BMSB Trapping and Opportunities for Biological Control

Dr. John McNamara Pote, Dr. Larry Gut
Michigan State University
Department of Entomology
Tree Fruit Entomology Laboratory

OR...

TREE FRUIT

AVENGERS

AND THE INFINITY BUG

MEANWHILE...

THE VILLAIN: BROWN MARMORATED STINK BUG

- Polyphagous pest, native to East Asia
- First Detected in US in late 1990s
- Initially found in Eastern Pennsylvania

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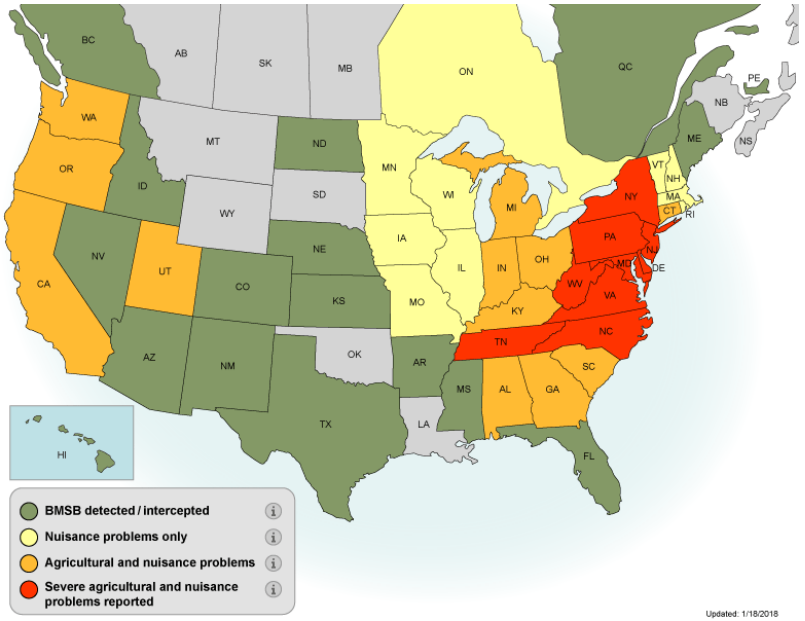
KAPOW!!!!!

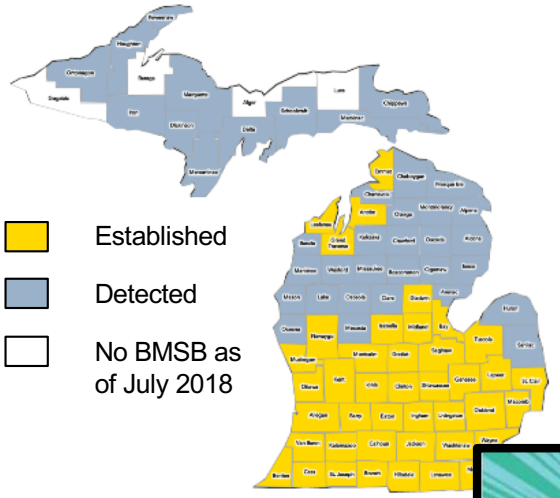
THE VILLAIN: BROWN MARMORATED STINK BUG

- Now present in < 40 States & Canada
- Major villain of tree fruit crops as well as vegetable, cane, field and vineyard crops



THE VILLAIN ARRIVES IN MICHIGAN

- BMSB was first detected in Michigan in 2011
- Since then, BMSB populations have nearly doubled each year
- BMSB damage is increasing, exceeding EIL and requiring specific sprays

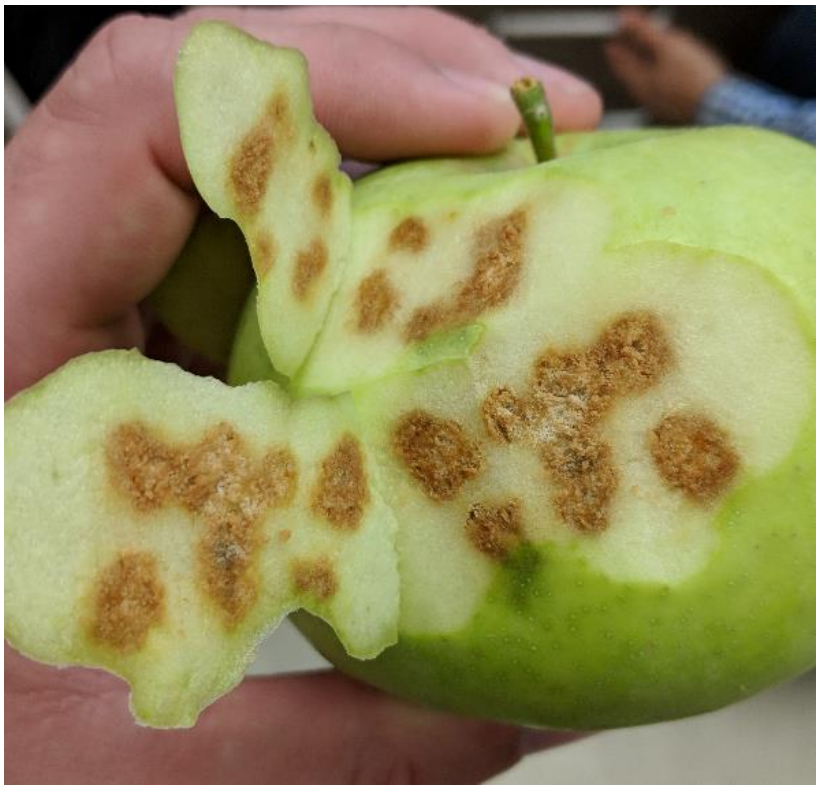


BMSB DAMAGE

External damage:

- Small ½" indentations with darkened skin
- Often a delay between feeding and the appearance of external damage


KABOOM!!!!



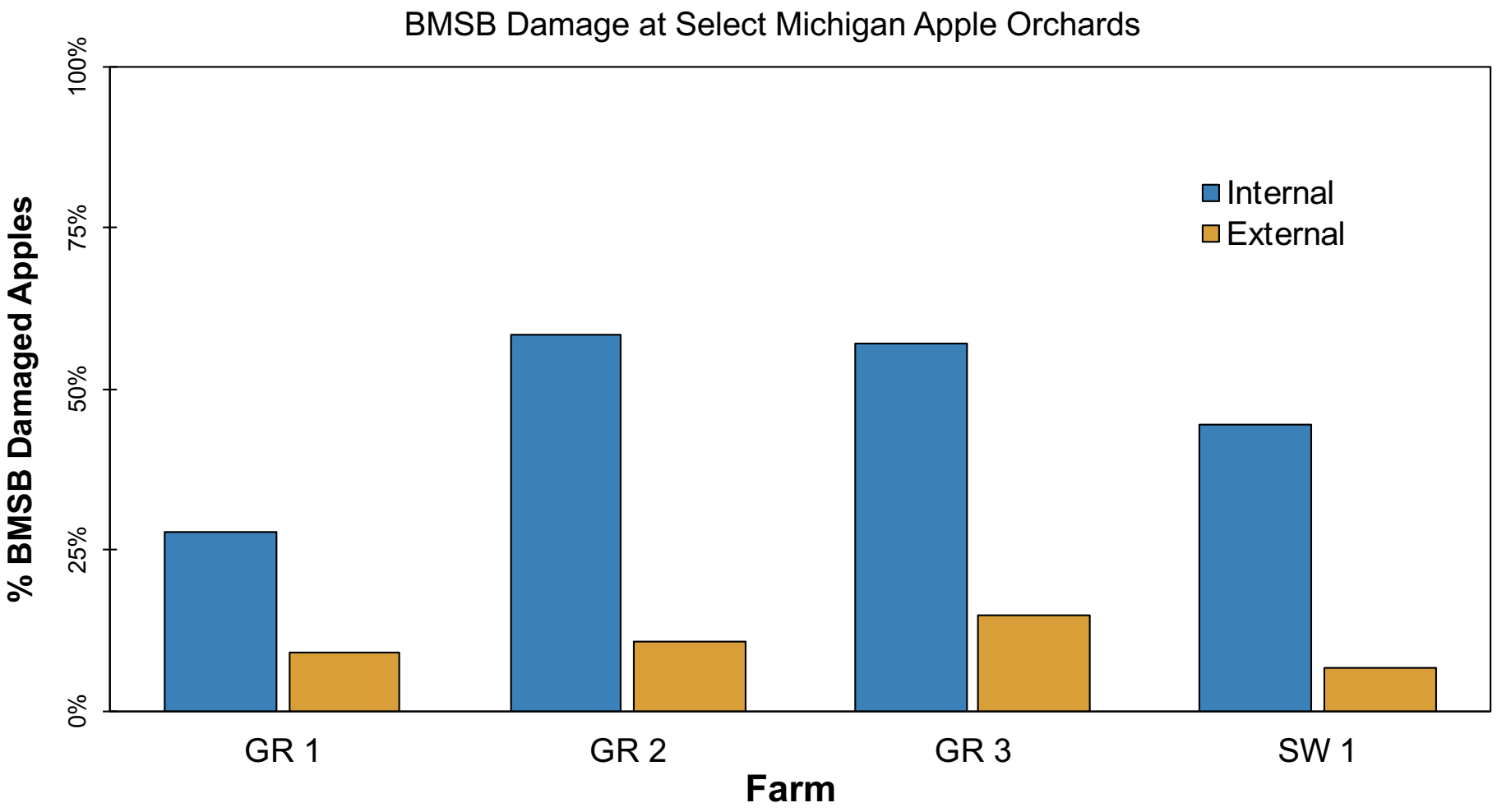
BMSB DAMAGE

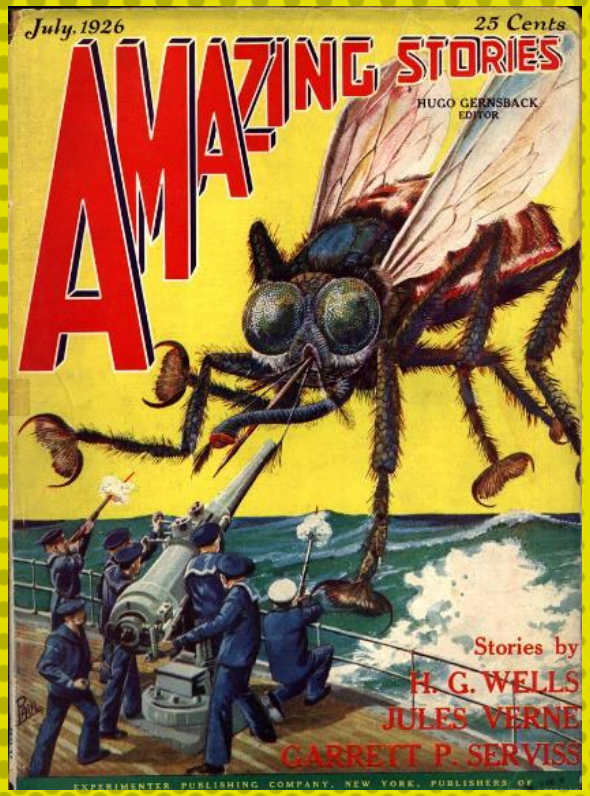
Internal damage:

- Discolored spots; only visible after peeling
- Apple tissue changes and looks dry/mealy
- Gives fruit an unpleasant gritty texture

SAMPLING BMSB DAMAGE IN MICHIGAN

- Sampled apples at 4 Michigan orchards in Mid-August:
  - 3 near Grand Rapids, 1 in SW MI
- Picked, peeled and assessed nearly 10,000 apples
- Assessed for signs of internal and external BMSB damage


BMSB Damage at Select Michigan Apple Orchards
% BMSB Damaged Apples
100%
75%
50%
25%
0%
Internal
External
GR 1
GR 2
GR 3
SW 1
Farm



WHAT CAN WE DO TO COMBAT THE DREADED STINK BUG VILLAIN?!

EFFECTIVE INSECTICIDES FOR CONTROLLING BMSB

("EXCELLENT" RATED PRODUCTS ONLY)

Trade Name	Active Ingredient	Class	PHI (Days)
Actara	Thiamethoxam	Neonicotinoid	14
Danitol	Fenpropathrin	Pyrethroid	3
Endigo	Labda-cyhalothrin + Thiamethoxam	Neonicotinoid + Pyrethroid	14
Lannate	Methomyl	Carbamate	4
Leverage	Imidacloprid + beta-cyfluthrin	Neonicotinoid + Pyrethroid	7
Pounce	Permethrin	Pyrethroid	14
Scorpion	Dinotefuran	Neonicotinoid	3
Venom	Dinotefuran	Neonicotinoid	3
Warrior II	Labda-cyhalothrin	Pyrethroid	14

From Wilson et al. 2016

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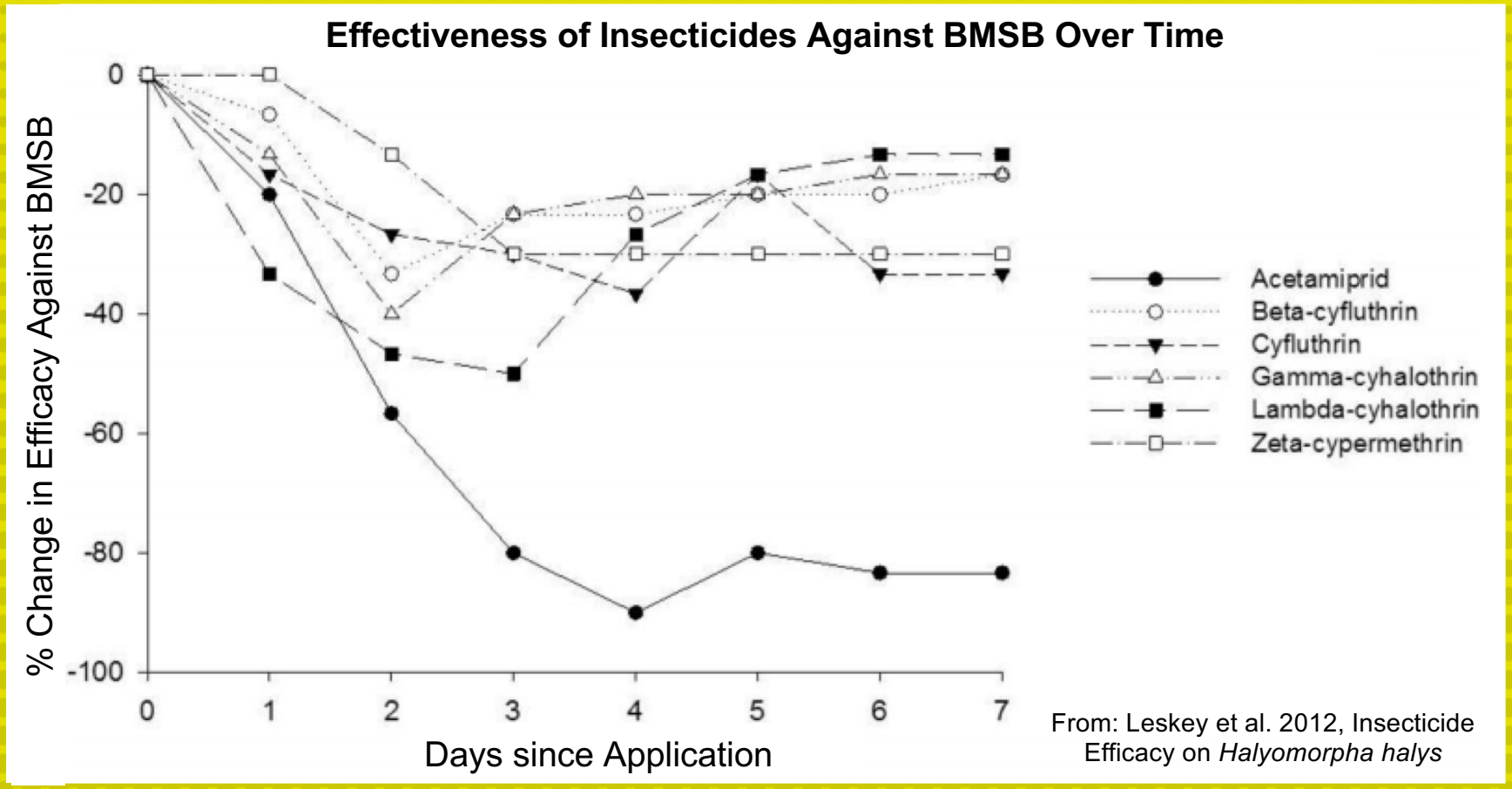
WHY EXCELLENT ONLY...?

"GOOD" PRODUCTS DON'T STAY GOOD



From: Leskey et al. 2012, Insecticide Efficacy on *Halyomorpha halys*

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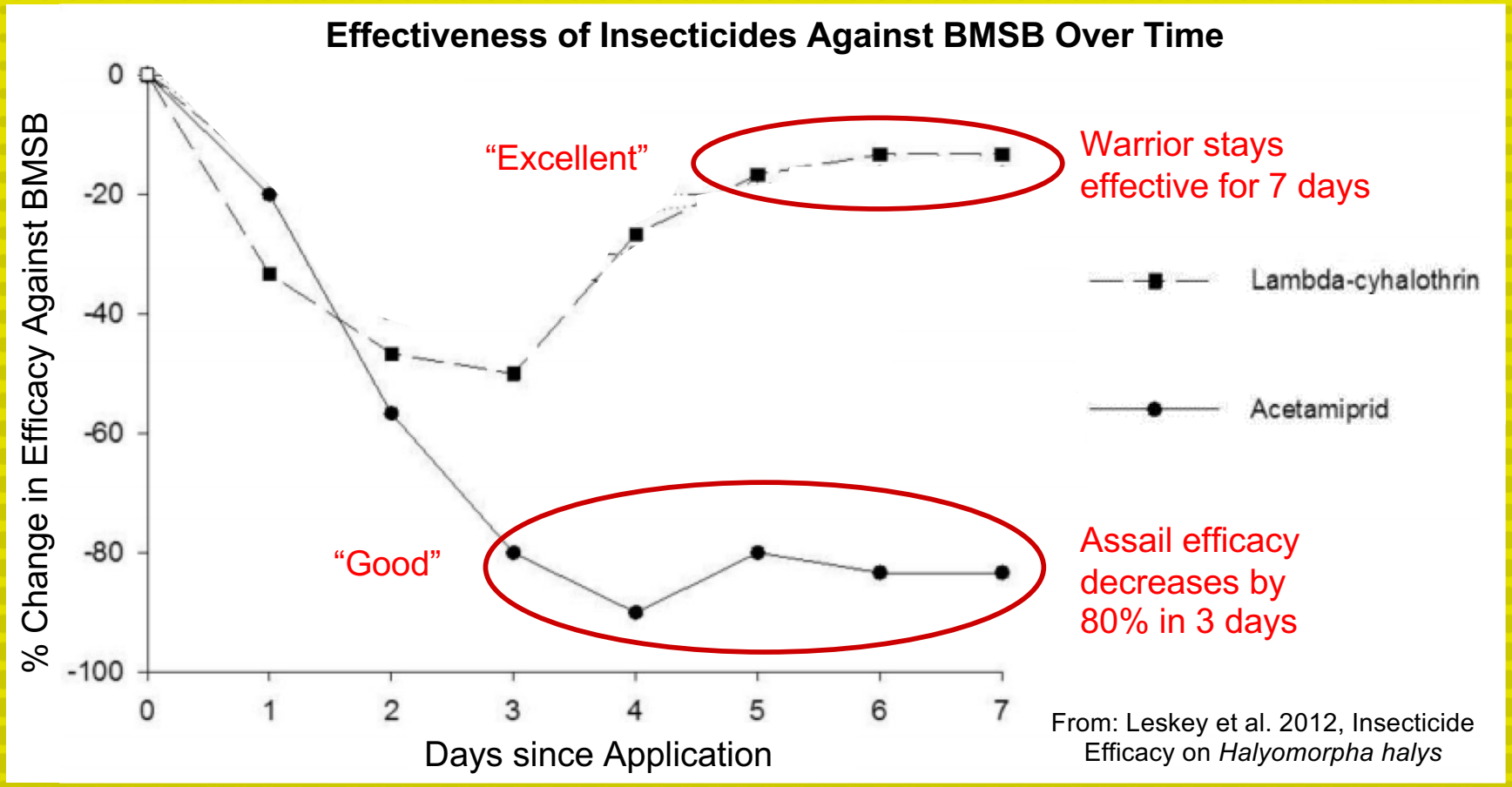

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INSECTICIDES:

THE HERO WE HAVE, NOT THE HERO WE NEED

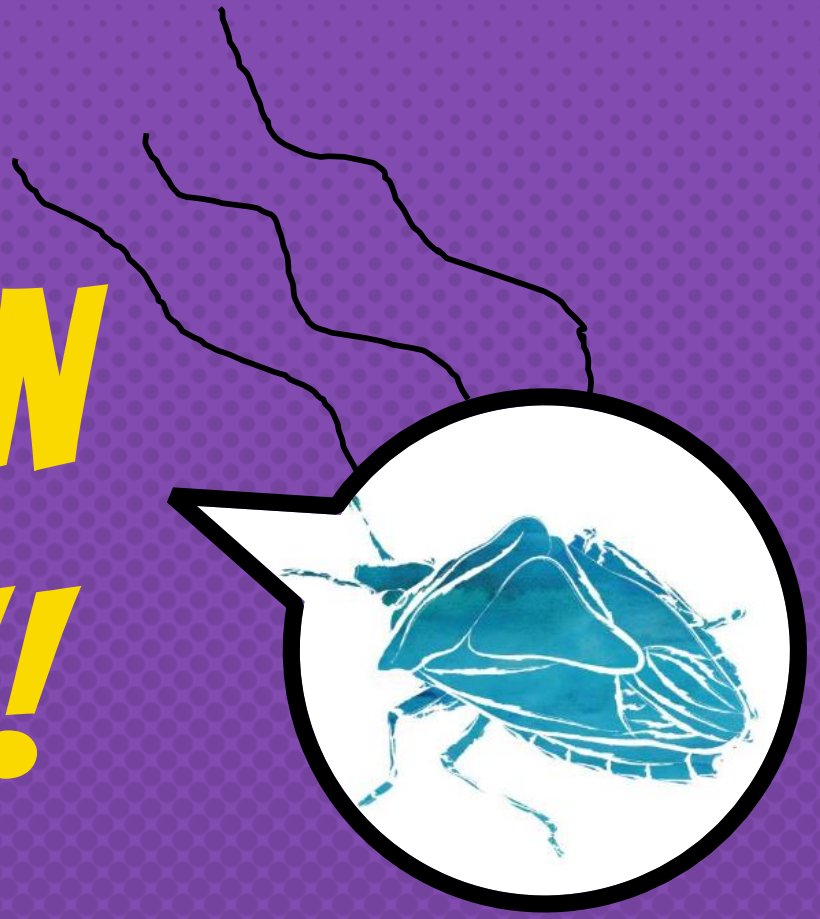
- BMSB has ended IPM in Mid-Atlantic tree fruit; pest status in MI growing
- Economic, environmental/worker health, secondary pest, regulatory and resistance management concerns
- Chemical management requires effective monitoring; lacking for BMSB

LUCKILY...

BMSB HAS A WEAKNESS!!

IT RELEASES

AGGREGATION PHEROMONE!!



BMSB AGGREGATION PHEROMONE

- Agg. pheromone only released by males
- Attractive to adult males/females and nymphs
- "Looser" response than sex pheromone
- Can be used as a trap bait or combined with mortality agent for "Attract & Kill" programs

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IF ONLY WE HAD A HERO CAPABLE OF CONTROL AND MONITORING...


OUR UNLIKELY
HERO:


OUR UNLIKELY
HERO:

THE HERO:

BMSB GHOST TRAPS!

- Primary material: Long-Lasting Insecticide Netting
- Baited with high-dose BMSB agg. pheromone lures
- Tarp to aid in recovery of dead bugs

CAN OUR HERO STOP THE DREADED STINK BUG VILLAIN?

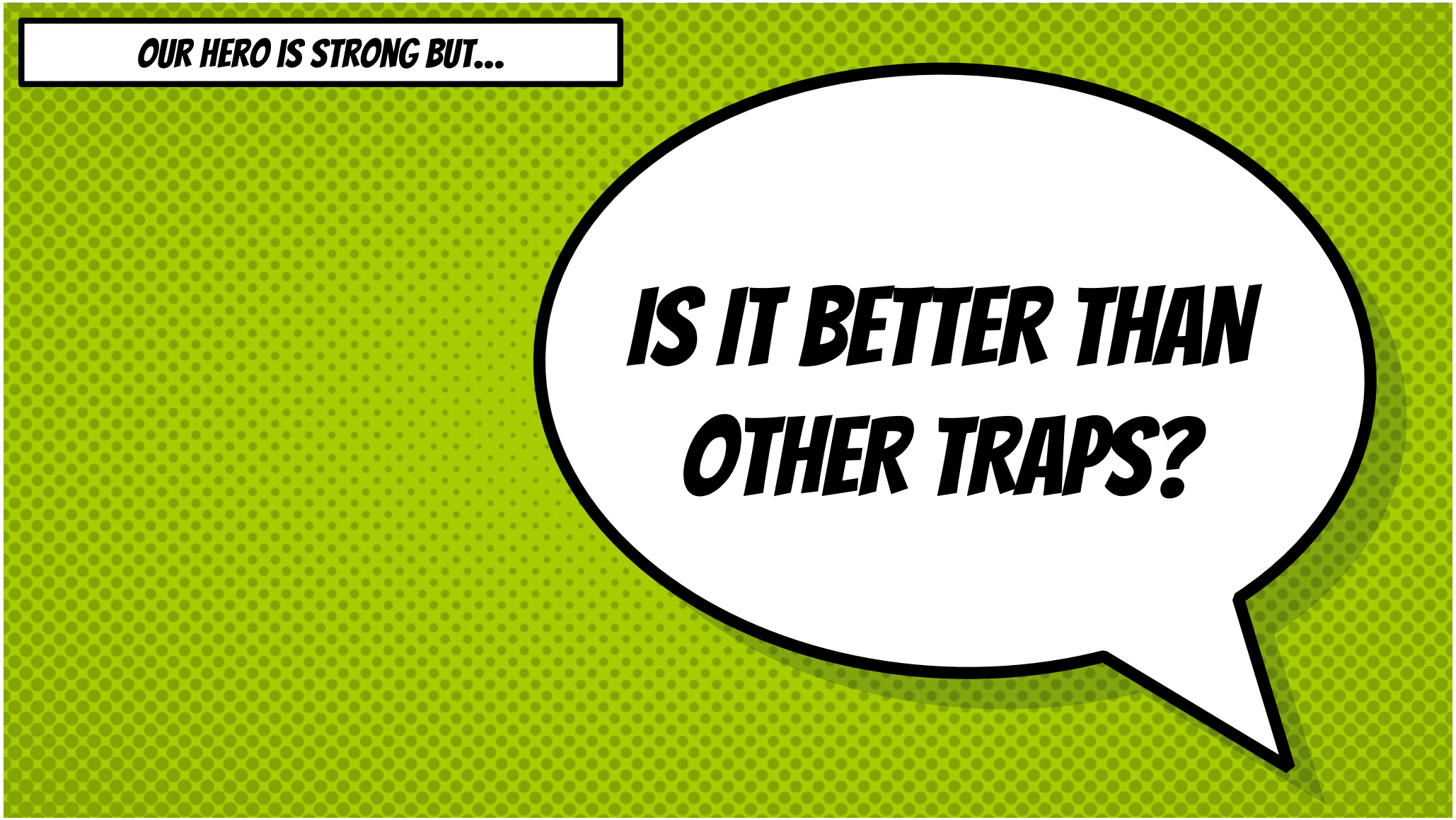

WHAMMO!!!

CAN OUR HERO STOP THE DREADED STINK BUG VILLAIN?

2018 Max. Single Ghost Trap Catch:

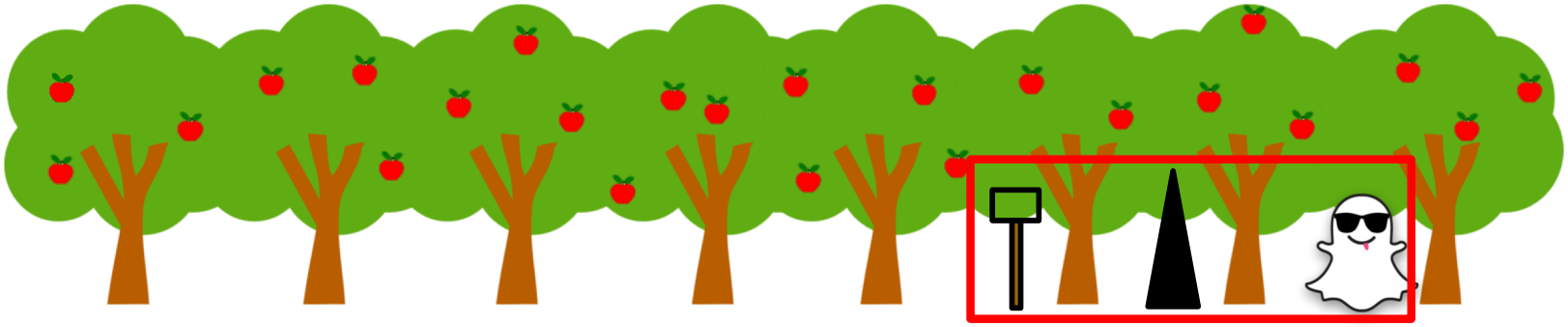
1362 BMSB


OUR HERO IS STRONG BUT...
HOW DO WE BEST USE THIS NEW TRAP?


OUR HERO IS STRONG BUT...
IS IT BETTER THAN OTHER TRAPS?

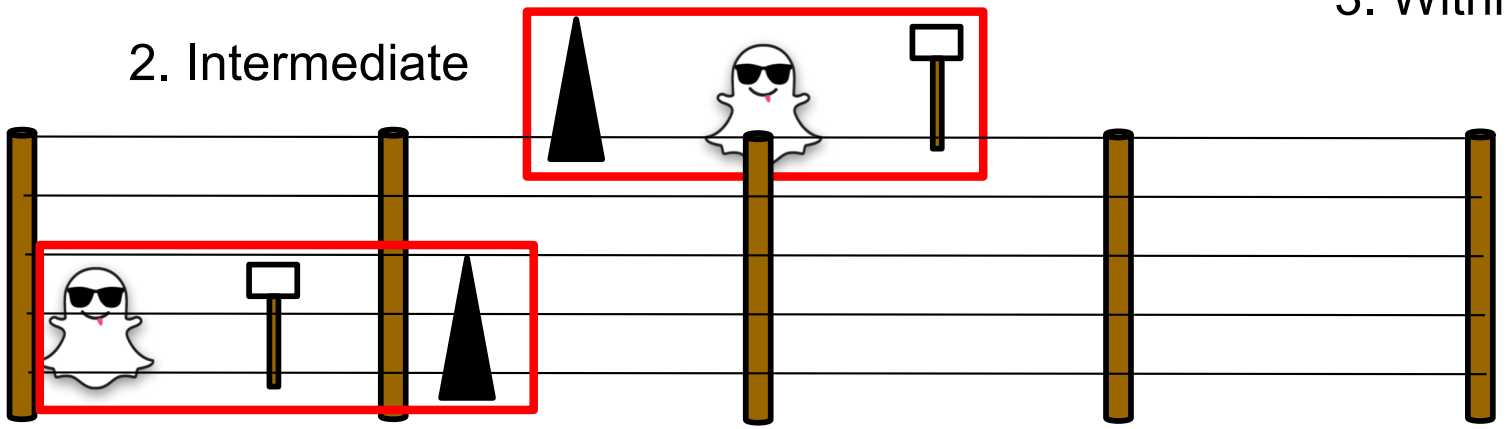
COMPARING GHOST TRAPS TO OTHER BMSB TRAPS

- 4 Michigan Orchards, 2 different orchard regions, Mixture of Peach and Apple orchards
- 3 traps x 3 placements: 9 treatments
- 50 yds apart, baited with high-dose BMSB dual-component lure (AgBio)
- Checked 1–2x weekly



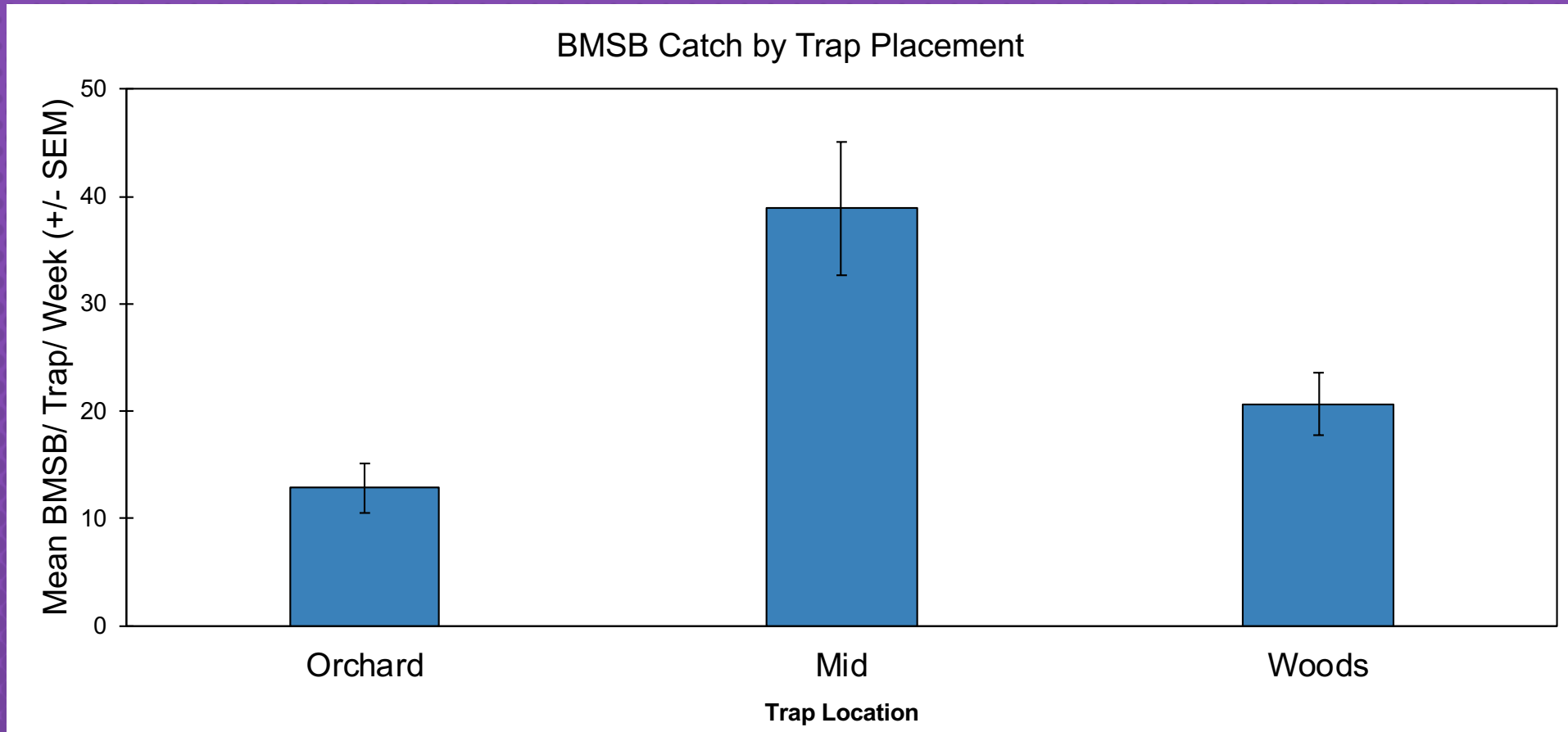
3. Within Crop

2. Intermediate



1. Fence/
Woodedge

WHAT DID WE FIND...



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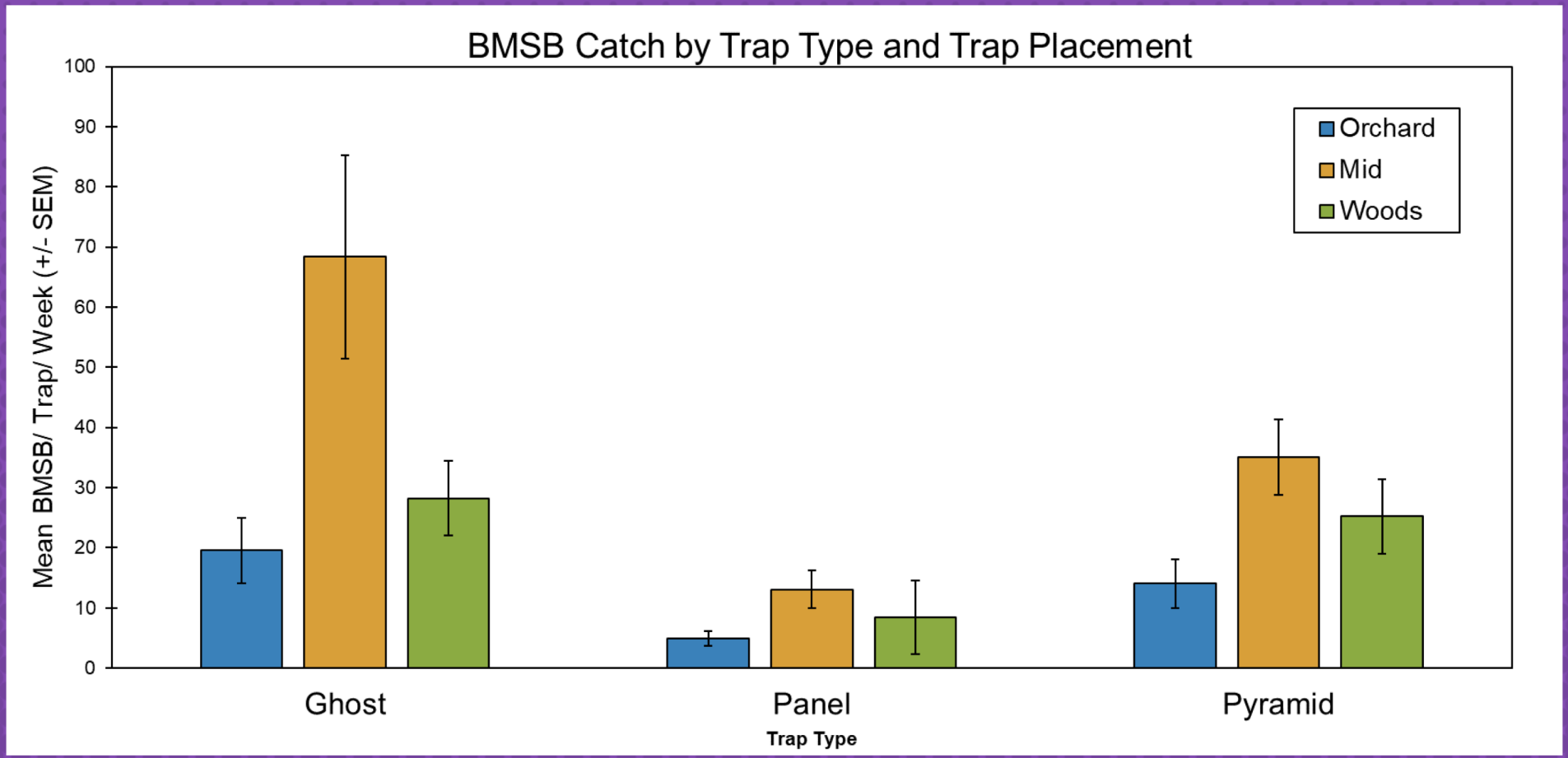

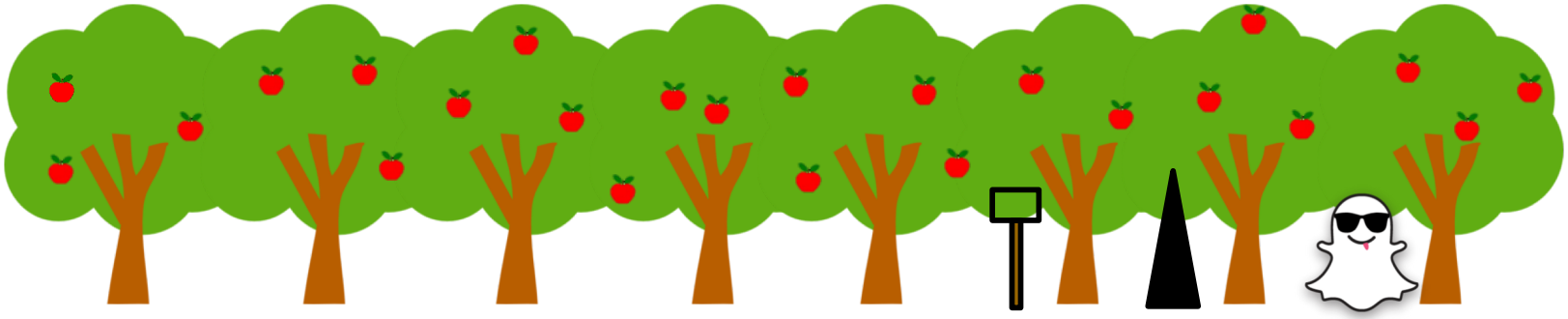

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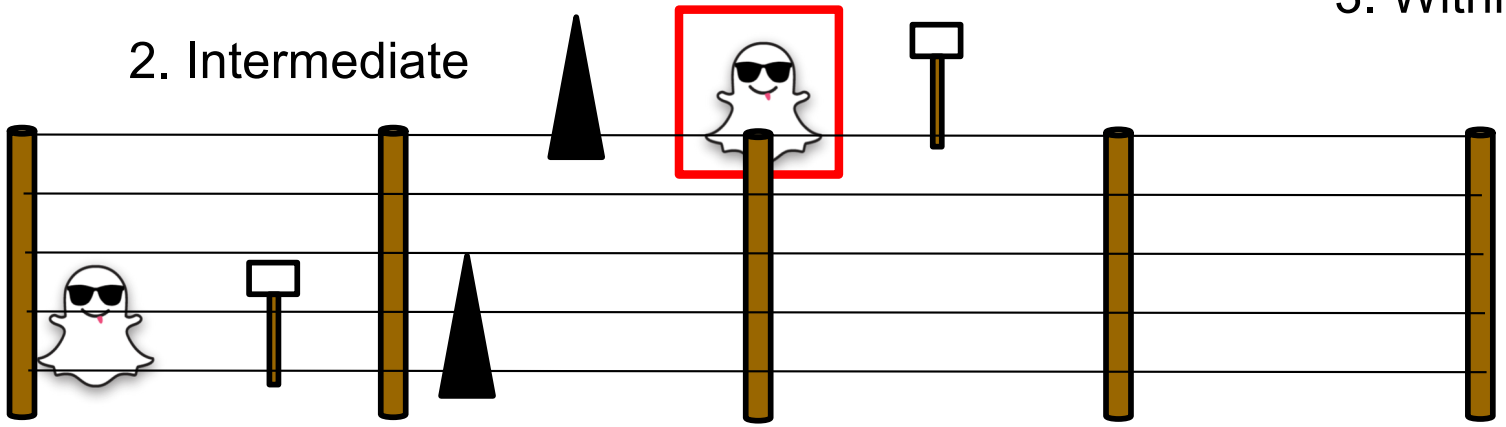

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Woodedge

GHOST TRAP: TAKE-HOMES

- Ghost traps catch more BMSB adults and nymphs than panel or pyramid traps
- Traps placed between orchard and wood-edge catch more BMSB
- Ratio of trap catches is not consistent throughout the year; unclear if higher numbers = higher accuracy

OTHER APPLICATIONS OF INSECTICIDE NETTING

- Netting "wall" along deer fence
- Ghost trap perimeter around orchard area
- Combine with other pest pheromone for dual-purpose Attract and Kill


NONE OF THAT MAKES ANY SENSE.

40,000+ BMSB

Dispatched during the course of this work

WHAT ELSE CAN BE DONE TO COMBAT THE EVIL STINK BUG?

A NEW HERO EMERGES...

INTRODUCING: THE SAMURAI WASP!

WHO IS THE MYSTERIOUS SAMURAI WASP?

- Invasive parasitoid wasp, native to Asia
- Specialist at attacking BMSB; mortality exceeds 90% in Asian orchards
- Recently Discovered in Michighan
- Unclear if state-wide establishment possible, but hopes are high

BMSB WILL RETURN AGAIN IN

TREE FRUIT AVENGERS: REVENGE OF THE INFINITY BUG!

Acknowledgements

The entire Tree Fruit Entomology family: Chris Adams, Juan Huang, Colin Guimond, Jessika Maas among others

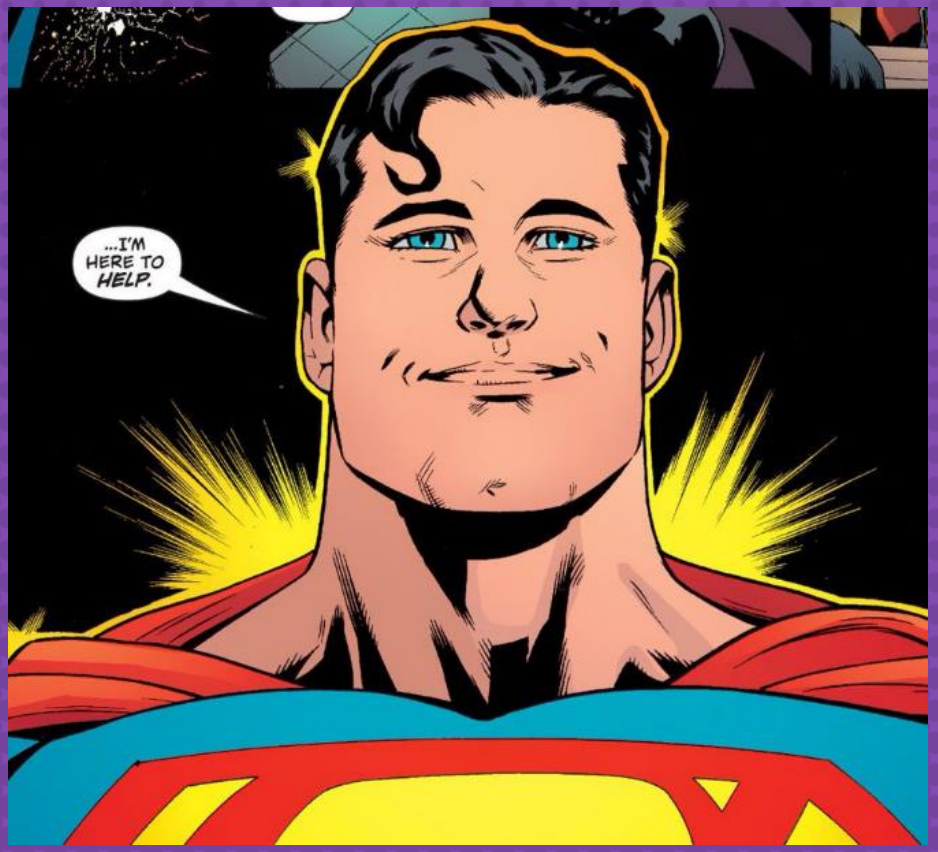
My wife Chelsea for patiently listening to me when I get too excited about bugs

MSU Project GREEEN for funding this work (#GR18-045)

Presentation template by SlidesCarnival

Project GREEEN

GOT STINK BUG PROBLEMS?



WE'RE HERE TO HELP!!

CONTACT ME AT:

potejohn@msu.edu

QUESTIONS?

GHOST TRAPS CATCH MORE BUT...

Trap Type	Total BMSB
Ghost	21.42
Panel	4.33
Pyramid	12.52

1 BMSB on a Sticky Panel = 4.95 in a Ghost Trap

1 BMSB In a Pyramid Trap = 1.71 in a Ghost Trap

WHY DO WE NEED TO MAXIMIZE TRAP CATCH FOR MONITORING?


SKADOW!!!

Trap Type	Total BMSB
Ghost	21.42
Panel	4.33
Pyramid	12.52

BECAUSE TRAP CATCHES ARE NOT ALWAYS PROPORTIONAL!!