

Update on Pheromone-Based Monitoring Tools for the Invasive Brown Marmorated Stink Bug

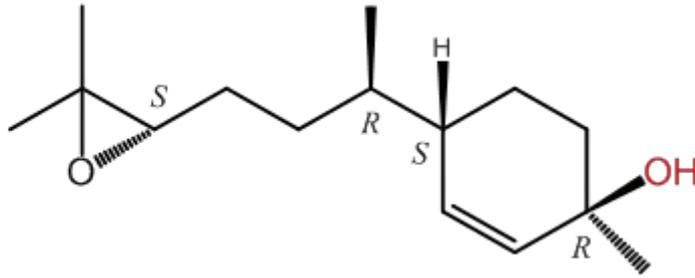
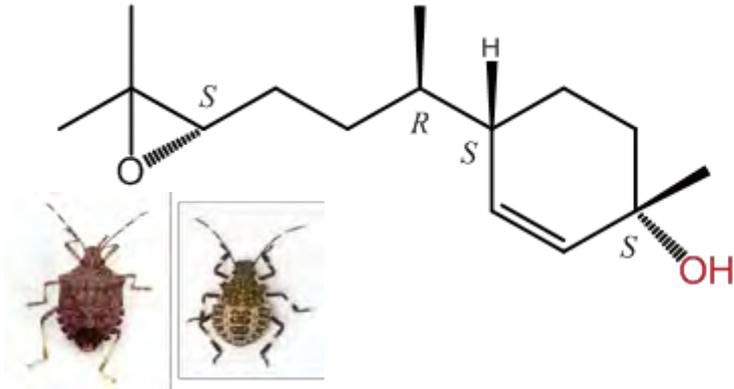
Tracy C. Leskey
Research Entomologist
USDA-ARS
Appalachian Fruit Research Station
Kearneysville, WV 25430 USA
tracy.leskey@ars.usda.gov
[@BMSBresearch](#)



Two-Component BMSB Aggregation Pheromone and Synergist

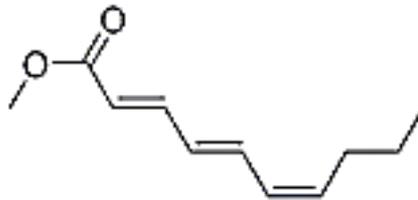
Main component of BMSB aggregation pheromone
(3*S*,6*S*,7*R*,10*S*)-10,11-epoxy-1-bisabolen-3-ol

Minor component of BMSB aggregation pheromone
(3*R*,6*S*,7*R*,10*S*)-10,11-epoxy-1-bisabolen-3-ol



+

Methyl (*E,E,Z*)-2,4,6-decatrienoate (MDT) acts as a synergist for BMSB pheromone



=

Synergism

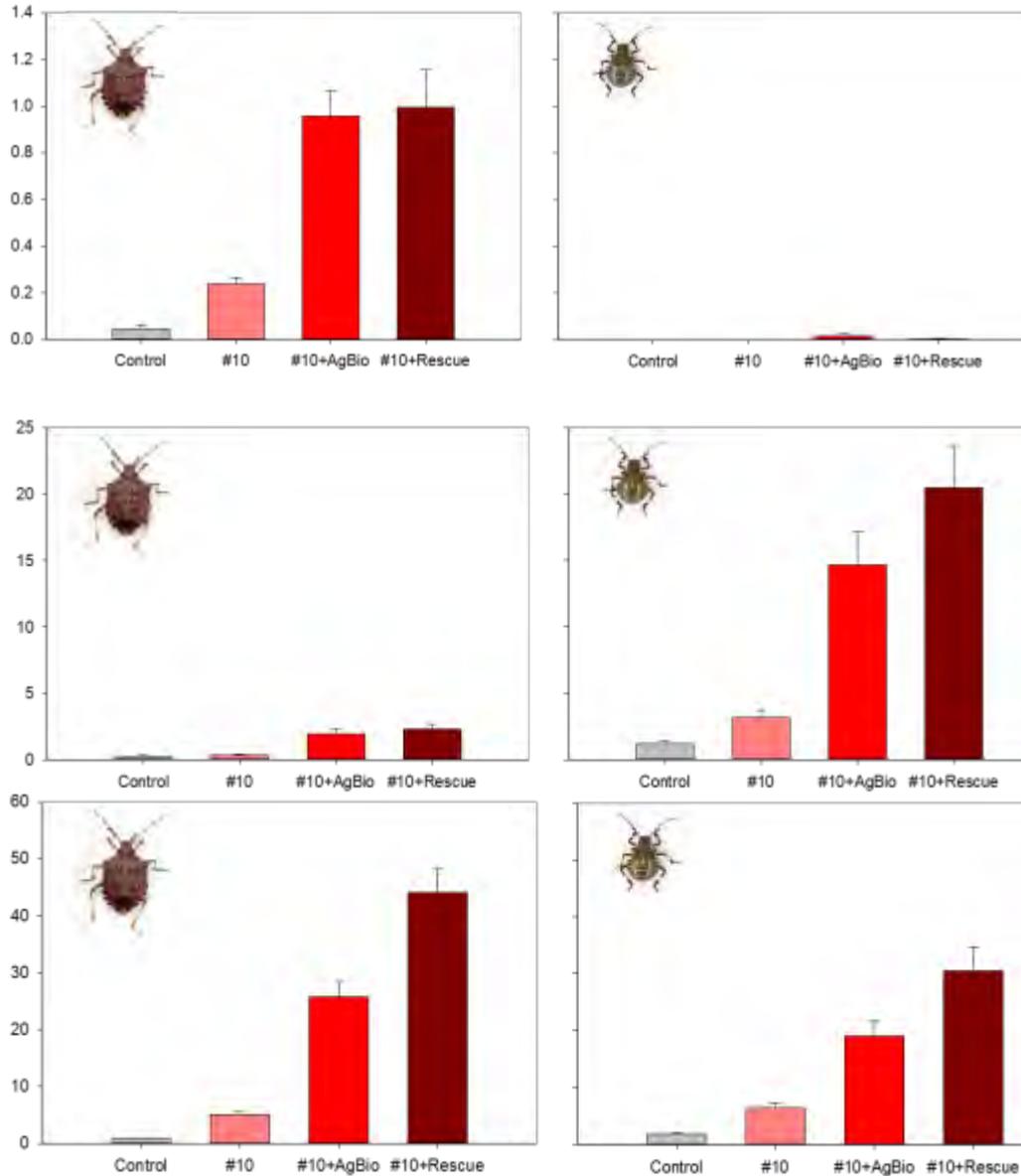
General Protocol

- **Black pyramid traps**
- **Four treatments**
 - 1) BMSB Pheromone (10 mg)
 - 2) BMSB Pheromone (10 mg) + Rescue MDT (119 mg)
 - 3) BMSB Pheromone (10 mg) + AgBio MDT (66 mg)
 - 4) Unbaited control
- **Traps are deployed between wild host habitat and agricultural production areas.**
- **Traps were deployed in mid-April and left in place season-long.**



2013 Season-Long Attraction To Baited Traps

Mean number of BMSB / trap / week



Early Season
Mid-April to Mid-June

Mid Season
Mid-June to Mid-August

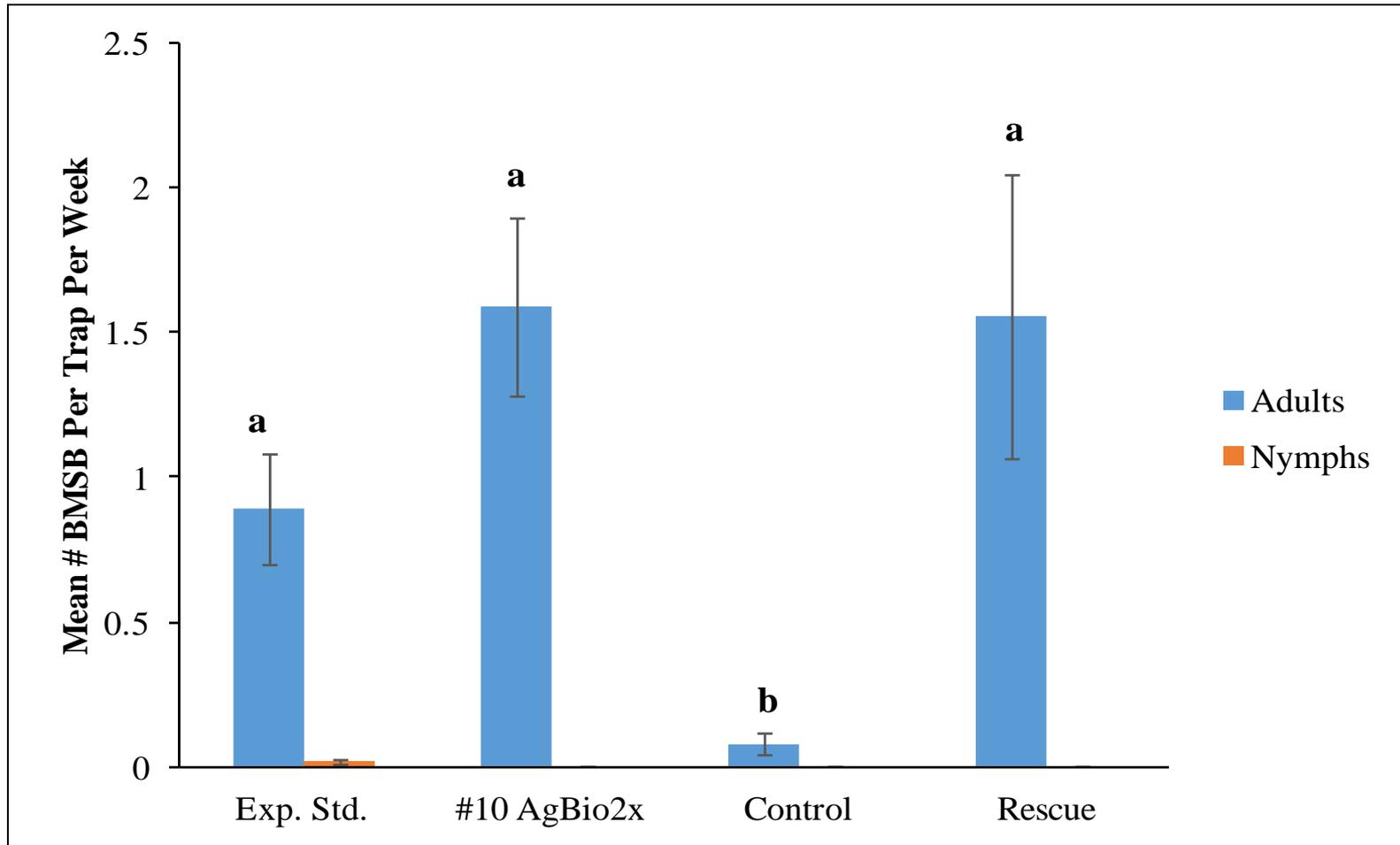
Late Season
Mid-August to Mid-October

2014 Coordinated Trapping Studies

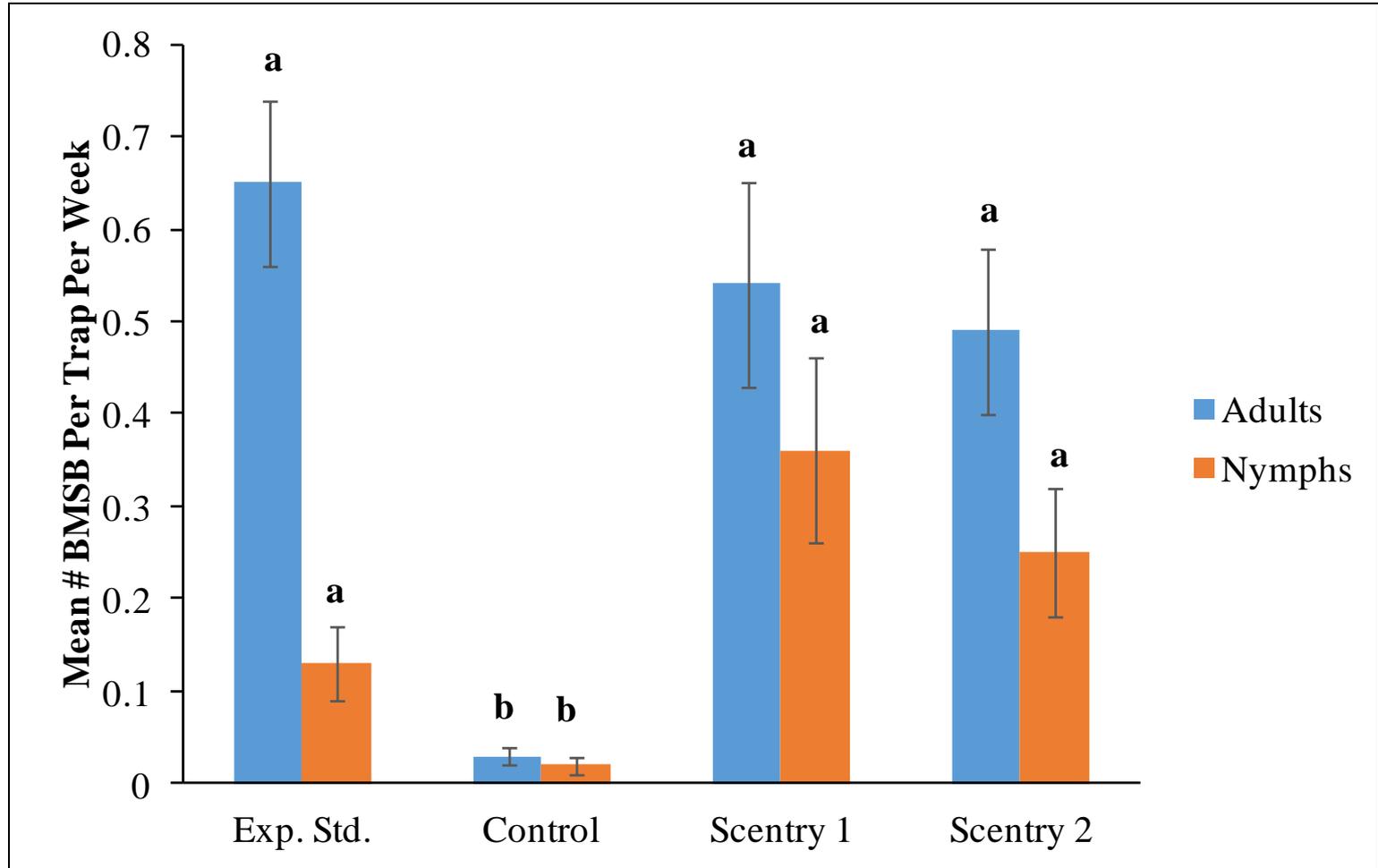
- Provide feedback to commercial companies.
- Monthly assessment of lure formulations provided by commercial companies.
- AgBio/ChemTica, Rescue, Scentry, Trece, AlphaScents, and Hercon (not presented).
- Compared with our experimental standard.
 - BMSB Pheromone(10 mg) + AgBio MDT (66 mg)



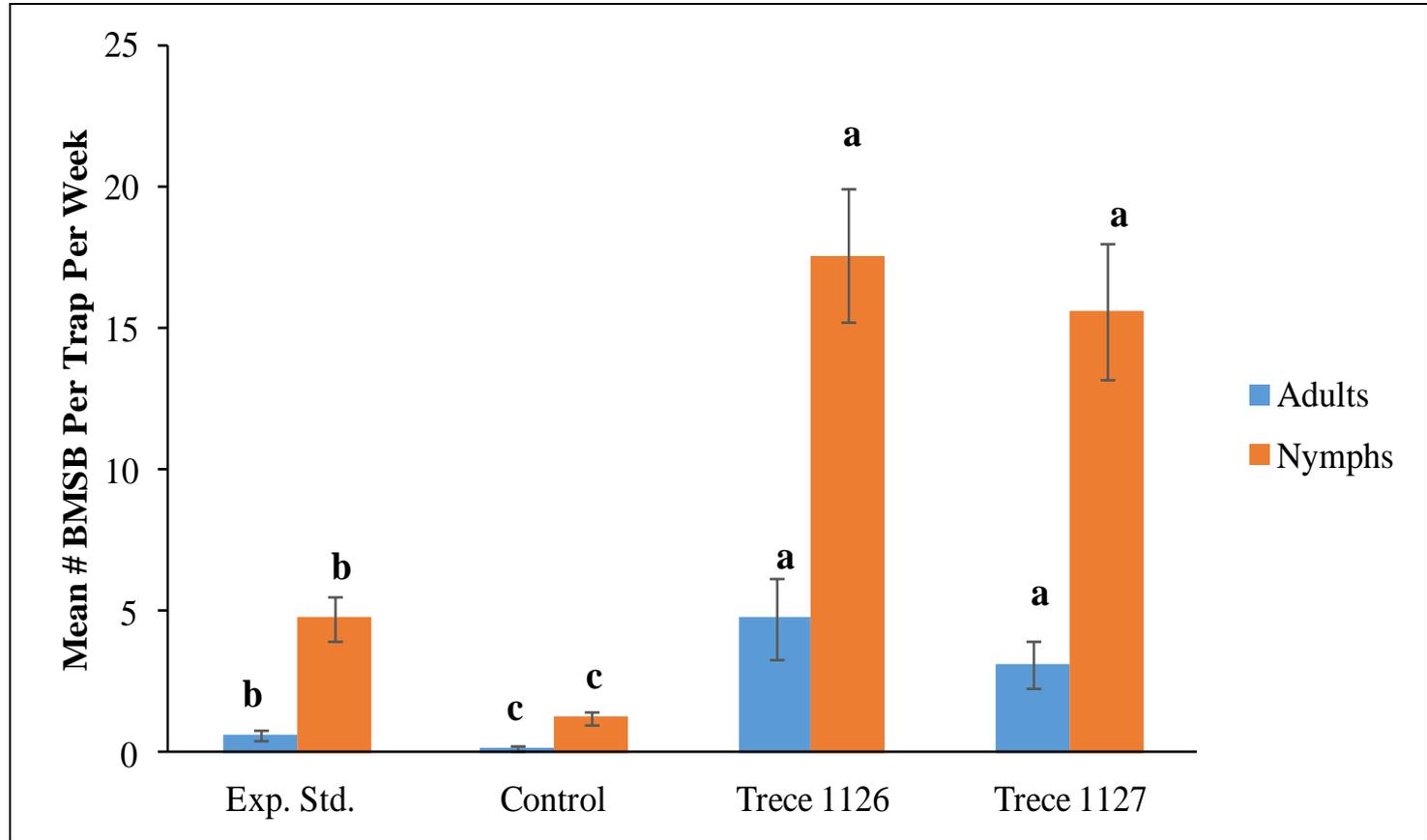
AgBio and Rescue (May)



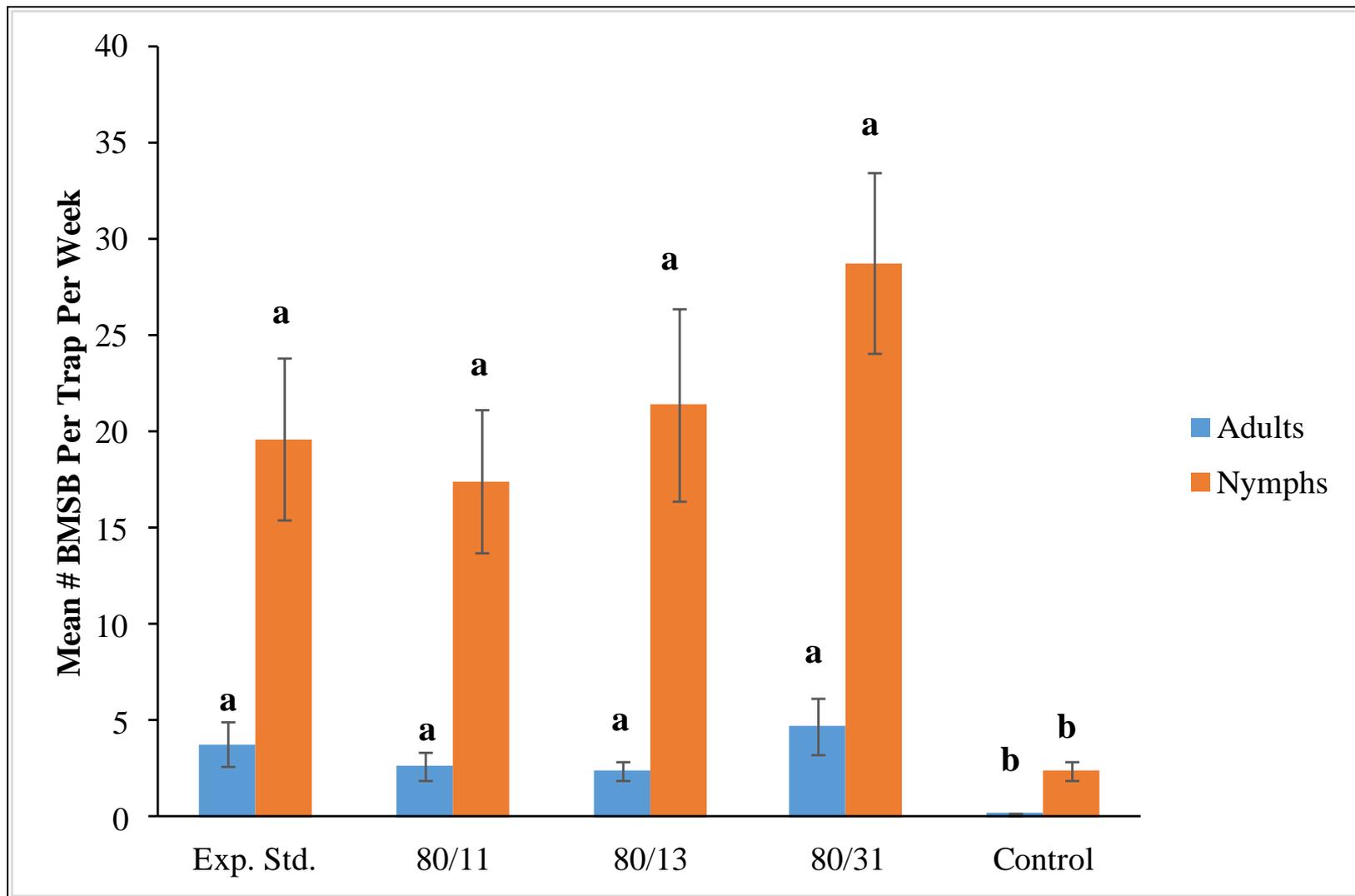
Scentry (June)



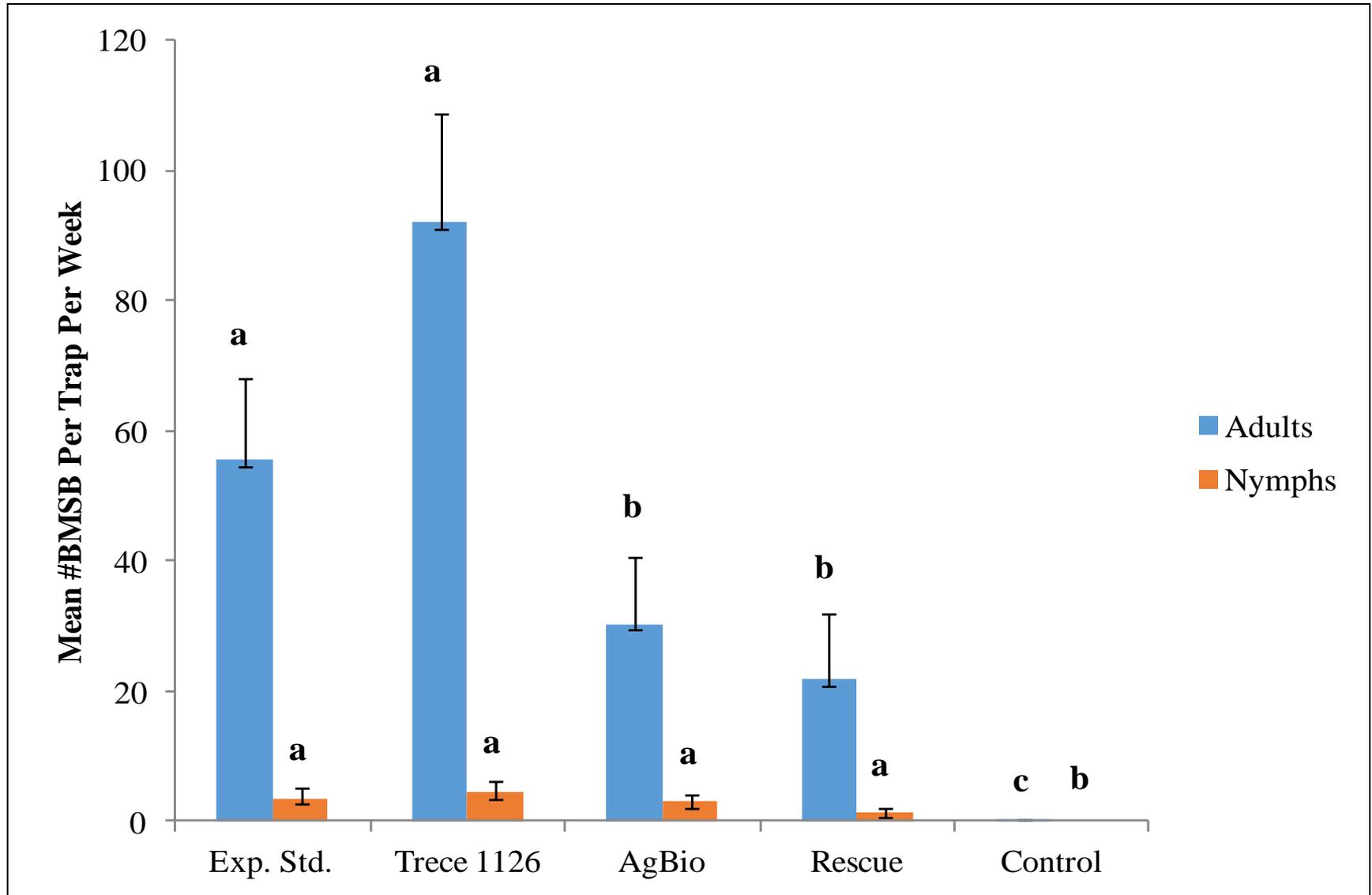
Trece (July)



AlphaScents (August)



Multiple Comparisons (Late-Season)

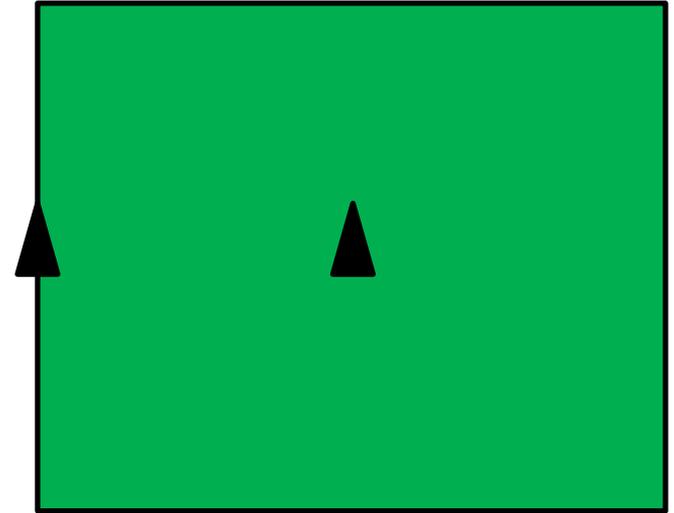


Tentative Conclusions

- Commercial companies have products that can be used to detect the presence, abundance, and seasonal activity of BMSB in specialty crops.
- In particular, Trece resulted in consistent attraction and has a long-lasting formulation.
- Expect that Trece, AgBio and Rescue will be selling products next year.
- Bedoukian will be manufacturing material.

Can we use biological information provided by trap captures to guide management decisions?

- Apple blocks at AFRS.
- Each block was monitored with two baited traps (10 mg pheromone + 66 mg synergist). Traps checked weekly.
- When cumulative captures of adults in either trap reached a set threshold, the block was treated with BMSB material (ARM).
- Block treated again 7-d later. Threshold was then reset.

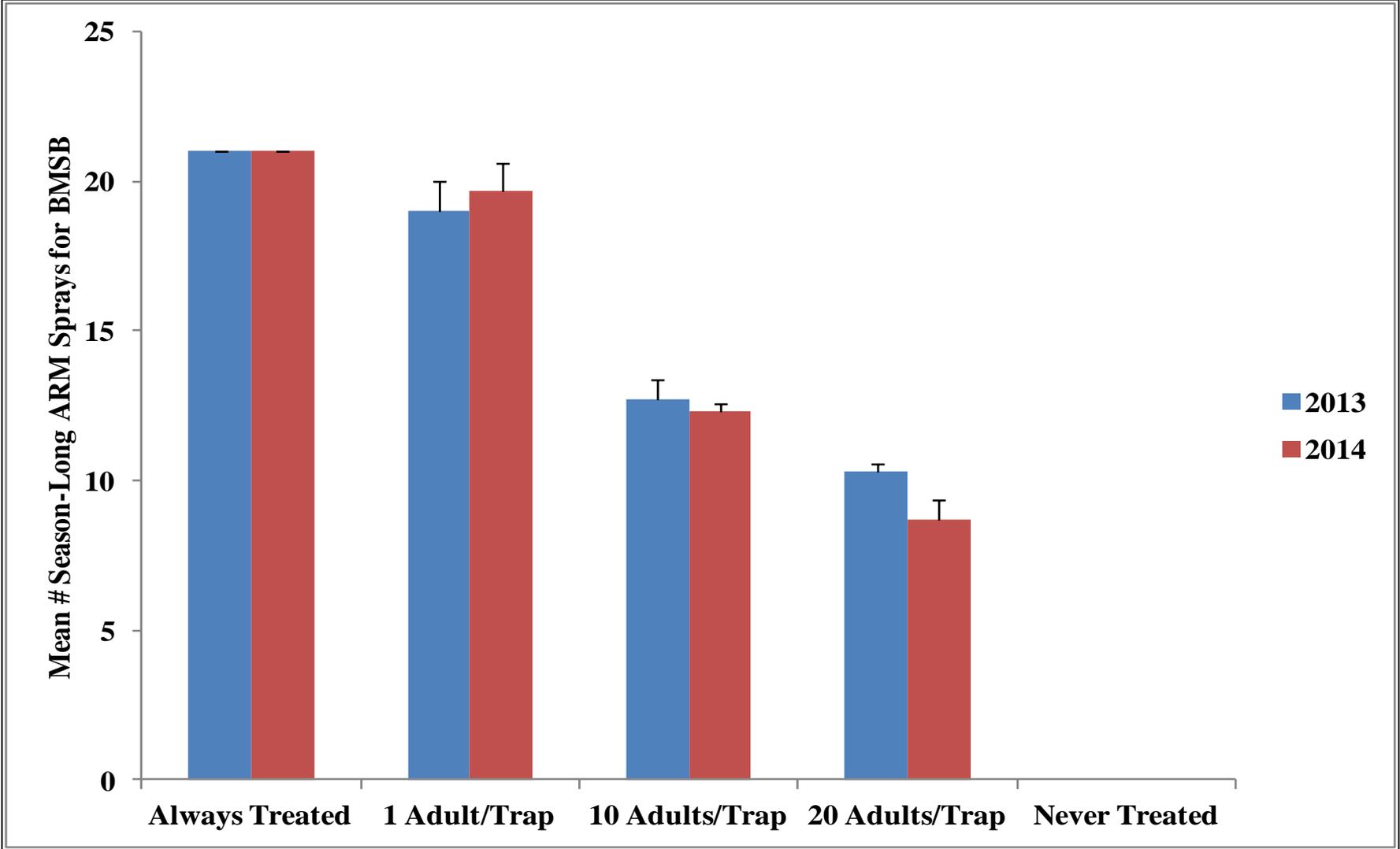


Treatment Regimes

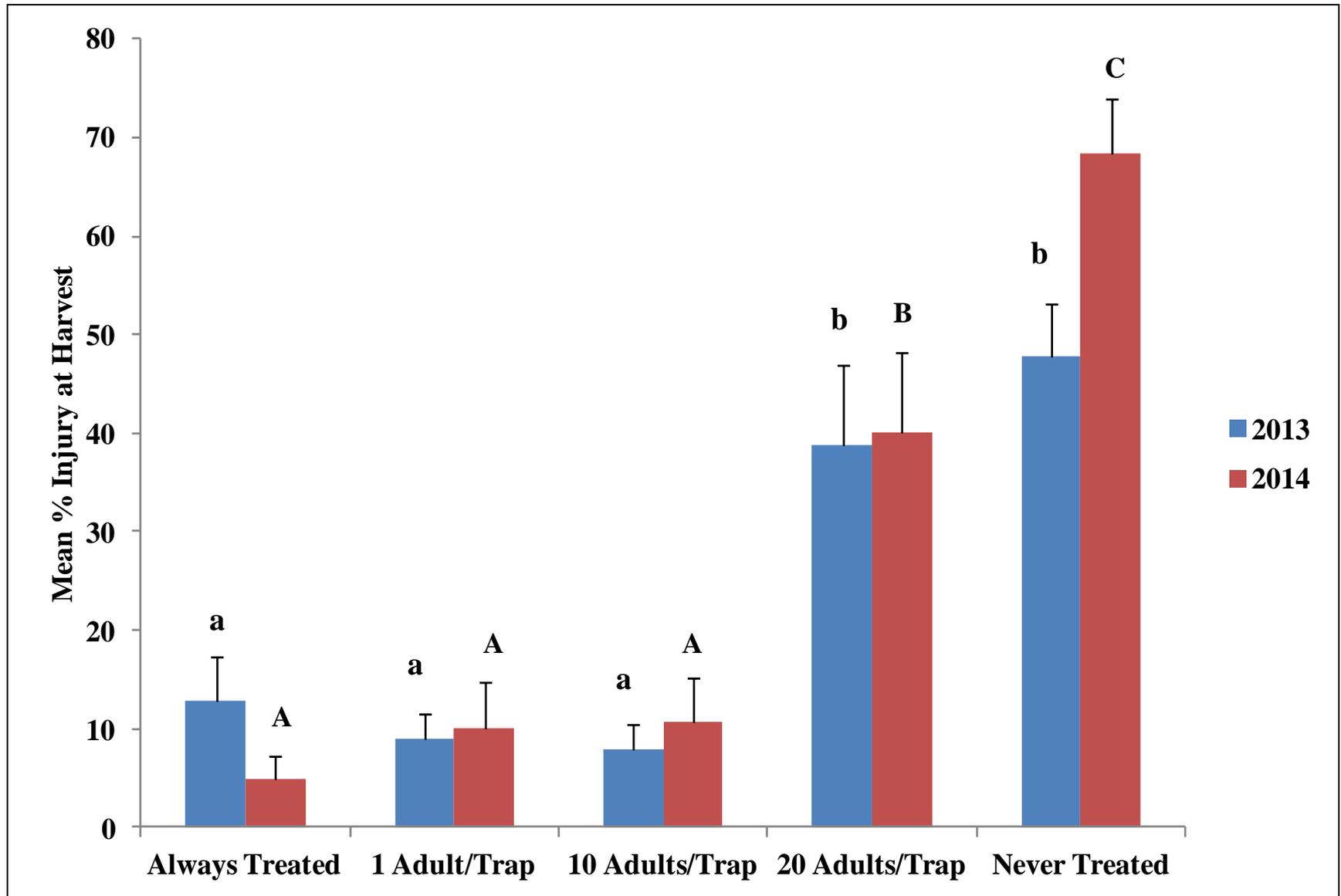
Sprays Triggered at:

- 1) 1 Adult / Trap
- 2) 10 Adults / Trap
- 3) 20 Adults / Trap
- 4) Treated Every 7 d
- 5) No Spray (Control)

Season-Long Insecticide Applications Made Against BMSB



BMSB Injury at Harvest



Tentative Conclusions

- Biological information provided by baited traps can be used to make management decisions for BMSB.
- A threshold of 10 adults/trap based our experimental standard lure combination reduced insecticide applications by 40% with no significant difference in injury at harvest compared with weekly ARM in 2013 and in 2014 .
- A threshold of 1 adult/trap was too sensitive – triggering too many sprays, without significant reductions injury. A threshold of 20 adults/trap was not sensitive enough – missing key sprays in mid-July (new F1 adults) and in the late-season (F1s and F2s).
- Five growers adopted this provisional threshold in 2014. No differences in injury at harvest in blocks managed using grower standard or with sprays triggered by baited traps.
- As commercial companies continue to refine and tweak lure formulations, we will need to recalibrate thresholds.

Can we utilize other trap styles?

Experimental
Standard
Wooden
Pyramid



Coroplast
Pyramid



Small
Pyramid
(Ground)



Small
Pyramid
(Hanging)



Small
Pyramid
(Limb)

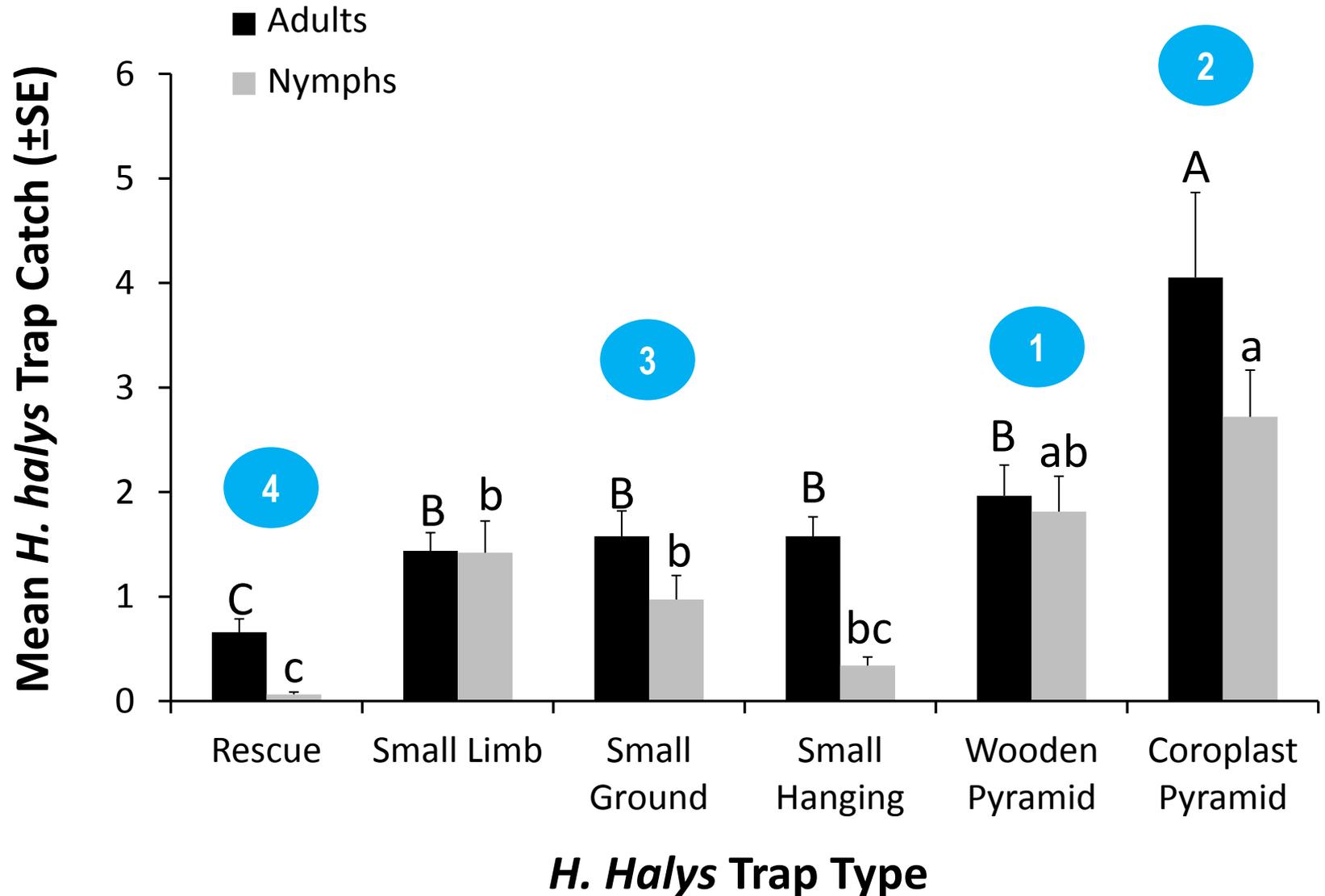


Rescue
(Hanging/
Foliage)



- Are captures similar among other trap types and deployment strategies compared with our experimental standard?
- Baited with 10 mg BMSB Pheromone + 66 mg MDT. Two years of data from commercial orchards.

Season-Long Trap Captures / Sensitivity



Coroplast vs. Standard Wooden Pyramids



Spearman Rank Correlation

$\rho=0.735$

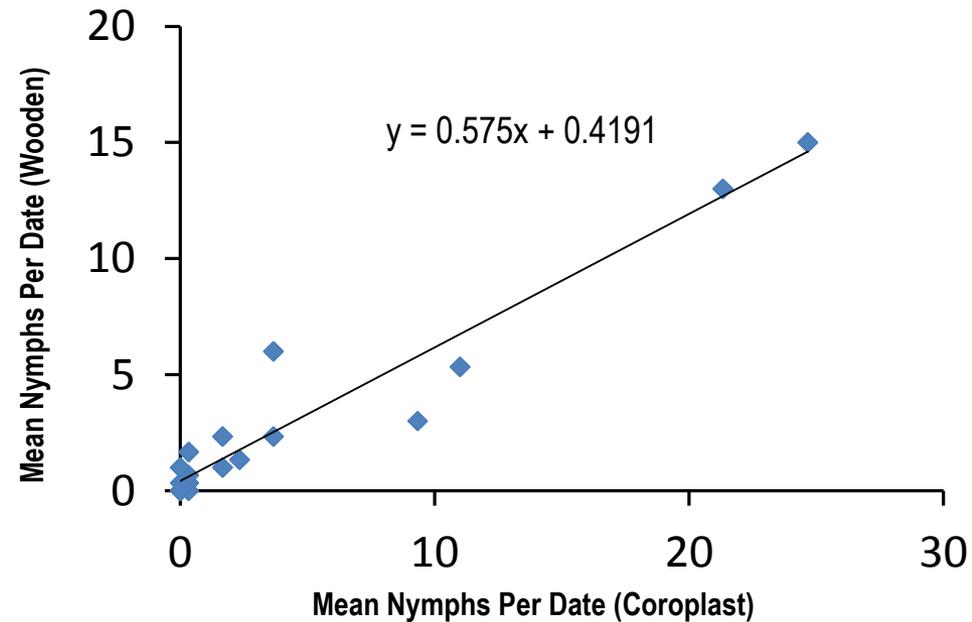
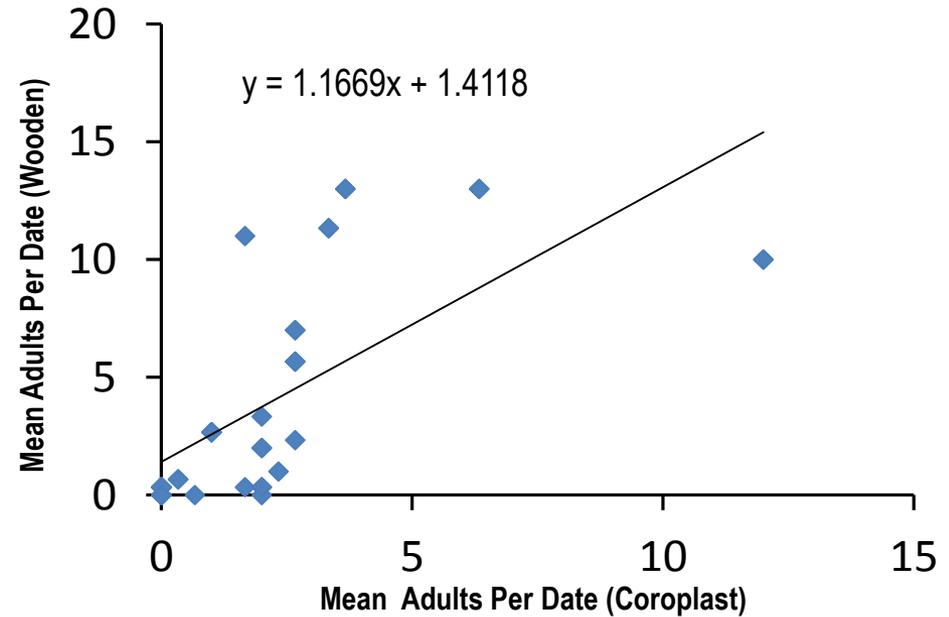
$P < 0.0001$



Spearman Rank Correlation

$\rho=0.900$

$P < 0.0001$



Coroplast vs. Small Pyramids Styles

Coroplast Pyramid



Small Pyramid (Ground)



Small Pyramid (Hanging)



Small Pyramid (Limb)



Rescue (Hanging/ Foliage)



Conclusions

- **Coroplast pyramid traps performed well compared with standard black pyramid traps. These are much cheaper and have held up well in the field. Tops need to be replaced annually.**
- **Other trap styles appear effective now that we have good olfactory stimuli. Based on correlations of trap captures with pyramid traps. However, hanging traps capture significantly fewer nymphs.**
- **We now have tools for reliable season-long monitoring and detection of BMSB.**



Acknowledgements



- BMSB SCRI CAP Team and Leskey Lab
- USDA NIFA Specialty Crops Research Initiative Award # 2011-51181-30937
- USDA NIFA OREI #2012-51300-20097
- USDA-ARS
- USDA-APHIS

