# Targeting BMSB via Organic Tactics: trap cropping and compost tea

C.R. Mathews[1,2] and M.H. Hallack[2]

[1]Institute of Environmental and Physical Sciences, Shepherd University, Shepherdstown, WV

[2]Redbud Farm, LLC, Inwood, WV

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Shepherd UNIVERSITY

red bud farm
Speciality Organics

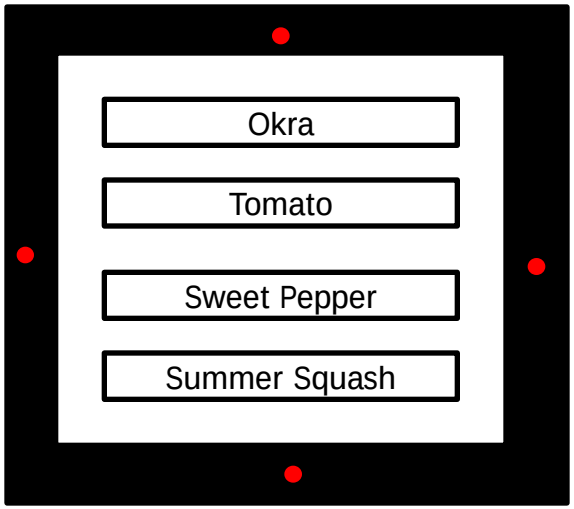
# 2013 Trap Crop Study Objectives

- Evaluate **pull-pull strategy**: **highly attractive host-plant + baited pheromone trap** →

- Determine **host-plant preferences**
- Modify design for **larger scale** of production

# 2013 Trap Crop Study

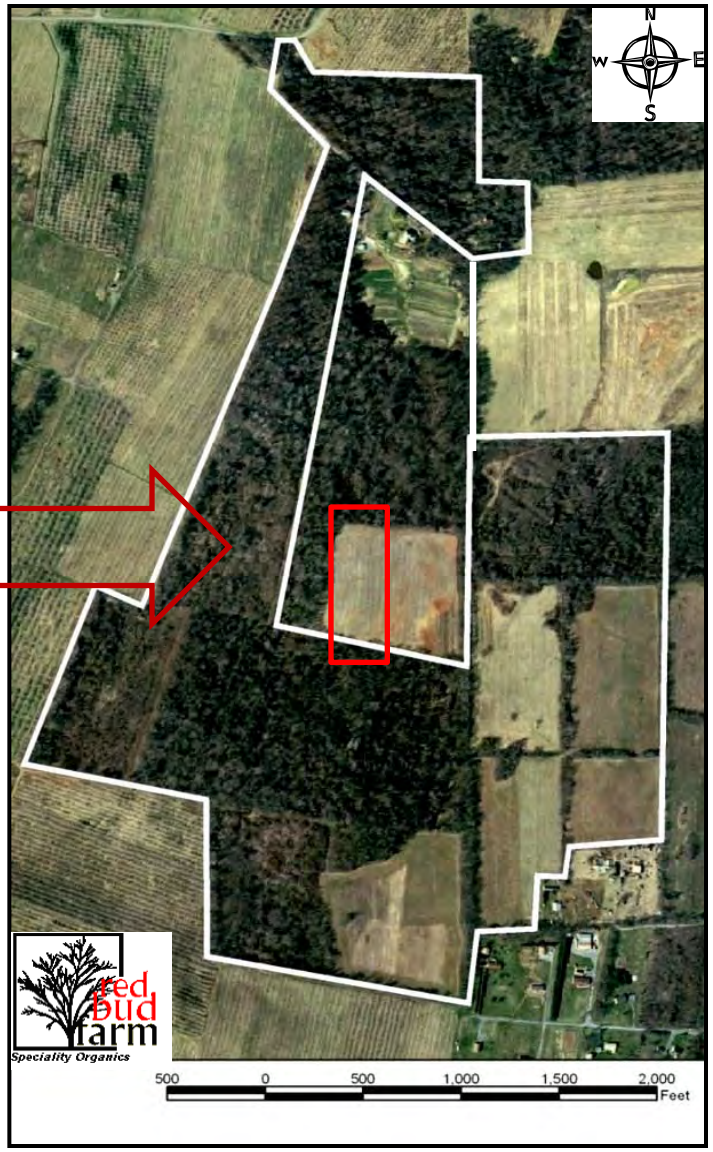
- Adapted perimeter trap design to **accommodate machinery**
- Compared **baited vs. unbaited** ‘Rescue’ traps



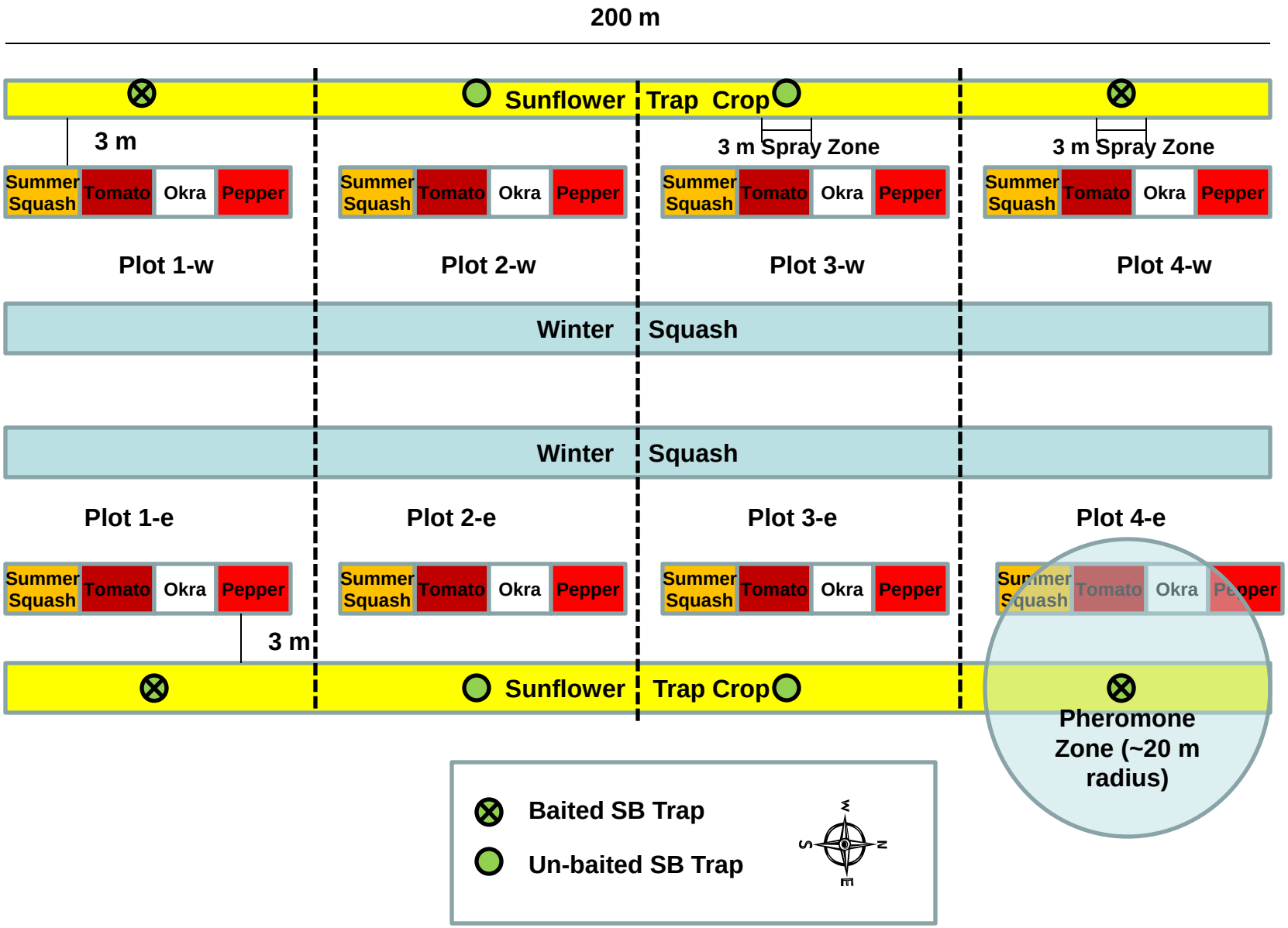

**2012 Field Design**

# 2013 Trap Crop Design

- **RCBD**, blocked west-east
- **Crops:** okra (‘Clemson Spineless’), sweet pepper (‘Red Ace’), tomato (‘Big Boy’), summer squash (‘Zephyr’)



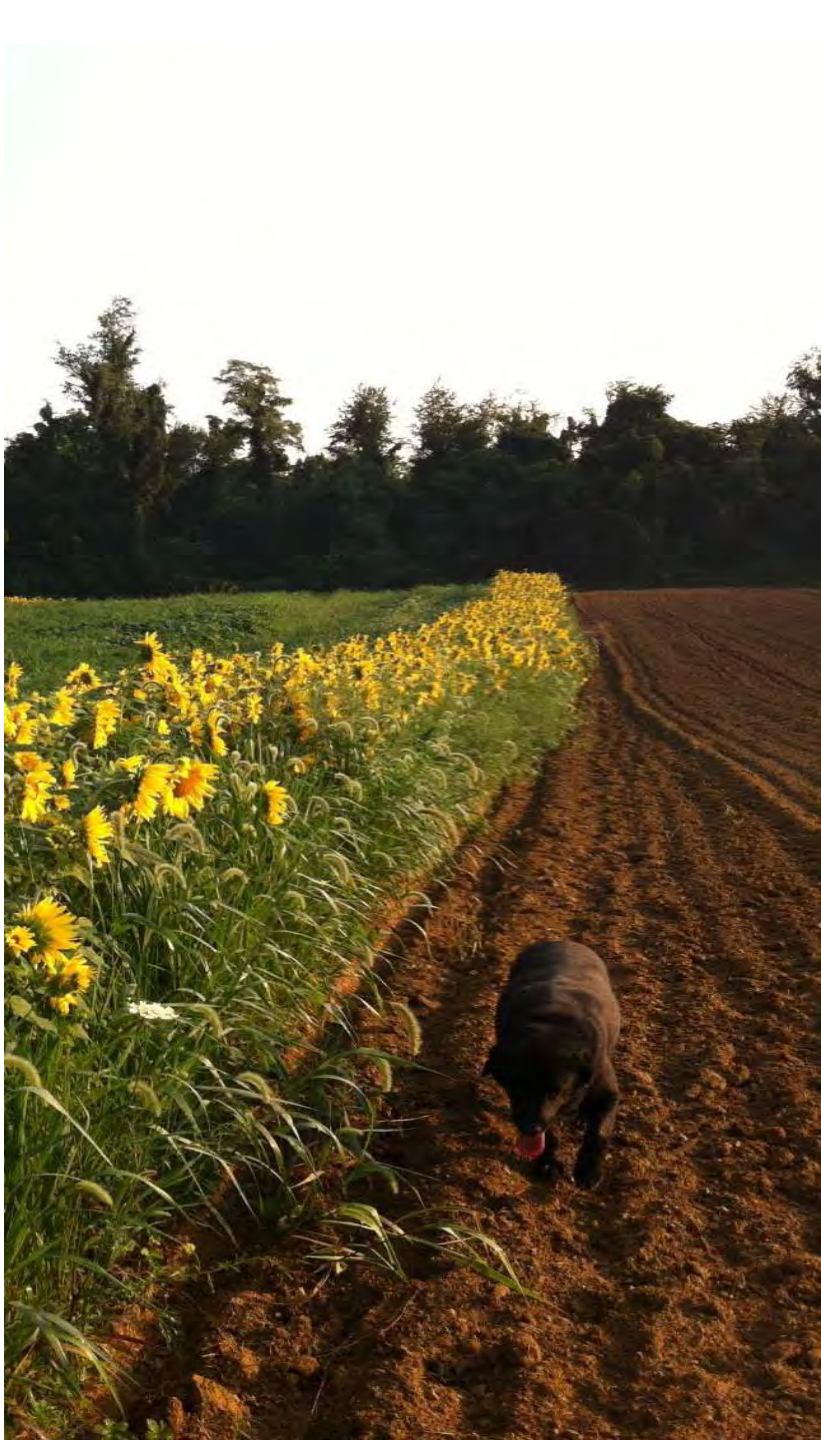
Deciduous Hardwood Forest




Soybean

# 2013 Trap Crop Methods

- **Trap crop:** 1 m strip, sunflower (open pollinated mixture, Johnny's Seeds)
- **Pheromone trap:** Rescue
  - Control (no lure)
  - USDA lure + MDT lure (installed late season)
- **Insecticide**: Azera (OMRI approved)



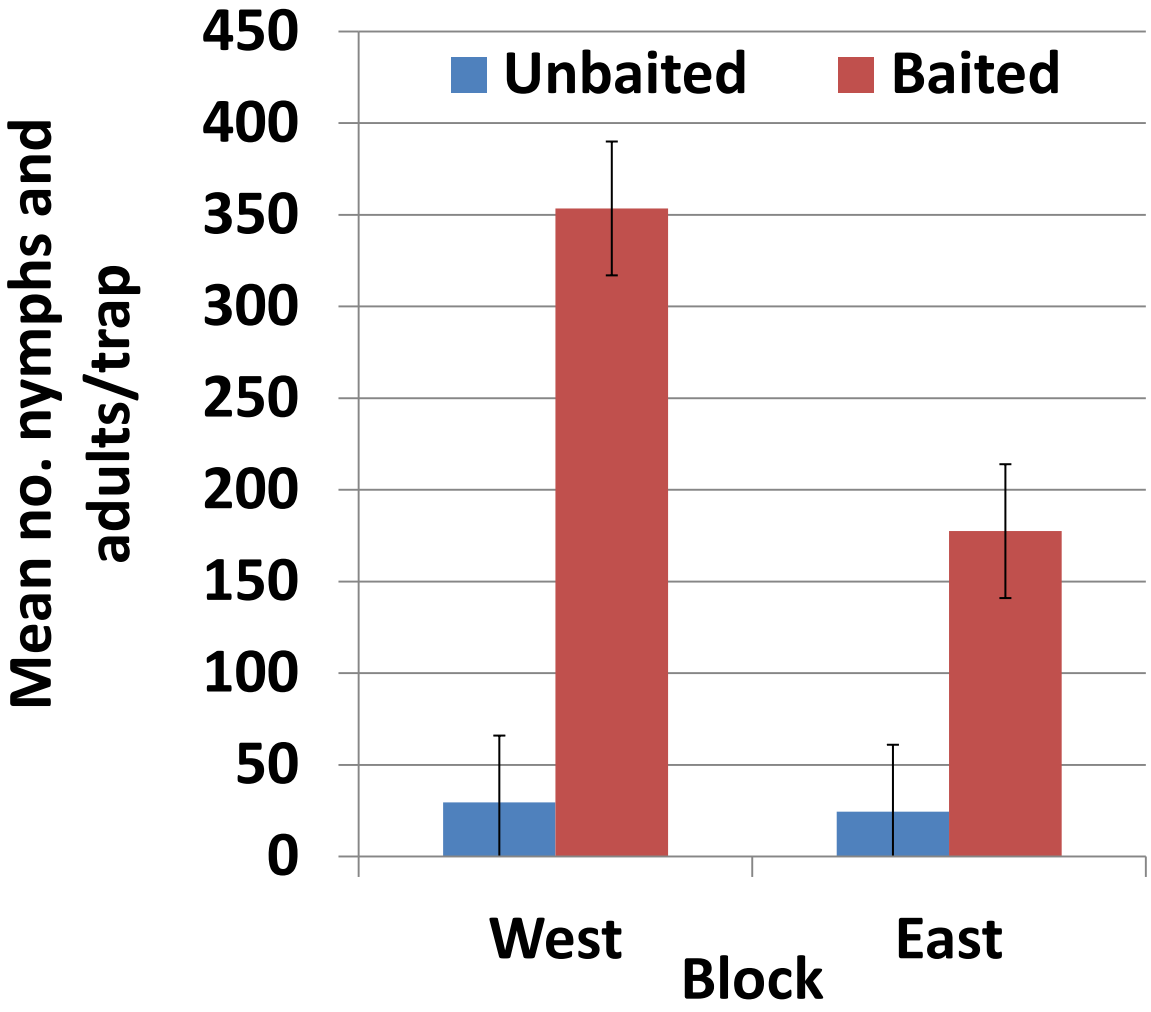
# 2013 Methods: Arthropod Sampling

- **Weekly** (24 Jun – 31 Sep)
- **Cash Crop:** Whole plant visual sample (3/row)
- **Trap Crop:** Whole plant visual sample (4/row, adjacent to trap); trap contents



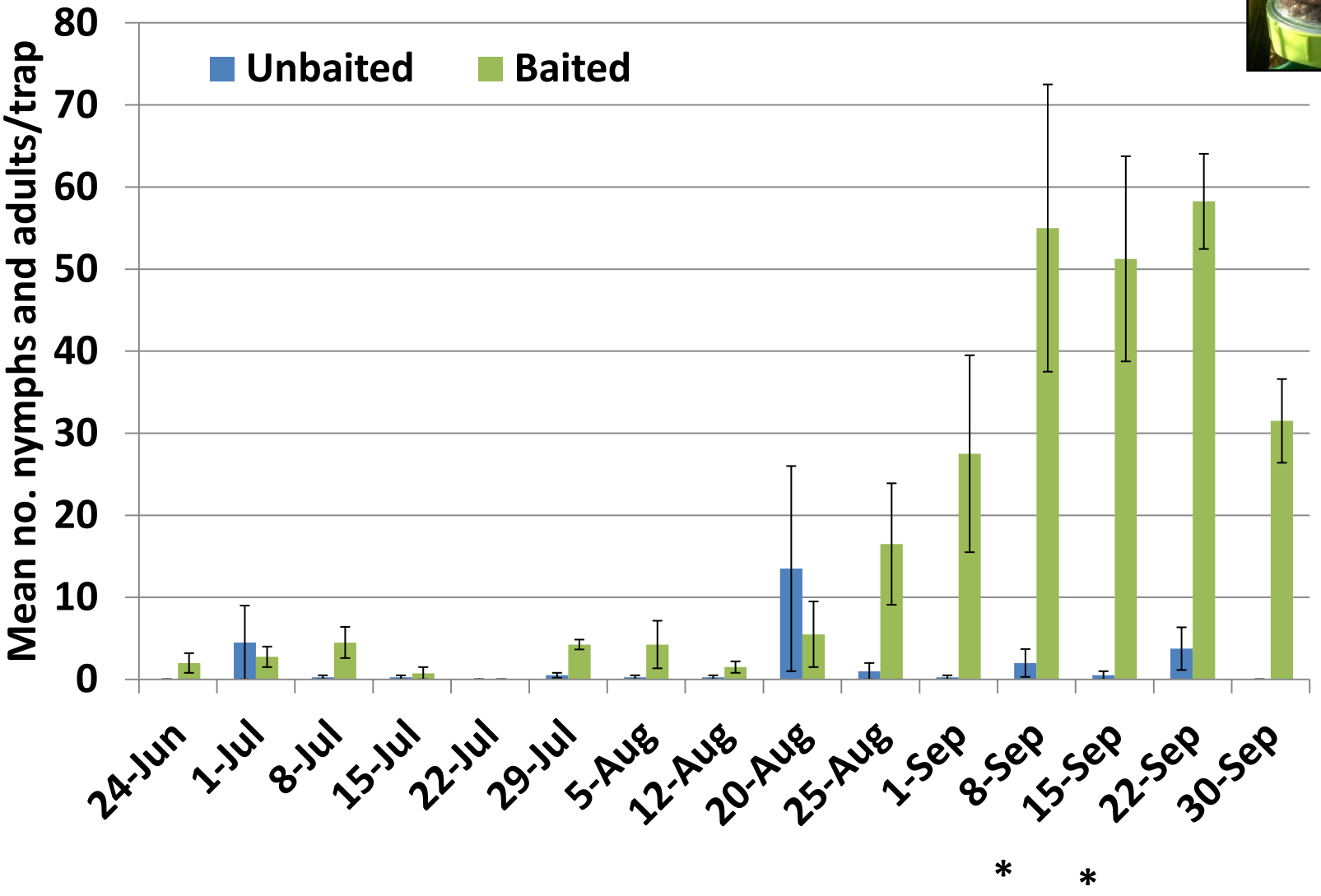


# Block*Trap Effect: Seasonal BMSB

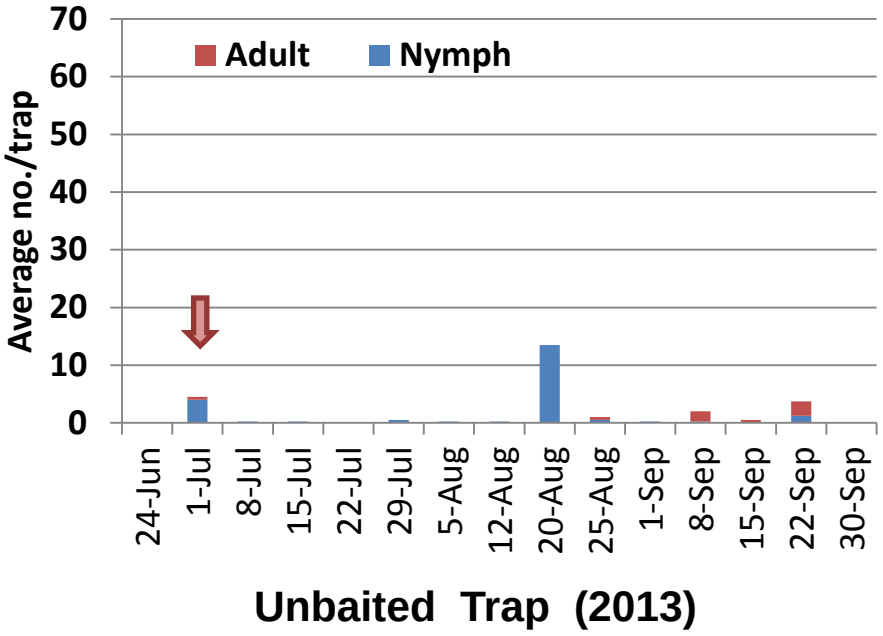



$P = .0097$
$F = 101.18$
$df = 1$

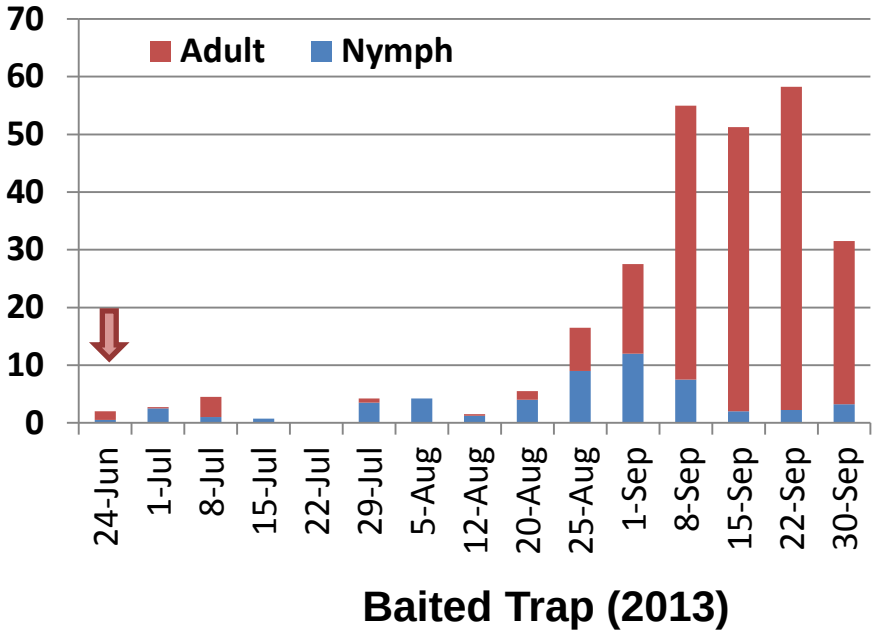
# BMSB in Pheromone Traps



# BMSB in Pheromone Traps, by Stage

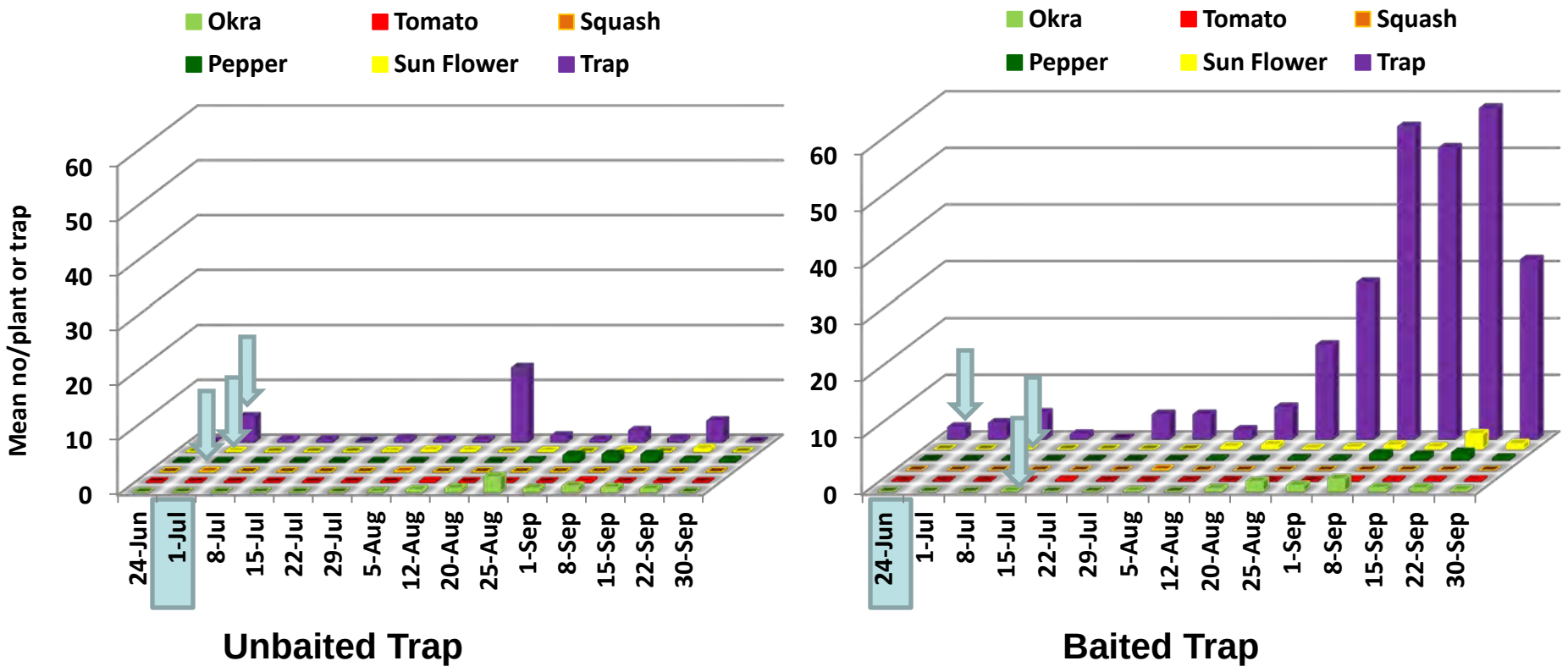



Unbaited Trap (2013)



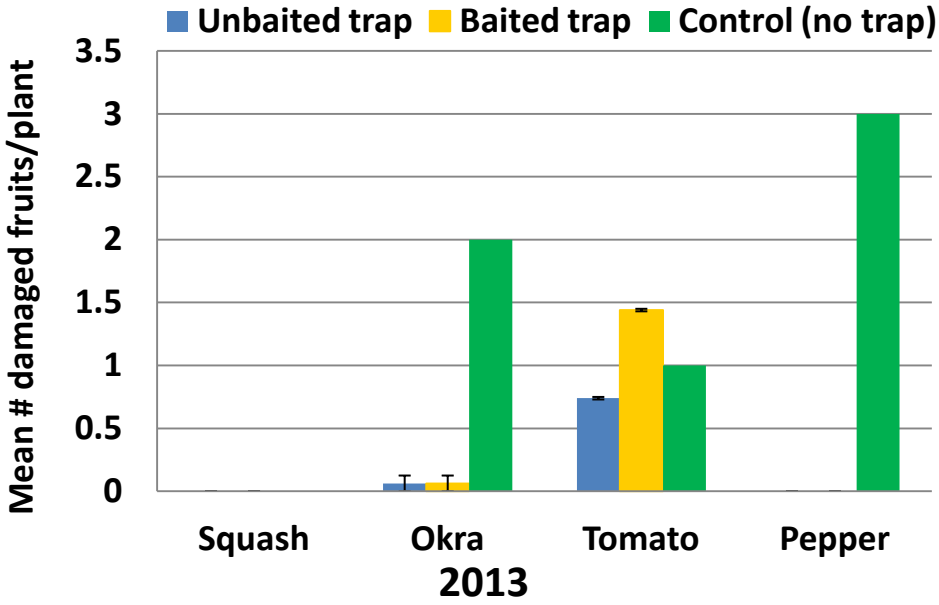

Baited Trap (2013)

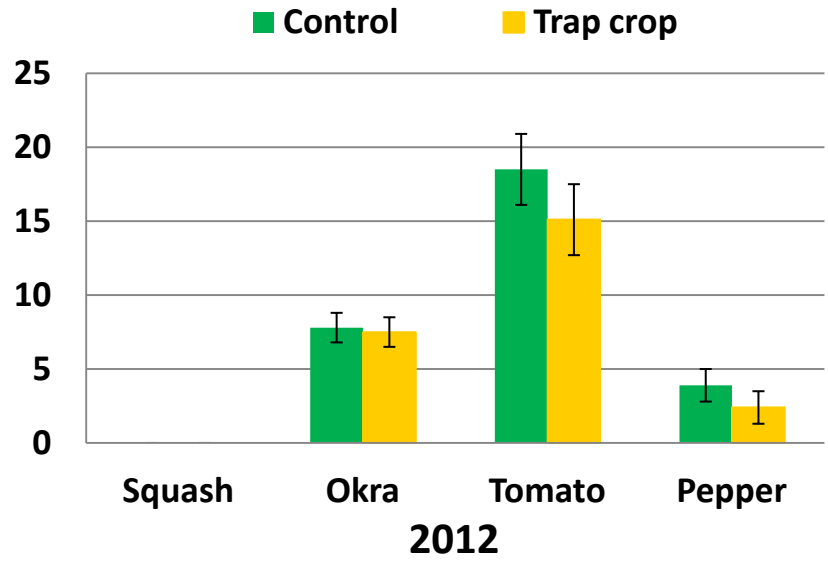
# Effectiveness of Pull-Pull System



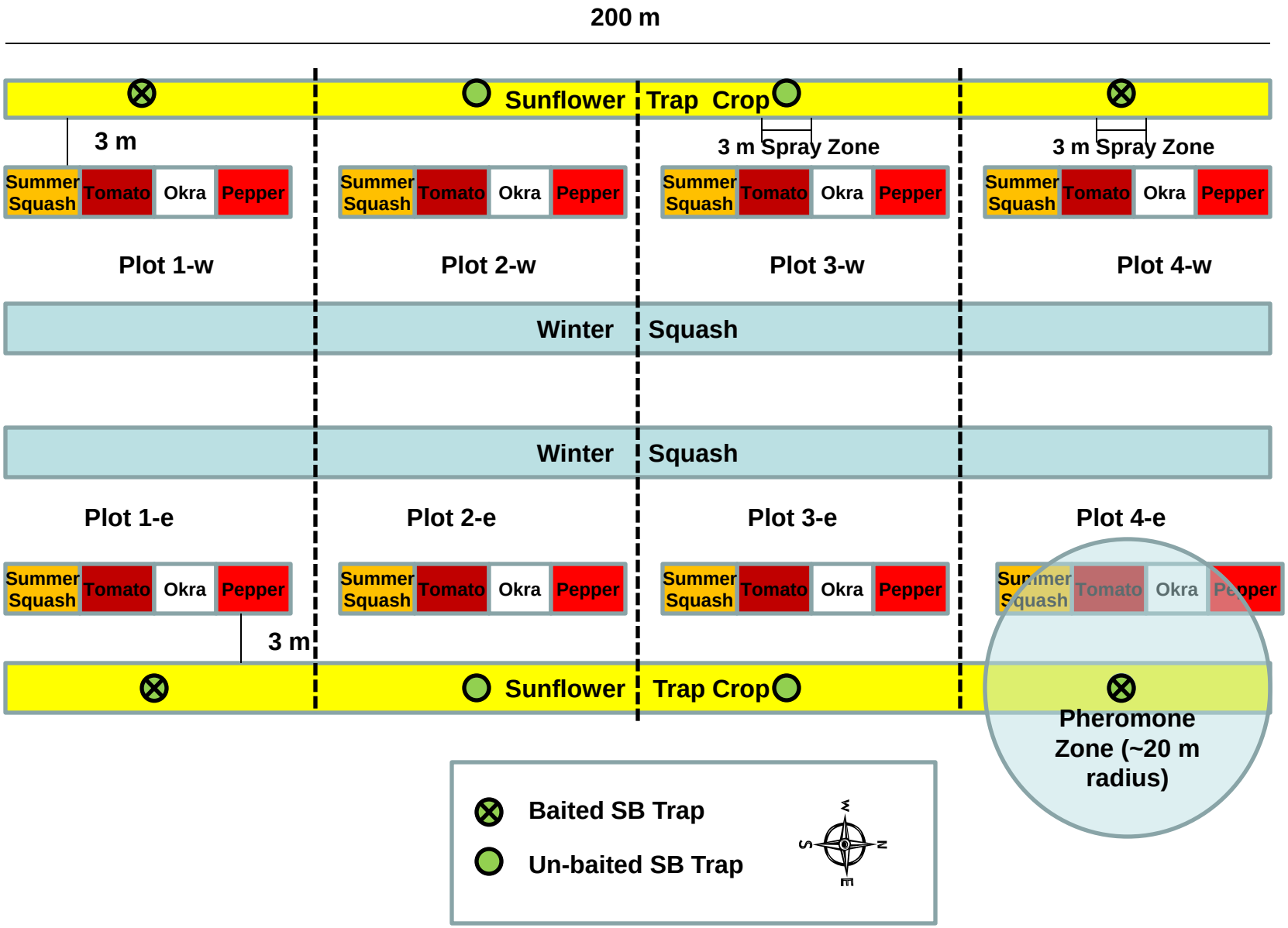

- Colonization of cash crops delayed 14 d with baited traps, entered most attractive crop (okra)

# Seasonal BMSB Crop Damage



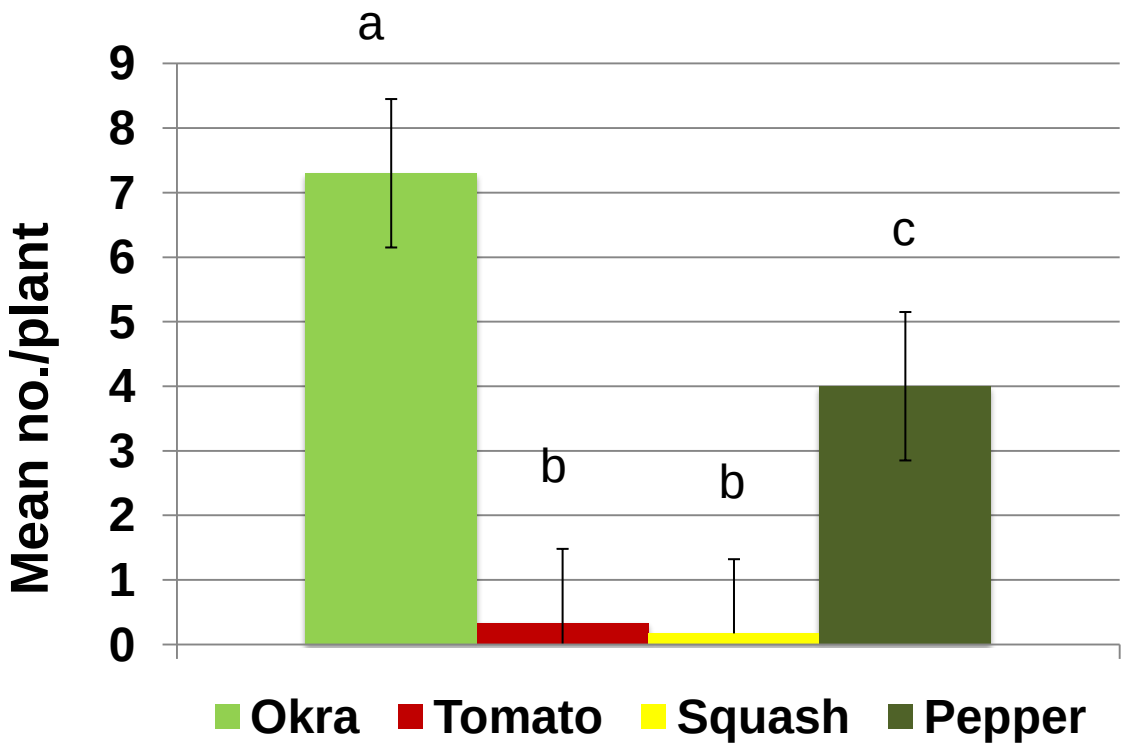



Deciduous Hardwood Forest




Soybean

# Seasonal BMSB (nymph and adult) on Cash Crops




***P* = <.0001**
***F* = 17.36**
***df* = 3**

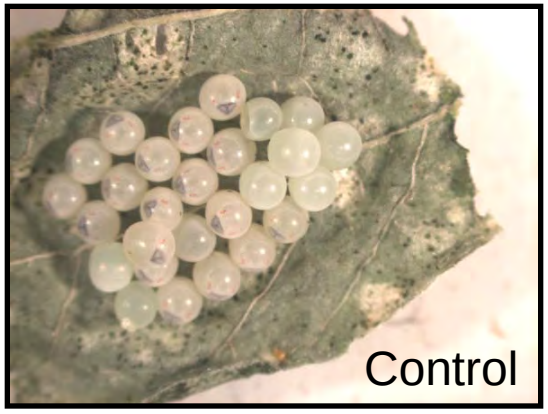
***[Same trend observed in 2012]***

# Compost Tea Studies

- **Egg masses** (26-28 eggs/mass; 2-3 d-old, 1-d old)
- **Poultry manure** and **mushroom** composts
- **‘Teas’:** 1:2 ratio (compost:water), steeped 24 h
- **50/50 mix** of both teas to maximize microbial diversity

# Compost Tea Methods

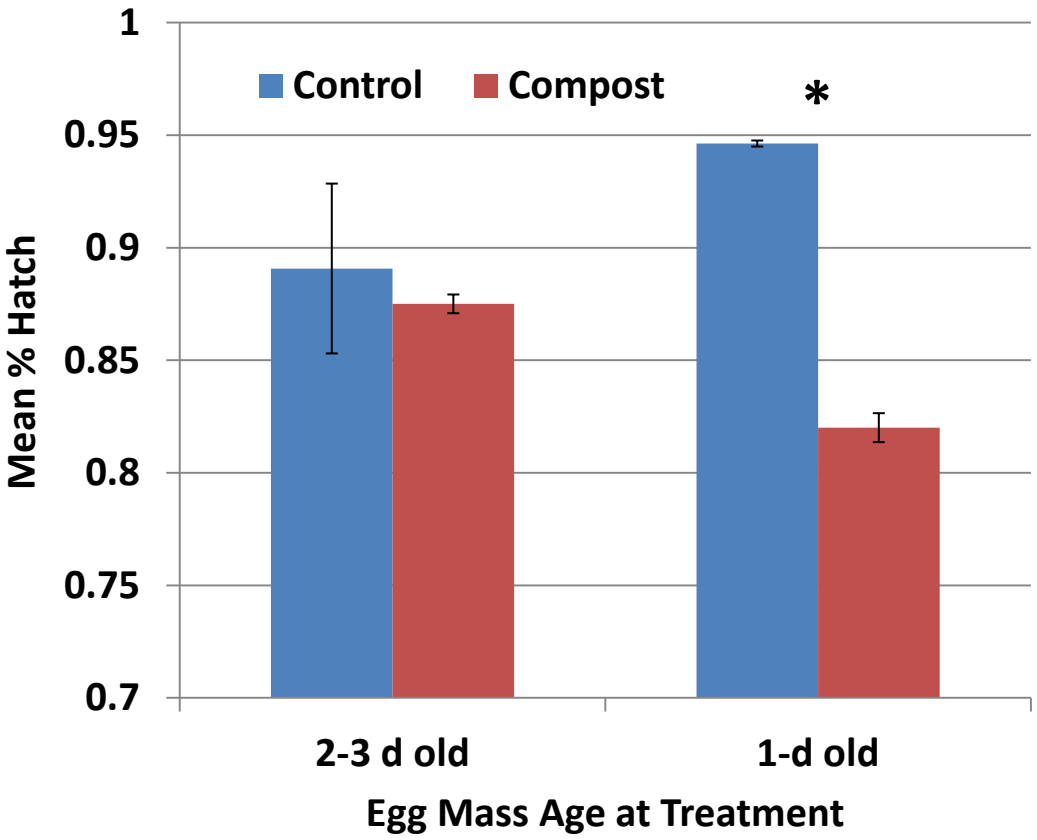

- Misted egg masses at 25 cm height (delivered ~0.12 ml) with **RO water** or **compost tea mix**





- 25°C (14:10 L:D) with sunflower, fresh bean, water; checked every 48 h

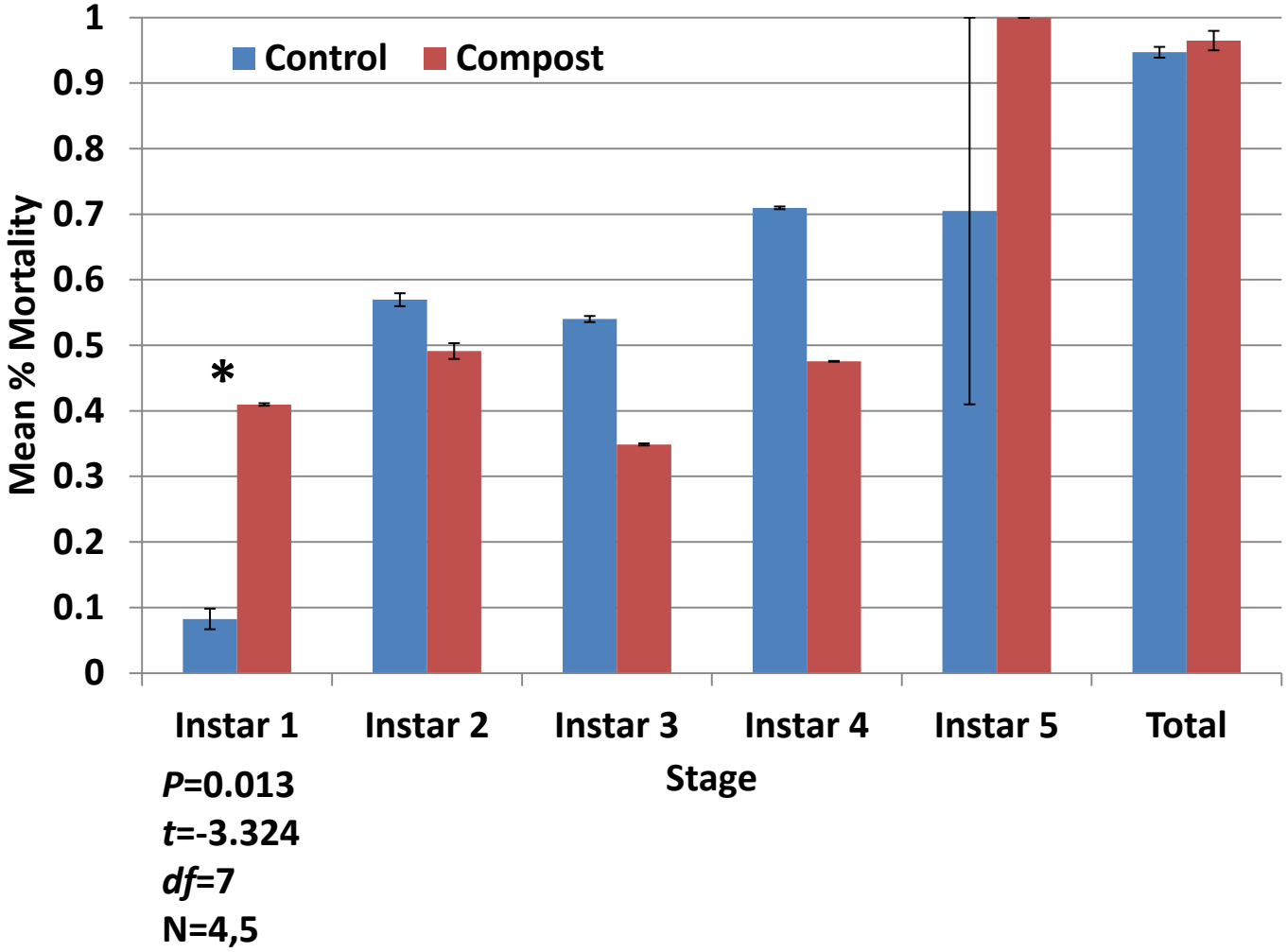
# Effect of Compost Tea on Hatch




*$P$ =0.026
$t$ =2.322
$df$ =36
N =19

# BMSB Nymphal Mortality

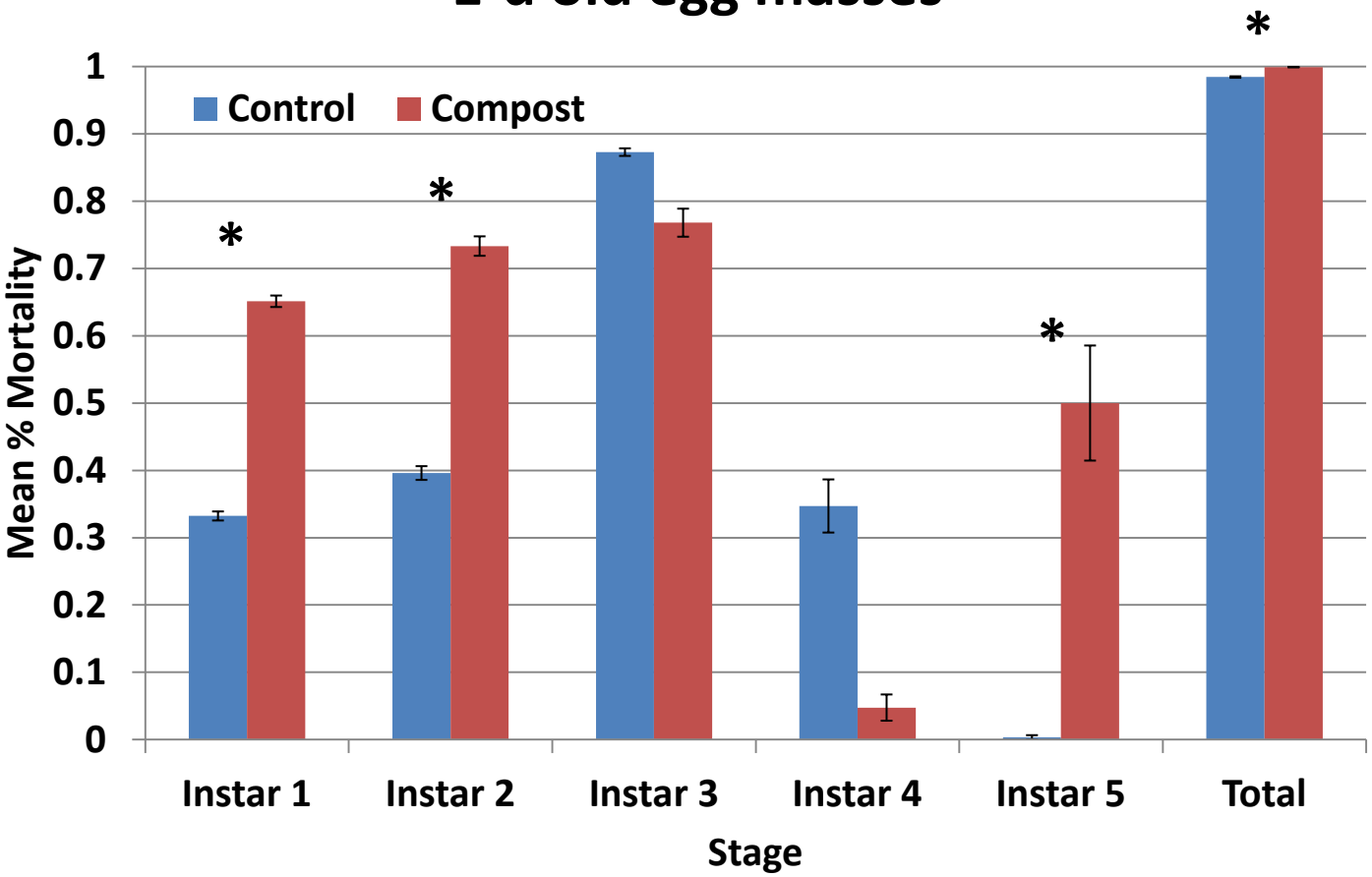
## 2-3 d old egg masses




*P*=0.013
*t*=-3.324
*df*=7
N=4,5

# BMSB Nymphal Mortality

## 1-d old egg masses




| Instar 1 | Instar 2 | Instar 3 | Instar 4 | Instar 5 | Total |
|---|---|---|---|---|---|
| P=.013 | P=.033 | | | P=.04 | P=.017 |
| t=-2.604 | t=-2.219 | | | t=-2.404 | t=-2.535 |
| df=36 | df=34 | | | df=7.5 | df=36 |
| N=19 | N=19,17 | | | N=9,8 | N=19 |

# Conclusions

- BMSB colonizing from **woods**
- **Pull-pull strategy** (trap crop + pheromone trap) **effective** – **removed average 350 BMSB** across the season, **delayed cash crop colonization by 14 d, < damaged fruits/plant** (compared to 18/plant in 2012)
- Compost tea **reduced hatch** and **significantly increased mortality in early instars** (60% for 1$^{st}$, 70% for 2$^{nd}$) …. gut symbiont competitively displaced?

# Thank You!

- Leskey lab (U.S.D.A. Appalachian Fruit Research Station)
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