Brown Marmorated Stink Bug: Progress on biocontrol




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Extension Entomologist
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THE OHIO STATE UNIVERSITY

Injury by stink bug

Michelle Peiffer & Gary W. Felton, 2014

Life Cycle of BMSB

Eggs & 1st instar nymphs

2nd instar

3rd

4th

5th

adult male

adult female

Exotic pest

- Pest arrives in new area
  - –No local natural enemies
  - –Outbreaks occur
- Over time:
  - –Local enemies adapt
  - –Exotic natural enemies arrive
    - By government-approved releases
    - On their own

Biological control by tiny wasp: *Trissolcus japonicus* the "samurai wasp" or "T.j."

The samurai wasp

- Egg parasitoid
- Specialist in attacking BMSB
- History:
  - –Known in Asia: kills 70% of eggs
  - –Quarantine studies in Newark DE
  - –No permits from USDA for release

Samurai wasp in USA

- **Found in wild in USA:**
  - **2014: Maryland**
  - **2015: Delaware, Virginia, DC, Washington**
  - **2016: New Jersey, New York, Oregon**

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  - **2017: Pennsylvania, Ohio**
  - **2018: Michigan**

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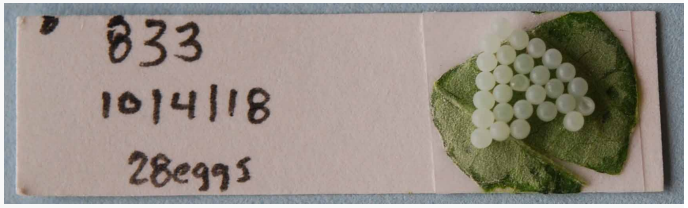
  - 2015: Delaware, Virginia, DC, Washington
  - 2016: New Jersey, New York, Oregon
  - 2017: Pennsylvania, Ohio
  - 2018: Michigan
- **Federal rules:**
  - Can move it within a state
  - Can not take across state lines

How to know if egg parasitoids present?

sentinel egg mass studies

- **Lab:**
  - —Collect eggs daily from colony
  - —Glue to card
  - —Count & inspect eggs



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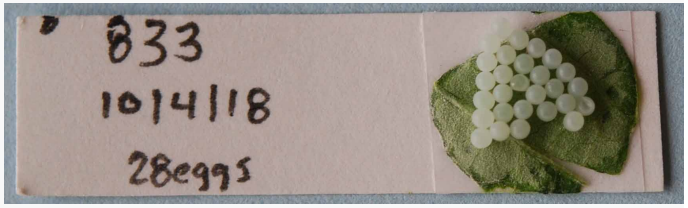

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- **Field:**
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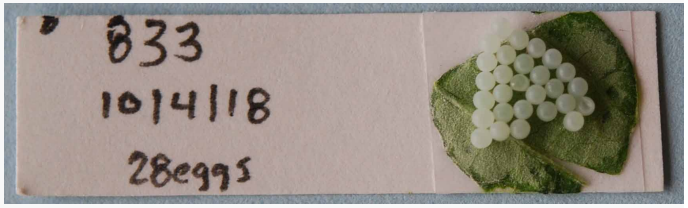
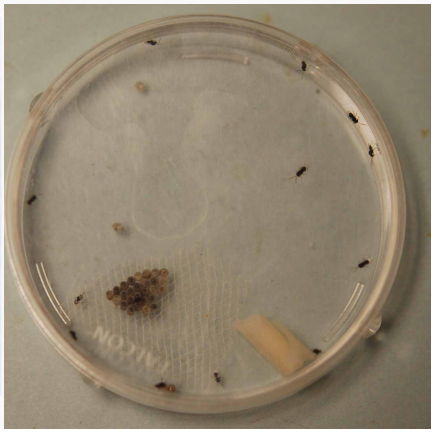
- **Lab:**
  - Observe hatch or not
  - Hold for 6 weeks





Sentinel egg mass studies in Ohio

- **Multi-State project, 2017-2018:**
  - **Treelines near apple, peach, berries, corn**

Sentinel egg mass studies in Ohio

- **New multi-State project:**
  - **Treelines near apple, peach, berries, corn**

Alternative:
Yellow sticky card sampling

- **Pros:**
  - No lab colony required
  - Larger sample size possible
- **Cons:**
  - Messy
  - Difficult to examine cards
  - If found, wasp is dead

Sentinel egg mass studies in Ohio

- **2017:**
  - 618 egg masses
  - 1 research farm & 3 commercial farms
    - 37 egg masses w/ parasitoids (6.0%)
    - 229 wasp specimens recovered

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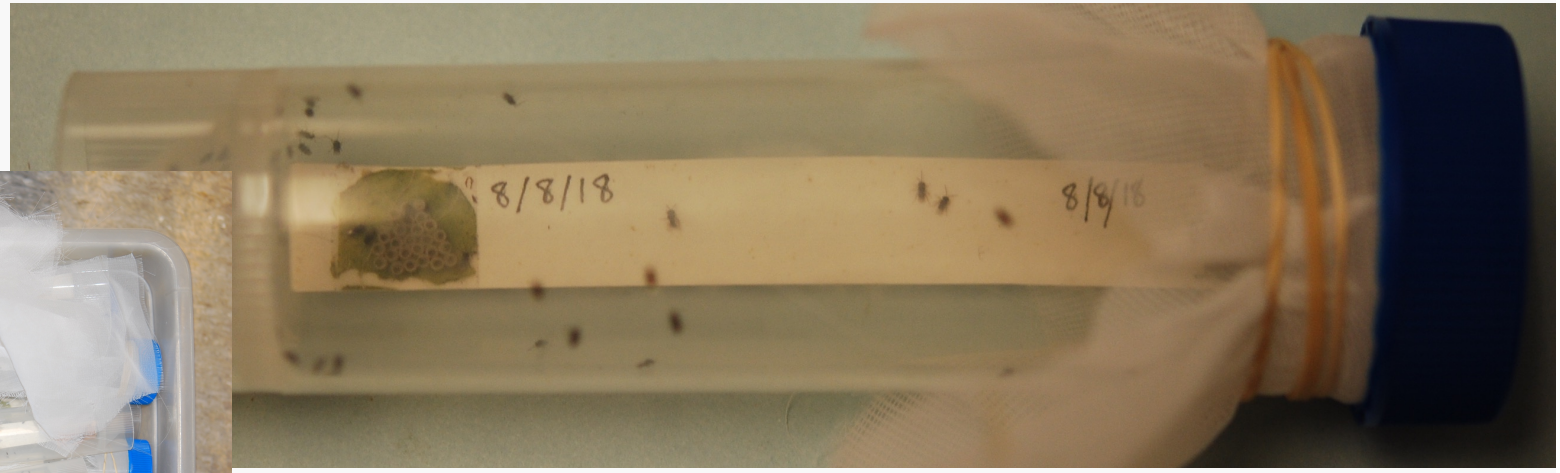
  - 618 egg masses
  - 1 research farm & 3 commercial farms
  - 37 egg masses w/ parasitoids (6.0%)
  - 229 wasp specimens recovered
  - **Samurai wasp found!**
    - 2 egg masses
    - Early August
    - Columbus OH (known 3/2018)

Sentinel egg mass studies in Ohio

- **2018:**
  - **—Samurai wasp found!**
    - **Alive!**
    - **First find in late May, Columbus**
    - **Samurai wasp lab colony started**
      - **—Easy!**
      - **—Need stink bug eggs & dilute honey**



Attempt to re-distribute the samurai wasp in Ohio, 2018

Step	Timing
1) Pre-release sampling at 10 farms	June-July

Attempt to re-distribute the samurai wasp in Ohio, 2018

Step	Timing
1) Pre-release sampling at 10 farms	June-July
2) Release at 5 farms, No-release at 5 farms	July-Aug
3) Post-release sampling at 10 farms	Aug-Sept

Samurai wasp release

- 15 parasitized egg masses per farm
- Use small area in treeline near crop
- Egg mass inside mesh bag

Samurai wasp release

BMSB lure (not in a trap) placed in target area at all 10 farms

Post-release sampling

- 10 commercial farms
- Used sentinel eggs
- ~10 egg masses per farm
- Results:
  - Samurai wasp found at 1 farm!
  - No samurai wasp at 9 farms

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- Results:
  - Samurai wasp found at 1 farm!
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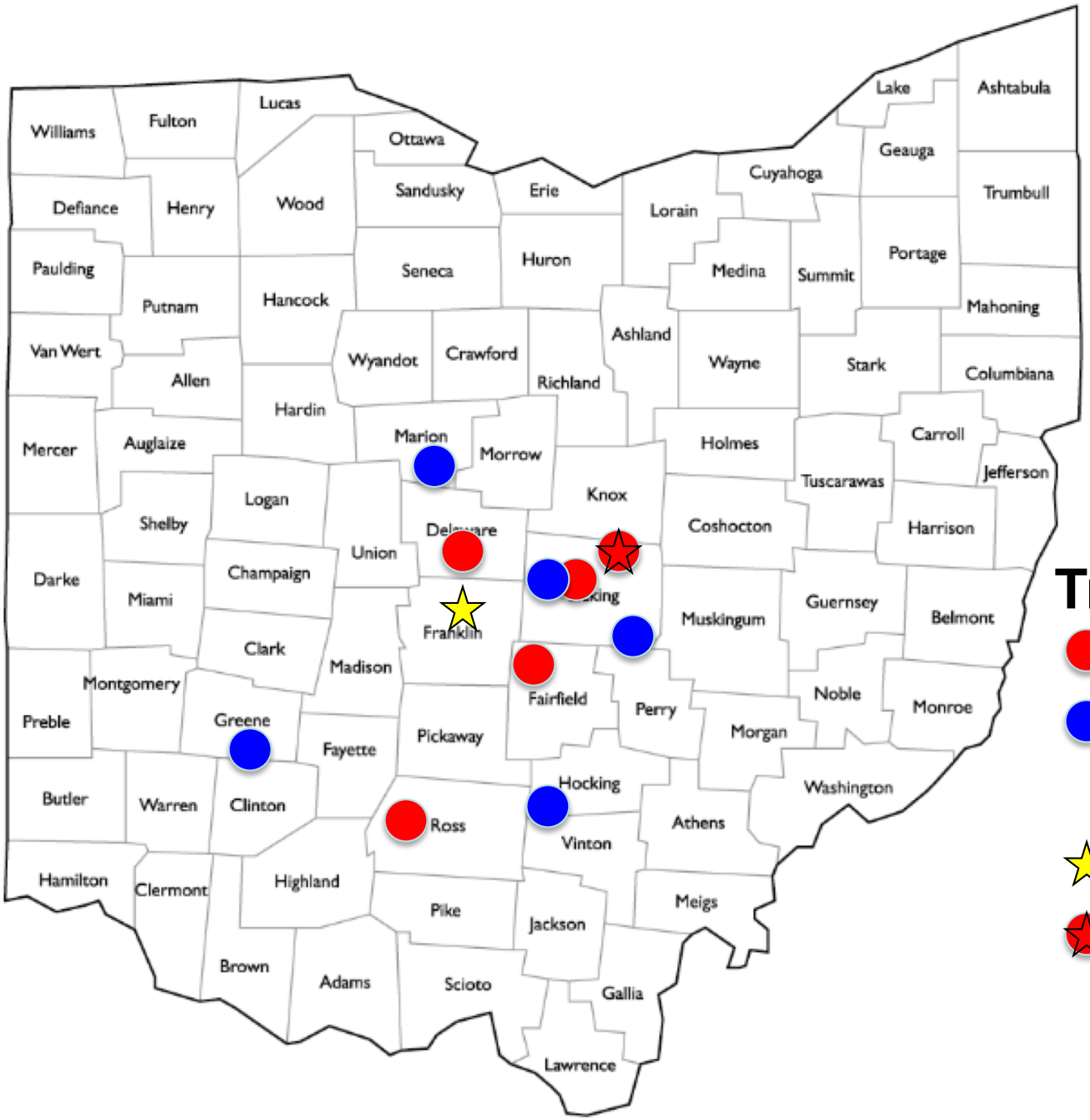
- Why not more?
  - Sample size was small
  - Done later than ideal
- Need to re-sample in 2019

Sites for T.j. trial, 2018

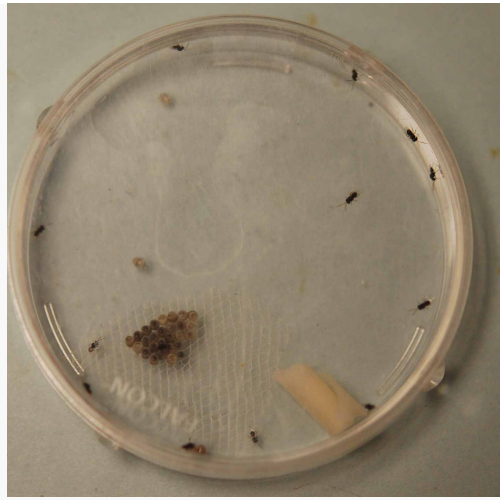


Treatments

- = release
- = no release

- initial find
- find post-release

Sentinel egg mass studies: summary of Ohio, 2018



- 832 egg masses deployed
  = 20,615 eggs
- 12 commercial farms & 1 research farm
- 45 egg masses with parasitoids (5.4%)
  - 29 with samurai wasp
    - 28 at research farm, Columbus
    - 1 at 1 commercial orchard
  - 16 with other parasitoid species
- Total 586 individual eggs parasitized

Information needed on samurai wasps

- **Establishment at new site**
  - **Number of parasitized egg masses needed to 'seed' the site?**
  - **Minimum BMSB population?**

Information needed on samurai wasps

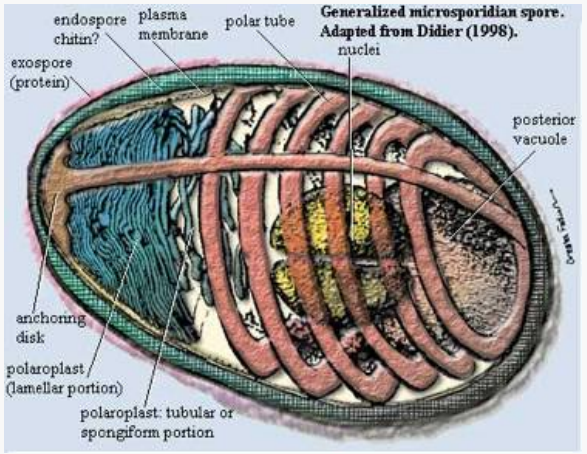
- **Establishment at new site**
  - Number of parasitized egg masses needed to 'seed' the site?
  - Minimum BMSB population?
- **After establishment**
  - Tolerance of wasp to insecticides?
    - Direct spray droplets
    - Dry residues
  - Searching ability of wasps?

Other stink bug news briefs

- Death by microbes
- Monitoring by traps
- Action threshold
- Ohio survey
- ‘Ghost traps’
- Border management

Microsporidian:

Nosema maddoxi



- Previously classified as a protozoan
- Reclassified as a primitive fungus
- Wiping out many lab colonies since 2012
- In 0 to 28% of field populations

Monitoring BMSB: New trap style, 2017

- **Trap**
  - –Sticky panel, double sided
  - –Made by Trécé Inc.
  - –On 5’ wood post
  - –Change every 2 - 4 weeks
- **Lure**
  - –Dual lure by Trécé Inc.
  - –Change every 12 weeks

Sticky panel

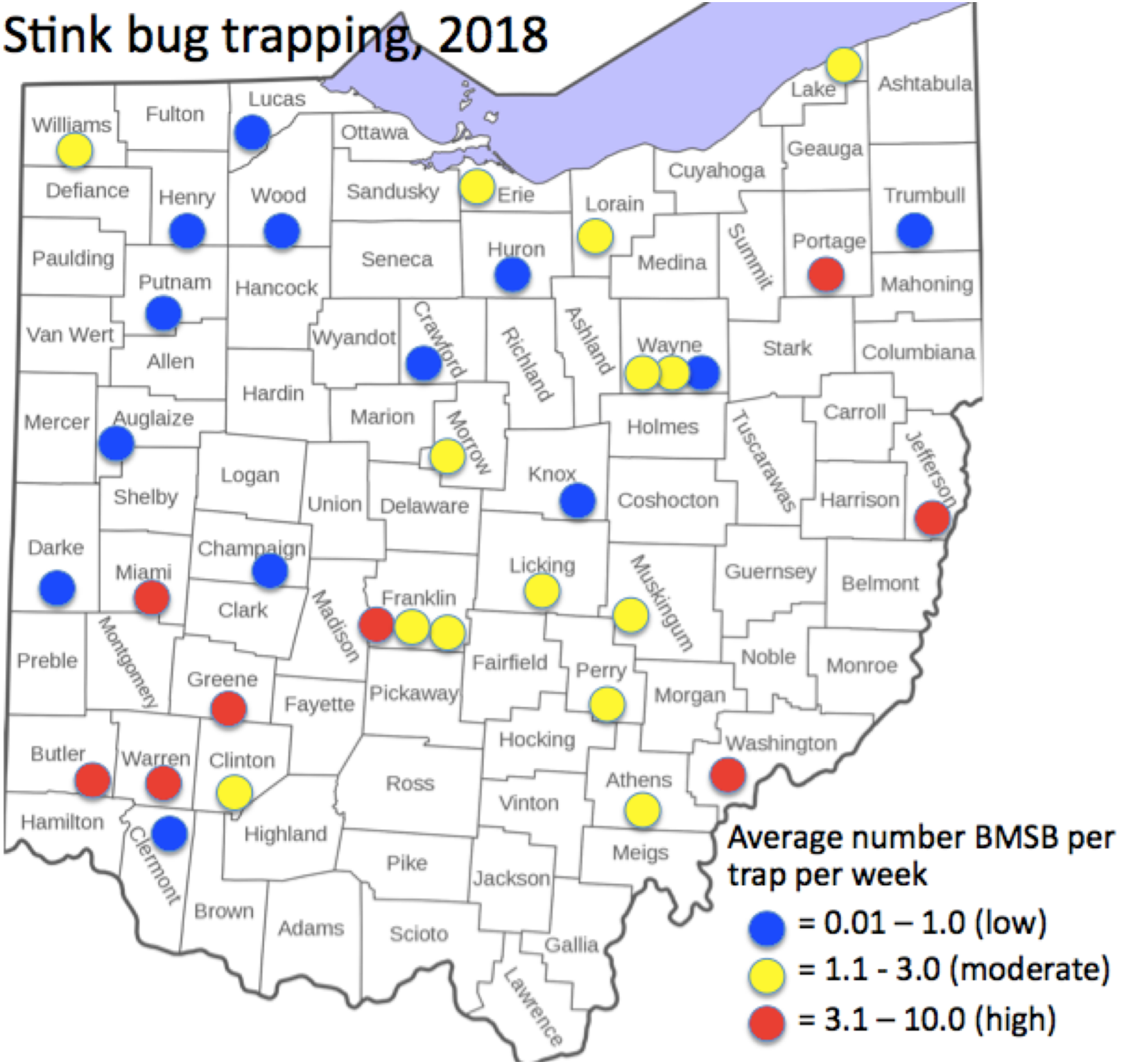
Square fat lure

Rectangular thin lure

New: location of traps

- Along treeline <u>adjacent</u> to crop
- 3 traps per site
- 50 meters (164 feet) between traps

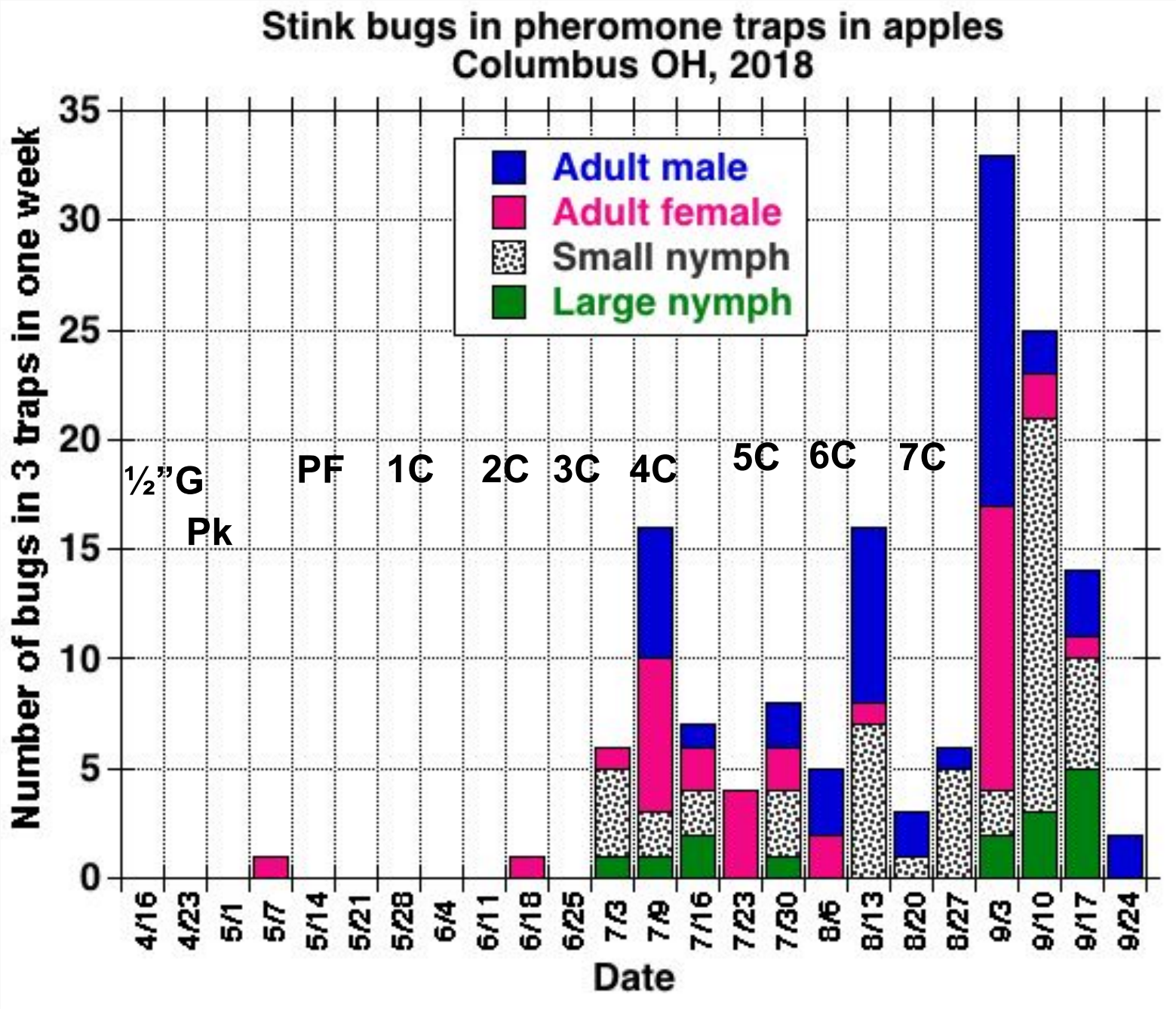
Stink bug trapping, 2018



Action threshold for BMSB on apples

- Developed by USDA in WV
- Use 2 traps:
  - 1 on edge
  - 1 in interior
- Count cumulative capture since last spray
- Once > threshold:
  - spray
  - re-set count to zero
- Firm threshold based on pyramid trap
  = average 10 adults per trap
- Tentative threshold based on sticky panel trap
  = average 4 adults per trap

Traps show seasonal trends



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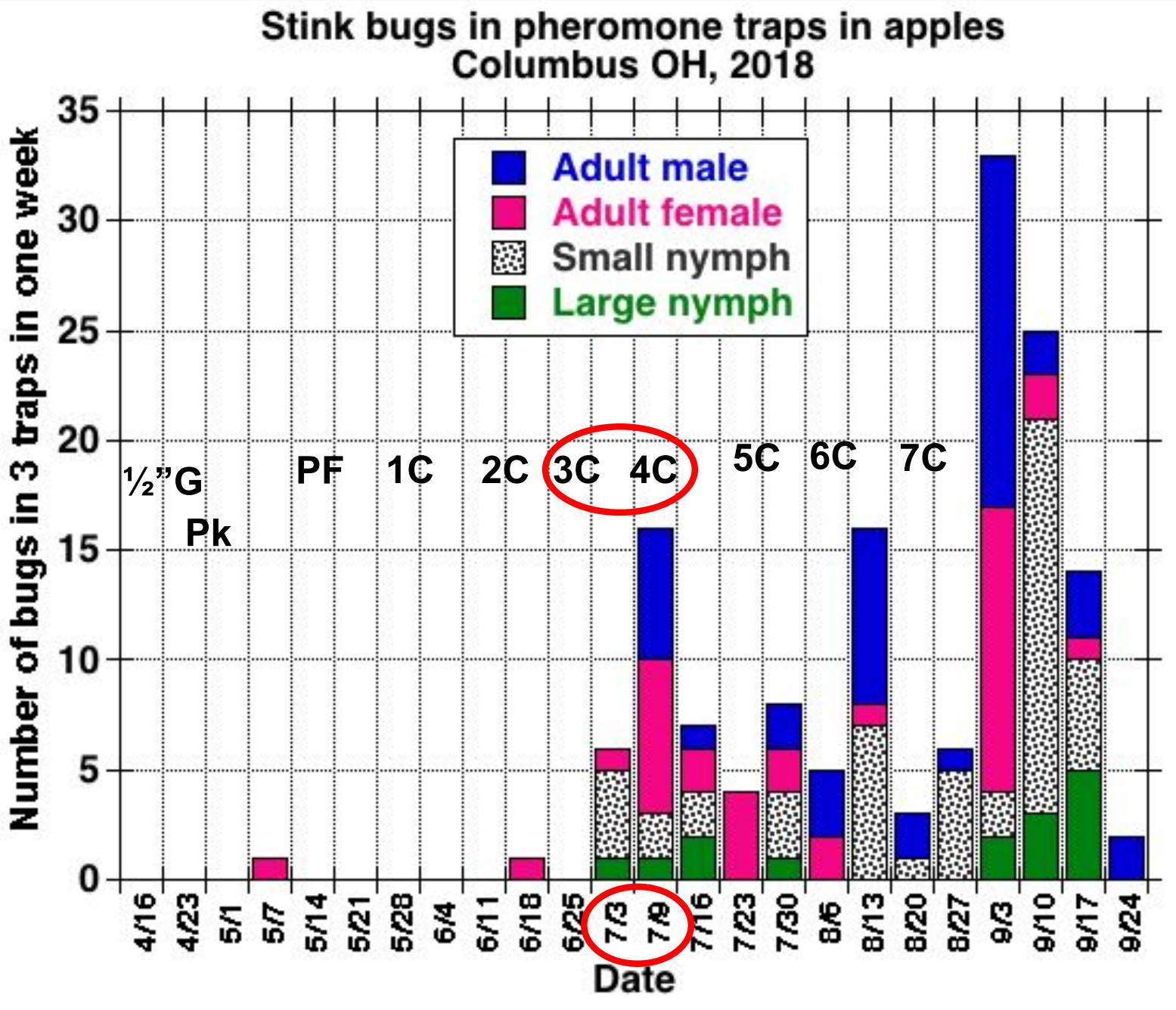

Future: ‘Ghost traps’?

- Same pheromone lure
- Not inside a trap
- Insecticide-impregnated netting
  - deltamethrin
- Vertical vs horizontal

‘Trap tree’ border tactic?

- Trials by USDA in WV
- Results look promising
- Place high-dose lures along orchard edge
  - —Every 50 meters
  - —But need cost reduction
- Kill bugs in only those trees & adjacent
  - —Spray every 7 days
  - —But 14-d sprays preferred
  - —Test ghost traps instead of spray

Future: ‘CPR’ = Crop Perimeter Restructuring

- Trials in New Jersey
- Apple & peach
- Stink bug: Weekly insecticide treatment to orchard borders only
- Worms: mating disruption
- Promising for blocks <= 10 acres
- Might not work if > 10 acres

Acknowledgements

- Ohio Vegetable & Small Fruit Research & Development Program
- Ohio IPM Program
- USDA-NIFA-SCRI grant

the end

Info on fruit & veg. pests

u.osu.edu/pestmanagement/

Questions?

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