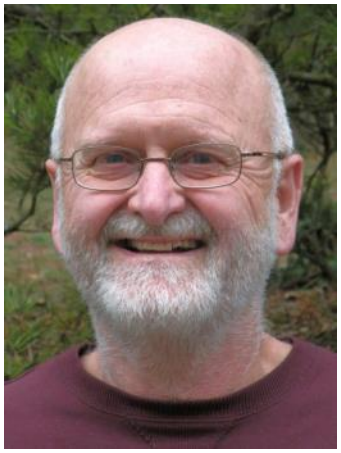
(Hamon et al. 1990; Vankosky et al. 2011)

4. Ongoing Work

- Overwintering biology
- Survey of distribution and range expansion
- Pheromone-based monitoring
- Role of insecticides and nitrogen
- Impacts on faba bean
- Trap crops
- Population forecasts
- Biological control

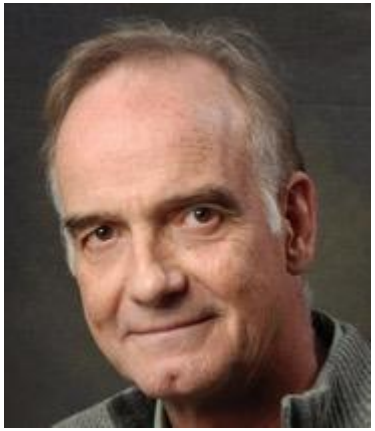
4. Ongoing Work

- It takes a team:









Owen Olfert
Scott Meers
Asha Wijerathna
Hector Carcamo
Yantai Gan
Maya Evenden
Scott Hartley…
and others

Acknowledgments

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Thank You

Image: Shelley Barkley, Alberta Agriculture and Forestry

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