



# ***Bringing IPM Back to Peaches in the Face of BMSB***

Anne L. Nielsen, PhD  
Department of Entomology  
Rutgers University



# *Integrated Pest Management*

- Management tactic that relies on monitoring pest populations
- Utilizing economic thresholds to initiate management
- Incorporating management of key pests with pesticide resistance management and minimal impact to non-target organisms
- Common tools:
  - Scouting for pests
  - Incorporation of Degree-Day models
  - Trap thresholds
  - Utilizing reduced-risk products
  - Rotating between chemistries
  - Mating disruption for moth pests



# *Introduction of Invasive Species*



## Existing Tools

- Scouting for pests
- Incorporation of Degree-Day models
- Trap-based thresholds
- Utilizing reduced-risk products
- Rotating between chemistries
- Mating disruption for moth pests

## Post Invasion

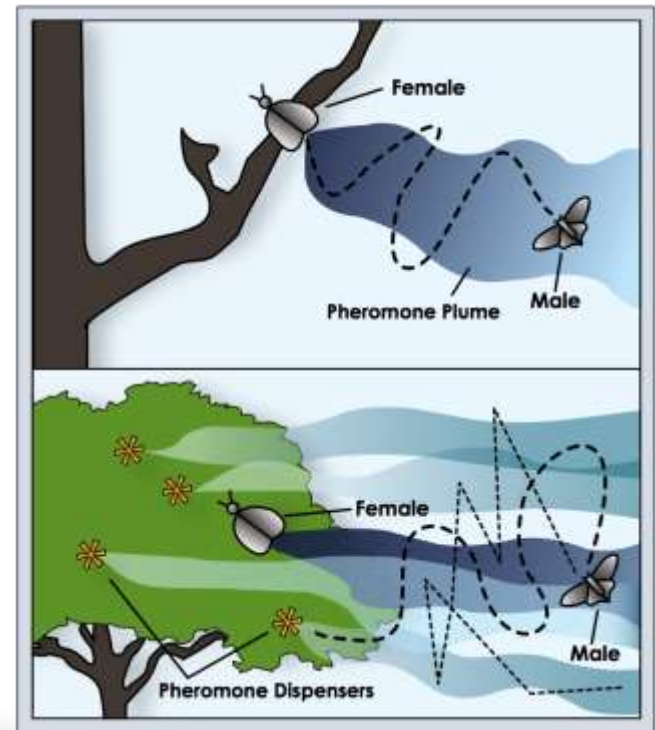






## IPM Programs

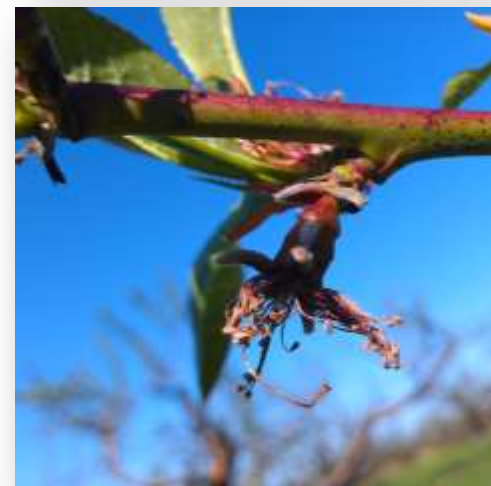
- IPM programs in mid-Atlantic pre-2010
  - Plum curculio
  - Oriental fruit moth/codling moth
  - Japanese beetle
  - Catfacing pests
  - Peach borers
- IPM is not dead!
- Adjust our strategy
  - Seasonality
  - Monitoring
  - Management





## *Plum Curculio*

- A recurrent problem
- Actara, Avaunt (6.0 oz), Asana
- New materials: Exirel 13.5-20.5oz/A
- Beleaf (2.9oz) and Apta (21 oz) reduced oviposition scars but not feeding



## *How to Manage BMSB Under IPM?*

- BMSB
  - Seasonality
  - Monitoring
  - Management
  - Pressure has varied
- Oriental Fruit Moth
- Catfacing insects
- Plum curculio



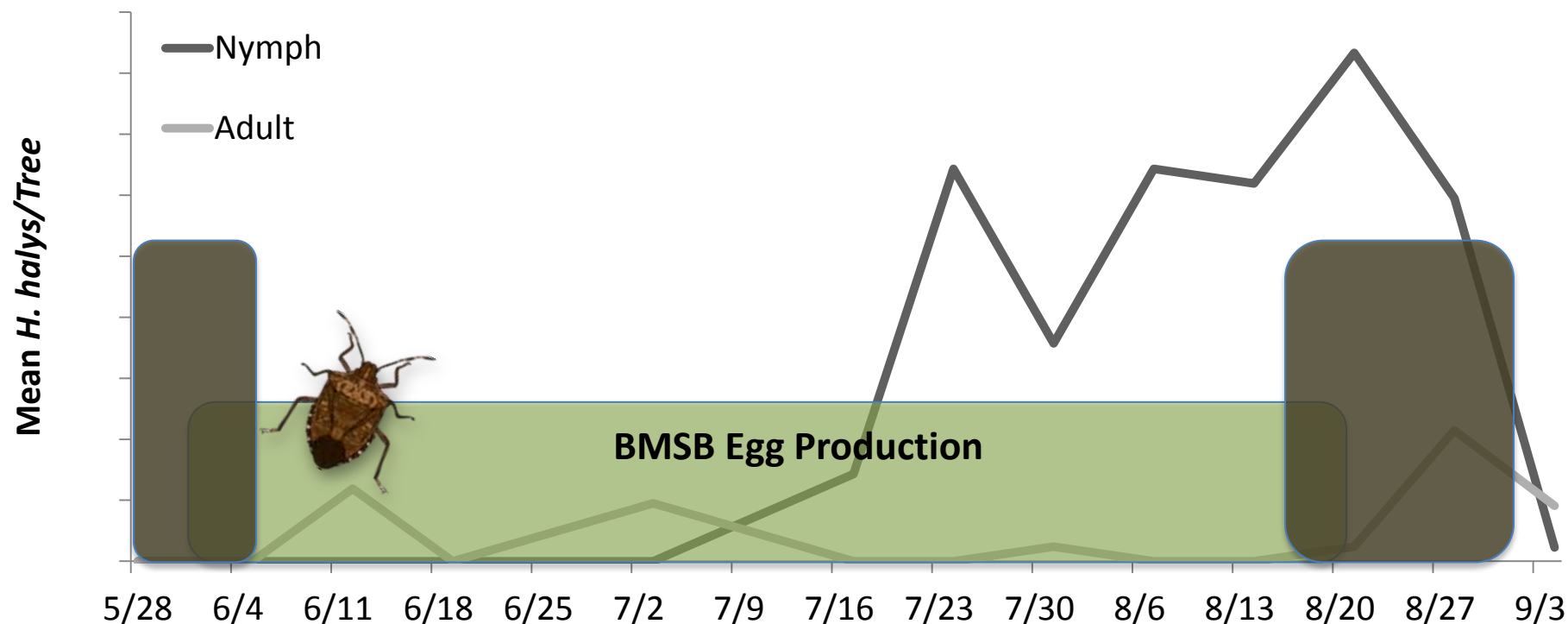
## Current BMSB Knowledge

- 1-2 generations
  - Dispersal into peach 140-266 DD (base 57°C)
- Landscape level pest
- Different seasonality and behaviors than native stink bugs
- Populations and damage highest along wooded borders
- Nymphs can develop on tree fruit and cause injury
- Aggregation pheromone has been identified
- Knowledge of effective insecticides





# Seasonality in Peaches

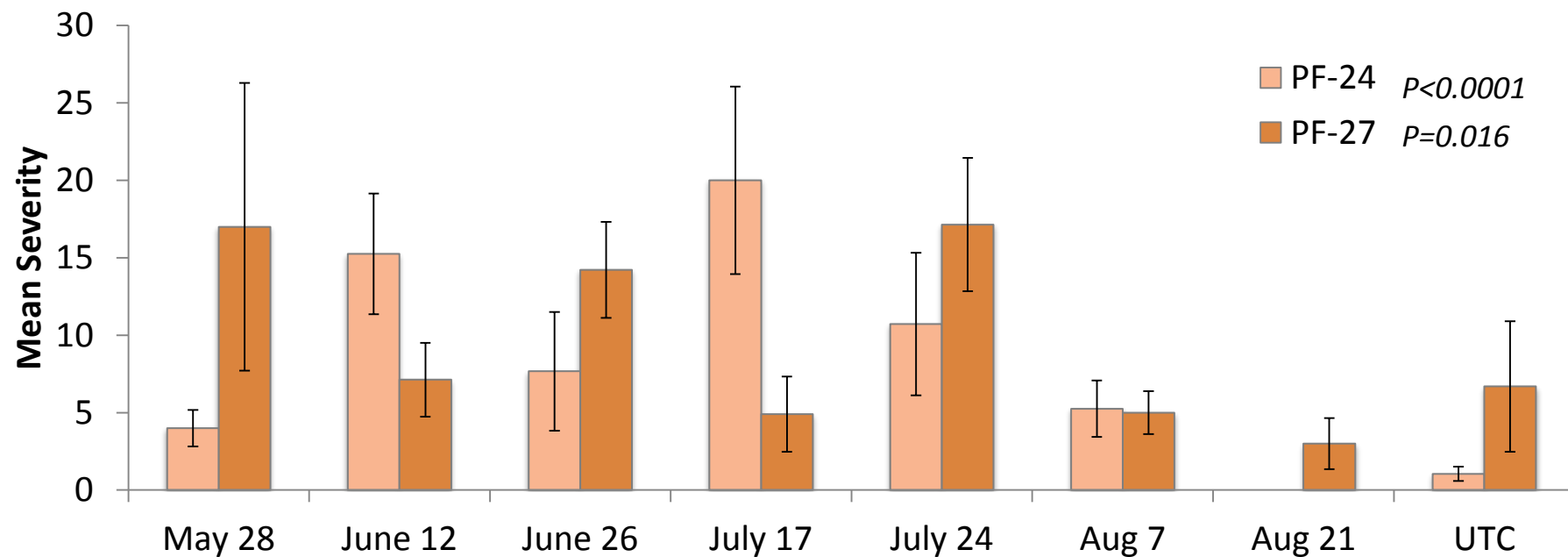
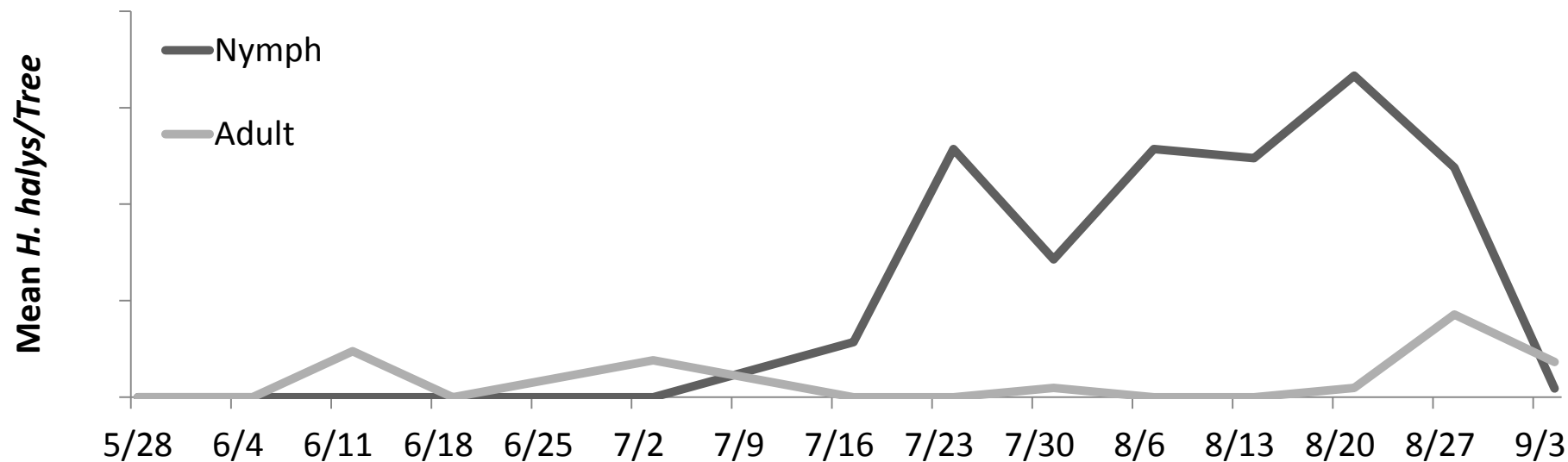


- Seasonality of BMSB is different than native stink bugs
- Peach is an early-season host
- Reproduce in peaches throughout the season
- Pest season-long

## *Seasonality in Peaches*

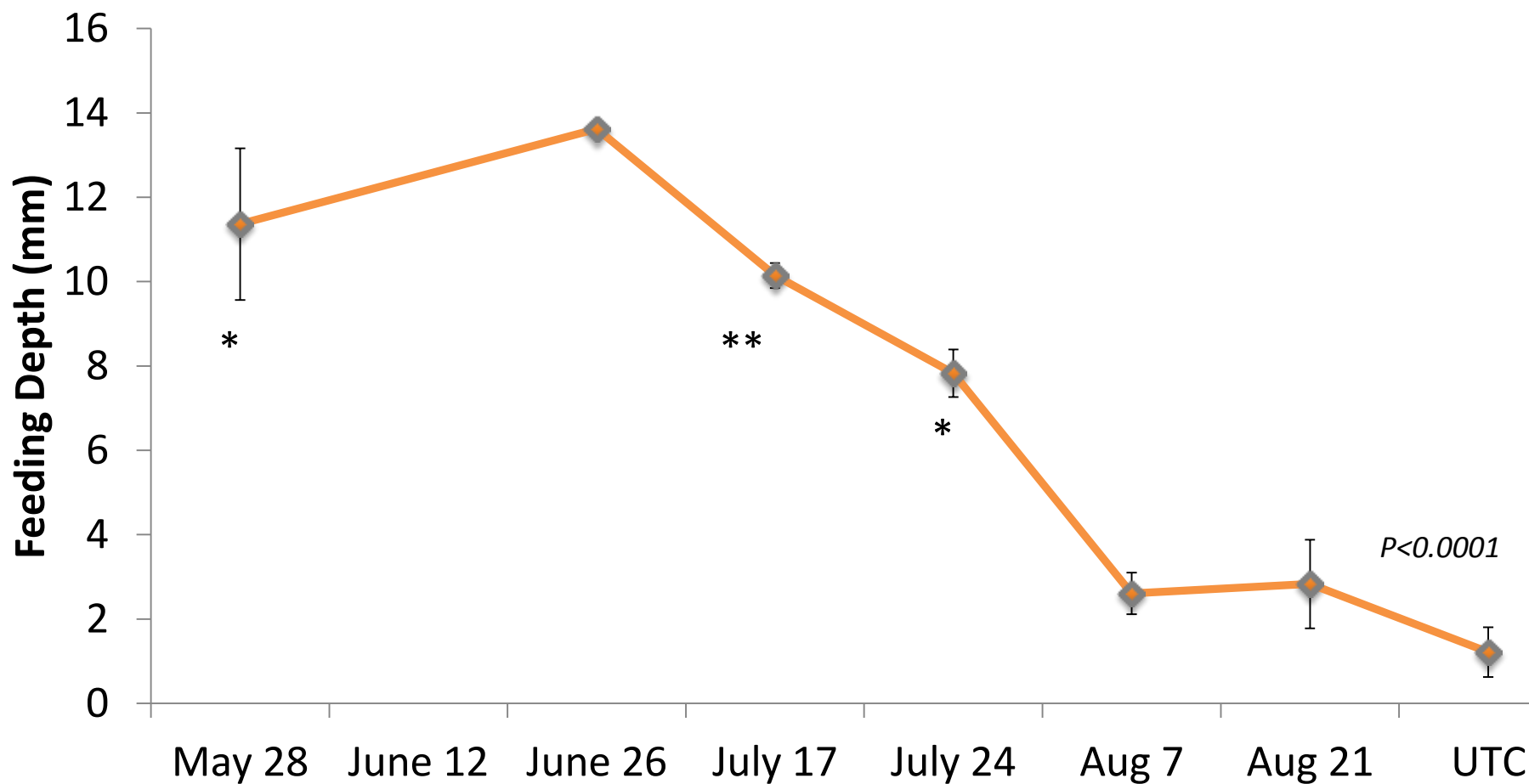
- Beat and visual sampling for BMSB twice weekly
- Bagged terminals to prevent insect injury
- Added 2 adult BMSB for one week, once every two weeks
- At harvest, fruit was assessed for injury and feeding depth was recorded

# Phenology of Injury to Peaches





# Phenology of Injury to Peaches





# *Fruit Injury*





## *How to Manage BMSB Under IPM?*

- BMSB
  - Seasonality
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  - Management
- Oriental Fruit Moth
- Catfacing insects
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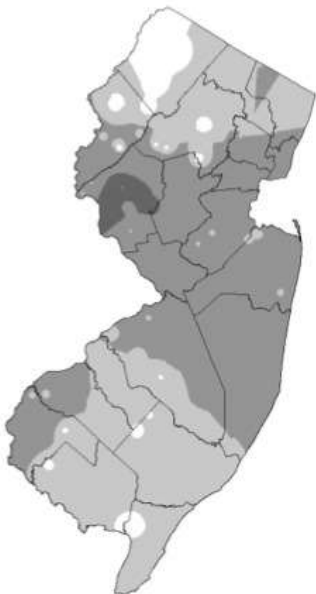


## *Monitoring BMSB*

- Orchard edge
  - 75% of adults stopped at the border of the orchard
  - Especially pronounced along wood-edge
  - Dispersal occurs throughout the season
- Nocturnal insect
- Good avoidance behaviors

2009

2011



## *Monitoring BMSB*

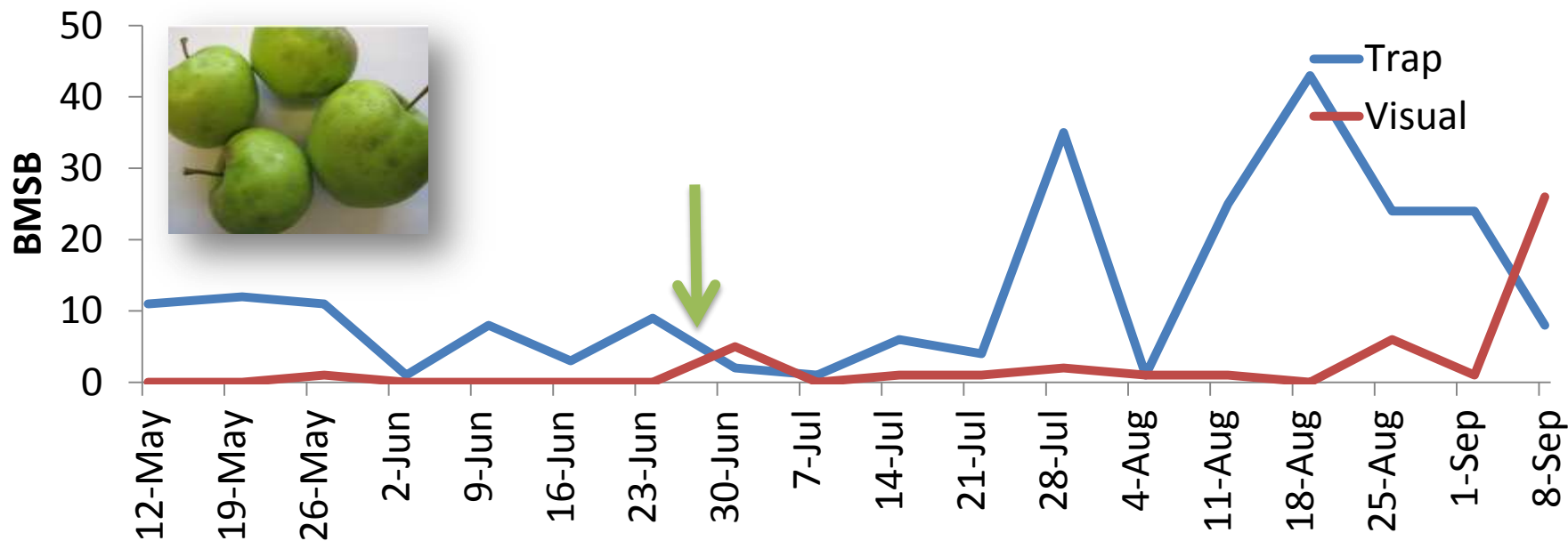
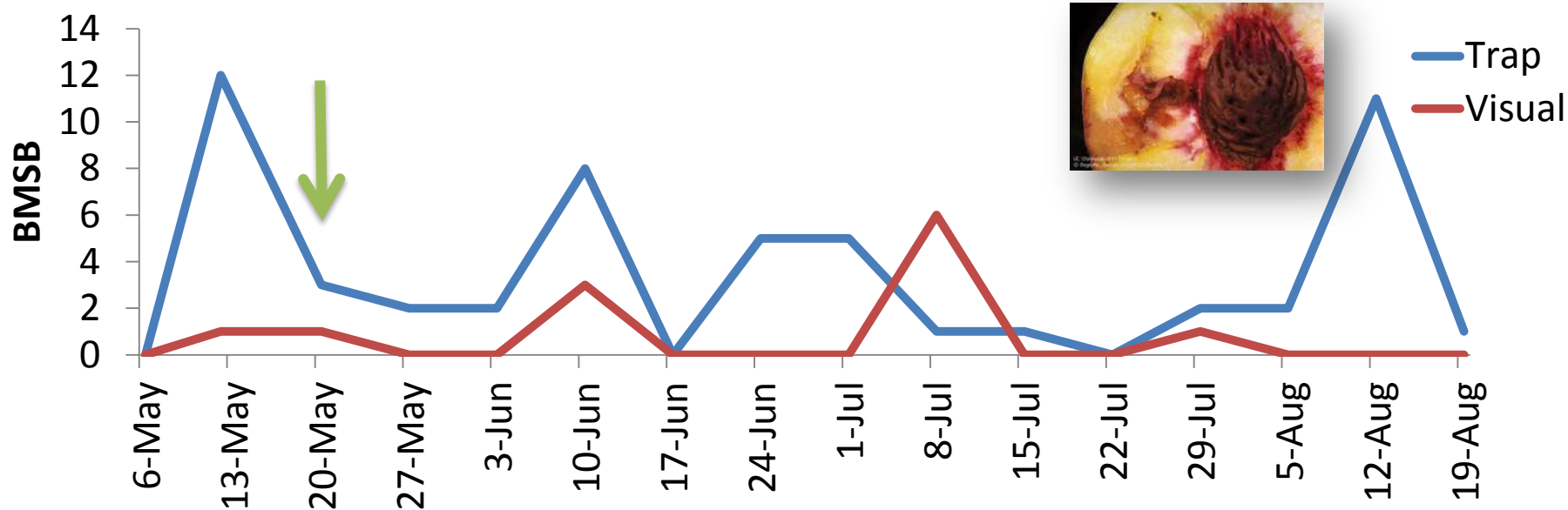
- Aggregation pheromone
- Trap is a tree-trunk mimic
- Season-long attraction
- 24-h monitoring
- Increase injury on adjacent trees
- Thresholds are being developed



Coroplast  
Pyramid



# Comparison of Monitoring Tools



## *How to Manage BMSB Under IPM?*

- BMSB
  - Seasonality
  - Monitoring
  - Management
- Oriental Fruit Moth
- Catfacing insects
- Plum curculio



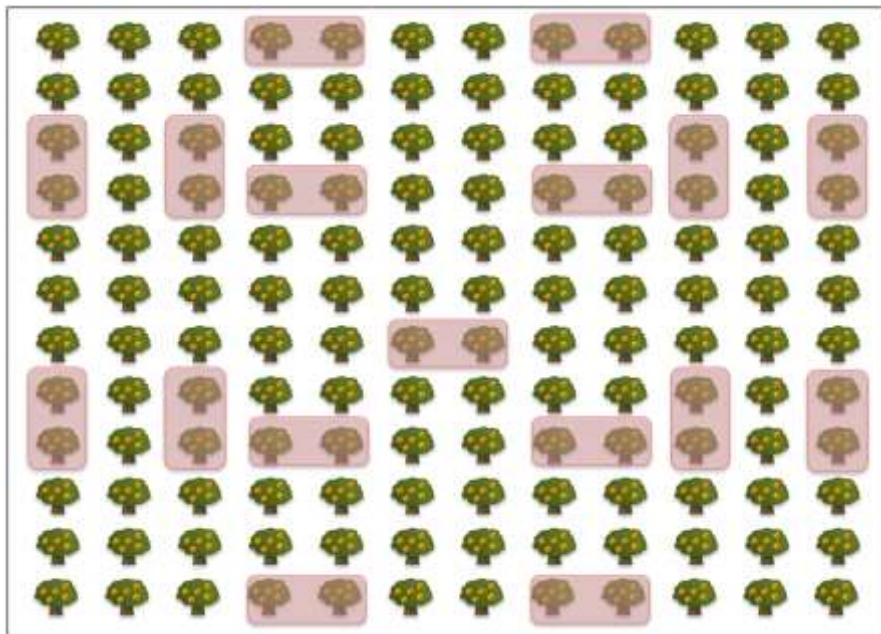
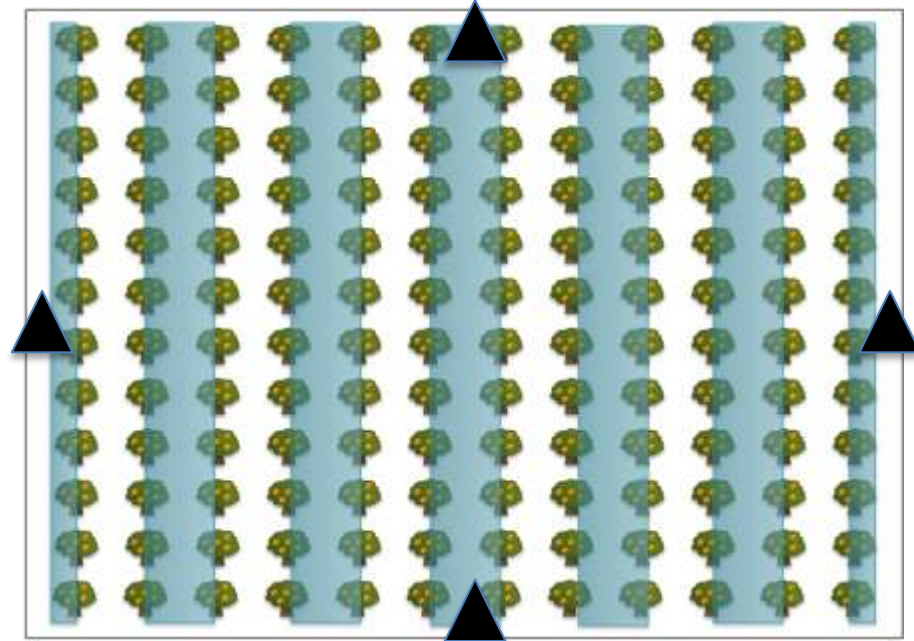
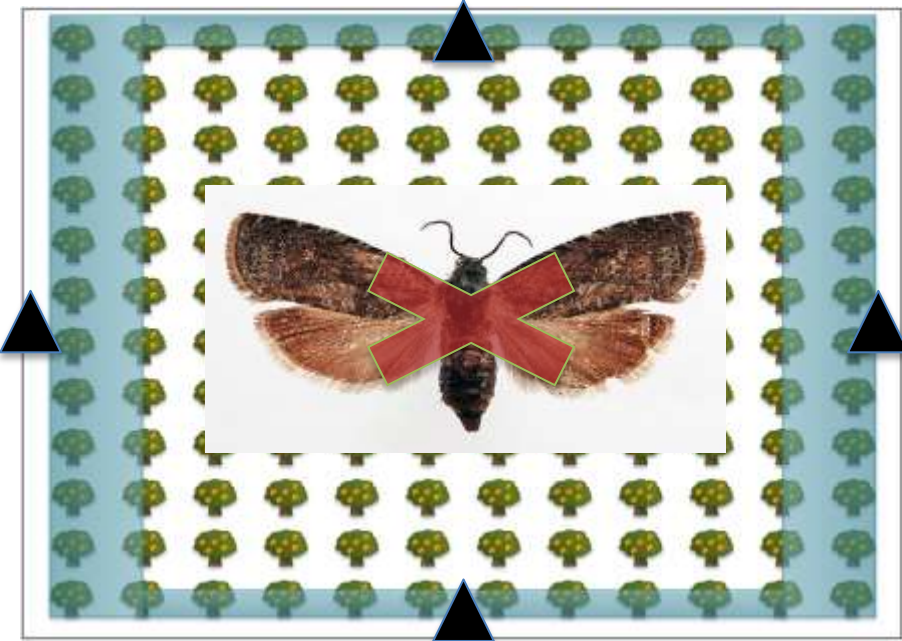
***IPM-CPR***

## *IPM-Crop Perimeter Restructuring*

- Monitor for key pests
- Mating disruption for OFM and/or CM
- Groundcover management
- DD model for BMSB
  - 77 DD<sub>45</sub>
- Border insecticide sprays
  - Weekly interval







- 17 sampling sites
- Visual sampling for BMSB, catfacing injury, moth injury
- Sweep net for *Lygus sp.*
- Harvested 50 fruit per sample (850 fruit/block)
- 3 farms
- 3 years

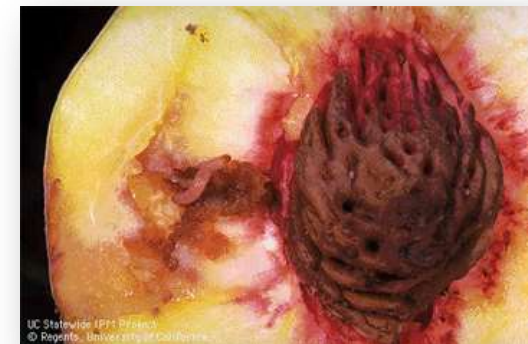
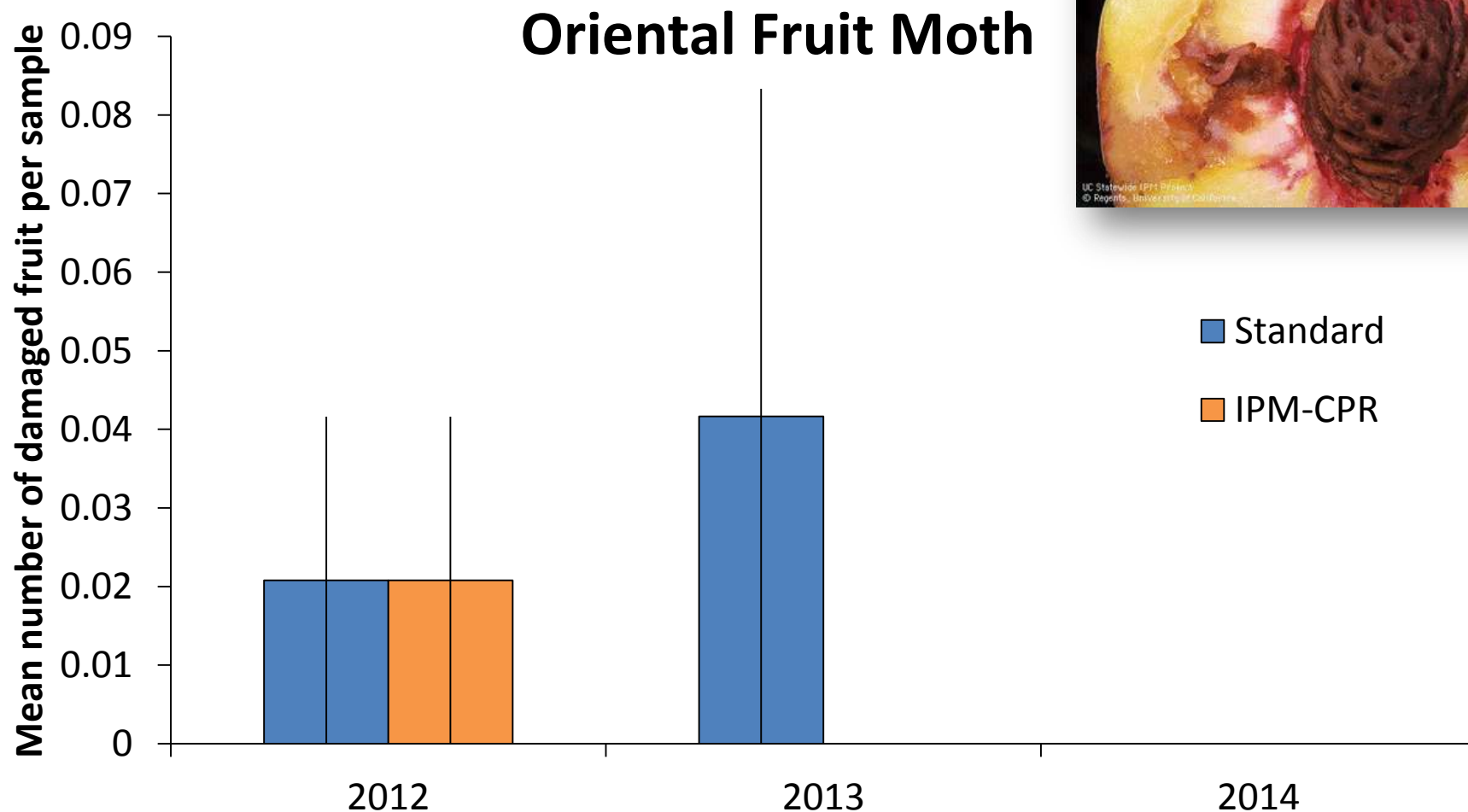
Pesticide application



Observational sampling site





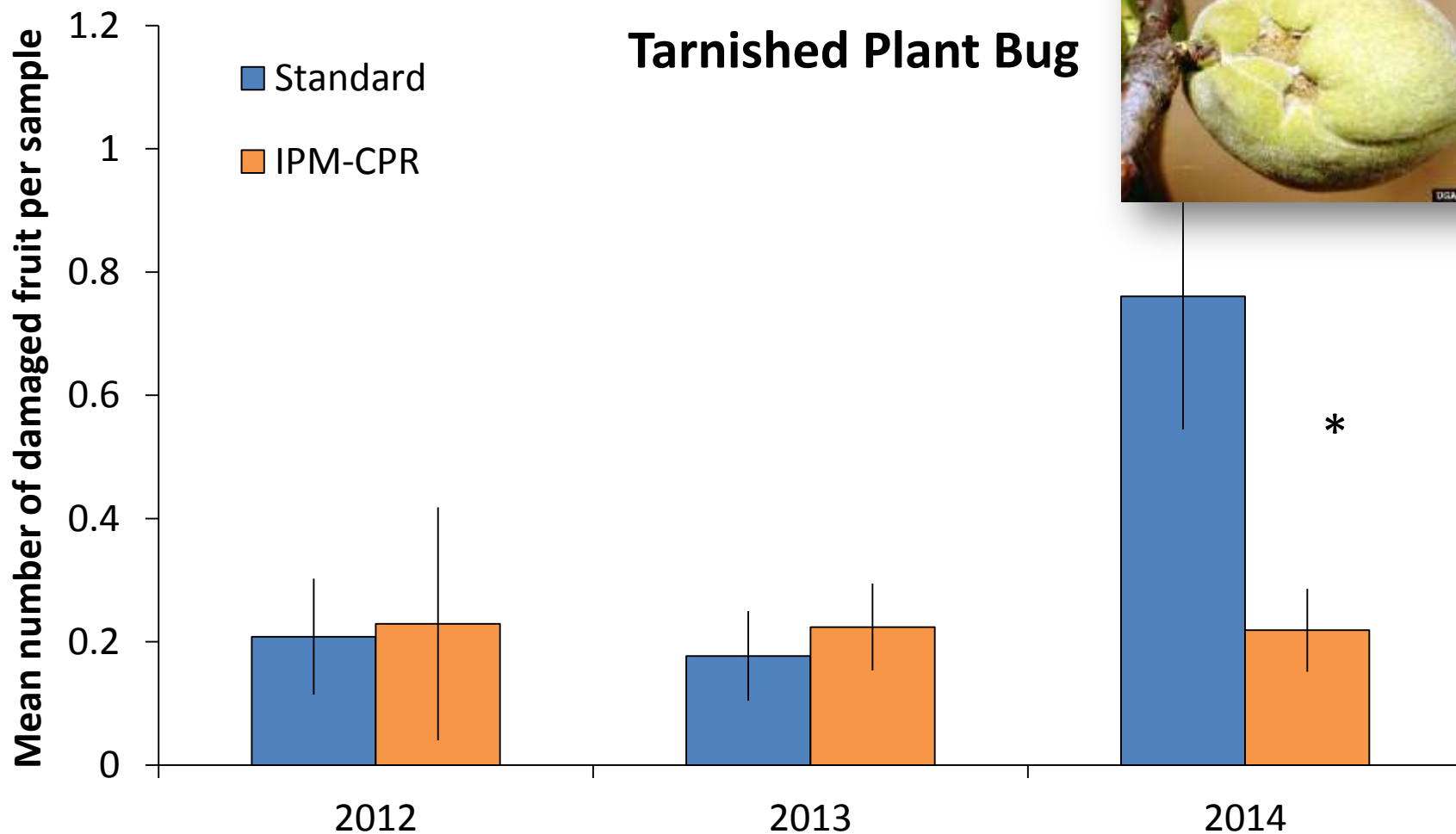


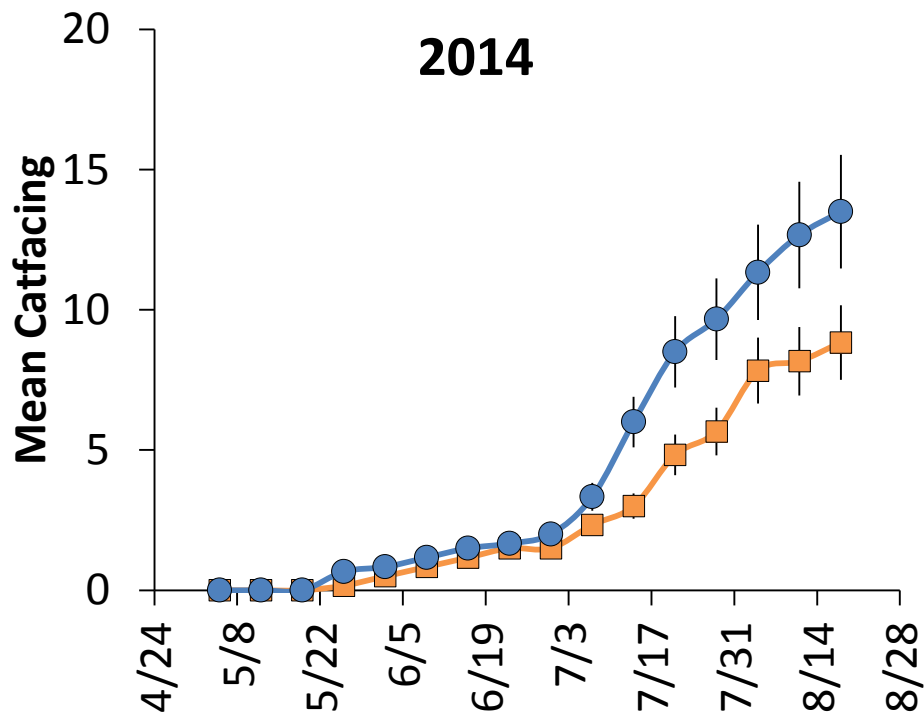
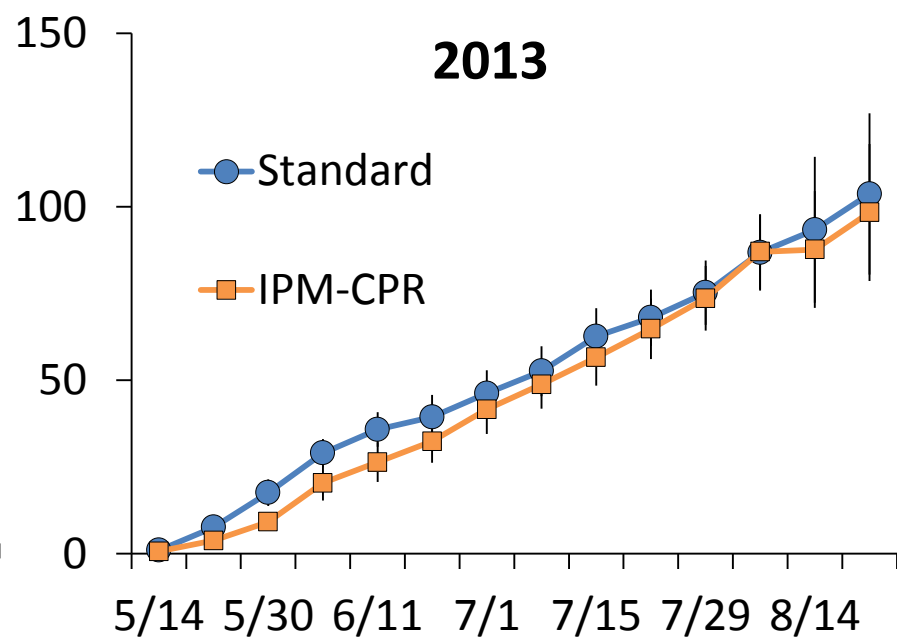
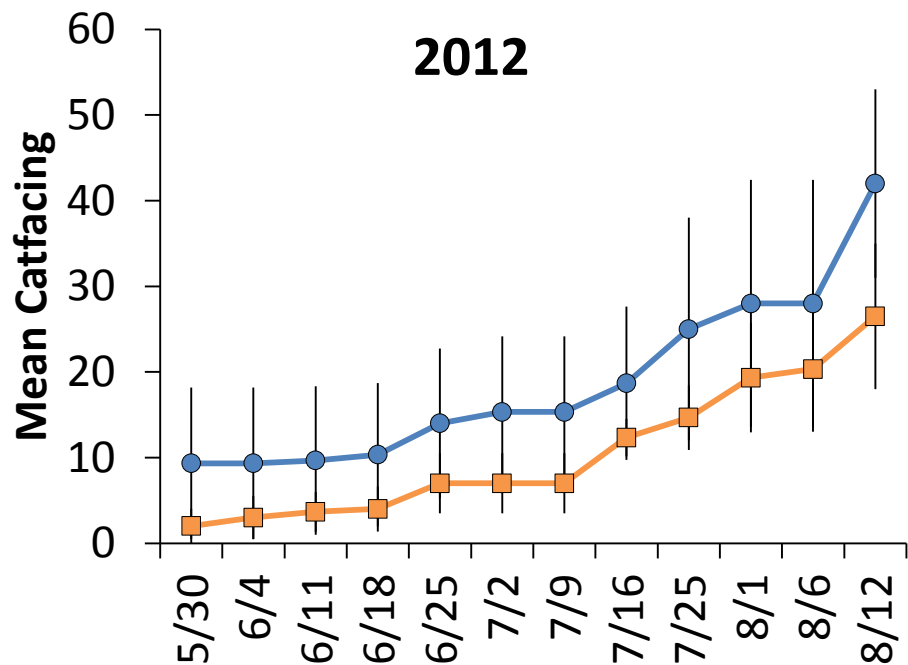
## ***Oriental Fruit Moth Management***

Year	Material	Rate	Internal Feeding	OFM Live
2014	Madex HP	1.5 oz	1.0 ± 1.0 b	3.9 ± 3.9 ab
	Altacor	4.0 oz	0.0 ± 0.0 b	6.0 ± 4.8 ab
	Untreated		13.1 ± 1.8 a	13.2 ± 4.5 a

**OFM TT provides 180 days mating disruption, 100 dispensers/acre**

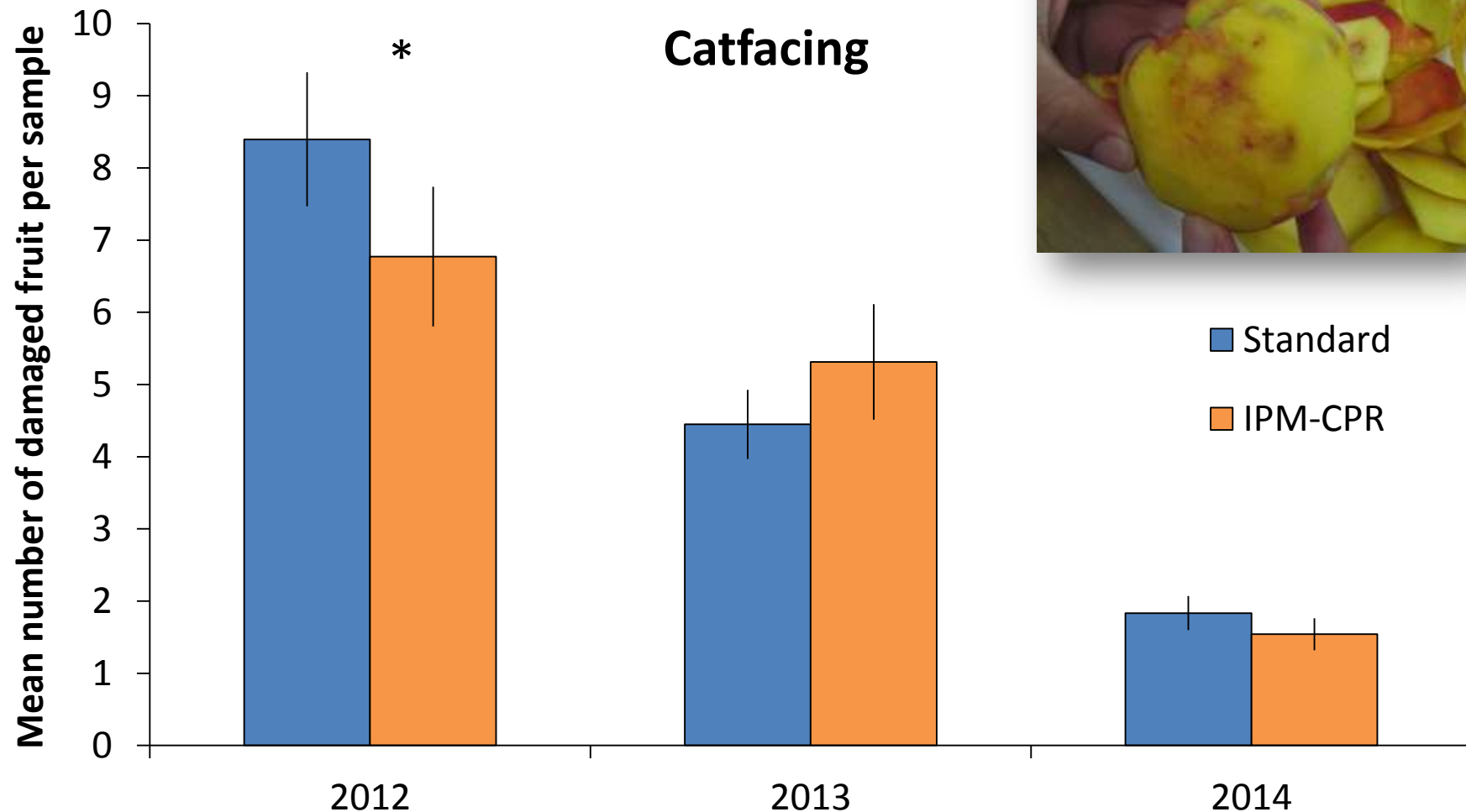
Year	Material	Rate	Internal Feeding	OFM Live
2014	Delegate WG	6.5 oz	3.0 ± 3.0 ab	3.5 ± 2.4 b
	Altacor	3.0 oz	2.0 ± 2.0 ab	1.0 ± 1.0 b
	Untreated		18.2 ± 4.9 a	30.5 ± 4.1 a



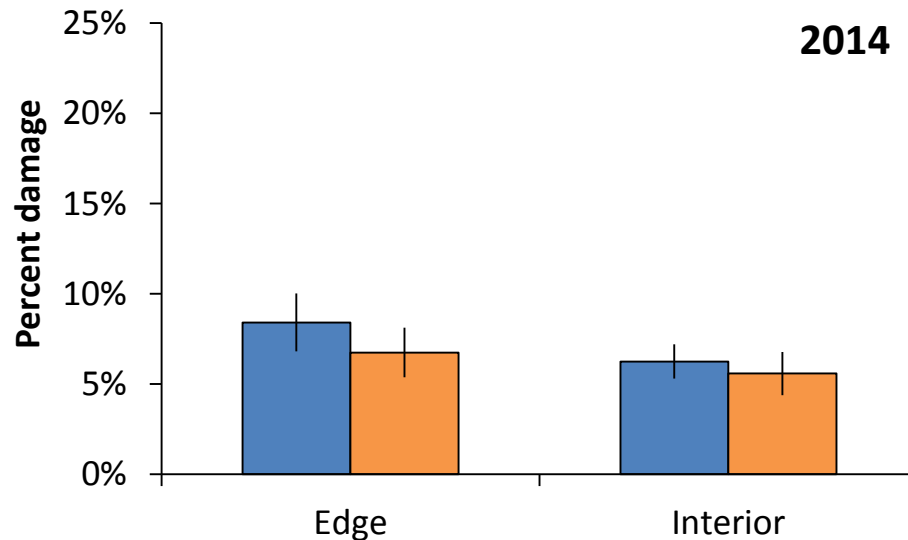
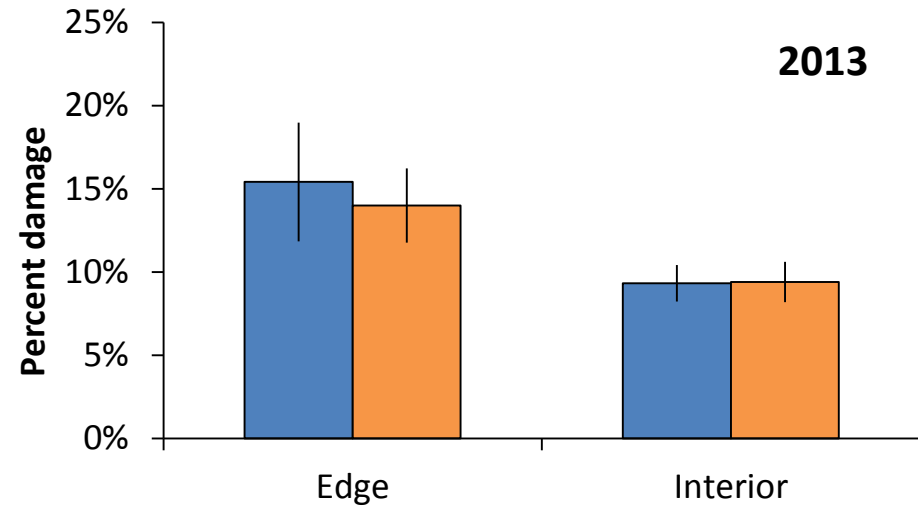
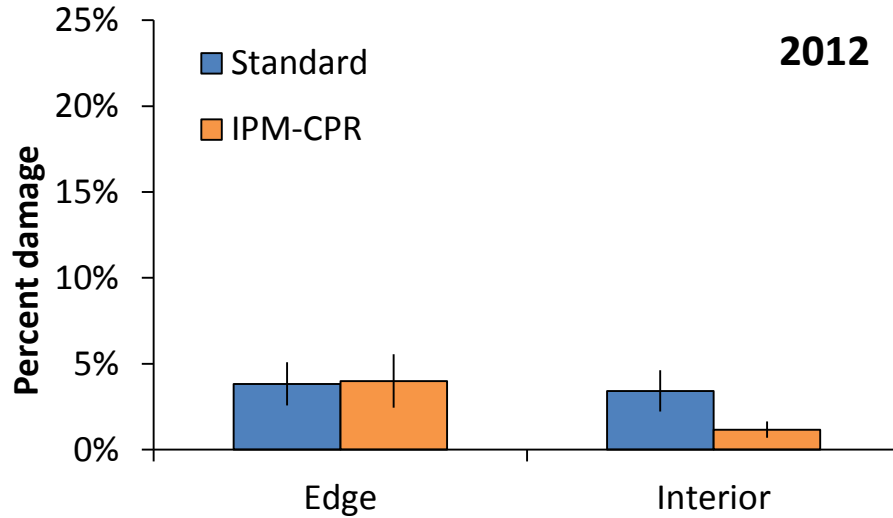




# Peach Damage at Harvest

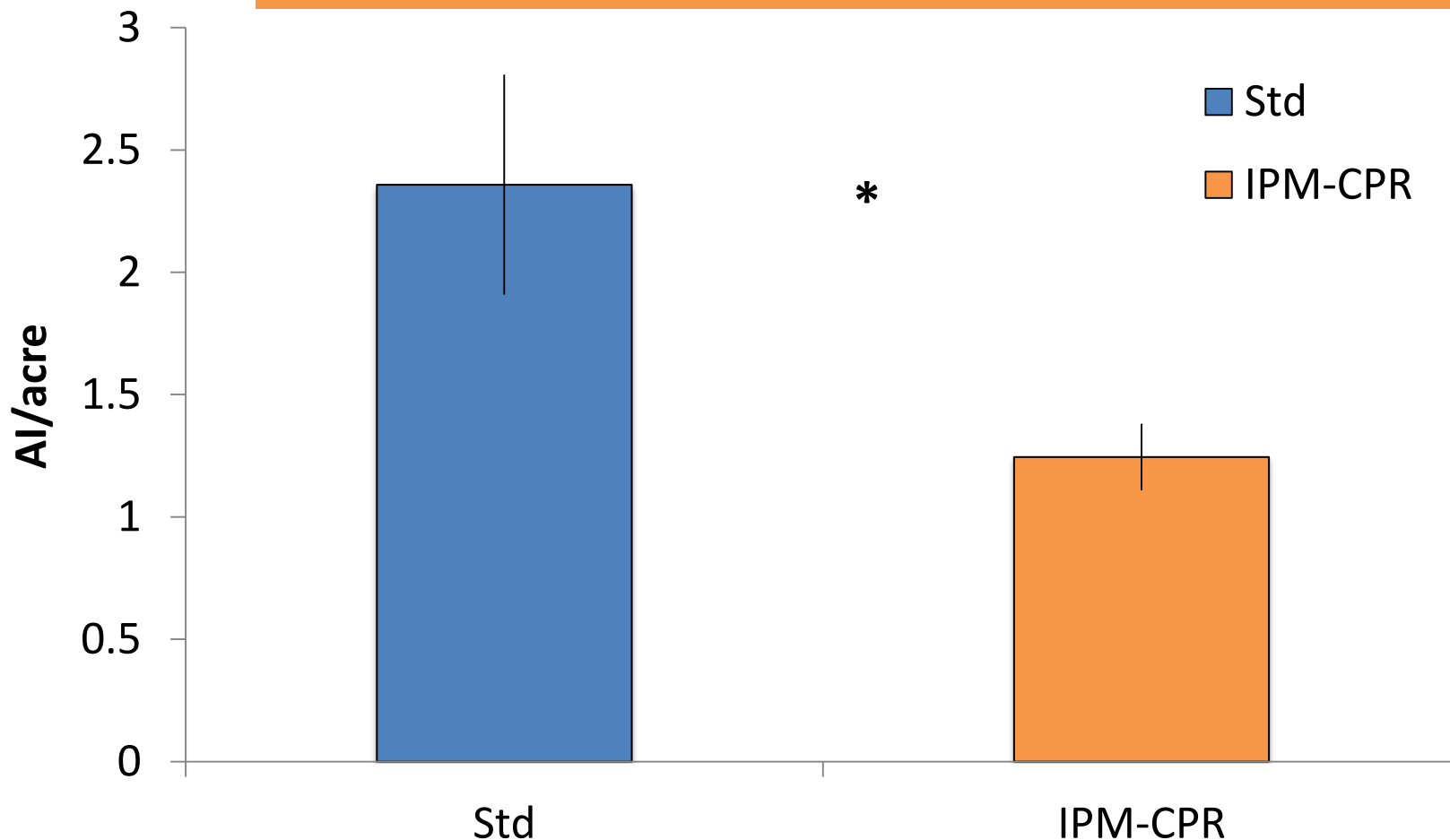


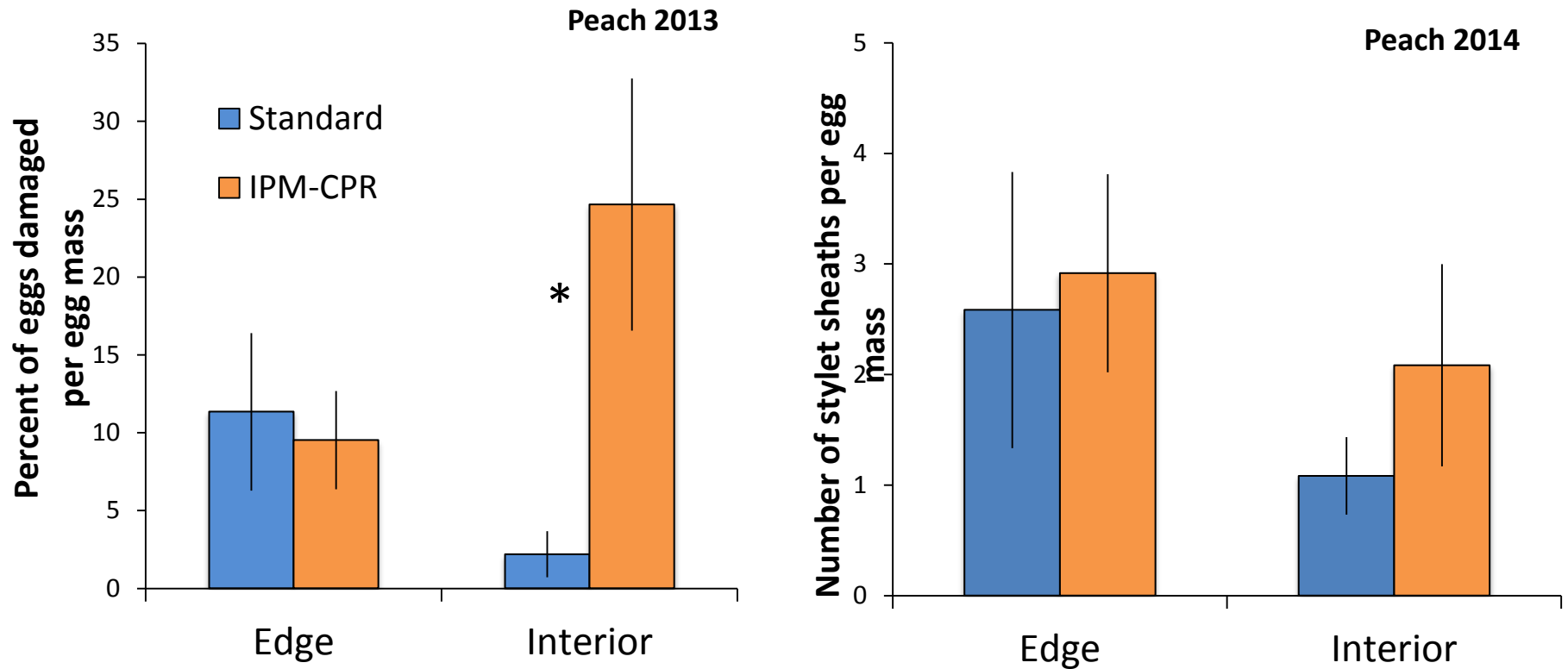
# RUTGERS *Catfacing Injury at Harvest in Peach*



## *Active Ingredient Applied*

**No relationship between size of border and amount of AI or % damage**

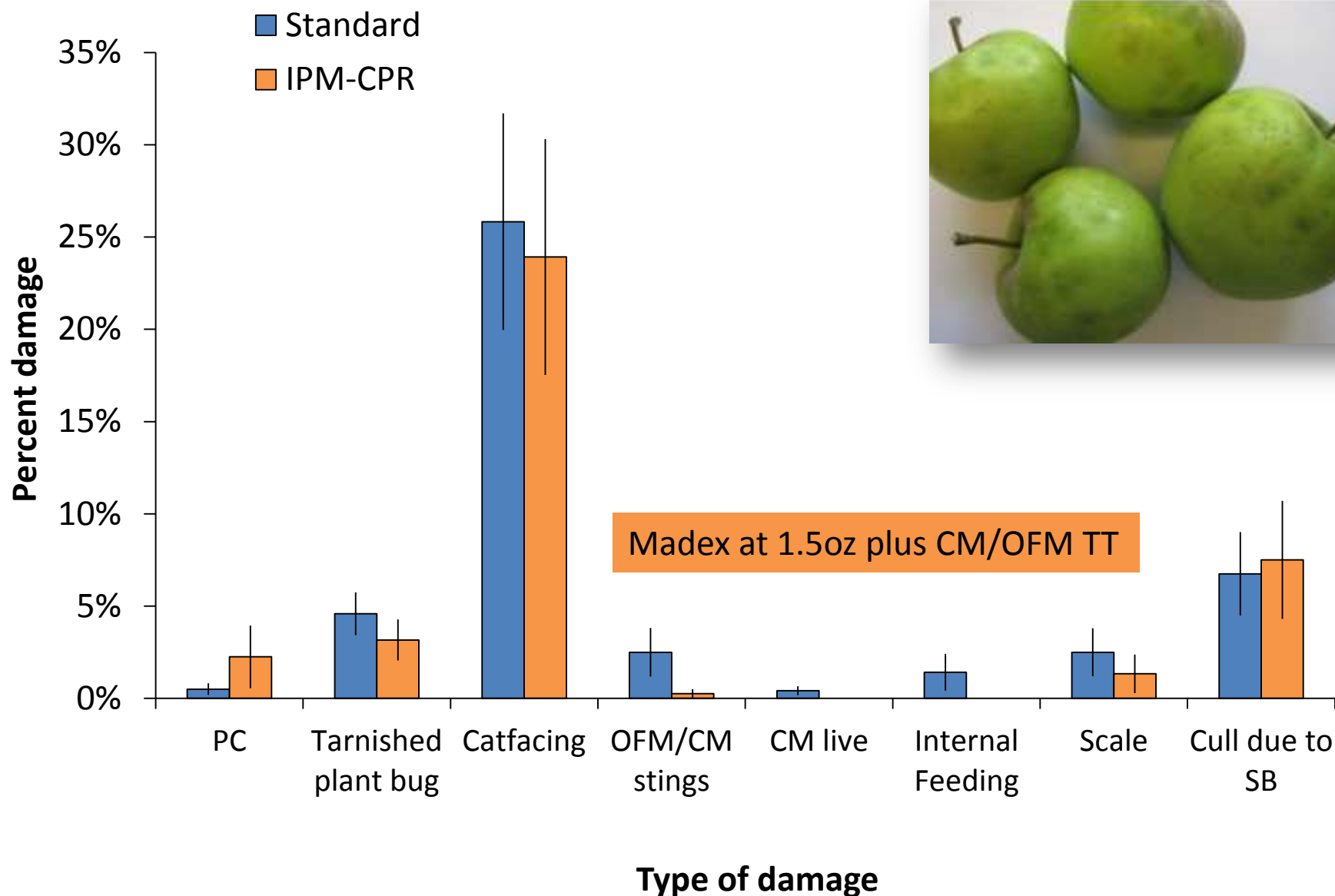




- IPM CPR uses insect behavior of multiple pests for management
- Enhances natural enemy services through reduced insecticide inputs
- Manages an invasive species



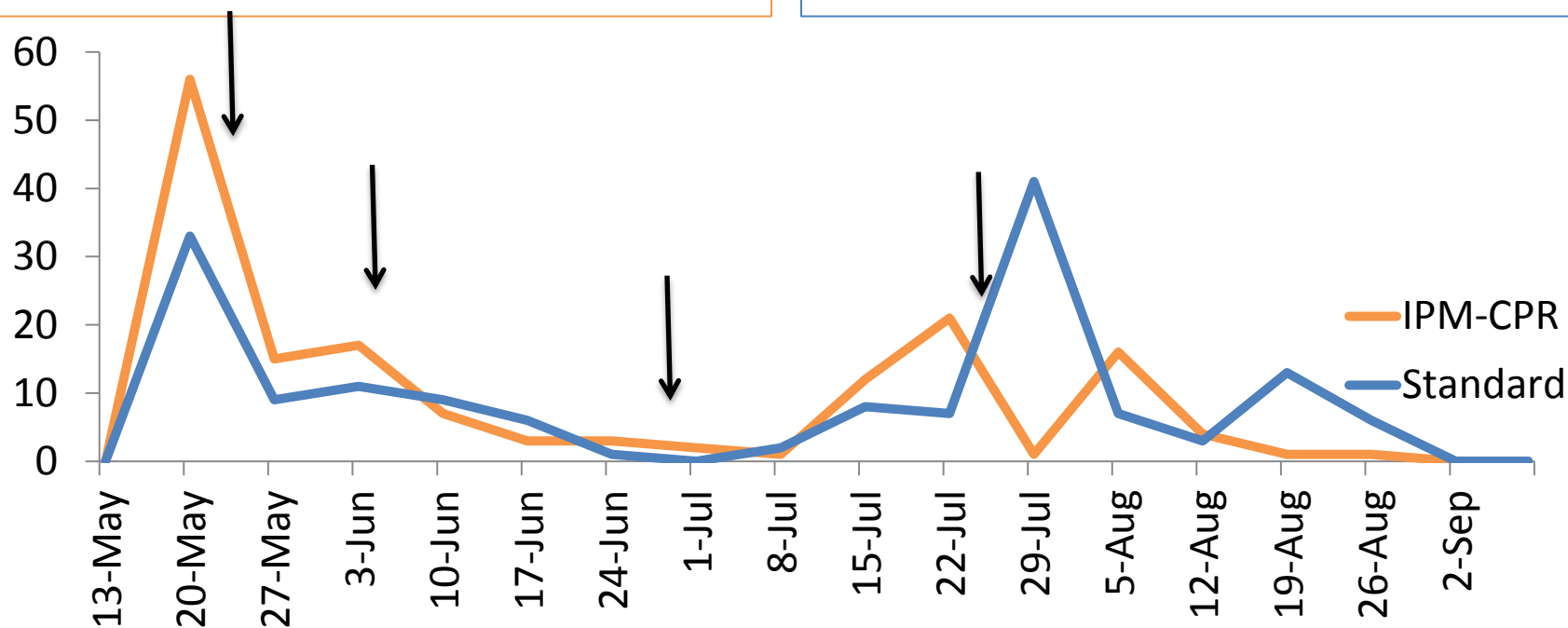
# Apple Damage at Harvest 2014



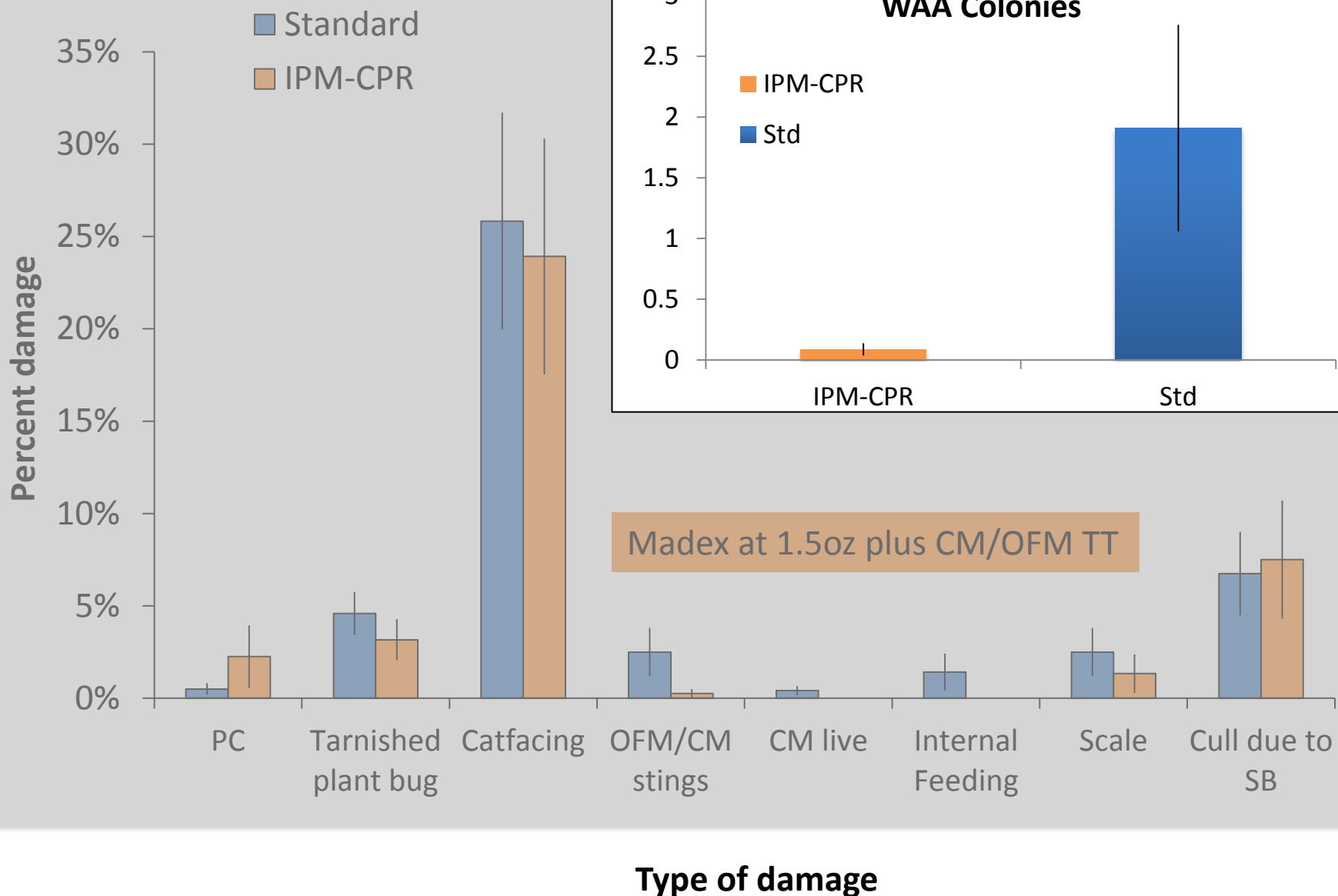
# Management of OFM and Codling Moth

- Mating disruption with Isomate CM/OFM TT
  - 200/acre
- Madex HP
  - 1.5oz/acre timed at egg hatch

- Avaunt
- Delegate
- Warrior



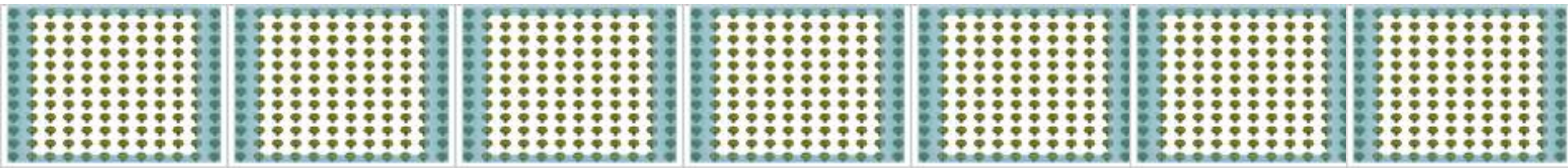
# Apple Damage at Harvest 2014



## *IPM Programs Incorporating BMSB*



- All insect pest populations are variable
- Reduced-risk products for OFM can be used in orchards with BMSB pressure
- BMSB is now part of the pest complex in orchards
- BMSB is an early-season pest of peaches with injury more severe early in the season
- IPM-CPR: Managed about 25% of the orchard for BMSB
  - Successfully reintroduced mating disruption and groundcover management
  - Catfacing was increased in trees with BMSB pheromone trap
  - Hope to refine this more by incorporating a treatment threshold for BMSB (USDA)





## Thanks!!

Nielsen Lab  
Brett Blaauw  
Ann Rucker  
Dean Polk  
Tracy Leskey

### NJ Growers:

Heilig Orchards

Circle M Farms

Summit City Farms

Sunny Slope Orchards



[njaes.rutgers.edu/extension100years](http://njaes.rutgers.edu/extension100years)



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