Netting as a BMSB Exclusion Barrier

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Specialty Crop Research Initiative

Collaborating Institutions

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

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History of Nets in Orchards

- ✓Hail nets
- ✓Shade nets

Hail-damaged fruit

Sunburned fruit

Types of Net Structures

Net Enclosures Expand in Washington

Multiple Functions

- ✓ Reduce heat stress
- ✓ Eliminate overhead cooling
- ✓ Improve fruit size, skin color
- ✓ Reduce worker exposure to UV
- ✓ Reduce worker heat stress
- ✓ Equipment-accessible
- ✓ Exclude birds
- ✓ Exclude deer

Exclude insects?

BMSB in Eastern WA Tree Fruit

BMSB not yet established as landscape-level agricultural pest in north-central WA

Washington Species

Natives used as proxies for BMSB

Red-Shoulder Stink Bug
Thyanta pallidovirens

Conchuela Bug
Chlorochroa ligata

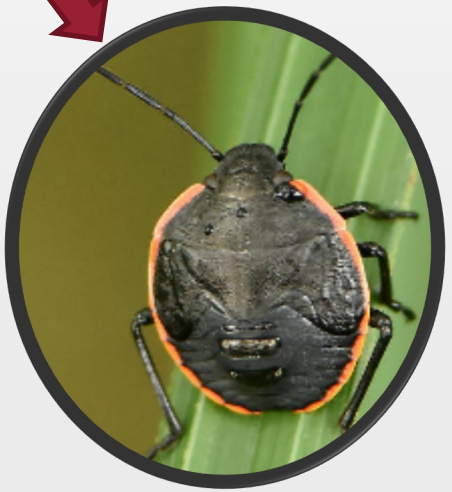
Consperse Stink Bug
Euschistus conspersus

(Zack *et al.,* 2012; McGhee, 1997)

Life Cycle

May-July
14-40 eggs/cluster

Jun-Aug (5 instars)



Aug-July
Dormant: Oct-April

(McGhee, 1997)

Habitat

Washington native stink bugs remain in natural vegetation for the majority of their lives.


Photo: A. Marshall

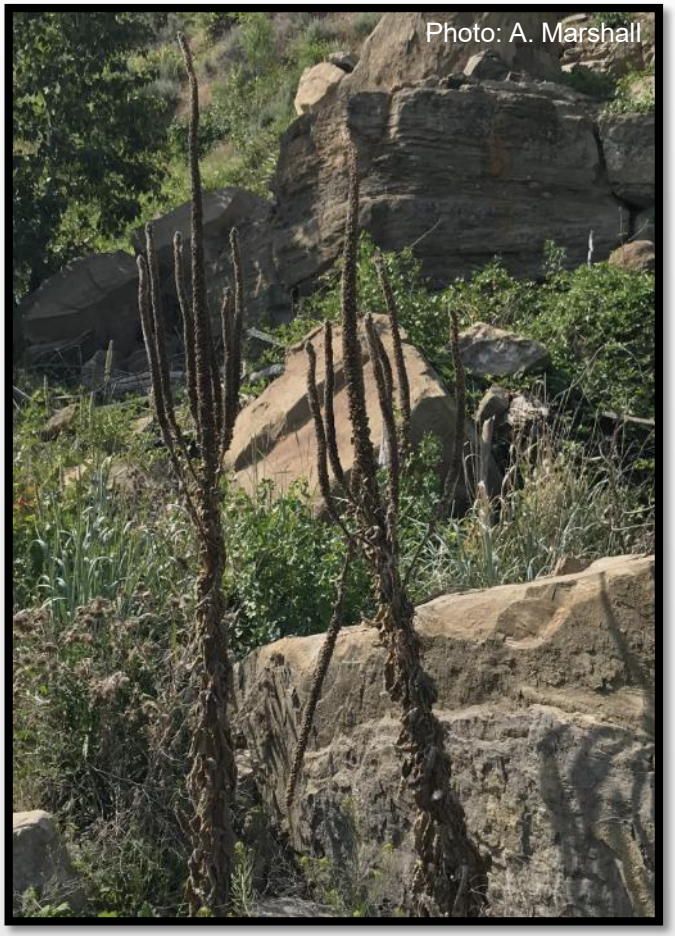

Photo: J. Hepler


Photo: J. Hepler

(Bordon et al., 1951)

Behavior

Migration into orchards is associated with vegetation senescence.



(McGhee, 1997)

Objectives

Obj. 1: Determine when and how stink bugs migrate into orchard.

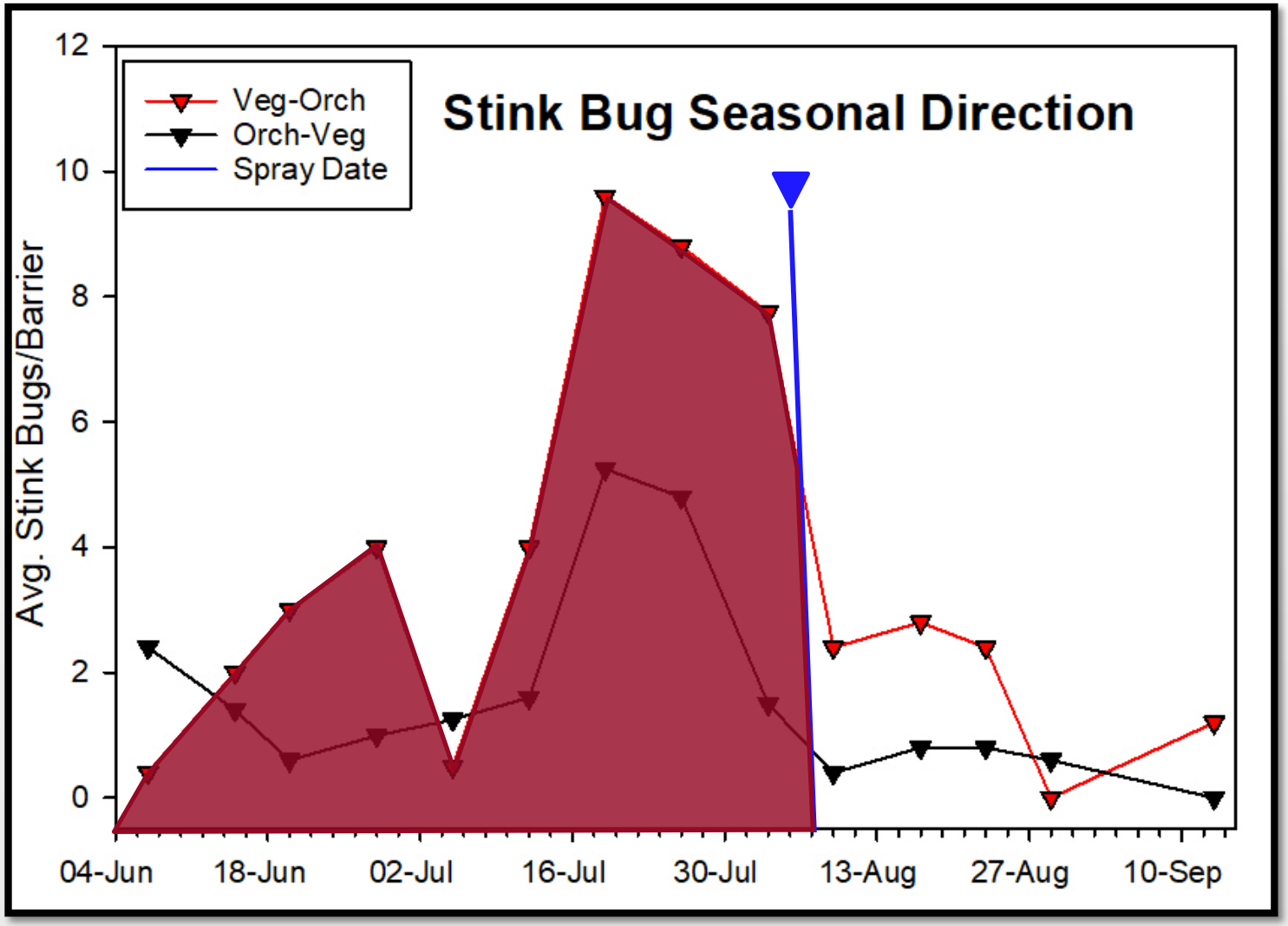
Obj. 2: Examine physical exclusion as a control tactic.

Experimental Design

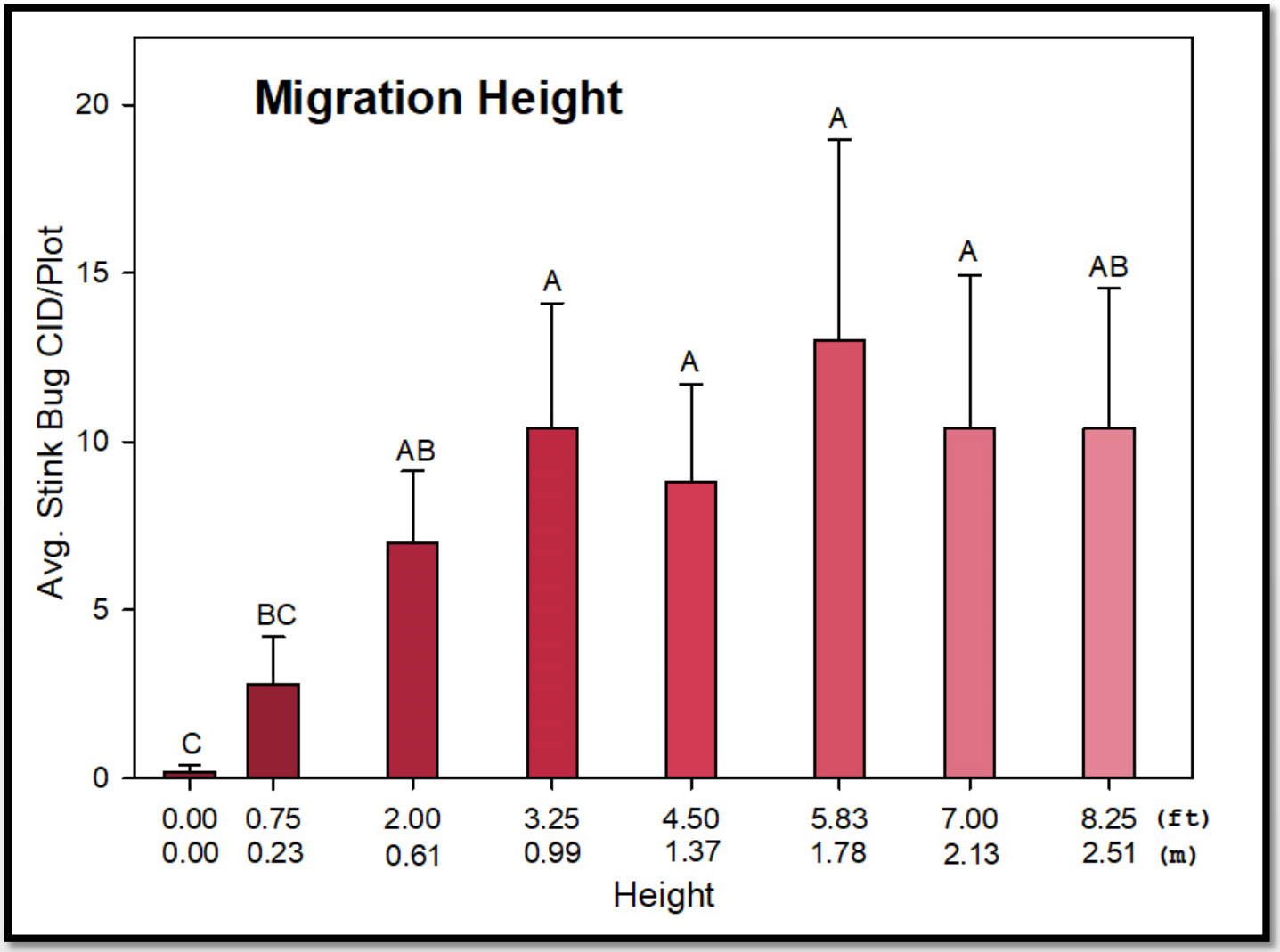
Obj.1: Determine timing, directionality, and height of stink bug migration.

- 2017: Constructed 5 - 6 x 9 ft sticky barriers.
  *2018: Increased sticky barriers to 13 ft.
- Recorded stink bugs weekly by height from 5 Jun – 13 Sep.

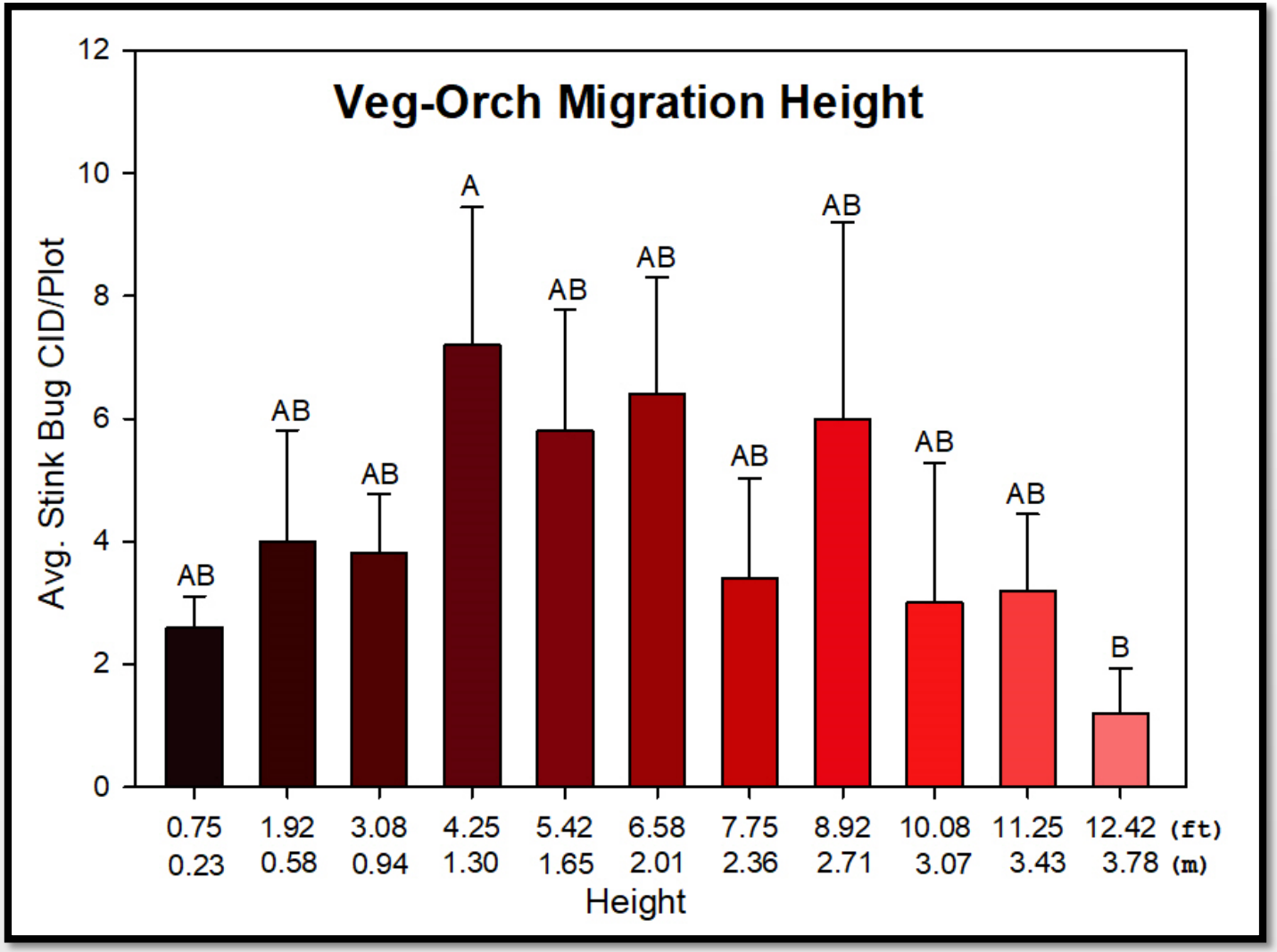
2018 Results



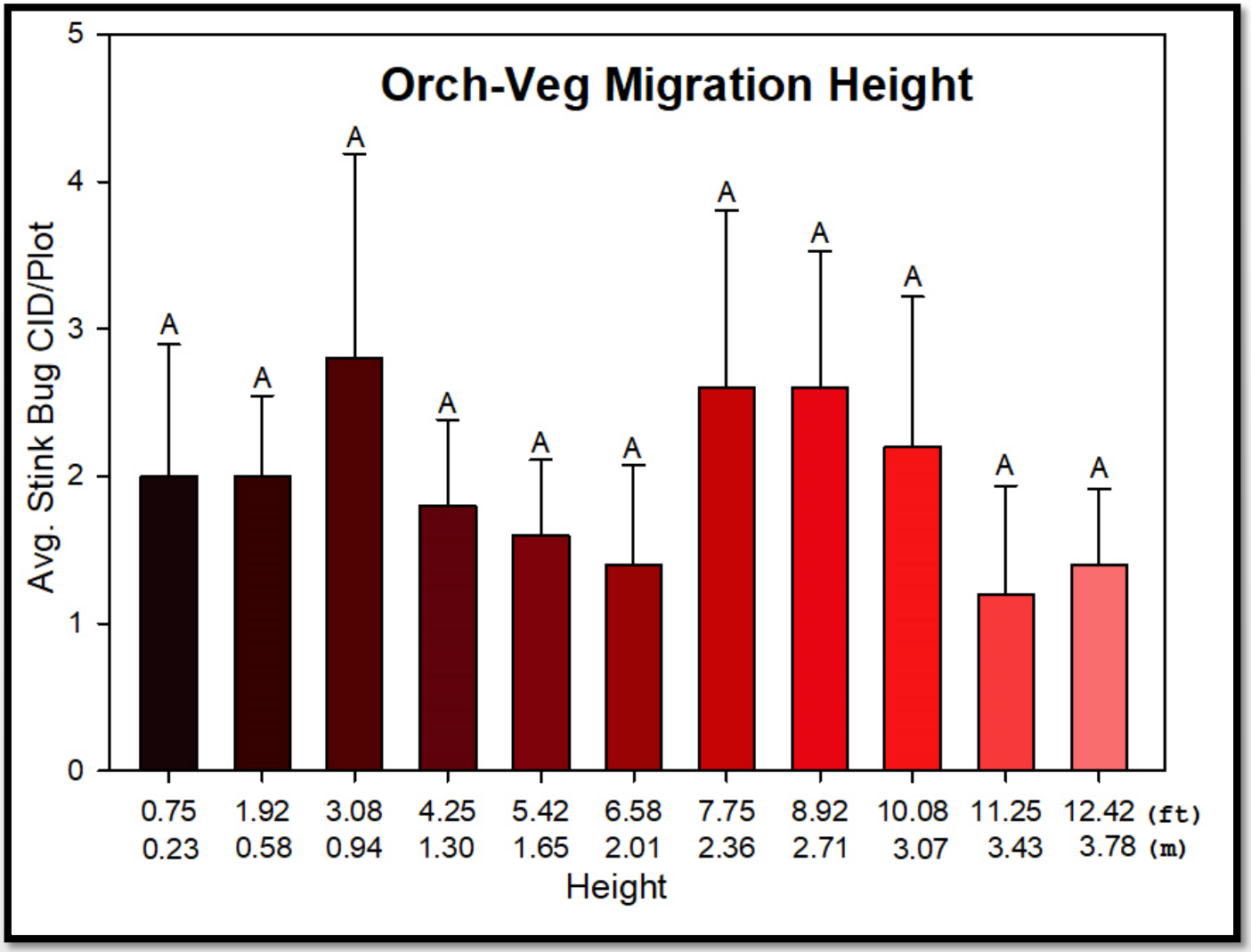
2017 Results



2018 Results



2018 Results



Physical Exclusion

Obj.2: Evaluate efficacy of shade net barriers to exclude migrating stink bugs.

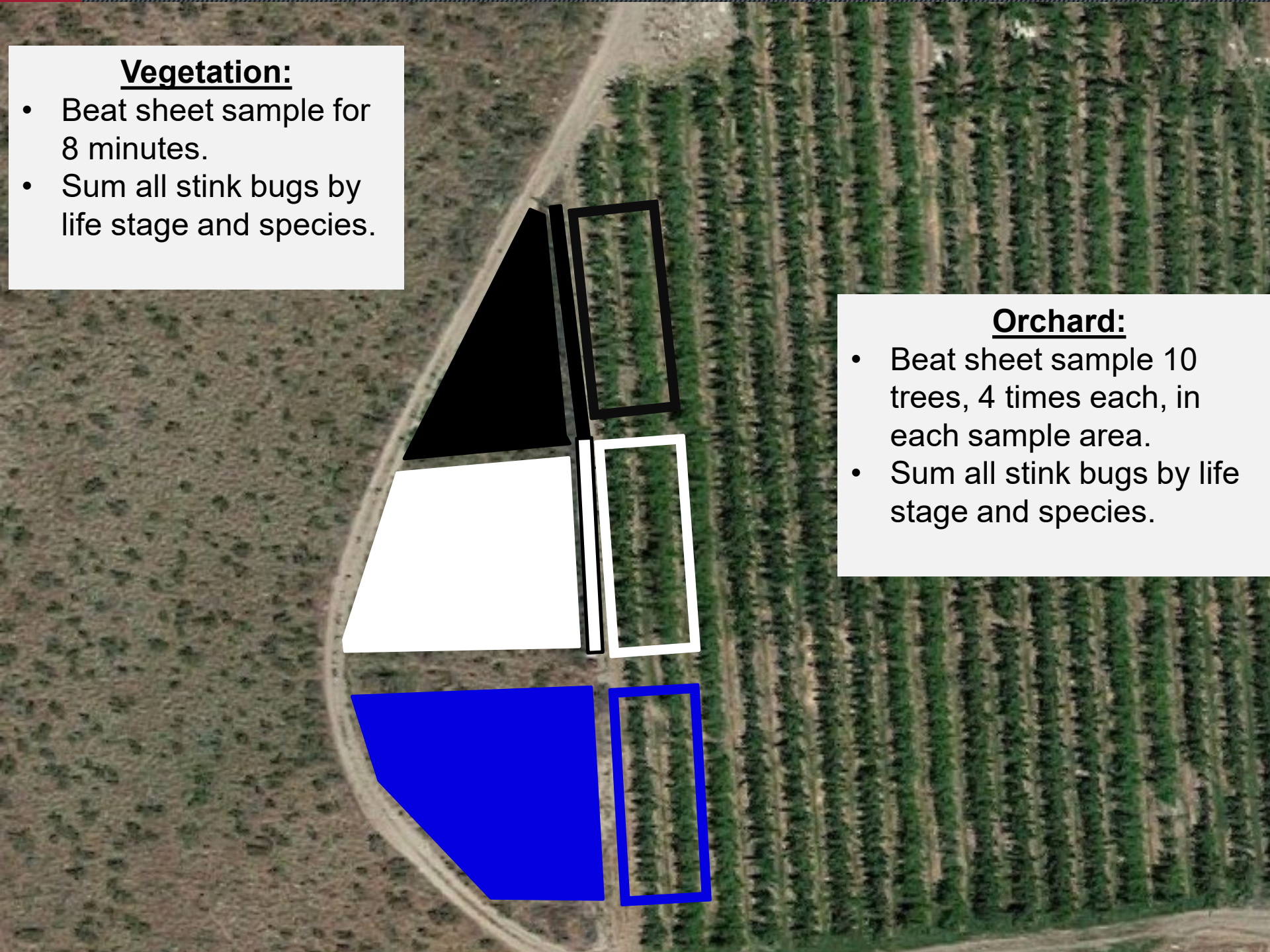
Experimental Design

- Constructed 3 -150 x 12 ft (45.72 x 3.65 m) shade net barriers with flaps in 2016.

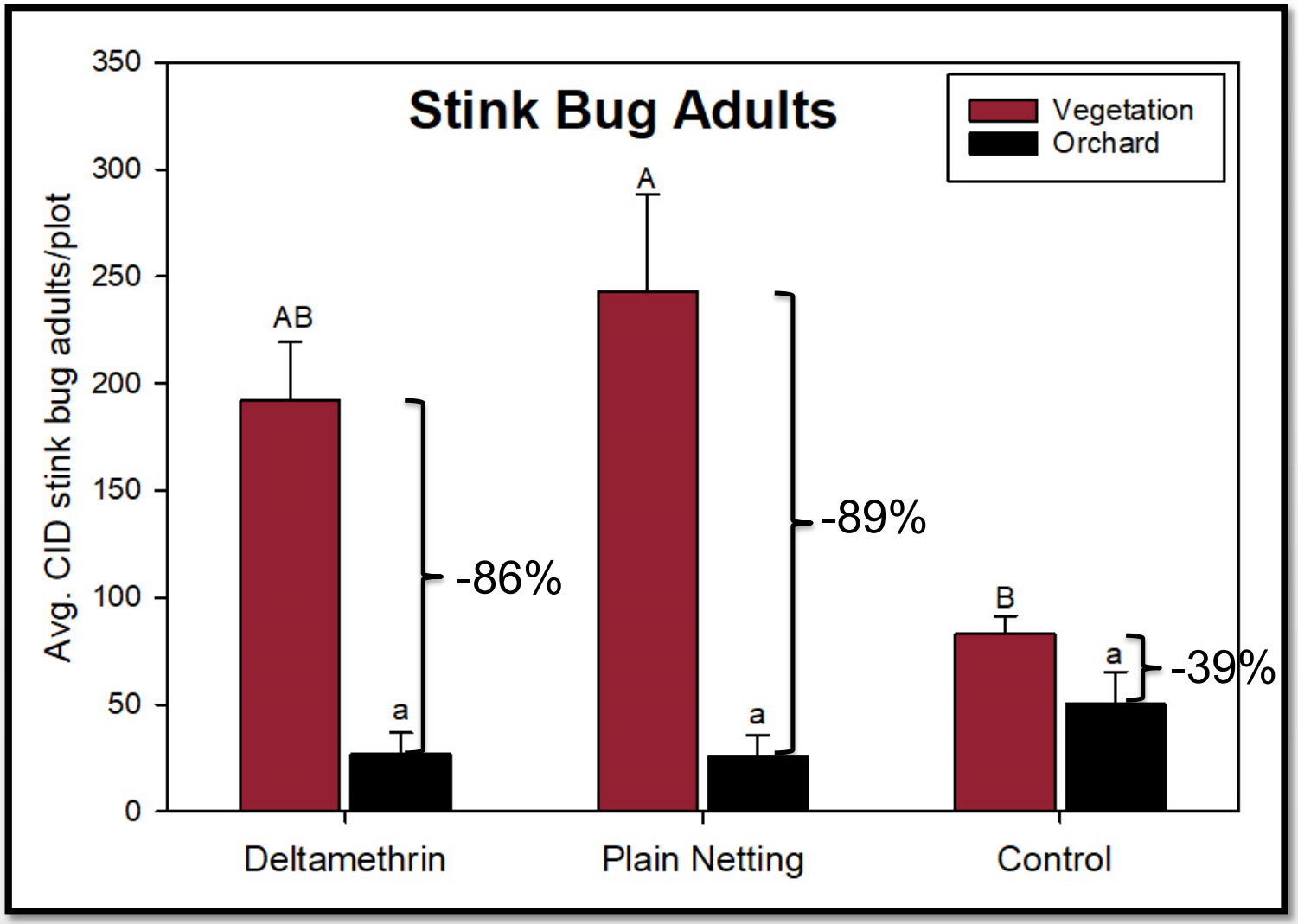
Experimental Design

3 treatments: 1. Netting with deltamethrin-infused flaps
2. Netting with non-insecticidal flaps
3. No net control.

Sampled vegetation and orchard weekly from Jun 1 – Sep 13


Vegetation:
- Beat sheet sample for 8 minutes.
- Sum all stink bugs by life stage and species.
Orchard:
- Beat sheet sample 10 trees, 4 times each, in each sample area.
- Sum all stink bugs by life stage and species.

2018 Results



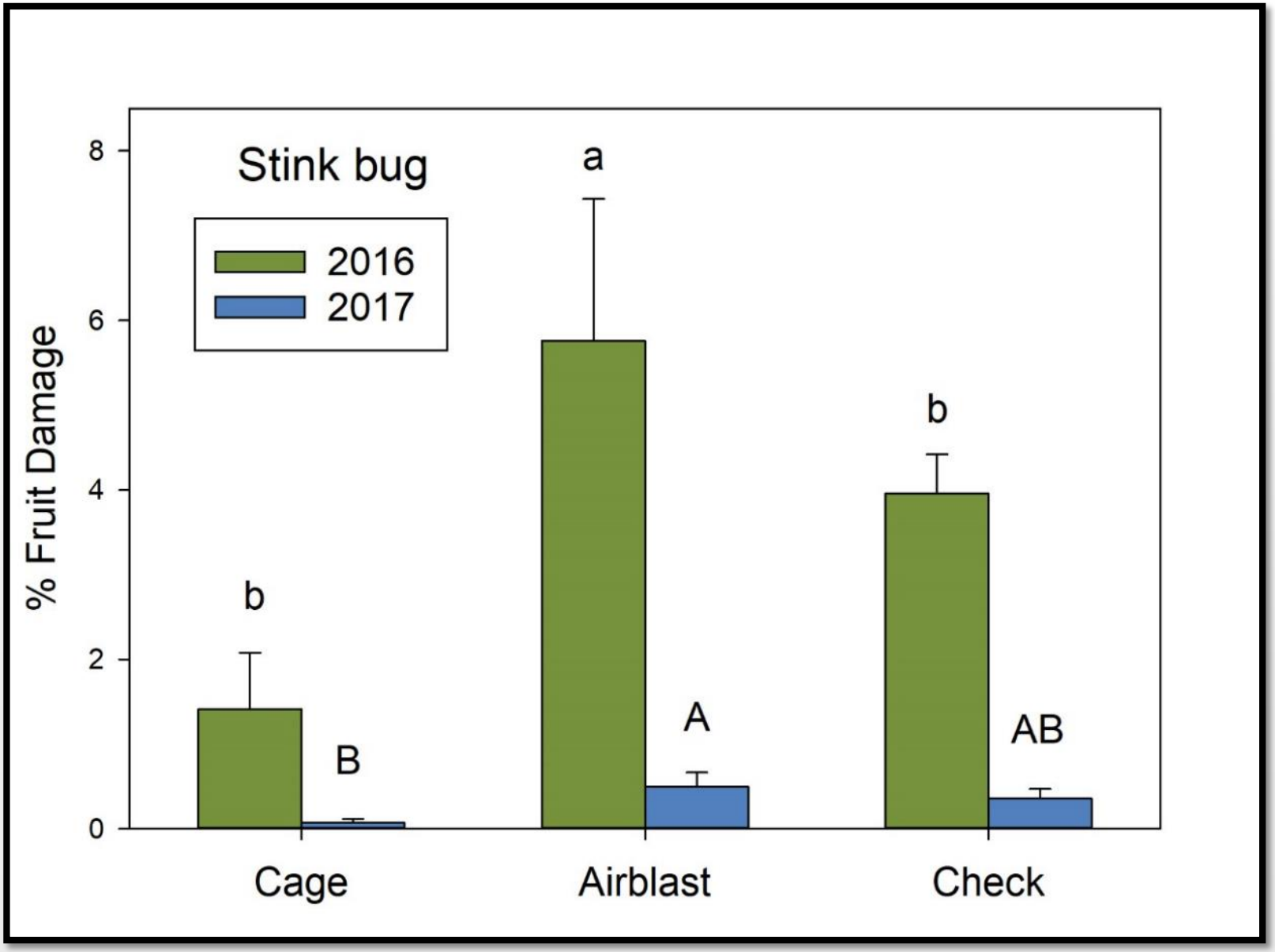
Shade Netting Enclosures

3 treatments:

1. Cage
2. Conventional
3. Control (no treatment)

4 replications
48 trees/plot

Stink Bug Damage Reduction



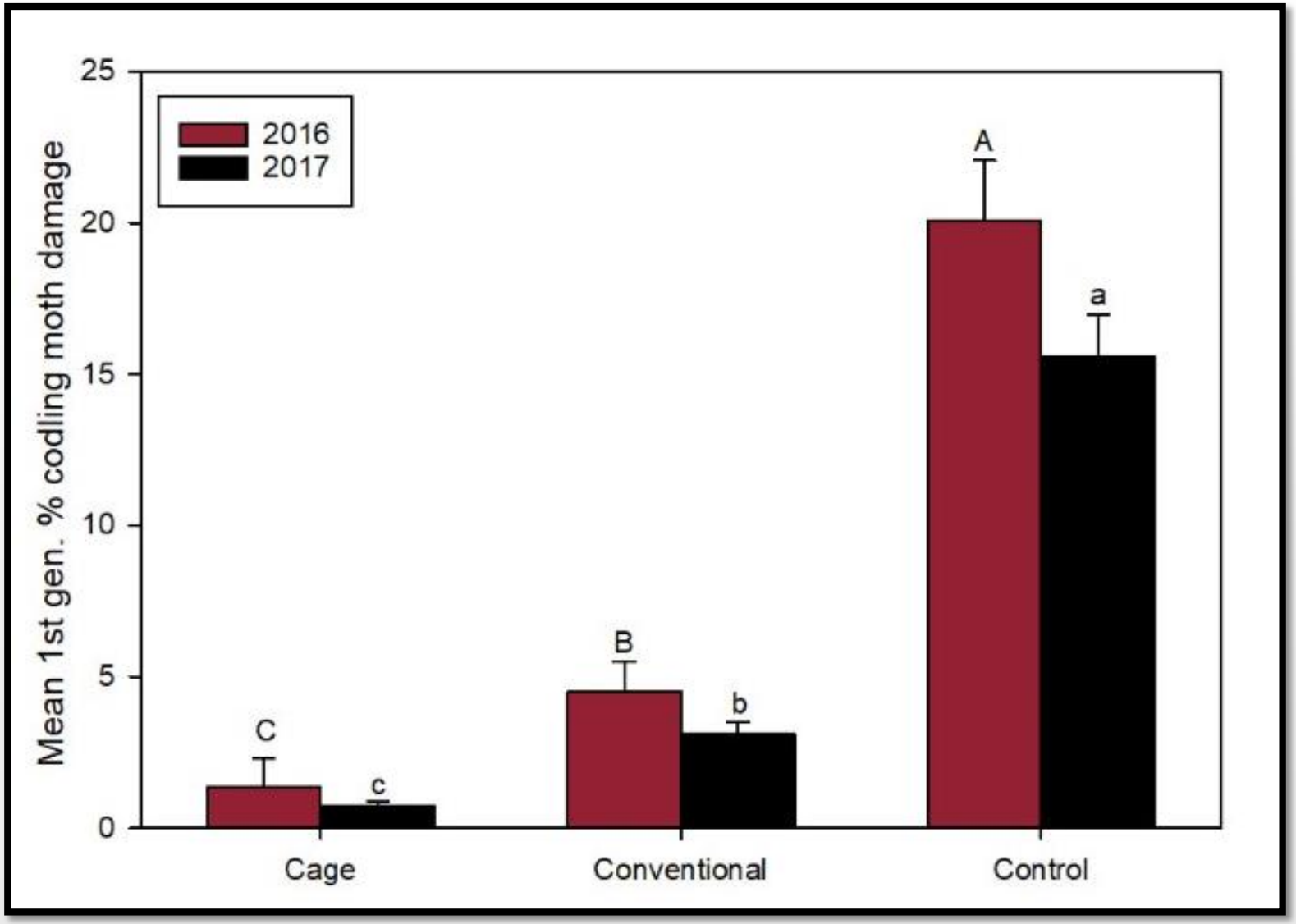
Codling Moth Exclusion


Photo: S. Schoof


Photo: J. Brunner


Photo: A. Marshall

Codling Moth Damage Reduction



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WASHINGTON TREE FRUIT RESEARCH COMMISSION

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The Beers Lab - Summer 2018

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