



Using a Phenological Model and Border Spray for Brown Marmorated Stink Bug

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BMSB Overview

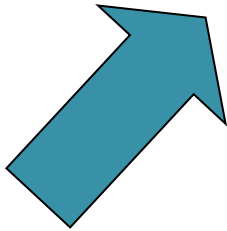
- Invasive species
- Stink bug - 5 nymphal instars
- Adults and nymphs feed on 100+ host plants
- Cause corking on interior of fruit and sunken or cat-faced fruit



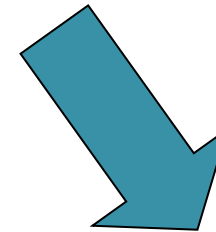
Summer



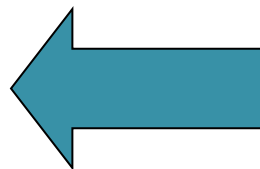
Spring



Fall



Winter

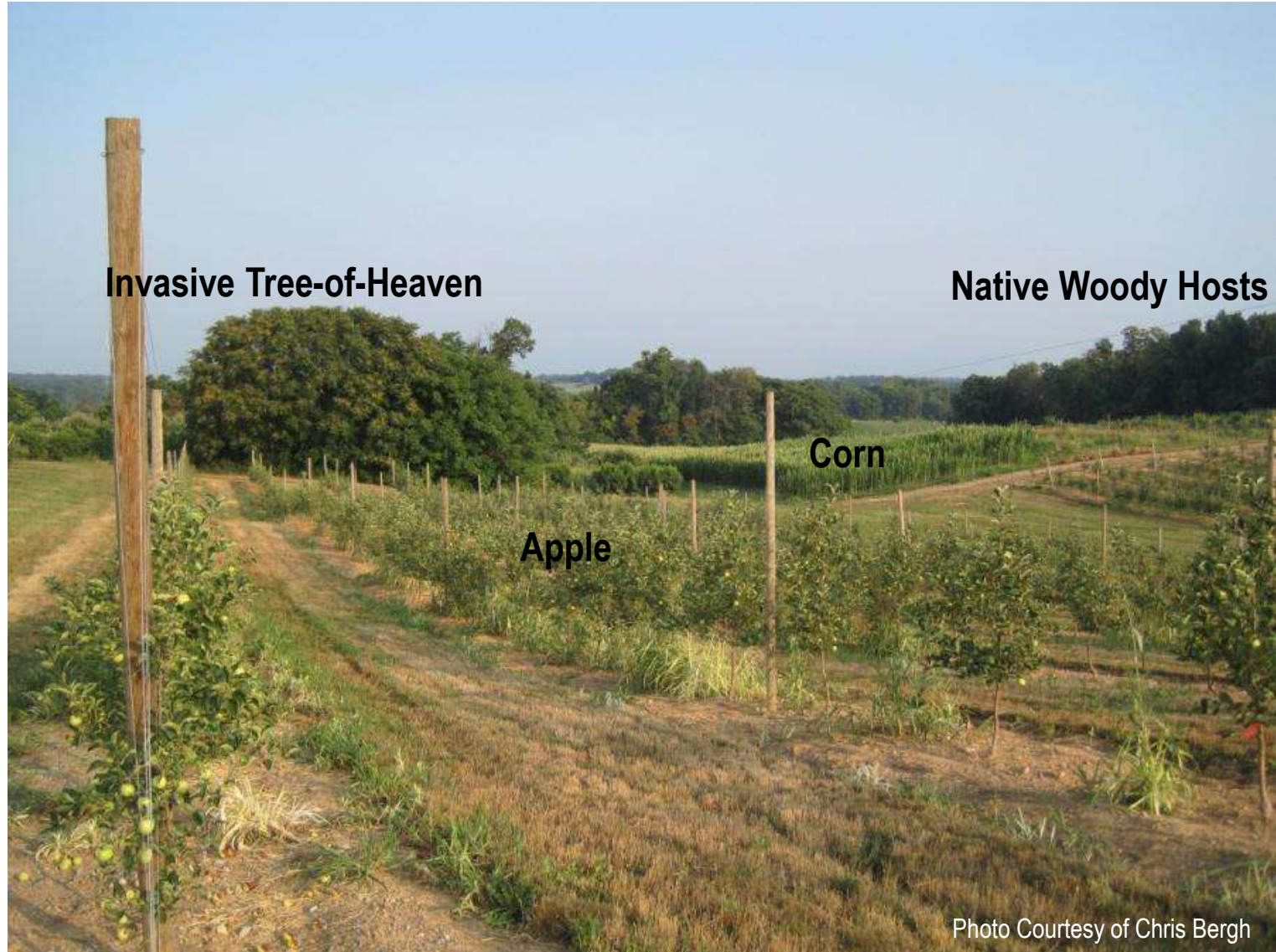


Why is BMSB a Severe Pest?

- Lack of natural enemies
- Different susceptibility to insecticides than native species
- Short residual of many insecticides
- Season-long pest in peach
- Population peaks when apples and pears are beginning to ripen
- Perimeter driven pest
- Highly mobile



Landscape Level Threat to Crops





ALN



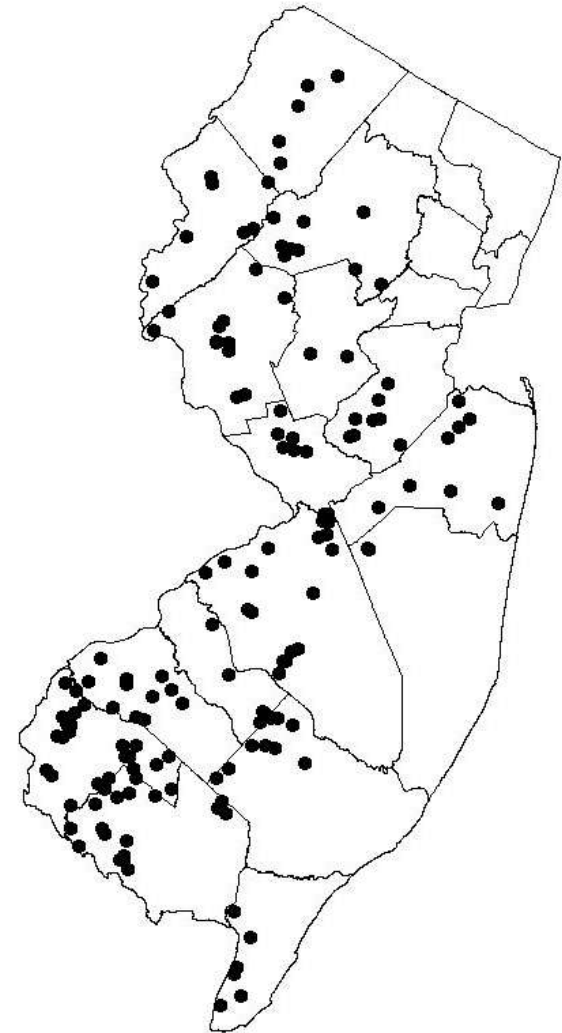
T. Leskey



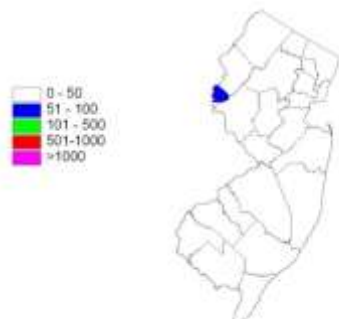
T. Leskey

Monitoring BMSB

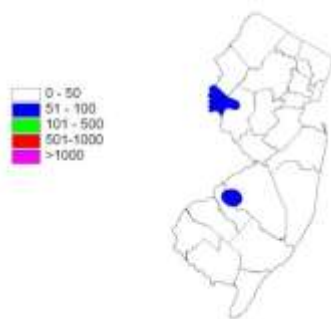
1. Back-ground population
 - Black light traps
 - NJ network of 50-70
2. Farmscape
3. On-plant



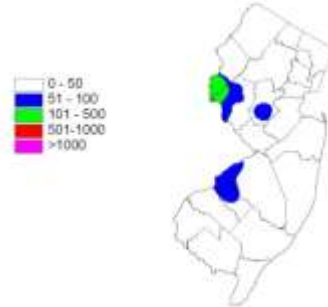
Distribution of Total Adult BMSB
catch for 2004



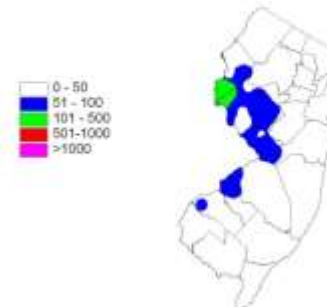
Distribution of Total Adult BMSB
catch for 2005



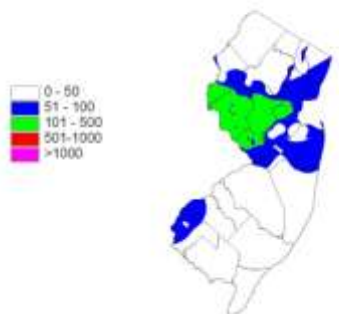
Distribution of Total Adult BMSB
catch for 2006



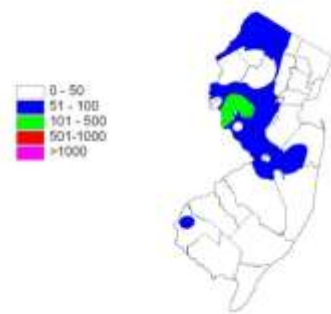
Distribution of Total Adult BMSB
catch for 2007



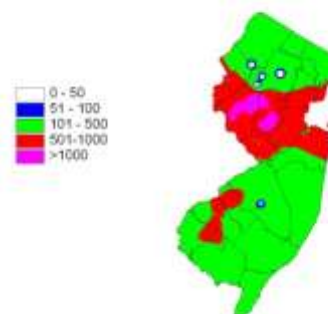
Distribution of Total Adult BMSB
catch for 2008



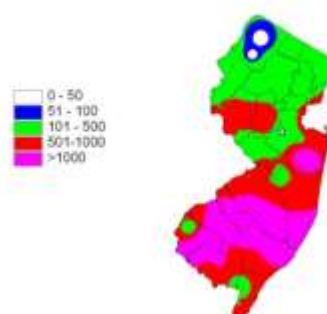
Distribution of Total Adult BMSB
catch for 2009



Distribution of Total Adult BMSB
catch for 2010



Distribution of Total Adult BMSB
catch for 2011



Monitoring BMSB

1. Back-ground population
 - Black light traps
 - NJ network of 50-70
2. Farmscape
 - Aggregation pheromone traps
 - How do they fit into a monitoring program?
3. On-plant



Monitoring BMSB

1. Back-ground population

2. Farmscape

3. On-plant

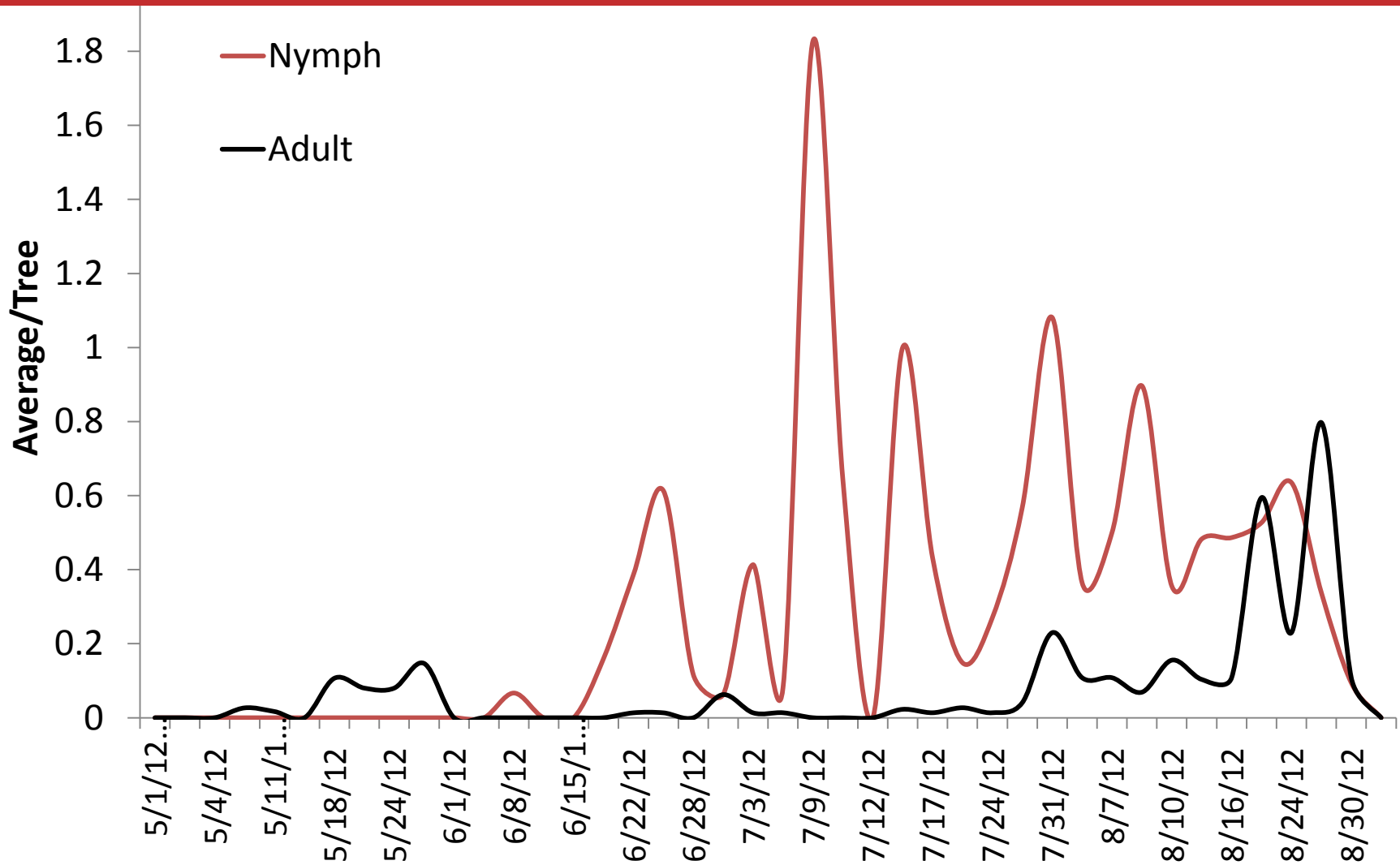
- Visual observations
- Sweep net



How Do We Manage BMSB?

- Current management relies heavily on insecticides, with up to 15/year on a calendar basis
- Control tactics should rely on accurate forecasting and phenological predictions
- Can we develop a phenological model to base an IPM program around?
 - Seasonality
 - DD accumulations
 - Population forecasting

Seasonality in Peach - 2012

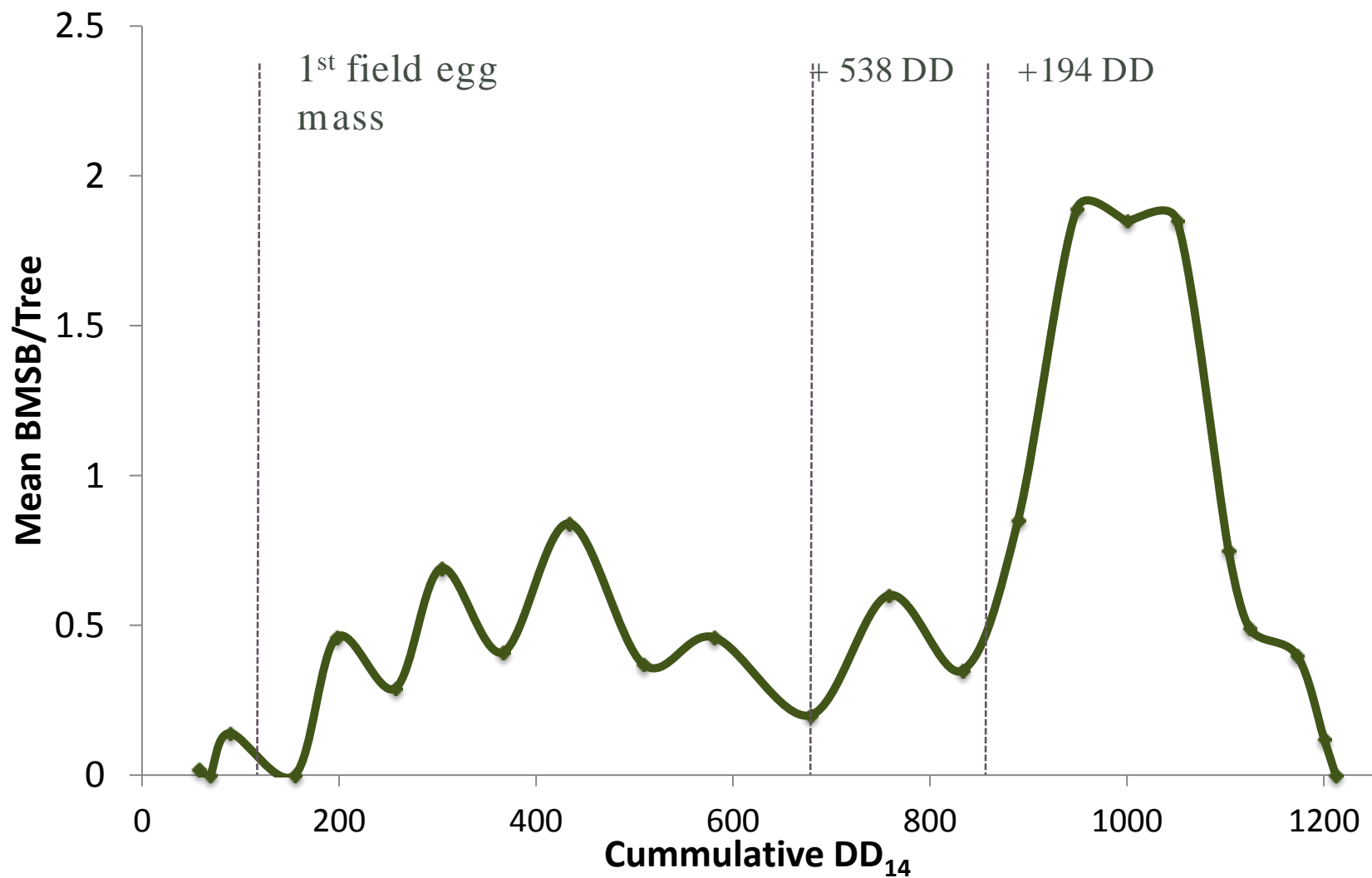


Can We Develop a Phenological Model?

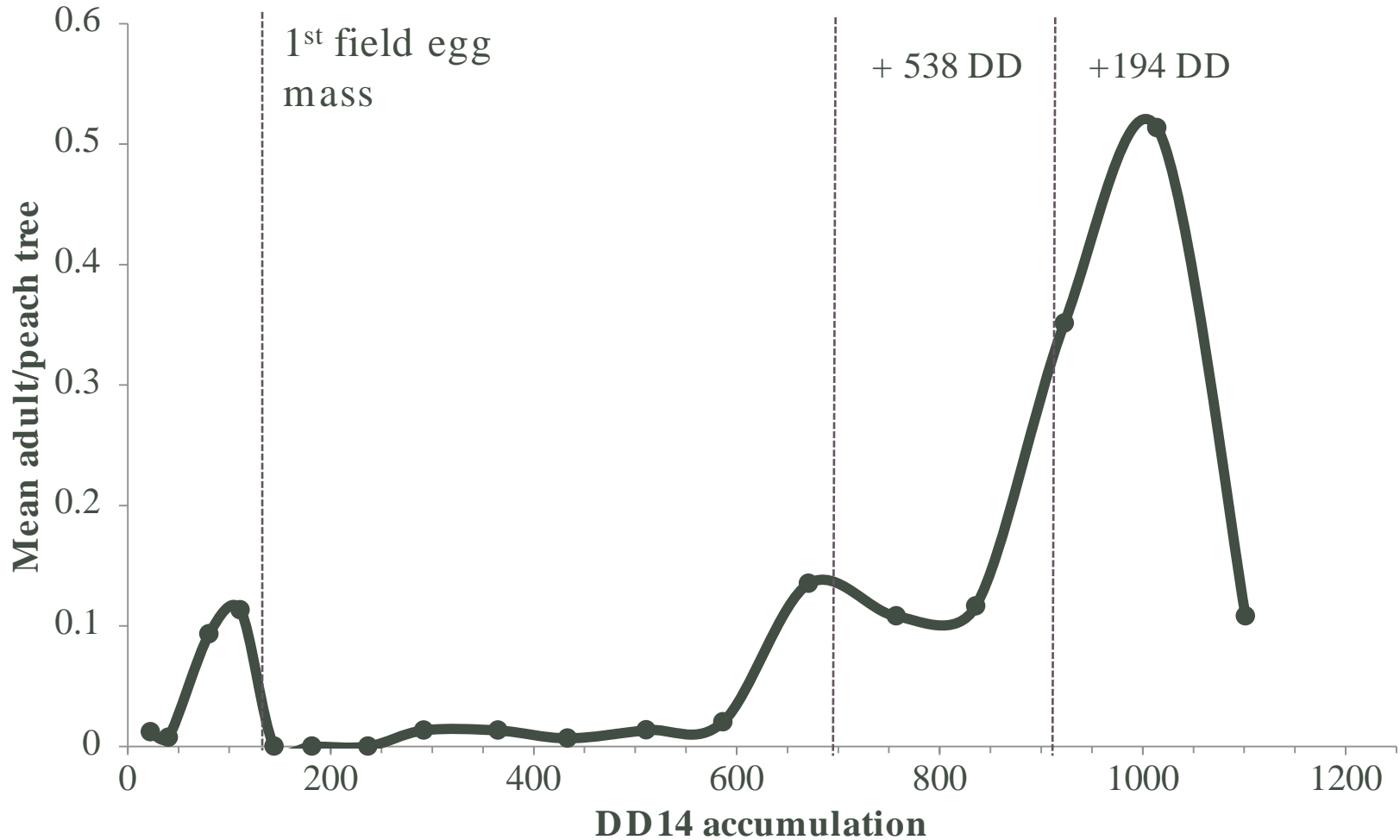
- Allow us to predict movement into the orchard
 - Gradually emerge from overwintering sites
 - Termination of diapause is a function of both photoperiod and temperature



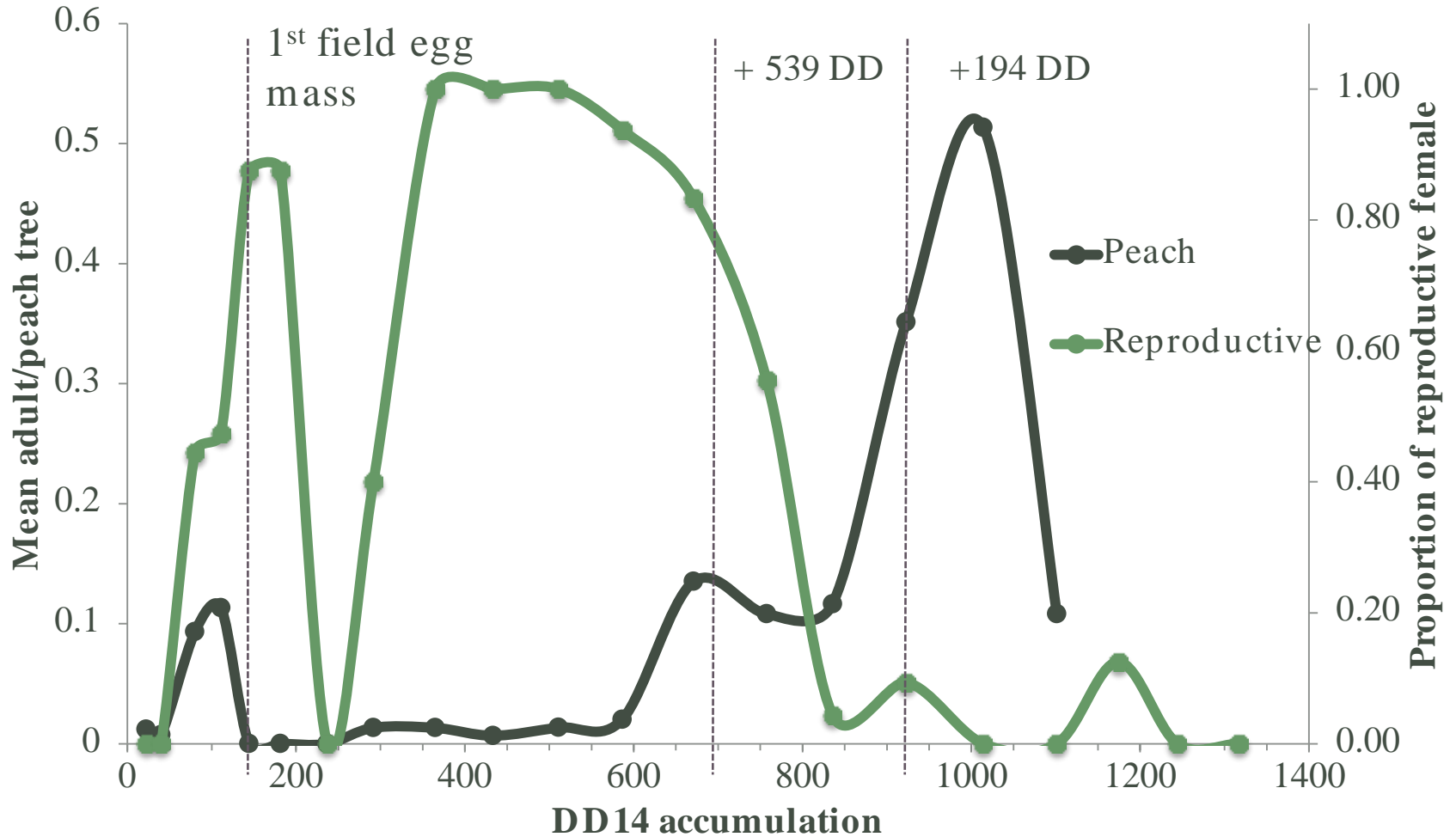
Phenological Model - 2011



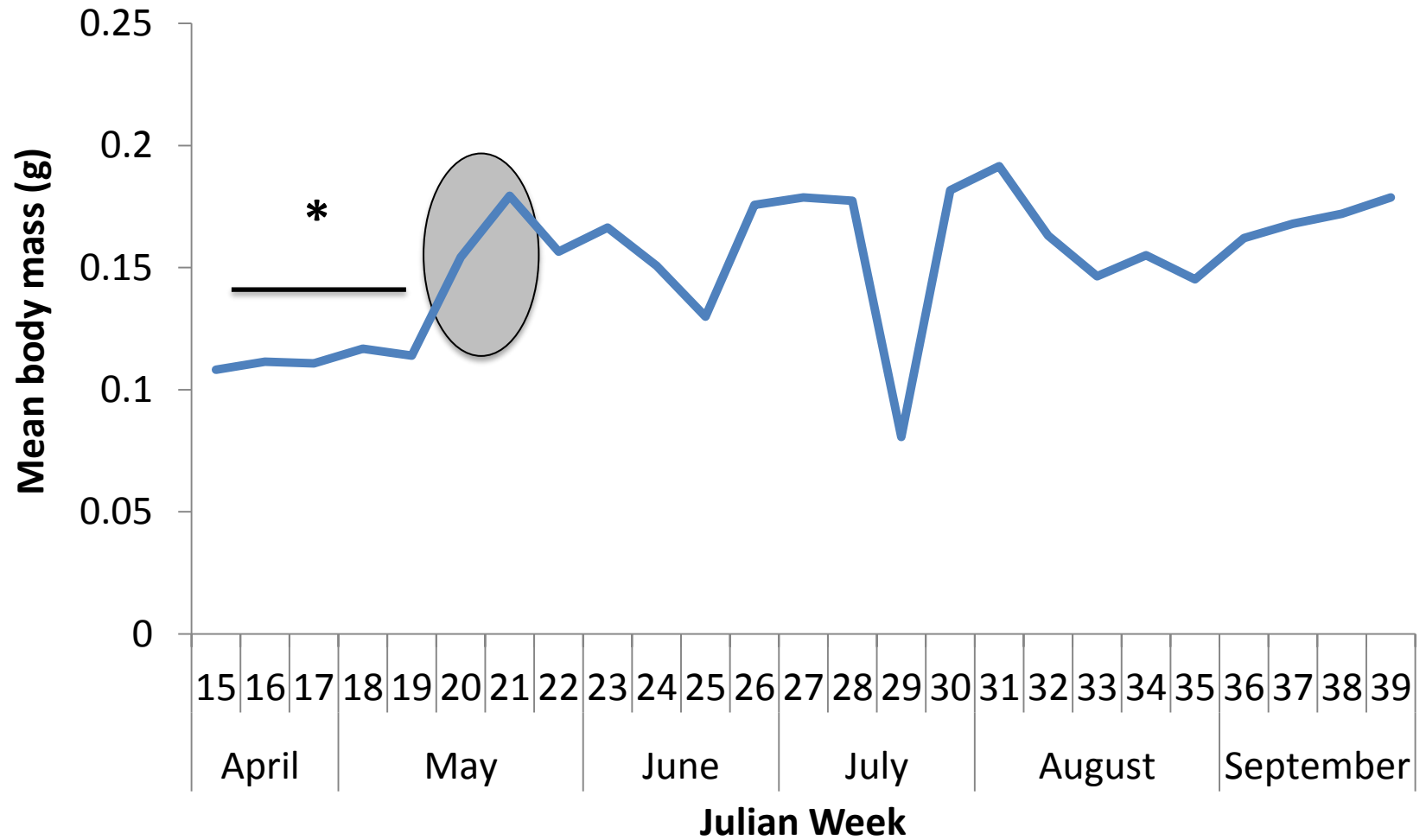
Phenological model - 2012



Phenological model



Female Body Mass



What are the Best Chemicals for Controlling BMSB?

- May be differences between efficacy against overwintering adults and summer adults
- Poor residual activity is a concern
- Starting to see secondary pest issues

<i>BMSB</i>	<i>Product Name</i>	<i>AI</i>	<i>Class</i>
++++	Endigo ZC	lambda-cyhalothrin + thiomethoxam	N+P
++++	Belay	clothianidin	N
++++	Voliam Flexi	thiomethoxam + chlorantraniliprole	N+D
++++	Voliam Xpress	lambda-cyhalothrin + chlorantraniliprole	P+D
++++	Brigade/Bifenture**	bifenthrin	P
+++	Actara	thiomethoxam	N
+++	Ambush/Pounce/Perm-Up	permethrin	P
+++	Baythroid	beta-cyfluthrin	P
+++	Leverage	imidacloprid + cyfluthrin	P+N
+++	Warrior/Warrior II	lambda cyhalothrin	P
+++	Admire Pro	imidacloprid	N
+++	Scorpion/Venom**	dinotefuran	N
++	Lannate	methomyl	C

Early Season Reduced-risk Trial

- Evaluated biopesticide or organic compounds against nymphs
- Azera, MBI-206, M-Pede showed laboratory efficacy and reduction in feeding injury against early season fruit



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Border Spray Trial

- Compared to grower standard spray, every 14 day or 10d ARM sprays
 - Jersey Queen or Harcrest varieties
- Apply insecticides for BMSB to perimeter of orchard only
 - Ground cover management, builds on previous IPM programs
 - Mating disruption for OFM (Isomate M-100; 100/acre)
 - Cover Sprays every 7-10 days
 - Beginning late-May
- Sampled weekly for stink bugs, TPB, catfacing injury, OFM stings and flagging, brown rot
 - Transect samples of perimeter of orchard, interior and middle
- At harvest, evaluated 800-900 fruit per block for insect injury

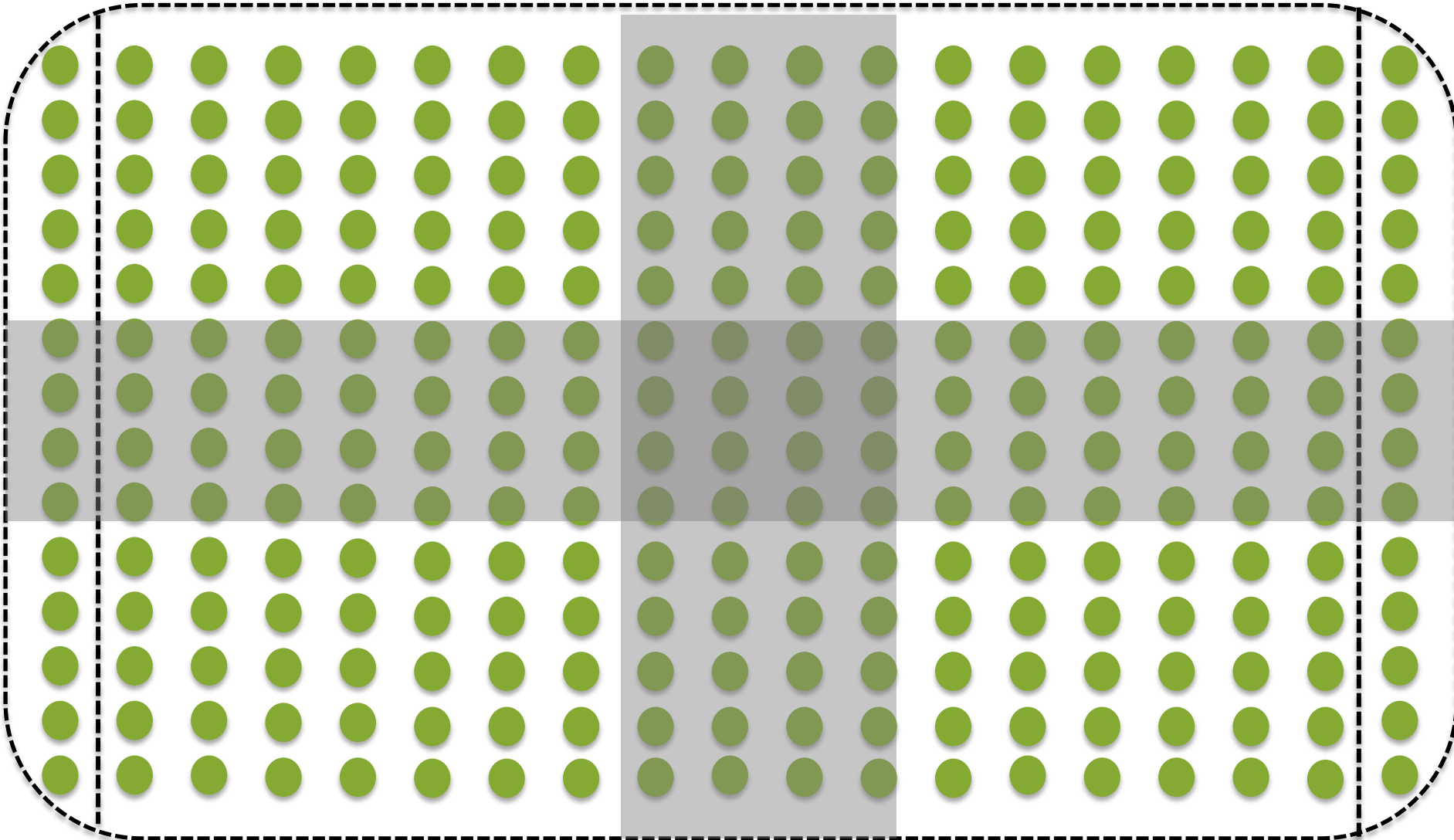


0.5 0 0.5 1 Mil

Sample Orchard

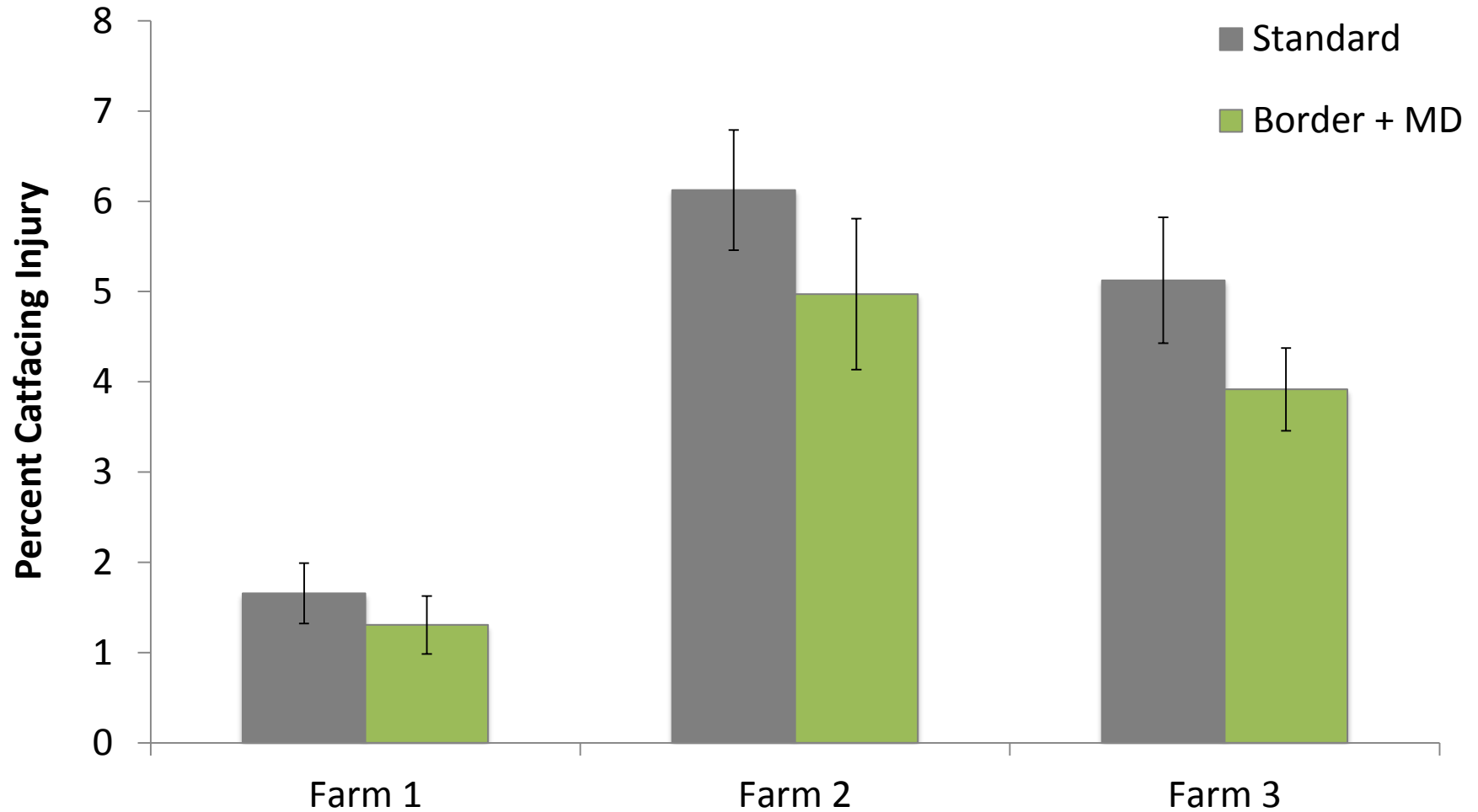


Sample Orchard

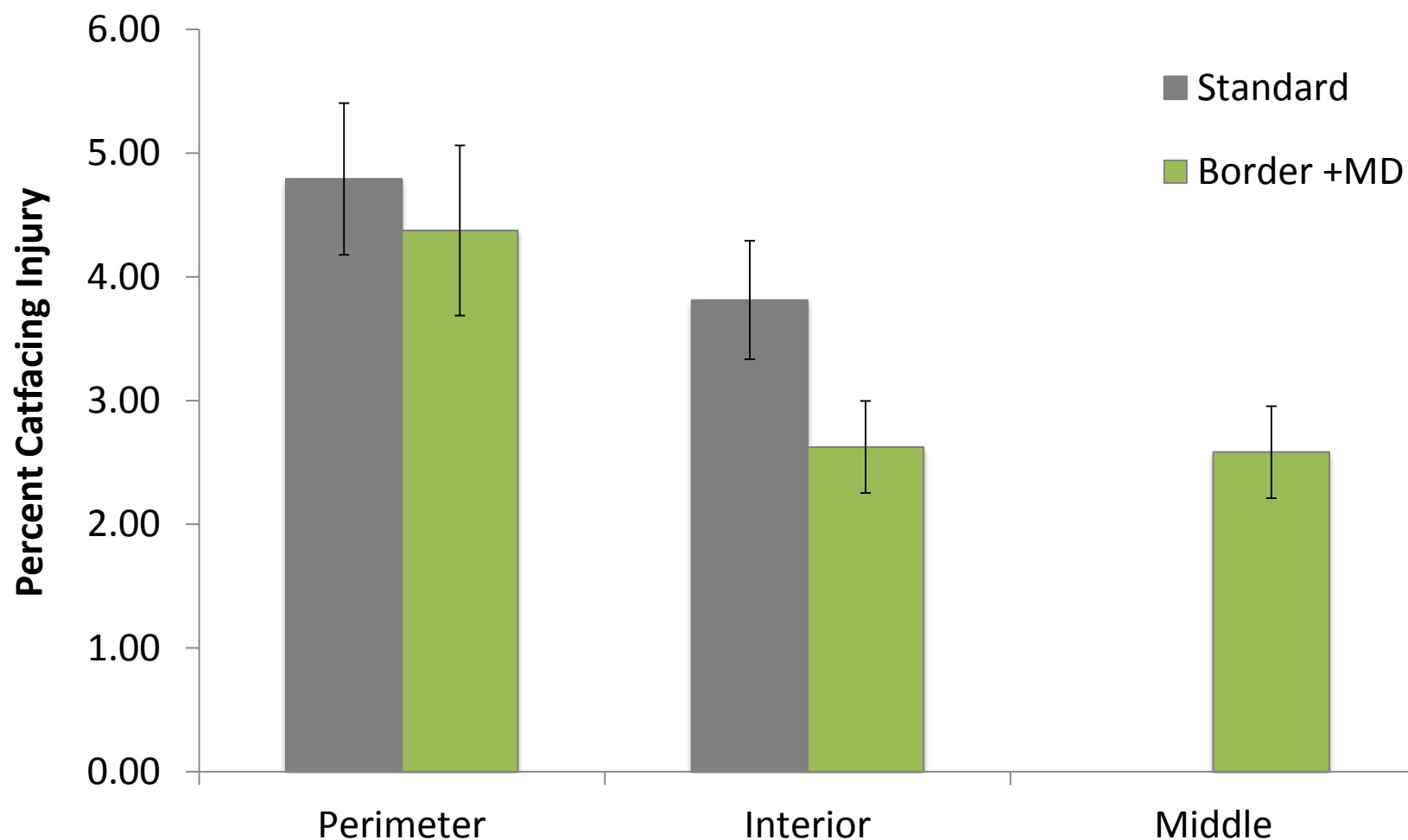


Did it Work?

Injury at Harvest



Injury by Location Within Orchard



Border Spray Trial Results

- No difference in OFM or PC fruit injury
- Cost of application/acre of cover sprays:

<i>Cost/Acre</i>	Standard	ARM	Border	% Border
Farm 1	\$60.38	Y		22
Farm 2	\$155.01	N		27.2
Farm 3	\$47.91	Y		22.9

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<i>Cost/Acre</i>	Standard	ARM	Border	% Border
Farm 1	\$60.38	Y	\$40.92	22
Farm 2	\$155.01	N	\$49.47	27.2
Farm 3	\$47.91	Y	\$43.03	22.9

Additional Expected Benefits

- Reduced impact on natural enemies
 - Biological control
 - 2^o pests
- Flexibility
 - 7 day interval
- Reduced AI in environment
 - Worker safety



Putting it all together

- Biofix of January 1
- Movement into orchards at ~80-120 DD
- Early Spring temperatures will not speed up activity
- Phenological model predicts activity and key reproductive periods



Putting it all together

- Target early season population during movement into crops
- Perimeter sprays effective in 2012
 - Save highly efficacious materials for late-season applications
- Border sprays save \$\$



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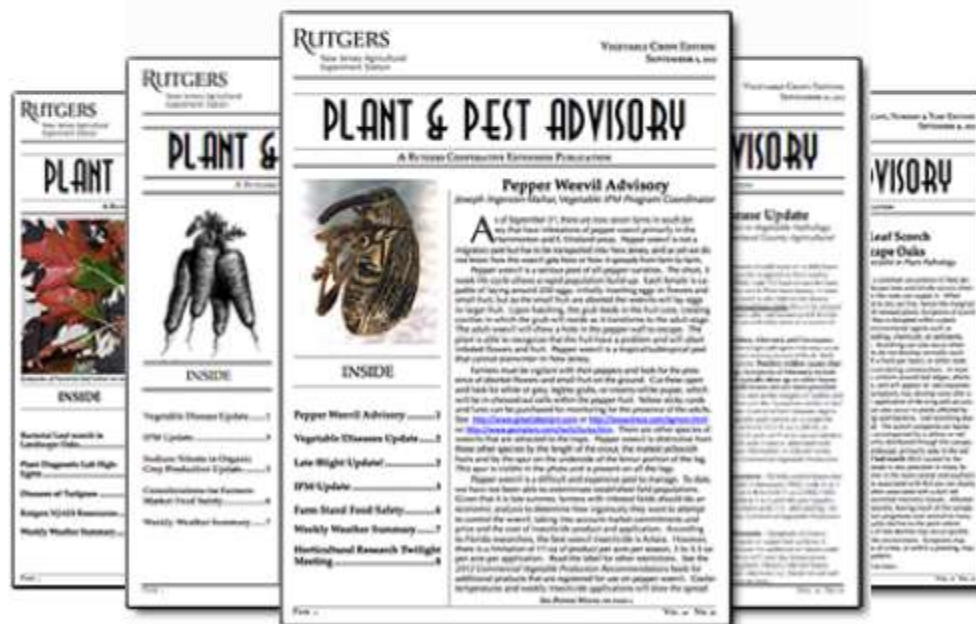
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Thanks

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