Co-Creating Attract-and-Kill Systems for Management of Brown Marmorated Stink Bug in Apple Orchards

Northeast Sustainable Agriculture Research & Education

Collaborators

USDA-ARS

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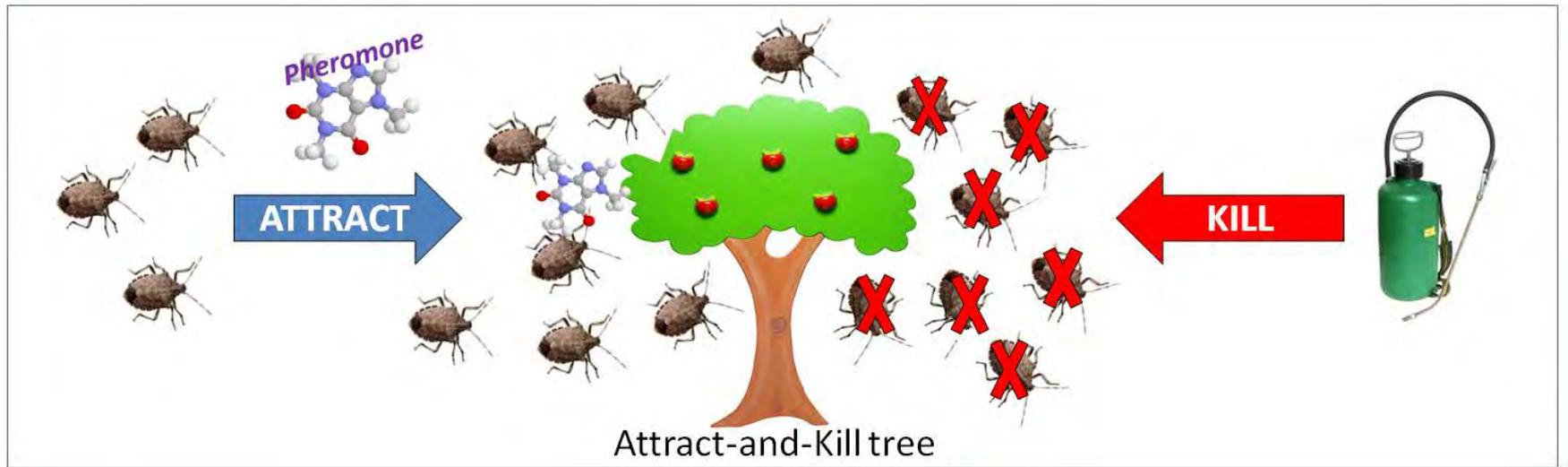- Chris Bergh

University of Maryland

- Bryan Butler

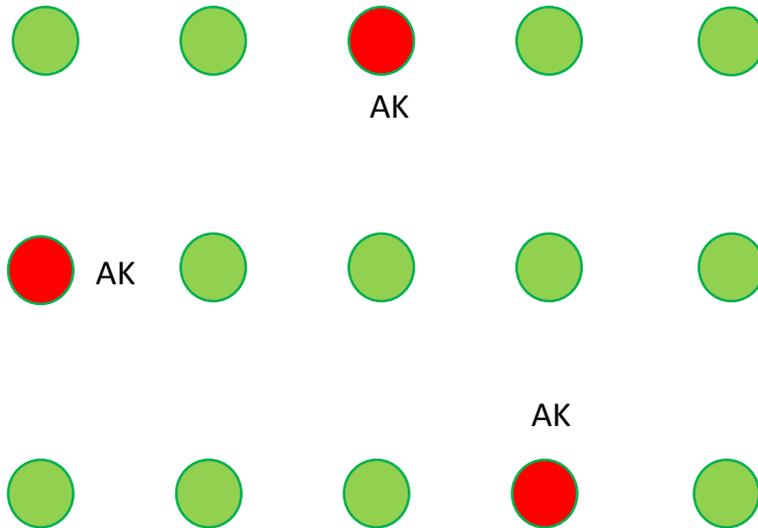**West Virginia University**

- Yong-Lak Park

Project Goals

- Reduce amount of insecticide applied to block
- Enhance natural enemy abundance and reduce secondary pests
- Maintain high quality fruit!
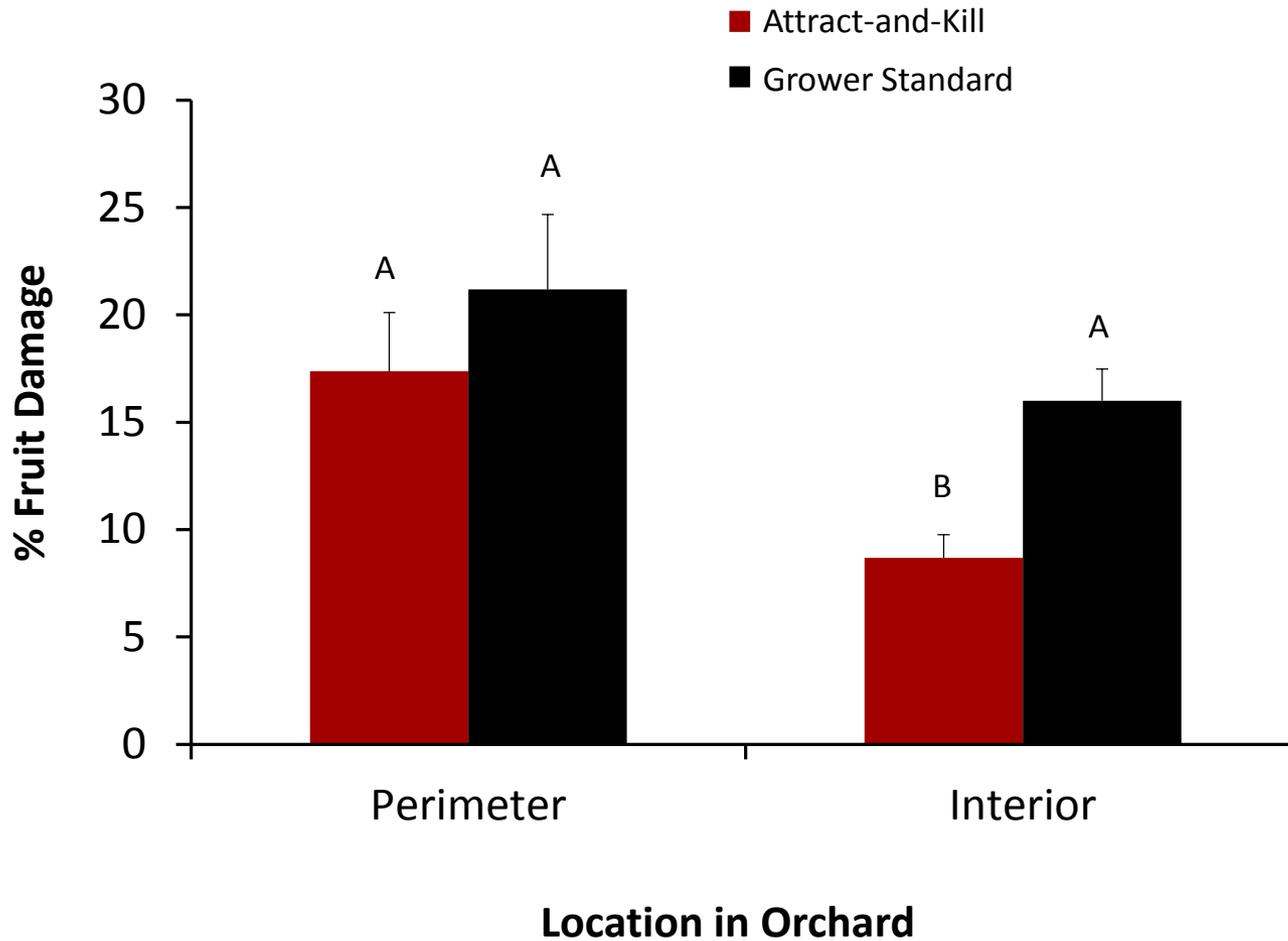
How Does Attract-and-Kill Work?

Pheromone

ATTRACT

KILL

Attract-and-Kill tree

Method of Application - 7-d intervals

Harvest Period

■ Attract-and-Kill
■ Grower Standard

% Fruit Damage
ANOVA
Log-transformed
Overall Model
$F_{9,431} = 54.4$
$P < 0.0001$
Period
$F_{2,431} = 133.6$
$P < 0.0004$

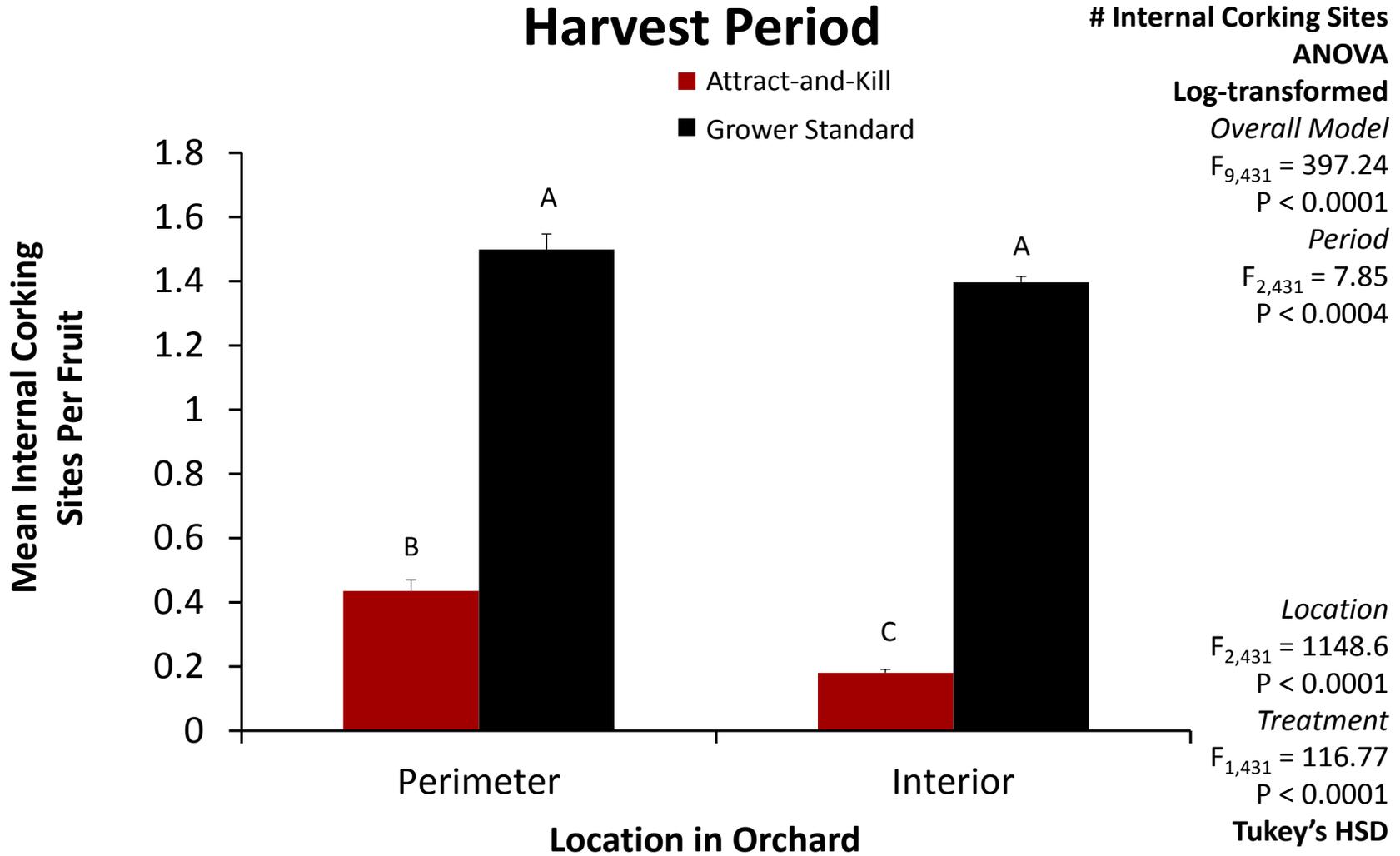*Location*
$F_{2,431} = 71.75$
$P < 0.0001$
Treatment
$F_{1,431} = 92.5$
$P < 0.0001$
Tukey's HSD

Y-axis: **% Fruit Damage** (0 to 30)

X-axis: **Location in Orchard** — Perimeter, Interior

Bar labels: Perimeter — A (Attract-and-Kill), A (Grower Standard); Interior — B (Attract-and-Kill), A (Grower Standard)

Harvest Period

■ Attract-and-Kill

■ Grower Standard

 # Internal Corking Sites
ANOVA
Log-transformed
Overall Model
$F_{9,431} = 397.24$
$P < 0.0001$
Period
$F_{2,431} = 7.85$
$P < 0.0004$

Location
$F_{2,431} = 1148.6$
$P < 0.0001$
Treatment
$F_{1,431} = 116.77$
$P < 0.0001$
Tukey's HSD

Mean Internal Corking Sites Per Fruit

Location in Orchard

Perimeter: B, A
Interior: C, A

Example Program:

Cost/Benefit of Commercial Attract-and-Kill Study

	Attract and Kill	Standard
Mean No. of BMSB Sprays	15	3
Percentage of Trees Sprayed	3-4	100
Cost of BMSB lures/per A/season	$1500	0
Cost of BMSB Sprays/per A/season	$6-20	$30-100

Other factors: fuel use, extra trips to field, labor costs, secondary pest management
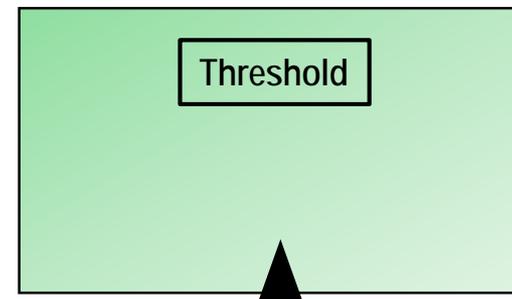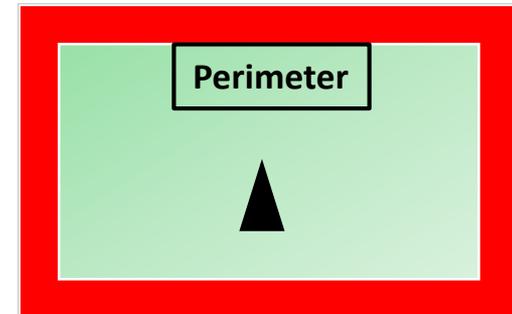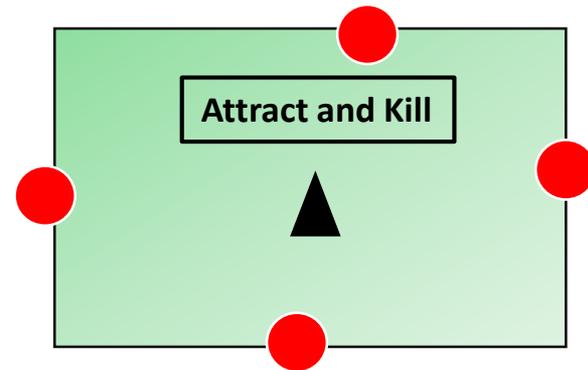
Optimizing Attract-and-Kill and Long-Term Projections

1. **Lower cost lures**
   1. **Competition/Volume/Refinement of production**
   2. **Smaller doses**
   3. **Inclusion of Host Plant Volatiles**

2. **Fewer lures**
   1. **Fewer per tree and/or fewer baited trees**

3. **Less frequent spray applications**
   1. **Threshold + Perimeter-Based Management**

4. **Impact on farm-level management**

5. **Long-term reduction of BMSB populations**

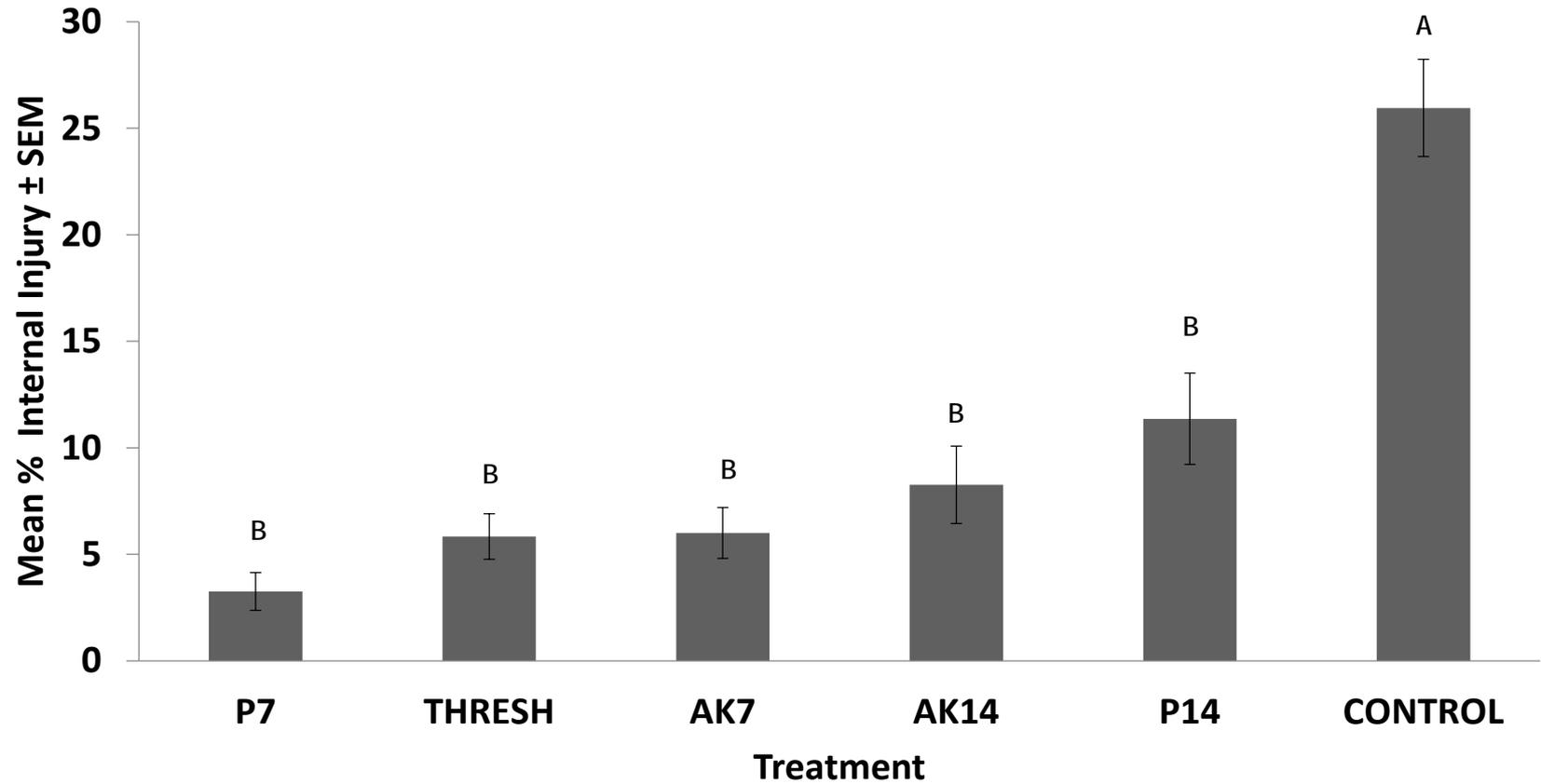# Refinement of Perimeter-Based Management

- **Apple blocks managed by the following perimeter-based strategies and compared with treatment threshold:**

  1) AK – 7-d intervals
  2) AK – 14-d intervals
  3) Full Perimeter – 7-d intervals
  4) Full Perimeter – 14-d intervals
  5) Treatment Threshold (10 BMSB/Trap)
  6) No Spray (Control)

- **Blocks monitored at center with baited trap. If threshold reached, ARM sprays triggered.**

2015 Results

Acknowledgments