Attract-and-kill for managing BMSB

Elizabeth Beers
Tracy Leskey,
Greg Krawcyzk,
Larry Gut

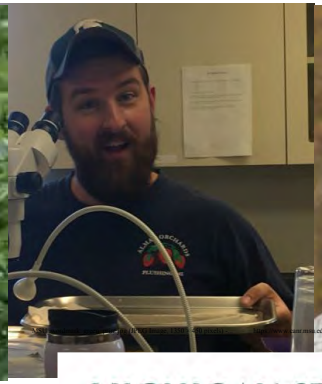
Funding

USDA United States Department of Agriculture National Institute of Food and Agriculture
Specialty Crop Research Initiative

Collaborating Institutions

ars · NC State University · PennState · OSU Oregon State · University of Maryland · University of Georgia · Washington State University · Northeastern IPM Center · Cornell University · Utah State University · Rutgers University · The Ohio State University · University of Kentucky · UC Davis · University of Minnesota · VirginiaTech · Berkeley · Michigan State University · UC Riverside

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Specialty Crop Research Initiative under award number 2016-51181-25409.



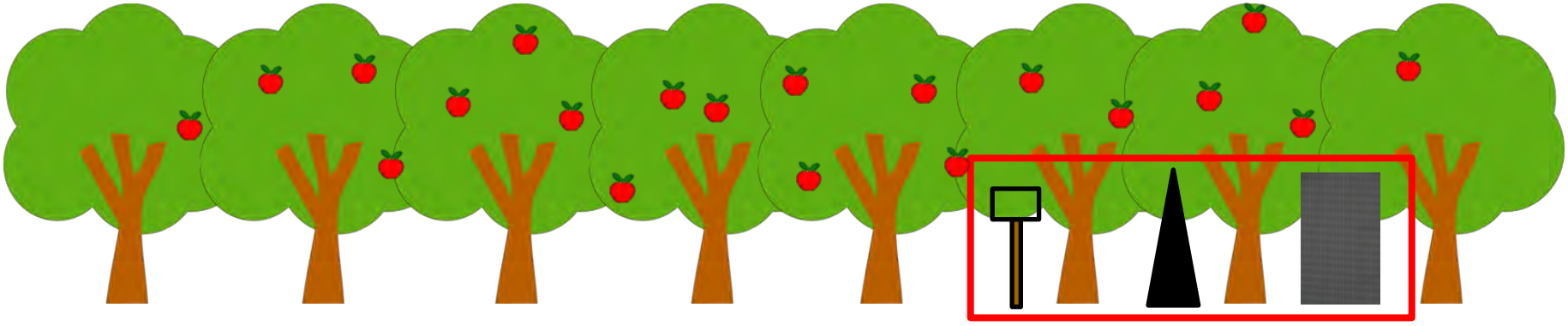
MICHIGAN STATE
UNIVERSITY

PennState
College of Agricultural Sciences

USDA United States Department of Agriculture
Agricultural Research Service

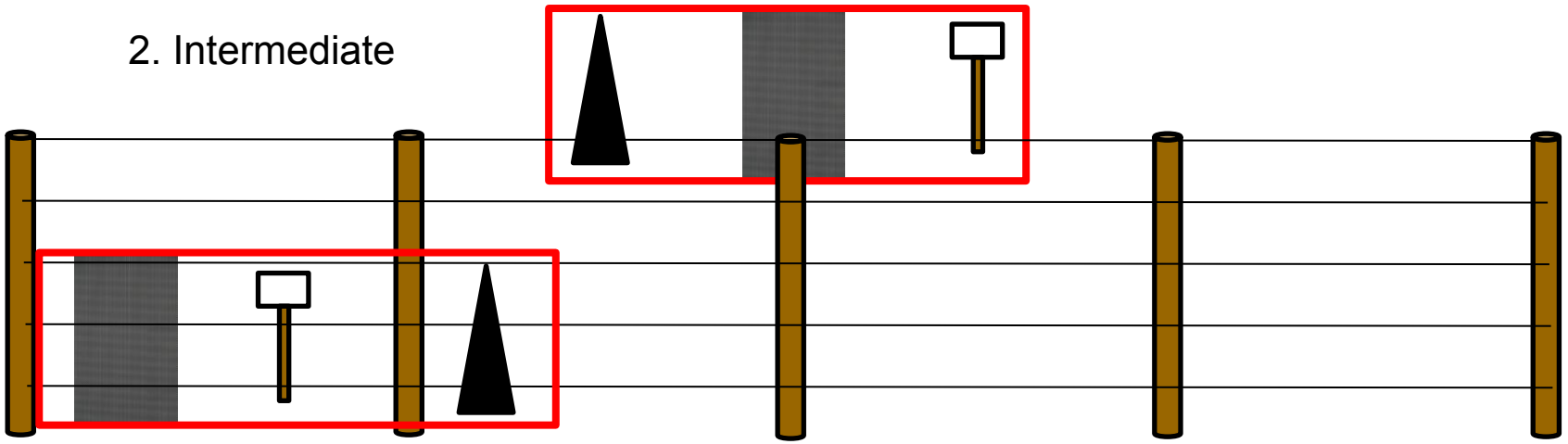
Long-lasting insecticidal netting trap (LLIN)

- deltramethrin-treated netting
- secured on shepherd crook, wooden post, fence or tree
- weed barrier cloth placed on ground directly underneath the netting
- commonly referred to as ‘ghost trap’

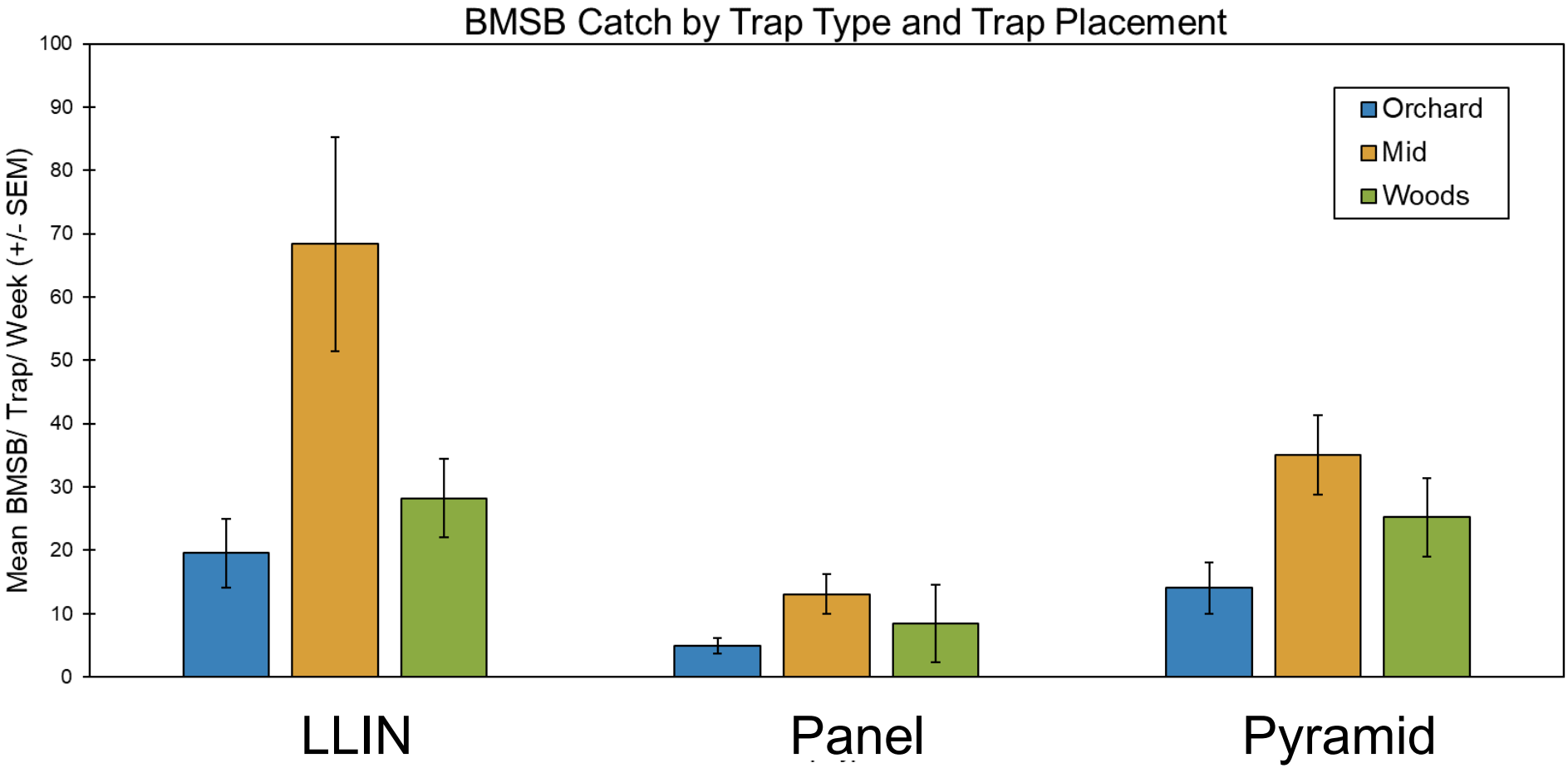


3. Within Crop

2. Intermediate

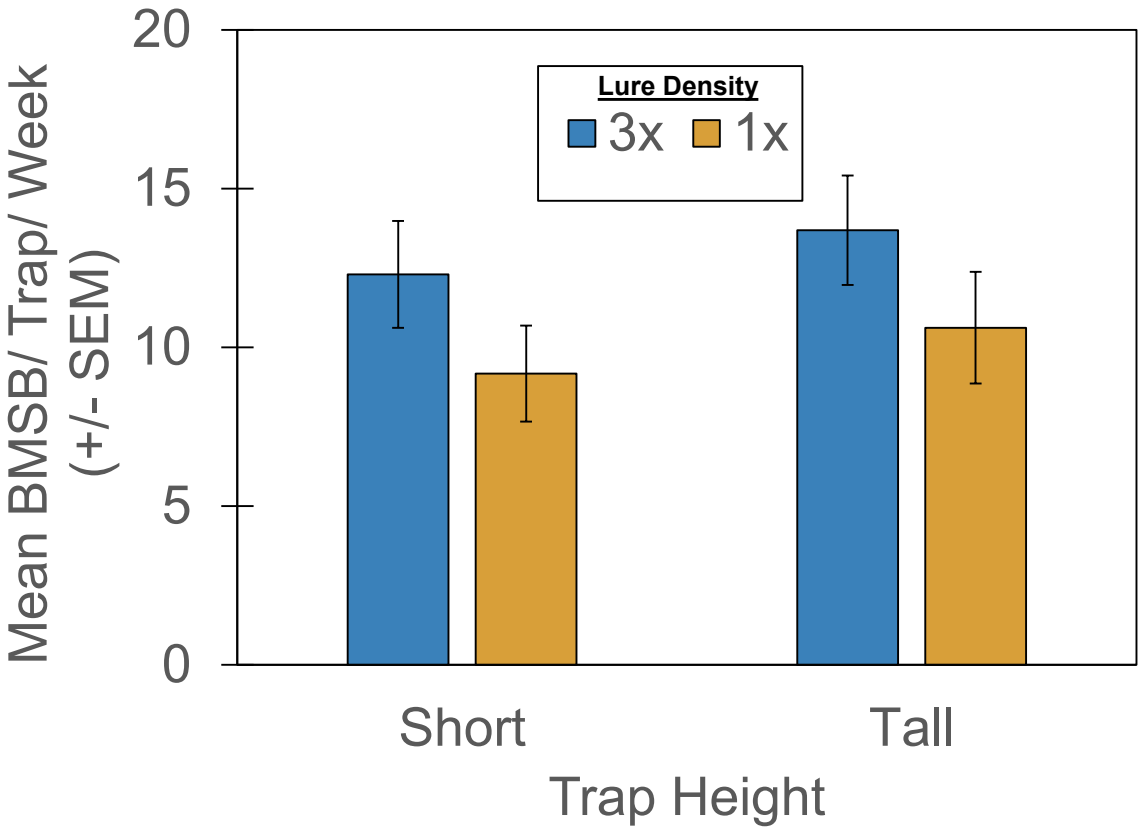


1. Fence/ Wood edge

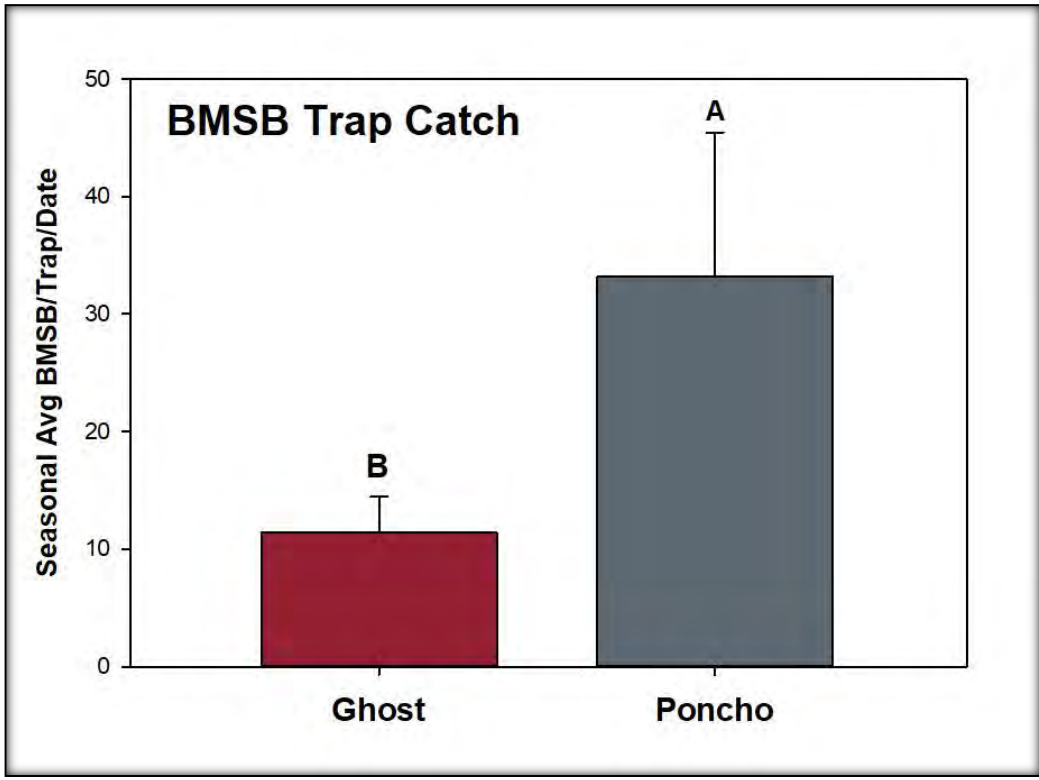

BMSB Catch by Trap Type and Trap Placement
Mean BMSB/ Trap/ Week (+/- SEM)
100
90
80
70
60
50
40
30
20
10
0
Orchard
Mid
Woods
LLIN
Panel
Pyramid

Effect of trap height and lure density on BMSB catch in LLIN traps

- 7’ or 4’ posts
- 1 or 3 Trécé Dual lures



Attract and Kill: Ghost, Poncho traps



Poncho trap designed to retain bugs
more elaborate/expensive constructio
Higher kill or higher retention?
Higher surface area of poncho may improve A&K
**Ongoing assessment of non-target effects of IIN

Research of Jim Hepler

PennState
College of Agricultural Sciences

BMSB ghost traps, lure load comparison

Adams County, PA, 2018

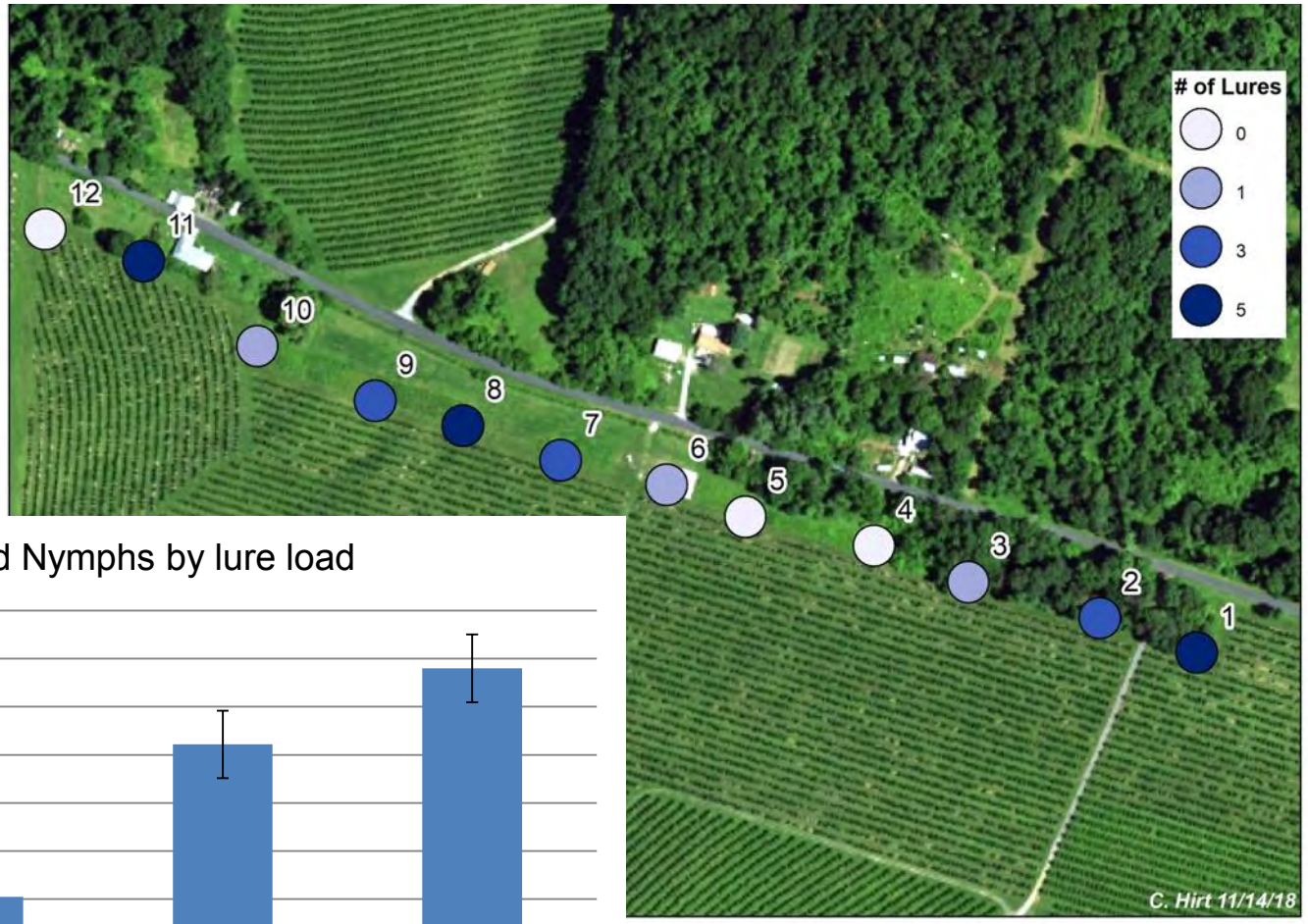
Trap:
2.4 m tall ghost traps

Lure:
BMSB Dual lure

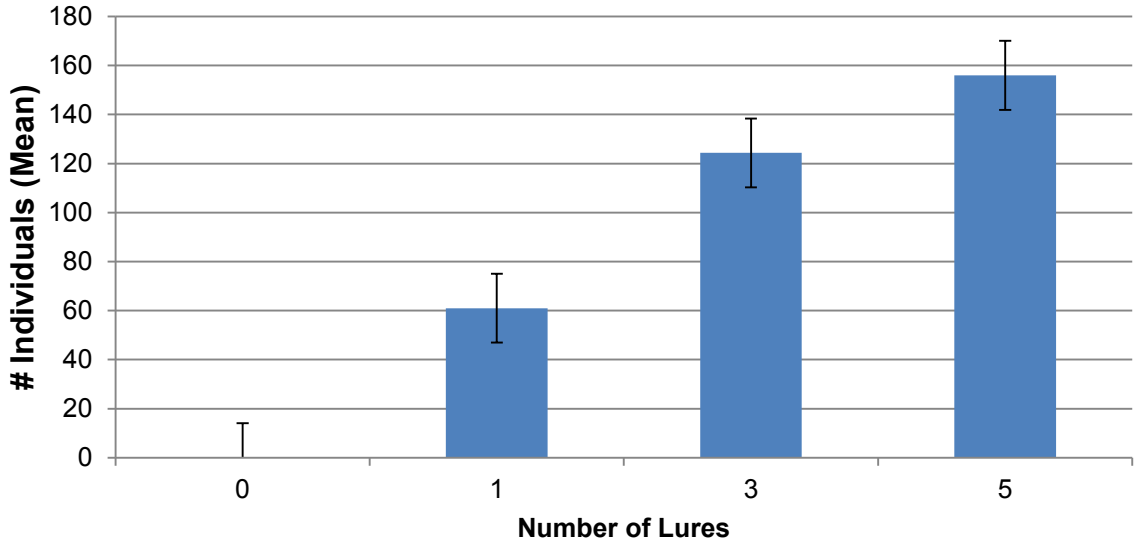
Dose:
1x, 3x, 5x and none

Duration:
Aug 01- Oct 15, 2018

Traps spaced 50 m apart



BMSB Adults and Nymphs by lure load



2018 Net Deployment Strategy Treatments

- How many BMSB do we kill with the following treatment variables?

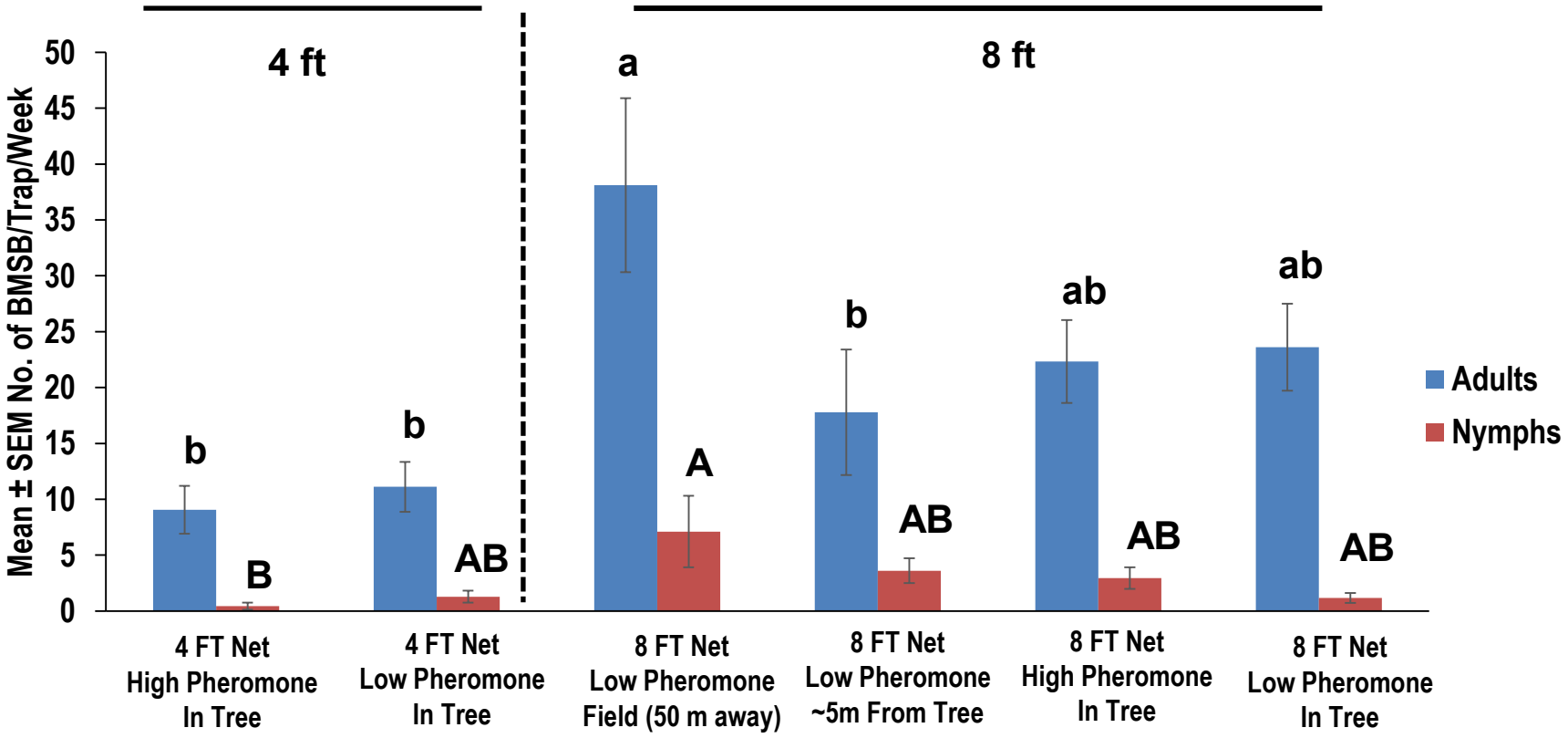
Treatment Variables

- Lure Loading Rate
  - Pher:MDT 15:150mg
  - Pher:MDT 60:600mg
- Net Size
  - 8ft
  - 4ft
- Net Location
  - In Tree
  - ~5 m from tree (Ghost)
  - ~ 50 m from block

- Recorded Dead BMSB weekly for 6 weeks

USDA United States Department of Agriculture
Agricultural Research Service

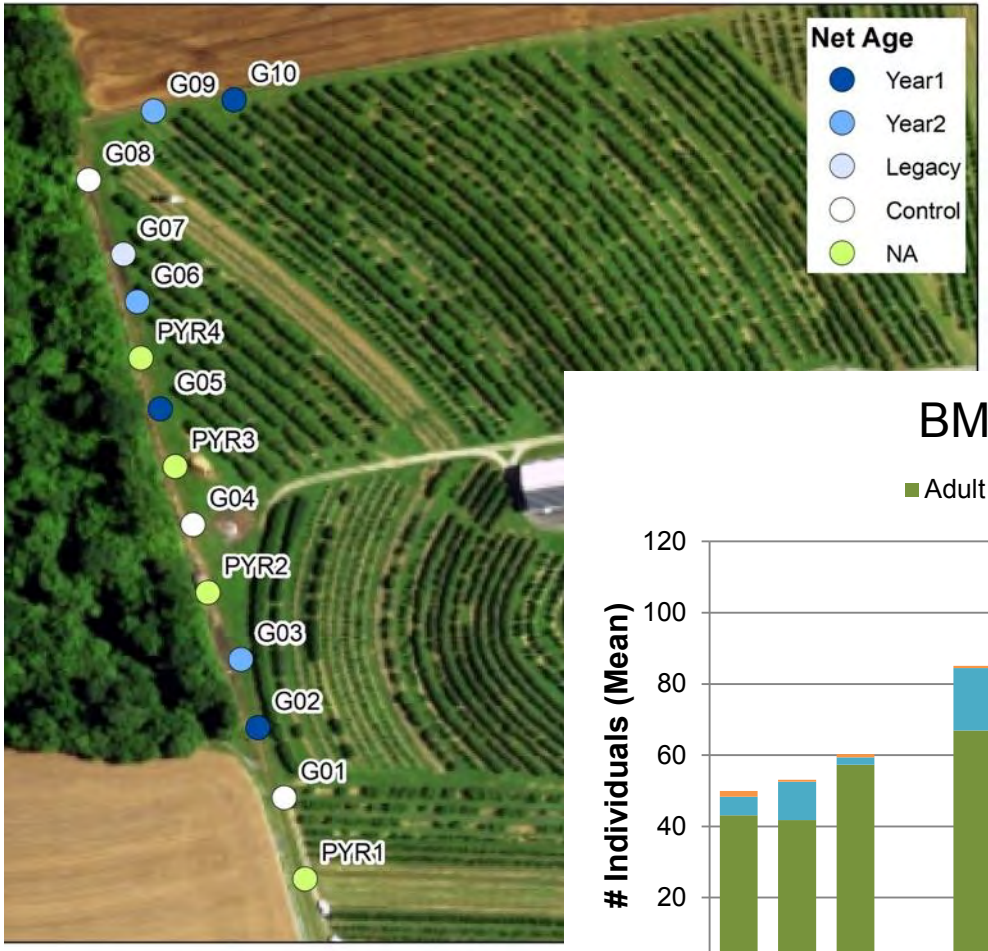
2018 Net Deployment Strategy Results



USDA United States Department of Agriculture
Agricultural Research Service

BMSB ghost traps, net age comparison

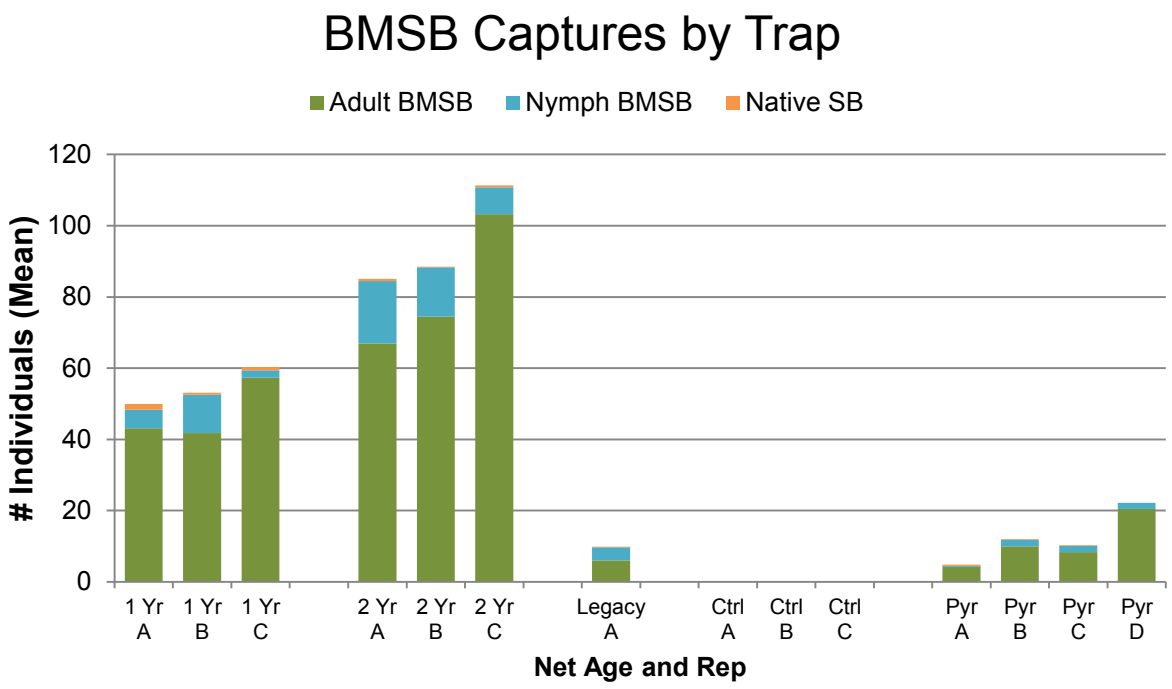
Lancaster County, 2018



Trap:
2.4 m tall ghost traps

Lure:
BMSB Dual lure
3 lures/trap

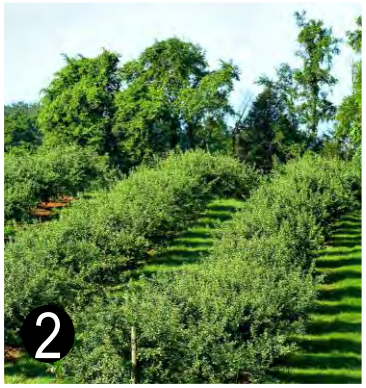
Treatments:
Year 1 net
Year 2 net,
Legacy net (2plus)
Pyramid trap



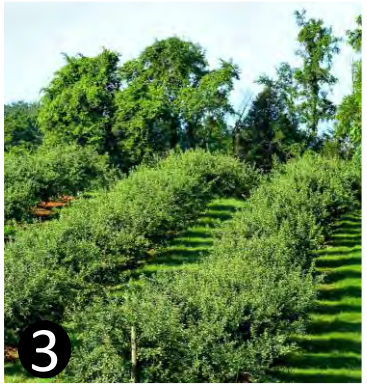
Leskey Lab Commercial Attract-and-Kill Trials

2015-2016
10 Commercial Blocks
Treatments
1. Baited Trees Treated With Insecticides

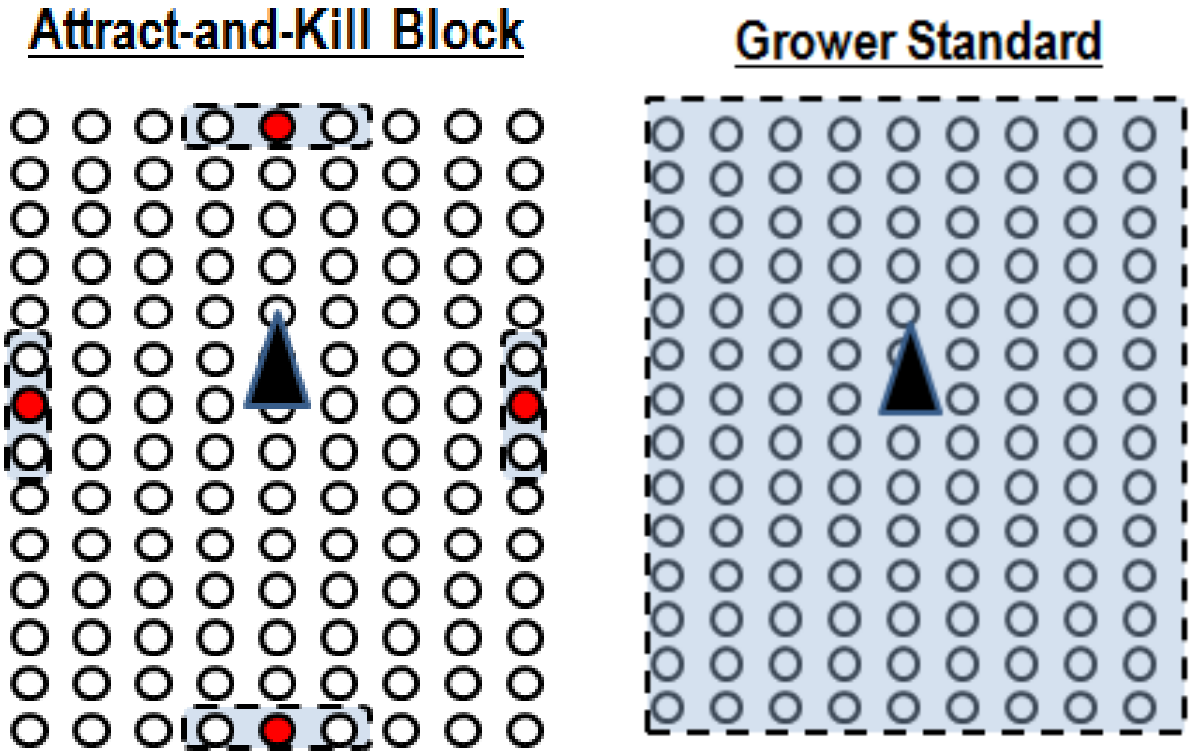
2017
3 Commercial Blocks
Treatments
1. Baited Trees + LLINs
2. Standard Grower



2018
3 Commercial Blocks
Treatments
1. Baited Trees + LLINs
2. Baited LLINS Outside (Ghost Net)

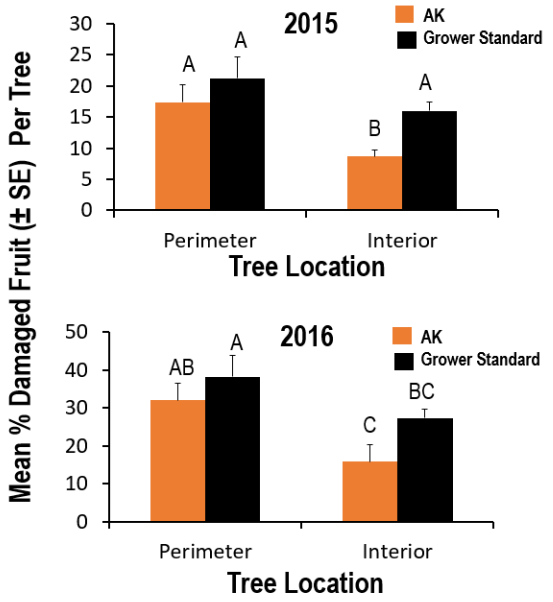


Generalized Set-Up



- AK Sites (including 'ghost net') spaced every 50 m around block.
- All blocks monitored at center
  - 2015-2016. Pyramid Trap (Threshold: 10 adults/cumulatively)
  - 2017 and 2018. Clear Sticky Trap (Threshold: 4 adults/cumulatively) .
- Fruit sampled at harvest for injury.

Commercial Attract and Kill Results



Treatment	% Injury ± SE
Baited Trees + LLINS	2.0 ±1.0 A
Grower Standard	13.0 ± 2.0 B

Treatment	% Injury ± SE
Baited Trees + LLINS	4.3 ± 0.8 A
Baited LLINs (outside)	12.5 ±1.4 B
Grower Standard	3.5 ± 0.8 A

Summary / Plans for 2019

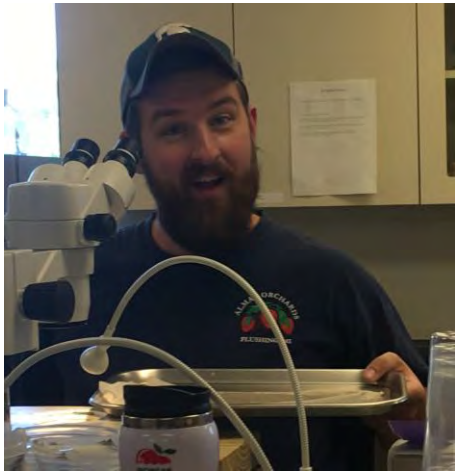
- AK sites that include a host apple tree increase efficacy of overall efficacy as host trees increase attraction and retention of BMSB at AK sites

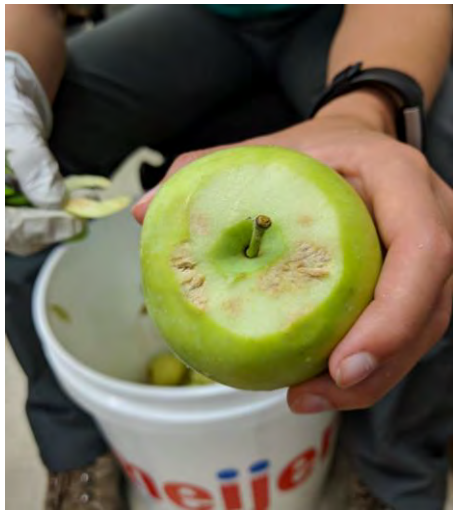
- LLINs paired with baited apple trees performed well, but when baited but decoupled from host tree, injury increased.

- Plans for 2019
  - LLINs will be deployed next to, but not touching baited host apple tree to determine if this distance will not only satisfy regulatory issue but also allow for maximized attraction and retention of BMSB.
  - Will be compared with all other treatments from 2018.

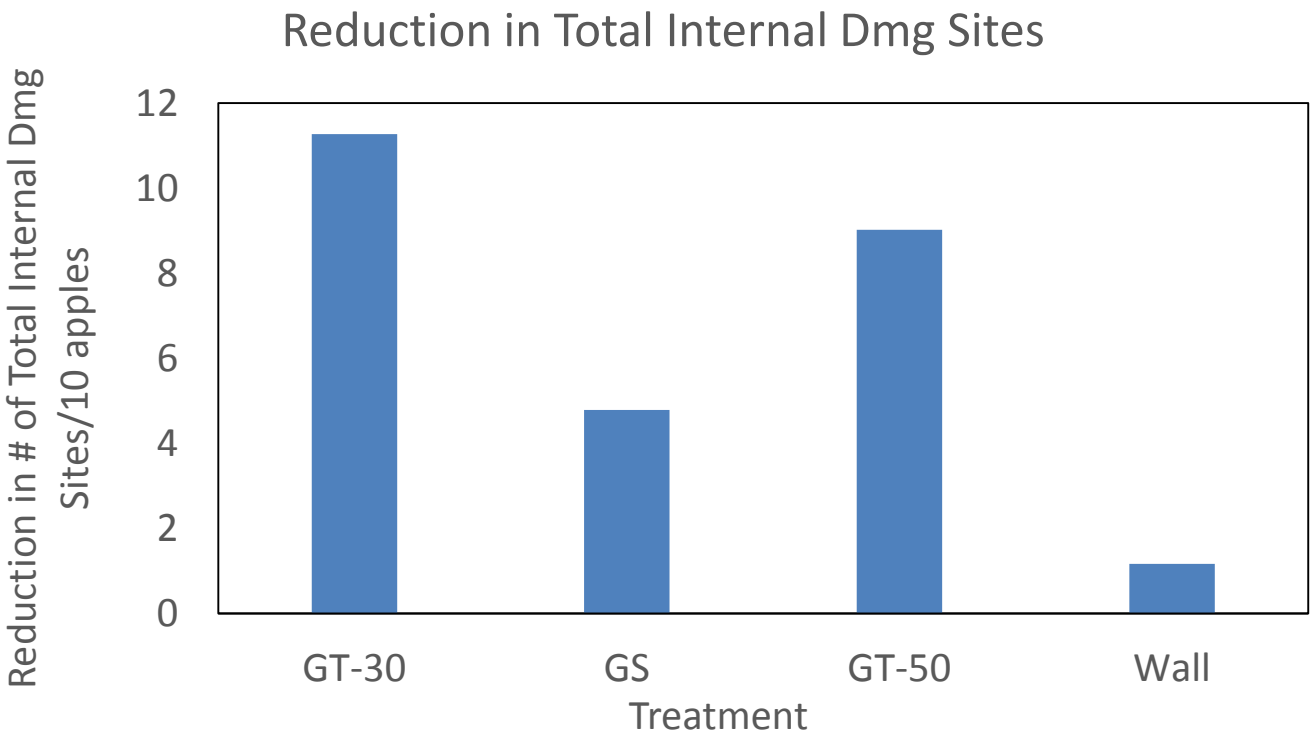
Michigan commercial attract-and-kill trial

- Two site, 3-7 ac plots
- Treatments: LLIN traps 30 or 50m apart along perimeter (baited with high-dose BMSB dual-component lure), 600’ x 1’ LLIN netting strip with lures at 15’ intervals
- Fruit injury counts on 8/13 and 9/25
- Sampled fruit from orchard edge to interior





- Similar 50-60 % damage across plots at first sampling date
- Declined substantially at second count
- Used change in damage as indicator of treatment effects
- Greatest decline in damage in LLIN trap plots

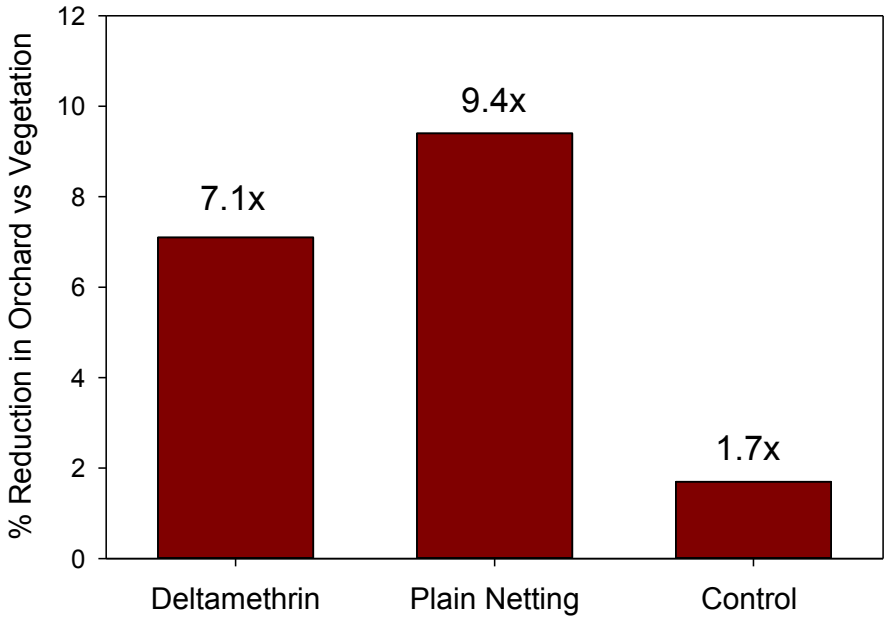


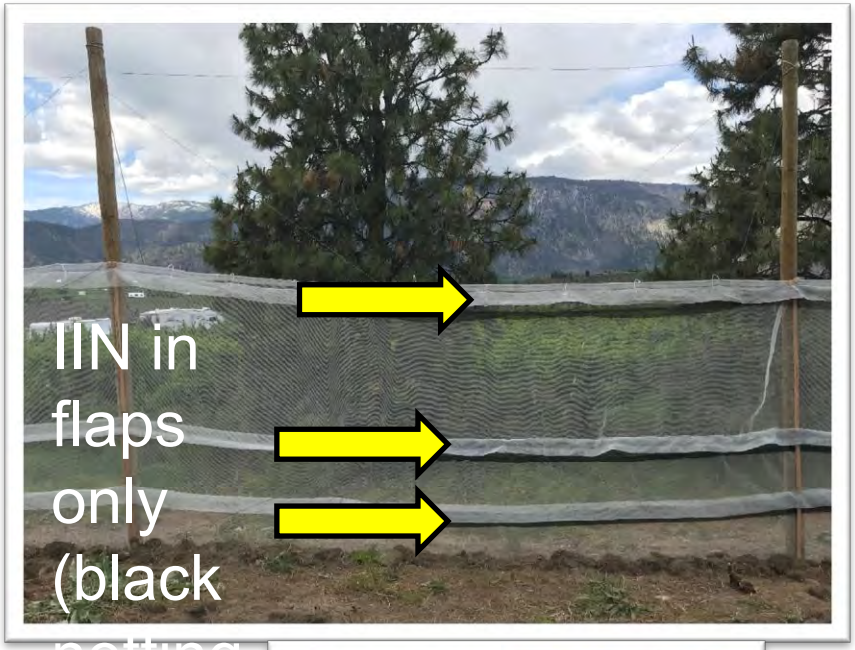
Two approaches to Mechanical Exclusion of Stink Bugs – cages and barriers

Research of Adrian Marshall

Use of net barriers (with and without IIN inserts) to reduce stink bug immigration

Reduction in stink bugs in orchard relative to vegetation

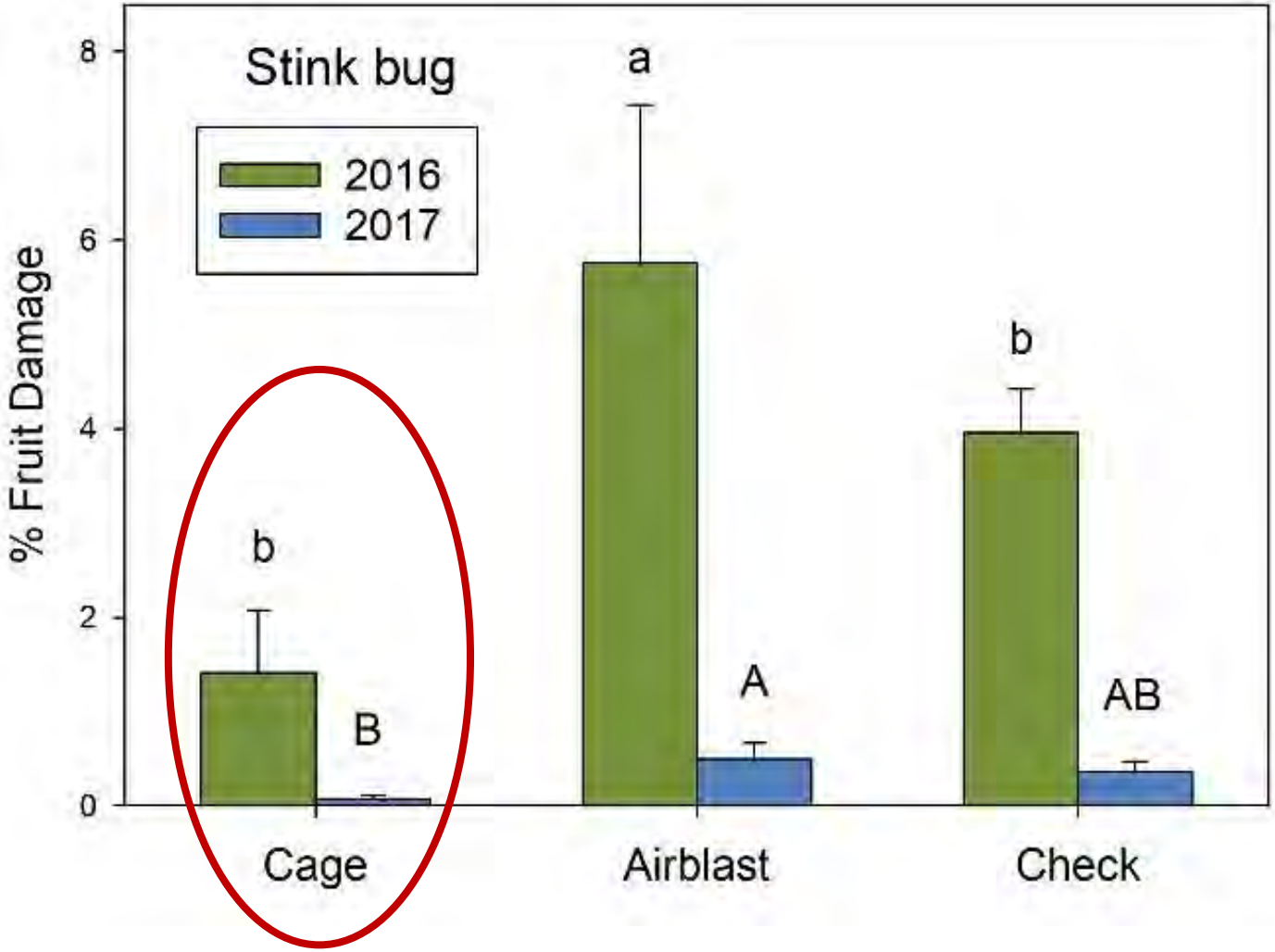




**Ongoing assessment of non-target effects of IIN

Research of Adrian Marshall

Cages are effective in excluding stink bugs/preventing damage



Research of Adrian Marshall