



IPM-CPR in Apples and Peaches

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Overall Goal of IPM-CPR

Build a new IPM system based on behavioral ecology that includes BMSB and is able to sustain perturbations to the system

Previous work in peach

- IPM-CPR provided **BMSB** and **OFM** control at levels equal to **grower standards** in **Jerseyqueen** and **PF-24**
 - *Potentially better along crop perimeter where insecticide is applied weekly*

Blaauw et al., (2014) in 5 acre peach block

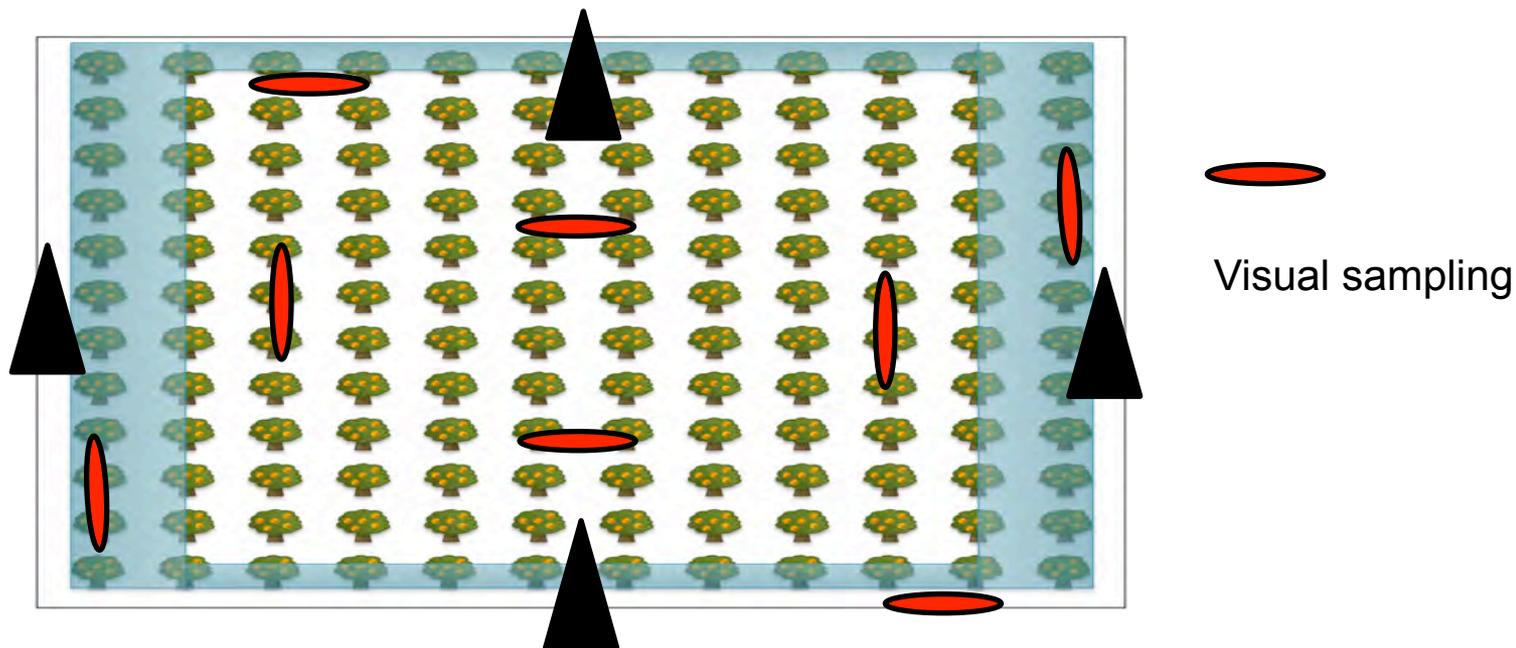
Specific objectives

- Determine **effectiveness** of IPM-CPR (border spray) as systems level management tactic in apples (2016 and 2017)
 - *Blaauw et al., (2014) in peach*
- Determine the maximum block size at which the IPM-CPR can work effectively in peach (2017)
 - *Based on work by Blaauw et al., (2014)*

Questions

- Can IPM-CPR work in apples as it did in peaches?
- What spatial scale does IPM-CPR works?
 - Increasing the size will shrink the size of the border relative to the block size

Layout of Blocks



Border spray blocks:

- Mating disruption for internal worms (OFM)
- Herbicide Stinger applied to row middles to remove flowering weeds
- BMSB management with border sprays

Grower standard:

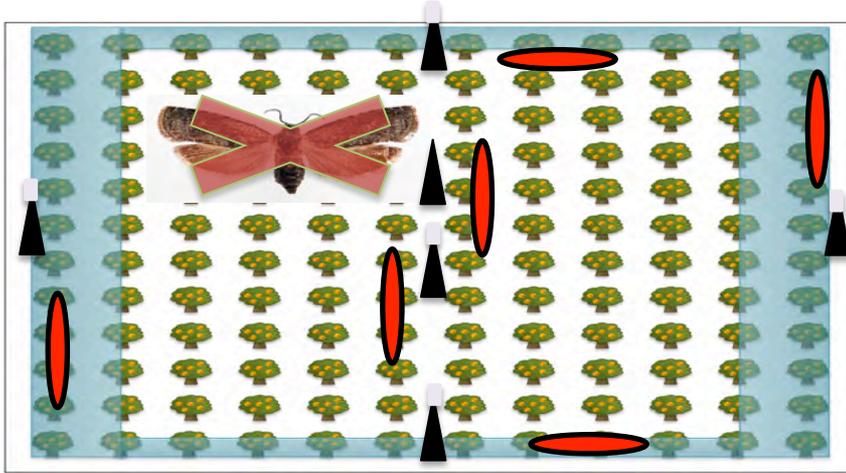
- All other pests managed using standard practices
- BMSB managed using full block/ Complete sprays

Injury/Damage assessment apple and peach

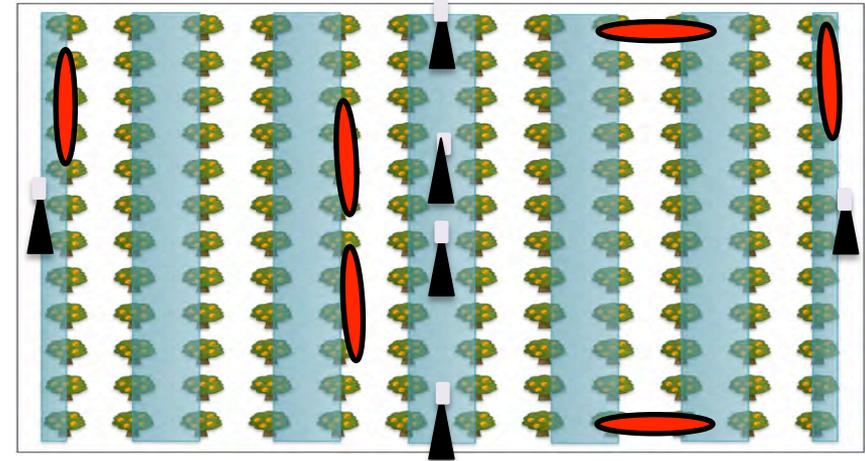
- Destructive sampling for injury assessment for **both apple and peach**
- At harvest collect 25 fruit per sampling tree (2-tree sample = 50 fruit)
- Fruit were peeled to assess internal damage:
 - Stink bugs (all species)
 - CM/OFM (data not presented)
 - Plum curculio (PC) (data not presented)

Apple

Layout of Apple Blocks



Pesticide application



 Visual sampling

Border spray blocks:

- Mating disruption for internal worms (CM & OFM)
- Herbicide Stinger applied to row middles to remove flowering weeds
- BMSB managed with border sprays + 1st full row triggered at two different times

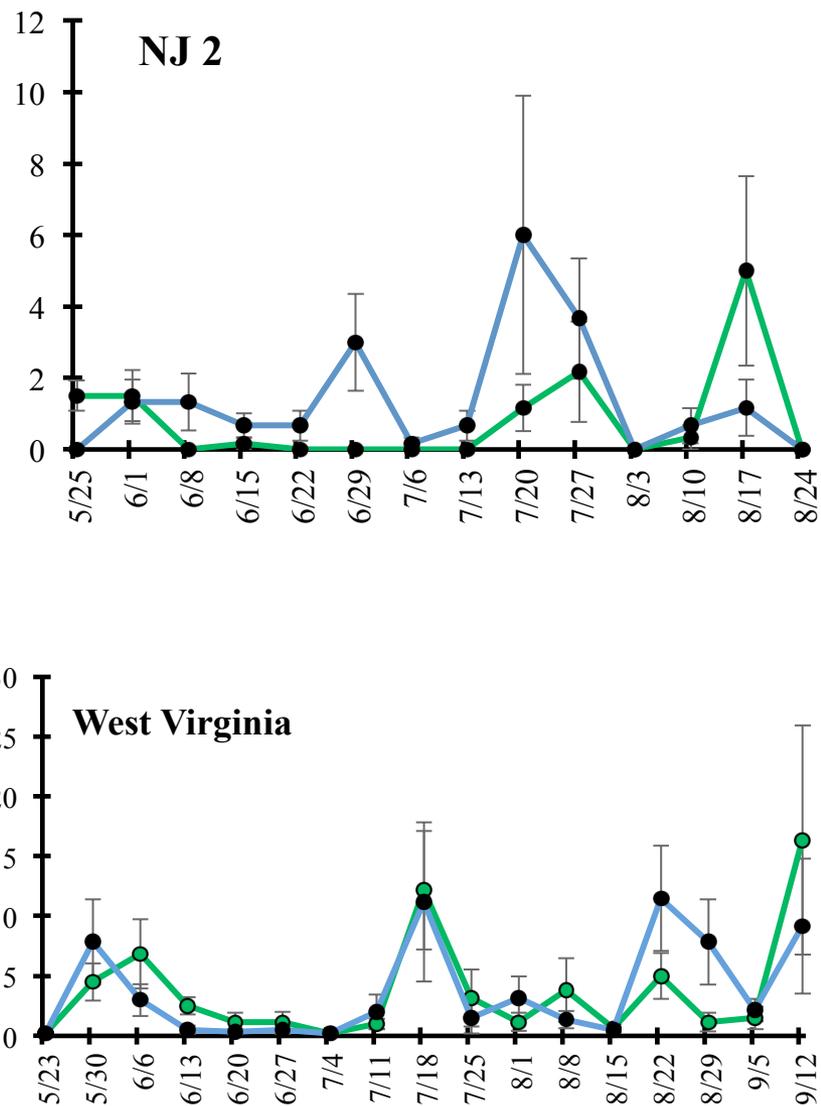
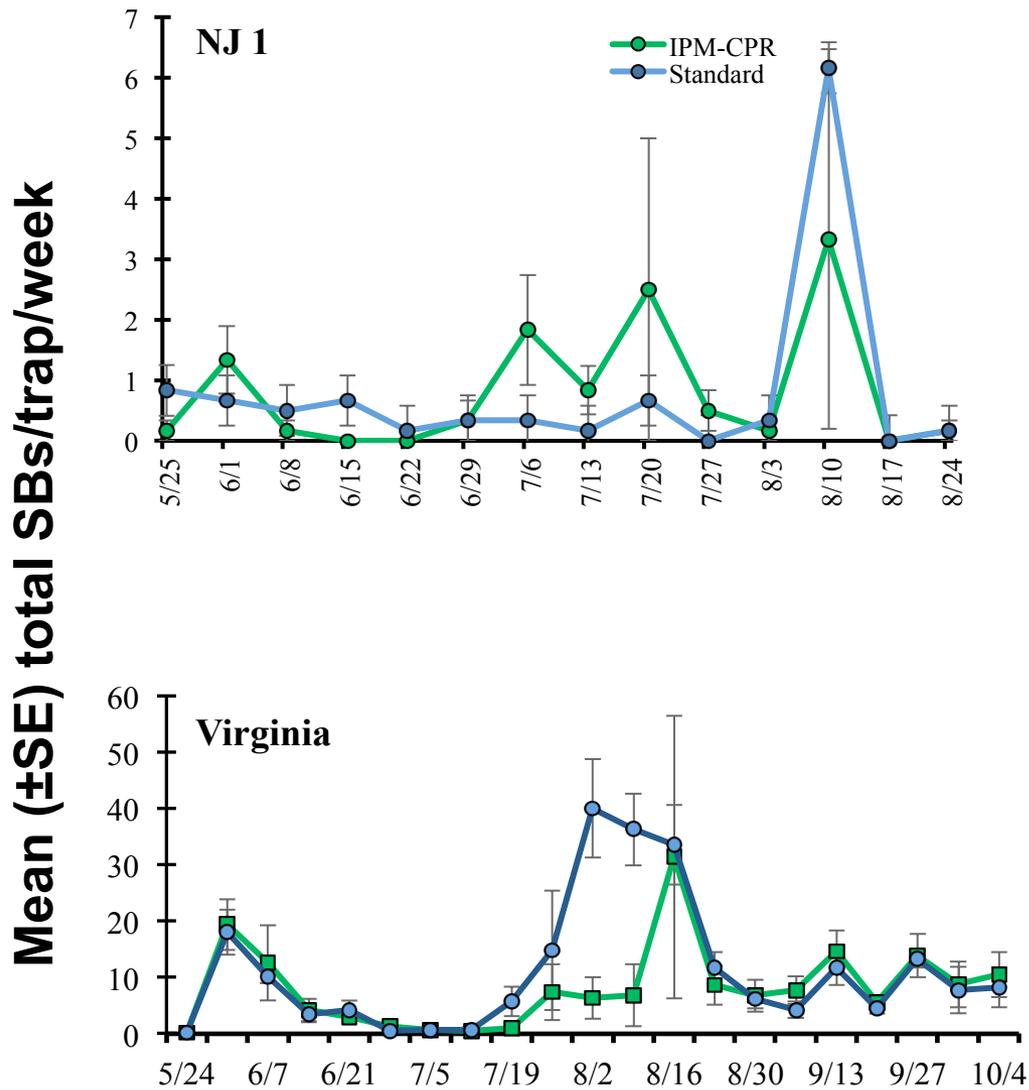
Grower standard:

- All other pests managed using standard practices
- BMSB managed using full block/ Complete sprays or ARM
 - Triggered by trap-based threshold for BMSB

Decision to spray in apple

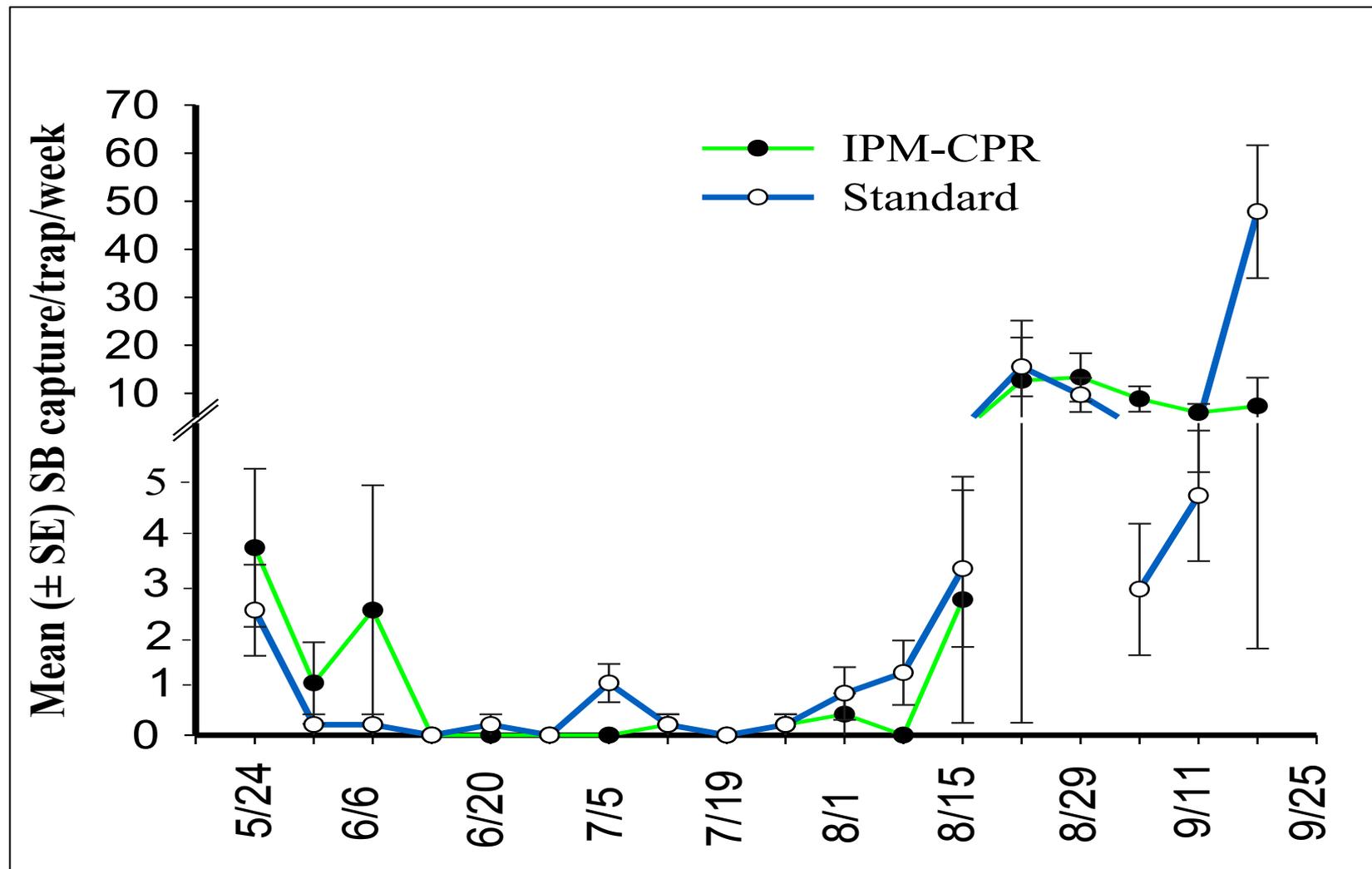
- A trap-based threshold was used to trigger a complete or ARM sprays early on in apples
- Then when those **zeroed out** we reset the threshold which would start border applications late in the season
- This allowed protection of the fruit early in the season and then a break when BMSB is foraging elsewhere before initiating the border applications

Weekly trap captures of all SBs



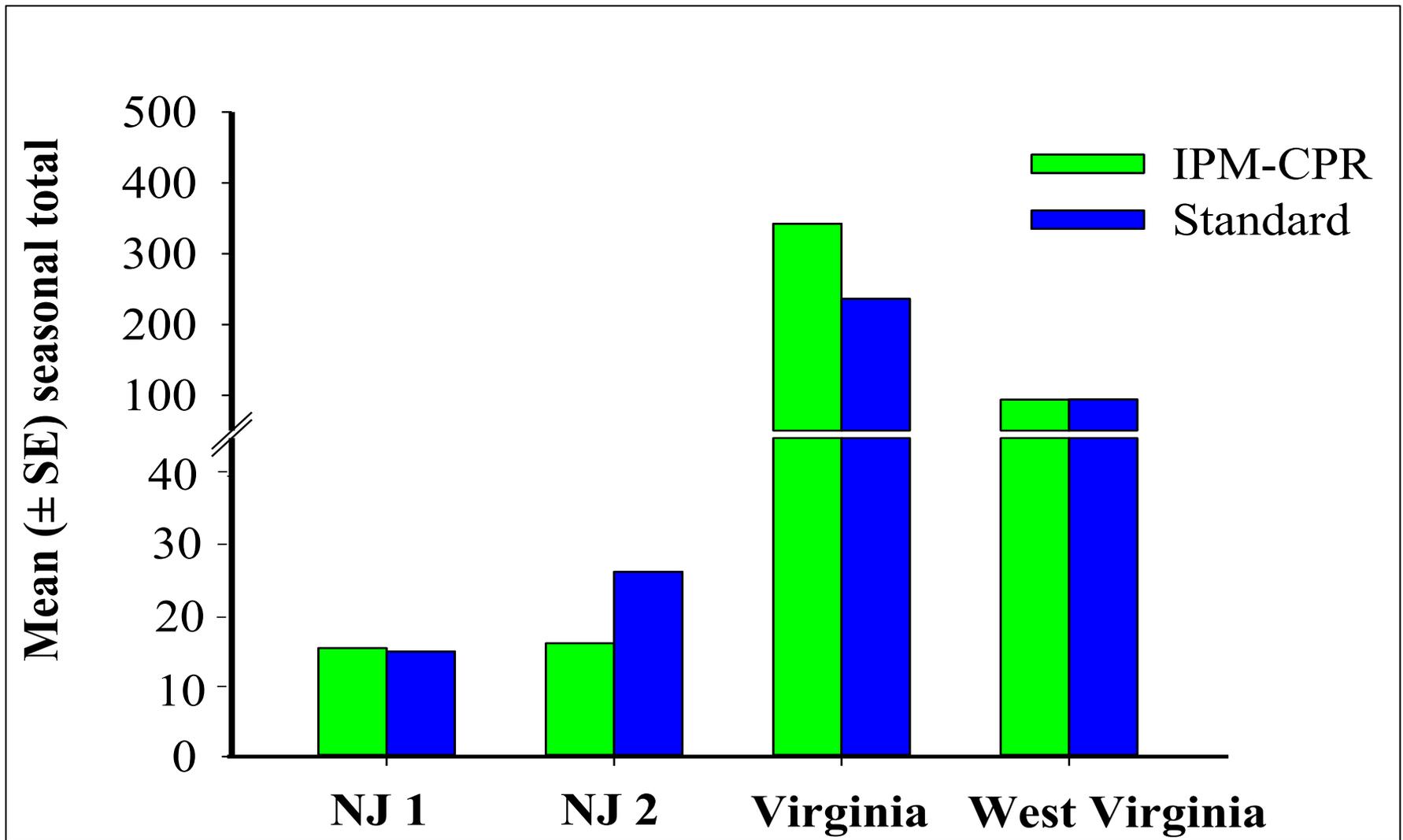
2016

Weekly trap captures of all SBs in VA



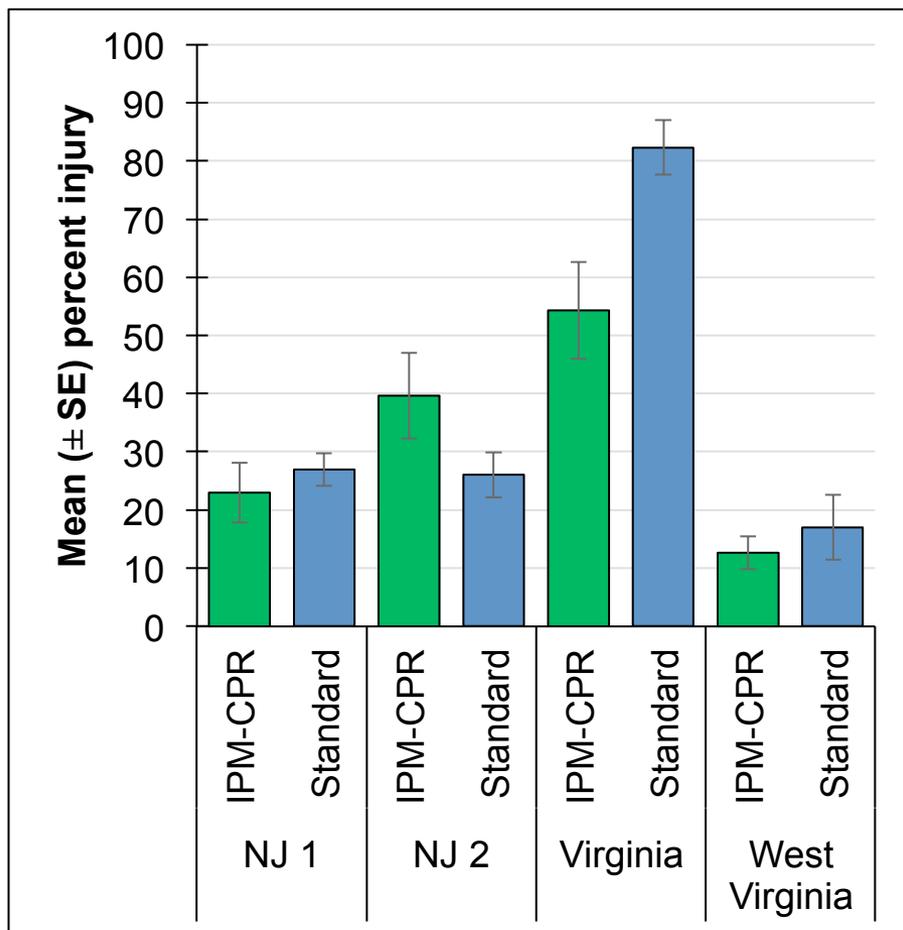
2017

Seasonal total of all stink bugs

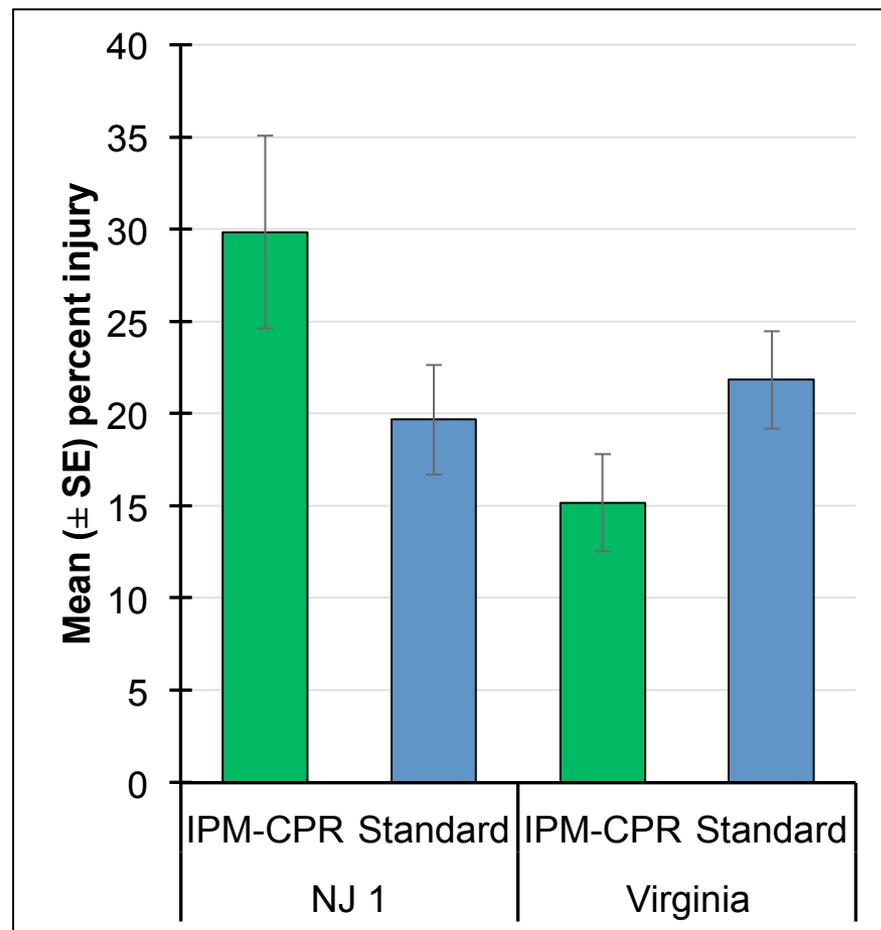


2016

Stink bug injury at harvest

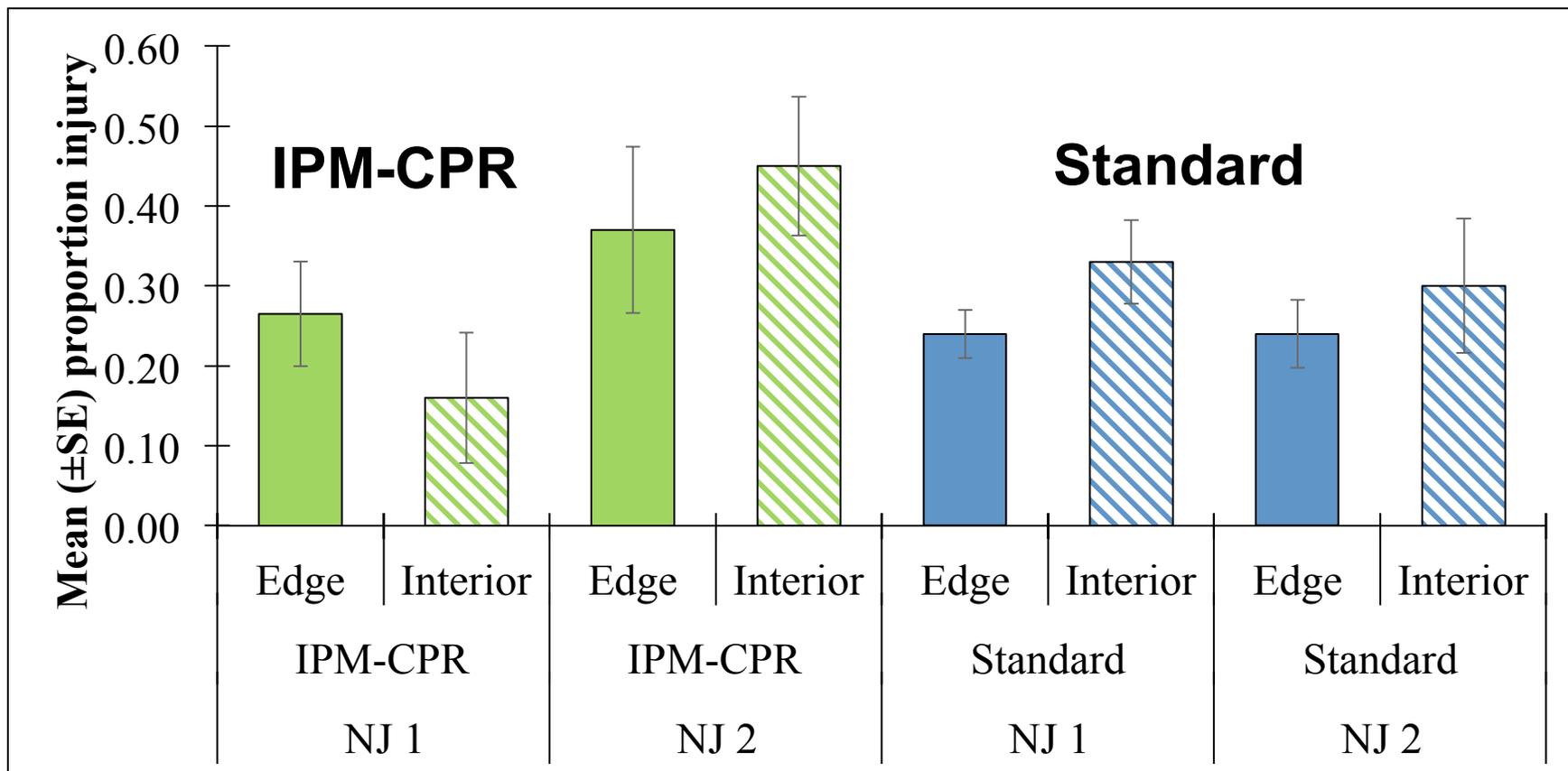


Apple 2016



Apple 2017

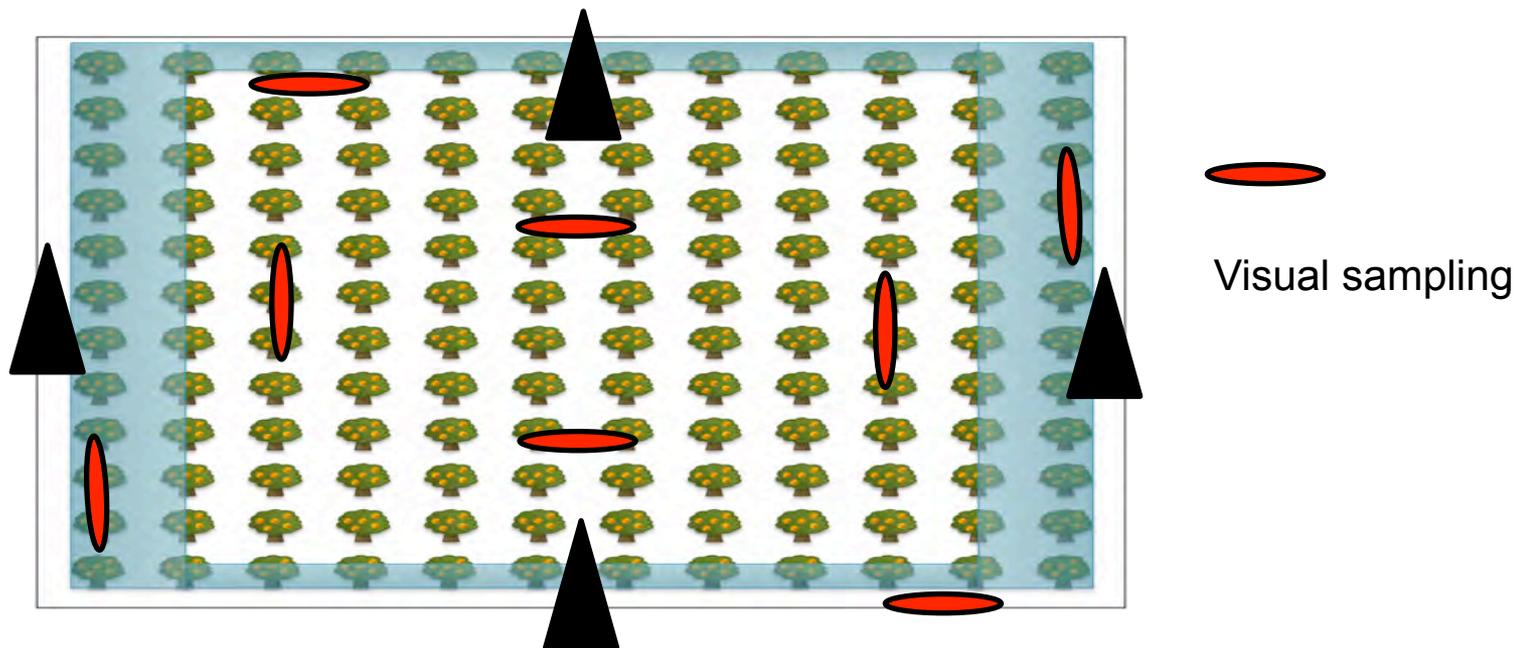
Injury Assessment at Harvest at Orchard Section-NJ



Apple 2016

Peach

Layout of Peach Blocks



Border spray blocks:

- Mating disruption for internal worms (OFM)
- Herbicide Stinger applied to row middles to remove flowering weeds
- BMSB managed with border sprays + 1st full row

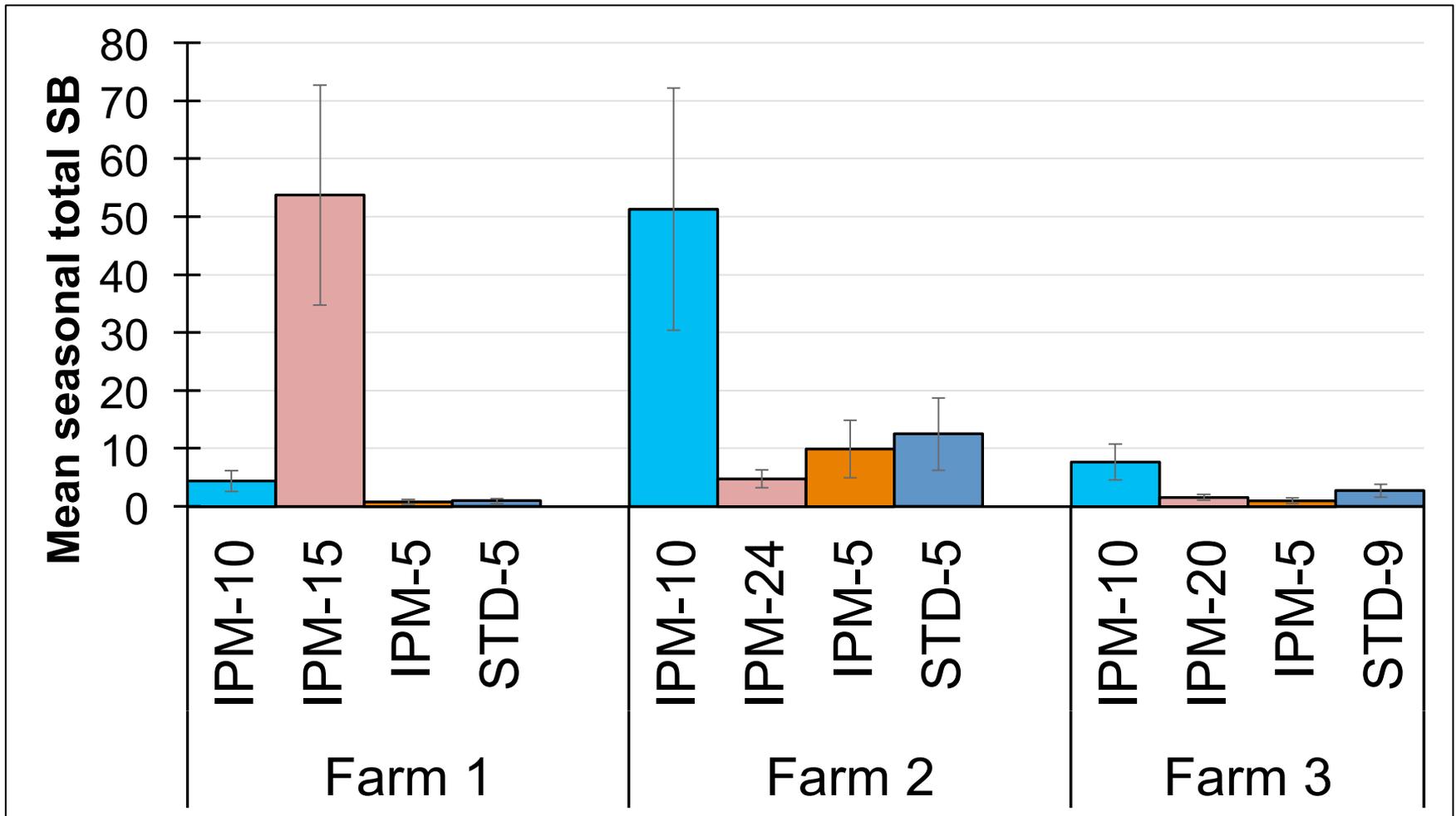
Grower standard:

- All other pests managed using standard practices
- BMSB managed using full block/ Complete sprays
 - Triggered by 2 insects of any life stage per visual observation for BMSB

Decision to spray in peach

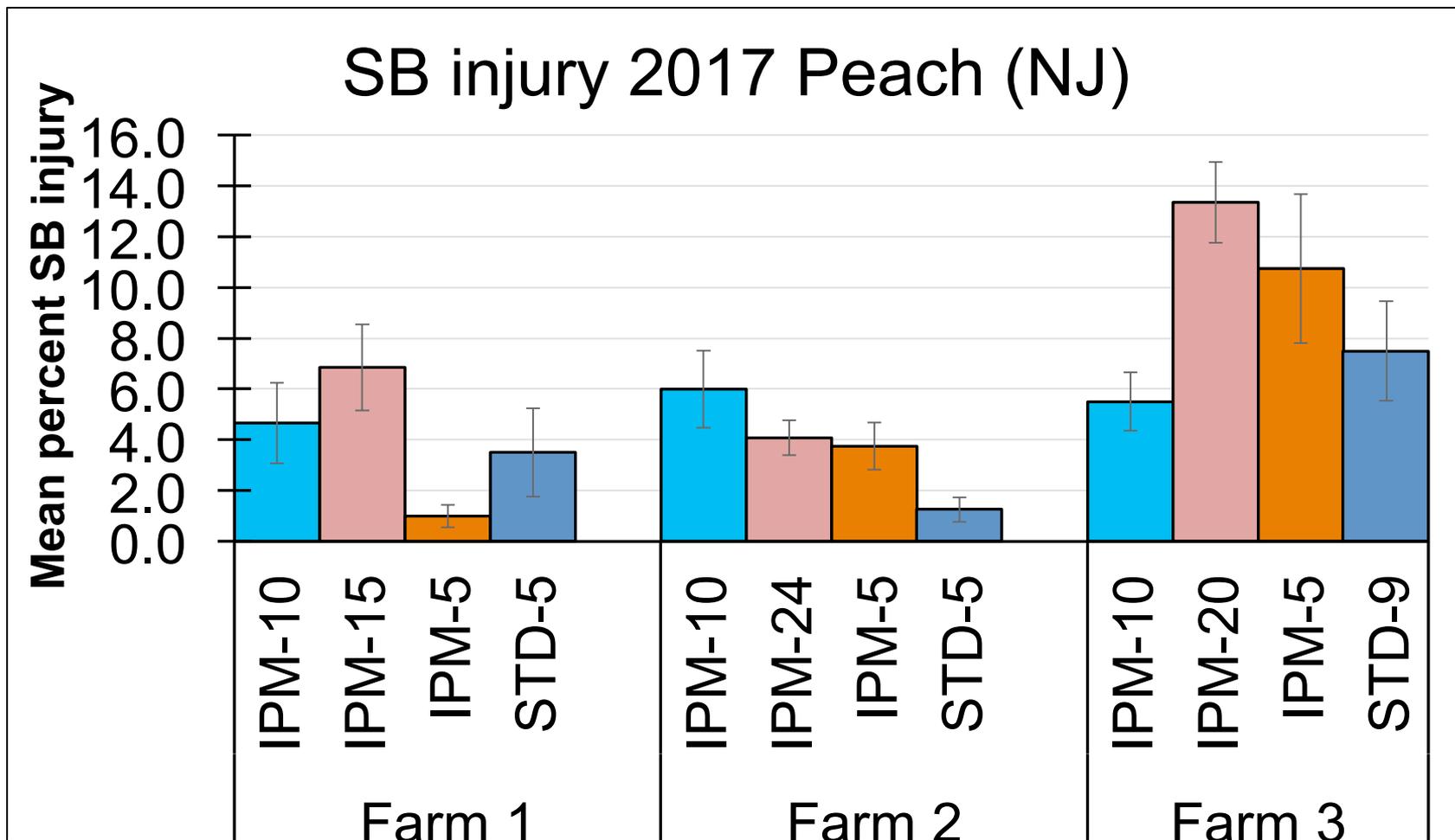
- Weekly border insecticide applications beginning late-May (170 DD₅₇)
- Visual samples are used to determine if sprays were needed on the interior of blocks

Seasonal total of stink bugs (ALL)



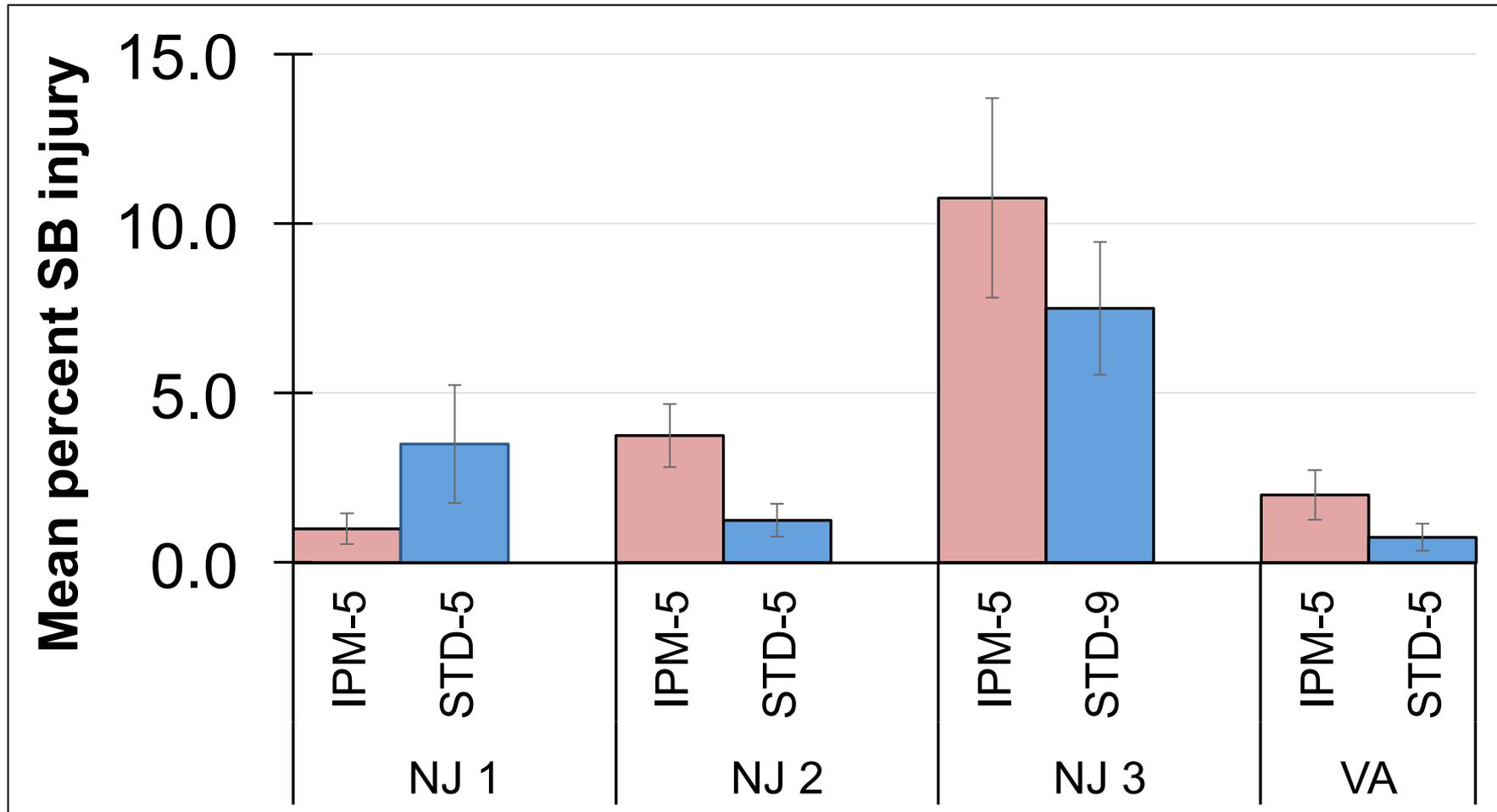
Peach 2017

Injury at harvest

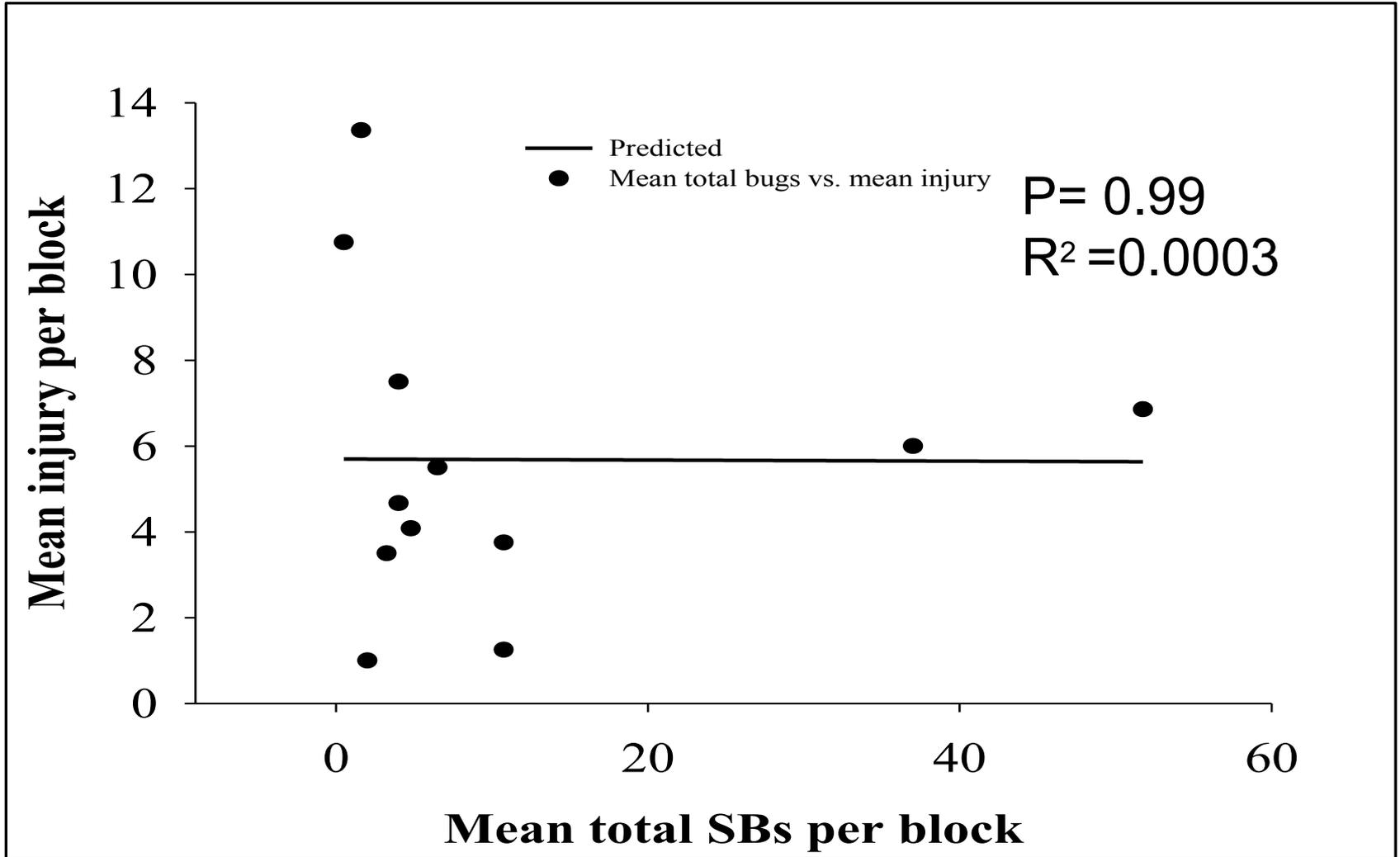


Peach 2017

Peach Injury at harvest



Correlation between total SB and Injury per block in peach



Other Benefits

Species	Apple		Peach	
	IPM-CPR	Standard	IPM-CPR	Standard
Codling moth/OFM	<i>Low to medium infestation (NJ)</i>	<i>Low to medium infestation (NJ)</i>	<i>Low</i>	<i>Low</i>
Plum curculio	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
Tarnished plant bugs	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
San Jose Scale	<i>Very low</i>	<i>Very low</i>	<i>Very low</i>	<i>Very low</i>

Summary and Take Home Message

- IPM-CPR was similar to **grower's standard** in terms of injury by BMSB
 - *Apple results are similar to peaches*
 - *STILL analyzing insecticide data but border are ~25% of the total area for a 5 acre block*
- There was damage at both the **edge and interior**
 - Damage at the edge was in most cases greater than the interior

Summary and Take Home Message

- Results suggest IPM-CPR works and can be adopted to manage BMSB
- Caveat:
 - *Size for border spray to hold up may be ~10 acres.*
 - *Landscape factors are important*
 - *Single variety vs. multiple varieties in commercial orchards*
- Cost analysis is being conducted

Good News?

- First record of T.j in commercial peach orchards
- These were found border spray plots
- As early as June
- IPM-CPR (Border spray) is compatible with biological control

Acknowledgments

- All cooperative growers who provided resources for the work
- Technical support from Dr. Nielsen's lab members
- Staff of RAREC
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Thank You

Questions