



Agriculture and  
Agri-Food Canada

Agriculture et  
Agroalimentaire Canada

## PEI Potato Growers Meeting: March 28, 2017



# Wireworm and Click Beetle IPM Studies in BC and PEI.

*Dr. Robert S. Vernon, Dr. Wim van Herk, Nicholas Ens,  
Amber Beaton and Melissa Richardson  
Agassiz Research & Development Centre, AAFC*



Growing Forward **2** 

Canada 

# Wireworm Topics

Wireworm and  
Click Beetle  
Biology

Control

Wireworms

Click Beetles

Potatoes

Monitoring

IPM

Cereals

Spray Trials

# Setting the stage:

-Wireworms:

-several economic species in  
Canada (> 20)



# Surveys: 2004-2016

## Identification of economic wireworms across Canada:

Wim van Herk  
Bob Vernon  
Christine Noronha

# Identification + distribution (summary)

- Main pest species today

- **BC**

- *Agriotes obscurus*
- *Agriotes lineatus*
- *Limonius canus*
- *L. californicus*

- **Prairies**

- *Hypnoidus bicolor*
- *Selatosomus destructor*
- *Limonius californicus*
- *Agriotes mancus*

- **Ontario**

- *Hypnoidus abbreviatus*
- *Limonius agonus*
- *Melanotus* spp.
- *Agriotes mancus*

- **Quebec**

- *Hypnoidus abbreviatus*
- *Limonius aeger*
- *M. communis/fissilis*
- *Dalopius vagus*
- *Agriotes mancus*

- **Atlantic Canada (PEI)**

- *Agriotes obscurus*
- *Agriotes lineatus*
- *Agriotes sputator*
- *Hypnoidus abbreviatus*
- *Limonius aeger*
- *Melanotus similis*
- *Sylvanelater cylindriciformis*
- *Agriotes mancus*

# Setting the stage:

## -Wireworms:

- A field may have one or **MULTIPLE** species

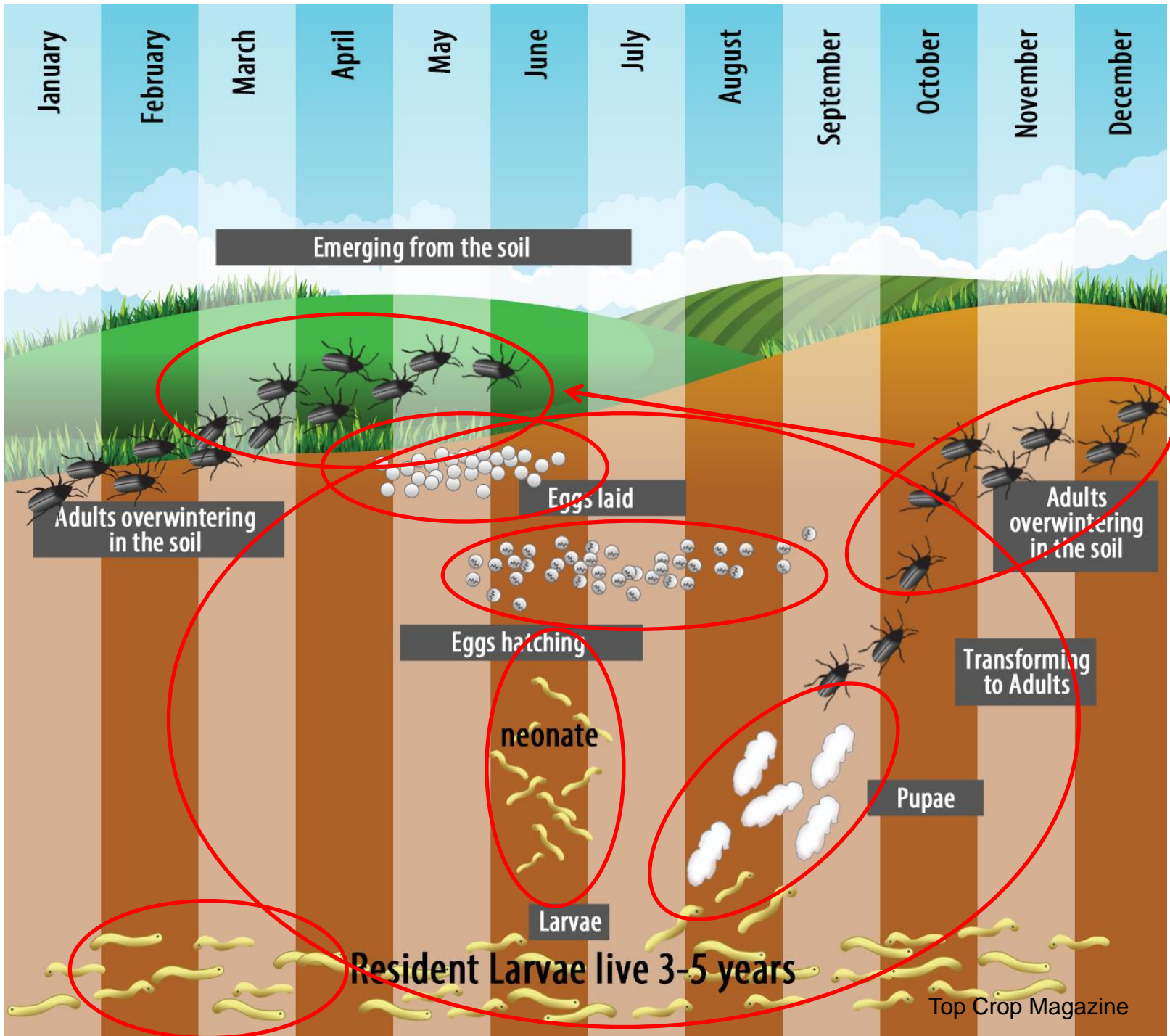
- Common combo in PEI:

  - Agriotes sputator* and  
*Hypnoidus abbreviatus*

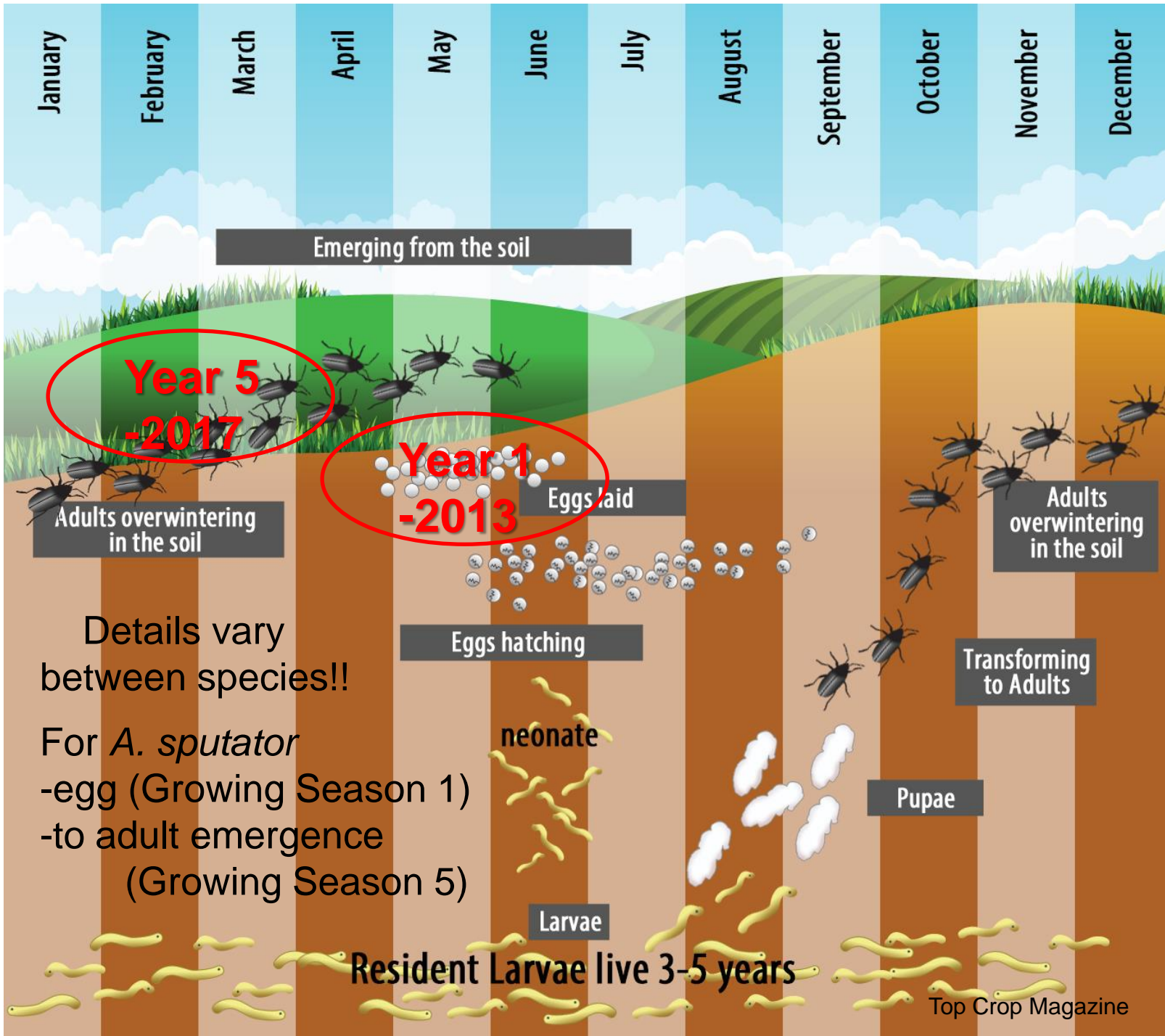


# Life Cycle









January

February

March

April

May

June

July

August

September

October

November

December

Emerging from the soil

**Year 5  
-2017**

**Year 1  
-2013**

Adults overwintering in the soil

Eggs laid

Adults overwintering in the soil

Details vary between species!!

Eggs hatching

Transforming to Adults

For *A. sputator*  
-egg (Growing Season 1)  
-to adult emergence  
(Growing Season 5)

neonate

Pupae

Larvae

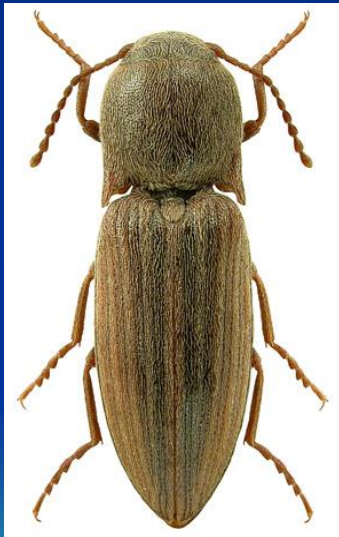
Resident Larvae live 3-5 years

Top Crop Magazine

# Click Beetle Research

## ➤ European click beetles in Canada

- Agriotes lineatus*. BC, Atlantic Canada
- Agriotes obscurus*. BC, Atlantic Canada
- Agriotes sputator*. Atlantic Canada



*Agriotes lineatus*



*Agriotes obscurus*



*Agriotes sputator*

➤ European click beetles **have pheromones!!!**

-*Agriotes lineatus*. BC, Atlantic Canada

-*Agriotes obscurus*. BC, Atlantic Canada

-*Agriotes sputator*. Atlantic Canada



*Agriotes lineatus*



*Agriotes obscurus*



*Agriotes sputator*

# Click Beetle Studies

# Click Beetle Trapping

Vernon Beetle Trap



Established in 1999



Traps manufactured by Contech Enterprises Inc. Delta BC

## Click Beetle Studies

## Click Beetle Trapping



Contech went out of business in 2014, so traps and lures no longer available.

A new trap design was needed for BC and possibly PEI.

# Desireable characteristics of a new IPM trap:

## 1) Highly effective and consistent catch.

- General surveys
- Monitoring in IPM programs
- Mass trapping
- Biological studies

## 2) Can be easily used by.

- Growers
- Ag. Professionals
- Scientists.

## 3) Inexpensive



- 4) Easy and fast to assemble, install and inspect.
- 5) Durable for several years of field use.
- 6) Easily portable and storable.
- 7) Rodent proof, water proof.



Click Beetle  
Studies

Click Beetle  
Trapping



Vernon Pitfall Trap™



1-a

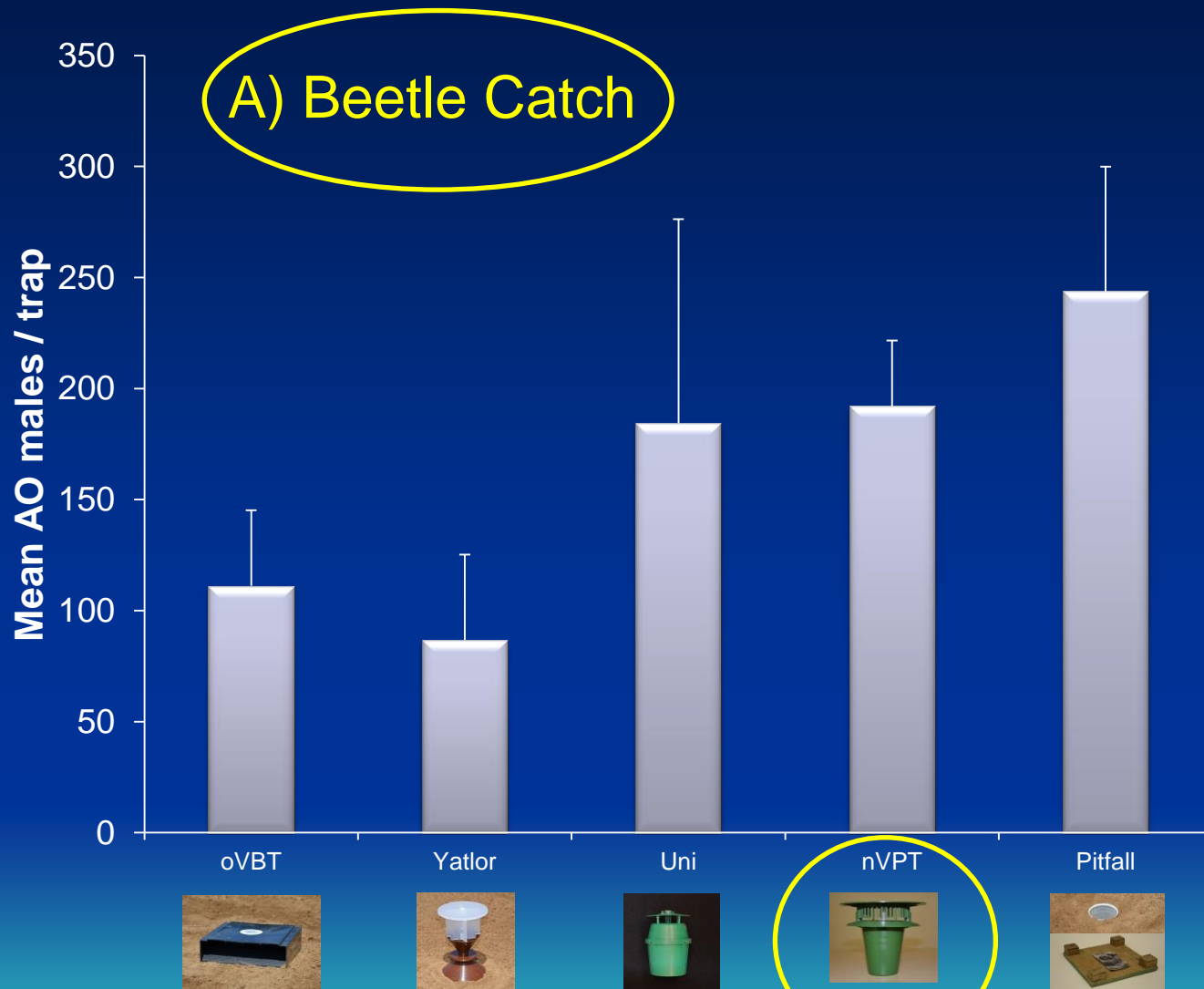


Yator  
Funnel

1-b



# *A. obscurus* Beetle Trap Comparison Study, 2016: Agassiz, BC



A top-down view of a green, ribbed plastic trap. The trap is circular and has two small, cylindrical openings on its rim. In the center of the trap is a clear plastic bucket filled with a large number of dark, brownish-black beetles. The trap is set on a patch of reddish-brown soil with some dry pine needles scattered around.

7000 *A. sputator* in  
1 trap in PEI in 5 days!!!

900,000 *A. sputator* beetles  
caught in 3 fields in PEI in 2015!!!

**A. *obscurus* Beetle Trap Comparison Study, 2015: Agassiz, BC**

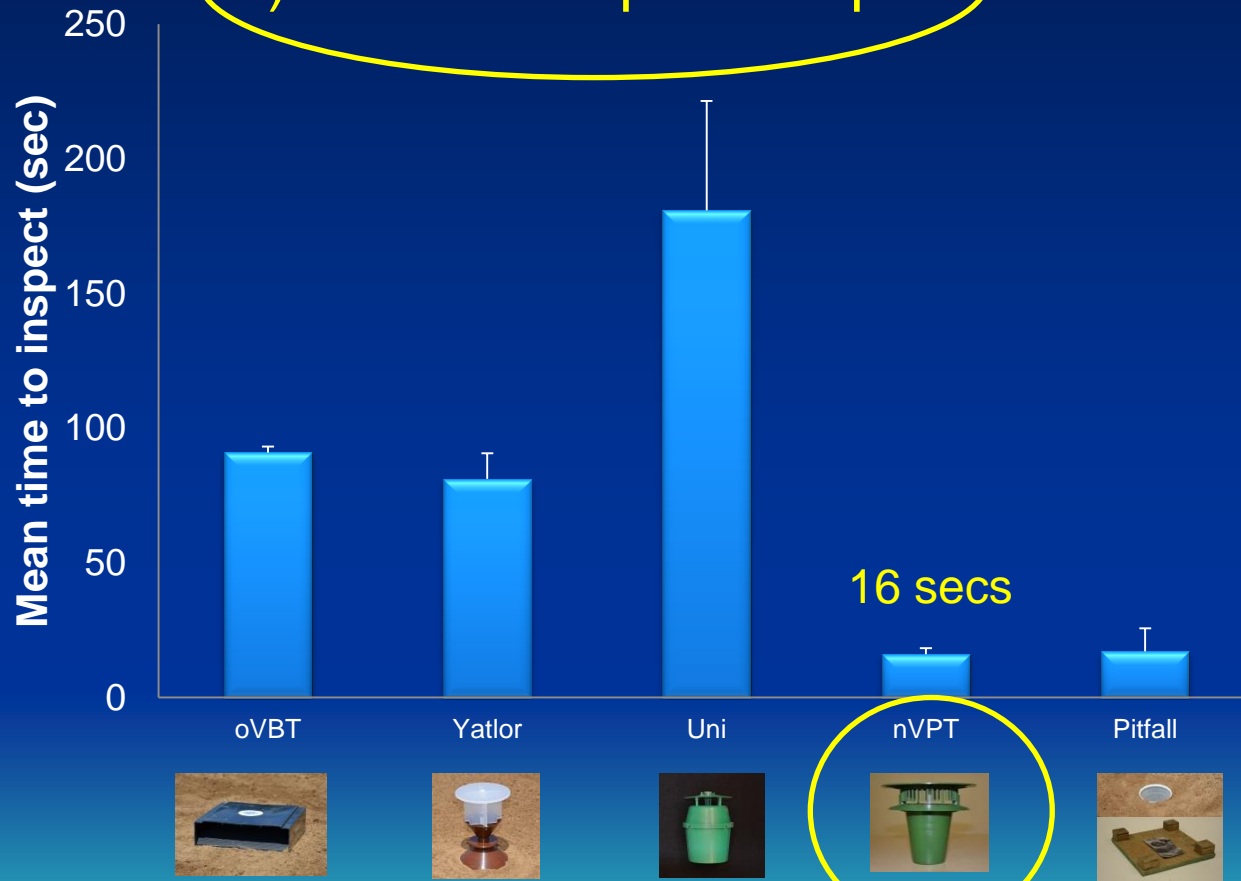
**C) Time to Install Traps**



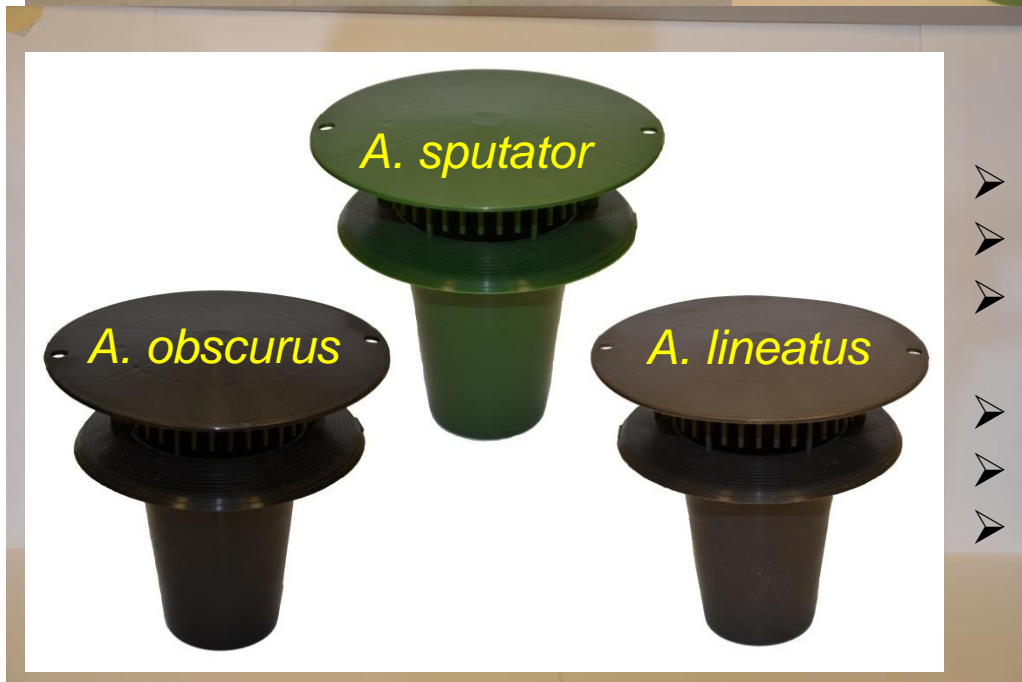
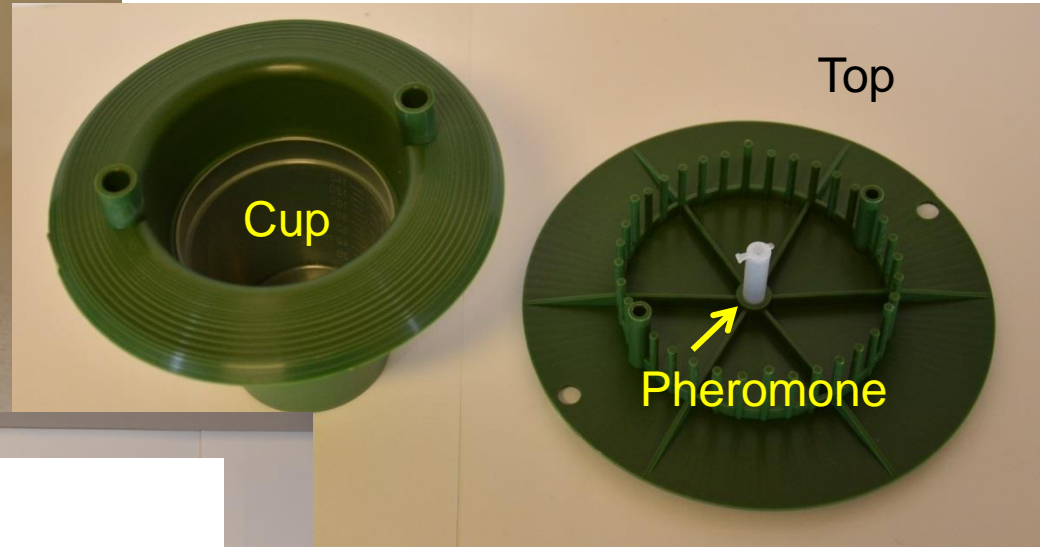


# *A. obscurus* Beetle Trap Comparison Study, 2015: Agassiz, BC

## B) Time to Inspect Traps



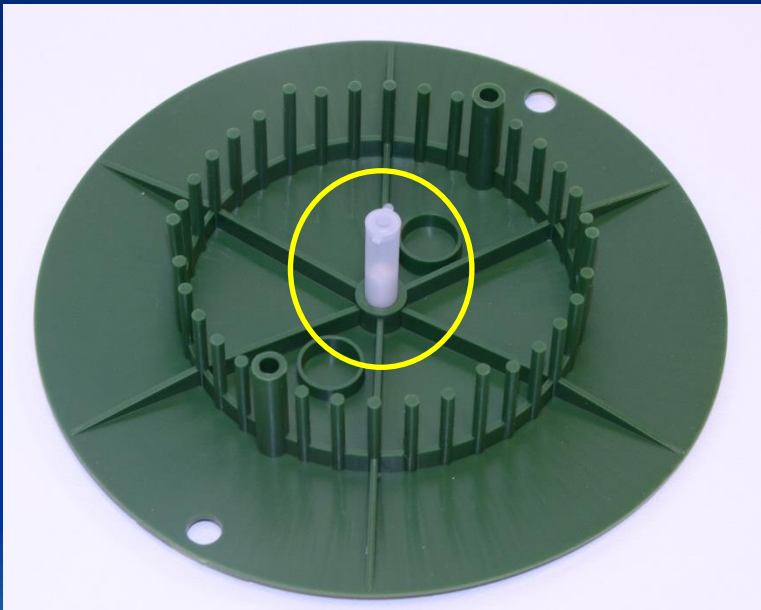
# Vernon Pitfall Trap™



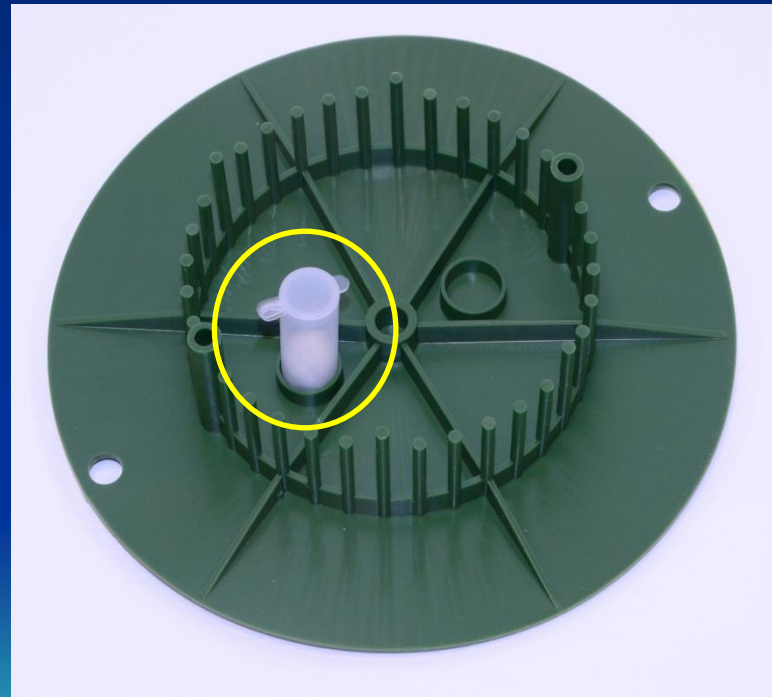
- Very inexpensive.
- \$1.50 per trap with pheromone.
- Works with or without pheromones.
- Rodent-proof.
- Somewhat water-proof.
- Different colors

# Modifications to traps in 2017

## IPM Trap Lures



## Mass Trap Lures





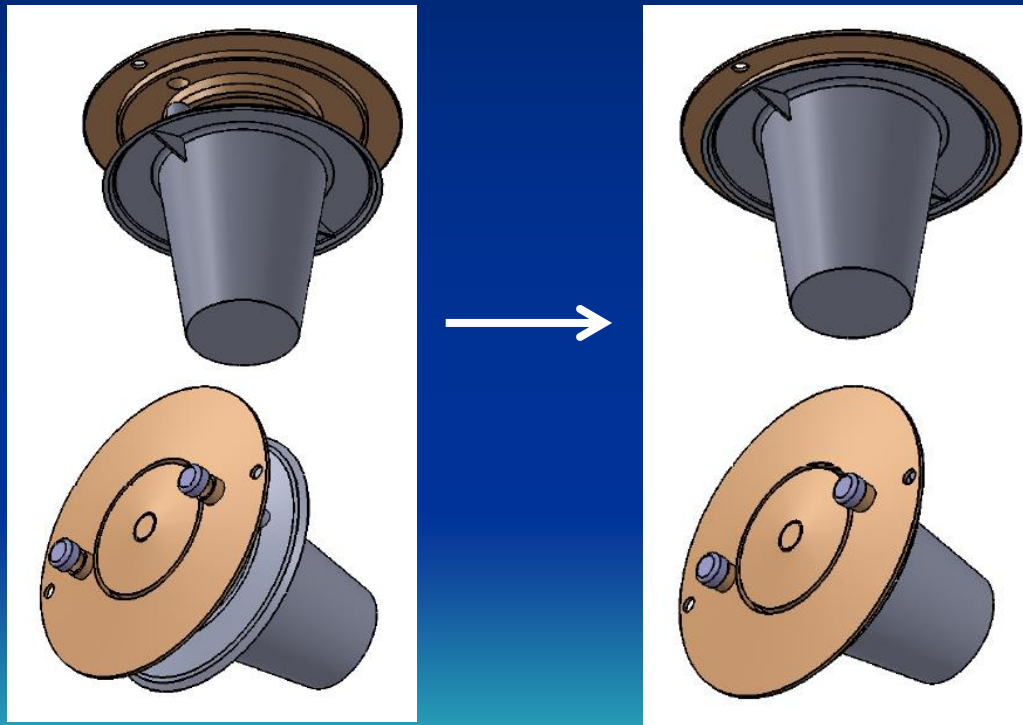


VOLUME TO # BEETLES			
Reading (mL)	Number of Beetles		
	AS	AO	AL
1	28	14	16
2	56	28	32
3	83	42	48
4	111	56	65
5	139	70	81
6	167	85	97
7	194	99	113
8	222	113	129
9	250	127	145
10	278	141	161
15	417	211	242
20	556	282	323
25	694	352	403
30	833	423	484
35	972	493	565
40	1111	563	645
45	1250	634	726
50	1389	704	806
60	1667	845	968
70	1944	986	1129
80	2222	1127	1290
90	2500	1268	1452
100	2778	1408	1613

# Modifications to traps in 2017

## New Winter Top Design (by May, 2017)

- For Permanent IPM and Mass Trapping Sites



Tightly sealed  
lid for winter



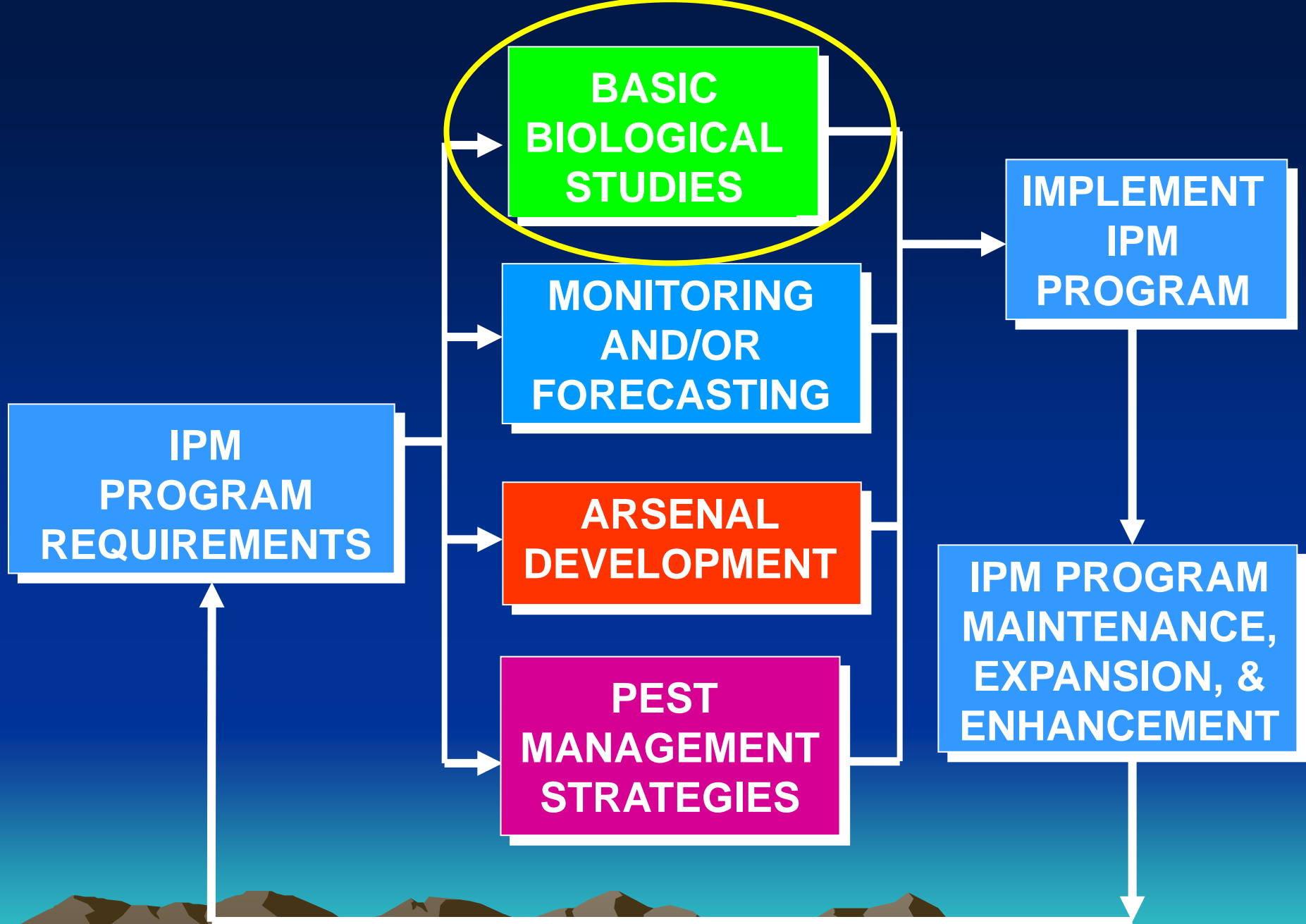
Vernon Pitfall Trap™

+



NELT Trap

Together, these traps provide a complete monitoring toolbox for Click Beetle IPM in PEI!!!



# Click Beetle Biology

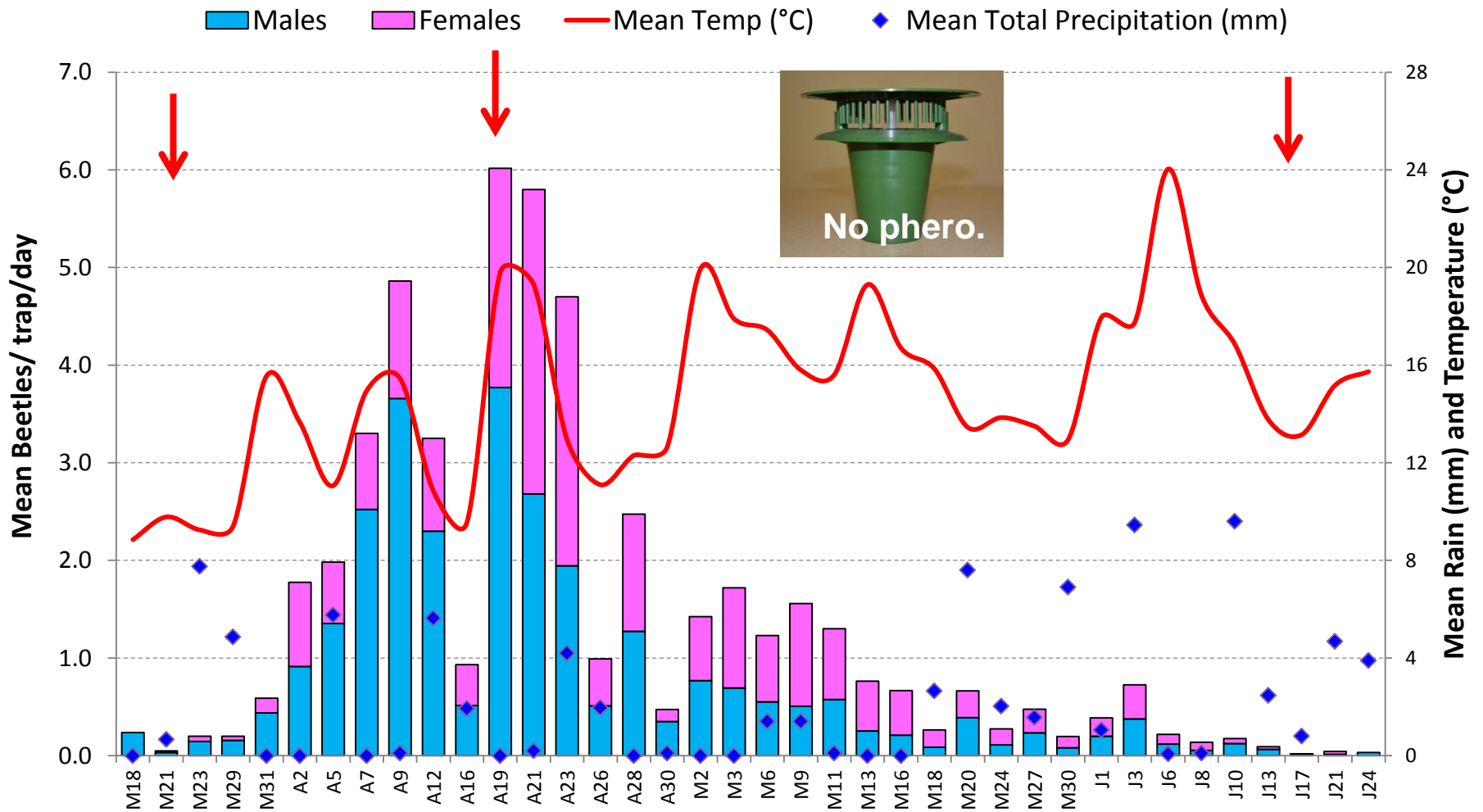


*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

Emergence:

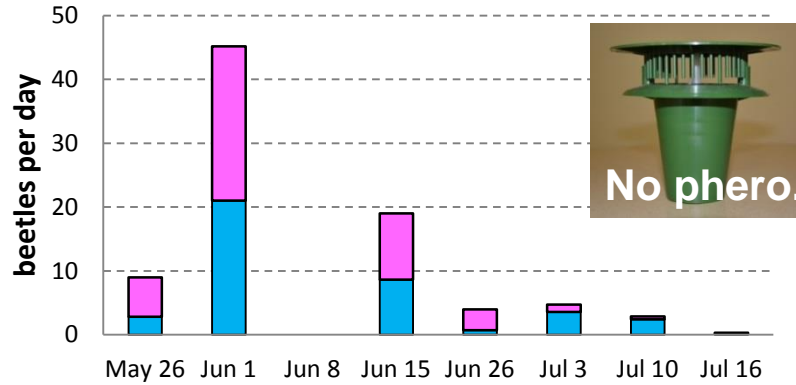
- Field vs Headland
- Timing: ♀ versus ♂

# Mean male and female *A. obscurus* in grassy field in Agassiz, BC, 2016



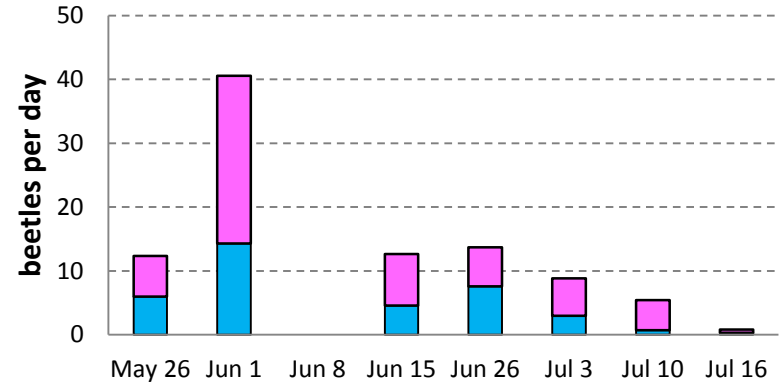
## *Agriotes sputator*

Field 1

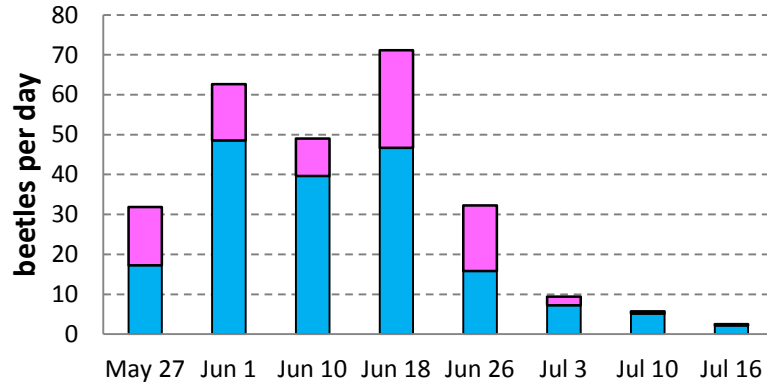


## *Hypnoidus abbreviatus*

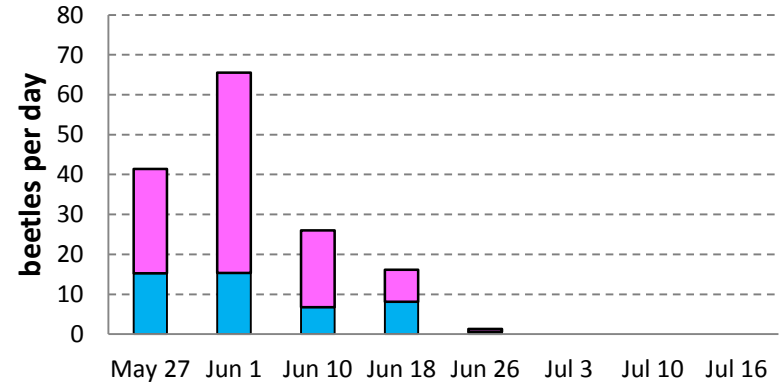
beetles per day



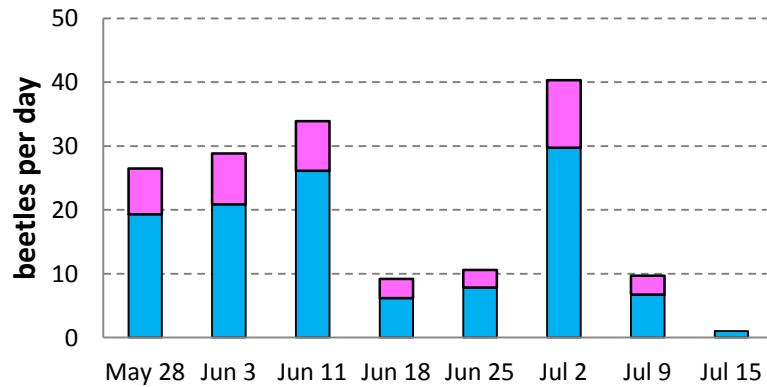
Field 2



beetles per day



Field 3



Female Male

# PEI Field Trials 2015



# Click Beetle Biology



*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

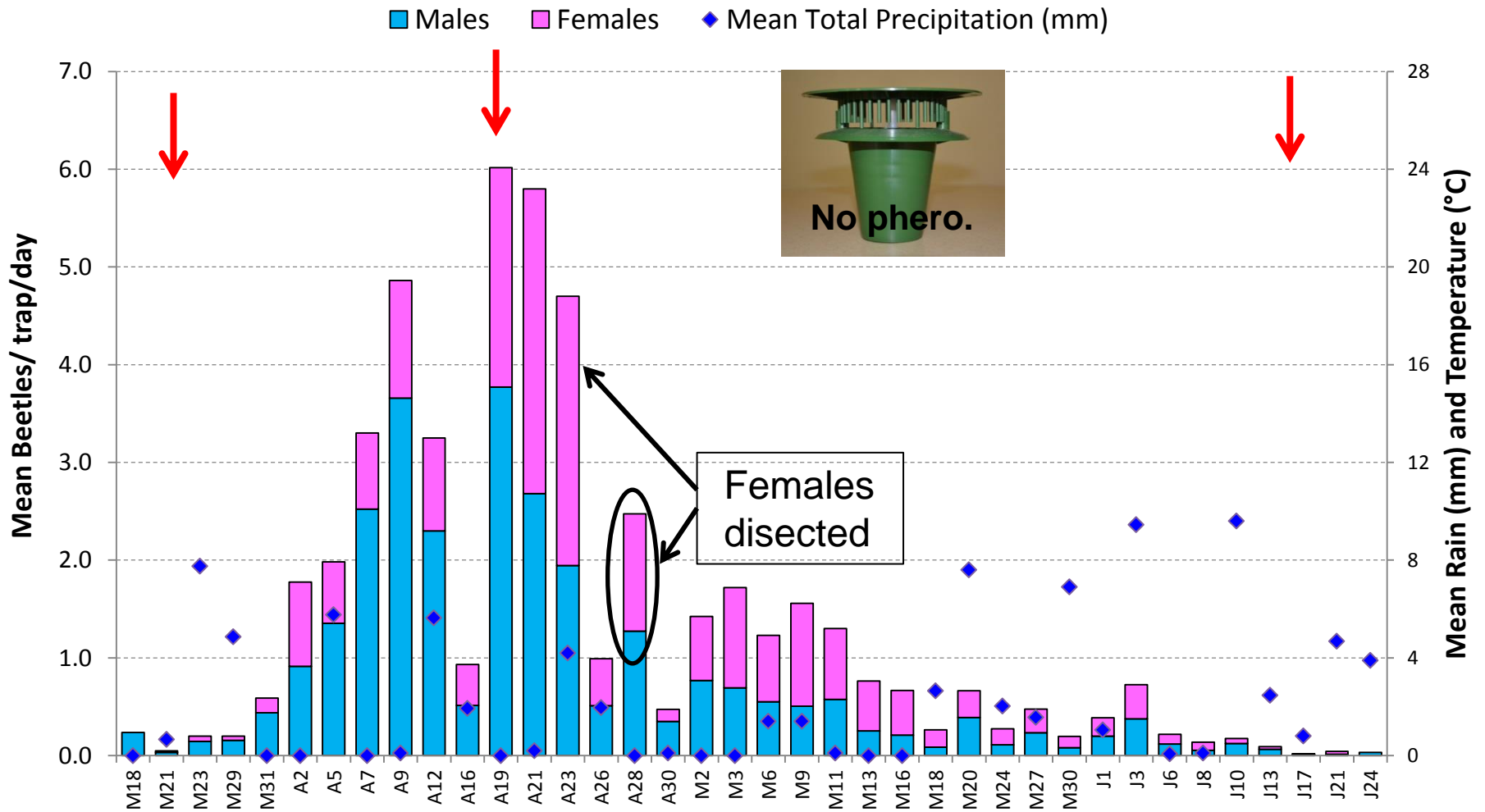
Emergence:

- Field vs Headland
- ♀ versus ♂

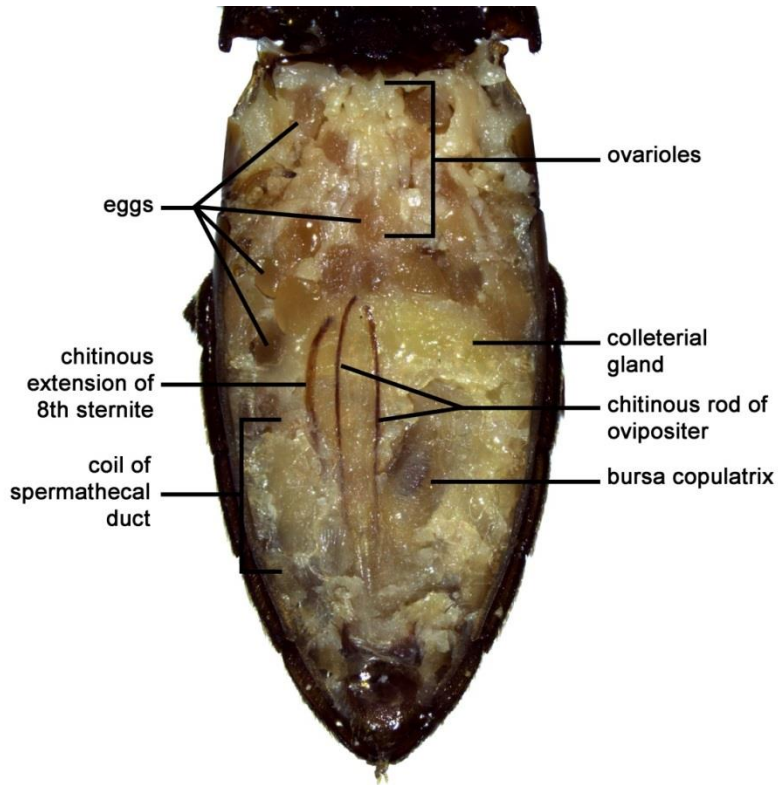
Egg Development

- Seasonal
- Egg laying (start/peak)

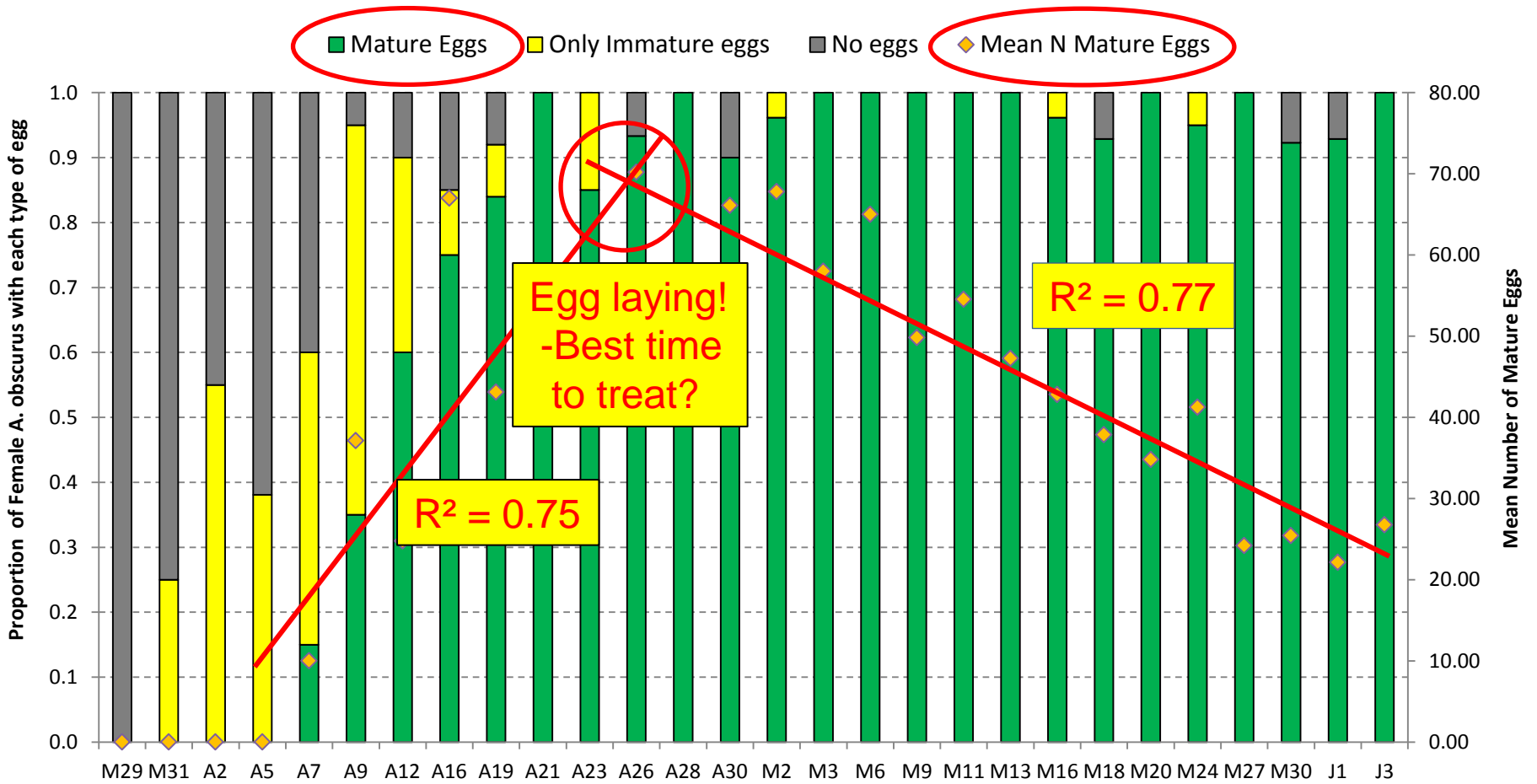
# Mean male and female *A. obscurus* in grassy field in Agassiz, BC, 2016



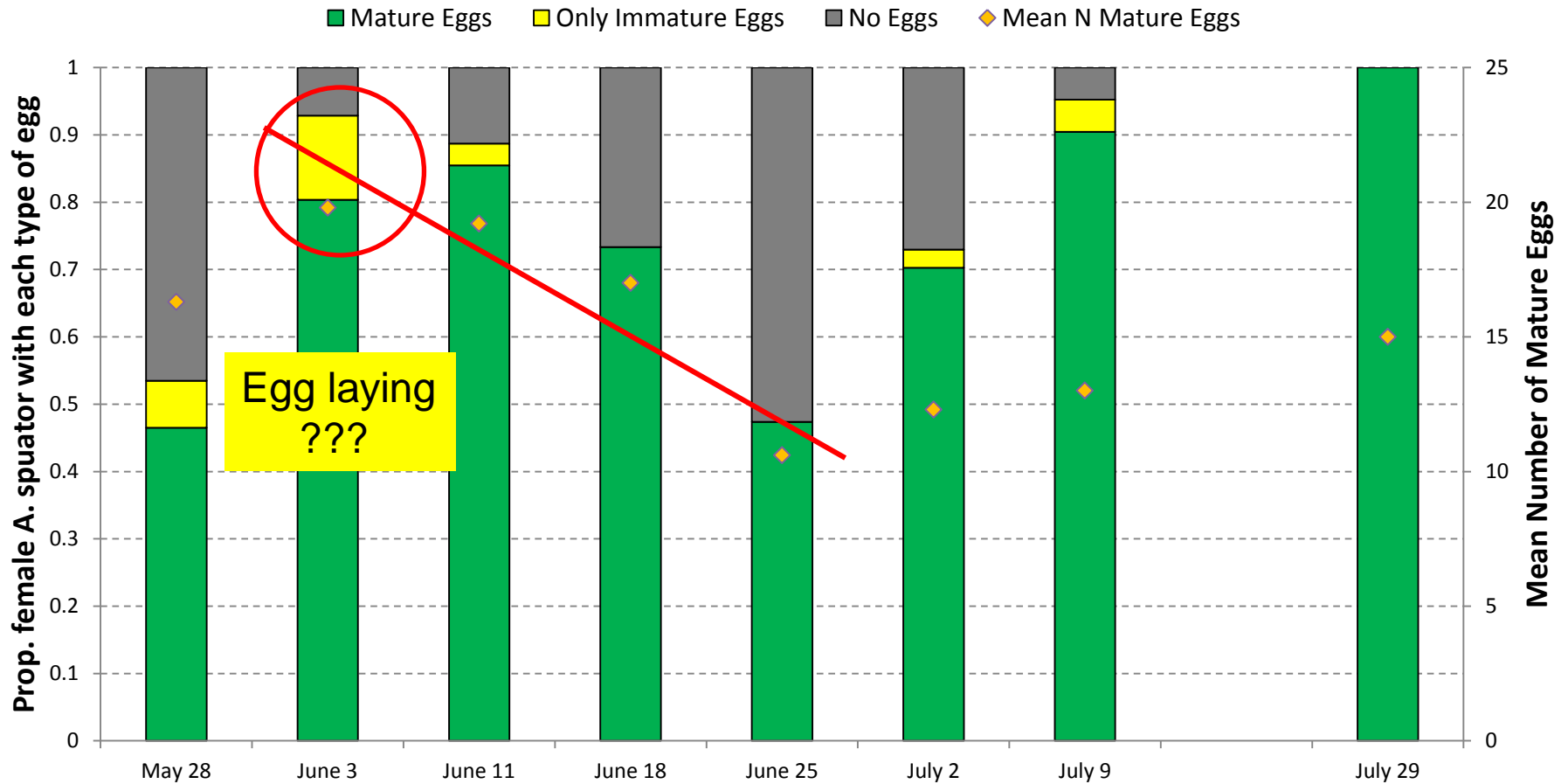
# Female Dissections: Esther Driver



# Egg Development in *A. obscurus* in a grassy field in Agassiz, BC, 2016



# Egg Development in *A. sputator* in a grassy field in PEI, 2015



# Click Beetle Biology



*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

Emergence:

- Field vs Headland
- ♀ versus ♂

Egg Development

- Seasonal
- Egg laying (start/peak)

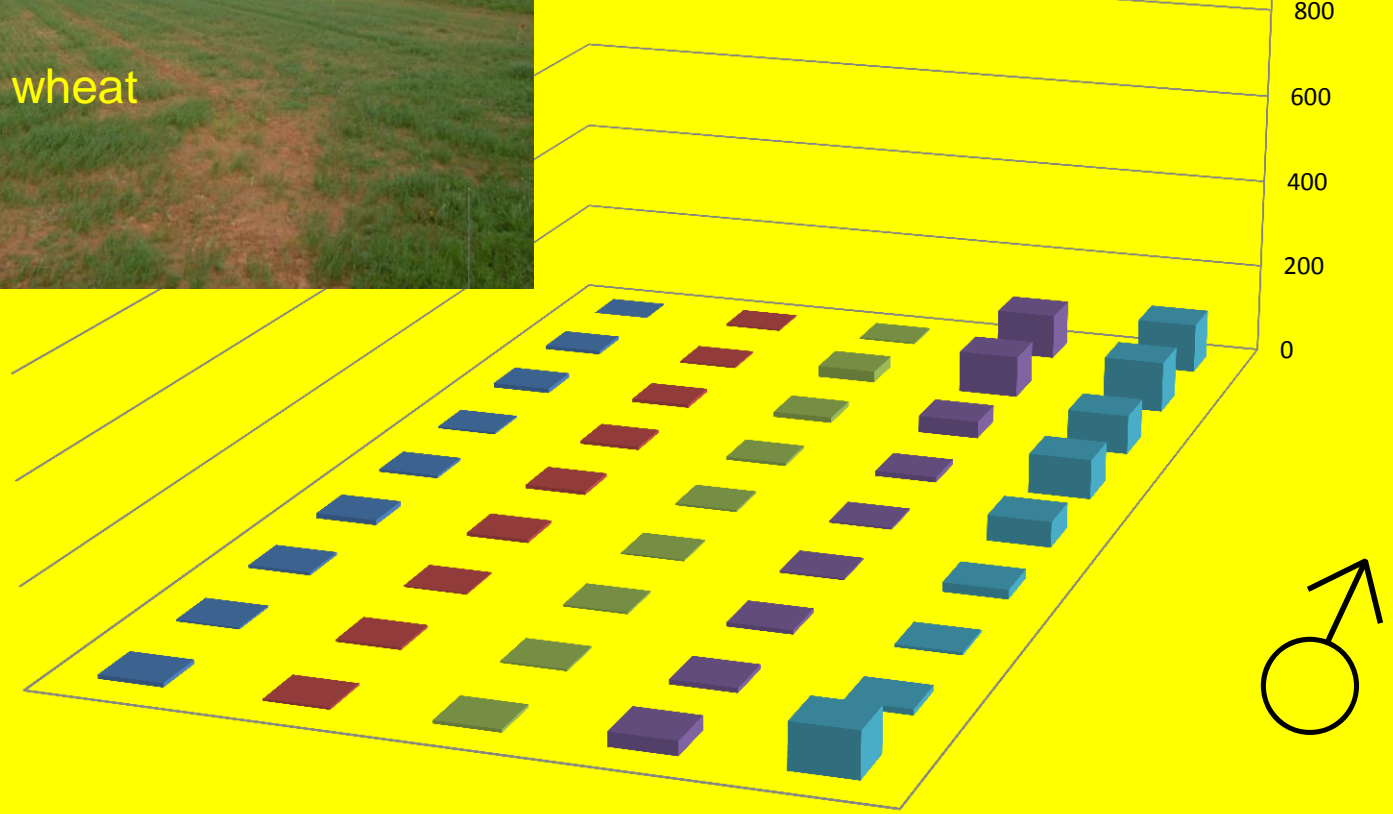
Field Distribution Over Time

- Headlands
- Within fields

# PEI Field 2: 2015



Winter Wheat  
-45 pheromone traps ♂  
-34 pitfall traps ♂♀  
-22 traps in headlands

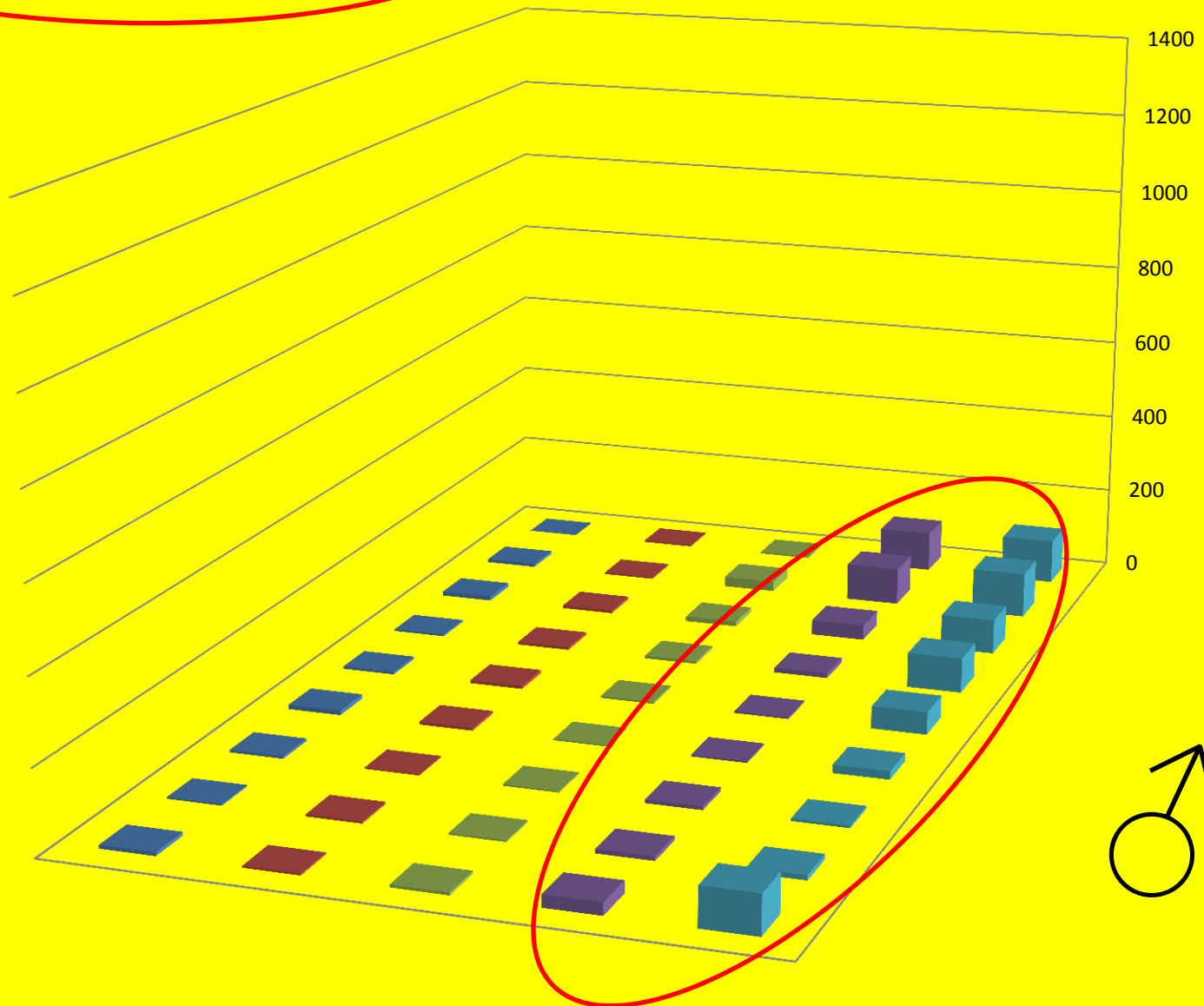


**PEI Field 2**

**Week 1: May 20-27**

***A. sputator*:**

**1038 males caught/day**



Temp = 13.6°C

Rain = 2.1 mm

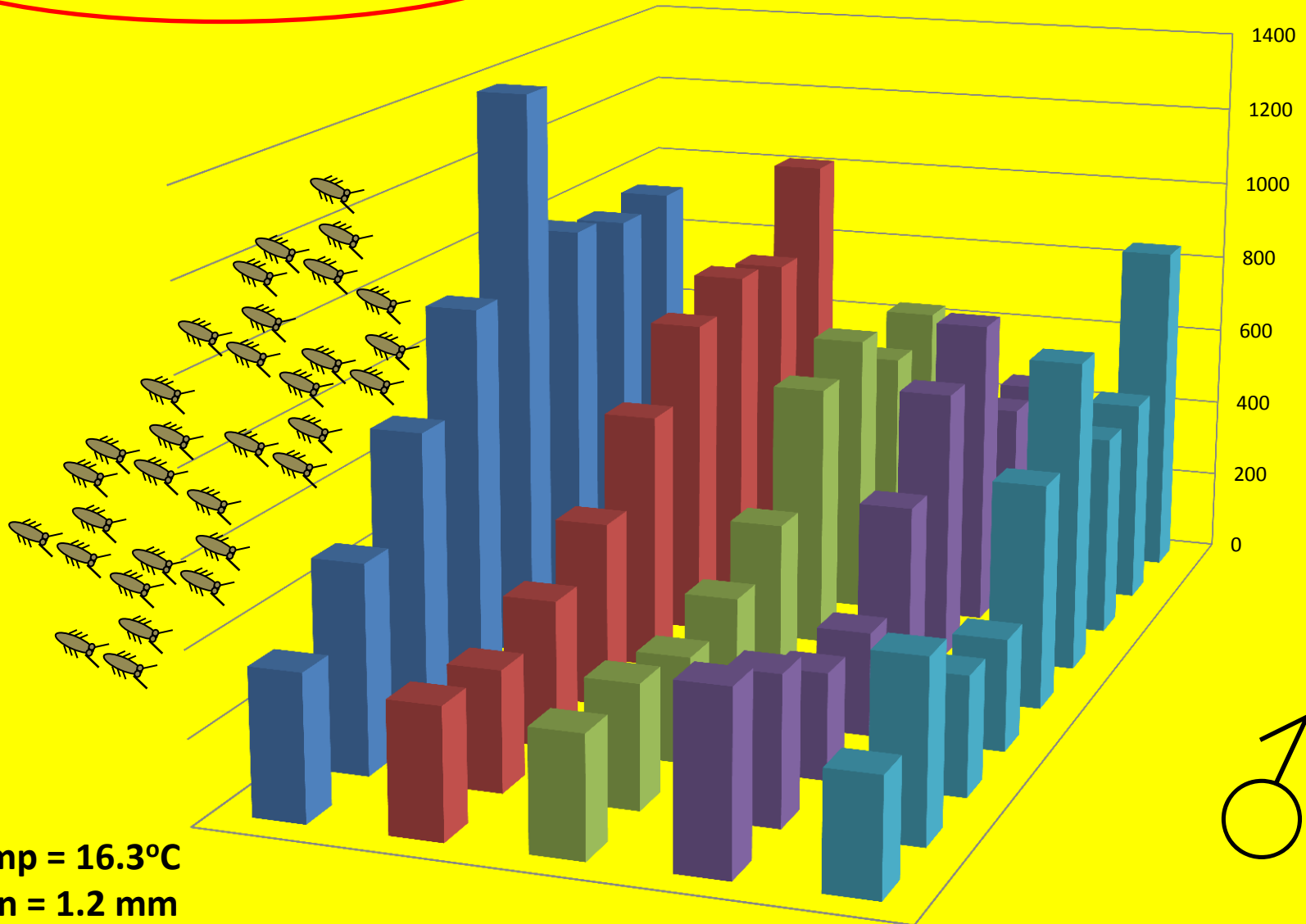


# PEI Field 2

Week 2: May 27-June 1

*A. sputator*:

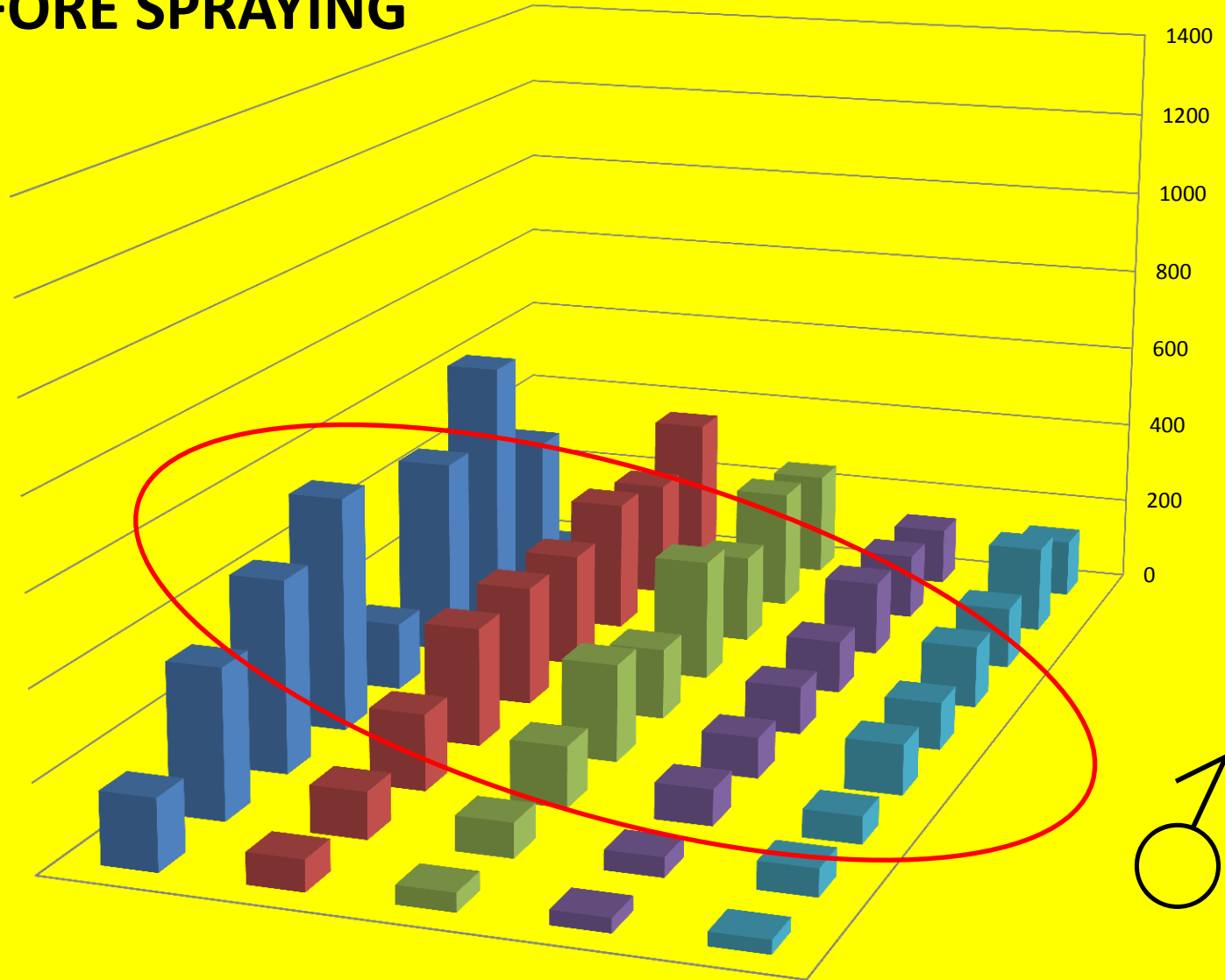
24784 males caught/day



Temp = 16.3°C  
Rain = 1.2 mm

**PEI Field 2**  
**Week 3: June 1-10**  
**BEFORE SPRAYING**

***A. sputator*:**  
**7941 males caught/day**



**Temp = 11.2°C**  
**Rain = 2.1 mm**

PEI Field 2

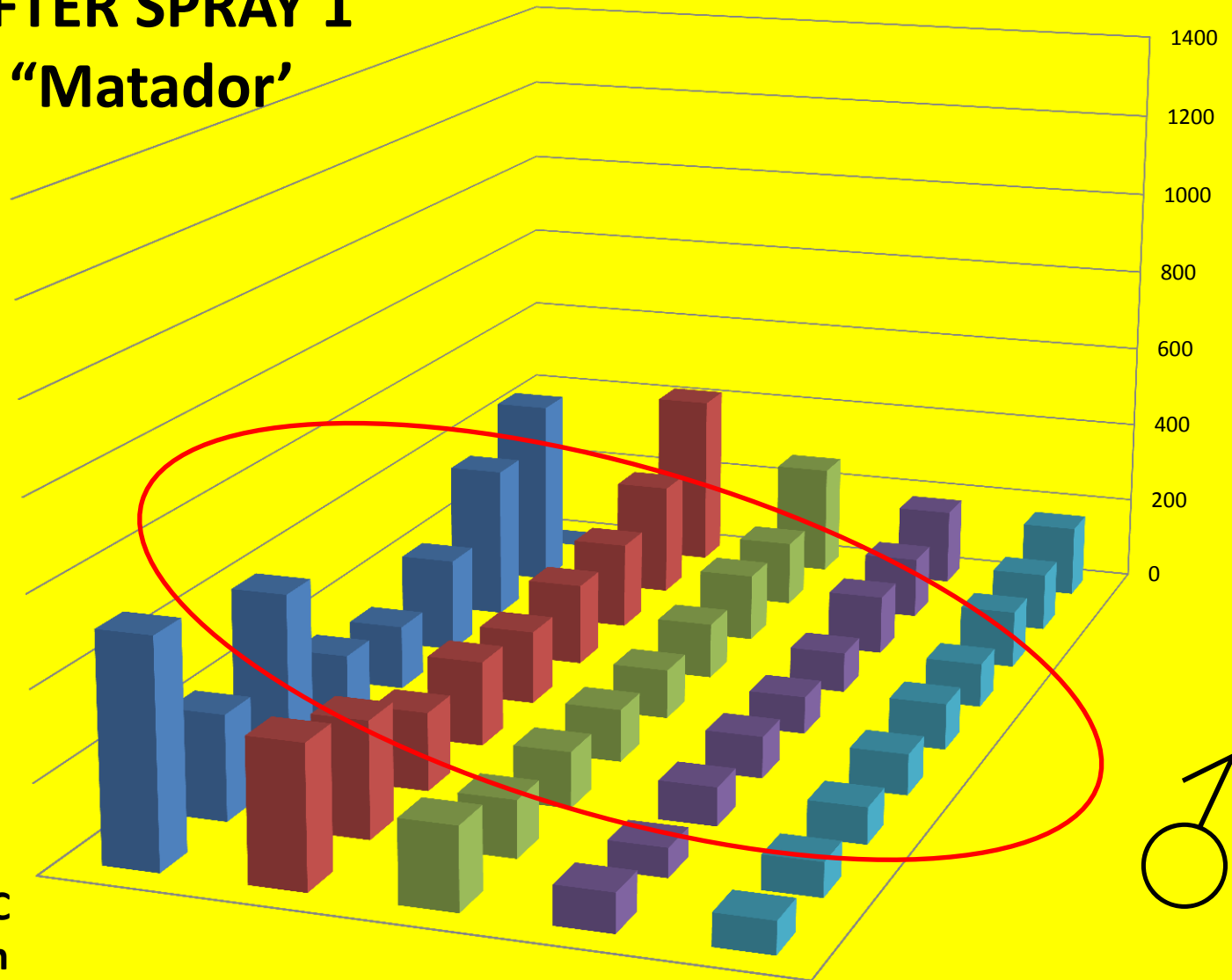
Week 4: June 12-18

AFTER SPRAY 1

“Matador”

*A. sputator*:

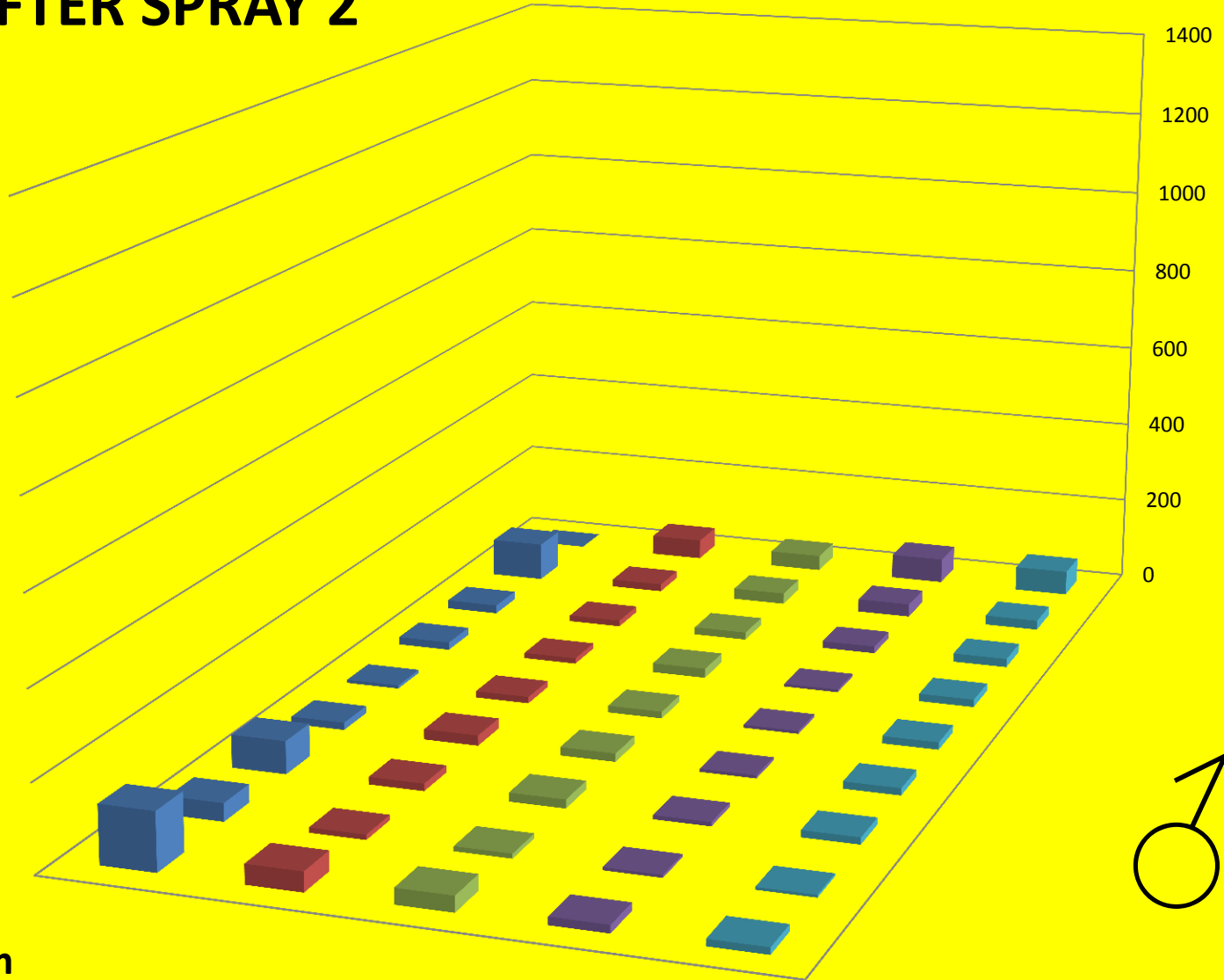
8085 males caught/day



Temp = 15.2°C  
Rain = 4.0 mm

**PEI Field 2**  
**Week 5: June 19-26**  
**AFTER SPRAY 2**

***A. sputator*:**  
**1095 males caught/day**  
**Max = 134/Trap/Day**



**Temp = 13.3°C**  
**Rain = 11.2 mm**

F

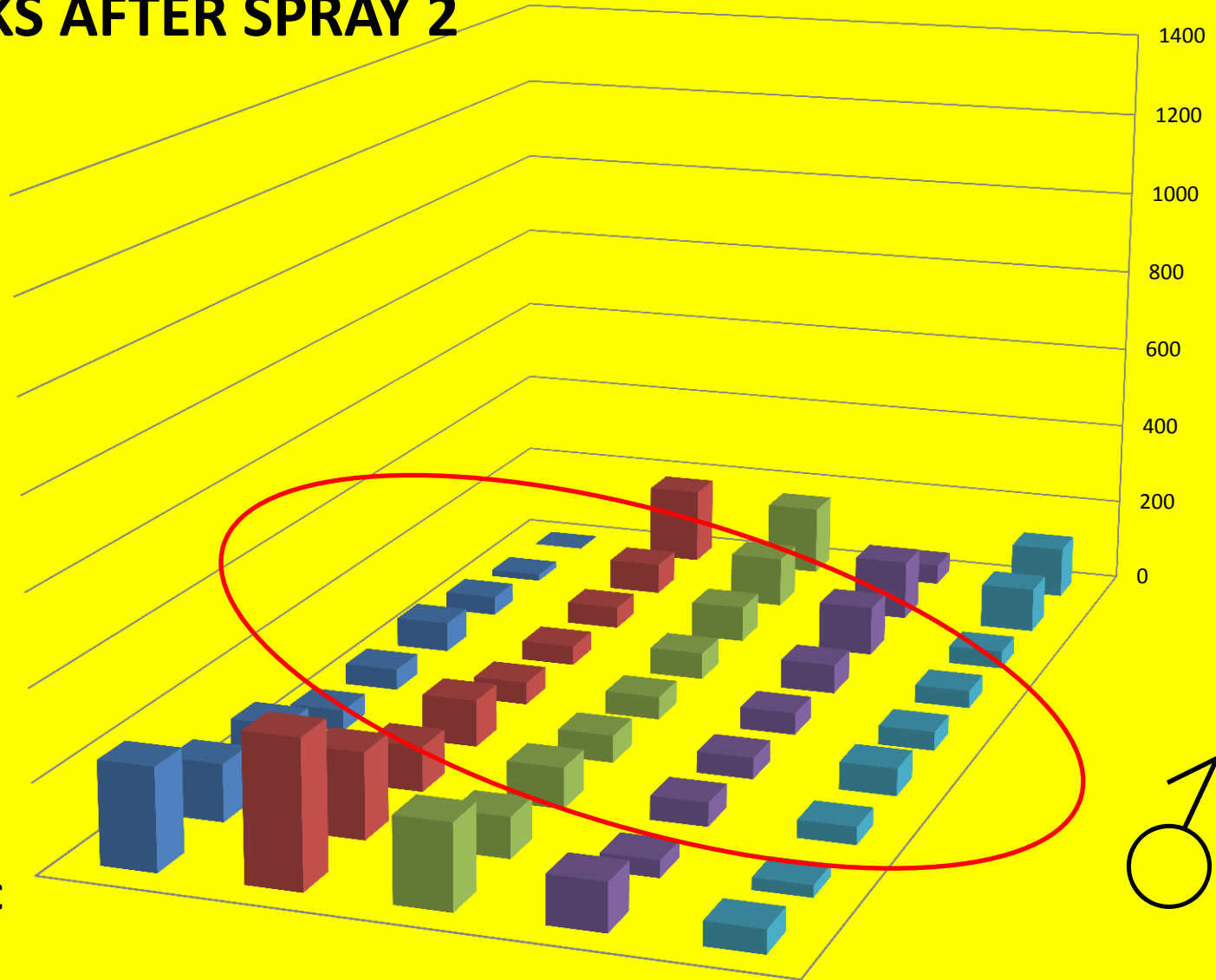
PEI Field 2

Week 6: June 26-July 3

2 WKS AFTER SPRAY 2

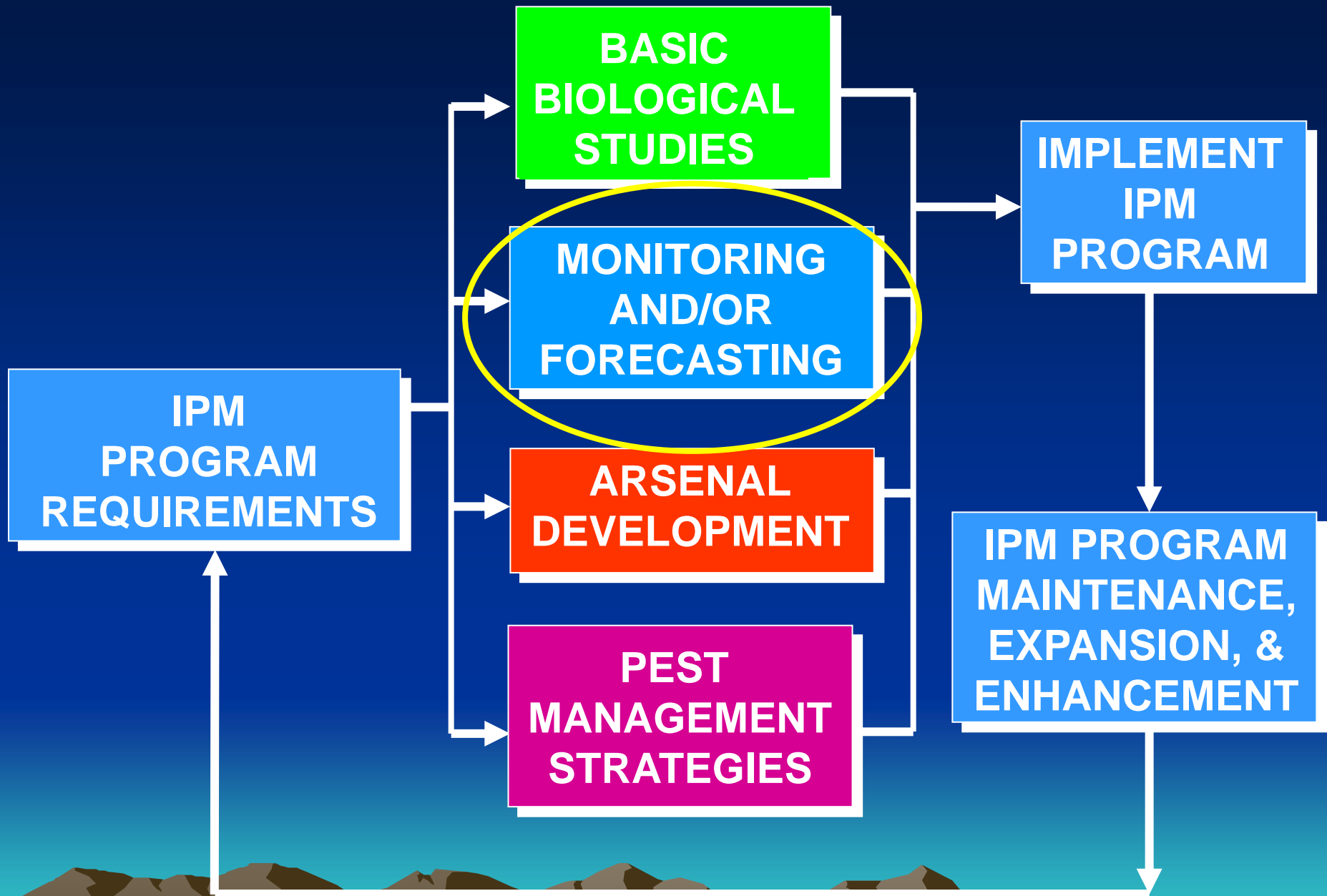
*A. sputator*:

3448 males caught/day



Temp = 16.4°C

Rain = 1.2 mm



**IPM  
PROGRAM  
REQUIREMENTS**

**BASIC  
BIOLOGICAL  
STUDIES**

**MONITORING  
AND/OR  
FORECASTING**

**ARSENAL  
DEVELOPMENT**

**PEST  
MANAGEMENT  
STRATEGIES**

**IMPLEMENT  
IPM  
PROGRAM**

**IPM PROGRAM  
MAINTENANCE,  
EXPANSION, &  
ENHANCEMENT**

# Click Beetle Monitoring



*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

In-Field Monitoring:  
- IPM program

Sentinel Traps:  
- General Survey  
- Risk Assessment

# Click Beetle Monitoring



*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

In-Field Monitoring:  
- IPM program

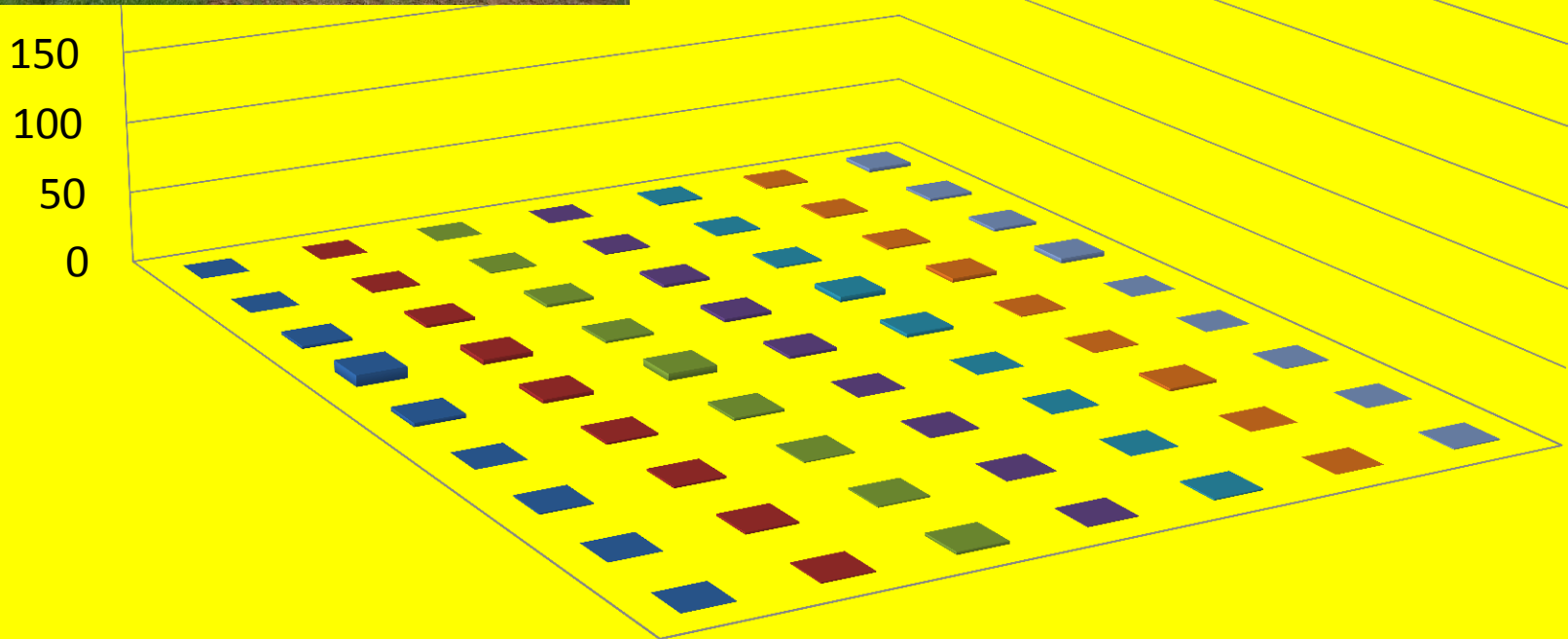
Number and placement  
of traps in fields



# PEI Field 1: 2015



Winter Wheat  
-63 pheromone traps ♂  
-51 pitfall traps ♂♀  
-28 traps in headlands

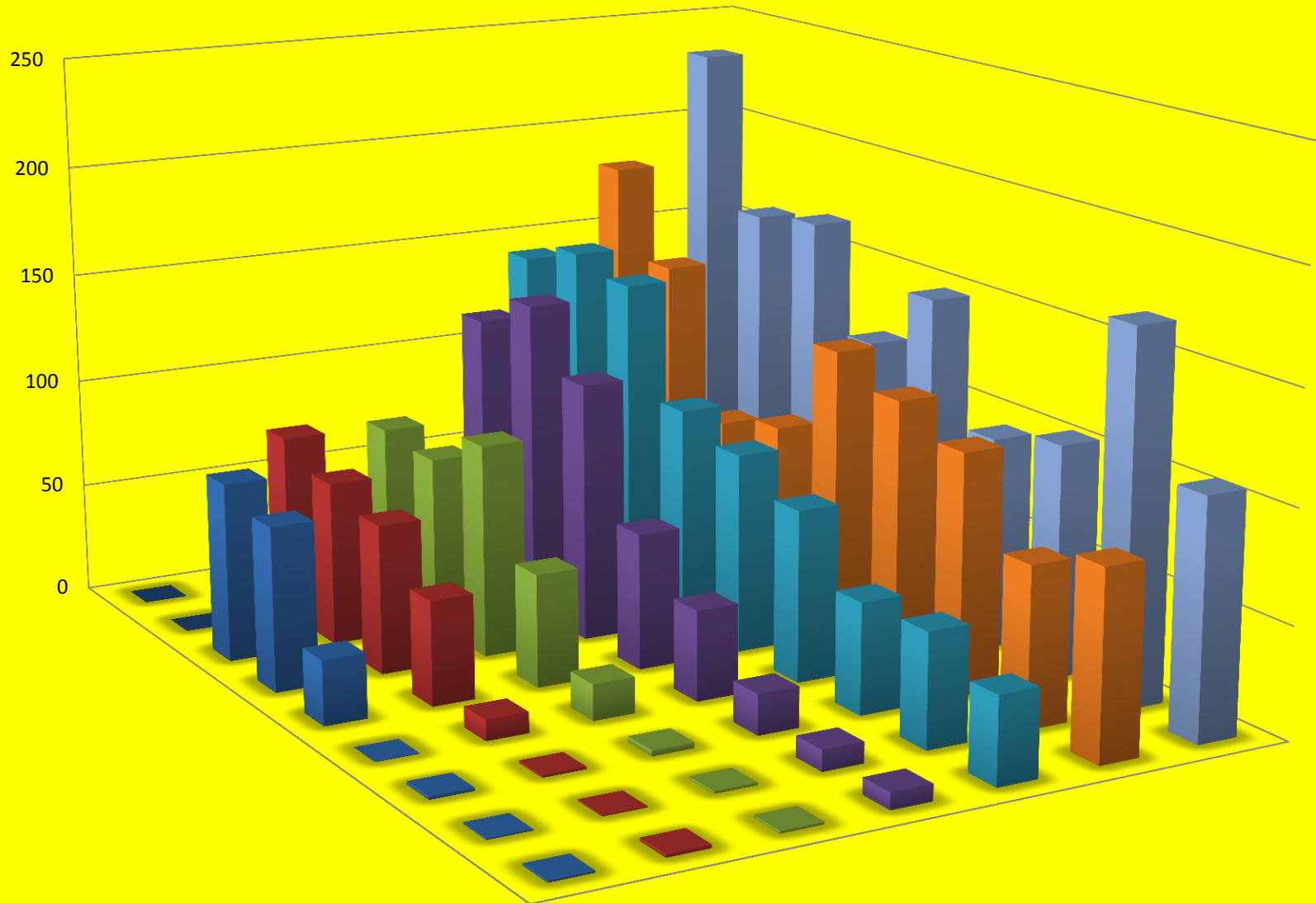


# PEI Field 1

*A. sputator*:

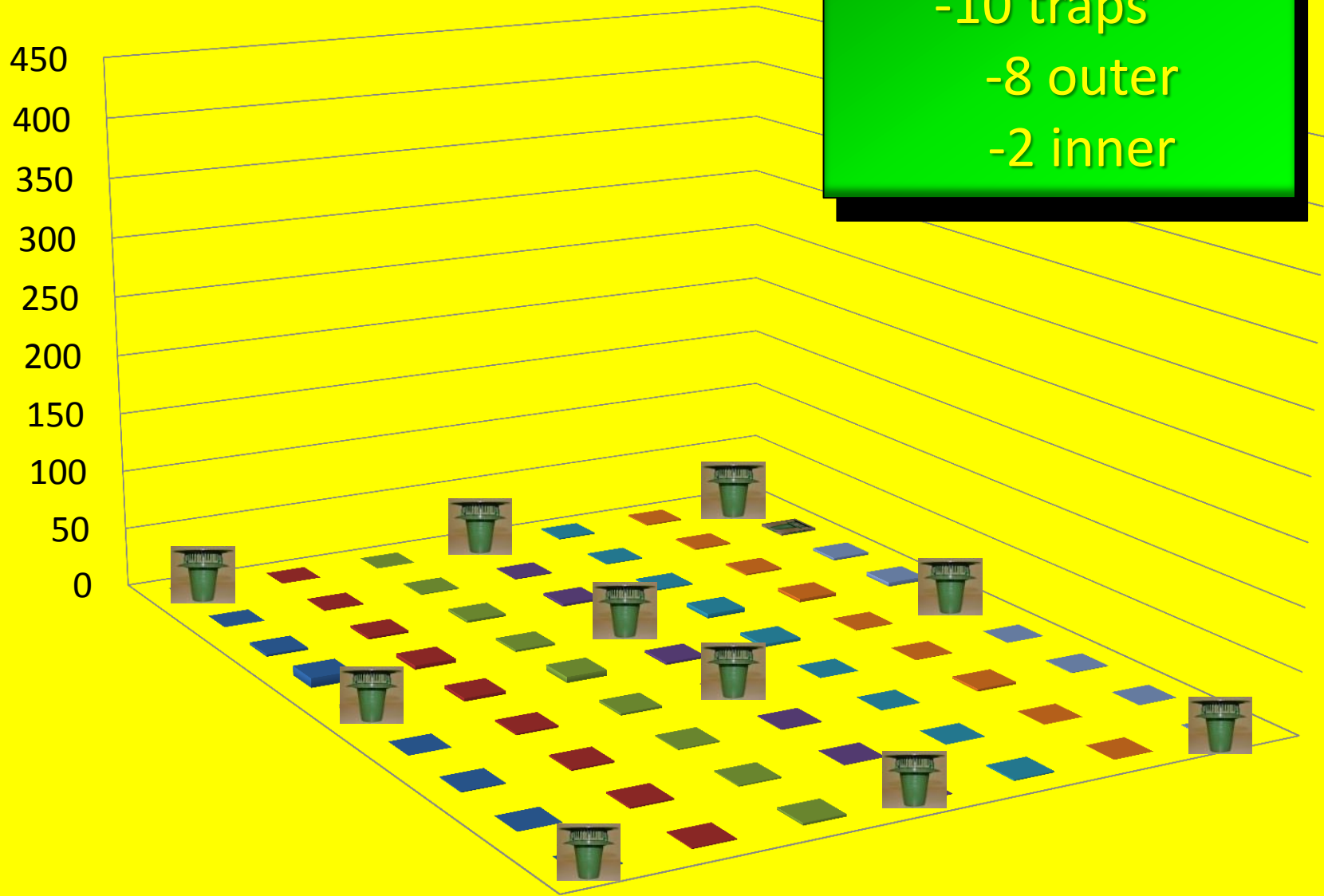
4508 males caught/day

Max = 231/Trap/Day



# PEI Field 1

Traps per Field?  
-10 traps  
-8 outer  
-2 inner



2016: 19 fields in PEI

-8 outer, 5 inner,

8 headland traps

-Crops:

Winter wheat,

Brown mustard,

Soybean



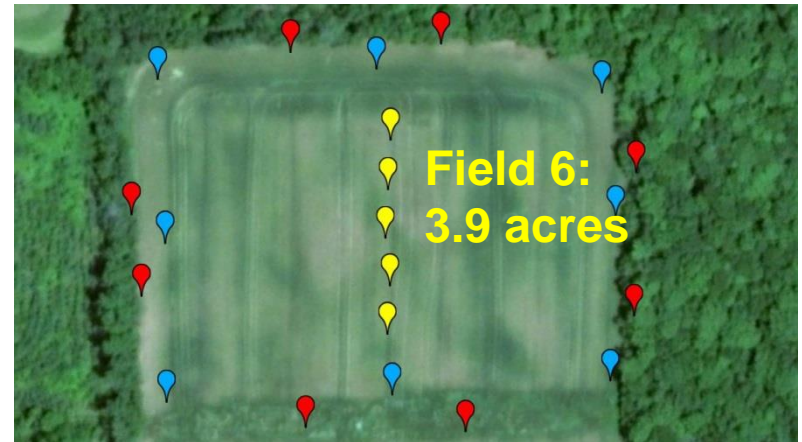
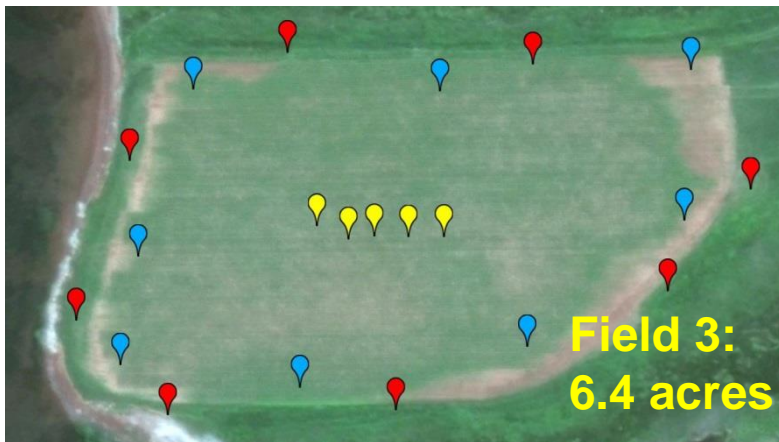
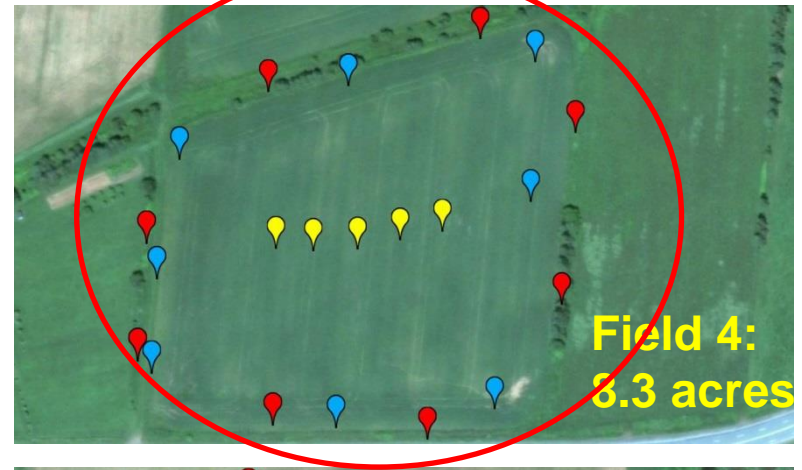
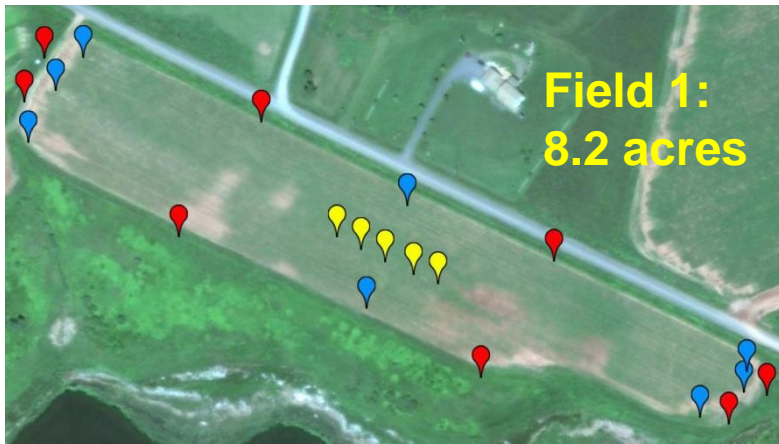
# Click Beetle Monitoring

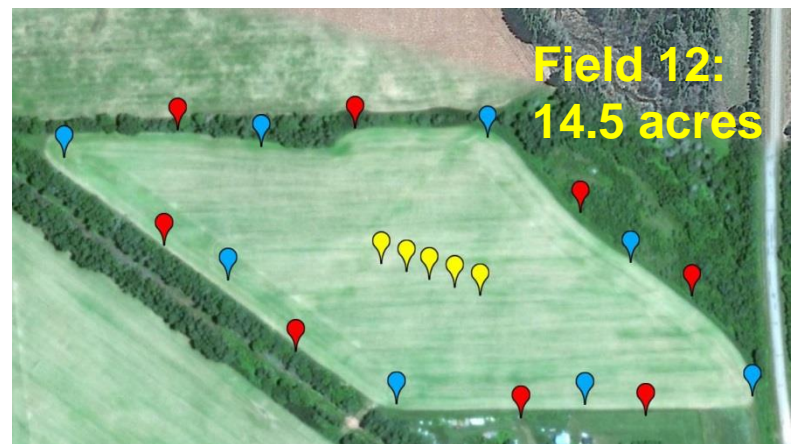
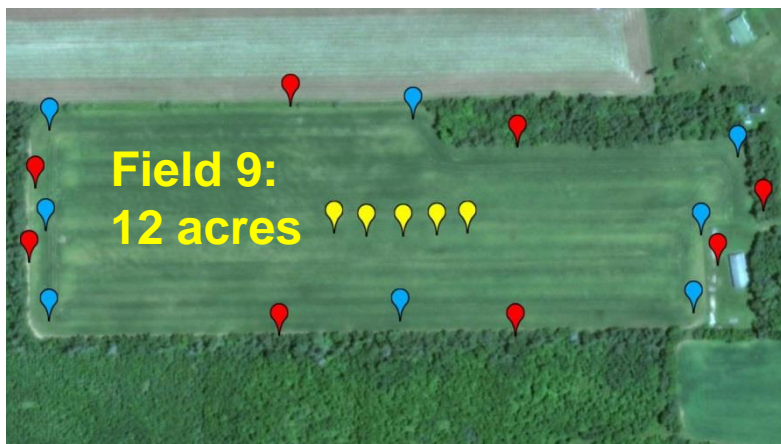
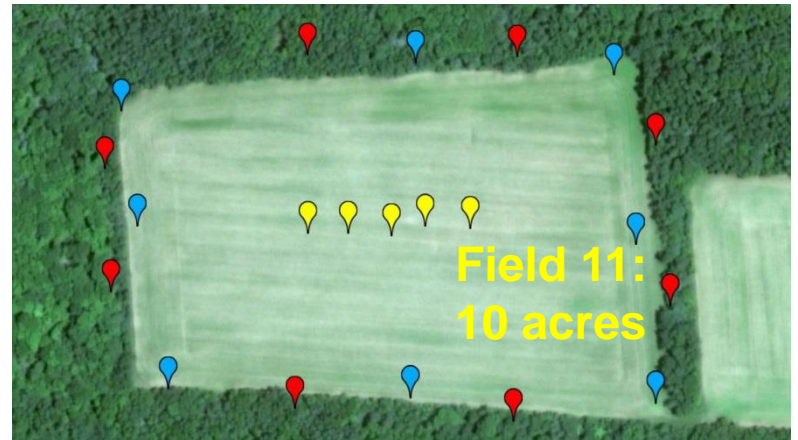
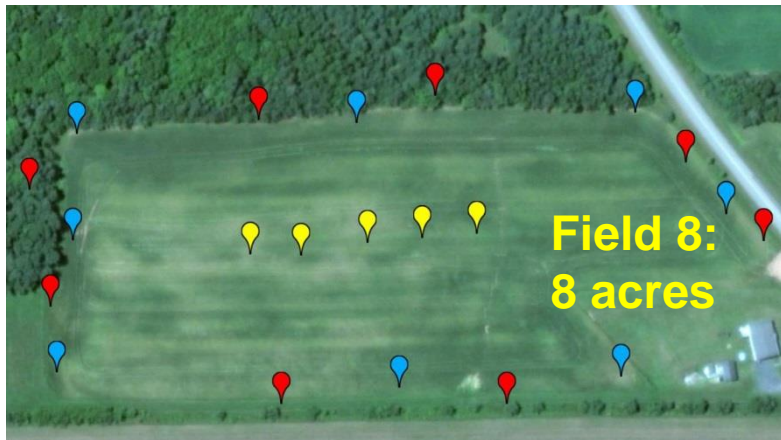
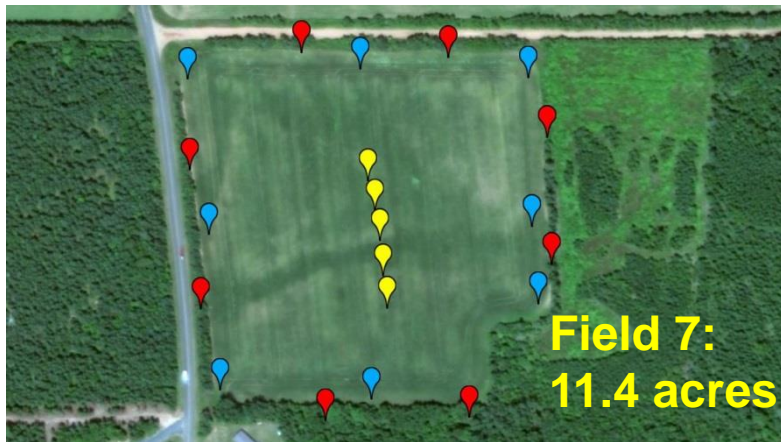


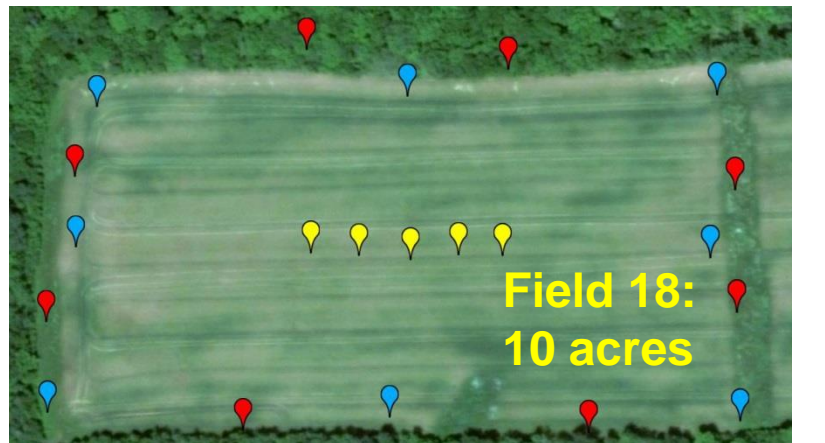
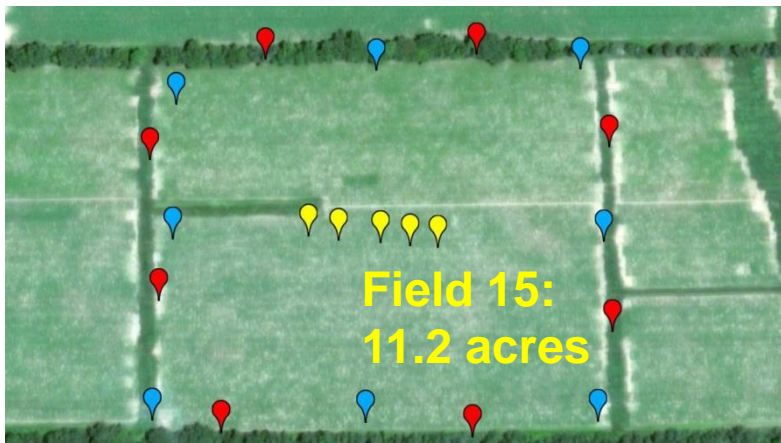
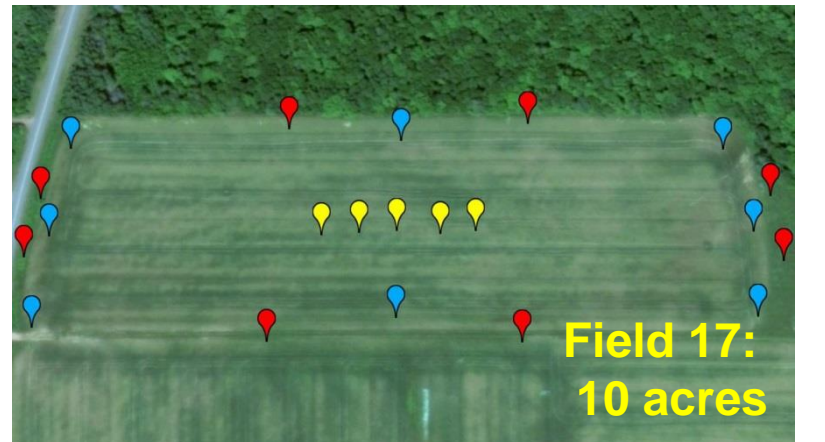
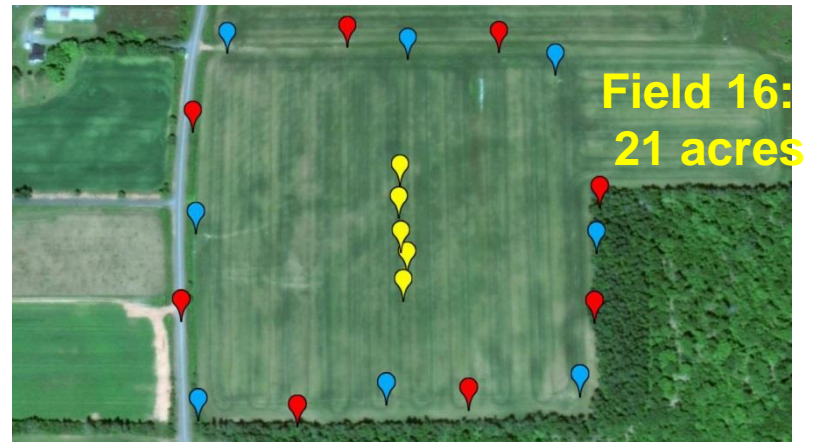
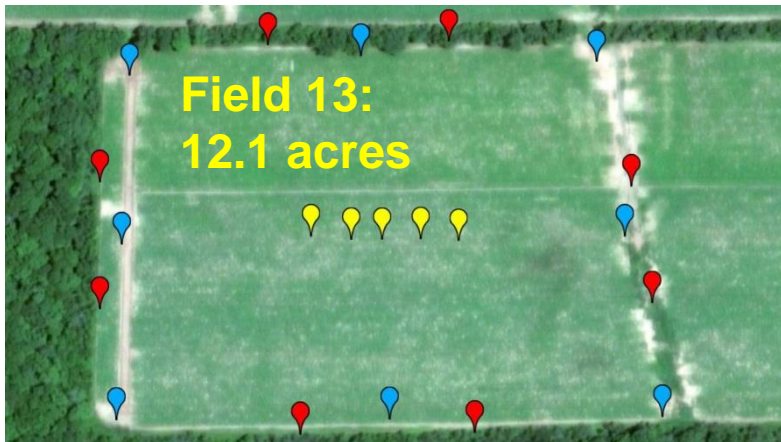
*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

In-Field Monitoring:  
- IPM program

IPM Studies in 2016







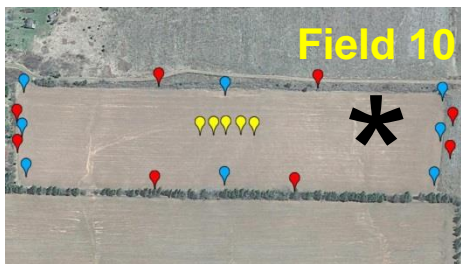




Crops in 2012: \*  
**Cereal/Hay**

**Field 14 Cropping History (9 acres)**

2011	Potatoes (Thimet)
2012	Winter Wheat
2013	Potatoes (Thimet)
2014	Winter Wheat
2015	Soybean
2016	Mustard





Headlands (Total Catch)

- 1 H1 (312)
- 2 H2 (460)
- 3 H3 (4229)
- 4 H4 (3973)
- 5 H5 (444)
- 6 H6 (286)
- 7 H7 (2002)
- 8 H8 (2006)

Perimeter (Total Catch)

- 1 P1 (2023)
- 2 P2 (1275)
- 3 P3 (3260)
- 4 P4 (4879)
- 5 P5 (3294)
- 6 P6 (957)
- 7 P7 (1801)
- 8 P8 (2073)

Center (Total Catch)

- 1 C1 (3314)
- 2 C2 (2391)
- 3 C3 (1521)
- 4 C4 (1700)
- 5 C5 (2192)



### Headlands (Total Catch)

- 1 H1 (312)
- 2 H2 (460)
- 3 H3 (4229)
- 4 H4 (3973)
- 5 H5 (444)
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- 8 H8 (2006)

### Perimeter (Total Catch)

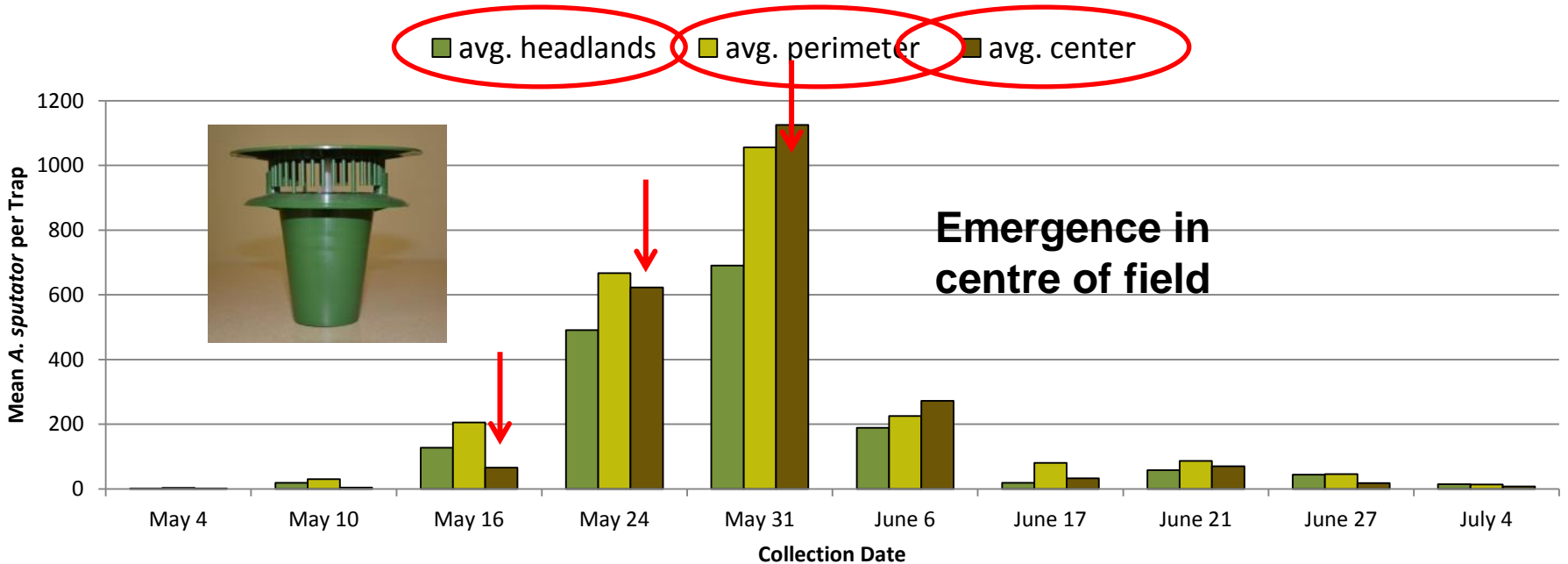
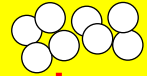
- 1 P1 (2023)
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### Center (Total Catch)

- 1 C1 (3314)
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- 3 C3 (1521)
- 4 C4 (1700)
- 5 C5 (2192)

## Field 14 Cropping History (9 acres)

2011	Potatoes (Thimet)
2012	Winter Wheat
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2015	Soybean
2016	Mustard



## Conclusions:

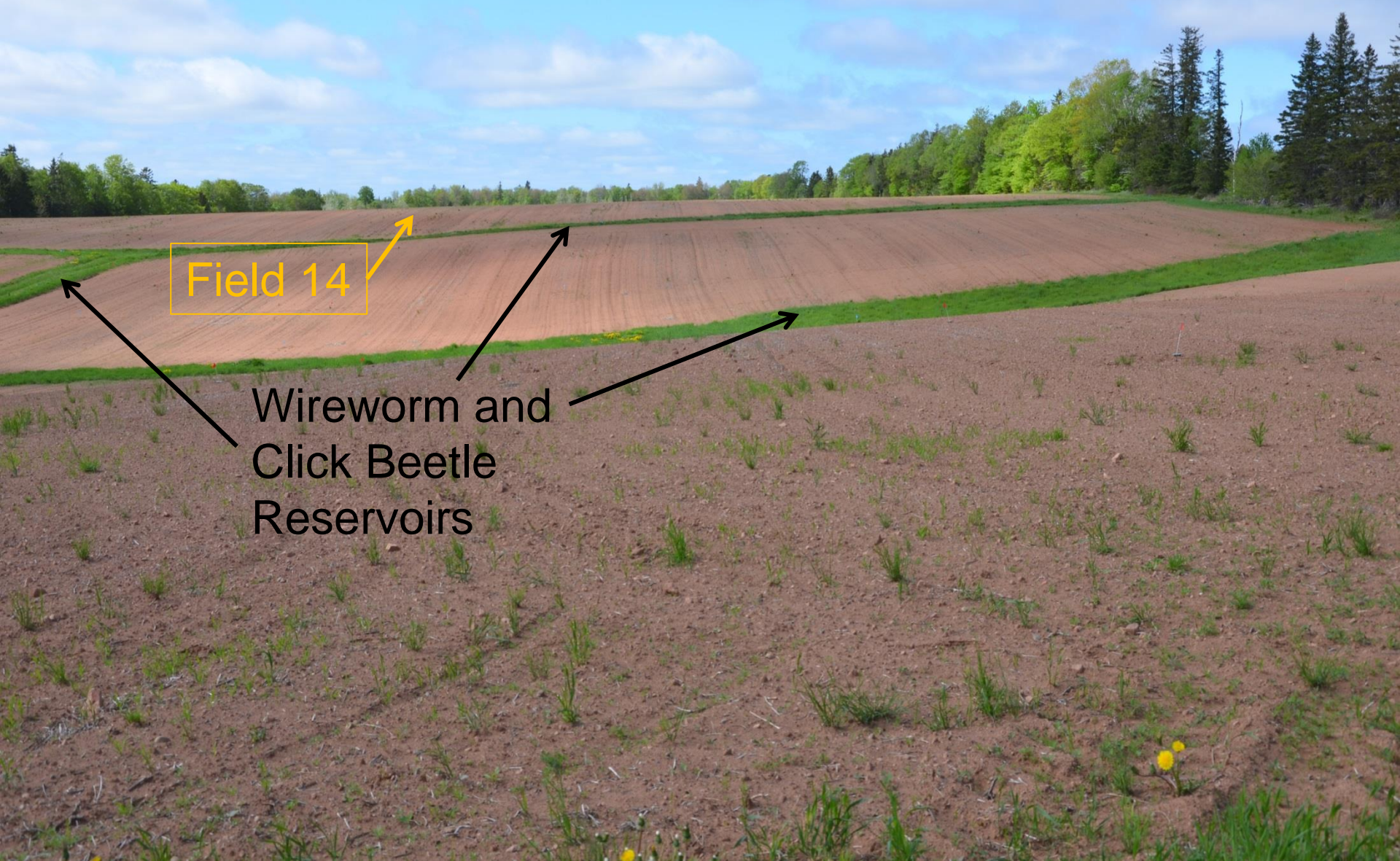
- 1) *A. sputator* eggs laid in a growing season will emerge as adults in 4 yrs.  
-eggs in 2012 become adults emerging in 2016.
- 2) Potatoes with Thimet do not kill ALL wireworms in the field.  
-about a 60% kill – BC studies

A wide-angle photograph of a large agricultural field under a blue sky with scattered white clouds. The field is divided into several sections. The foreground is a field of brown soil with sparse green grass and small yellow flowers. A yellow box with the text "Field 14" is overlaid on the image, with a yellow arrow pointing from the box to a specific area in the middle ground. The middle ground shows a large, flat area of brown soil, possibly a potato field, with a green grassy strip running through it. In the background, there is a line of trees, including evergreens and deciduous trees with green foliage.

Field 14

# Conclusions:

3) Grassy headlands surrounding Field 14 very likely source of problem.



Field 14

Wireworm and  
Click Beetle  
Reservoirs



### Headlands (Total Catch)

- 1 H1 (312)
- 2 H2 (460)
- 3 H3 (4229)
- 4 H4 (3973)
- 5 H5 (444)
- 6 H6 (286)
- 7 H7 (2002)
- 8 H8 (2006)

### Perimeter (Total Catch)

- 1 P1 (2023)
- 2 P2 (1275)
- 3 P3 (3260)
- 4 P4 (4879)
- 5 P5 (3294)
- 6 P6 (957)
- 7 P7 (1801)
- 8 P8 (2073)

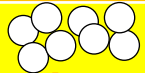

### Center (Total Catch)

- 1 C1 (3314)
- 2 C2 (2391)
- 3 C3 (1521)
- 4 C4 (1700)
- 5 C5 (2192)

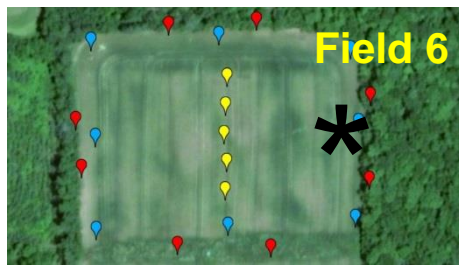
# Conclusions:

4) Fortunate that Field 14 planted to Brown Mustard in 2016.  
-if planted to Wheat crop in 2016, would be a huge wireworm population buildup. **About 100x higher!!!!!!**

Field 14 

Field 14 Cropping History (9 acres)	
2011	Potatoes (Thimet)
2012	Winter Wheat 
2013	Potatoes (Thimet)
2014	Winter Wheat
2015	Soybean
2016	Mustard 

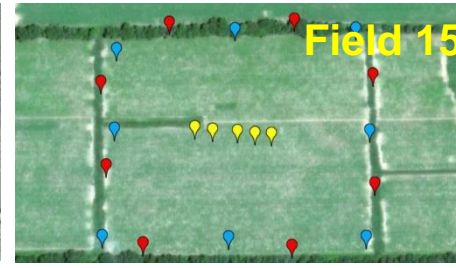
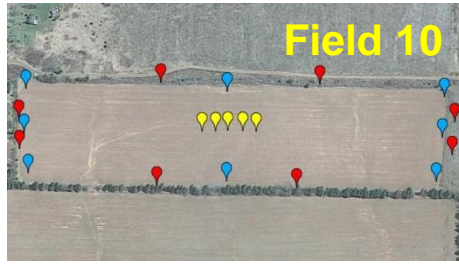
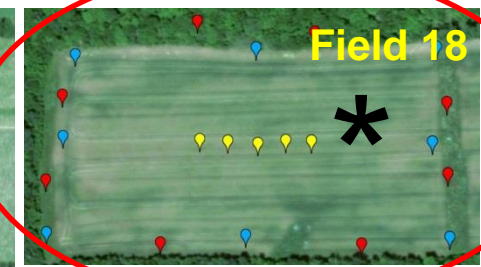
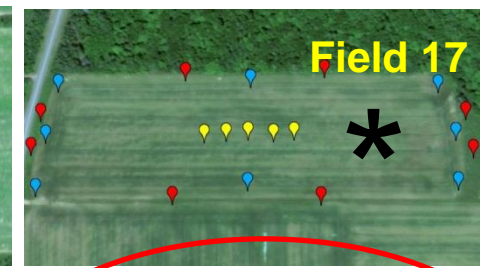
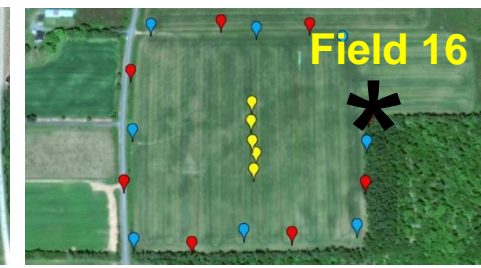




Crops in 2012: \*  
Potatoes +  
Thimet 15G

**Field 6 Cropping History (10 acres)**

2011	Soybean
<b>2012</b>	<b>Potatoes (Thimet)</b>
2013	Winter Wheat
2014	Barley
2015	Potatoes (Thimet)
<b>2016</b>	<b>Winter Wheat</b>



### Headlands (Total Catch)

- 1 H1\* (157)
- 2 H2\* (1205)
- 3 H3 (1849)
- 4 H4 (2101)
- 5 H5 (264)
- 6 H6 (61)
- 7 H7 (140)
- 8 H8 (139)

### Perimeter (Total Catch)



- 1 P1 (427)
- 2 P2\* (1335)
- 3 P3 (3020)
- 4 P4 (2785)
- 5 P5 (2155)
- 6 P6 (83)
- 7 P7\* (329)
- 8 P8\* (452)

### Center (Total Catch)

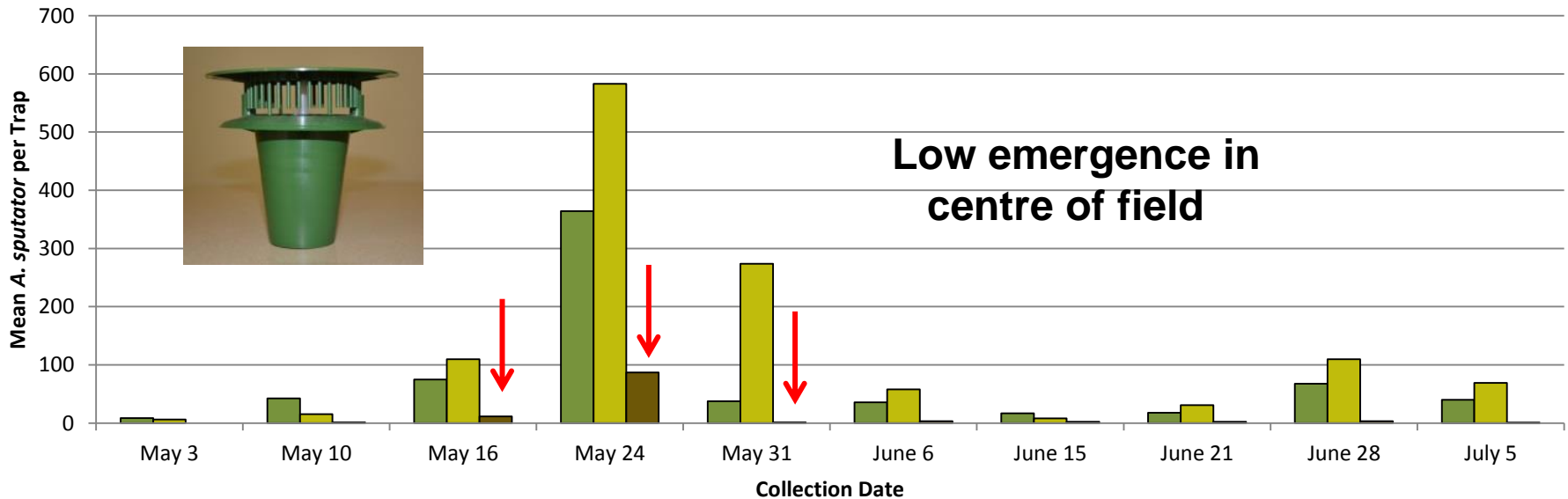
- 1 C1\* (115)
- 2 C2\* (116)
- 3 C3\* (88)
- 4 C4\* (137)
- 5 C5\* (117)



## Field 18 Cropping History (3.9 acres)

2011	Soybean	
2012	Potatoes (Thimet)	
2013	Winter Wheat	
2014	Barley	
2015	Potatoes (Thimet)	
2016	Winter Wheat	

■ avg. headlands ■ avg. perimeter ■ avg. center



## Conclusions:

- 1) Potatoes with Thimet did not favour egg laying that year.
  - So potatoes in 2012 gave rise to low beetle emergence in field in 2016.
  - Potential Reasons: Potatoes not favoured for egg laying AND/OR Thimet also affects egg laying or hatch survival

Field 18 in 2016

A wide-angle photograph of a vast, green agricultural field, likely a potato field, under a bright blue sky with scattered white clouds. The field is filled with dense, vibrant green plants. In the background, a thick line of trees with varying shades of green and brown stretches across the horizon. The overall scene is bright and clear, suggesting a sunny day.

# Click Beetle Monitoring



*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

In-Field Monitoring:  
- IPM program

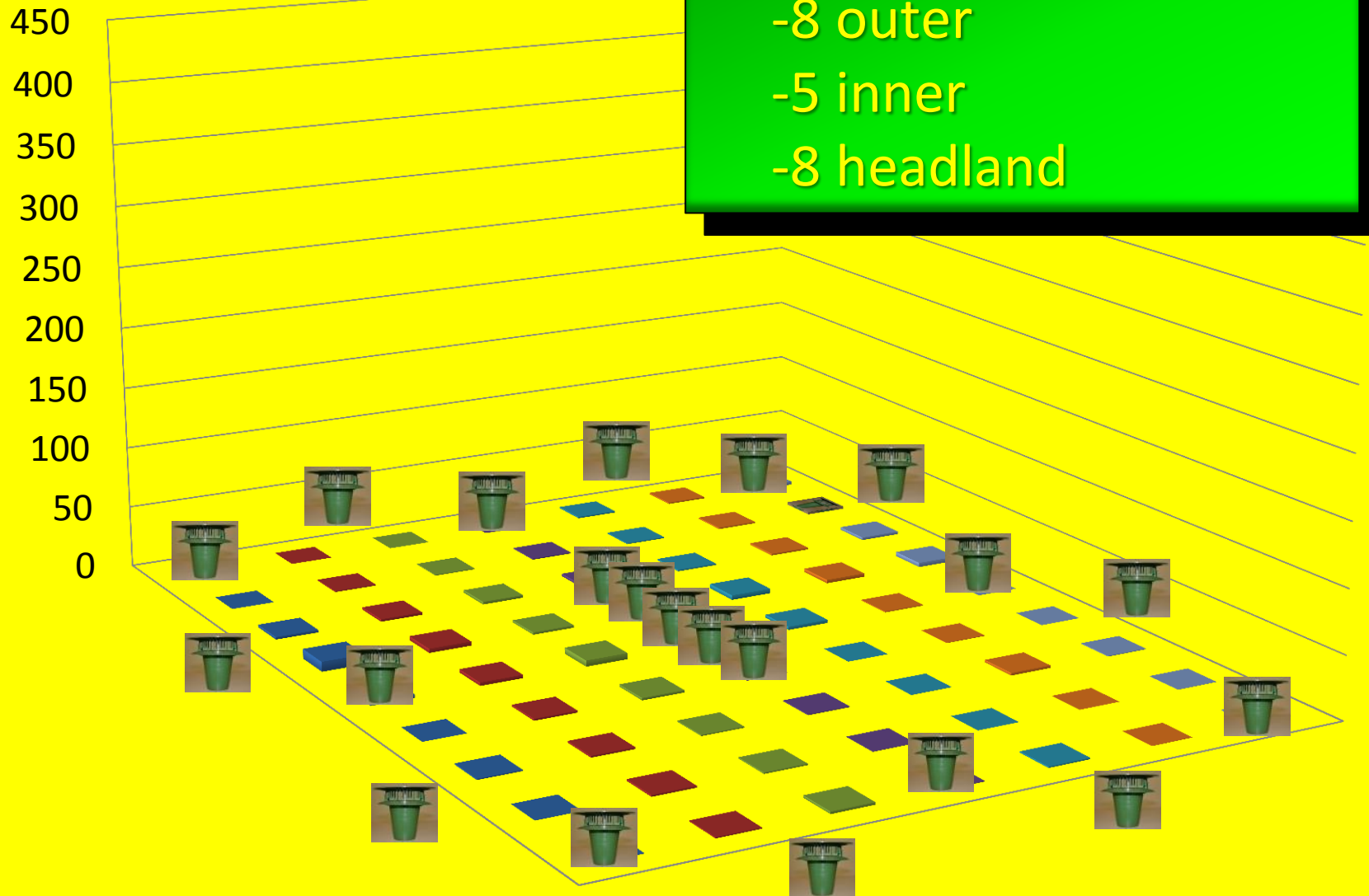
New IPM Trapping  
Strategy for 2017

2016: 19 fields in PEI

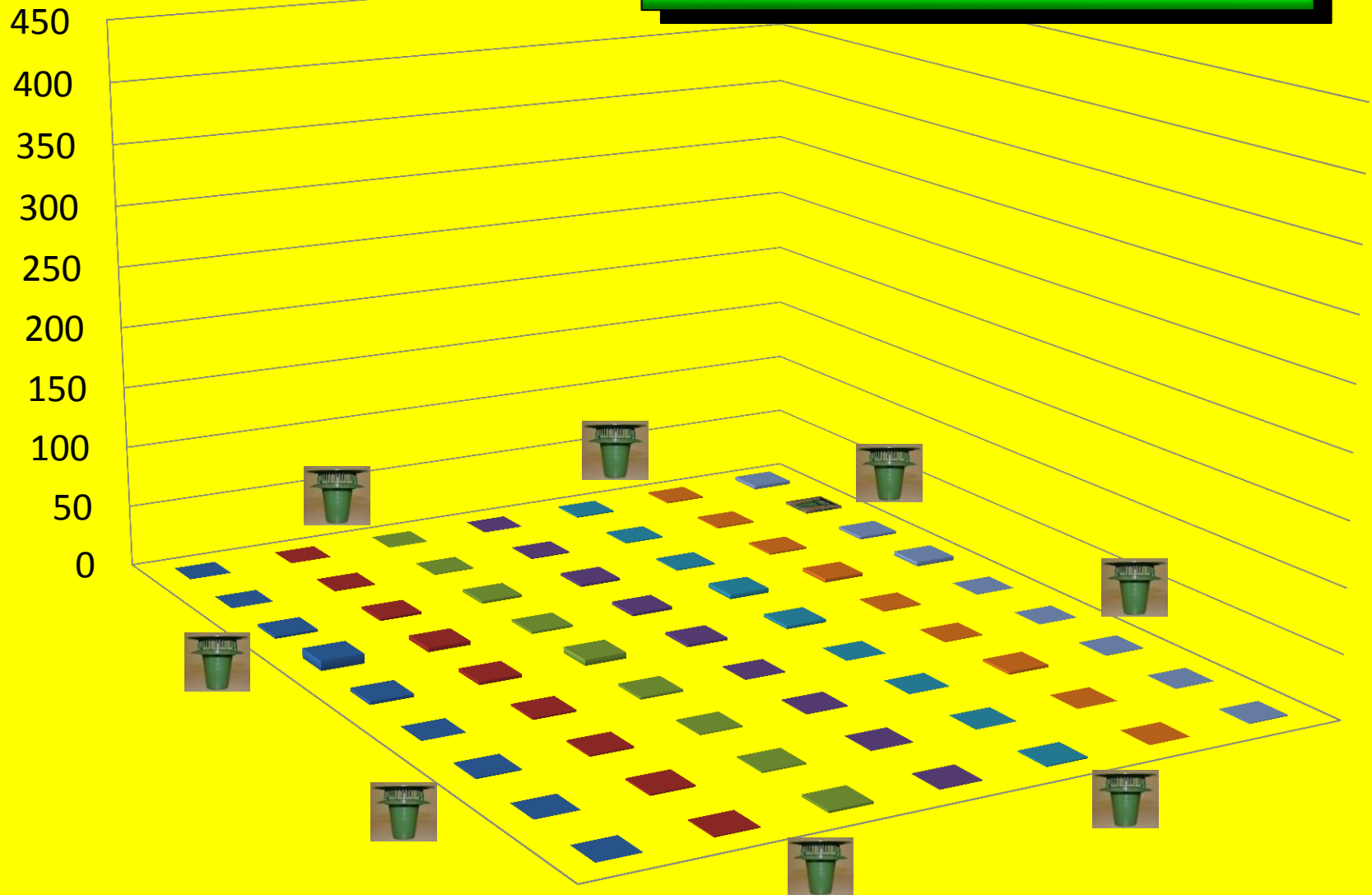
-8 outer

-5 inner

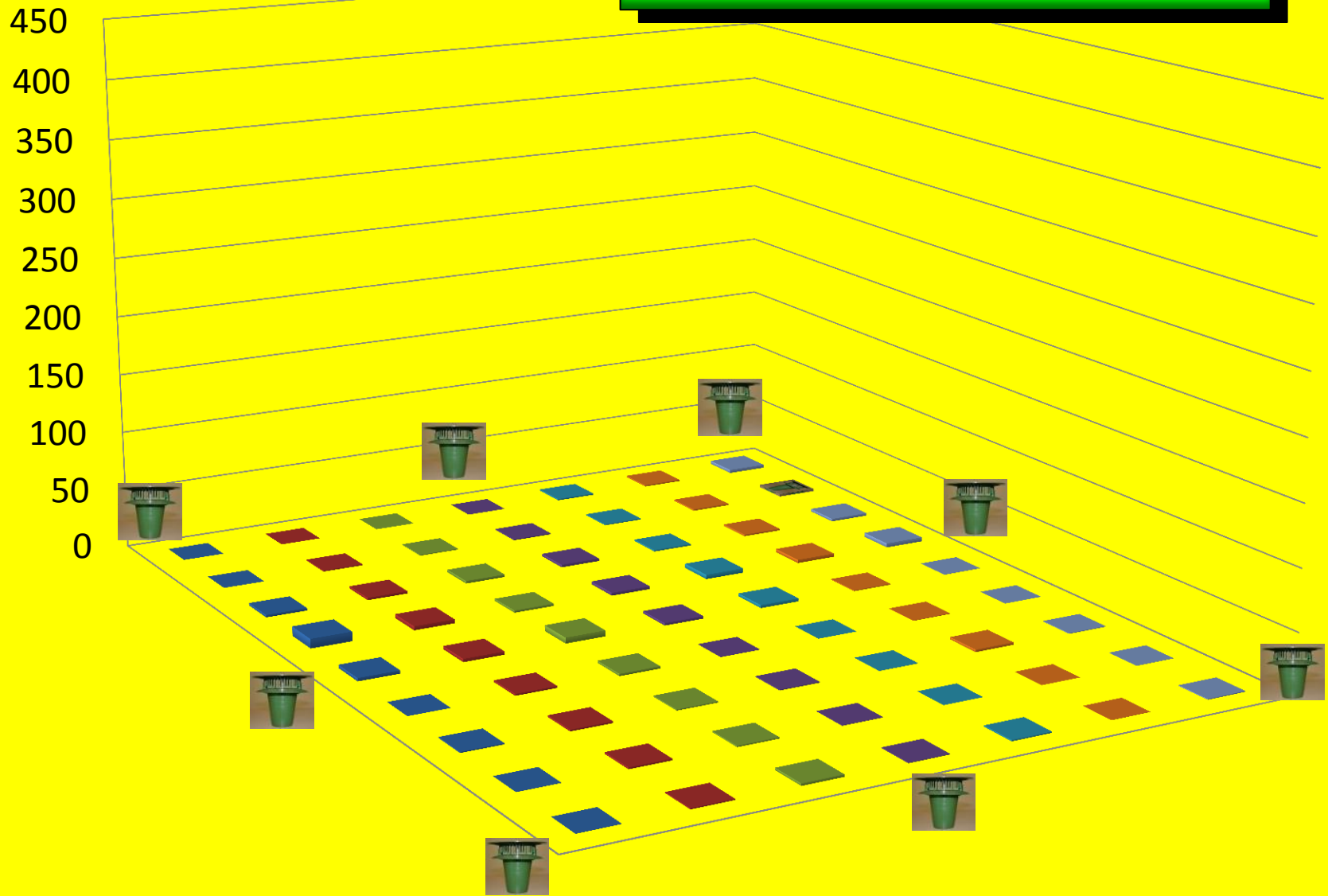
-8 headland



# Future IPM Program -8 headland traps



# Future IPM Program -8 headland traps





## Advantages:

- Determine field risk for *A. sputator*.
- Identify main infestation areas.
- Convenient trap locations (not in field).
- Can be permanent sites (winter lids).
- Cost of 8 traps = \$16 (year 1); \$4 (future).



## Advantages:

- All CBs in traps are *A. sputator* males.
- Rapid counting method developed.
- Can be run by anyone.
- 10-20 acres done per hour.
- Labour reduced after first year.
- Makes Mass Trapping more affordable



# Headlands (Total Catch)

- 1 H1 (911)
- 2 H2 (451)
- 3 H3 (3)
- 4 H4 (20)
- 5 H5 (882)
- 6 H6 (1578)
- 7 H7 (241)
- 8 H8 (445)

Wipe out  
Reservoir pop'n



If you are having serious  
problems with wireworms:  
HIRE A SUMMER STUDENT  
TO DO THE TRAPPING  
Cost is about \$30/acre



# Click Beetle Monitoring

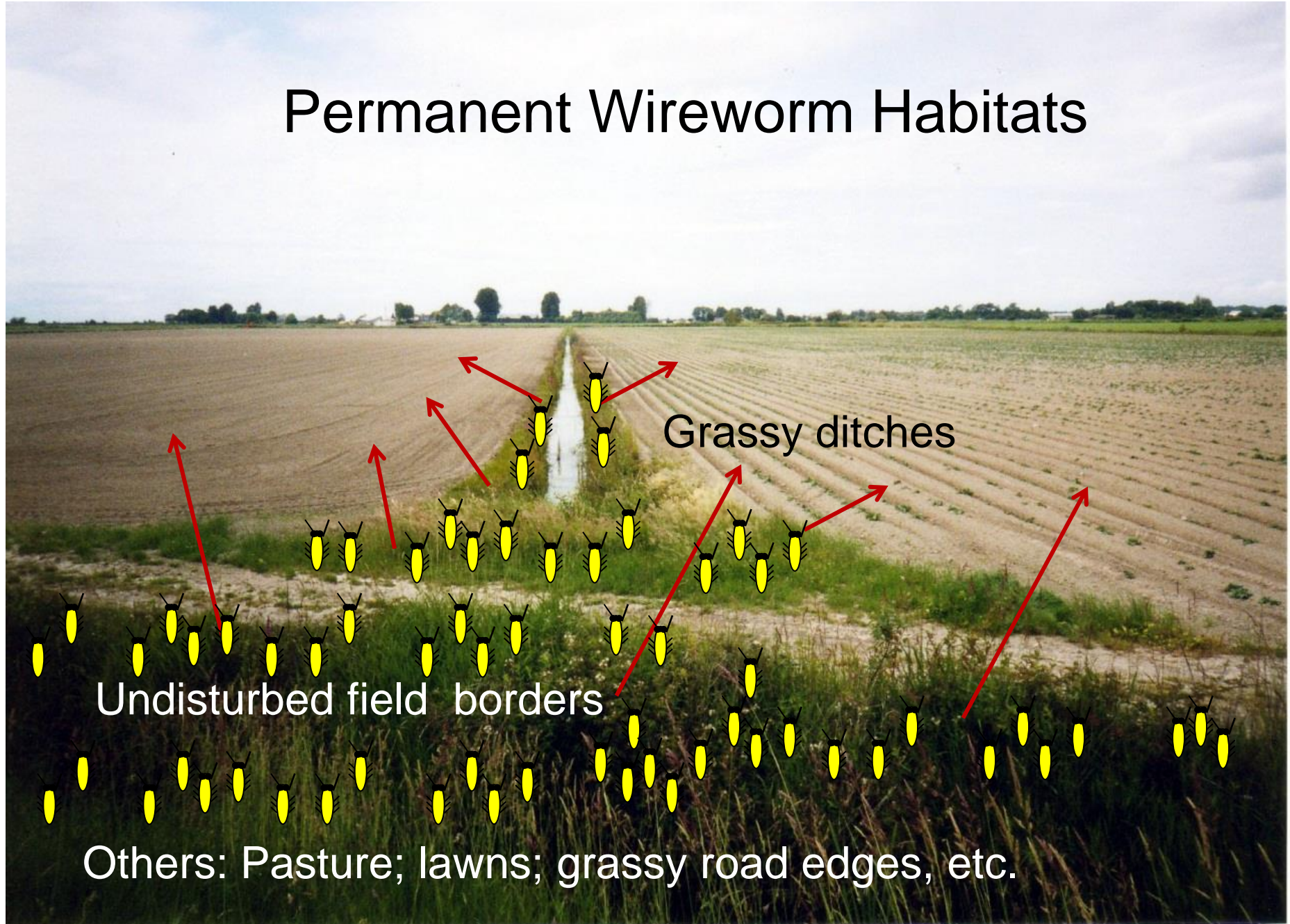


*A. sputator*; *A. obscurus*;  
*A. lineatus*; *H. abbreviatus*

In-Field Monitoring:  
- IPM program

Sentinel Traps:  
- General Survey  
- Risk Assessment

# Permanent Wireworm Habitats



Grassy ditches

Undisturbed field borders

Others: Pasture; lawns; grassy road edges, etc.



Permanent  
Wireworm/  
Click Beetle  
Reservoir

Populations  
fairly consistent

## Advantages of Sentinel Trapping:

- Is *A. sputator* in the field?
- Relative numbers in area?
- One person can run 150-200 sites.
- Can be run by anyone.
- Can help determine WW risk in area.
- To be discussed in last talk.

X



Permanent  
Wireworm/  
Click Beetle  
Reservoir



## Disadvantages of Sentinel Trapping:

- Site selection for trap important.
- Not as accurate as IPM approach  
(1 trap versus 8 headland traps).

X

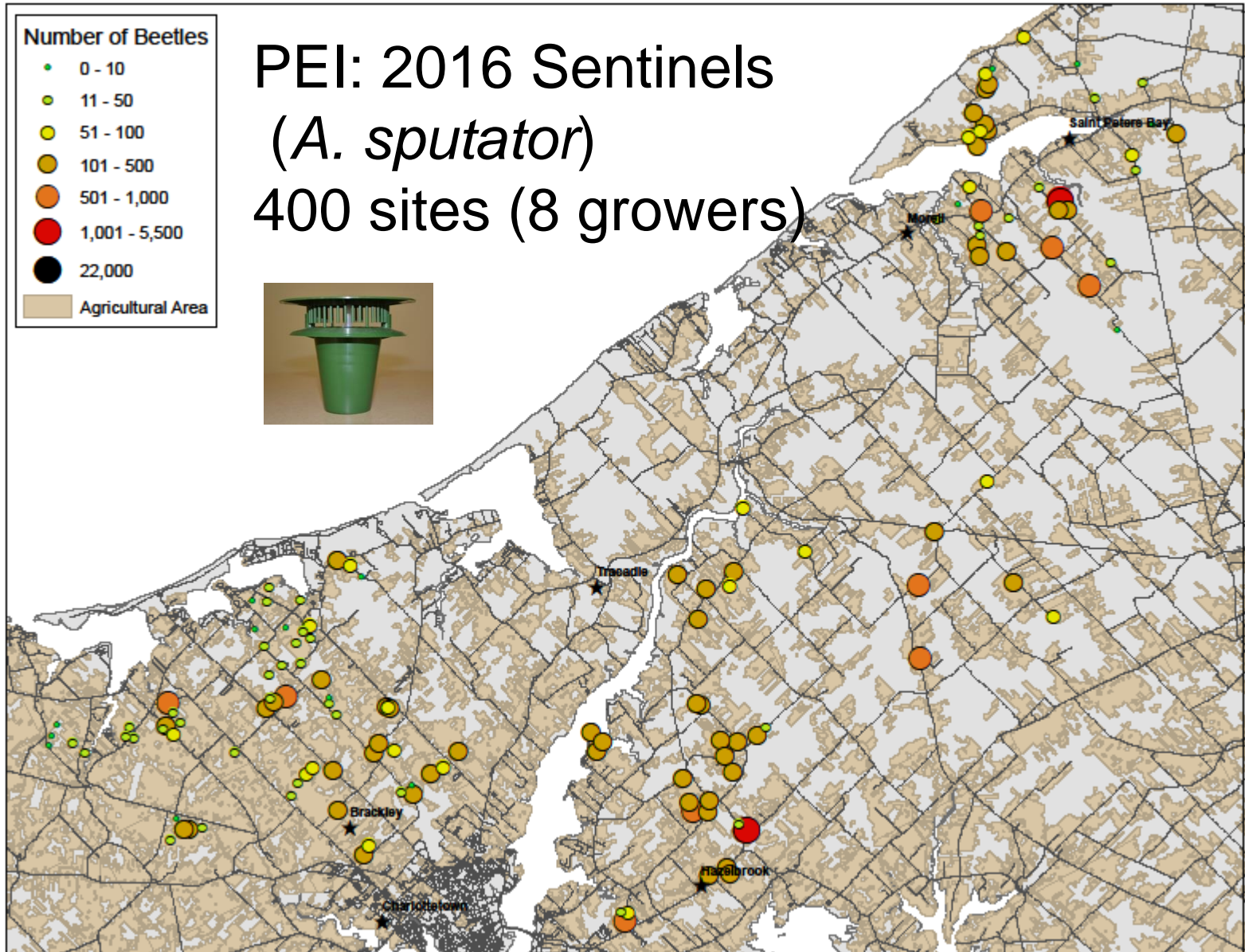


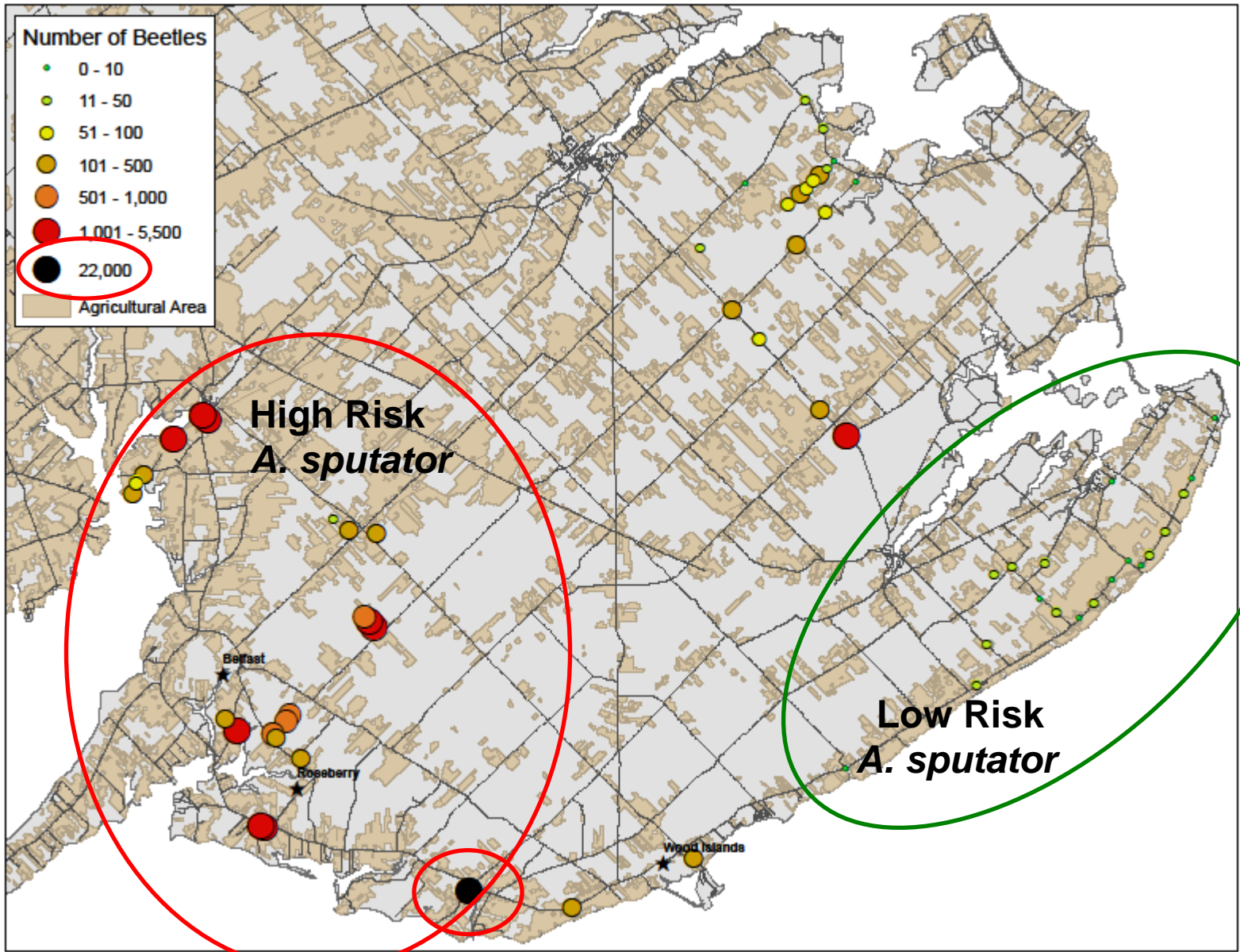
Permanent  
Wireworm/  
Click Beetle  
Reservoir

Number of Beetles

- 0 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1,000
- 1,001 - 5,500
- 22,000
- Agricultural Area

# PEI: 2016 Sentinels (*A. sputator*) 400 sites (8 growers)





Wireworm  
Topics

Wireworm and  
Click Beetle  
Biology



Control

Click Beetles



Wireworms

Potatoes

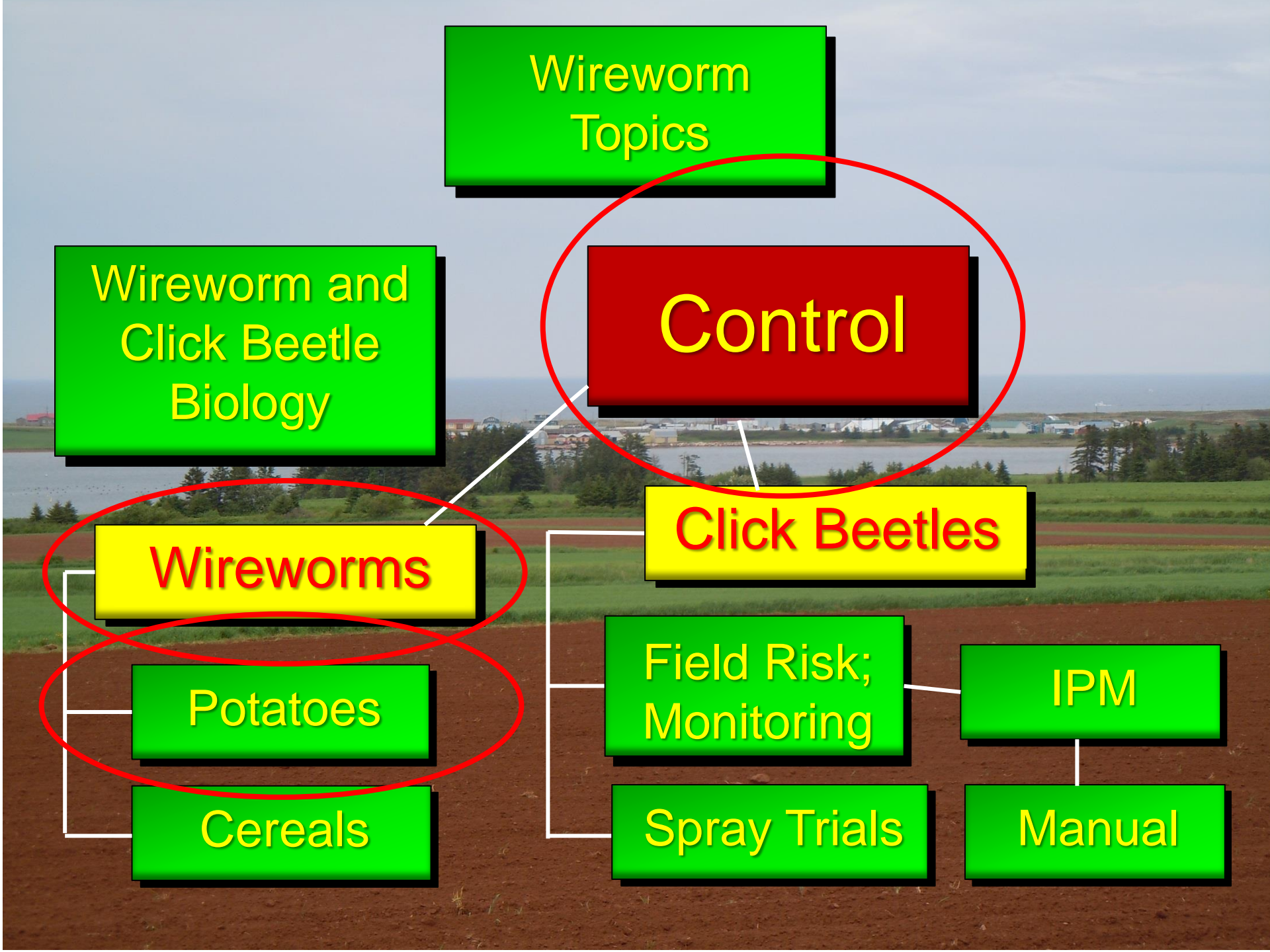
Cereals

Field Risk;  
Monitoring

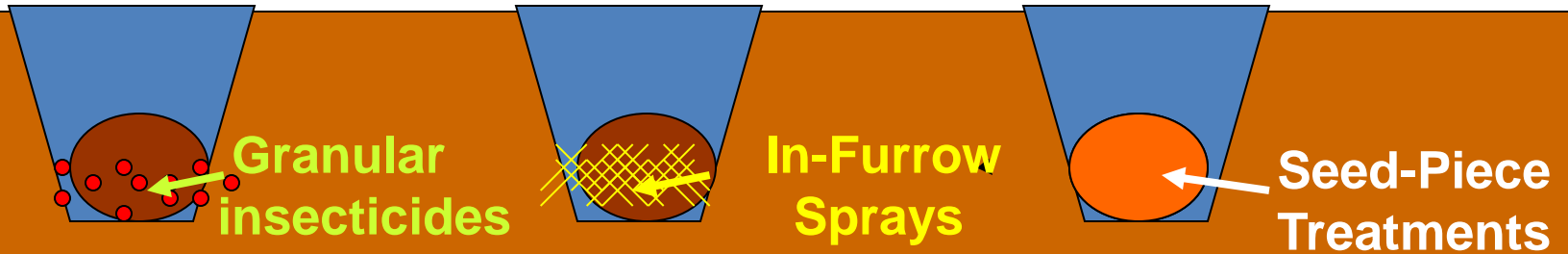
Spray Trials

IPM

Manual



# At planting options in potato production in Canada.



Thimet (OP)



Actara (N)  
Admire (N)



Titan (N)  
Actara (N)  
Admire (N)



Pyrifos (OP)



Pyrinex (OP)



Capture (P)

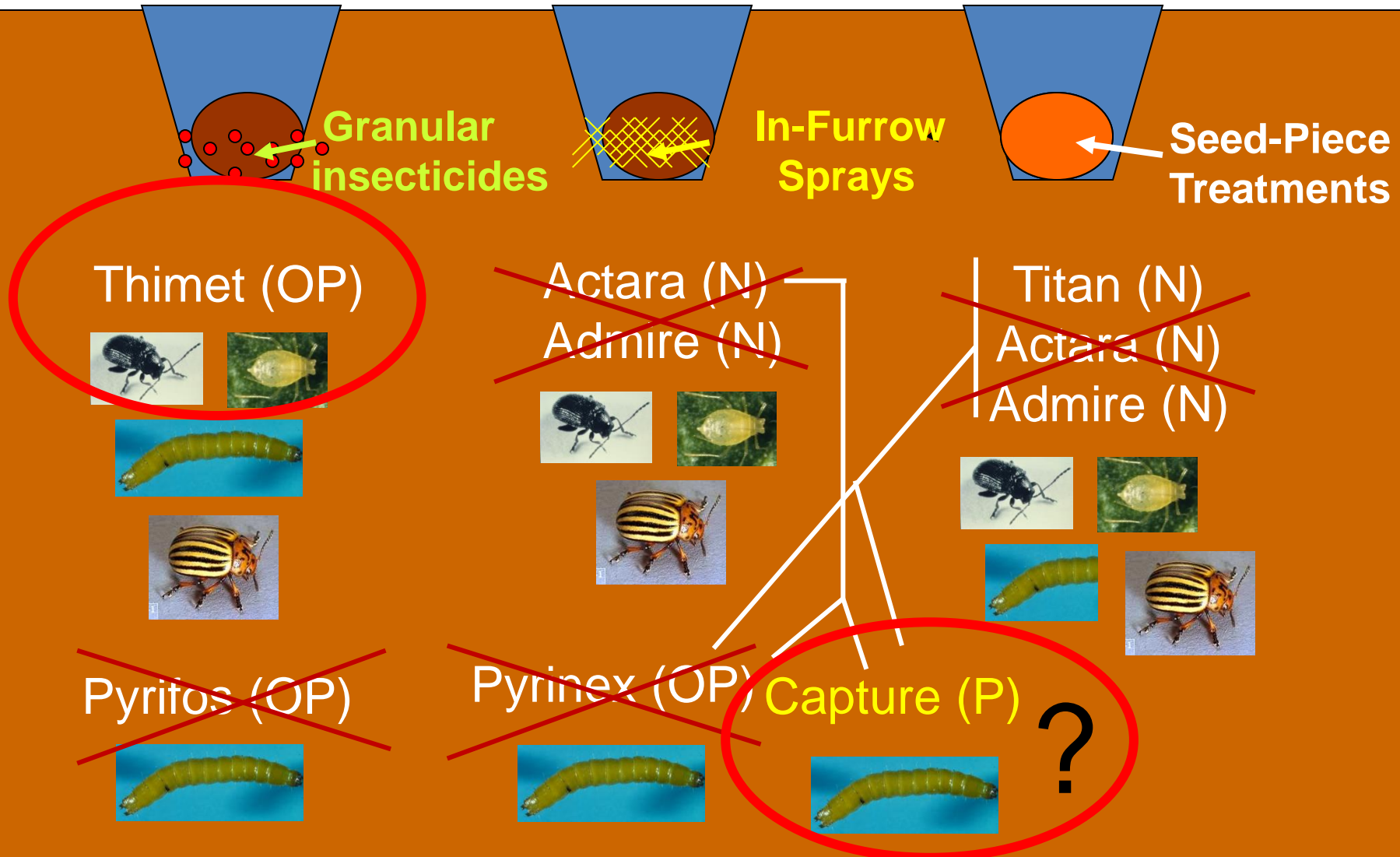


## Present dilemma in Canada:

- Neonics (e.g. Titan) under the gun.
  - Worldwide honeybee issues.
- Chlorpyrifos (e.g. Pyrinex) fate uncertain.
- Capture: conditional registration.
- May lose most of our WW arsenal.



# At planting options in potato production in Canada.



# Growing Forward II initiative: -Canadian Hort. Council Wireworm Cluster Project

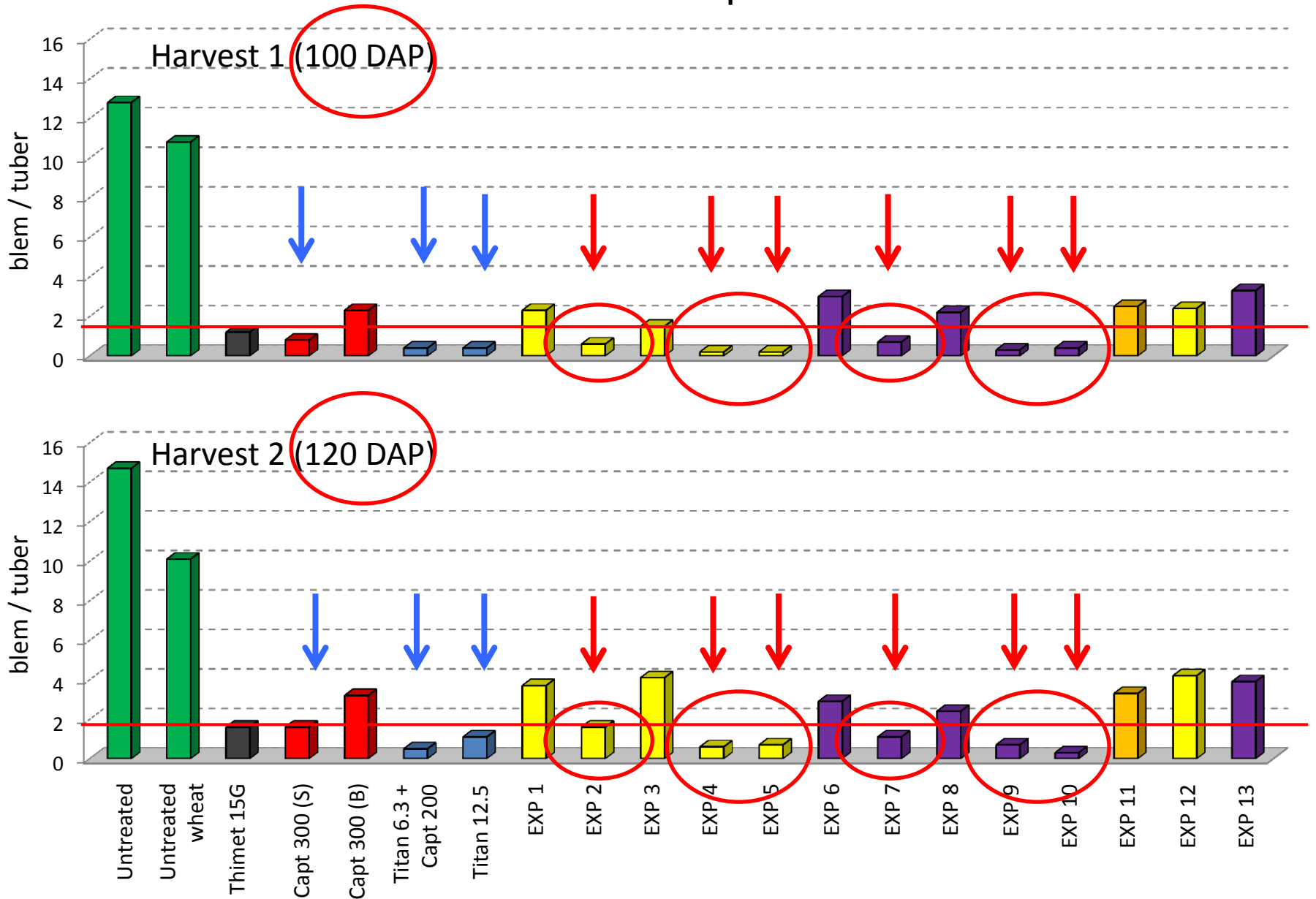


Annual potato insecticide trials conducted in BC, PEI and other areas across Canada to develop safer, efficacious and cost effective solutions for the future.



# ***Insecticide Efficacy Trials at PARC, Agassiz, 2016***

## Mean wireworm blemishes per market-sized tuber



# Concurrent Field and Laboratory Wheat Trials

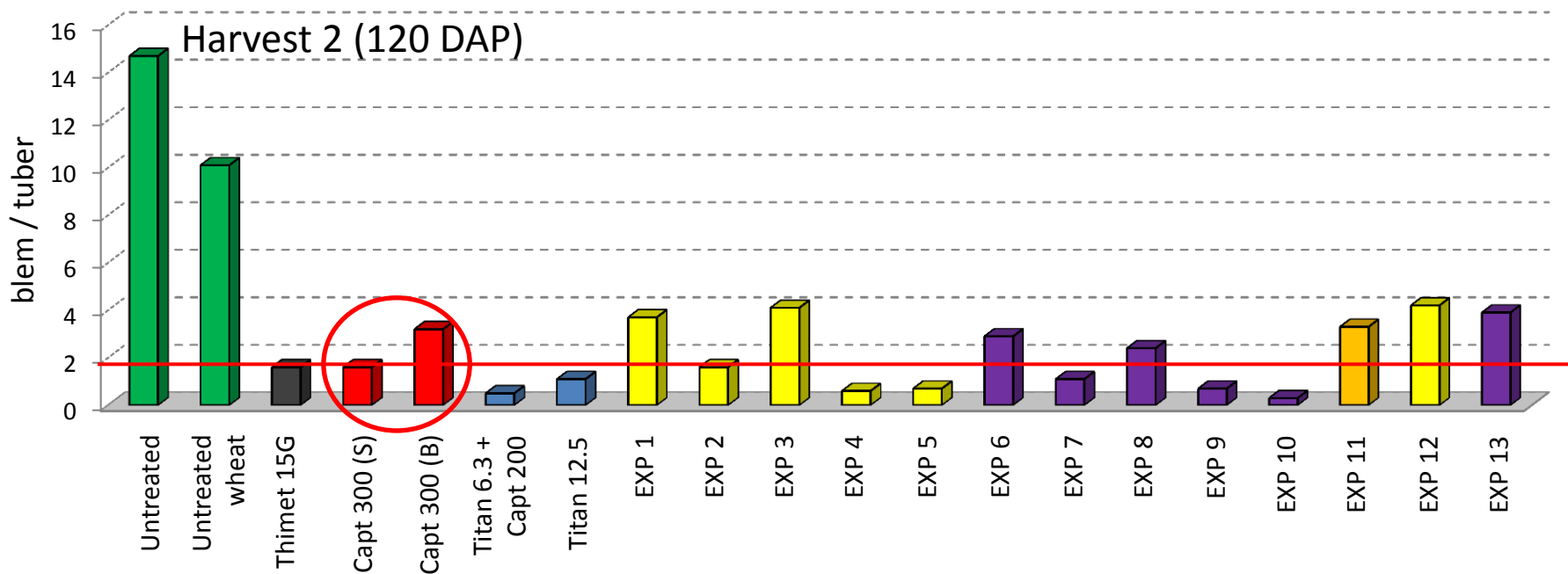
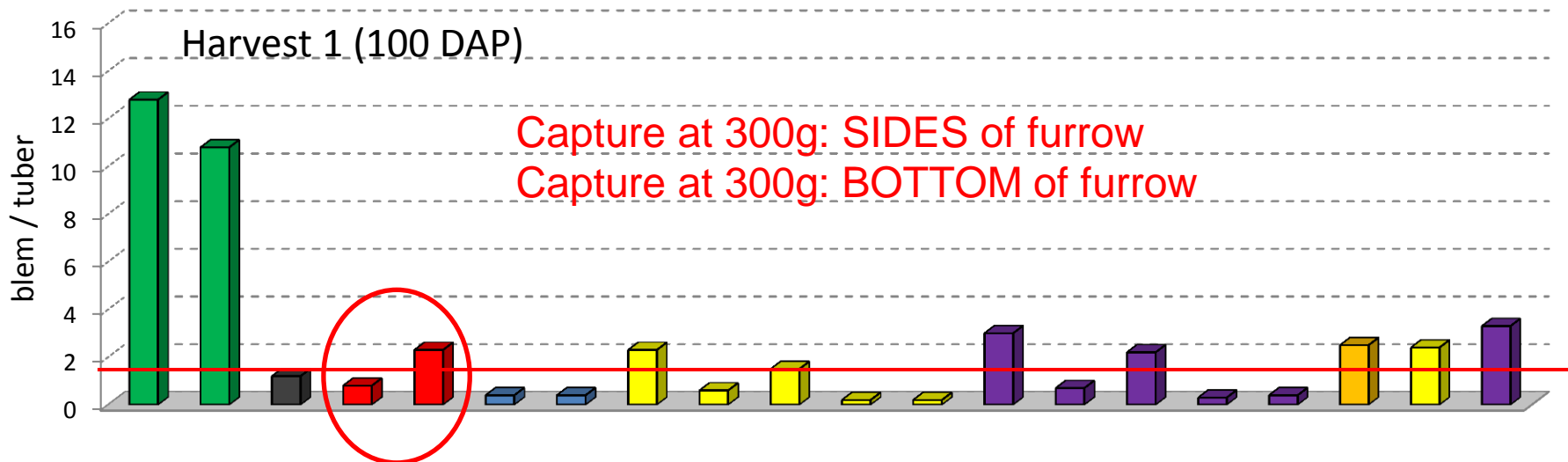
- Support potato and cereal crop registrations
- Crop protection data
- Wireworm kill

Definite hope for the near future!!!

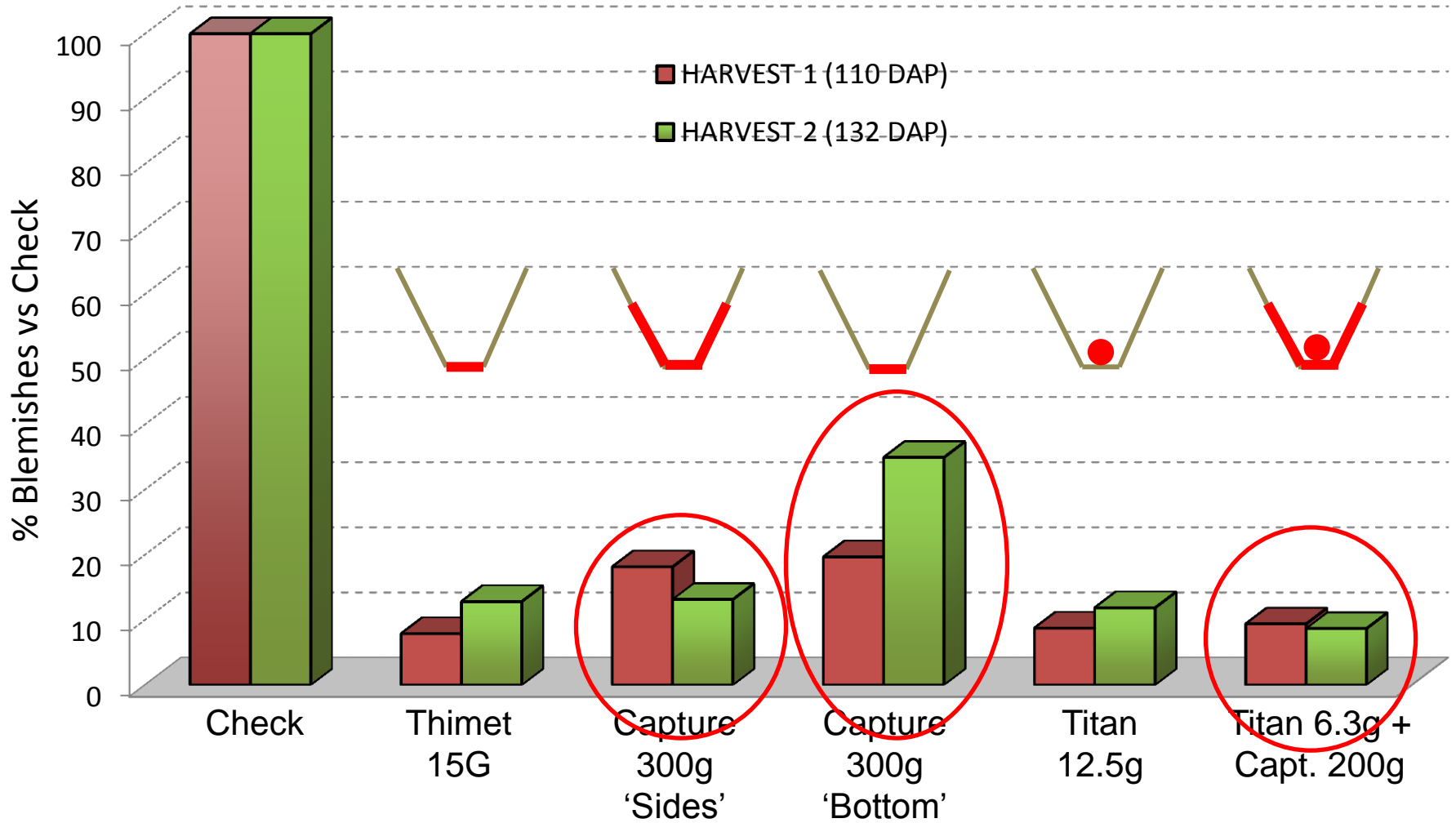
A wide-angle photograph of a large agricultural field. The foreground and middle ground are filled with rows of young, green wheat plants. The plants are spaced out in a grid pattern, with small blue and red markers visible between them. The soil is dark brown. In the background, there are rolling green hills and mountains under a bright blue sky with scattered white clouds. A few buildings and trees are visible in the distance.

# *Insecticide Efficacy Trials at PARC, Agassiz, 2016*

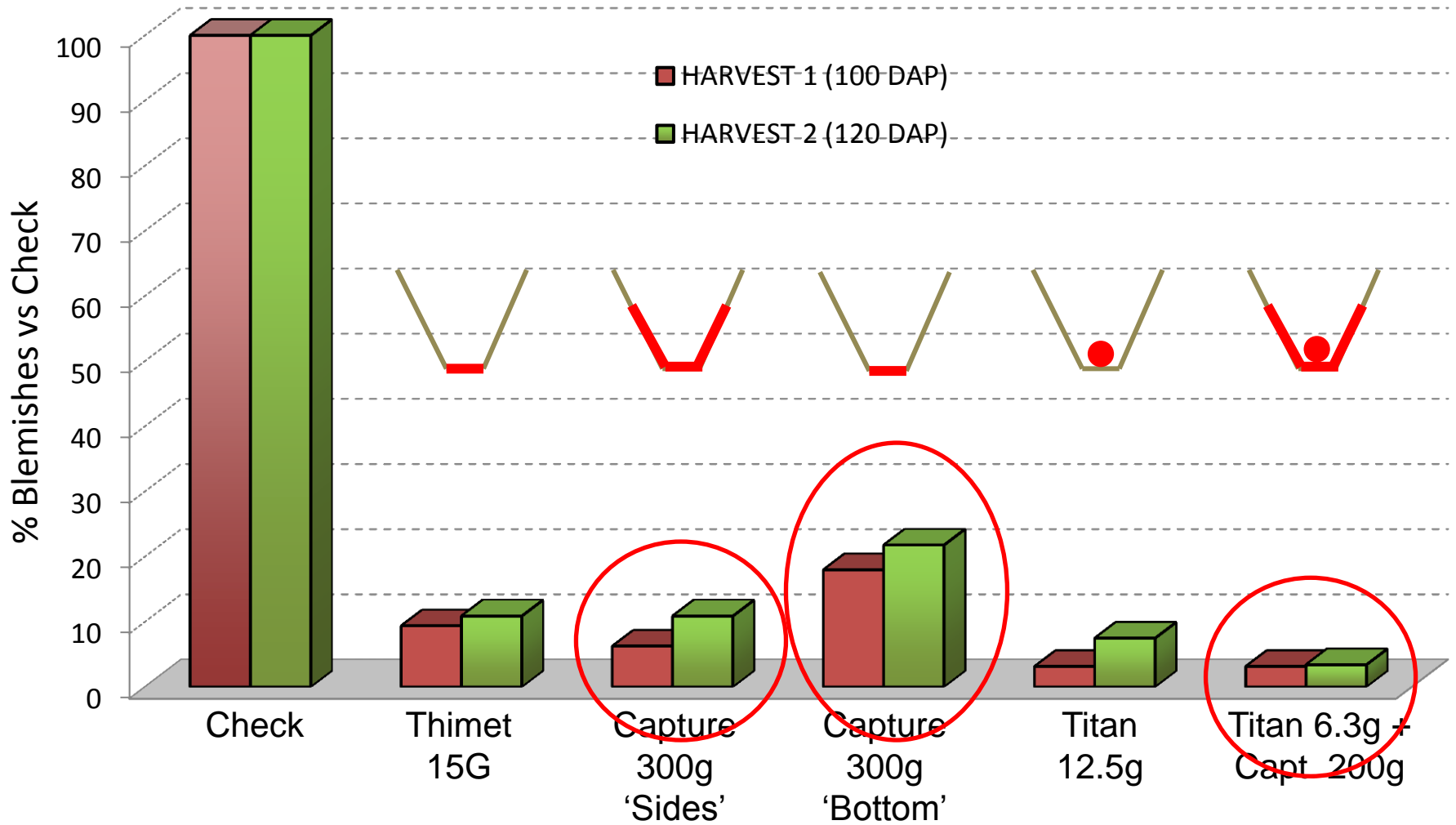
## Mean wireworm blemishes per market-sized tuber

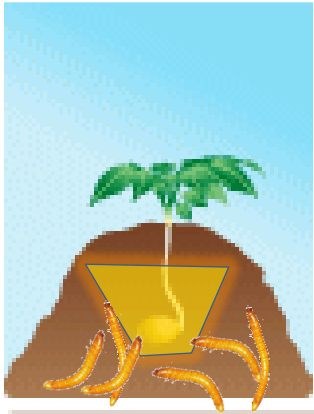


# 2015 Agassiz Potato Trial



# 2016 Agassiz Potato Trial





Early Rosette

Wireworm  
Topics

Wireworm and  
Click Beetle  
Biology

Control

Wireworms

Click Beetles

Potatoes

Field Risk;  
Monitoring

IPM

Cereals

Spray Trials

Manual

# Click Beetle Control





January

February

March

April

May

June

July

August

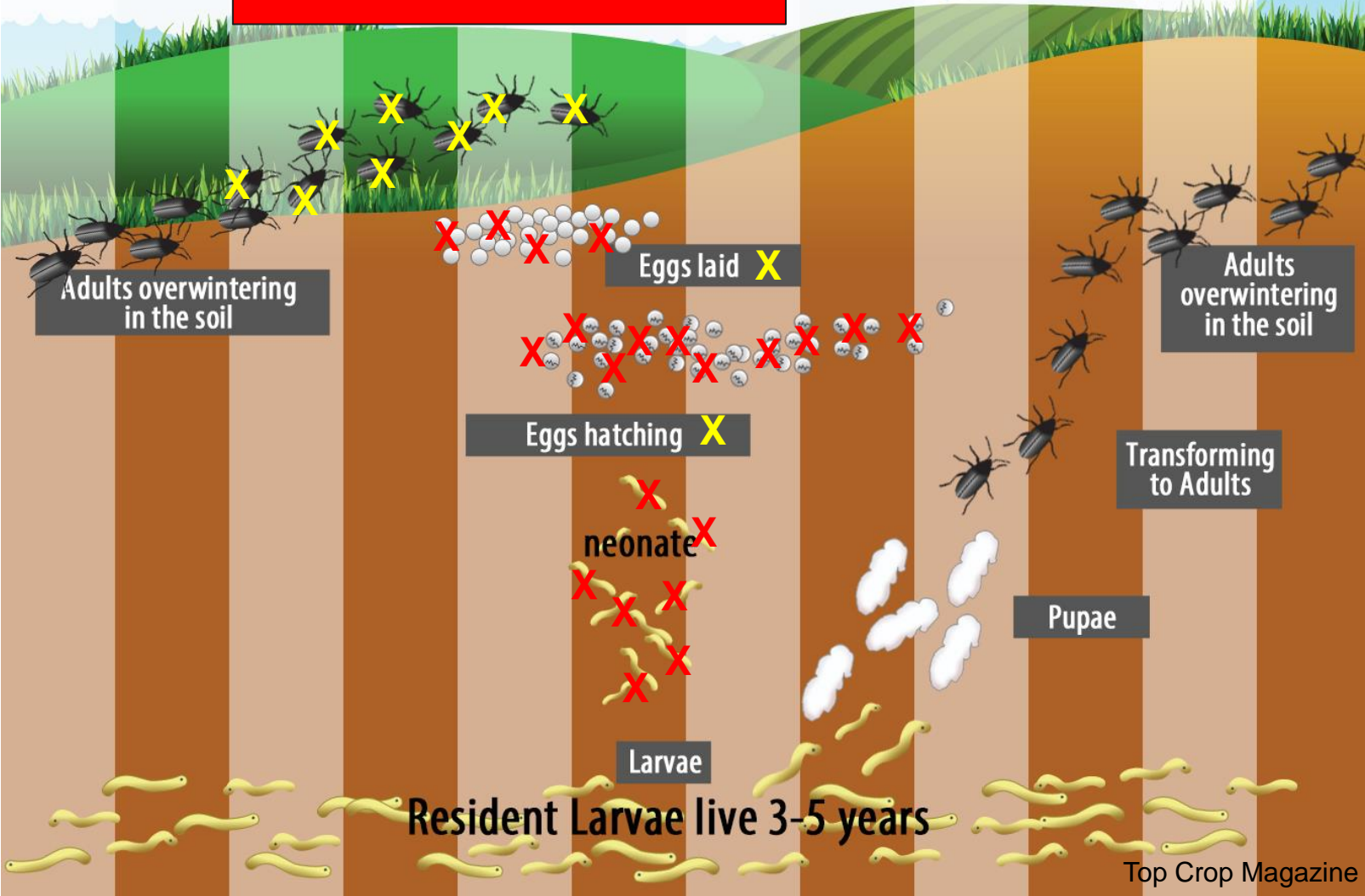
September

October

November

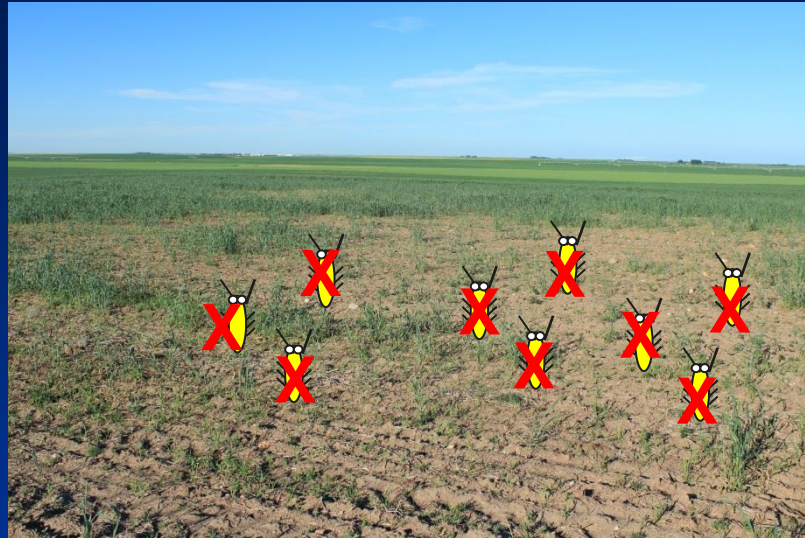
December

# Control Click beetles



# Control Options:

**A) Farmed  
Habitats**



**+**

**B) Non-Farmed  
Habitats**



# A) Farmed Habitats

## Strategies under evaluation

- **Insecticidal sprays.**
  - B. Vernon and W. van Herk
- **Biological + Semiochemical.**
  - T. Kabaluk

Wireworm  
Topics

Wireworm and  
Click Beetle  
Biology

Control

Wireworms

Click Beetles

Potatoes

Field Risk;  
Monitoring

IPM

Cereals

Spray Trials

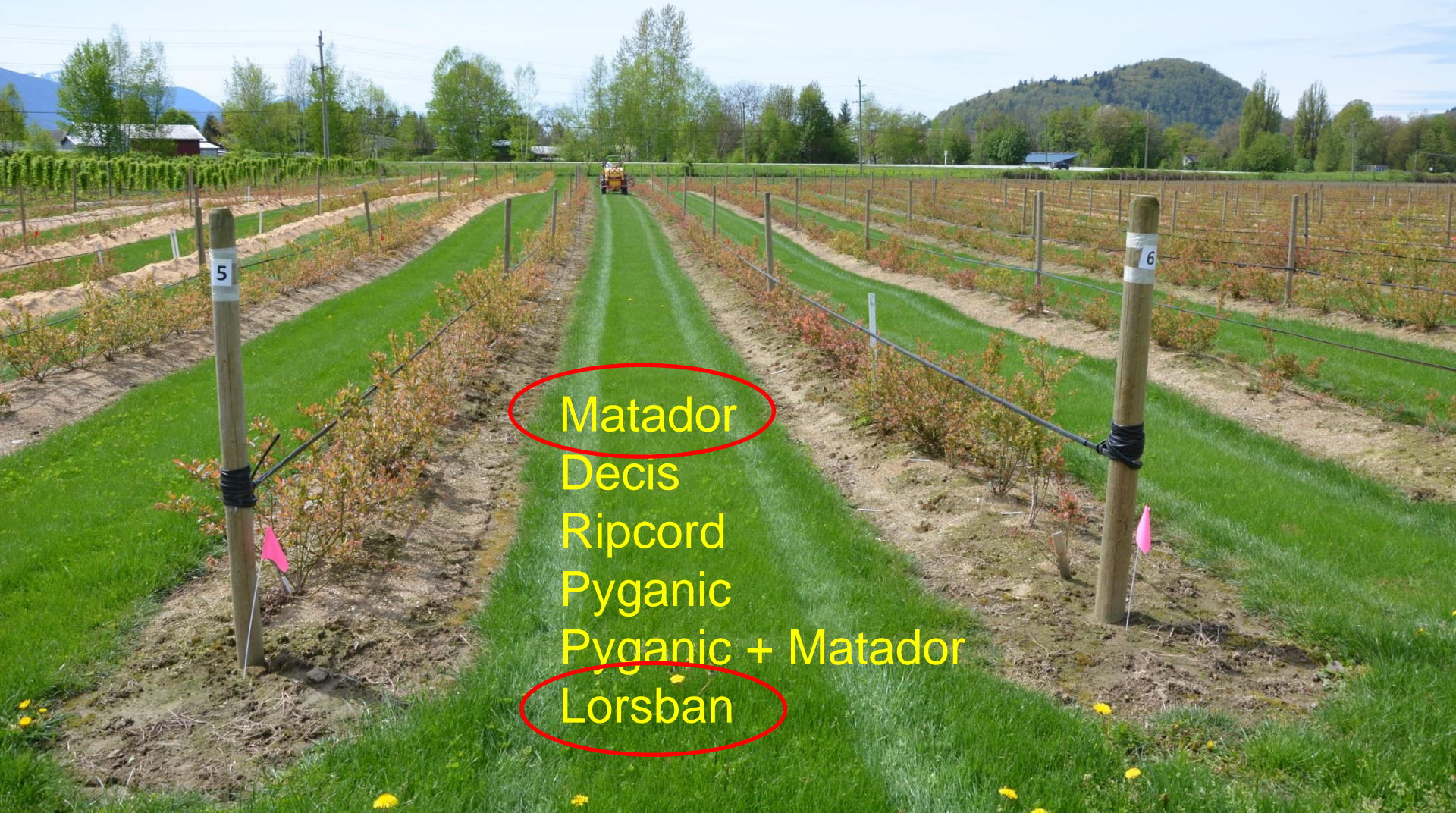
Manual

# Insecticidal sprays.

- Nothing registered for click beetle control in Canada.
- Need registrations, which requires research.



# 2014-16 Click Beetle Spray Studies



Matador

Decis

Ripcord

Pyganic

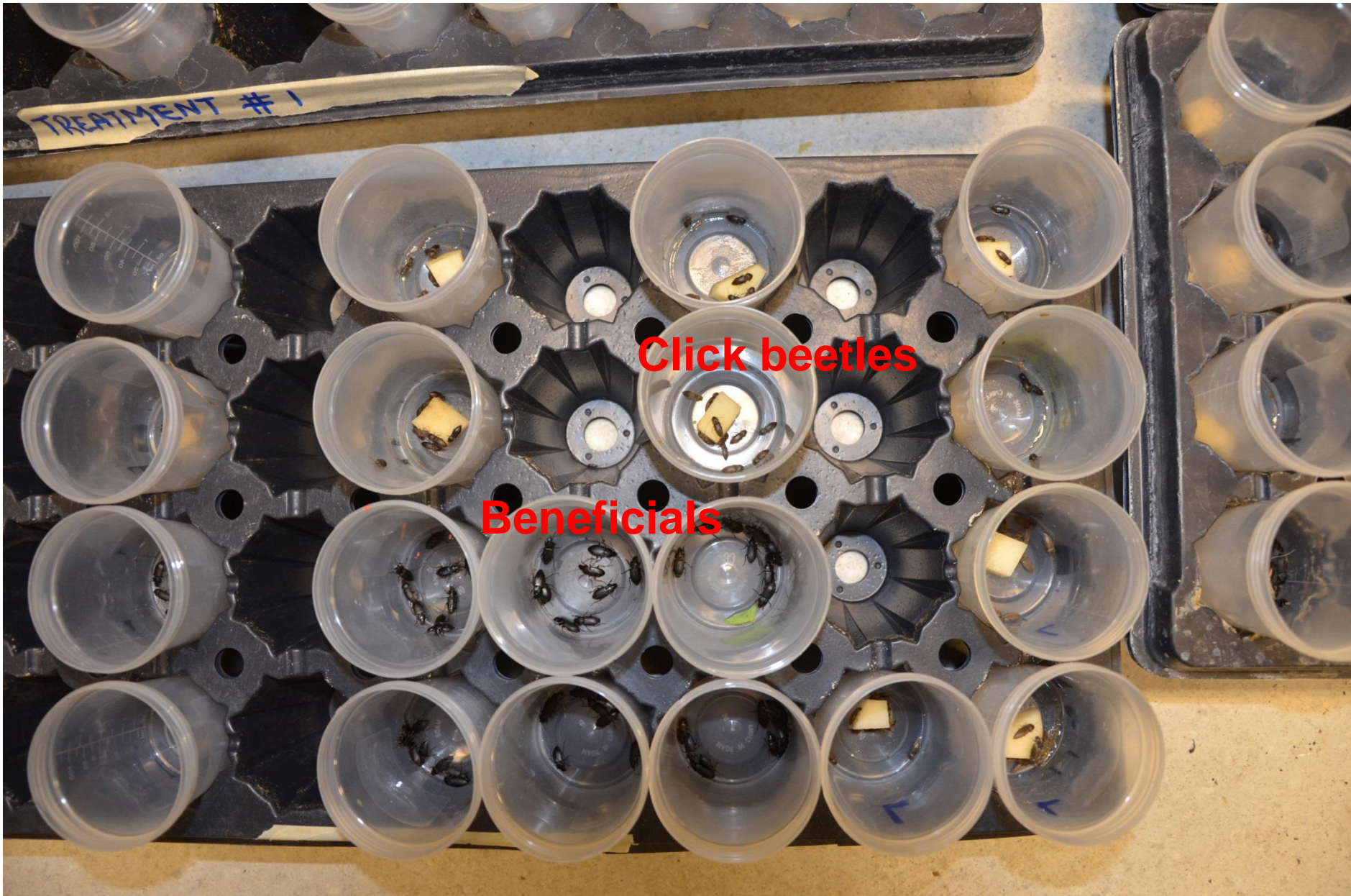
Pyganic + Matador

Lorsban

TREATMENT # 1

Click beetles

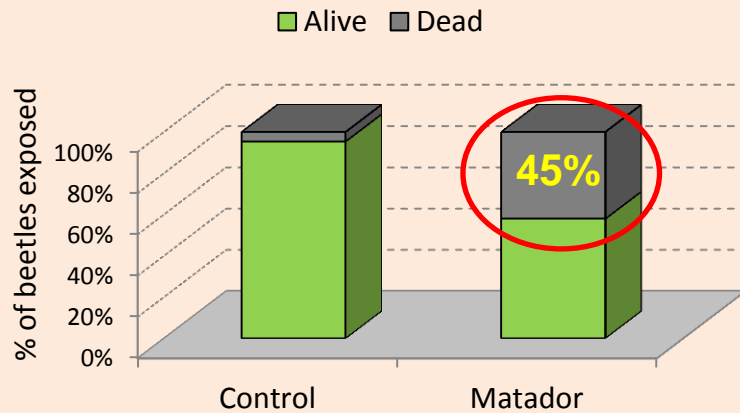
Beneficials



# Matador 120EC (lambda hyhalothrin)

*A. obscurus* (N=220)

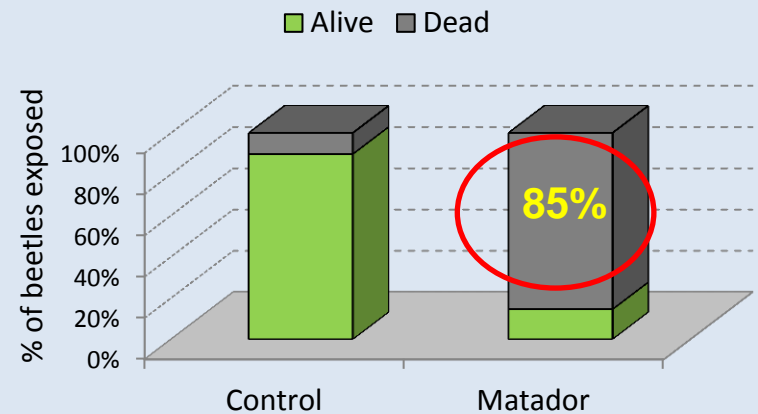
Lambda cyhalothrin: Max rate



Dr. Wim van Herk

*A. lineatus* (N=100)

Lambda cyhalothrin: Max rate





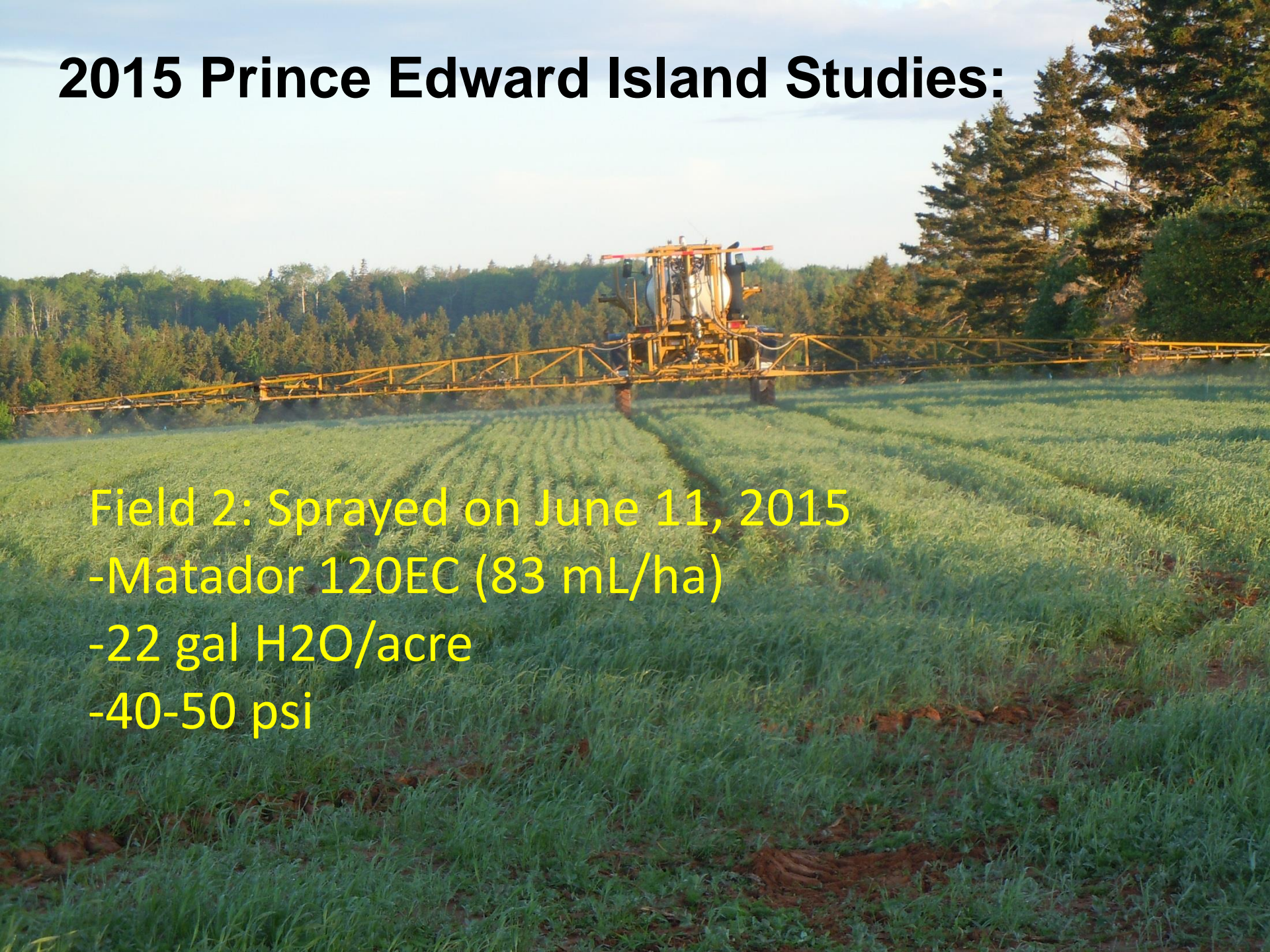
# 2015 Prince Edward Island Studies:

Field 2: Sprayed on June 11, 2015

-Matador 120EC (83 mL/ha)

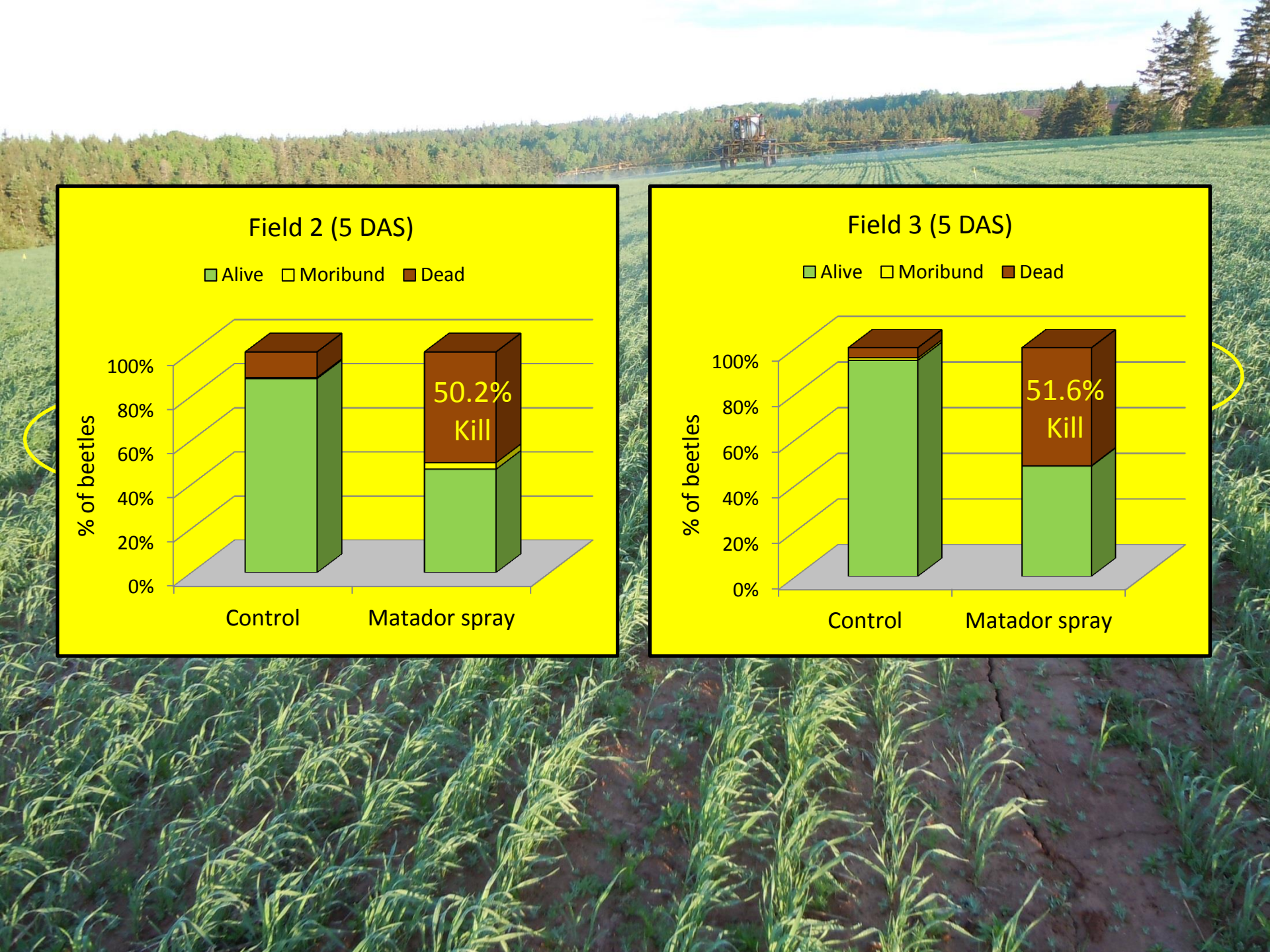
-22 gal H<sub>2</sub>O/acre

-40-50 psi



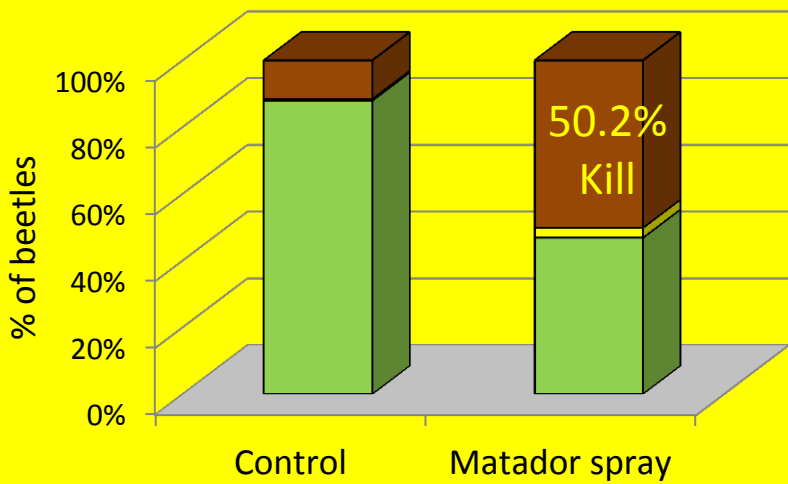
**Field 3: Sprayed on June 11, 2015**  
**-Matador 120EC (83 mL/ha)**





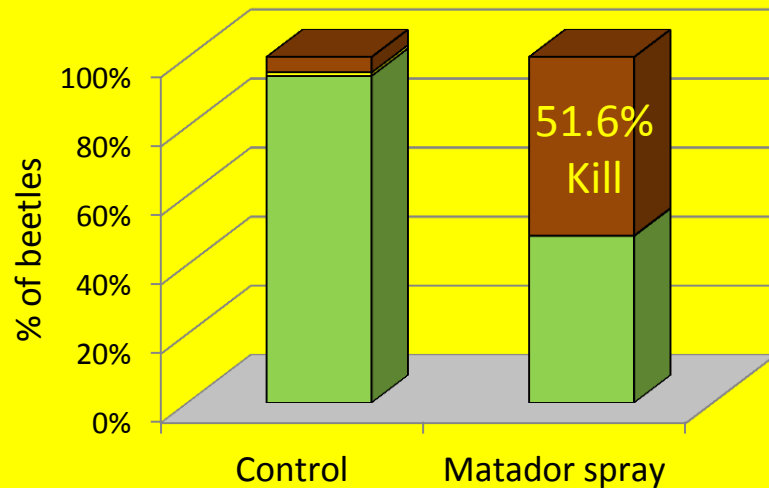
Field 2 (5 DAS)

■ Alive □ Moribund ■ Dead



Field 3 (5 DAS)

■ Alive □ Moribund ■ Dead



# A) Non-Farmed Habitats

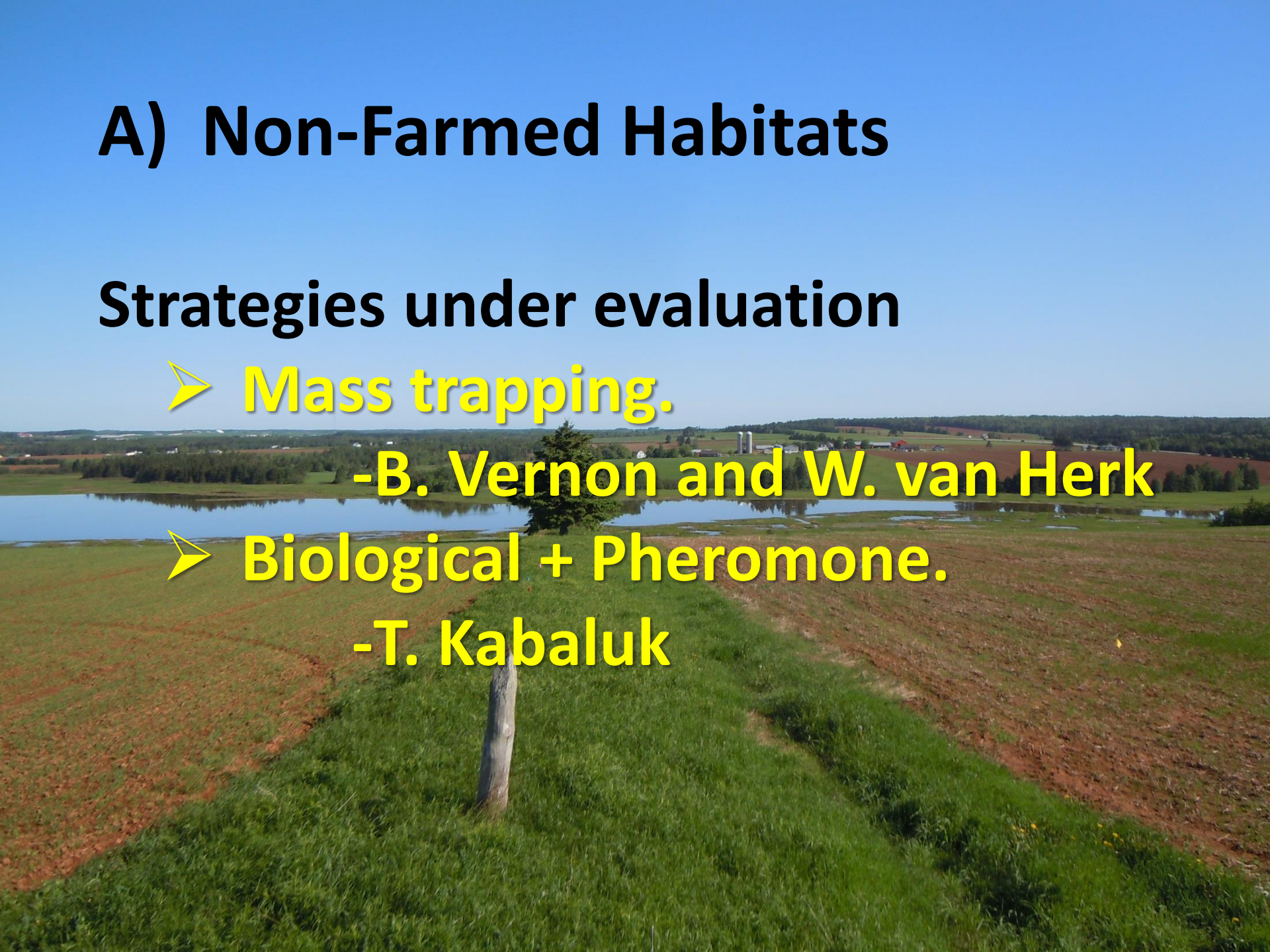
## Strategies under evaluation

➤ **Mass trapping.**

**-B. Vernon and W. van Herk**

➤ **Biological + Pheromone.**

**-T. Kabaluk**



# Pheromones: 'Mass Trapping'

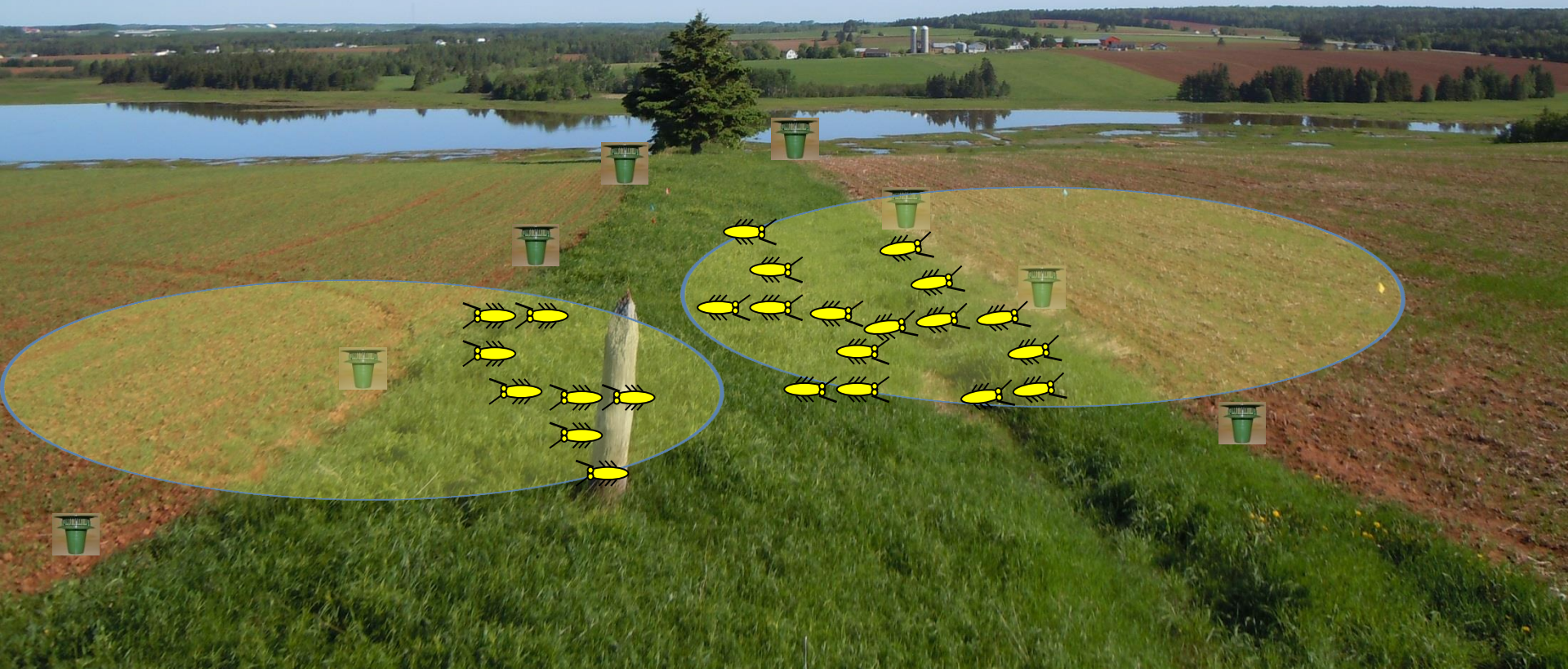


7000 beetles in 5 days!!!



# Pheromone curtain

- Alongside permanent grassy headlands
- Majority of males removed in Spring
- Untrapped females not mated
- Trial(s) planned for BC and PEI in 2017





# Wireworm IPM Program Development

- Continuing research:
- Wireworm and Click Beetle controls.
  - Monitoring and Field Risk Assessments
  - Management Strategies

Wireworm  
Management  
Manual by 2018



# How do you know your field is at risk of wireworm damage?

Wireworm Risk  
To Fields


Field  
History

Sampling

Baseline  
Score

+

Sampling  
Scores

A bald eagle is shown in flight, wings spread wide, against a clear blue sky. The eagle's head is white, and its body and wings are dark. It is flying from the left side of the frame towards the right.

*This project is generously funded through the Canadian Agri-Science Cluster for Horticulture 2, in partnership with Agriculture and Agri-Food Canada's AgriInnovation Program, a Growing Forward 2 initiative, the Canadian Horticultural Council and many industry contributors.*

*Special thanks to:  
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Technology Crops Int.,  
AAFC, Charlottetown staff,  
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Beaton, and Nic Ens.*

*Thank you!!!!*