Cucumber Beetle Management in Organic Cantaloupe & Squash

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THE OHIO STATE UNIVERSITY

Cucumber beetles: key pests of cantaloupe & squash

Feeding damage

Vectors of bacterial wilt disease

Bacterial wilt of cucurbits: Vectored by cucumber beetles

- Transmitted in feces
- Enter via plant wound
- Moisture needed
- Cotyledon stage most susceptible

Russ Ottens, University of Georgia, Bugwood.org

Recent trials

- Row covers
- Insecticides (organic)
- Trap cropping
- Biocontrol
  - Cover crops
  - Strip tillage

Extended duration row cover for muskmelon

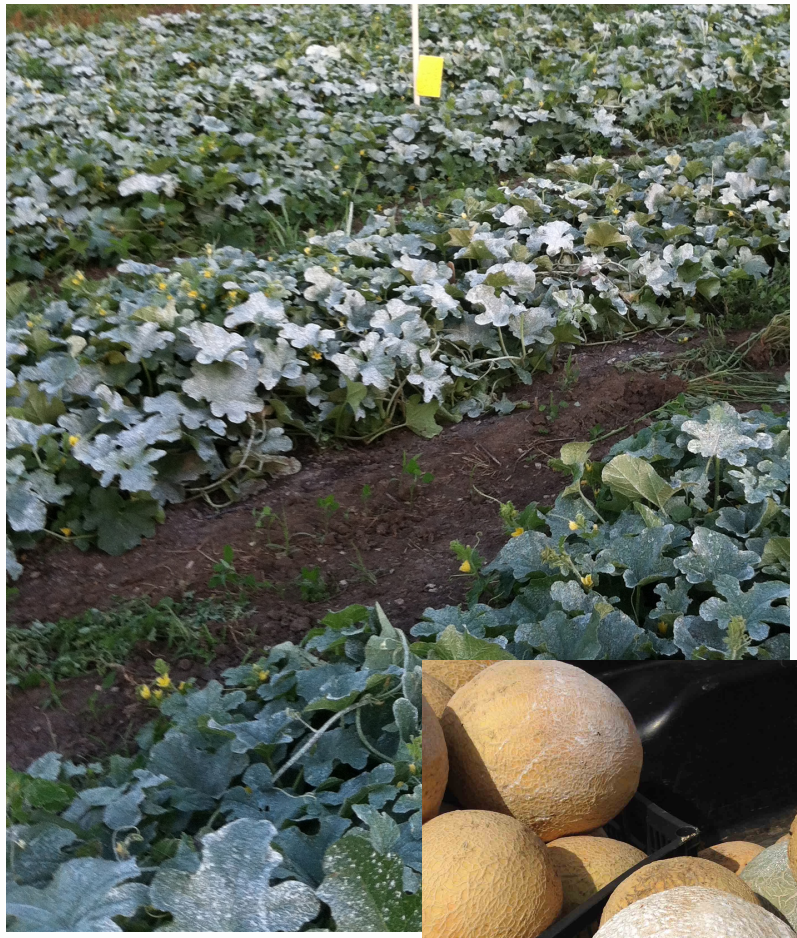
- **SARE projects**
  - –2011 & 2012
  - –2014 & 2015
- **Celeste Welty, Mary Gardiner, & Sally Miller (Ohio State)**
- **& Mark Gleason & Jean Batzer (Iowa State)**

Extended duration row cover

- **Lightweight row covers**
  - Agribon-19
- **4 treatments**
  - No row cover
  - Remove at anthesis
  - Open ends at anthesis, remove all 10 days after anthesis
  - Remove 10 days after anthesis
- **Control after removal: ‘Surround’**

Row cover removal, 7/19/2012

Surround (kaolin), 7/28/2012



Novasource®
Tessenderlo Group

Surround® WP

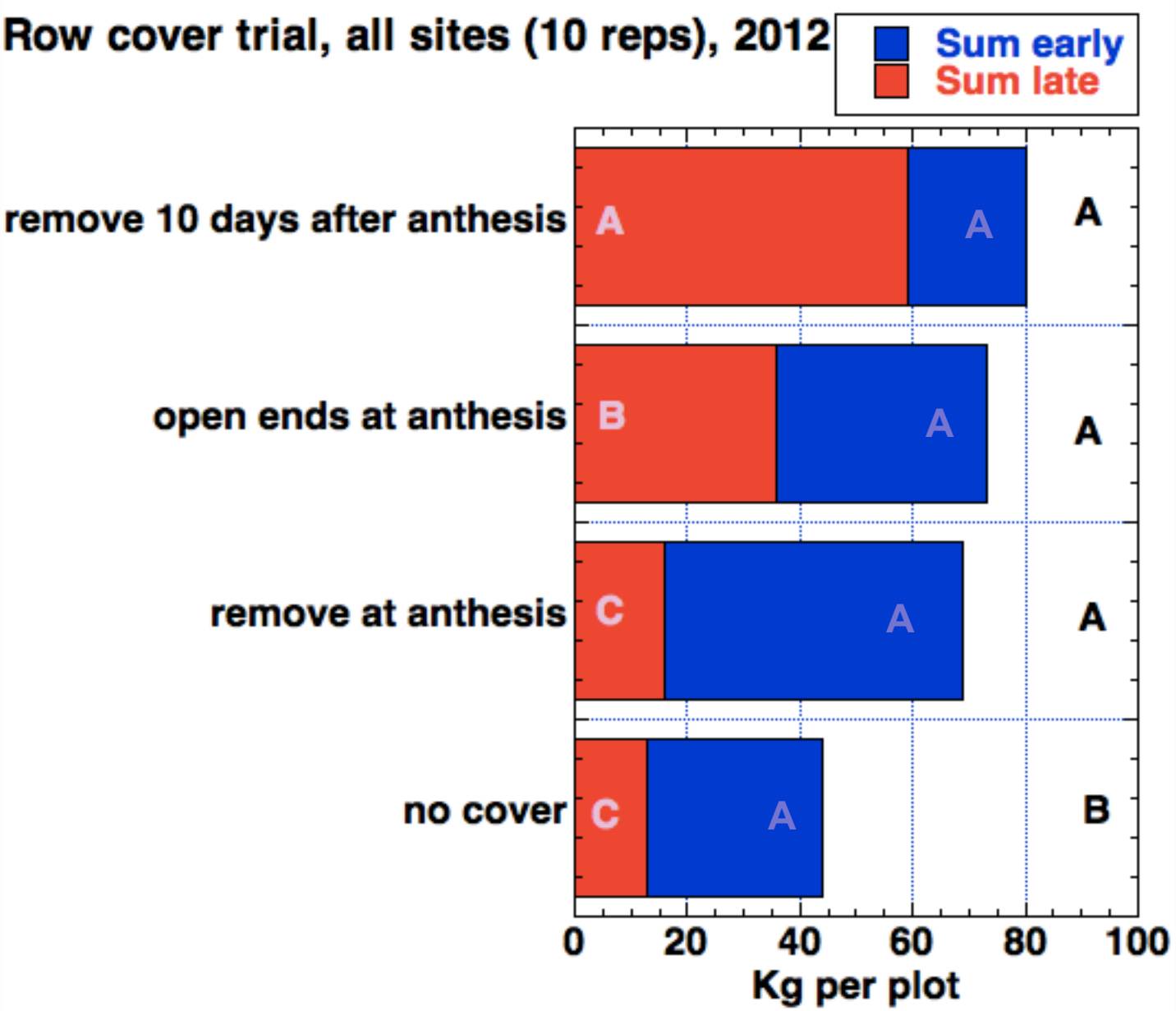
Crop Protectant

OMRI™ Listed
Organic Materials Review Institute

Cucurbit Vegetables
Such as cucumber, summer and winter squash, pumpkin, citron melon, muskmelon, and watermelon

PEST	LBS/ACRE	APPLICATION INSTRUCTIONS
Cucumber beetle, grasshoppers	25-50	Suppression only*. Start prior to infestation, applying every 5-7 days, with the first two applications 3 days apart.
Powdery mildew		Suppression only*. Apply every 7-14 days as required to maintain coverage.
Sunburn and heat stress	25-100	See I D.
*If complete control is needed, consider using supplemental controls.		

Cost ~ $22 for 25-lb bag


Row cover trial, all sites (10 reps), 2012
Sum early
Sum late
remove 10 days after anthesis
open ends at anthesis
remove at anthesis
no cover
A
A
A
B
A
A
C
A
C
A
A
A
B
0
20
40
60
80
100
Kg per plot

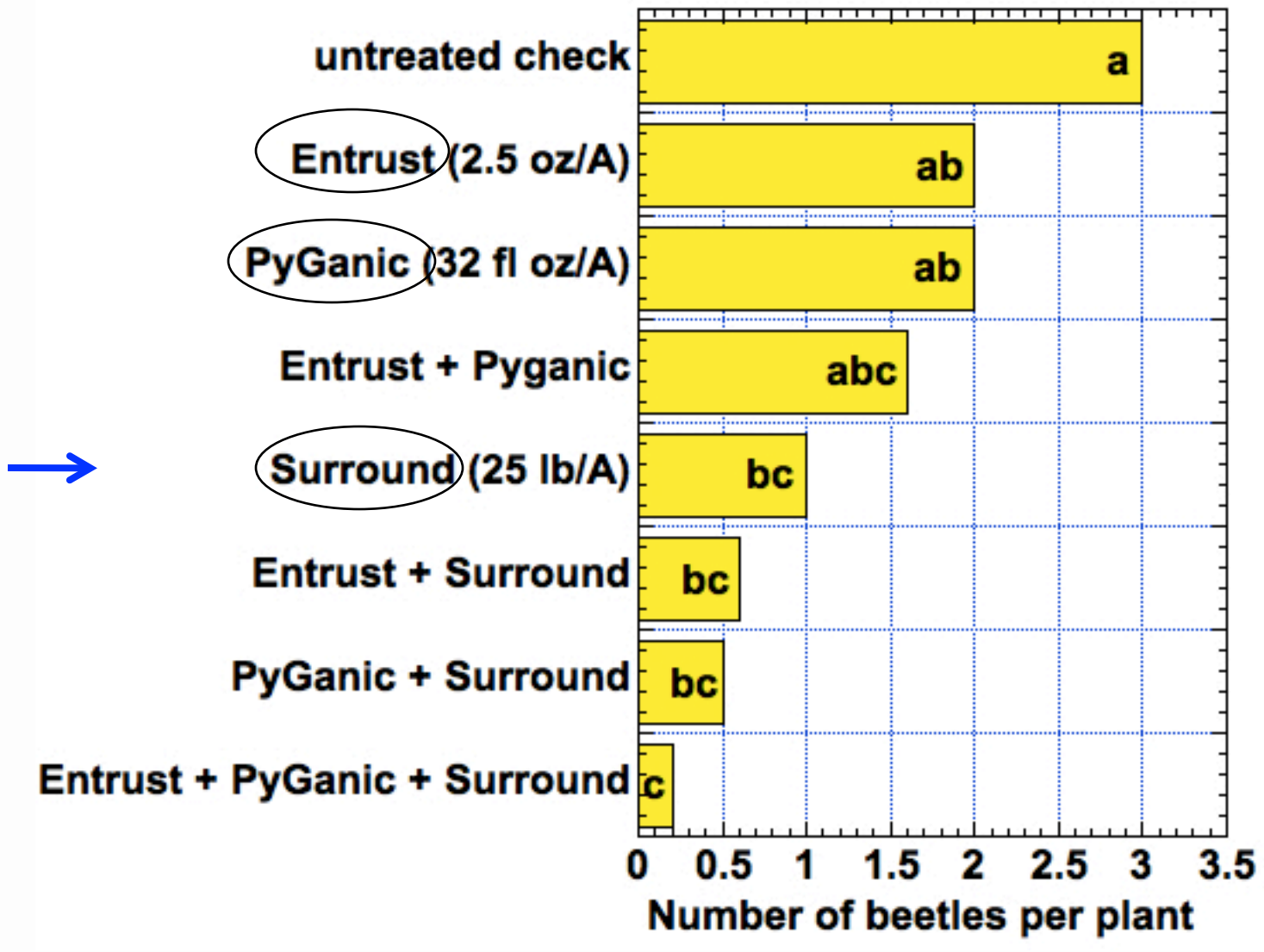
Control of cucumber beetles with insecticides?

- **Seed or soil applied:**
  - No current options for organic
- **Foliar applied**
  - Some options for organic
  - Beware of toxicity to bees

Cucumber beetle & OMRI insecticides

Active ingredient	Product
pyrethrins?	PyGanic
spinosad?	Entrust
kaolin?	Surround
neem oil?	Trilogy
Beauveria?	Mycotrol
any + CideTrak D?	

Cucumber beetle trial, UMass, 2009: 3 foliar applications

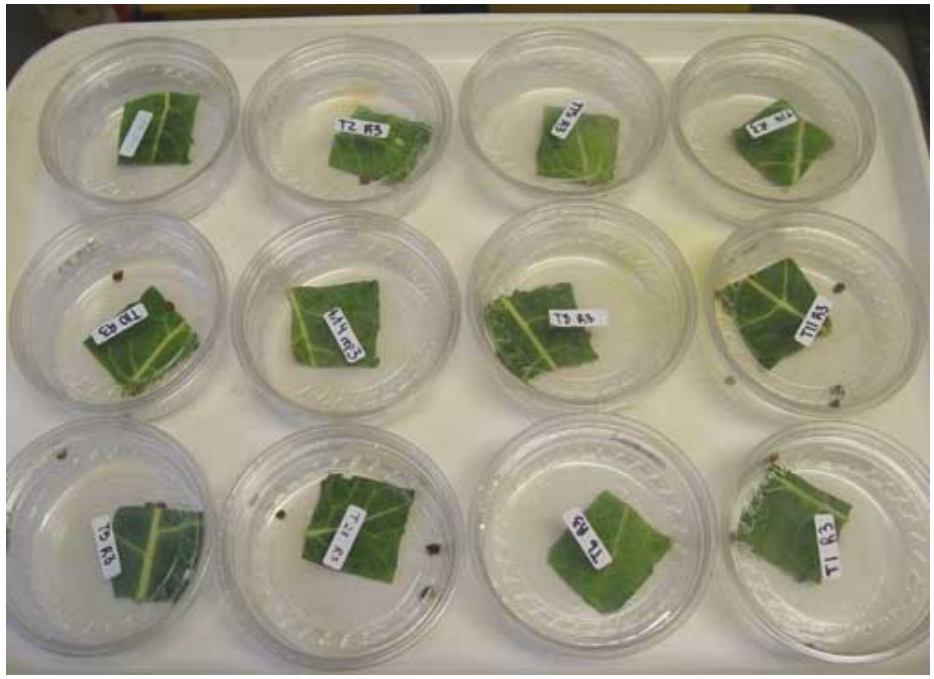


CideTrak D

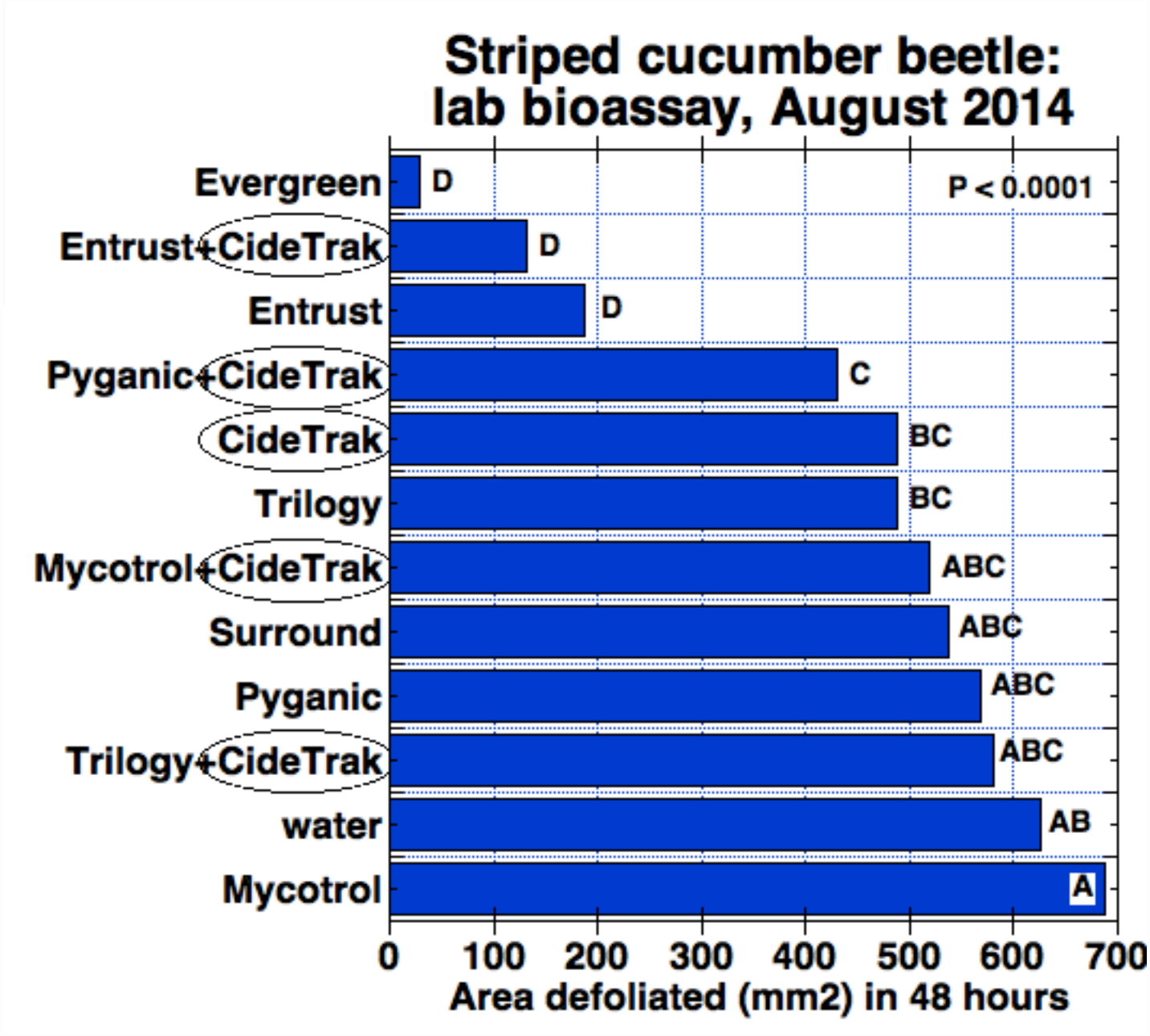
- Buffalo gourd root powder
- Cucurbitacin
- Gustatory stimulant
- Not insecticide
- Mix with insecticide
- 3.1 oz/A
- OMRI list (as adjuvant)
- Made by Trécé Inc.
- Costs $92.50 for 4-lb bag (@CPS)

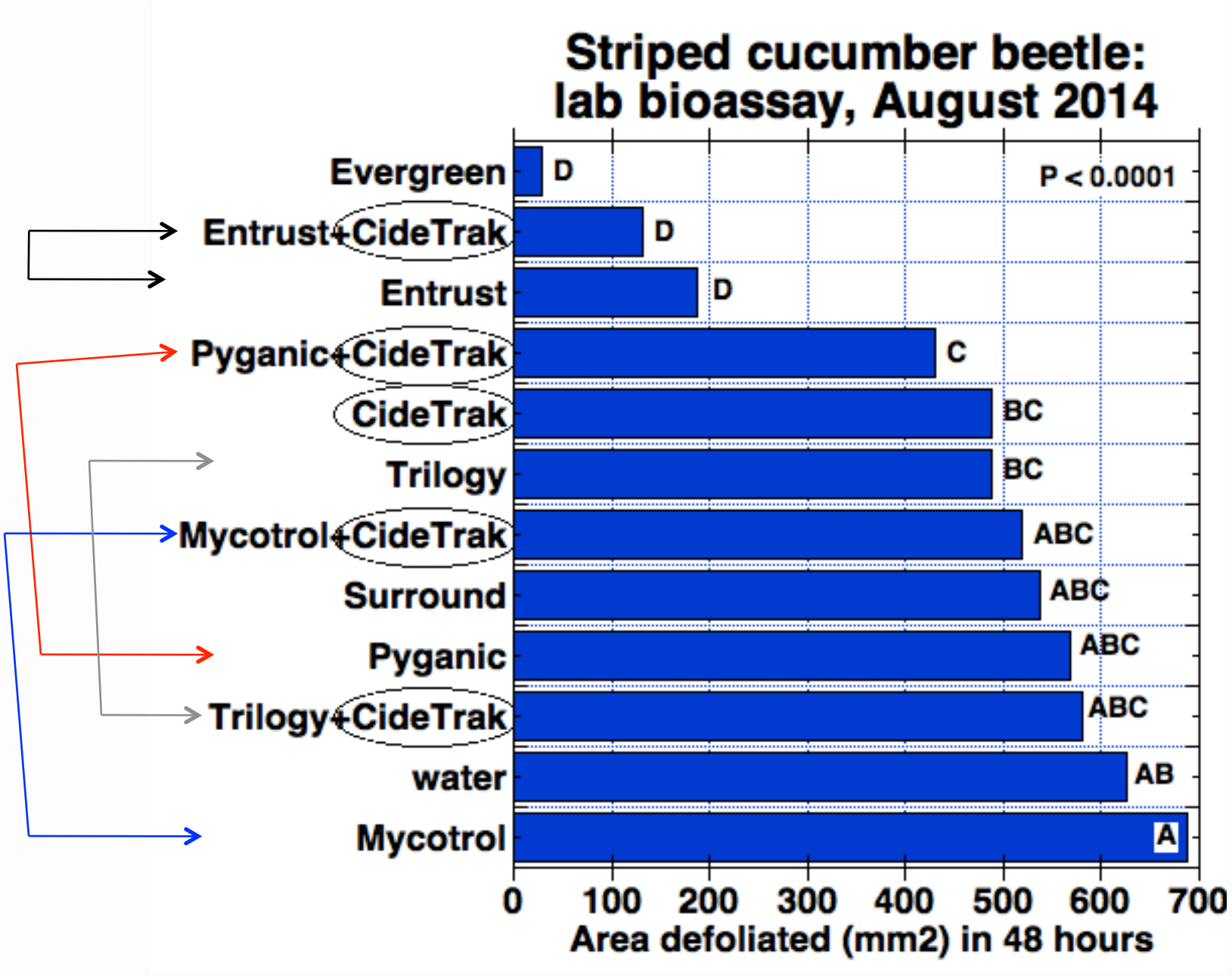
Cucurbita foetidissima

Lab bioassays to evaluate insecticide efficacy



- Defoliation
- Mortality


Striped cucumber beetle:
lab bioassay, August 2014
P < 0.0001
Evergreen
Entrust+CideTrak
Entrust
Pyganic+CideTrak
CideTrak
Trilogy
Mycotrol+CideTrak
Surround
Pyganic
Trilogy+CideTrak
water
Mycotrol
D
D
D
C
BC
BC
ABC
ABC
ABC
ABC
AB
A
0
100
200
300
400
500
600
700
Area defoliated (mm2) in 48 hours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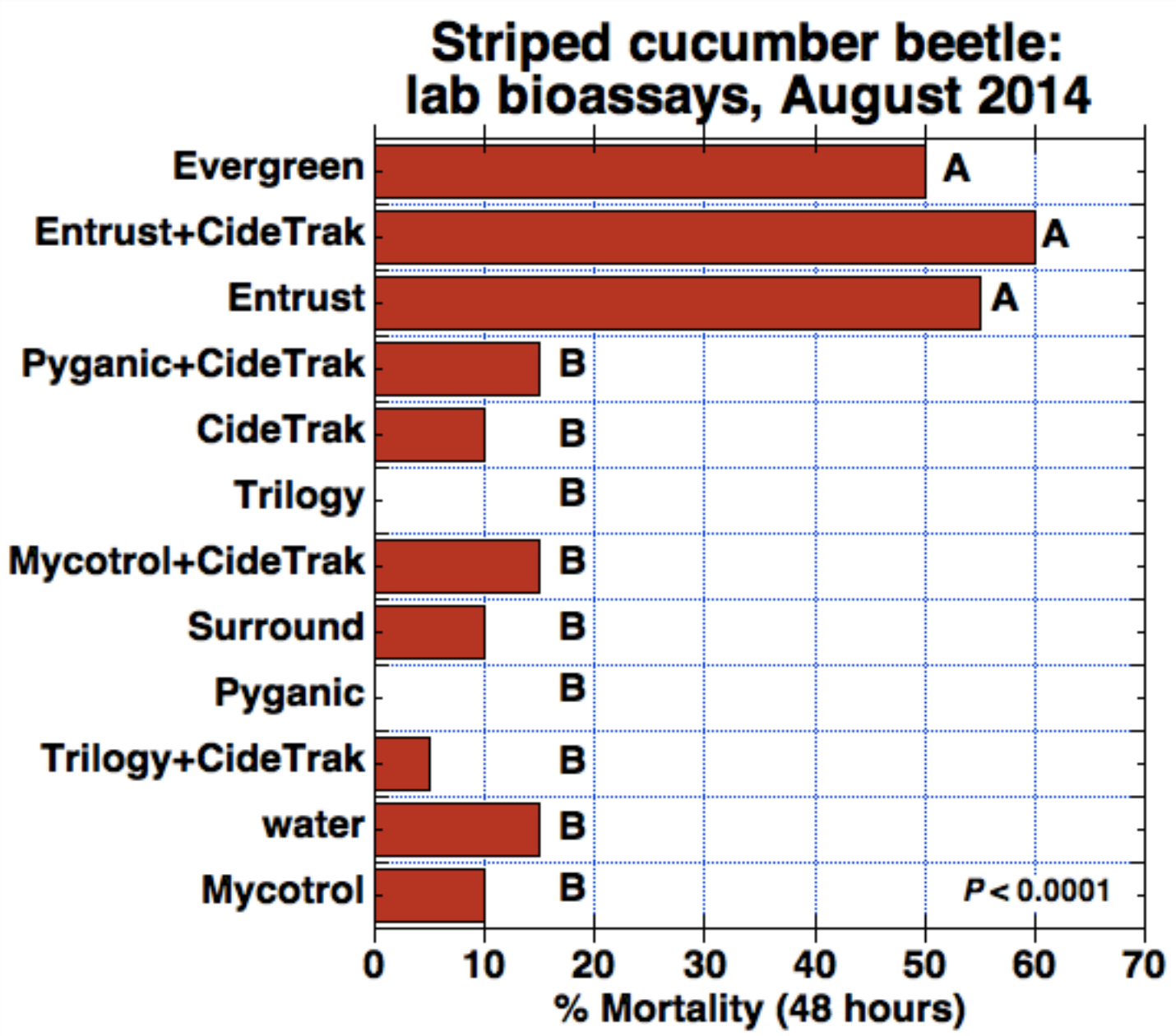
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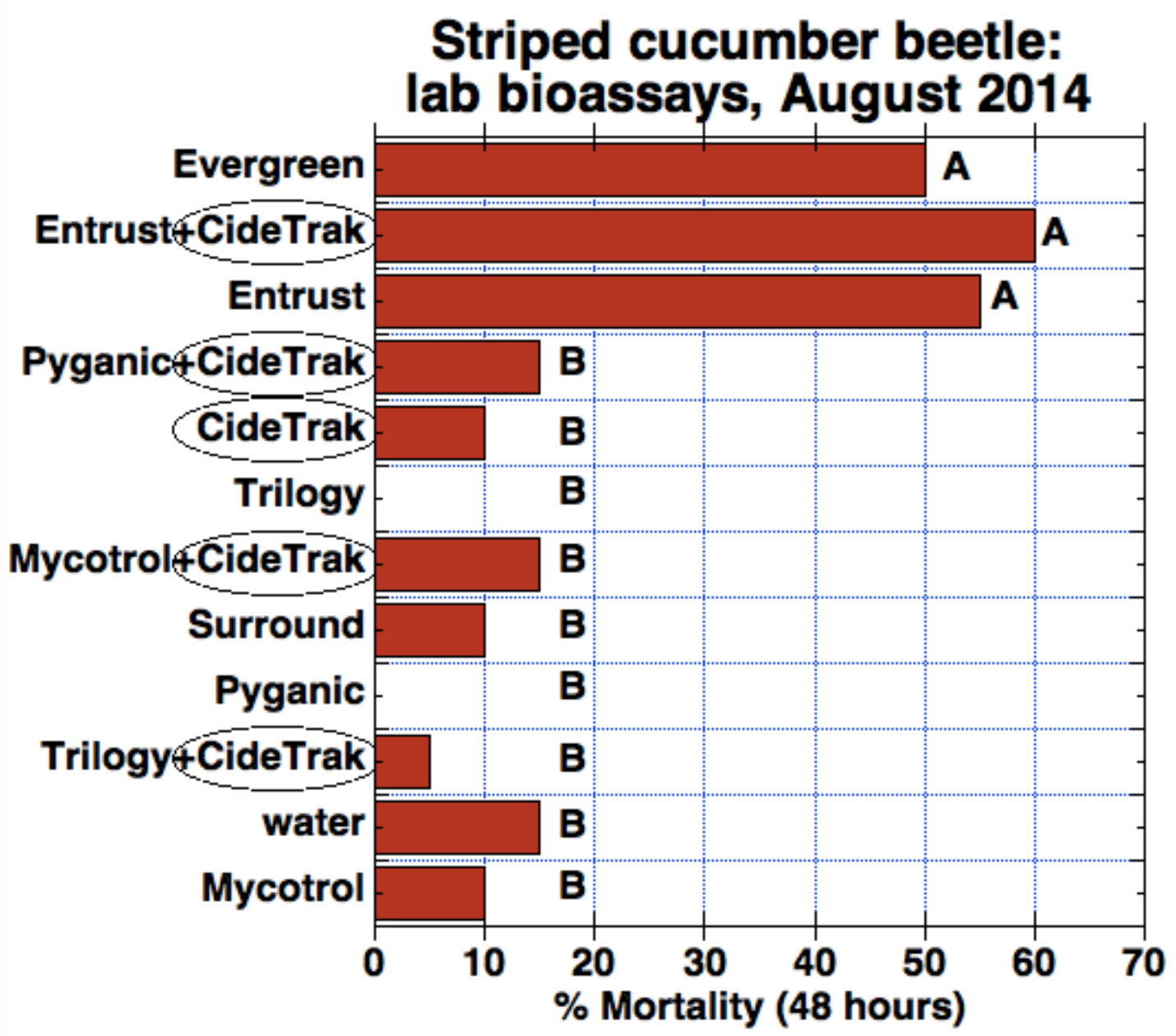
water
Mycotrol
A
A
A
B
B
B
B
B
B
B
B
B
P < 0.0001
0
10
20
30
40
50
60
70
% Mortality (48 hours)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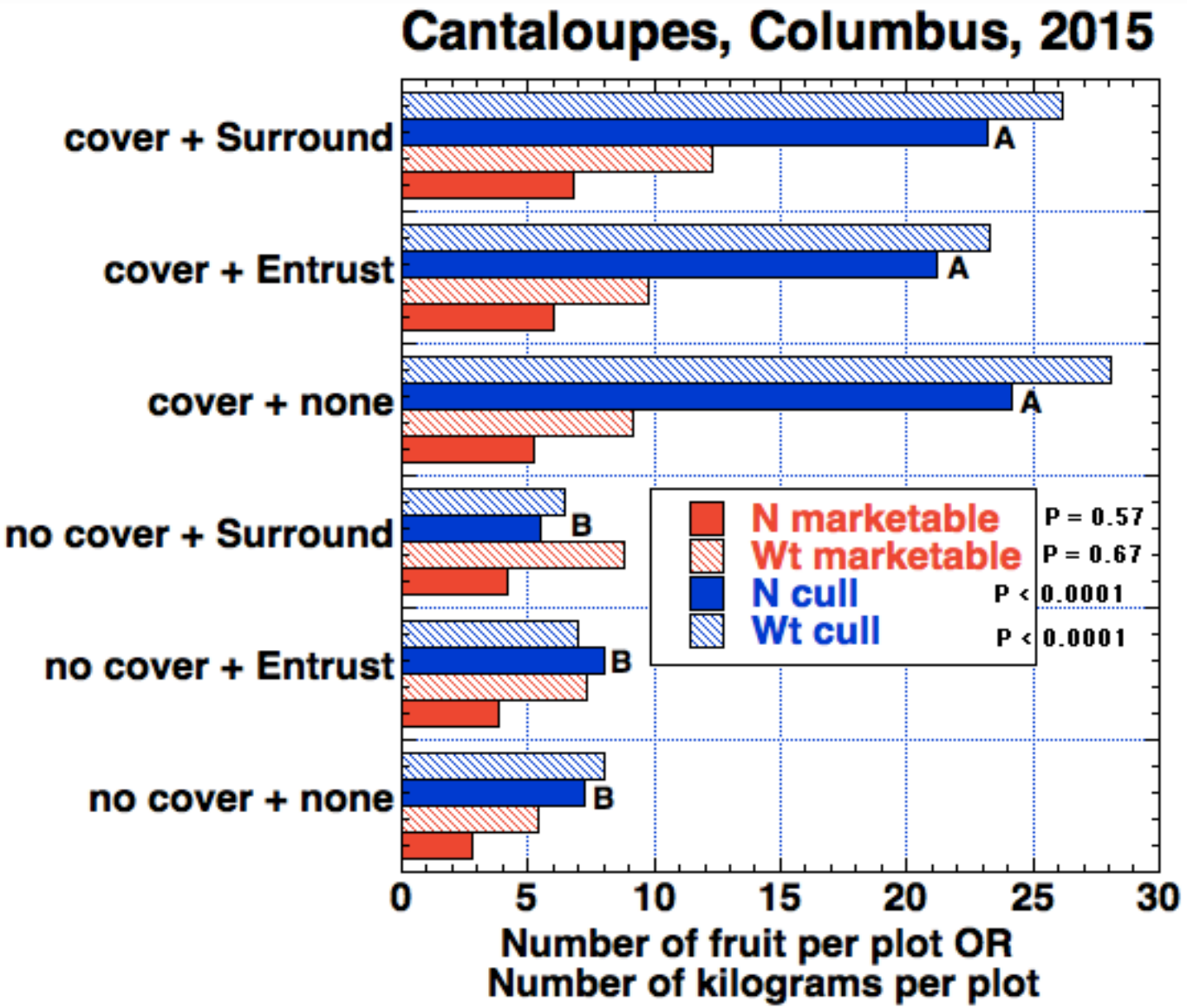
A
A
B
B
B
B
B
B
B
B
B
0
10
20
30
40
50
60
70
% Mortality (48 hours)

Cantaloupe field trial: row covers & organic insecticides

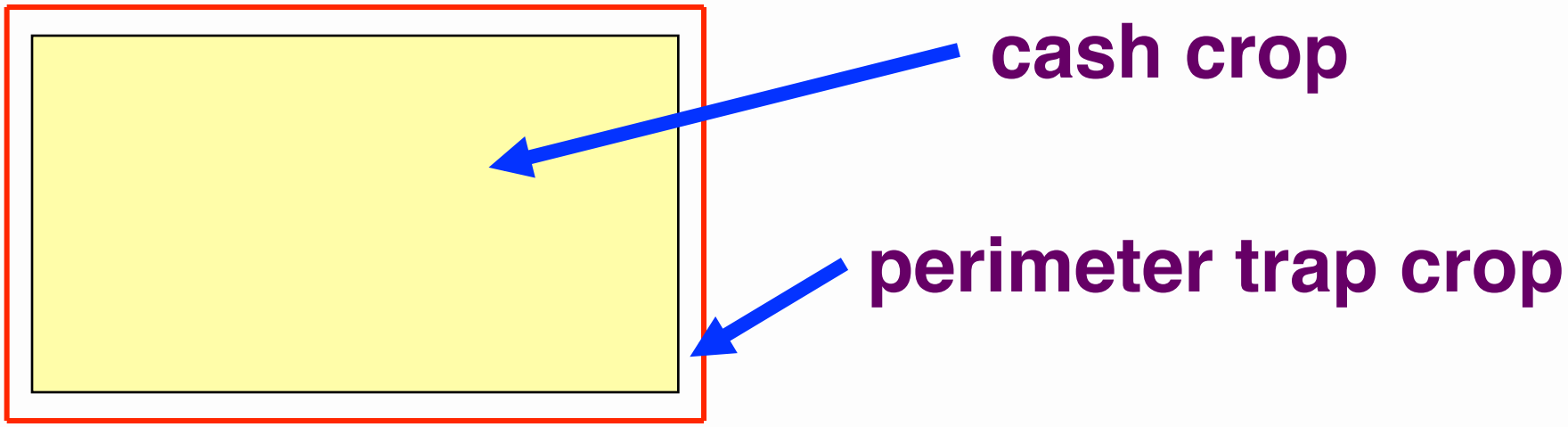
	1st month	2nd month
1	Row cover	Entrust + CideTrak-D
2	Row cover	Surround
3	Row cover	(nothing)
4	No row cover	Entrust + CideTrak-D
5	No row cover	Surround
6	No row cover	(nothing)


Cantaloupes, Columbus, 2015
cover + Surround
cover + Entrust
cover + none
no cover + Surround
no cover + Entrust
no cover + none
A
A
A
B
B
B
N marketable
Wt marketable
N cull
Wt cull
P = 0.57
P = 0.67
P < 0.0001
P < 0.0001
0
5
10
15
20
25
30
Number of fruit per plot OR
Number of kilograms per plot

Culls in cantaloupe field trial, 2015

1	Appearance (small, poor netting)	76%
2	Rots	12%
3	Deep feeding by beetles	10%
4	Rodent gnaws	2%

Trap cropping



- Planting time options
  - Same time
  - 2 weeks early for trap crop
- Insecticide
  - Use if > threshold
  - Expect less in cash crop

Cantaloupe surrounded by perimeter trap crop of buttercup squash

Perimeter trap crop trials

- 2 treatments:
  - With buttercup squash perimeter
    - 2-rows
    - Plant 2 weeks earlier
  - With ryegrass perimeter

- Separated 500-1000 meters
- 1 rep @ 4 sites in Ohio

Perimeter trap crop trials

- **2011 & 2012**
  - Plots 8 rows x 50 ft
  - Admire used as transplant drench
- **2014 & 2015**
  - Plots 8 rows x 200 ft
  - No Admire used at planting

Scouting weekly

Thresholds:

- **All season:**
  - 1 beetle per plant
- **3-step:**
  - Seedling: **0.5** beetle/plant
  - Until 1st female flower: **1** beetle/plant
  - After 1st flower: **3** beetles/plant

weeks over threshold, 2012 (in 8 weeks)

Site	Melons within rye	Melons within squash	Squash
Fremont	5	4	6
Columbus	4	2	6
Wooster/Frye	4	2	8
Wooster/Snyder	1	1	6

fewer

Yield in trap crop trial, 2012

Yield	melons within rye	melons within squash	analysis
Kg Total	847	1030	*P* = 0.07
Kg Marketable	572	668	*P* = 0.39
N Total	434	514	*P* = 0.17
N Marketable	235	264	*P* = 0.55

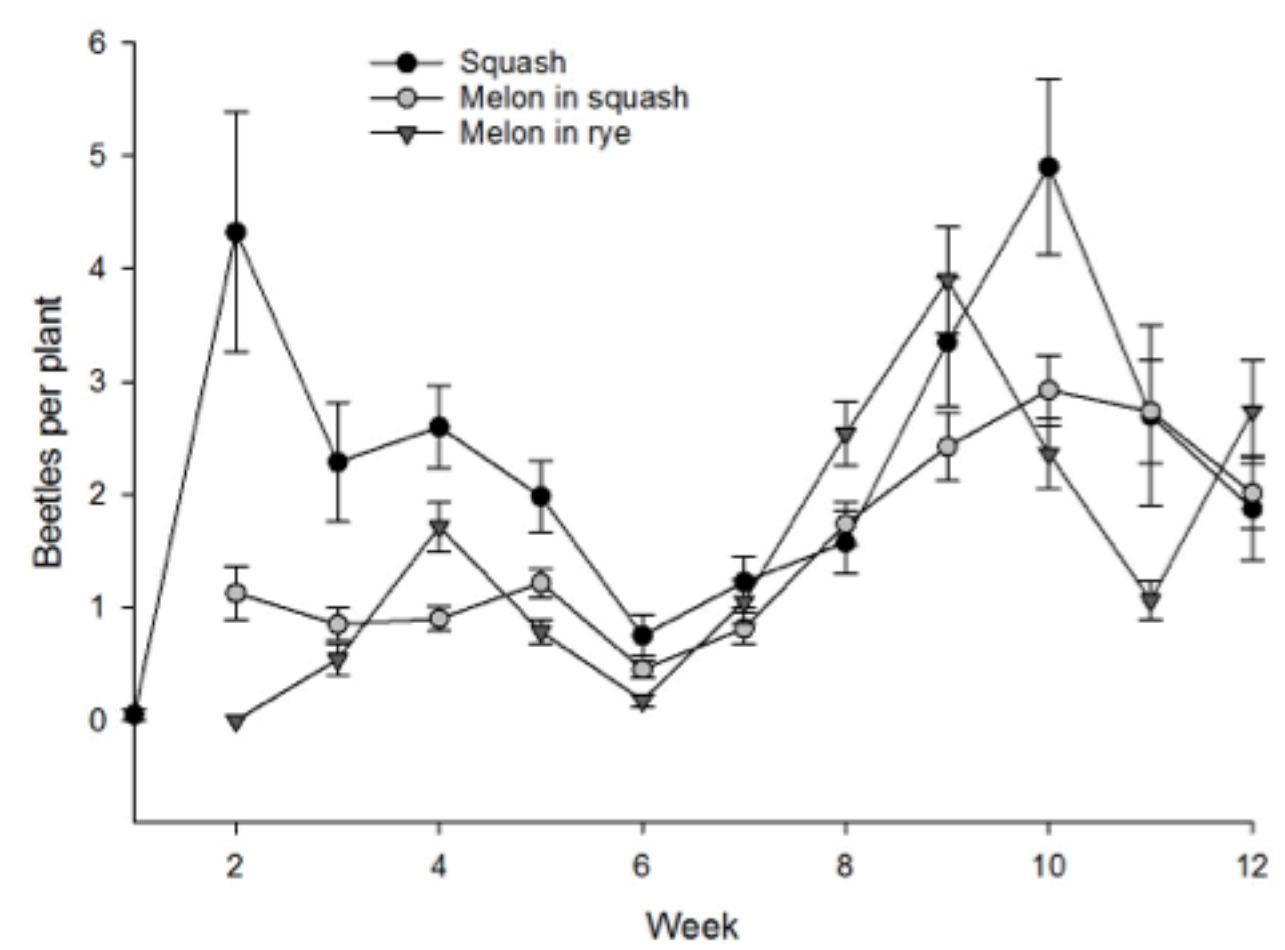
Trend of higher yield but not statistically significant

Problem! Squash vine borer

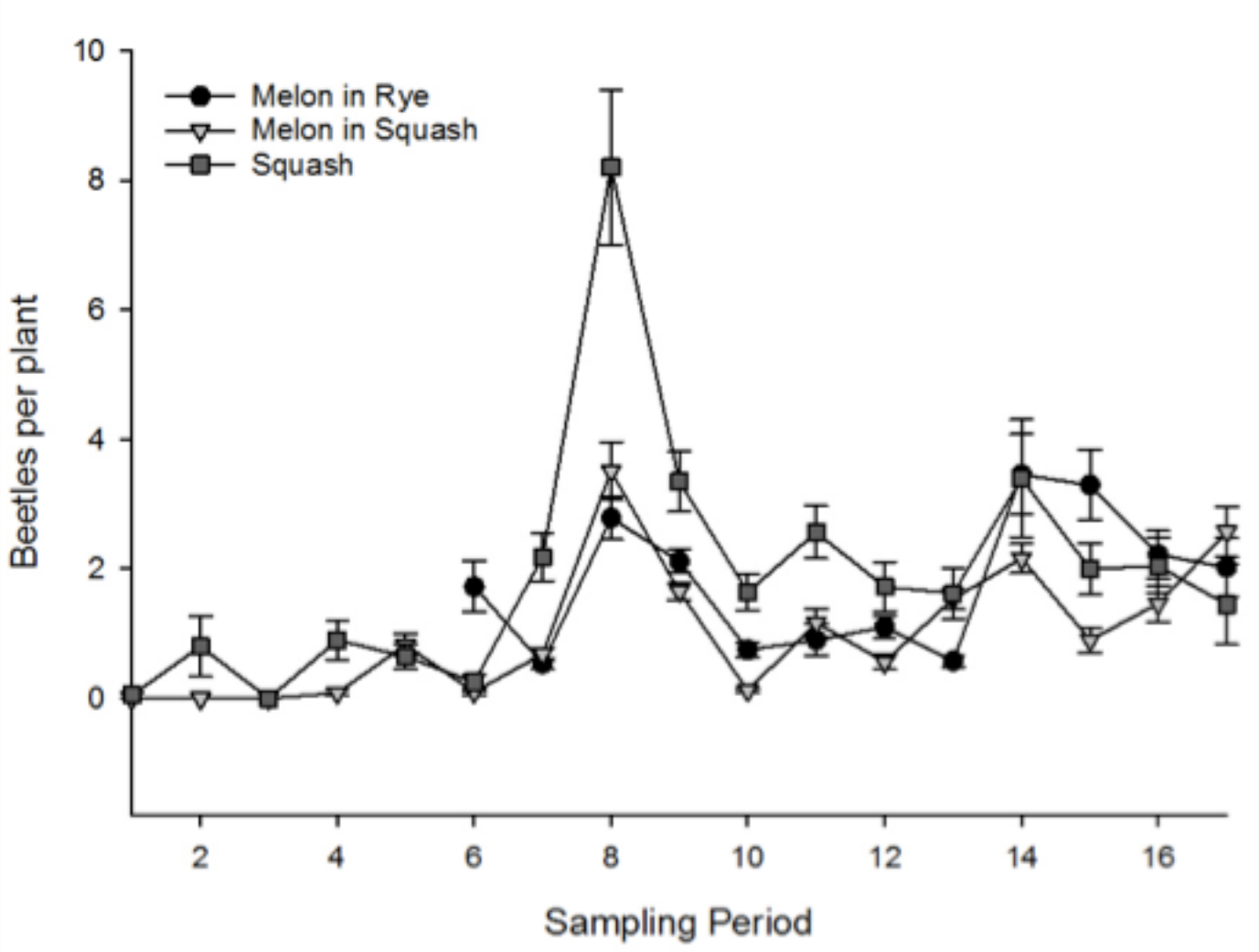
- **Must be considered**
  - –Kills the trap crop
  - –Symptoms confused with BW
- **Controlled by pyrethrins+PBO ('Evergreen'), 6 sprays in 2012**
- **By Asana in 2014 & 2015**



Trap crop trial, 2014



Trap crop trial, 2015



Incidence of bacterial wilt

Year	Treatment	% wilt	
2014	No trap crop	34%	NS
	With trap crop	21%	
2015	No trap crop	35%	NS
	With trap crop	24%	

weeks over threshold, 2014

Site	Melons within rye	Melons within squash	Squash
Columbus	7	8	10
Fremont	4	5	8
Wooster/Unit2	1	2	2
Wooster/Snyder	0	3	3

Not fewer!

weeks over threshold, 2015

Site	Melons within rye	Melons within squash	Squash
Columbus	6	7	6
Fremont	5	6	4
Wooster/Frye	4	4	2
Wooster/Snyder	5	4	1

Not fewer!

Trap crop trials: summary

Factor	Result
Bacterial wilt in melons	Lower with trap crop
Number of insecticide sprays in melons	Not lower with trap crop
Yield of marketable melons	Not higher with trap crop

Trap crop trials: why trends not as expected?

- Beetles abundant?
- Rain excessive?
- No Admire at-plant?
- Better in smaller plots (8 rows x 50 ft) than larger plots (8 rows x 200 ft)?

Bacterial wilt project
Multi-State multi-disciplinary

- USDA/SCRI = Specialty Crop Research Initiative
- Iowa, Ohio, Kentucky, Pennsylvania
- 2013 & 2014

Cucurbit field trials, 2013 & 2014

Element	Conventional	Organic
Cover crop killing	Herbicide	Roller-crimper
Fertilizer	Synthetic	Natural
Seed treatment	Fungicide only	None
Transplant media	Standard	Organic
Treatment at planting	Admire soil drench	None
Insecticide at threshold	Asana	Entrust + CideTrak D

Results to be presented by Molly

the end

Info on fruit & veg. pests
u.osu.edu/pestmanagement

Questions?

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cell phone: 614 746 2429