Trap Crops for Organic Management of BMSB: 2012 Findings & Recommendations

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Preliminary Observations: 2011

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

Potential BMSB Sources

- Surrounding woods, tree rows

2012 Field Study Objectives

- Identify **direction** of BMSB colonization
- Explore **host-use patterns,** overall **host-plant preferences**
- Evaluate effectiveness of **trap crop perimeter system** and impacts on **natural enemies**

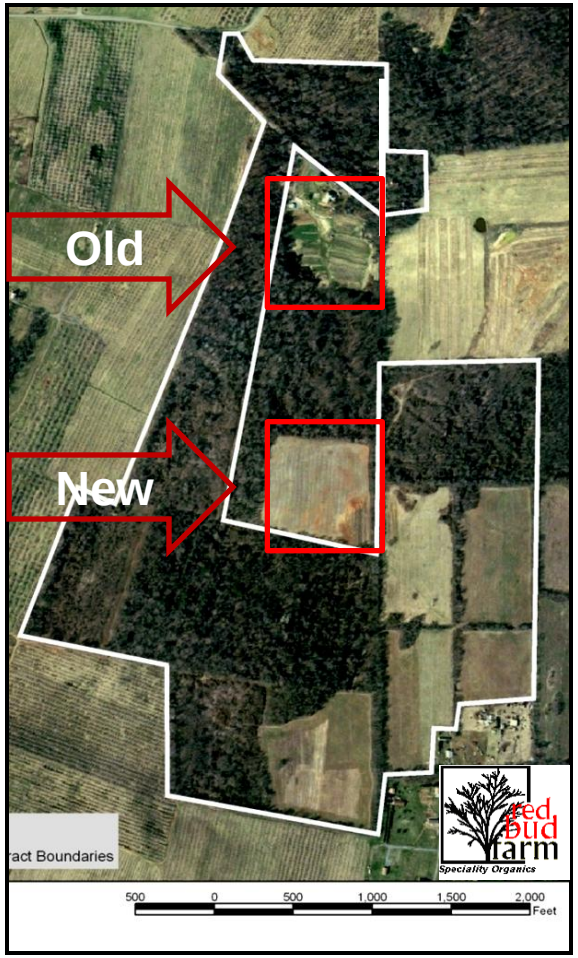
Methods

- **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.)

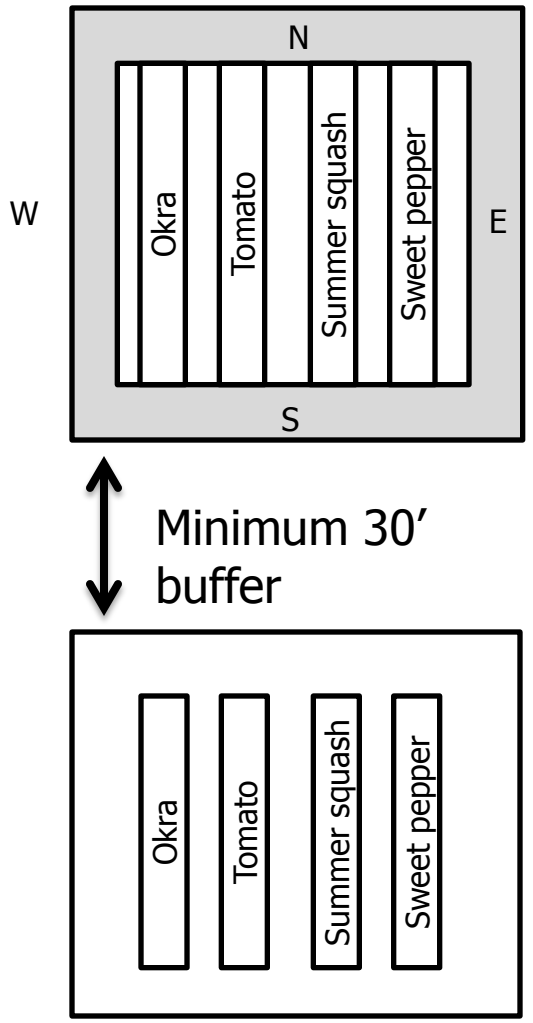
Methods

- 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

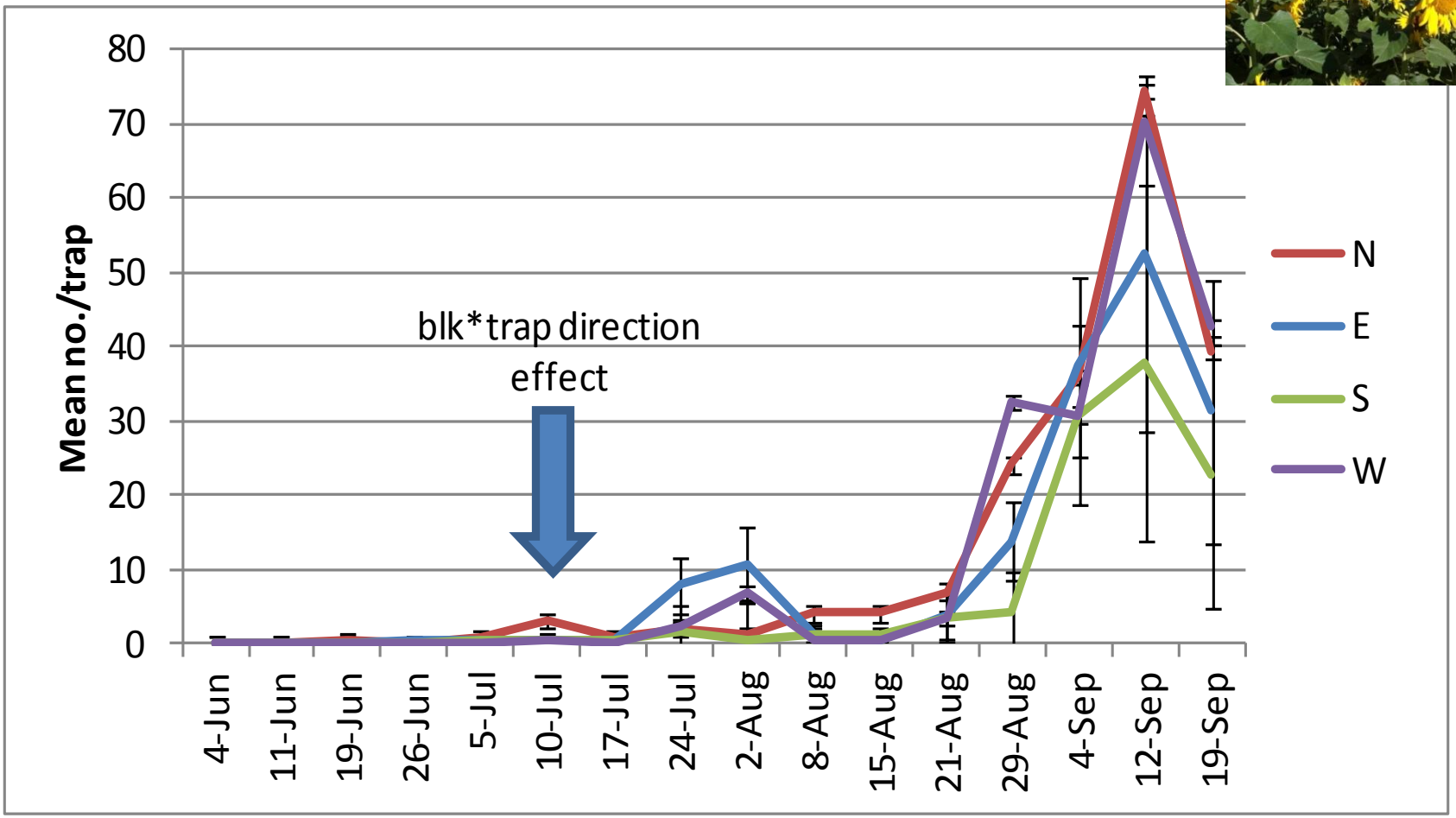
- **Weekly** (4 Jun –19 Sep)
- **Cash Crop:** Whole plant visual sample (3/row), BMSB, native stinkbug and predator densities
- **Trap Crop:** Rescue trap contents recorded, removed

Methods: Crop Damage & Yields

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

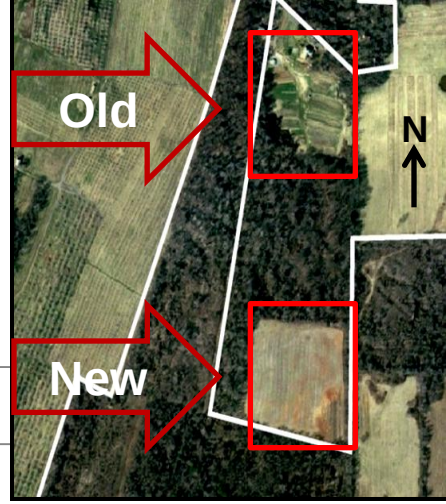


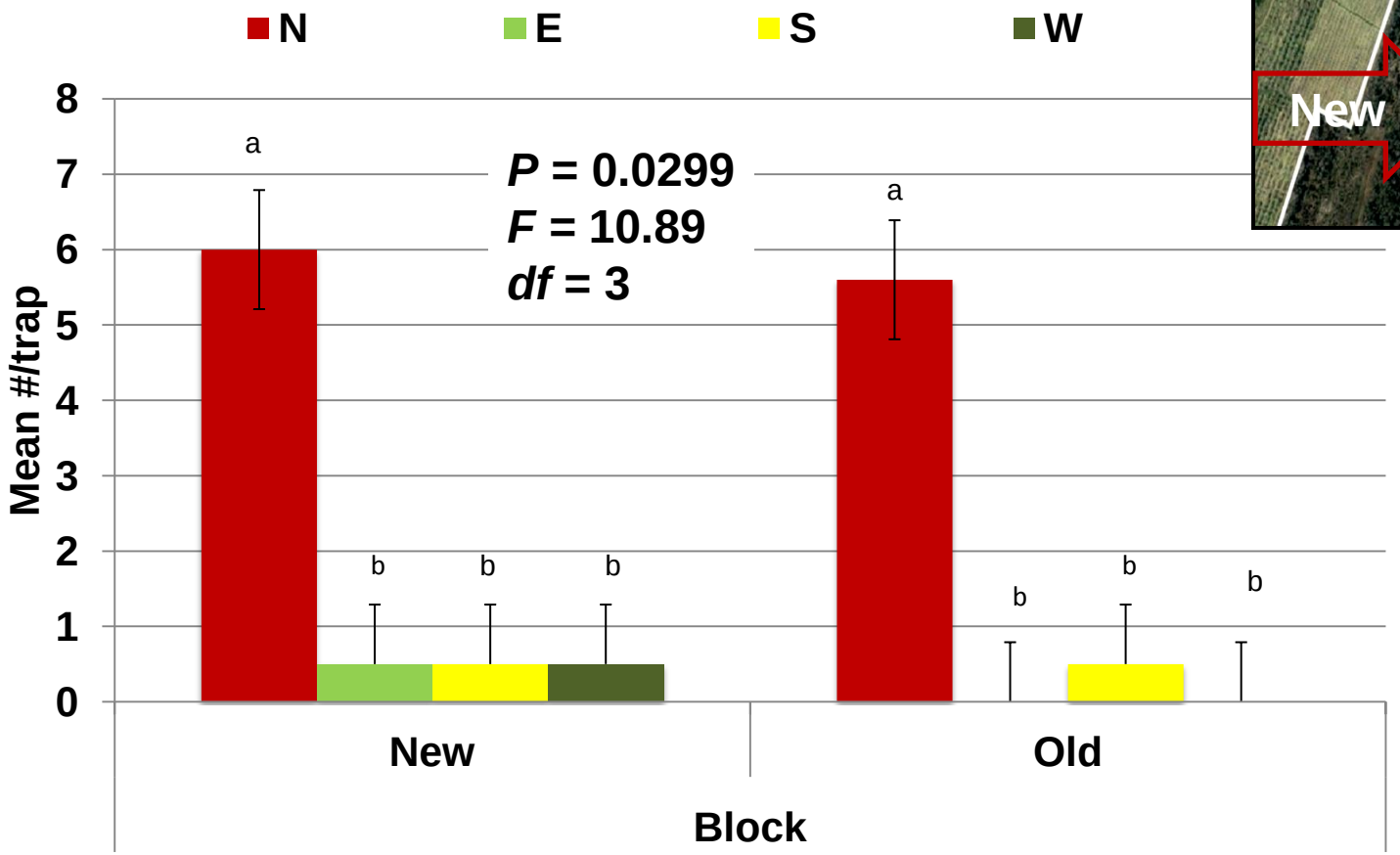

Directionality of BMSB in Trap Crop



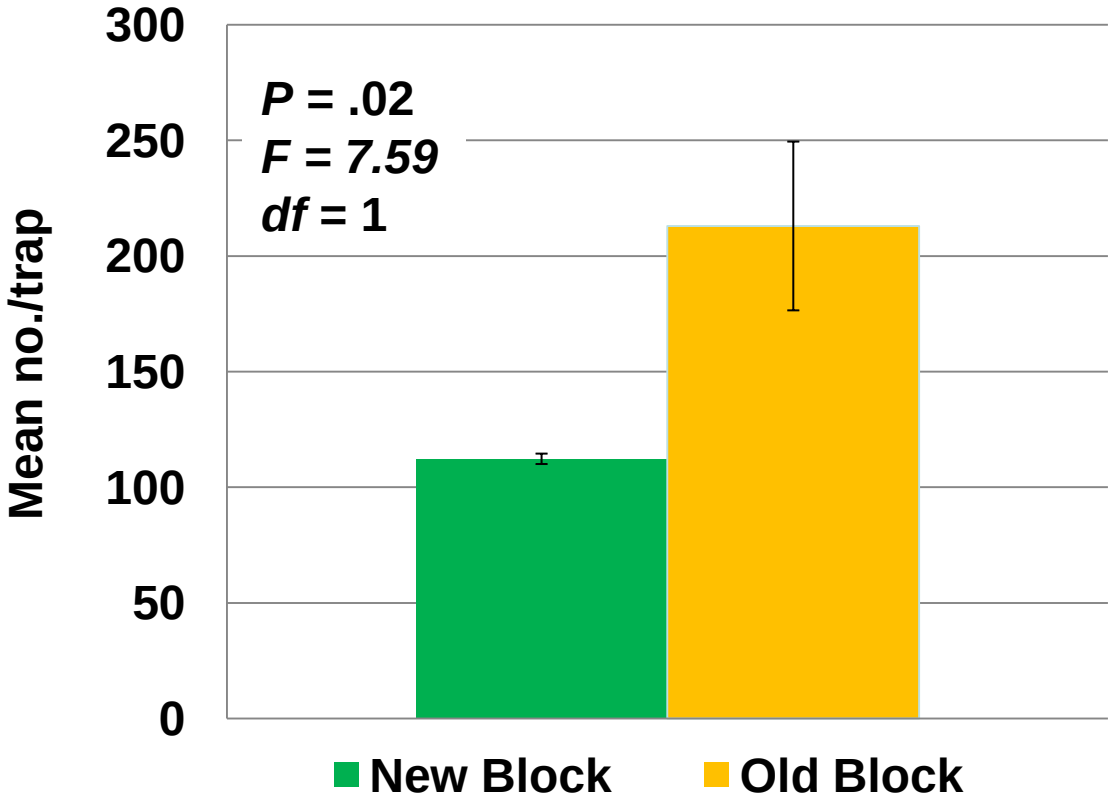
- No effect of trap placement within sample dates

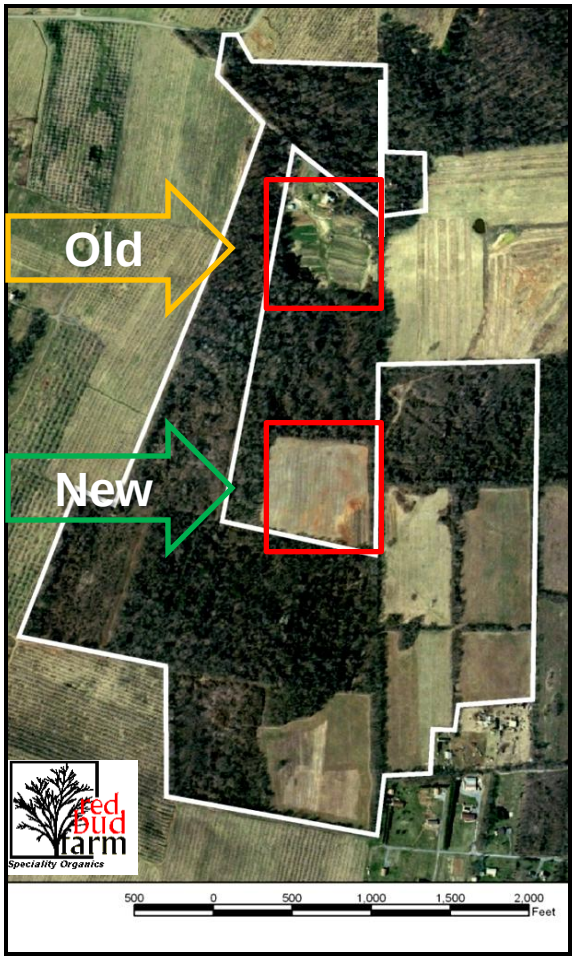
Block*Trap Placement: 10 July



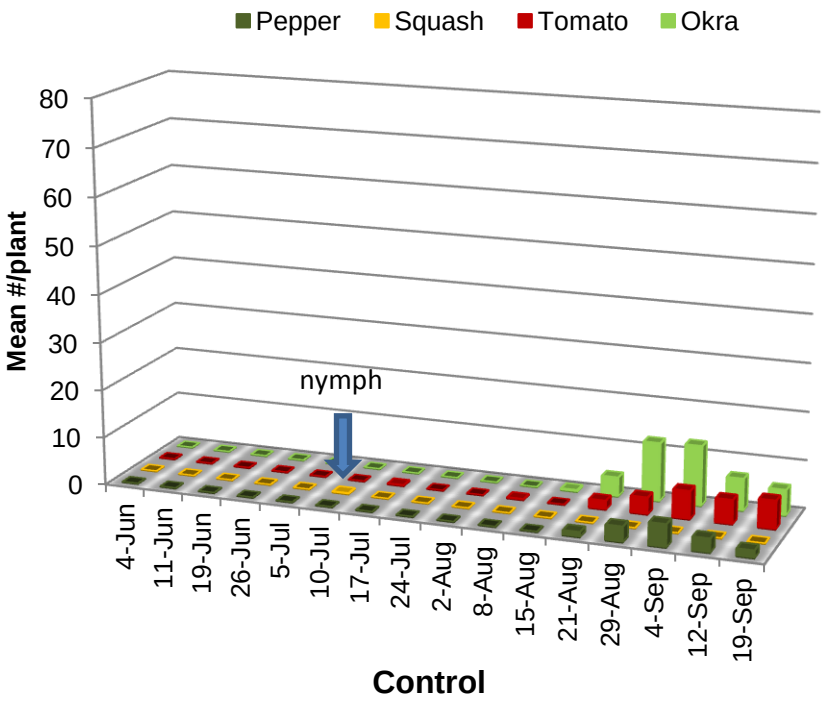


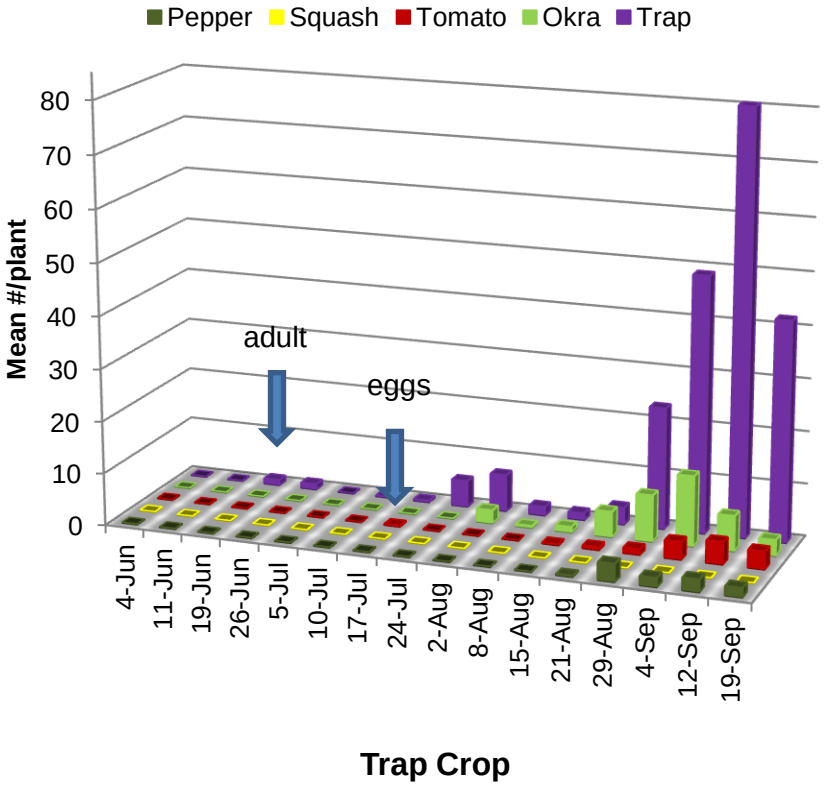
Seasonal BMSB Densities (nymph and adult) in Trap Crop





Colonization & Use of Cash Crops: Old Block

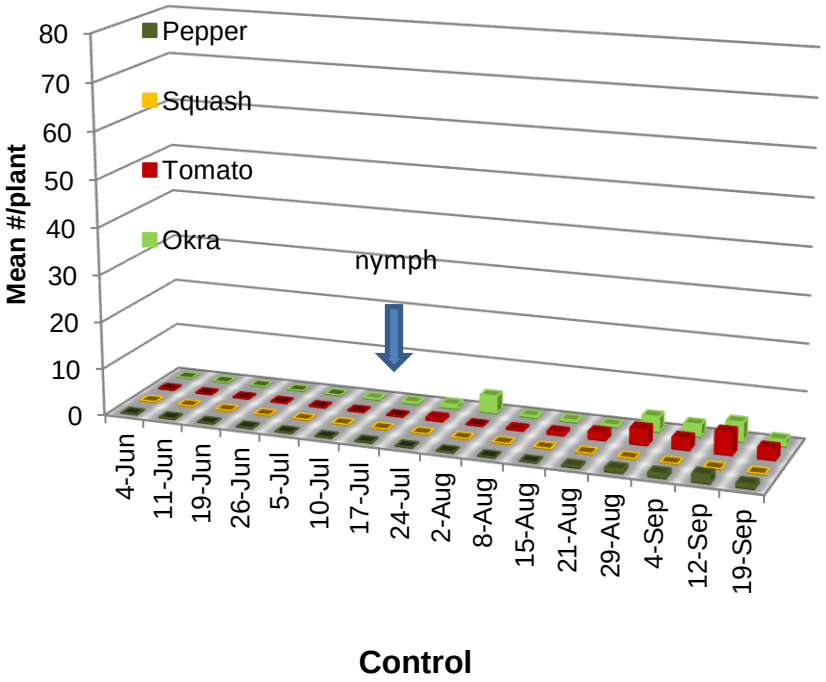


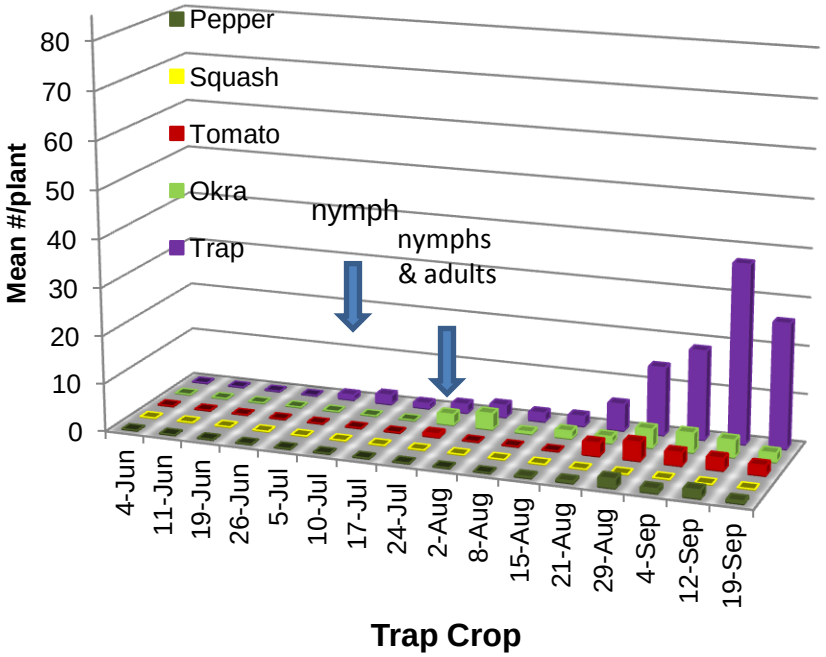


- Colonization of cash crops delayed 14 d in Trap Crop vs. Control; okra used before other cash crops
- Early colonization and consistent use of trap through season

17 July

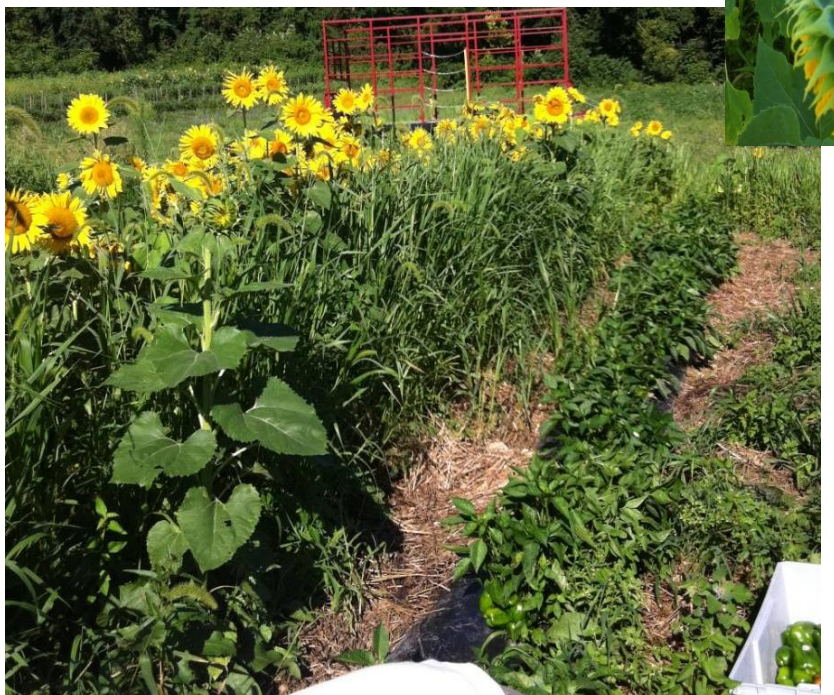
Colonization & Use of Cash Crops: New Block



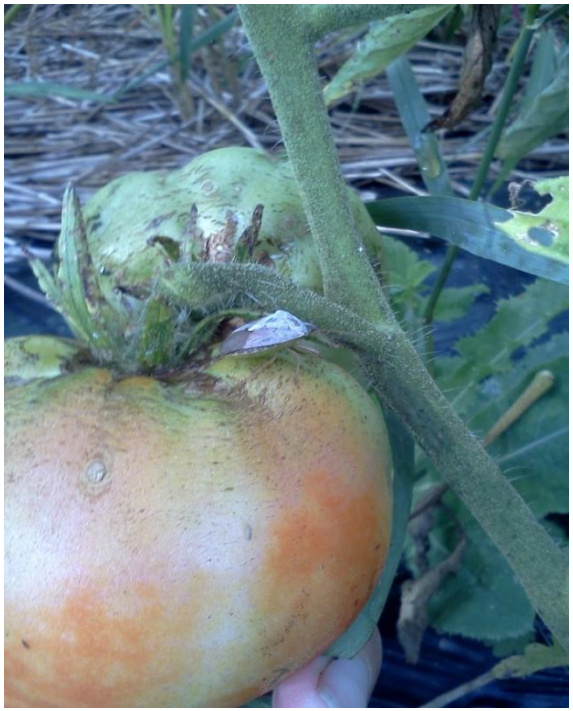
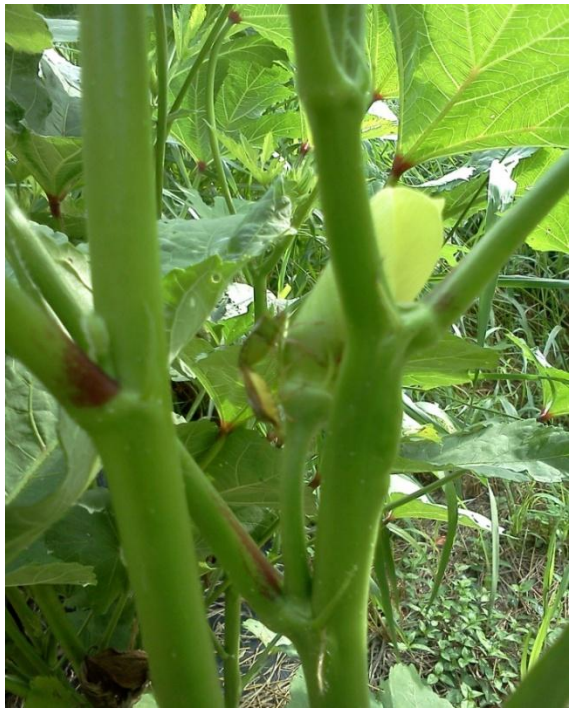


- Colonization of cash crops delayed 7 d in Trap Crop vs. Control; okra used before other cash crops
- Early colonization and consistent use of trap through season

24 July



17 Aug


25 August

19 September

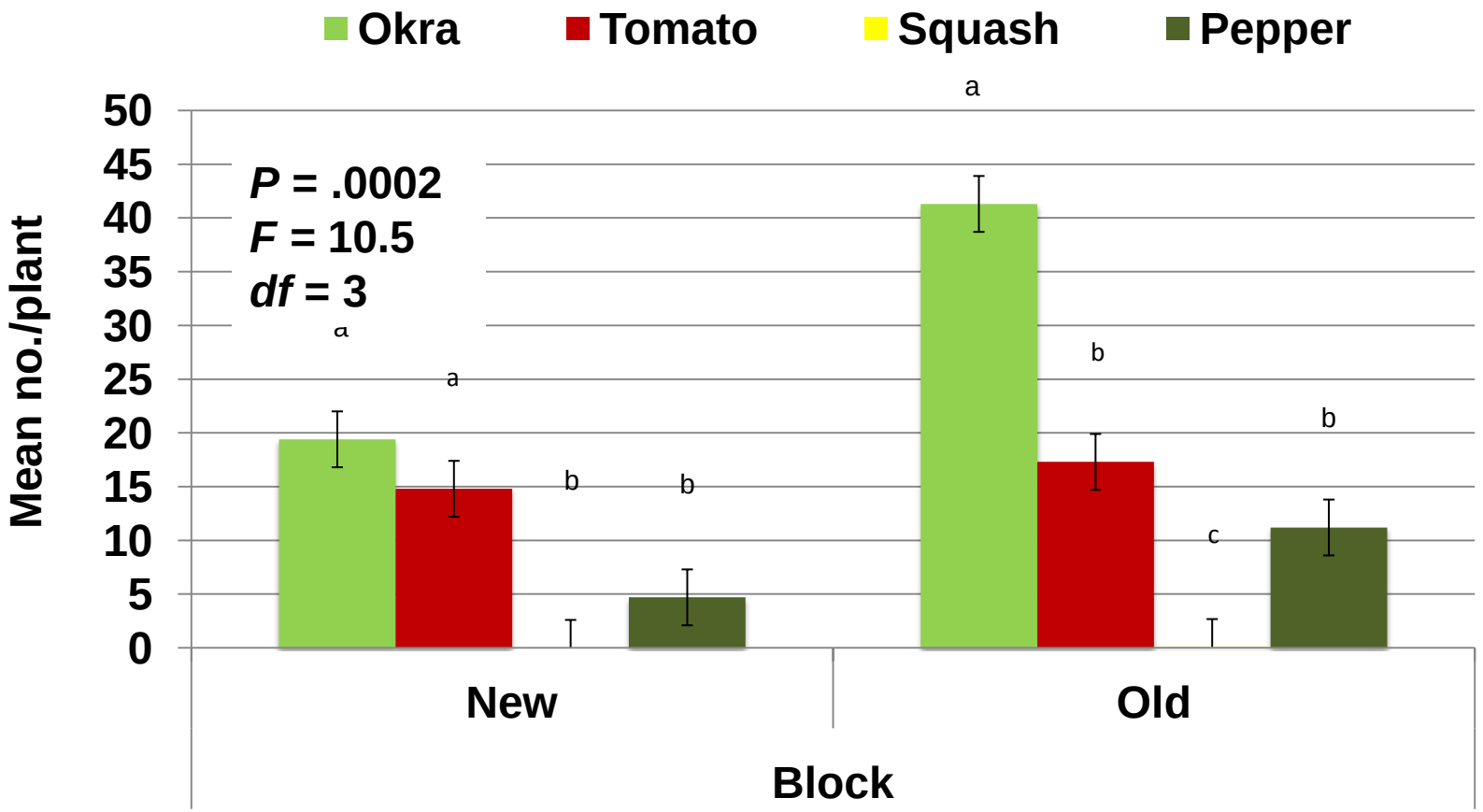






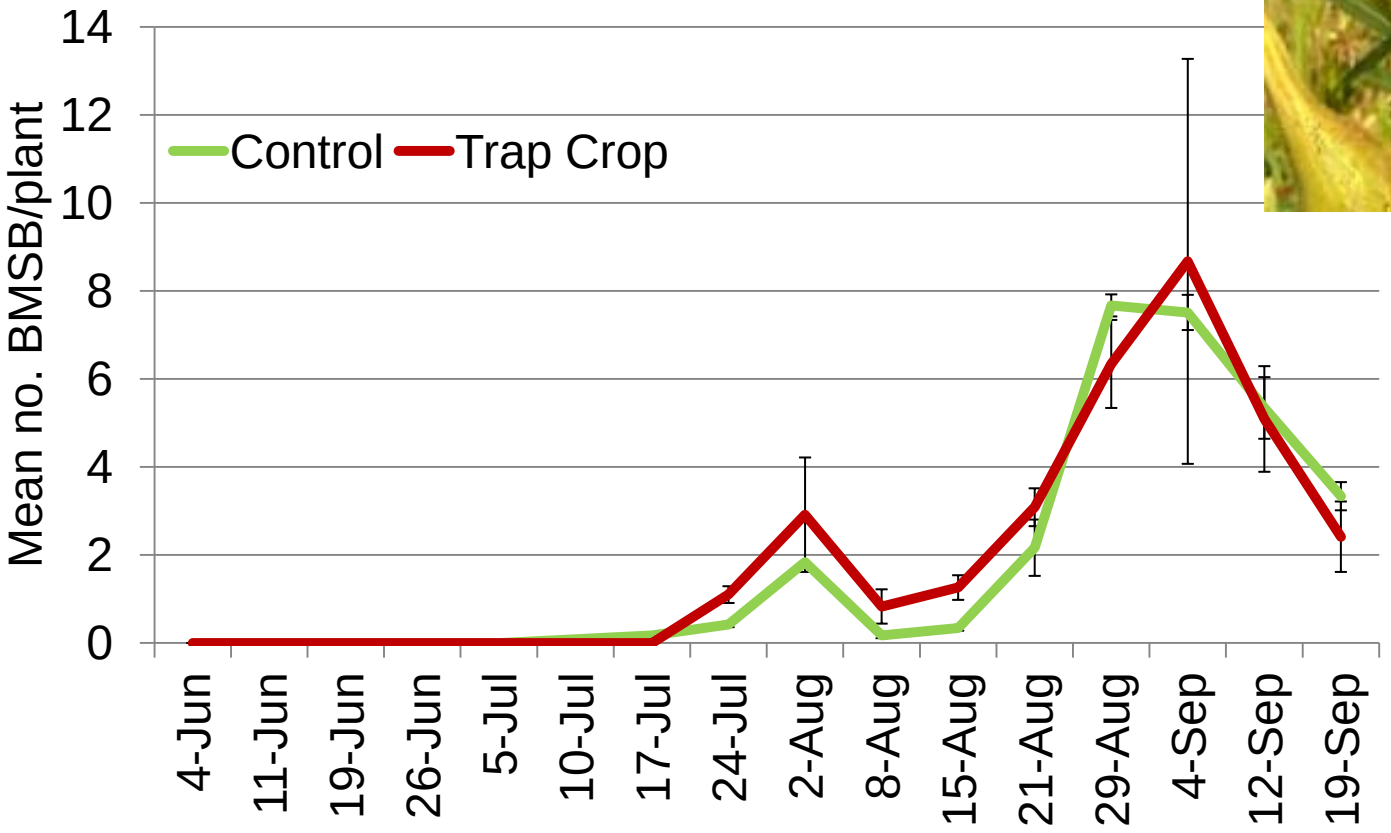
19 September: Alternative Hosts

Seasonal BMSB Densities (all stages) in Cash Crops: Block*Crop Effect

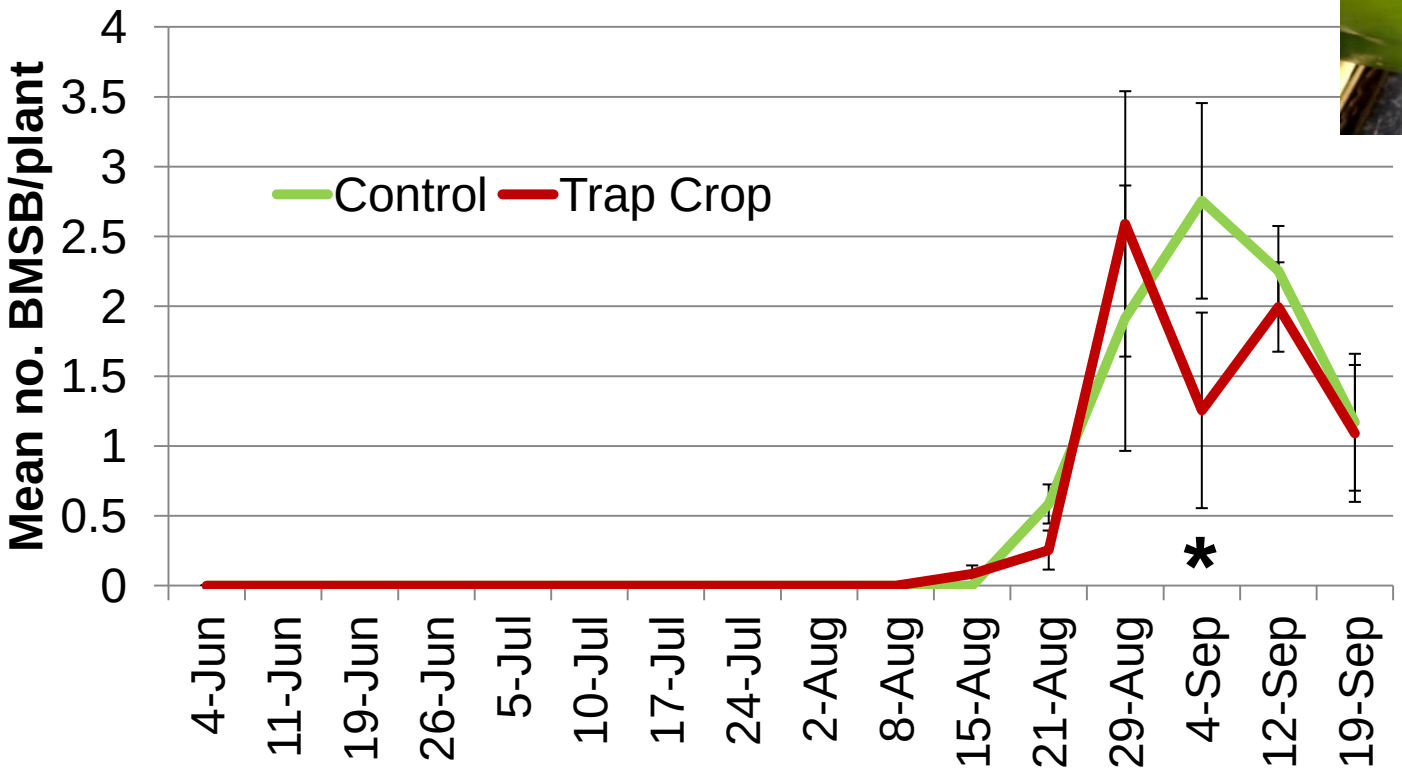


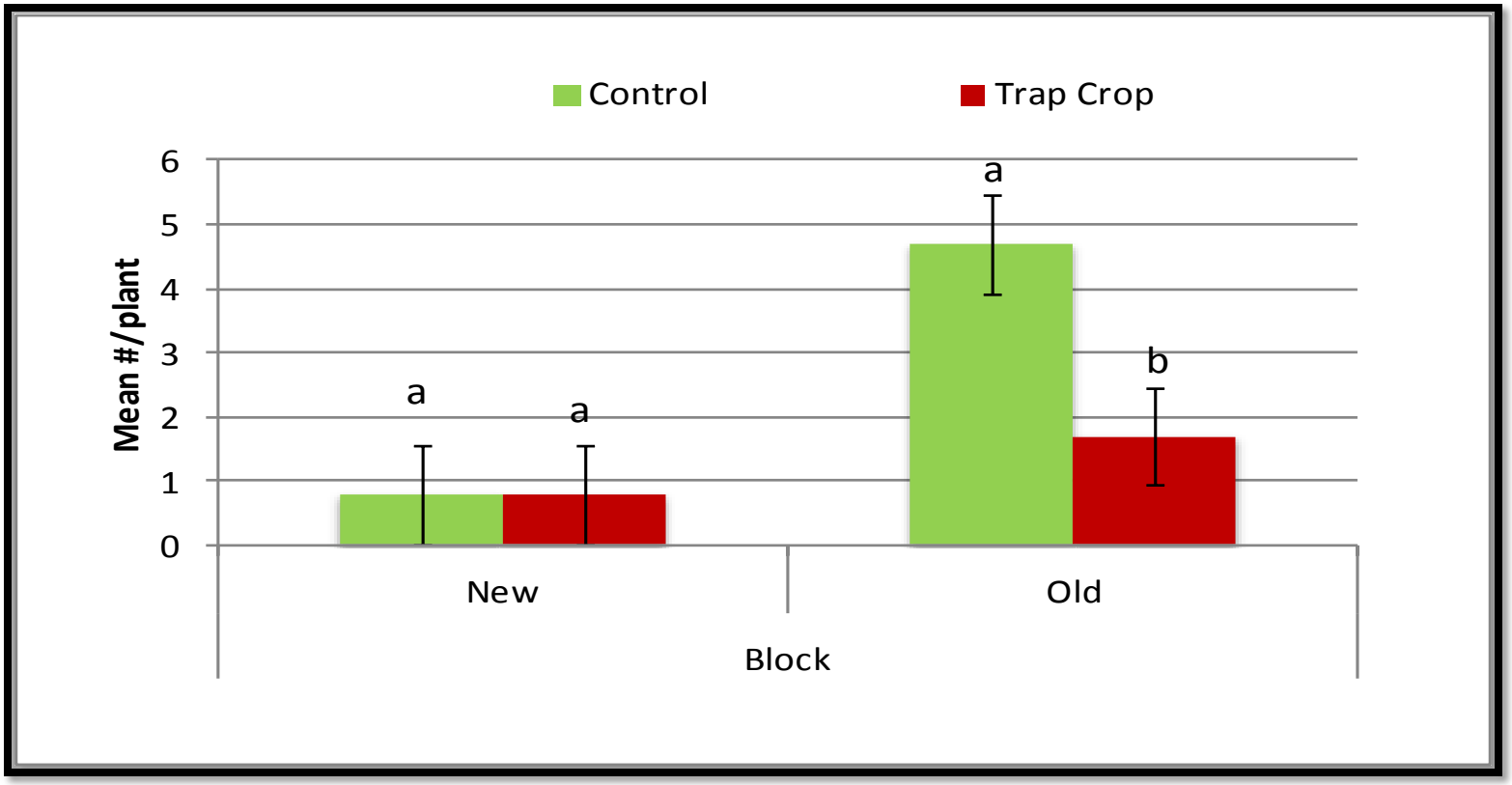
• Same host-plant preference profile, but higher magnitude in plot with history of production

Trap Crop Effectiveness: Okra



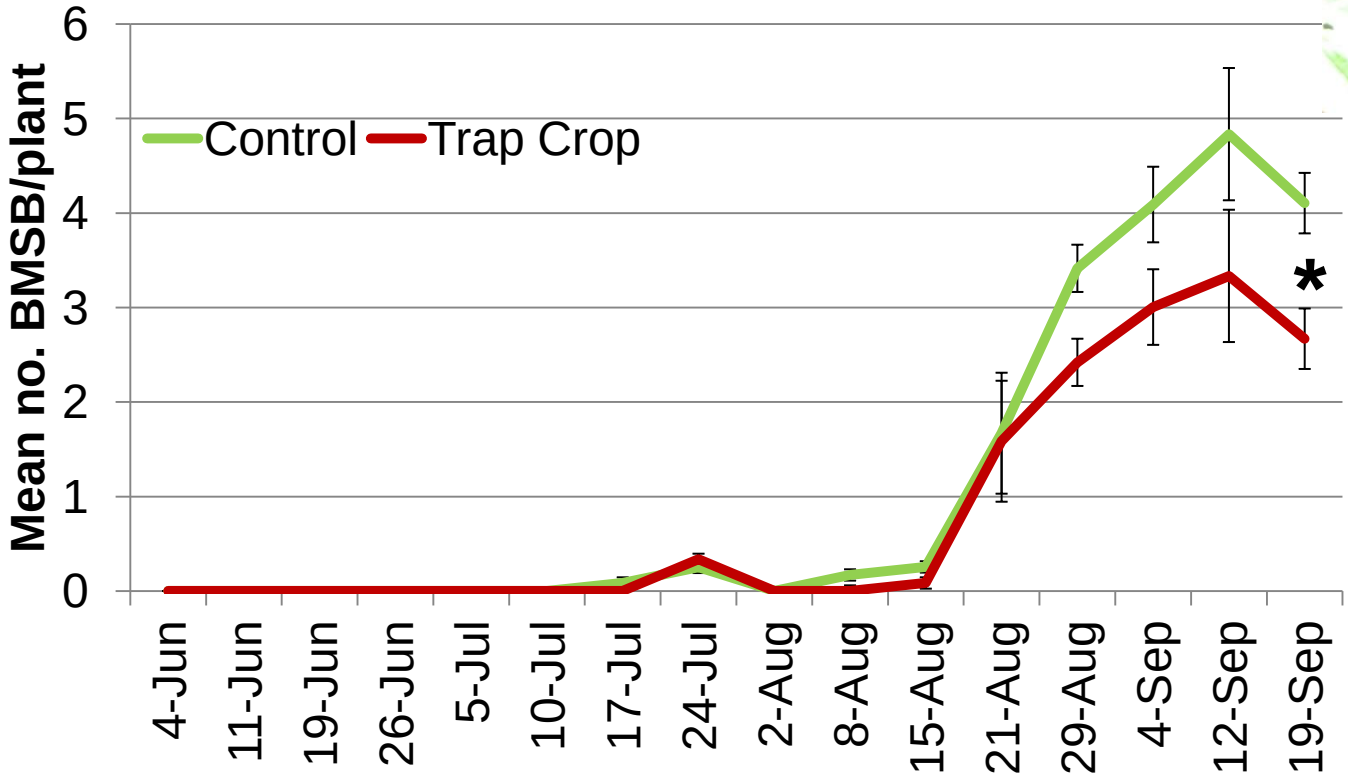
Trap Crop Effectiveness: Pepper



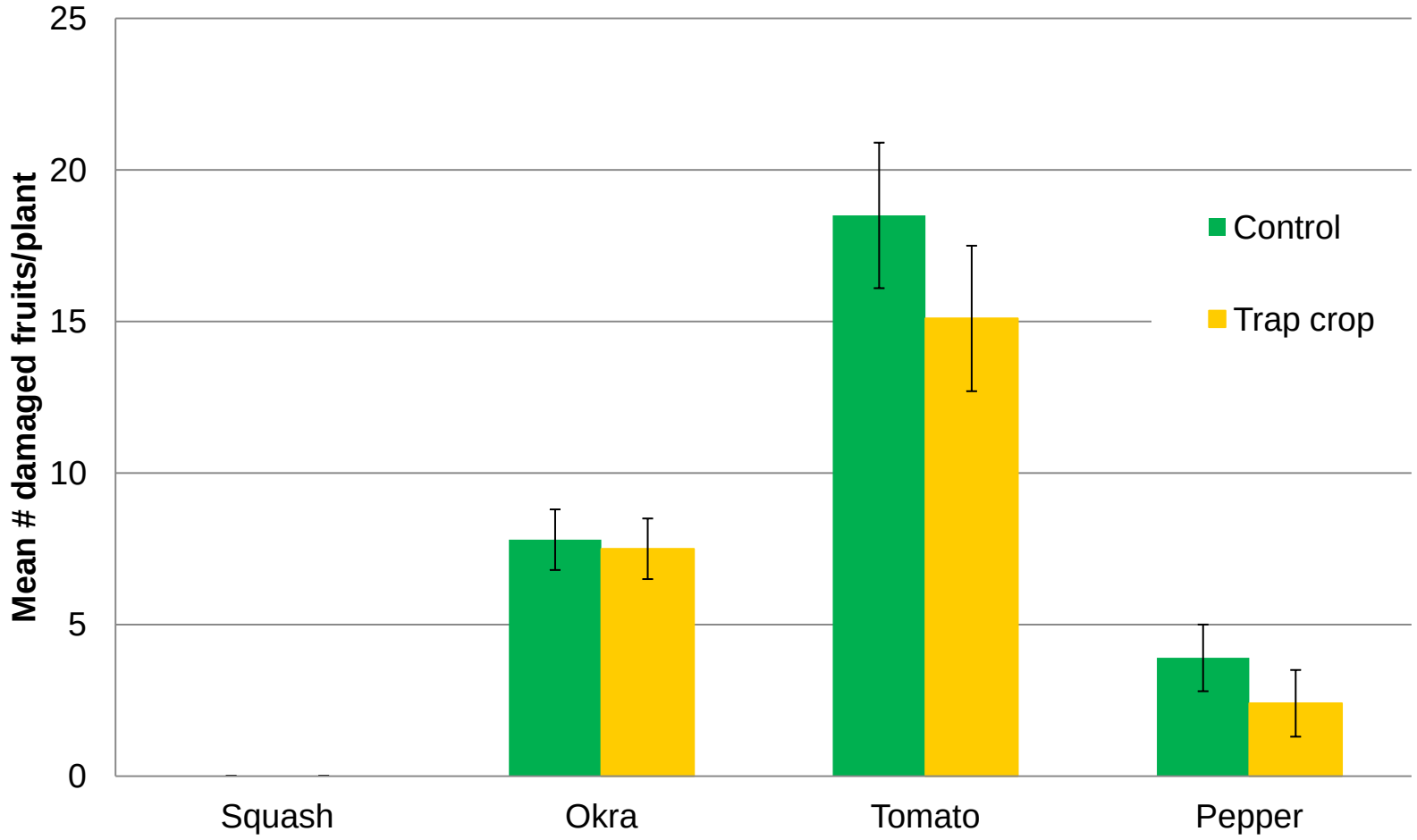


- Mean BMSB (eggs, adults and nymphs) densities on pepper plants, detected during whole plant visual samples (3 plants/row) on 4 September 2012; means of a block (‘new’ or ‘old’) sharing the same letter were not statistically different (LSD; *P*=0.05).

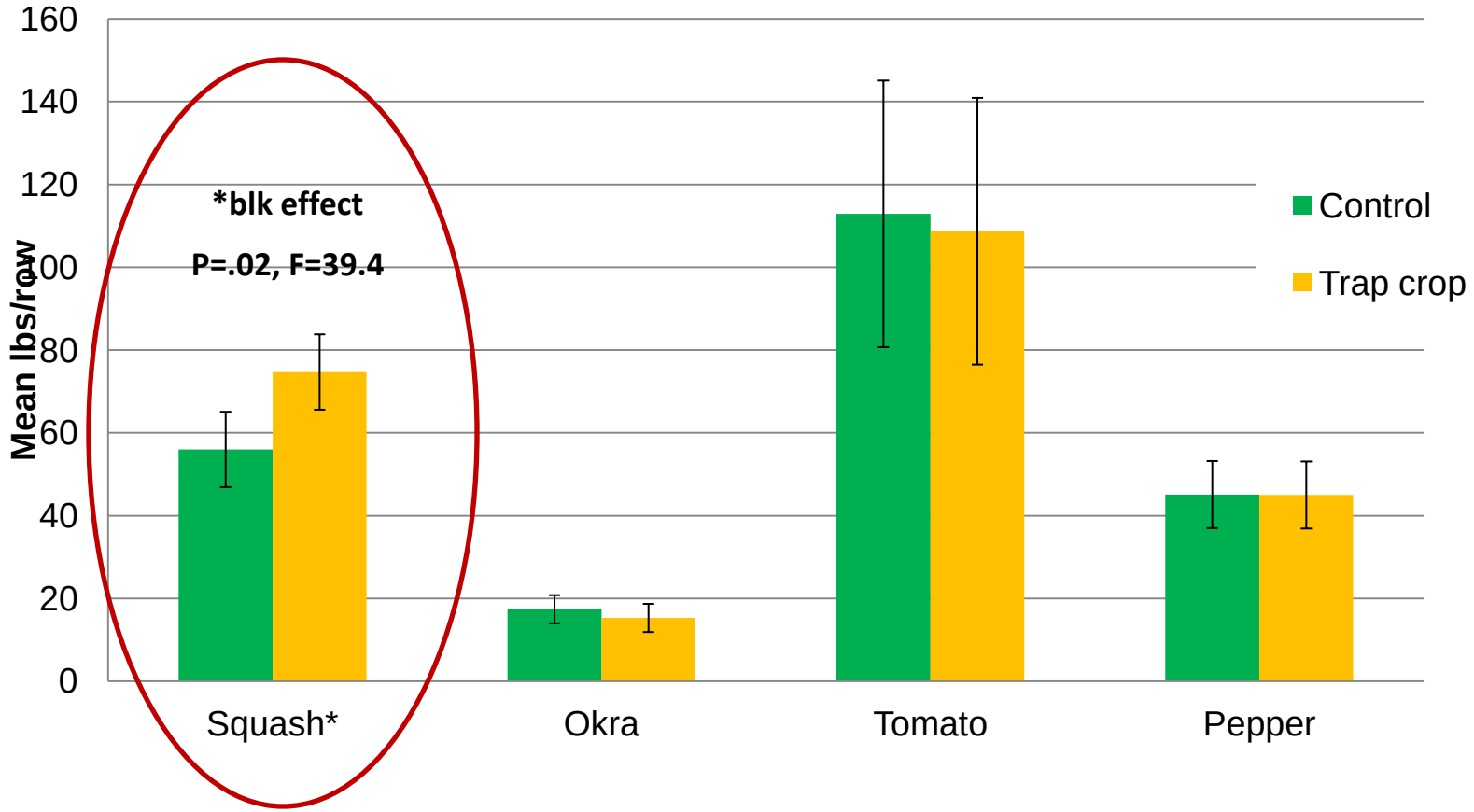
Trap Crop Effectiveness: Tomato



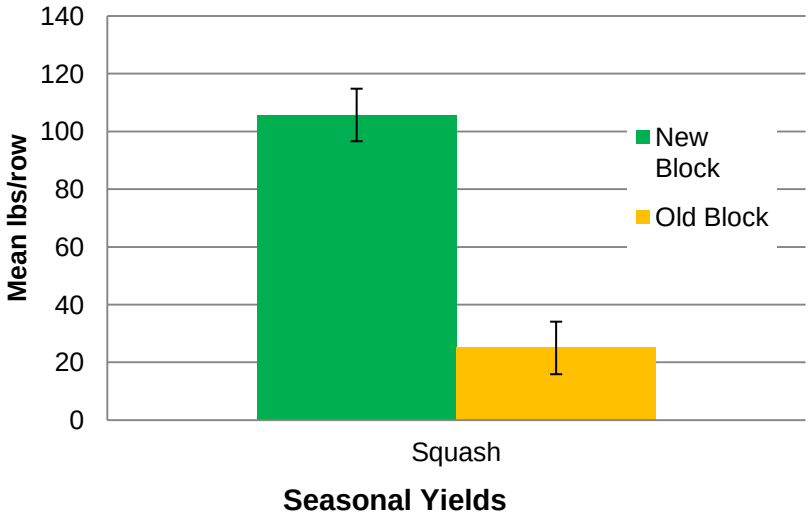
Seasonal Stinkbug Damage



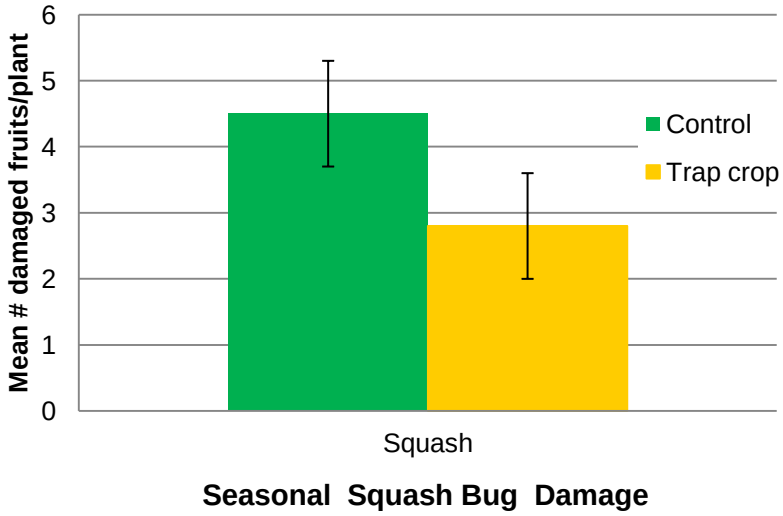
Seasonal Crop Yields



Block effect for squash yields, losses due to squash bug

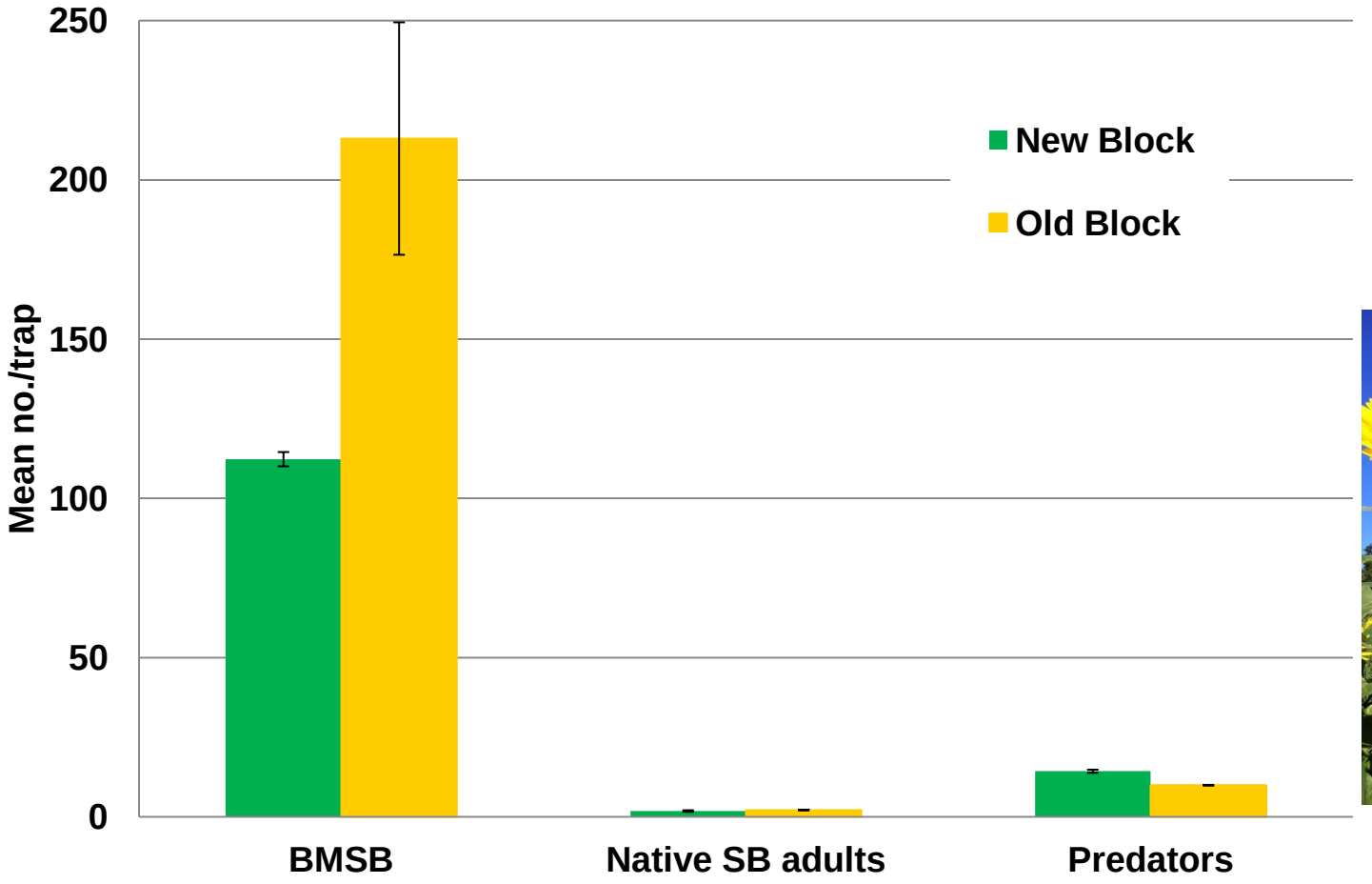


Seasonal Yields

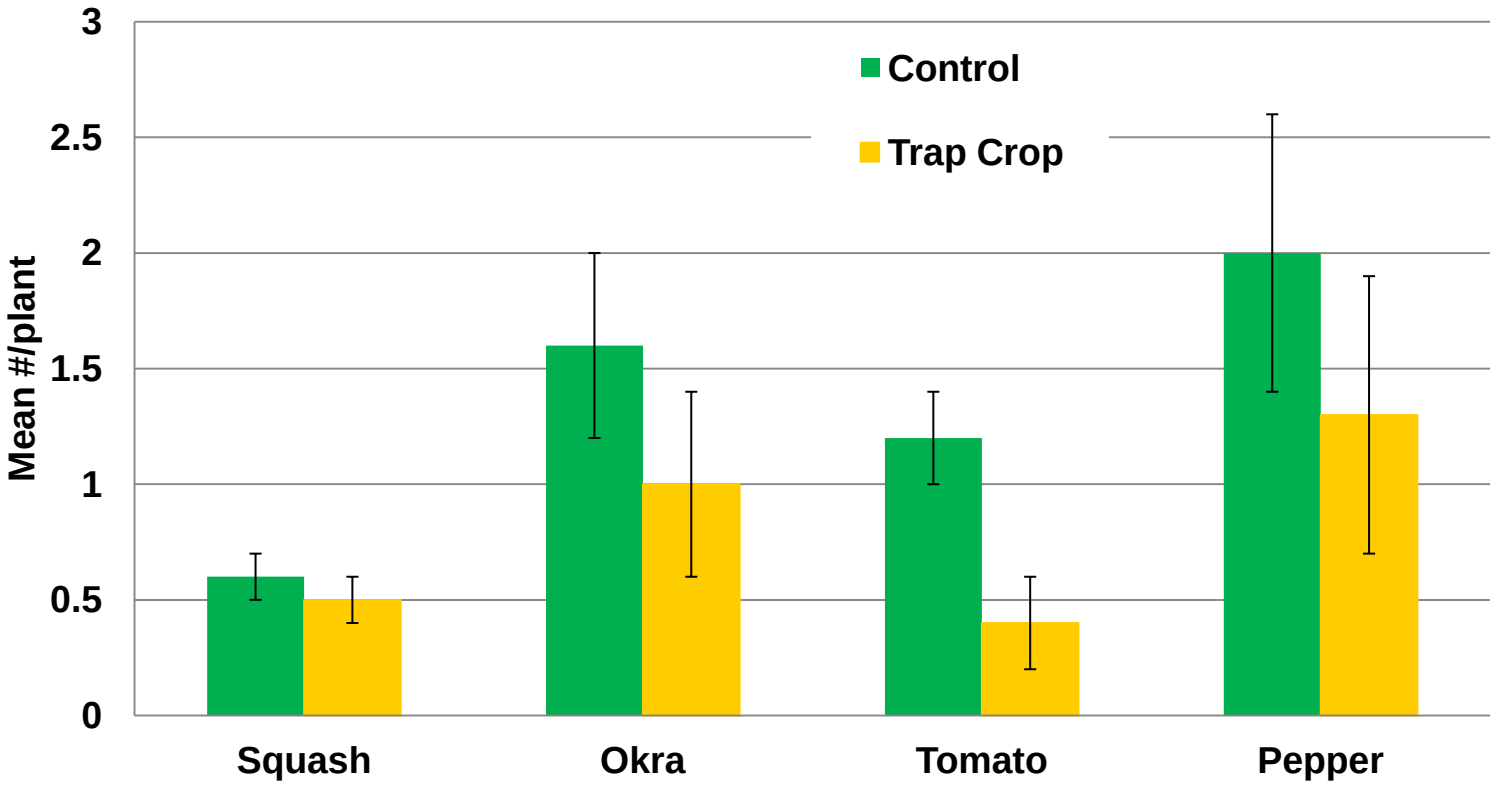


Seasonal Squash Bug Damage

Seasonal Pentatomid Pests and Predators in Trap Crop Perimeter



Predators Observed in Cash Crops



- **Coccinellids, Chrysopids, Syrphids and Araneae**

Conclusions

- **Prior production** key (14 d earlier colonization and 2-fold higher density in old vs. new block)
- **Sunflower trap highly attractive** season-long (even after senescence)
- BMSB colonize **sunflower first**, then move to **okra before other cash crops**
- **Better removal (i.e., lure) or kill mechanism needed** to reduce cash crop damage or yields

Recommendations

- Focus field research efforts on farms/fields with **prior production history** (particularly organic)
- Methodology must permit **equipment access, turn around, > trap crop distance**
- **Okra** strong trap crop candidate, **amaranth** cannot be mixed
- **Integrate effective and practical** removal or kill mechanism

Acknowledgements

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