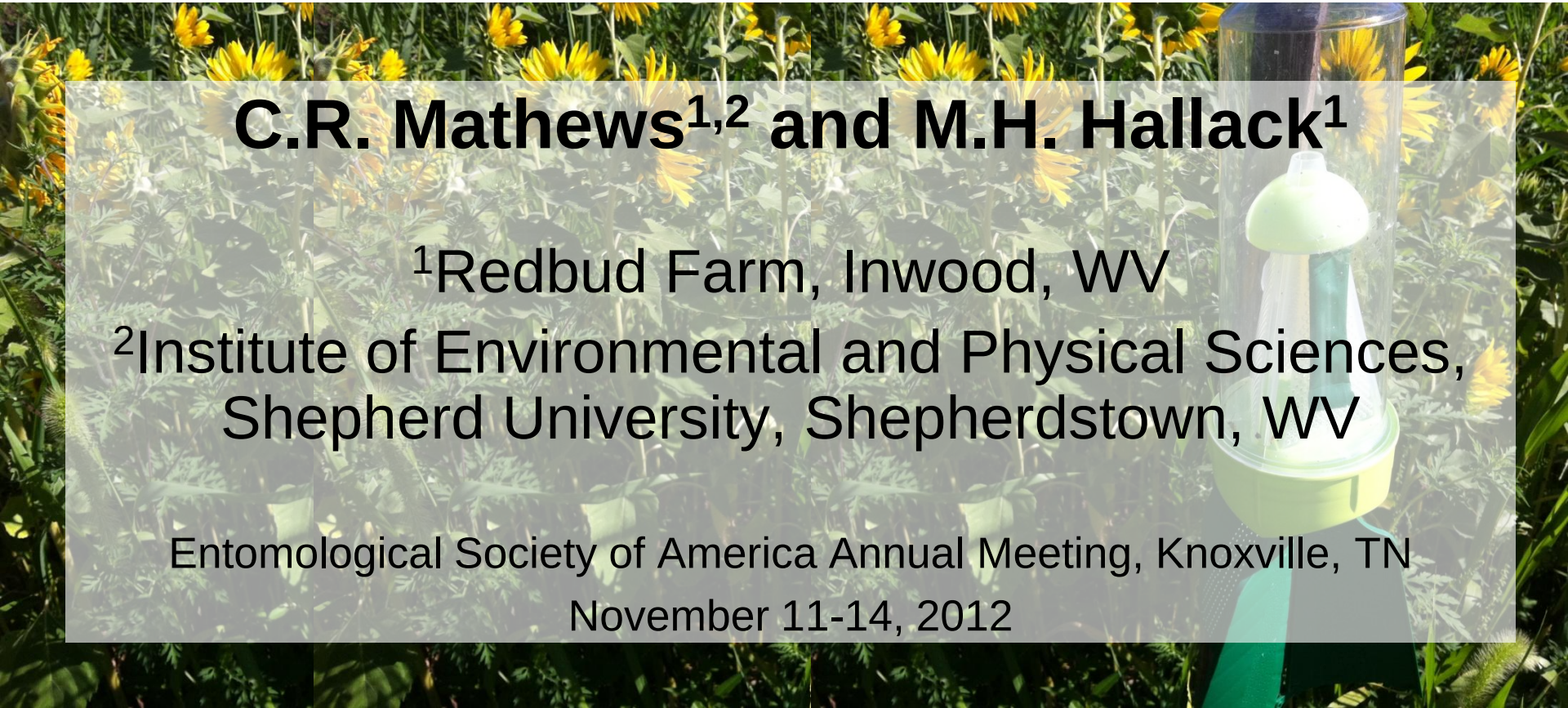
Integrated Trap Crop and Pheromone Trap System for Organic Management of Brown Marmorated Stink Bug



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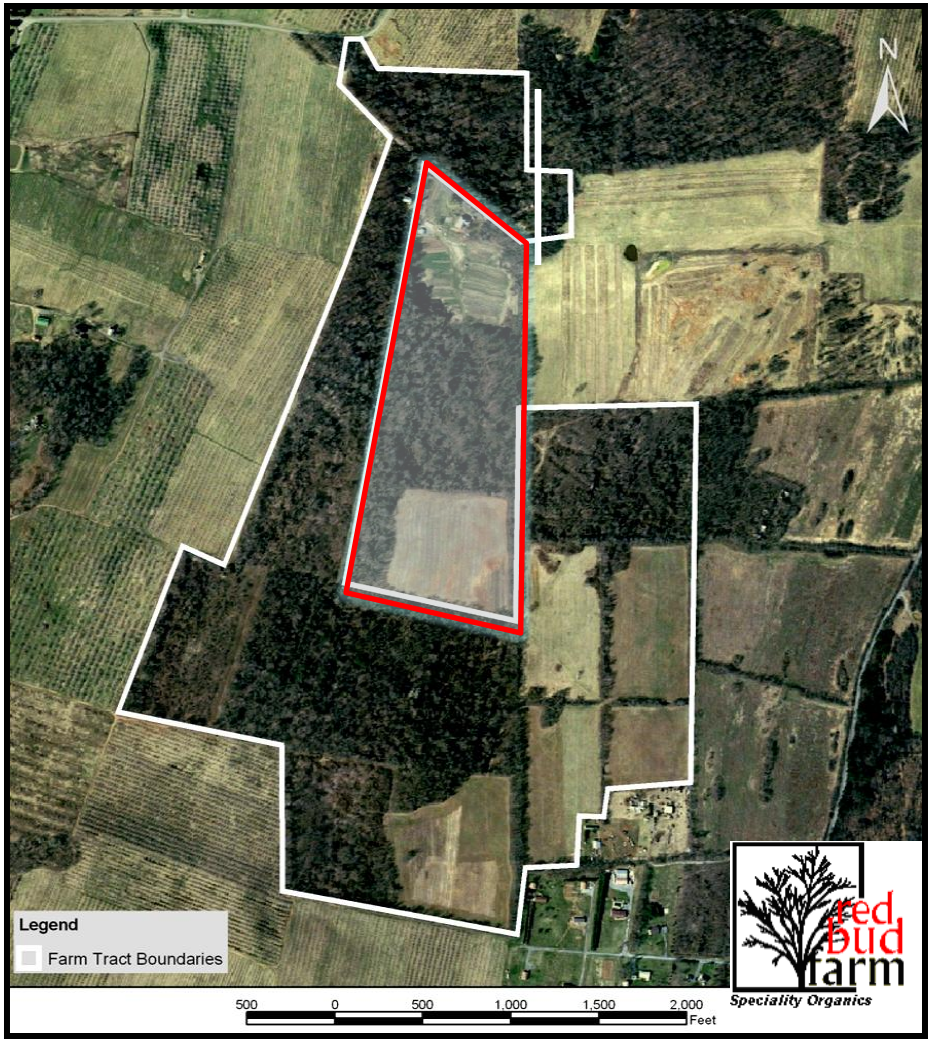
Background

- Invasive Brown Marmorated Stink Bug (BMSB), *Halyomorpha halys*
- Broad feeding range, lack of effective native natural enemies, rapid dispersal
- Significant economic losses, particularly for **organic growers**



Small-scale, highly diverse organic farms endangered

- 220 acres in Eastern panhandle WV, 15 acres highly diversified market production
- Surrounded by conventional tree fruit, field crops



- Intercropping (>50 varieties)
- Minimal pesticides, reliance on natural enemies

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Need BMSB strategy that does not disrupt **agroecosystem stability**

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Preliminary Observations: 2011

- Organic pyrethrin (Pyganic) ineffective
- Green amaranth (*Amaranthus spp.*) and sunflower highly attractive … **trap crop?**

2012 Field Study: Objectives

- Can we attract BMSB to **trap crop buffer** surrounding cash crops?
- Can we remove BMSB via **pheromone traps** to protect cash crops?
- Does trap crop impact **natural enemies**?

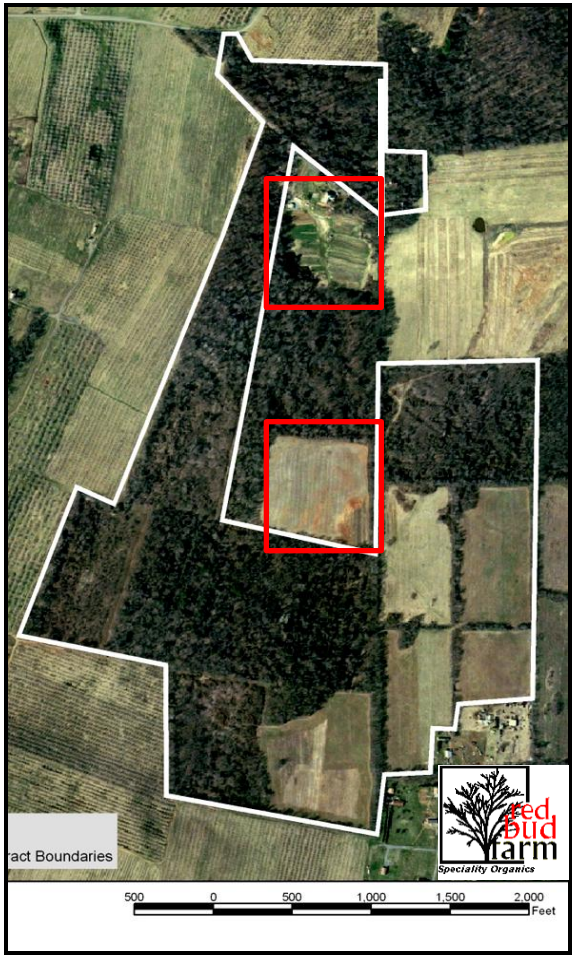
Methods

- **Cash crops:** okra ('Clemson Spineless'), sweet pepper ('Red Ace'), tomato ('Big Boy'), summer squash ('Zephyr')
- **Trap crops:** green amaranth (*Amaranthus spp.*) and sunflower (open pollinated mixture)
- **Pheromone traps:**

'Rescue' dual lure (Sterling International, Inc.)

Methods

- RCBD with two blocks
  (‘old’ and ‘new’)
- Two replicates per block



1 Replicate (900 sq ft)

- 3 x 36 ft crop rows, black plastic
- 3 ft aisles, straw mulch
  - **Treatment:** 3 ft wide perimeter, sunflower and amaranth (broad-cast 23 May), 4 Rescue traps, 3 ft height (6 June)

Methods: Arthropod Sampling

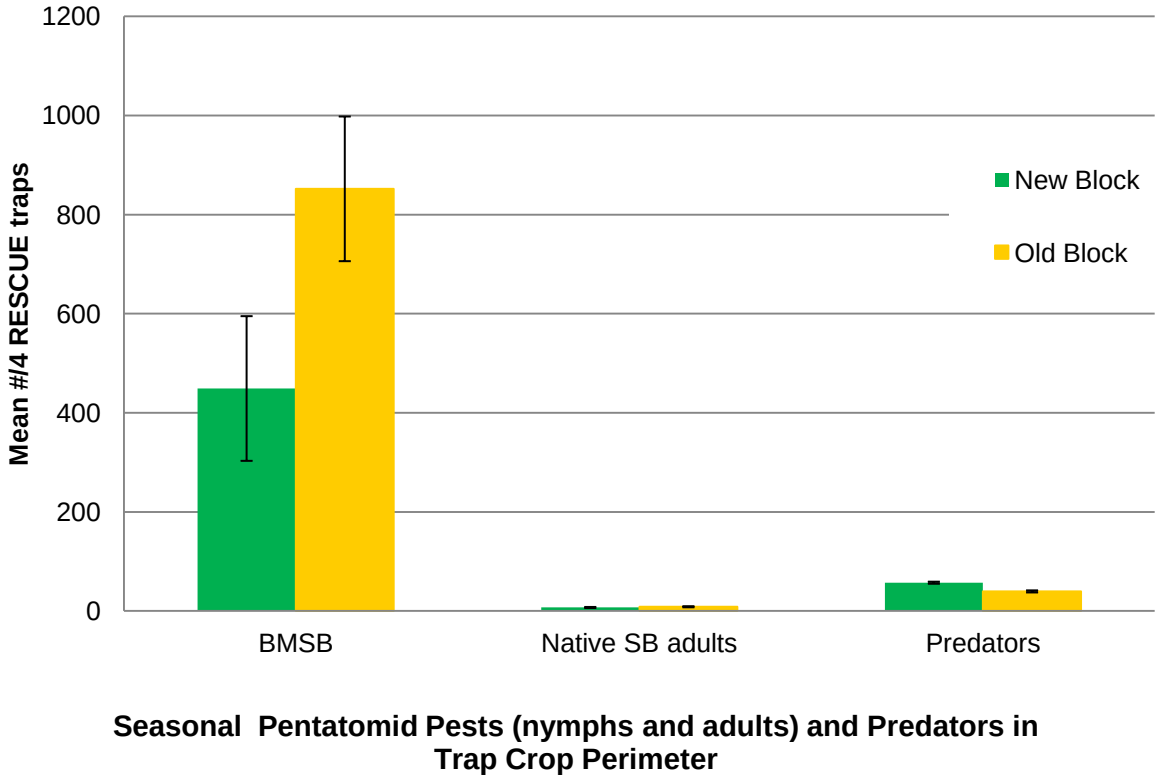
- **Weekly** (4 Jun –19 Sep)
- **Cash Crop:** Whole plant visual sample (3/row), BMSB, native stinkbug and predator densities
- **Trap Crop:** Rescue trap contents recorded, removed

Methods: Crop Damage & Yields

- **Weekly** crop damage (# fruits/3 plant) assessed, fruit removed
- Yield (lbs/row) recorded at harvest, totaled across season



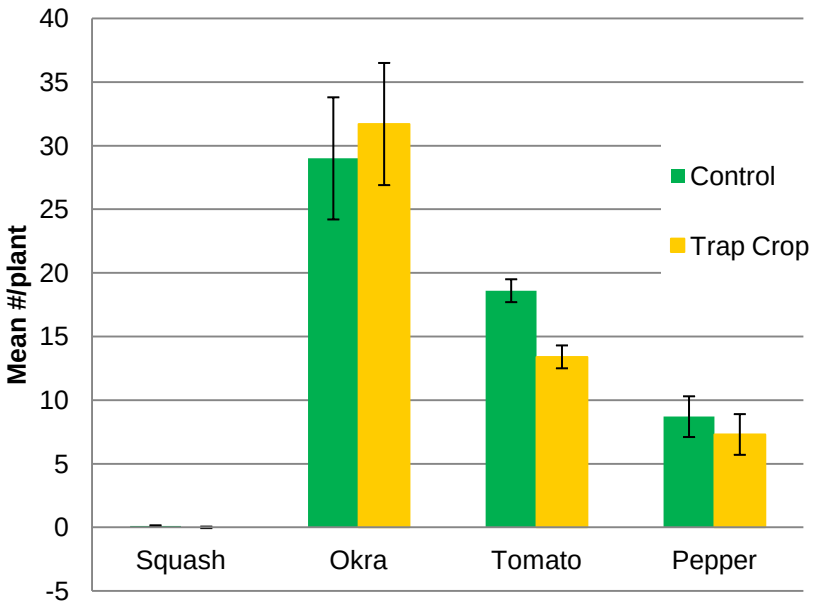

Results: Densities in Trap Crop Perimeter



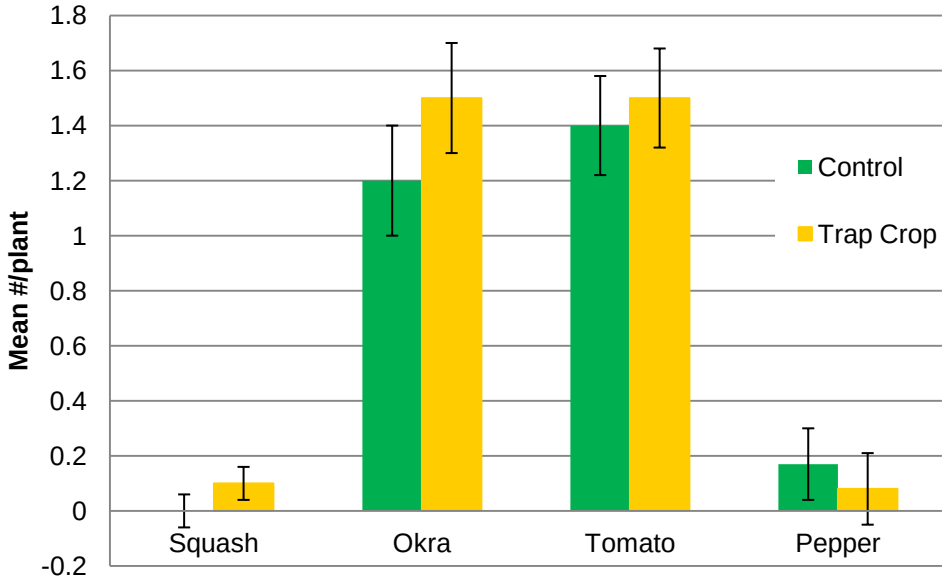
Seasonal Pentatomid Pests (nymphs and adults) and Predators in Trap Crop Perimeter

- BMSB densities higher in block with prior vegetable crop production

Results: Densities in Cash Crops



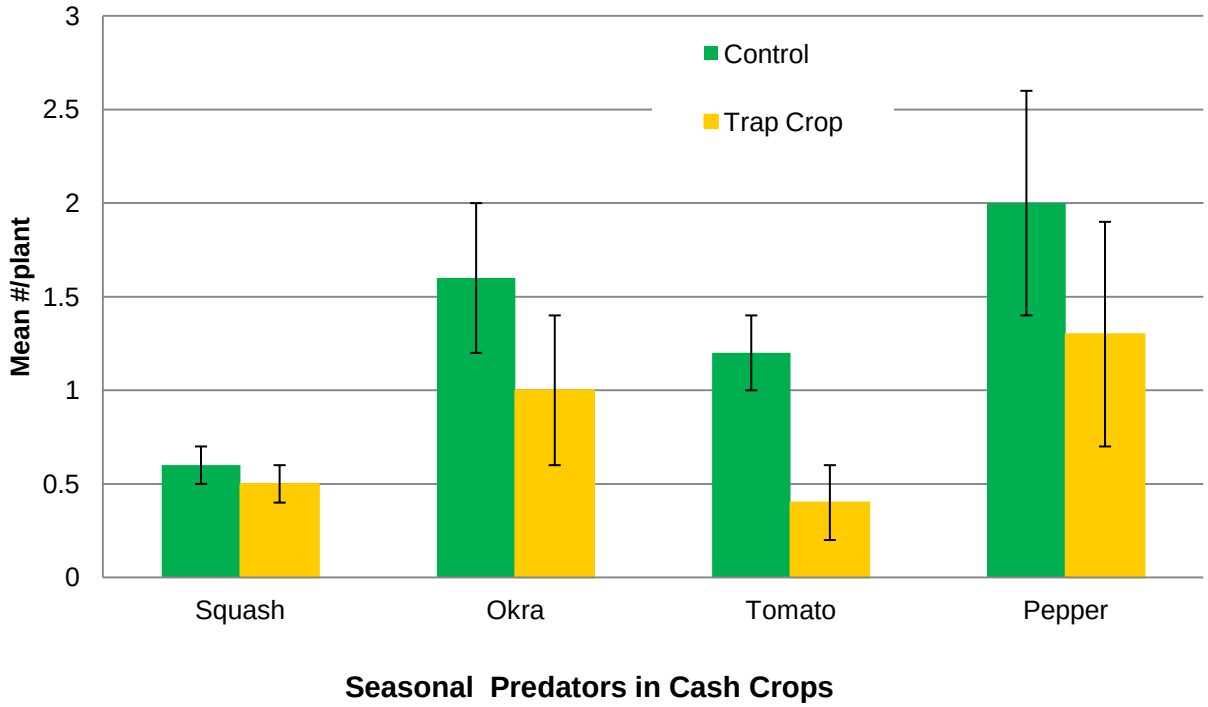
Seasonal BMSB (nymphs and adults) in Cash Crops



Seasonal Native SB (nymphs and adults) in Cash Crops

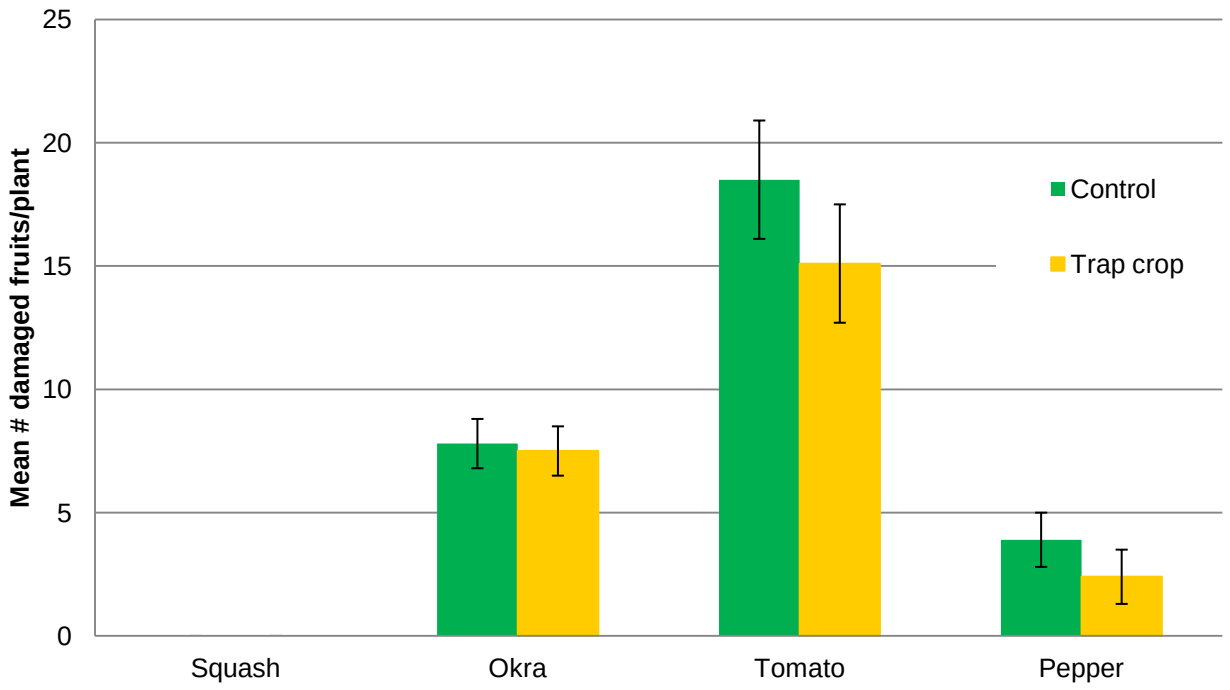
- Native stink bugs not affected by trap crop
- Okra attractive to both BMSB and natives

Results: Densities in Cash Crops



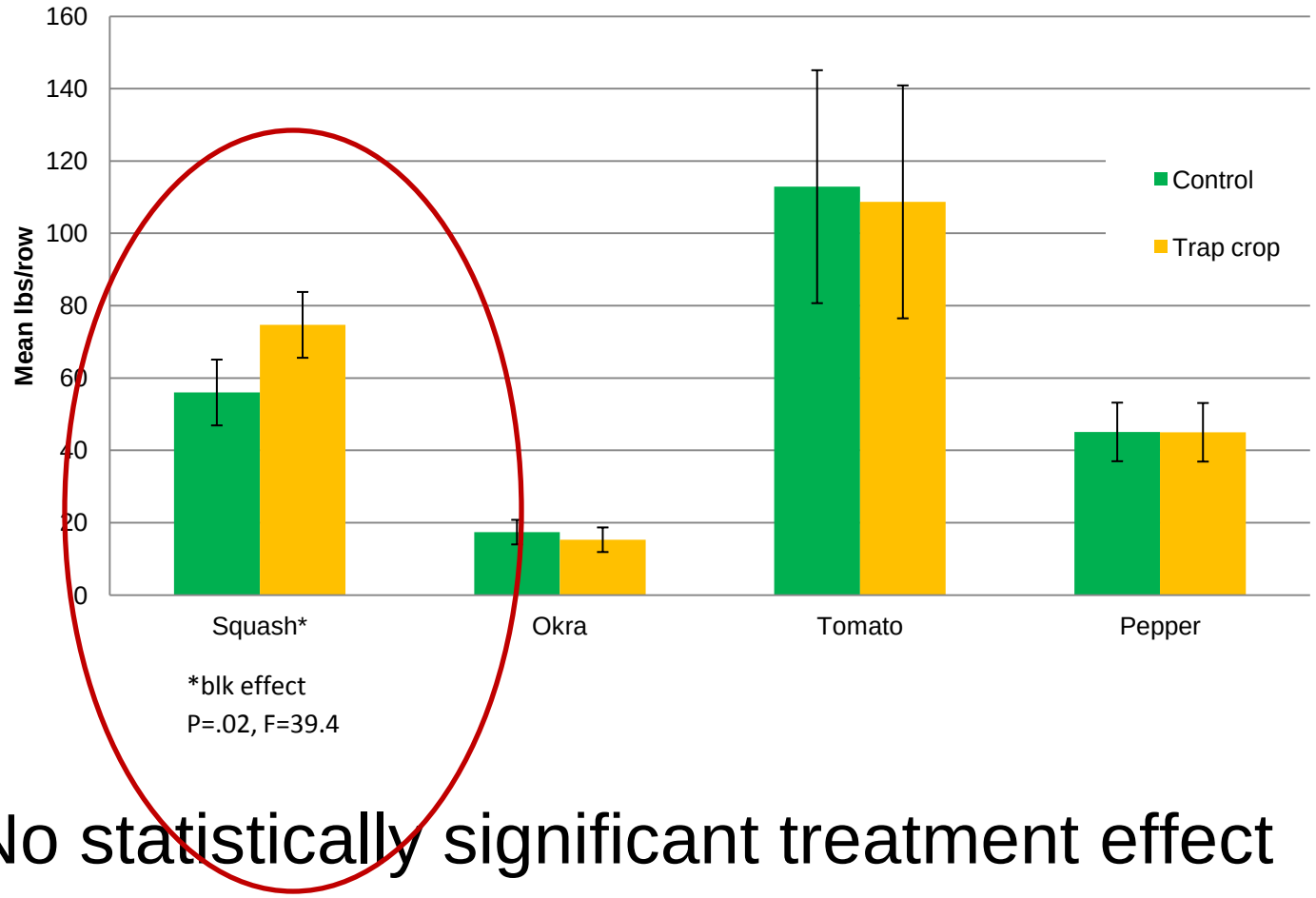
- Predators: Coccinellids, Chrysopids, Syrphids and Araneae
- Higher density in control plots

Results: Seasonal Stinkbug Damage

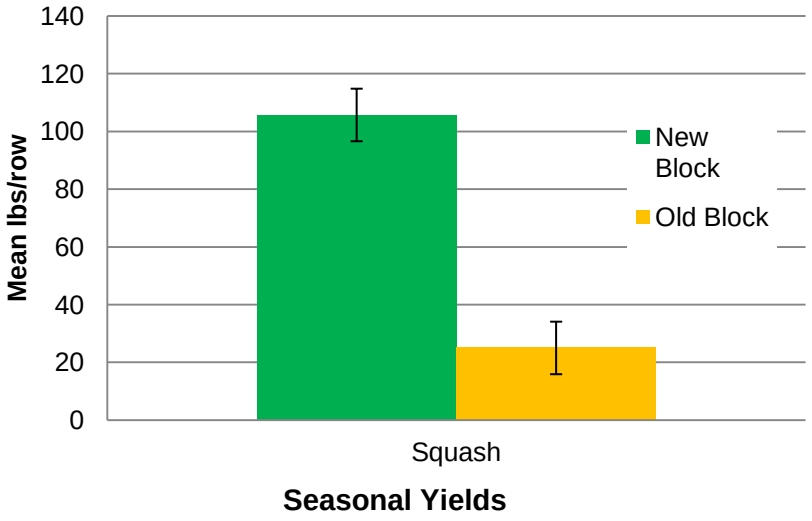


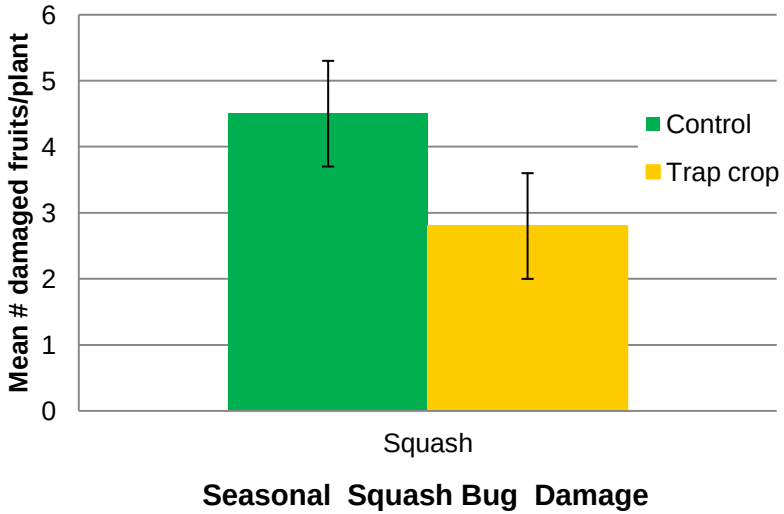
- Promising trend, but no statistically significant treatment effect

Results: Seasonal Crop Yields



- No statistically significant treatment effect





- Significantly higher yields in new block, less squash bug damage in trap crop plots

Conclusions

- High degree of variability between agricultural field plots, more replication needed
- Trap crop appears to deter squash bugs, may be TOO attractive to predators
- Okra should be investigated as potential trap crop!

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