

Progress In Pheromone-Based Trapping

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- Visual Stimulus
 - Large black pyramid
- Olfactory Stimuli
 - BMSB aggregation pheromone
 - Synergist
- Capture Mechanism
 - Tapered pyramid to inverted funnel jar with DDVP toxicant strip
- Deployment Strategy
 - Traps placed in peripheral row of orchard

Broad Validation in Multi-State Trial

- Is BMSB attracted to #10 in the early season?
- Is BMSB attracted to #10 season-long?
- How attractive is this stimulus relative to MDT and unbaited traps?
- WV, MD, VA, PA, NJ, NY, DE, NC, OR, WA, and OH



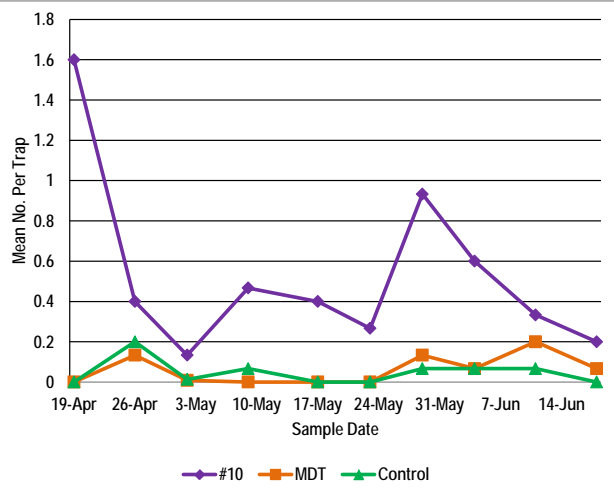
General Protocol

- Black pyramid traps
- Three odor treatments
 - 1) #10
 - 2) MDT
 - 3) unbaited control
- Traps are deployed between wild host habitat and agricultural production area.
- Traps were deployed in mid-April and left in place season-long.

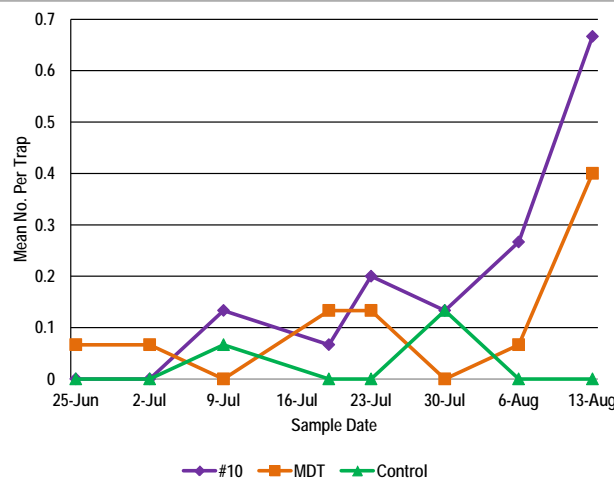


Reliable Season-Long Monitoring in Commercial Orchards

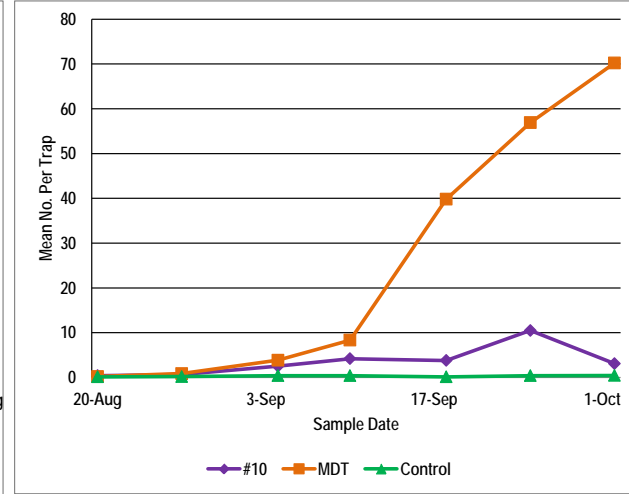
Early Season
Mid-April – Mid June



Mid-Season
Mid June - Mid August

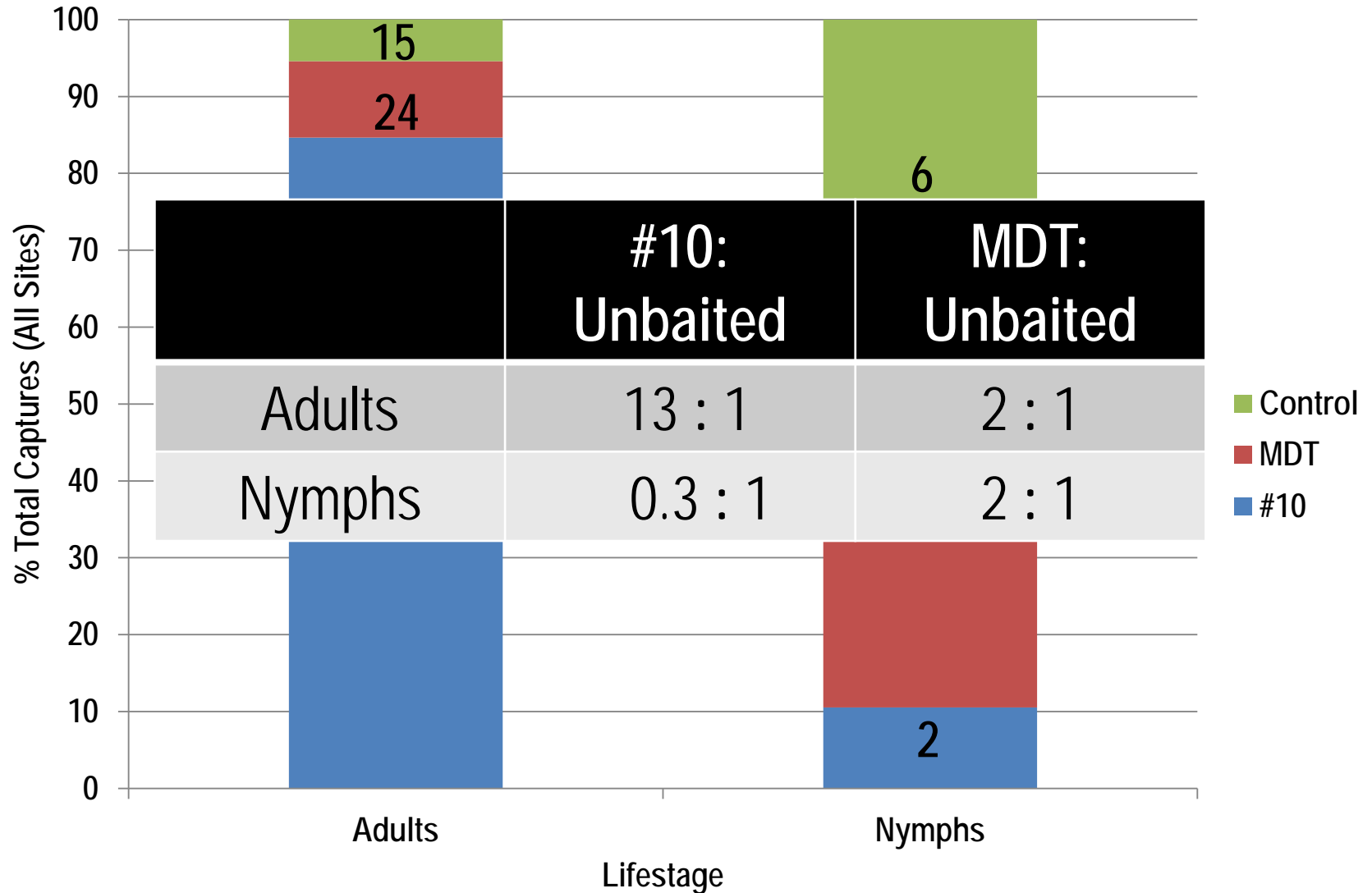


Late Season
Mid-August – Early October



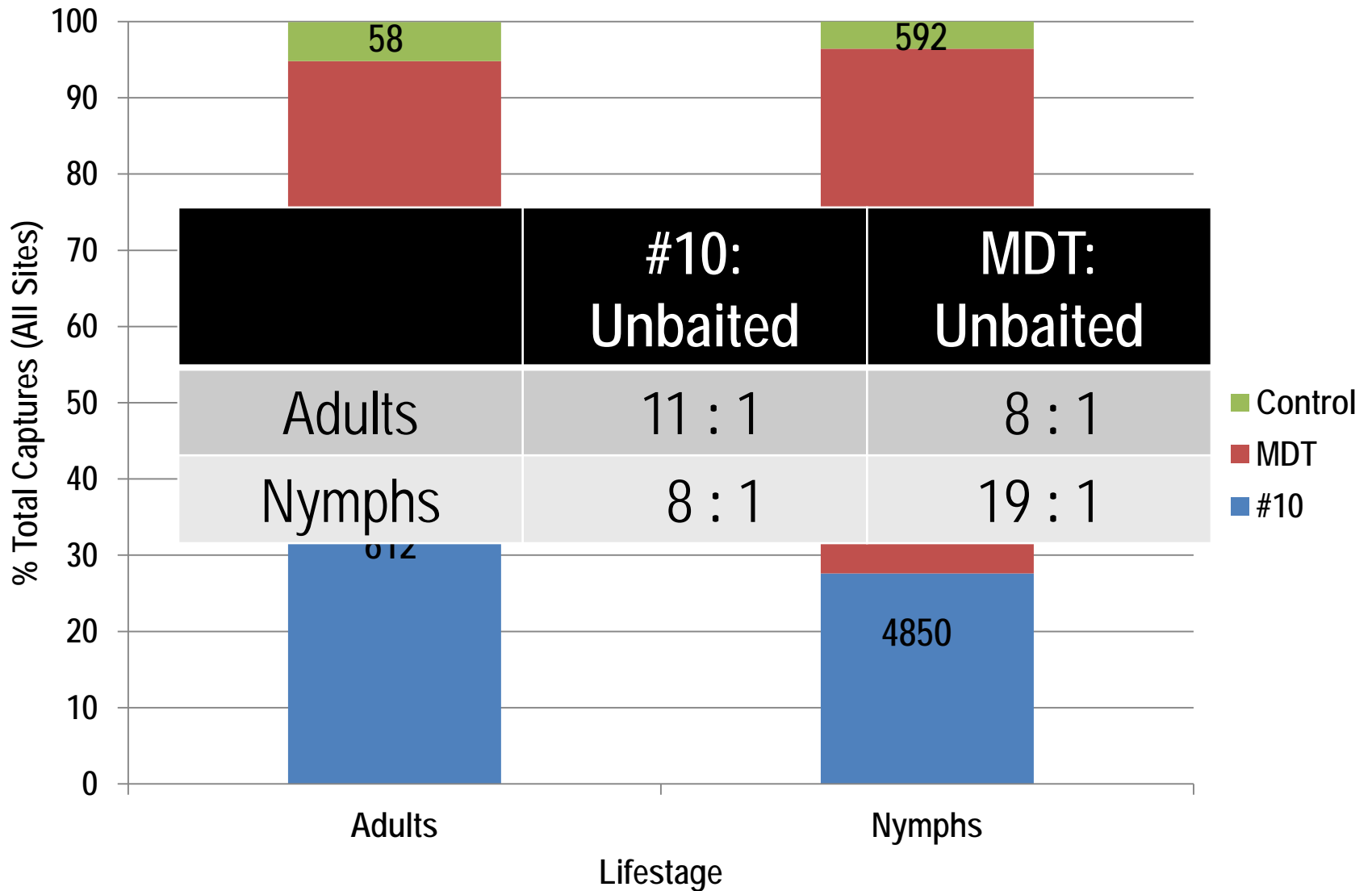
- BMSB reliably captured during early season.
- Low numbers during much of mid-season.
- MDT very attractive and #10 attractive in the late season.

Early Season Mid-April – Mid June



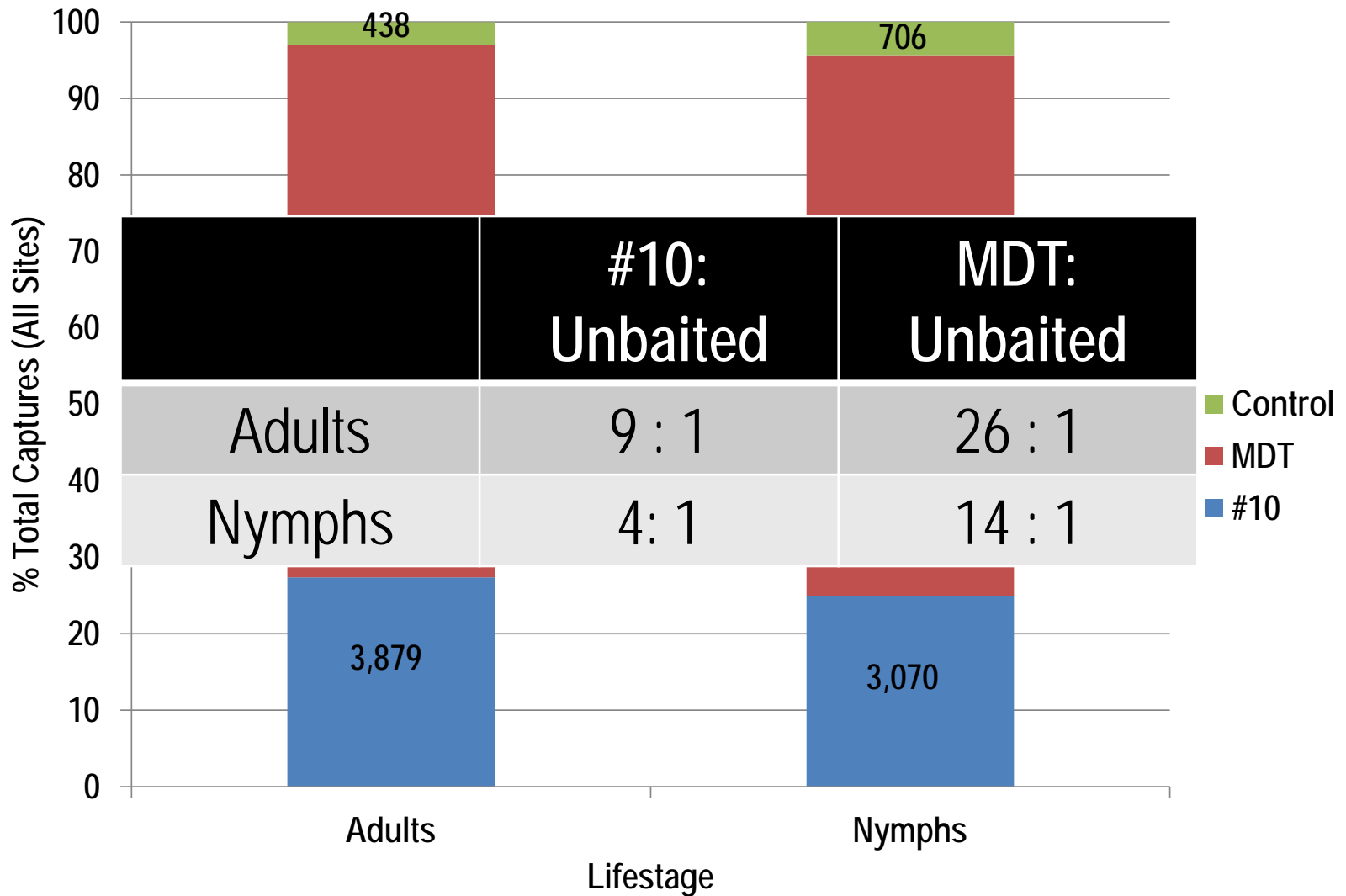
Mid-Season

Mid June - Mid August



Late Season

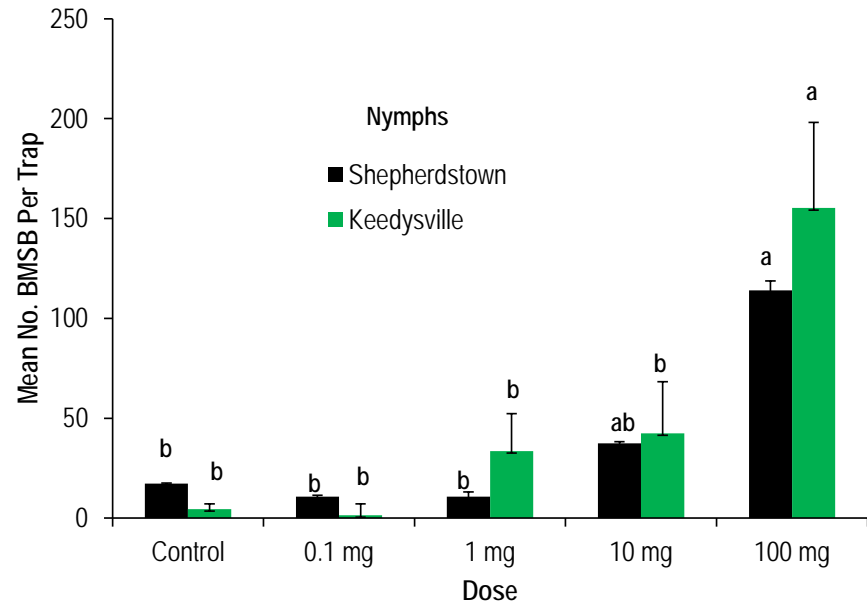
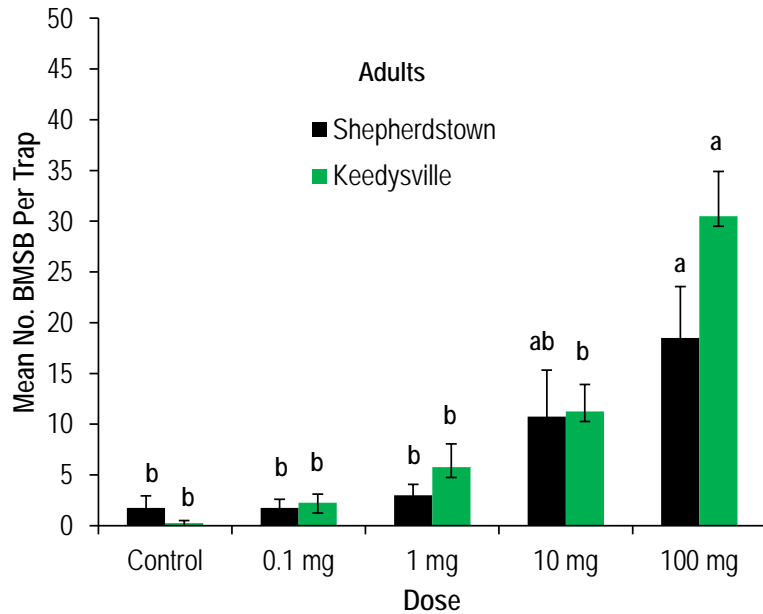
Mid-August – Early October



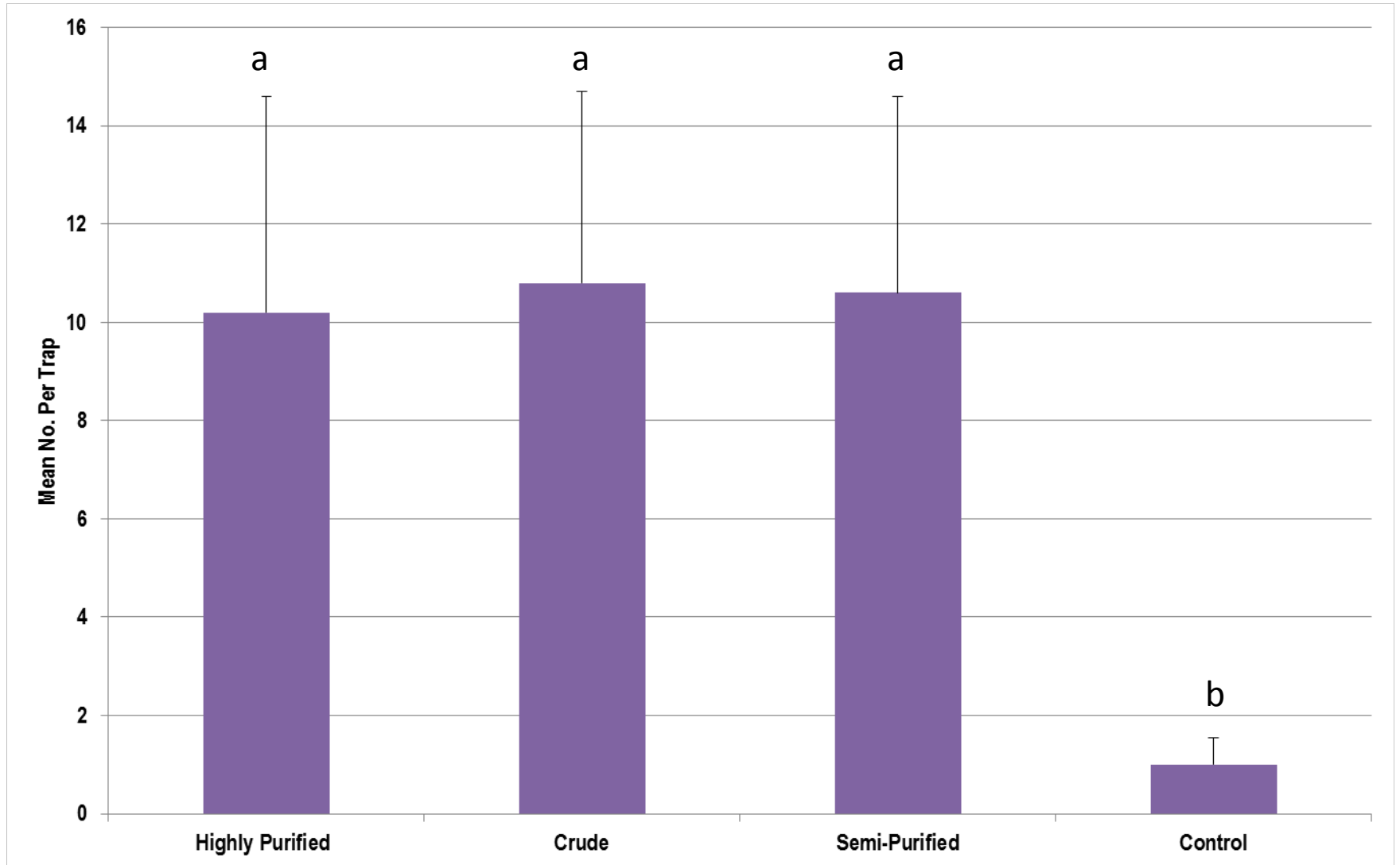
Dose Response Trial

June 14-July 19, 2012

11:1 Ratio (Baited: Unbaited) for 10 mg lure
~25:1 Ratio (Baited: Unbaited) for 100 mg lure



Lure Affordability: Encouraging Results from Purity Trial



Effect of Synergist



Control

1 x

1 x

#10

8-11 x

2-4 x

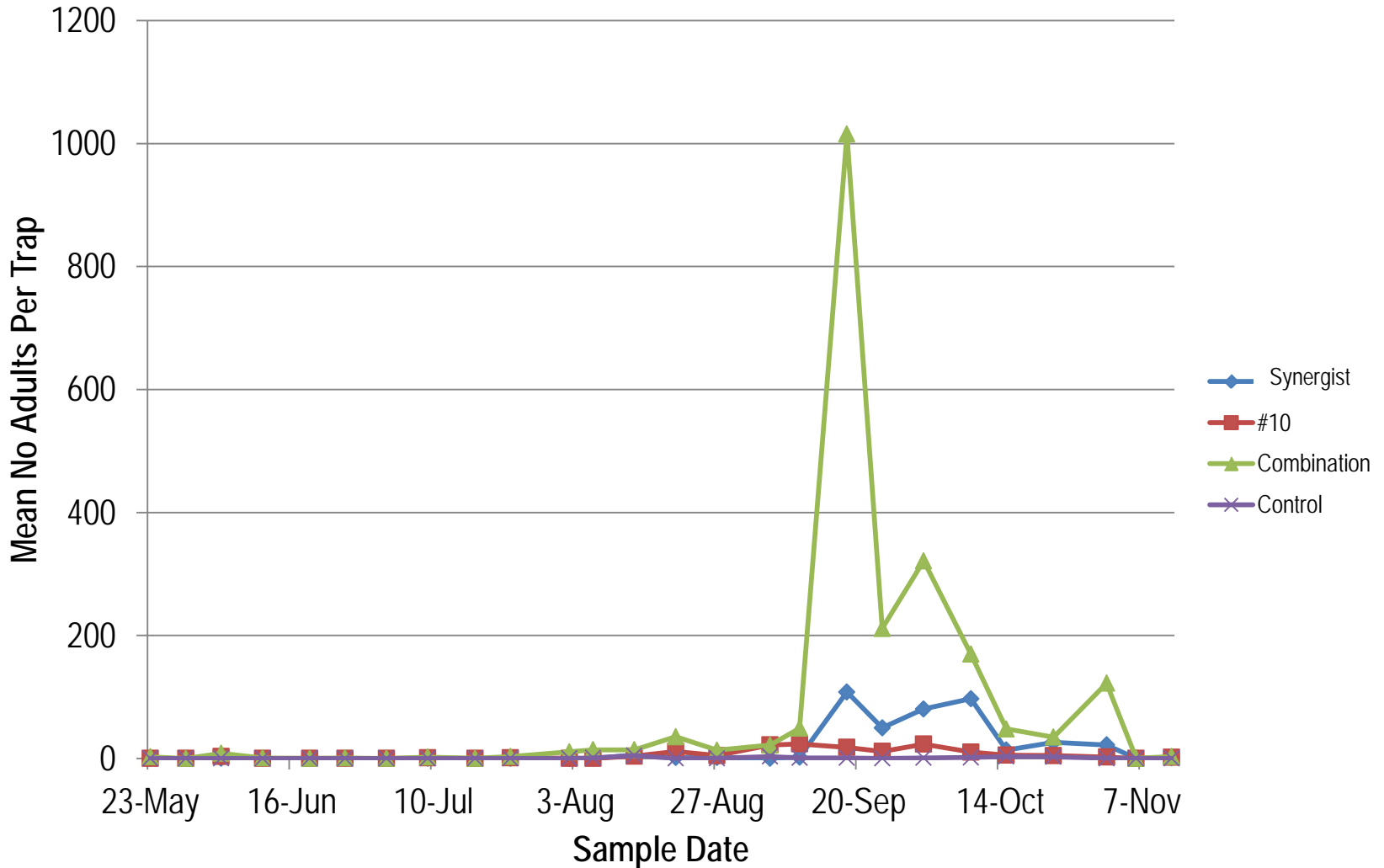
#10 + Synergist

~5-120 x

~5-100 x

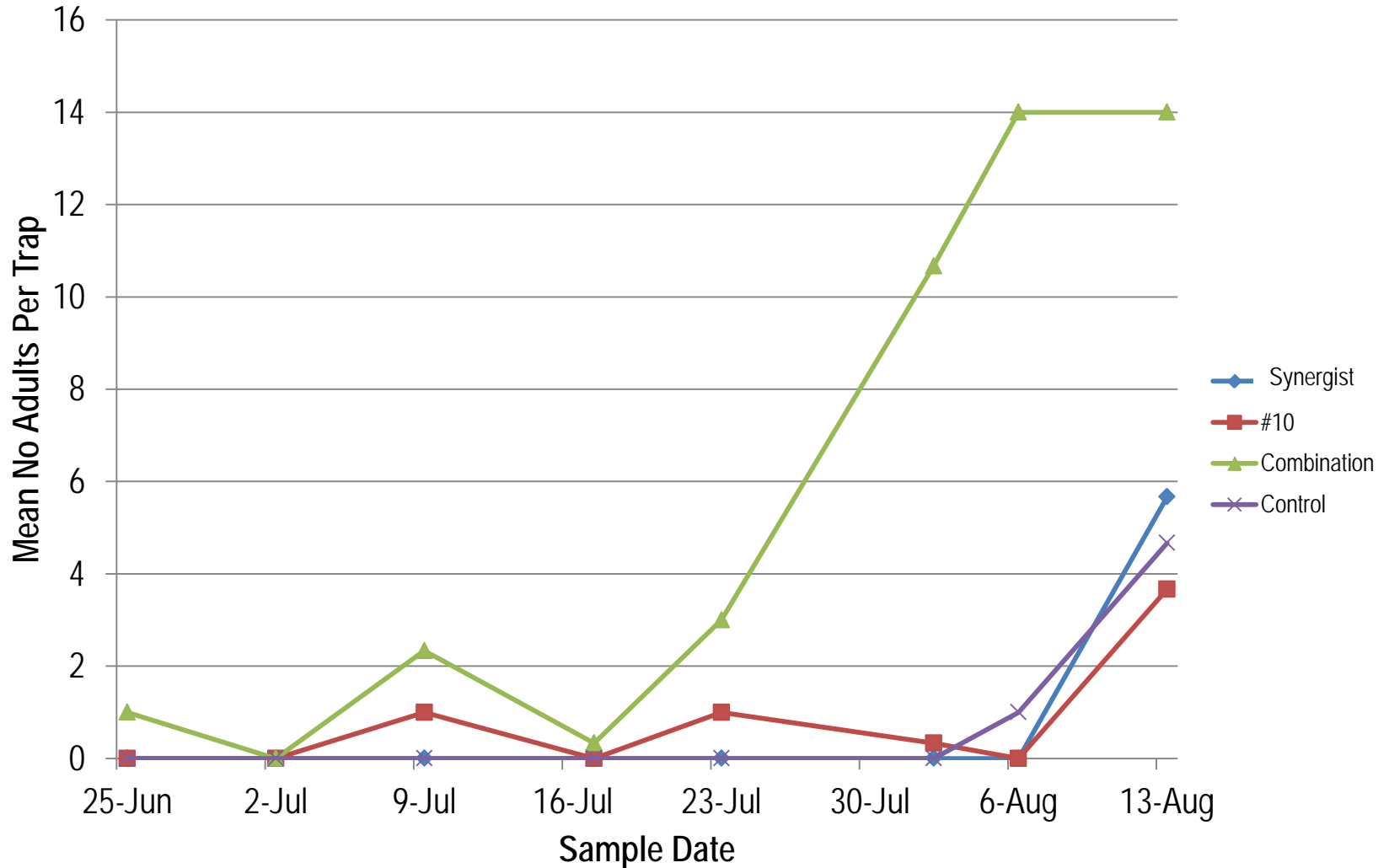
Season-Long Synergist Results

Mid-May – Mid November



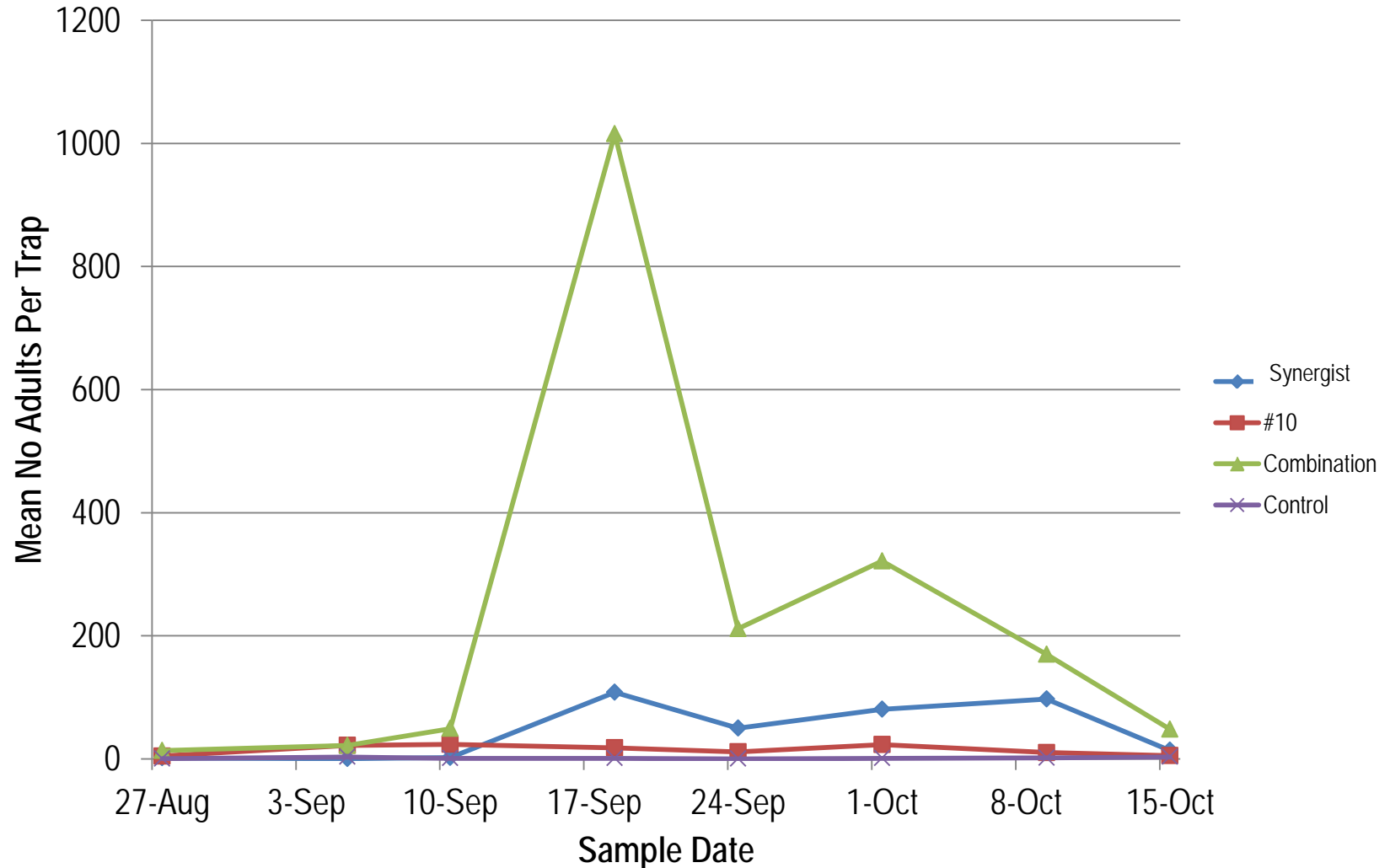
Mid-Season

Mid June - Mid August



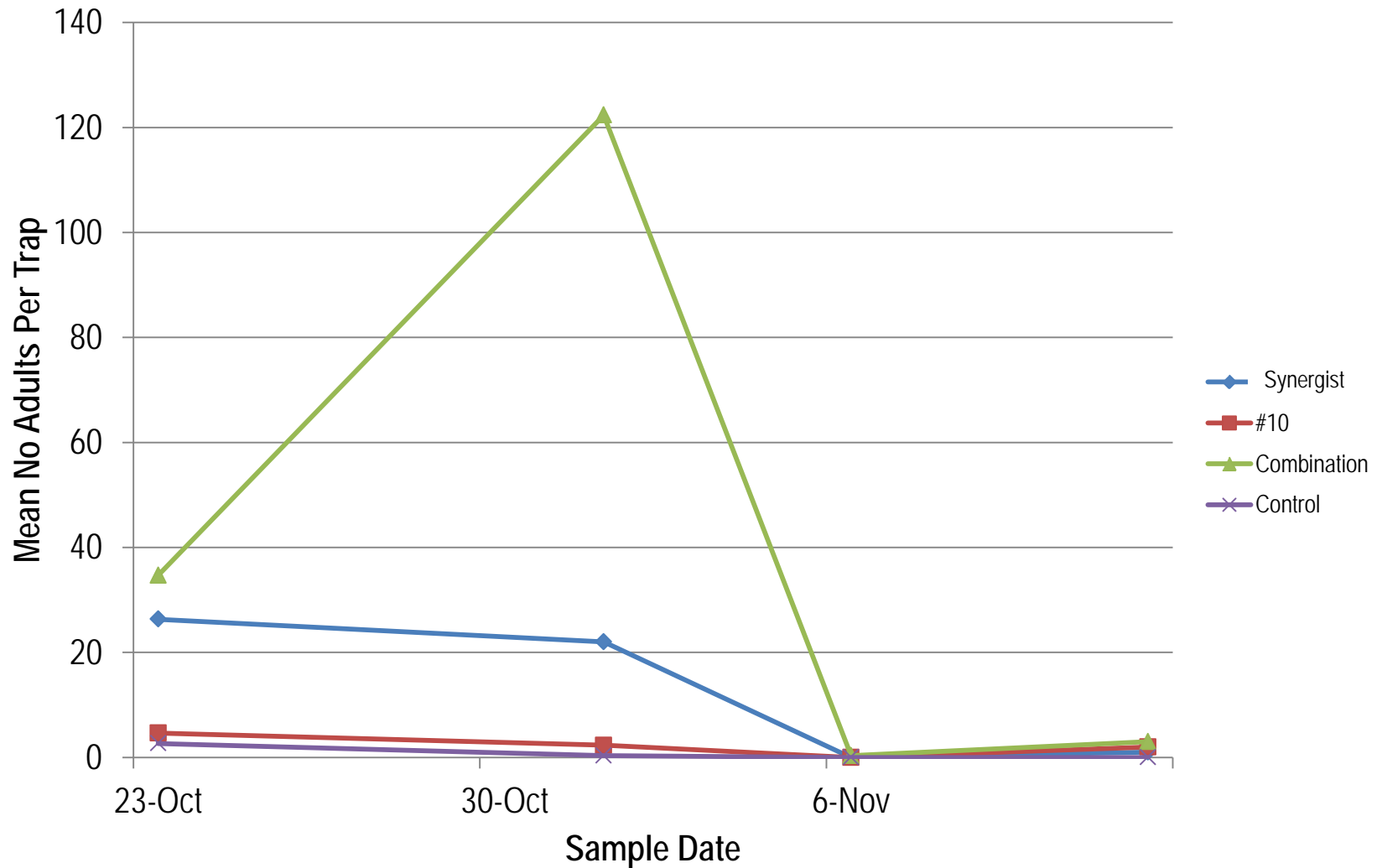
Late Season

Mid-August – Mid October



Post-Harvest

Mid-October – Mid-November



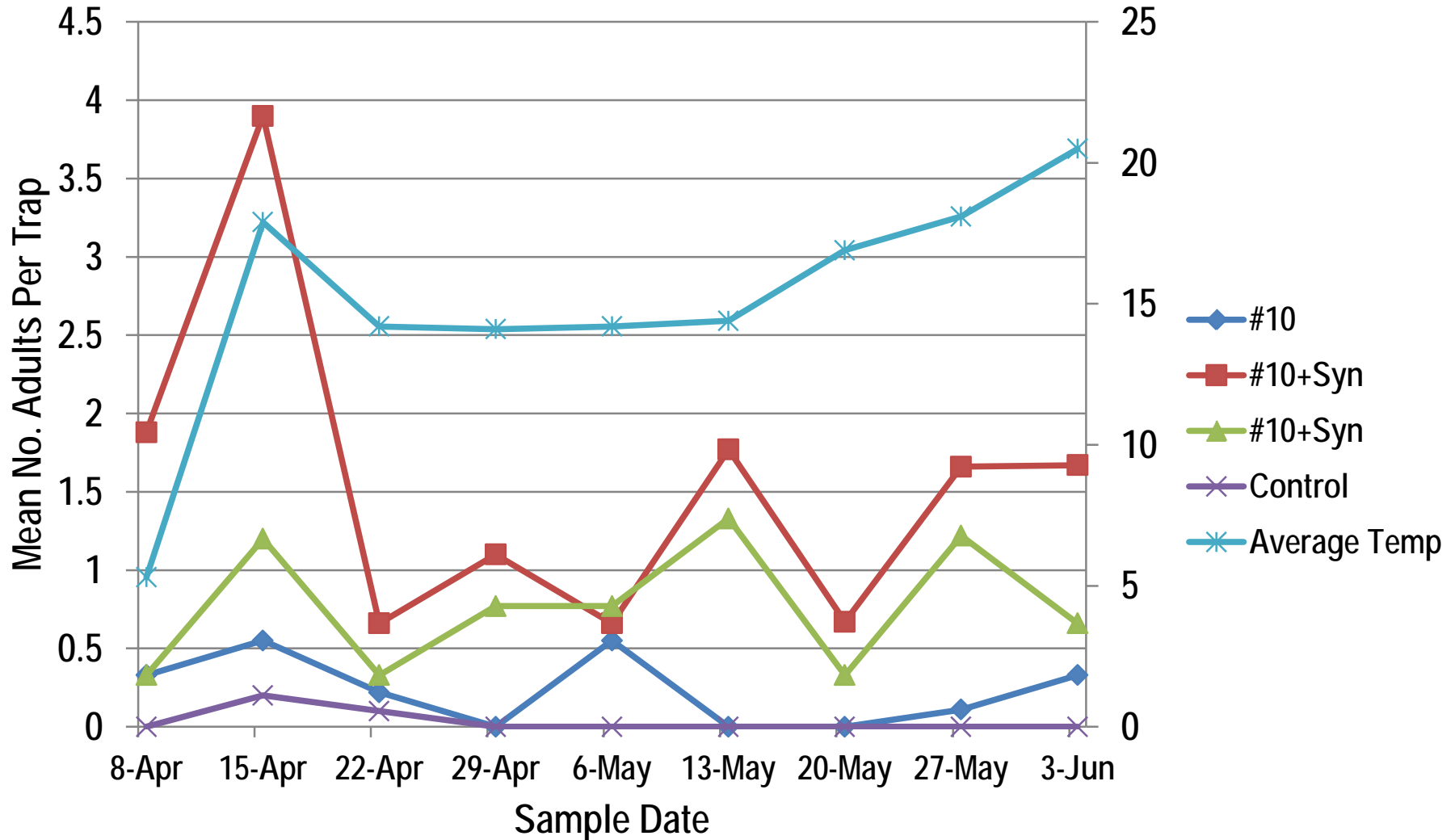
Broad Validation in Multi-State Trial in 2013

- Document season-long patterns of activity.
- Compare commercially available synergists in combination with #10
- ME, NH, CT, MA, PA, NJ, VA, WV, MD, DE, NC, FL, AL, MI, OH, IA, MO, UT, CA, OR, WA



Season-Long Captures in Apple in 2013

April 3-June 3 2013



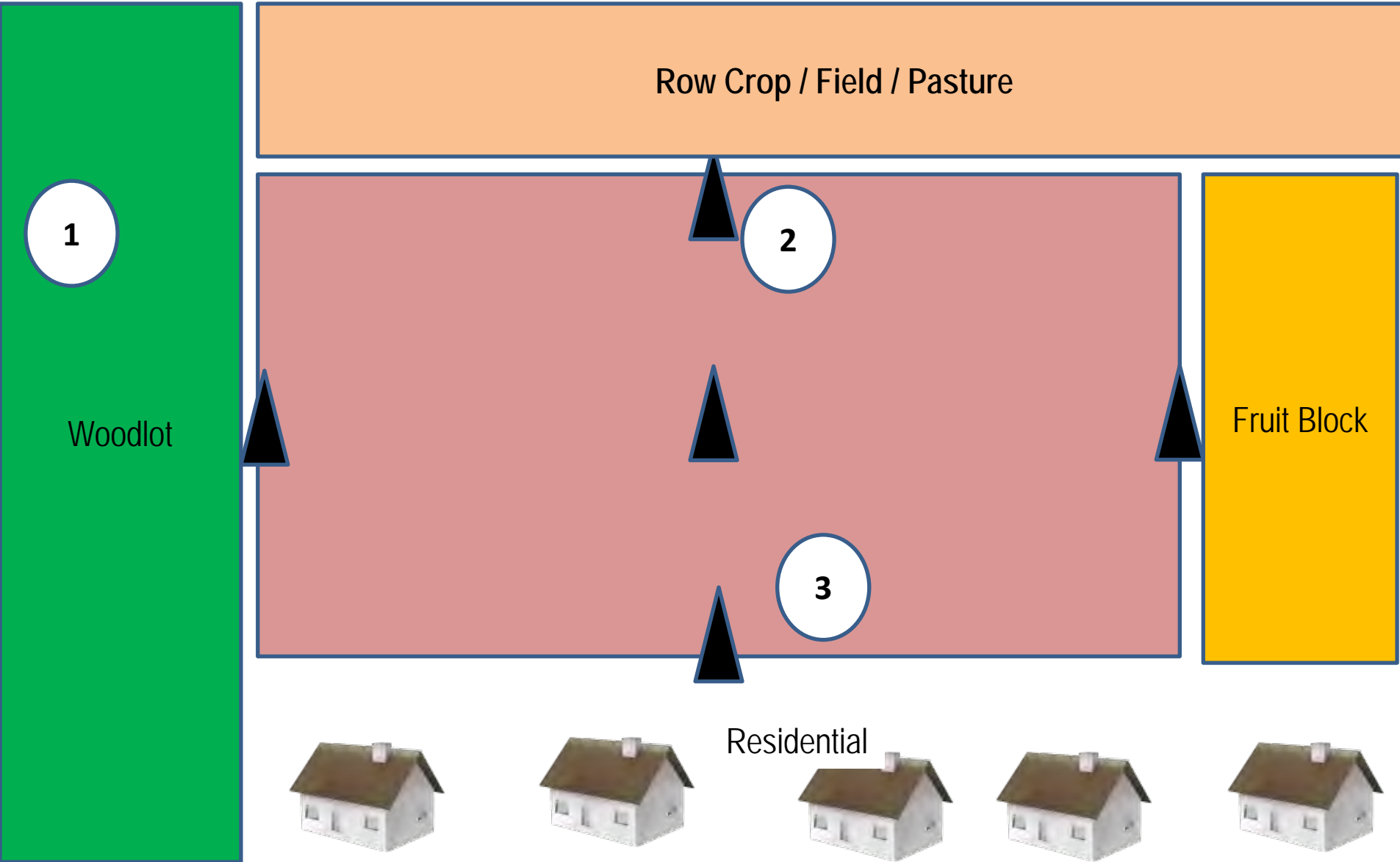
Coordinated Trial Results To Date

Total Captures	#10	#10 + Synergist	#10 + Synergist	Control
Adults	96	430	411	13

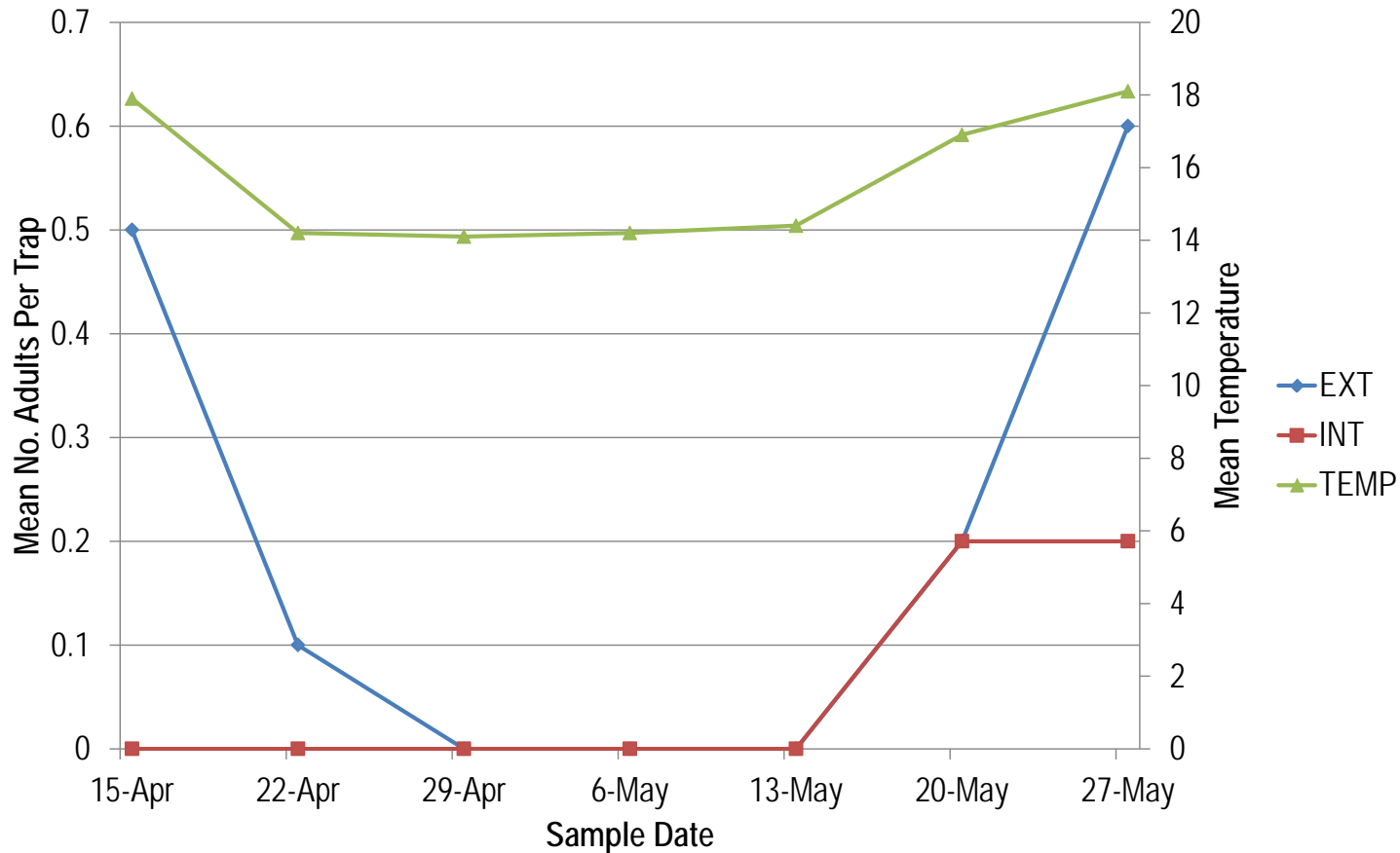
Results from WV, MD, PA, VA, NJ, OR, DE, NY and NC

Current Studies

Commercial Orchard Threshold Studies

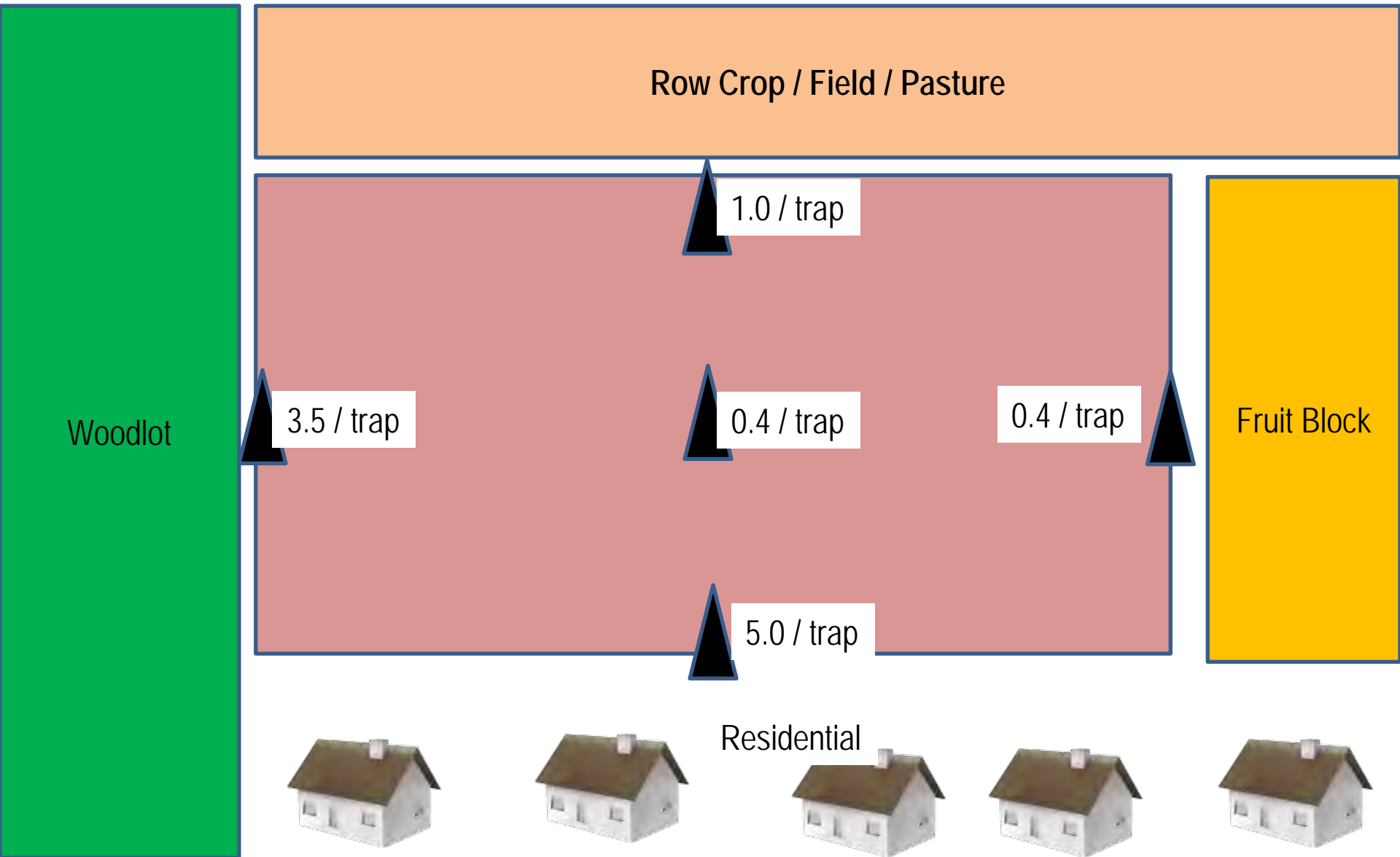


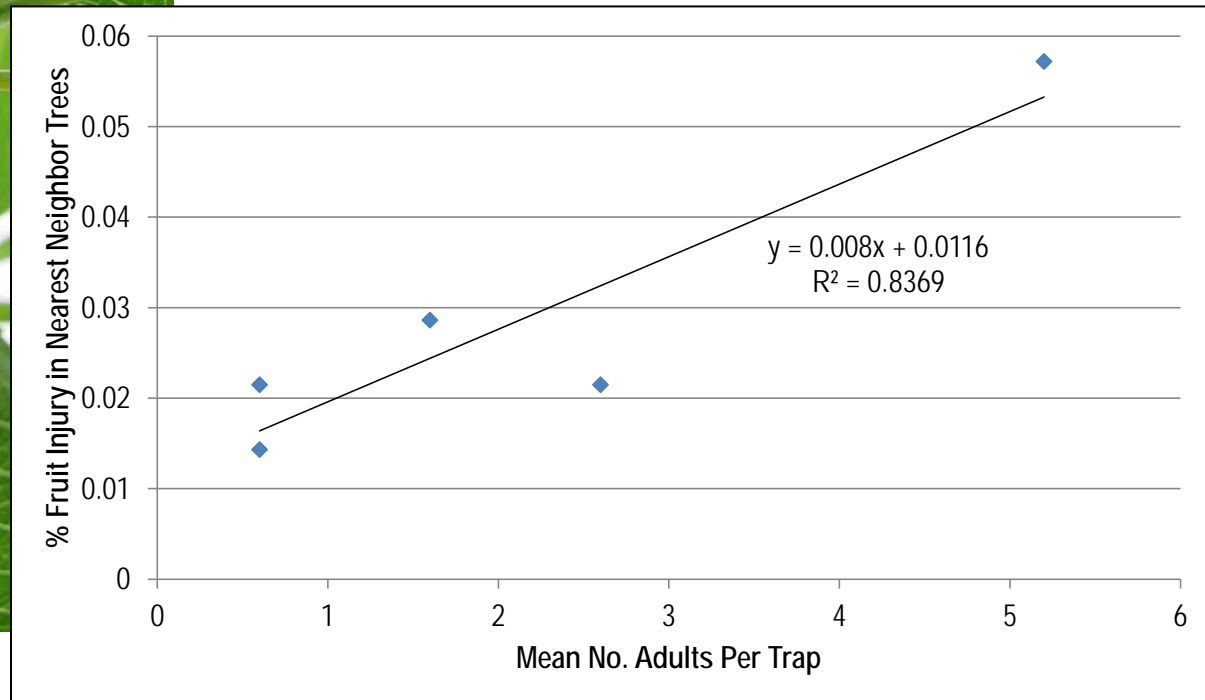
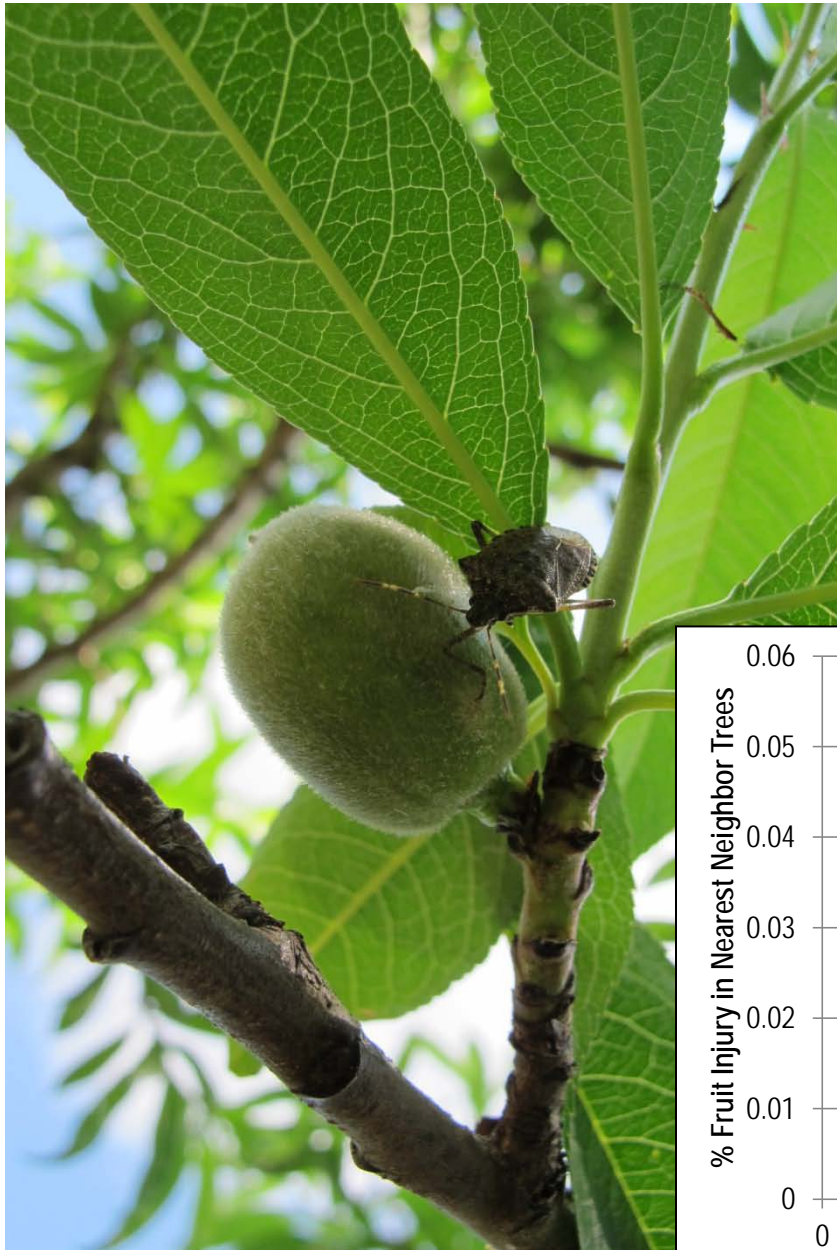
Preliminary Peach Results



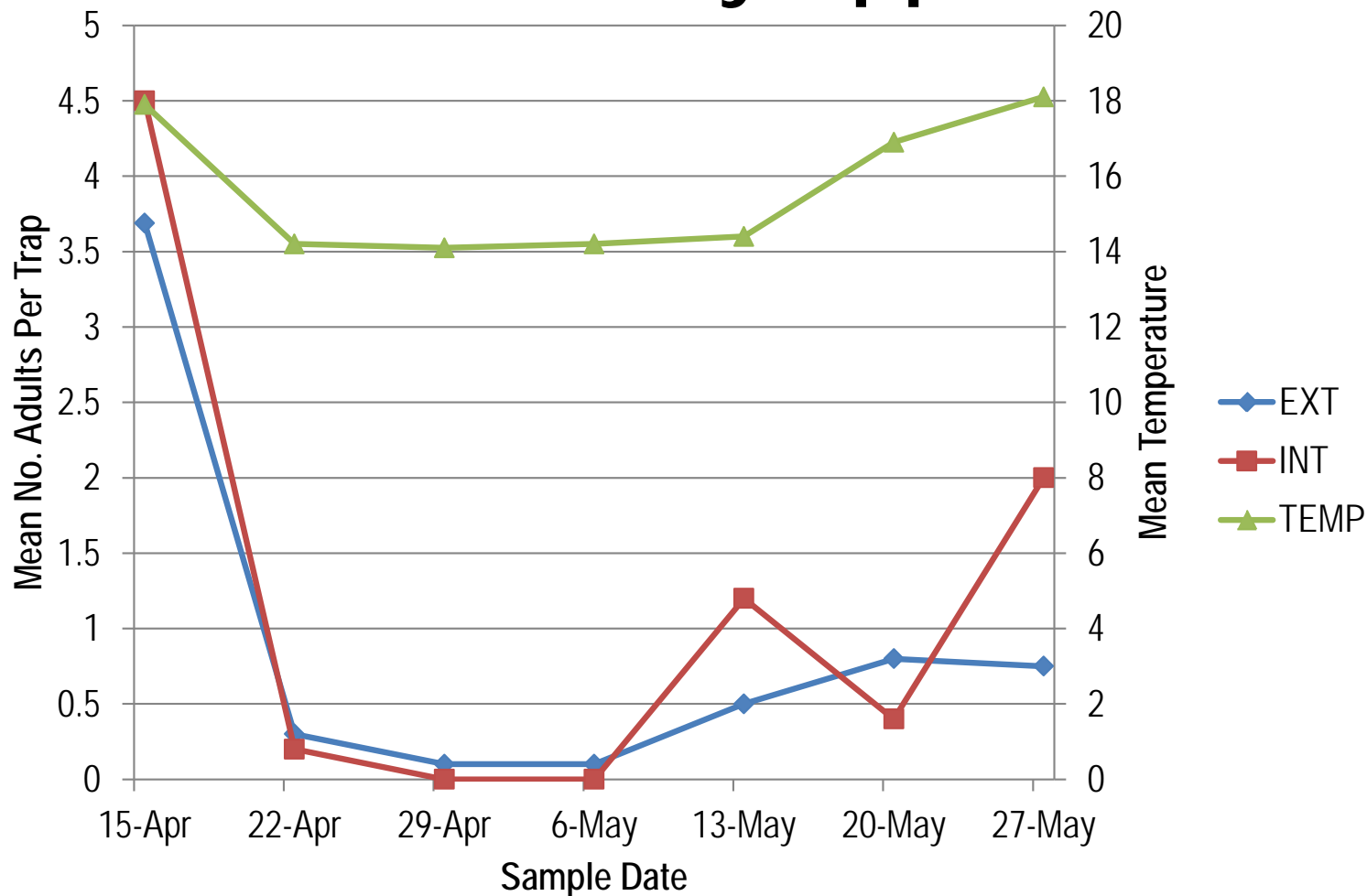
- Significant linear relationship between exterior trap captures and temperature ($P=0.002$; $r^2=0.89$) but not interior trap captures and temperature ($P=0.204$; $r^2=0.44$).
- No significant correlation between exterior and interior trap captures.

Preliminary Trends in Trap Captures and Border Landscapes in the Early Season in Peach



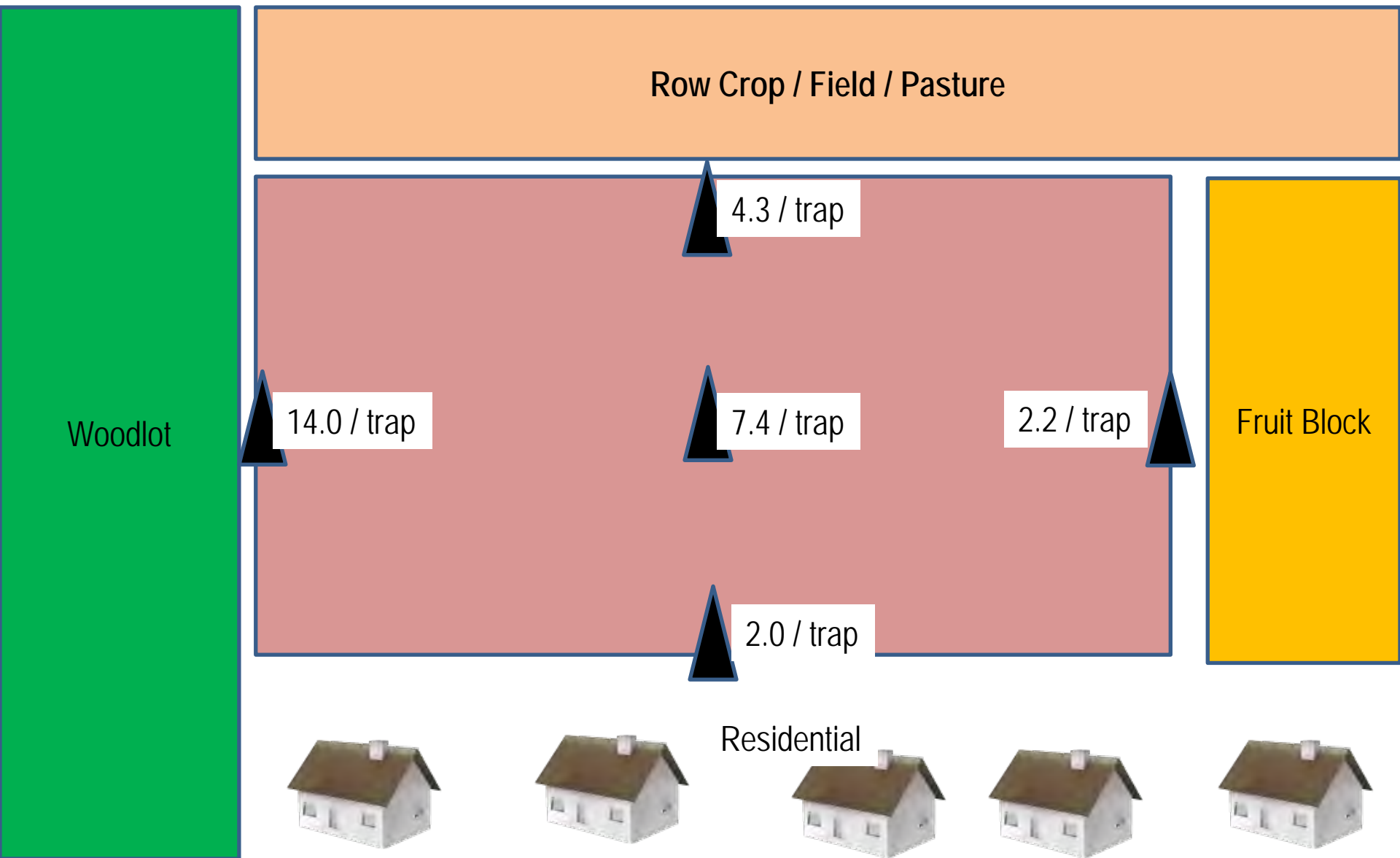


Preliminary Apple Results

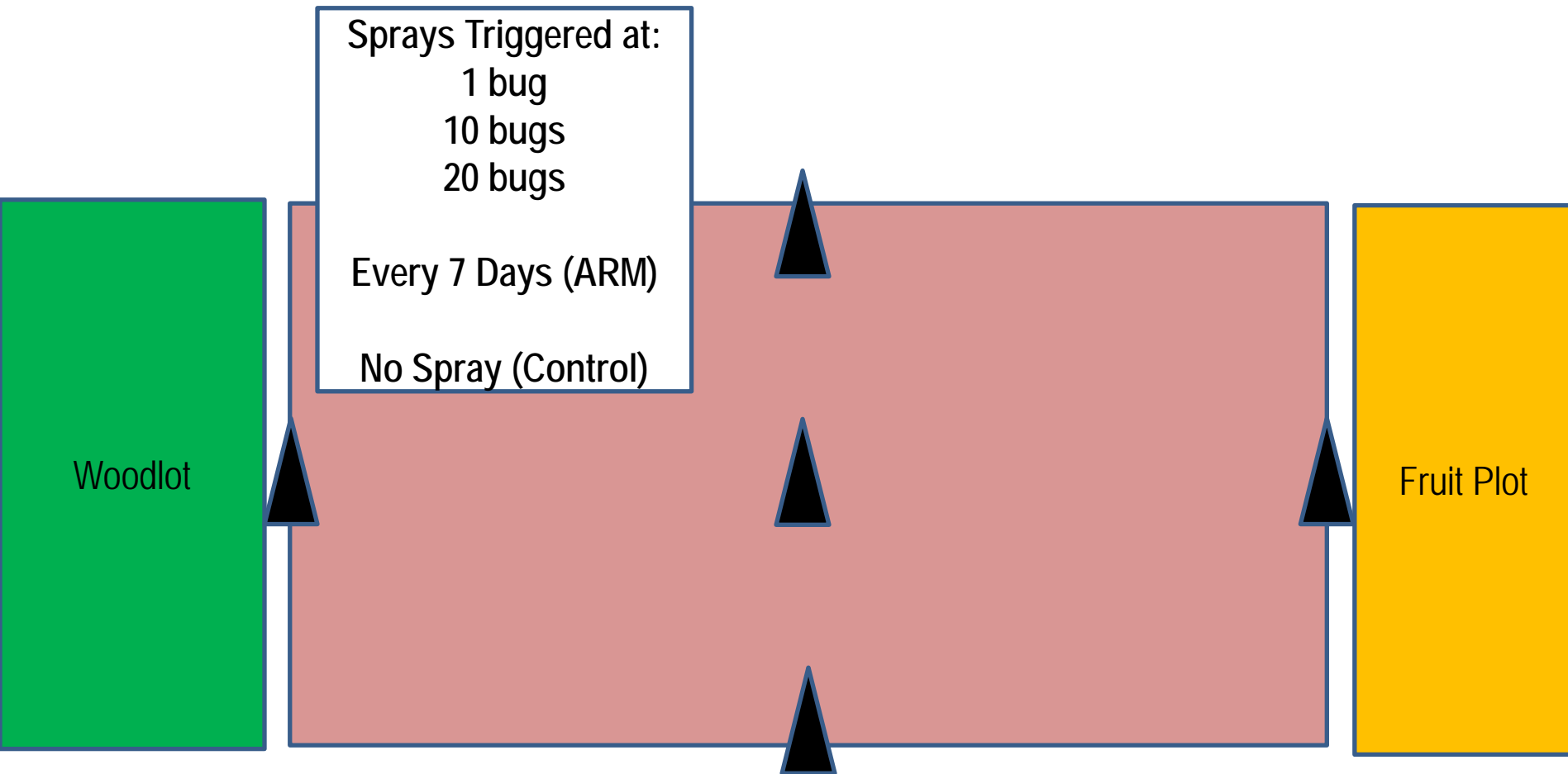


- Linear relationship between exterior trap captures and temperature at $P = 0.0955$; $r^2=0.46$ and interior trap captures and temperature at $P = 0.0594$; $r^2=0.54$
- Significant relationship interior trap and exterior trap captures ($P=0.002$; $r^2=0.89$)

Preliminary Trends in Trap Captures and Border Landscapes in the Early Season in Apple



On-Station Threshold Studies in Apple



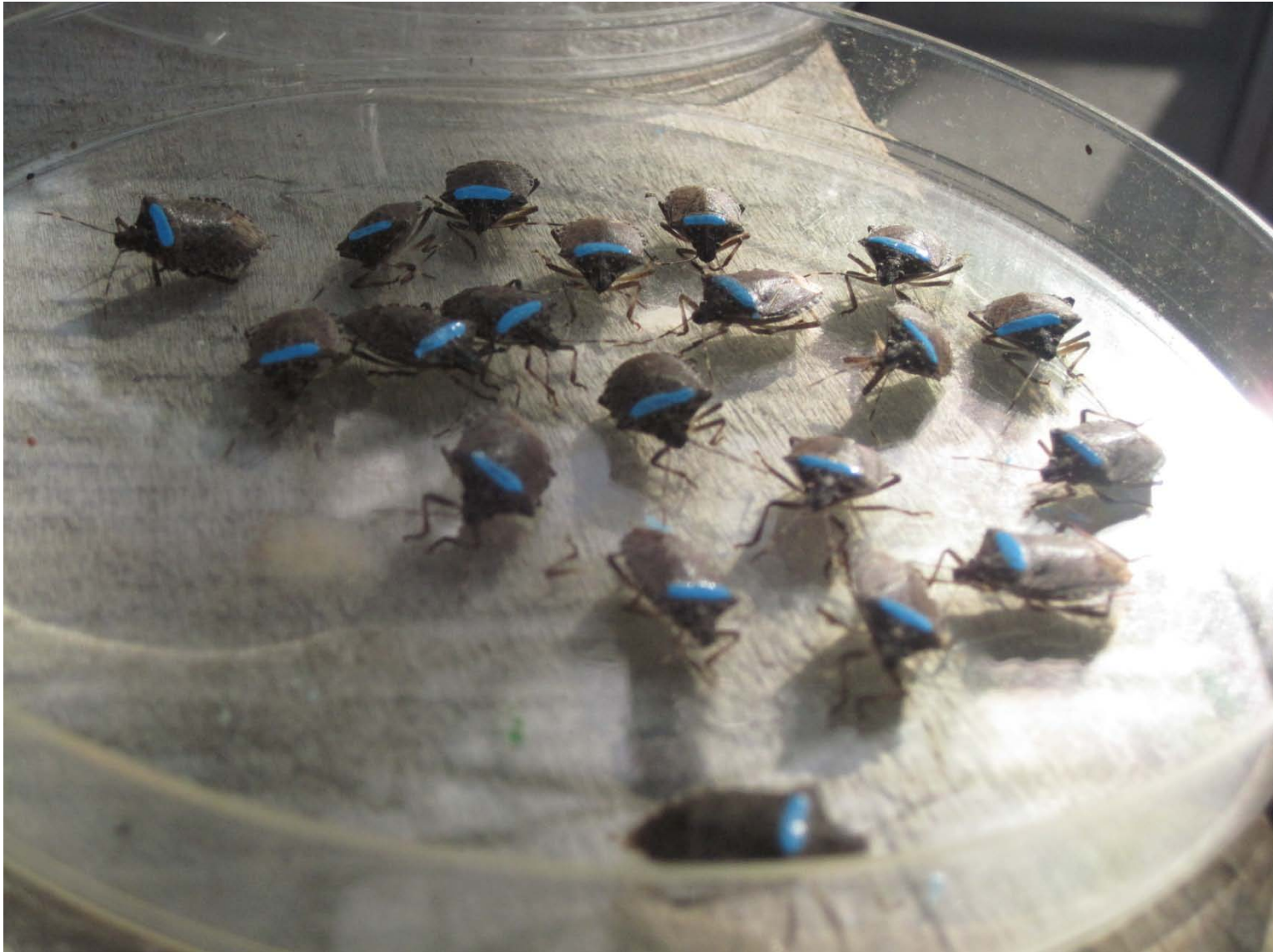
Dispersal from Overwintering Sites

- Under what abiotic conditions (temperature), do BMSB become active?
- What does the pattern of emergence from overwintering sites look like?
- Do they respond to pheromone traps immediately after exiting overwintering sites?

Collect Overwintering Bugs



Marked Over 4,000 Bugs For Release



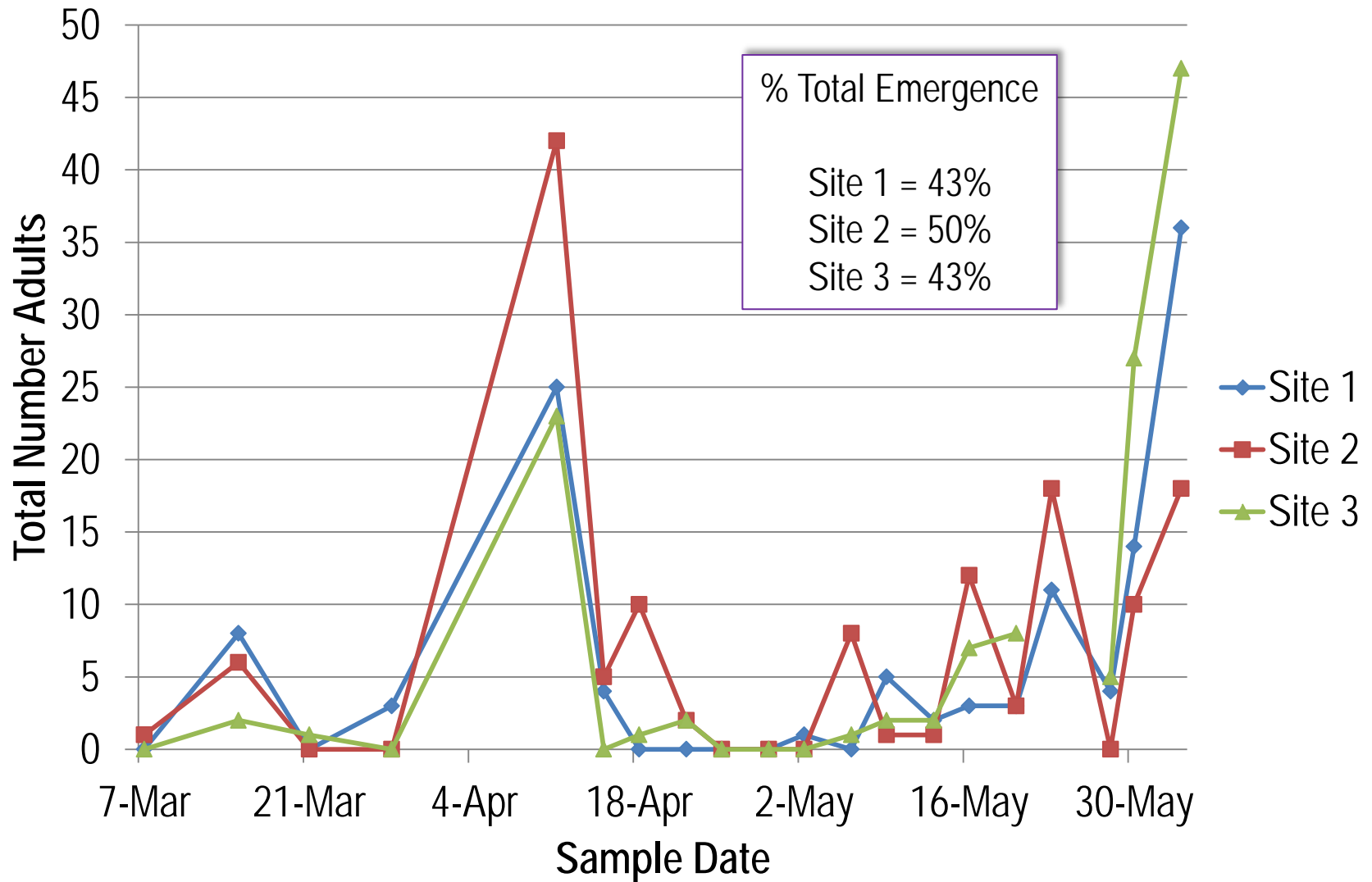
Provisioned Each Overwintering Shelter With 300 Marked Bugs



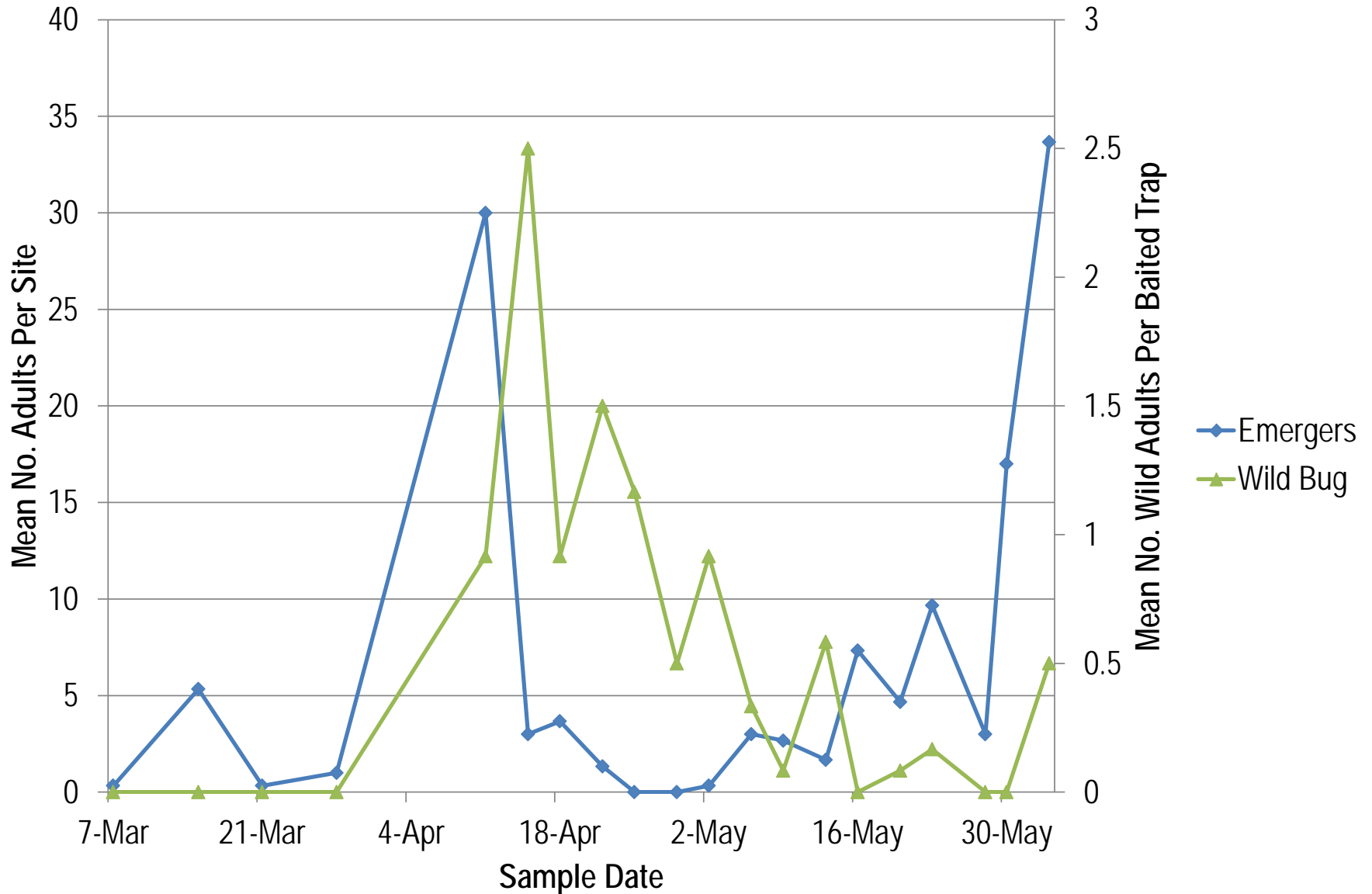
Deployed Paired Overwintering Shelters and Baited Traps in Wooded Locations in Late February



Emergence Results to Date



Emergence and Wild Bug Captures



Emergence and Wild Bug Captures

- Similar patterns of emergence at all sites.
- Similar pattern of wild bug activity in traps and emergence.
- No marked bugs. Obligatory dispersal flight?

Trap Type Study

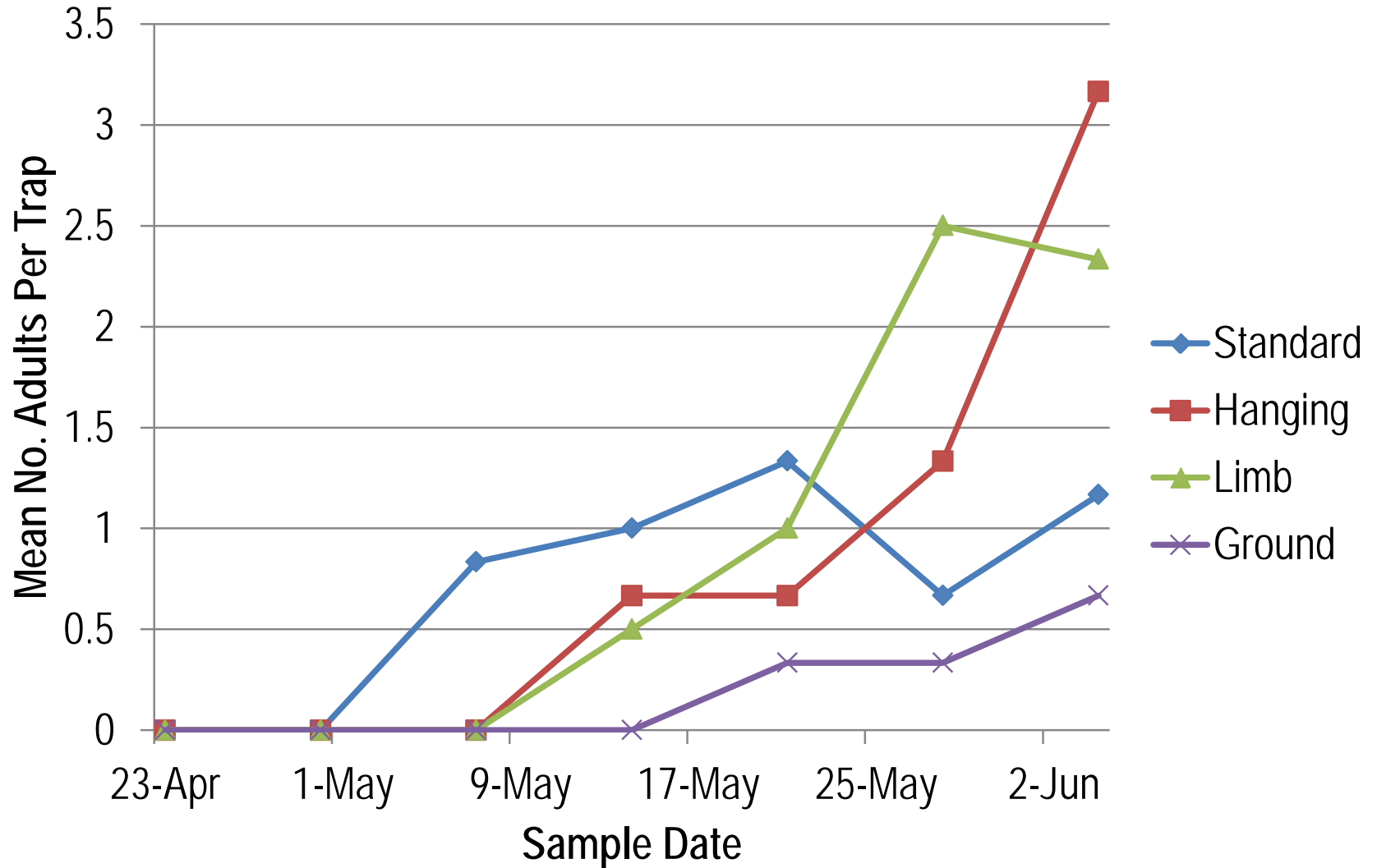
- Are capture patterns similar among ground-mounted standard 4-ft pyramid trap and smaller pyramid style traps?



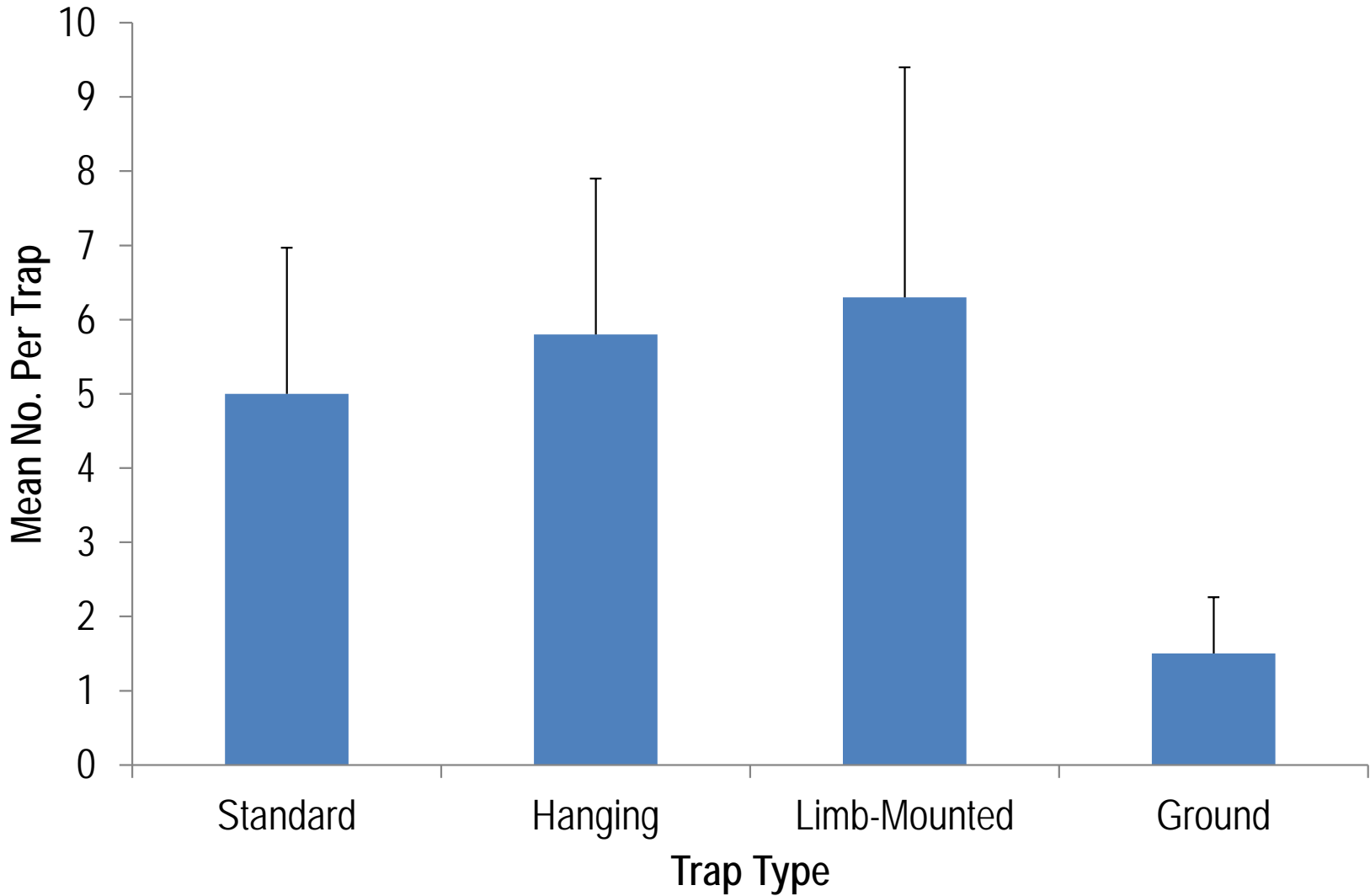
Season-Long Trial in Commercial Apple Orchards



Preliminary Results



Preliminary Results



Conclusions

- Aggregation pheromone of BMSB has been identified.
- Synergist has been identified.
- These stimuli provide reliable detection of BMSB activity.
- Applied questions can now be addressed.



Acknowledgements

To learn more about this project and find links to BMSB information, visit



- USDA-ARS, USDA NIFA SCRI # 2011-51181-30937, VDACS, and USDA-APHIS



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