Photo by Matt Bertone

Spotted wing drosophila management in the Southeastern USA- economic impacts and future management

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and

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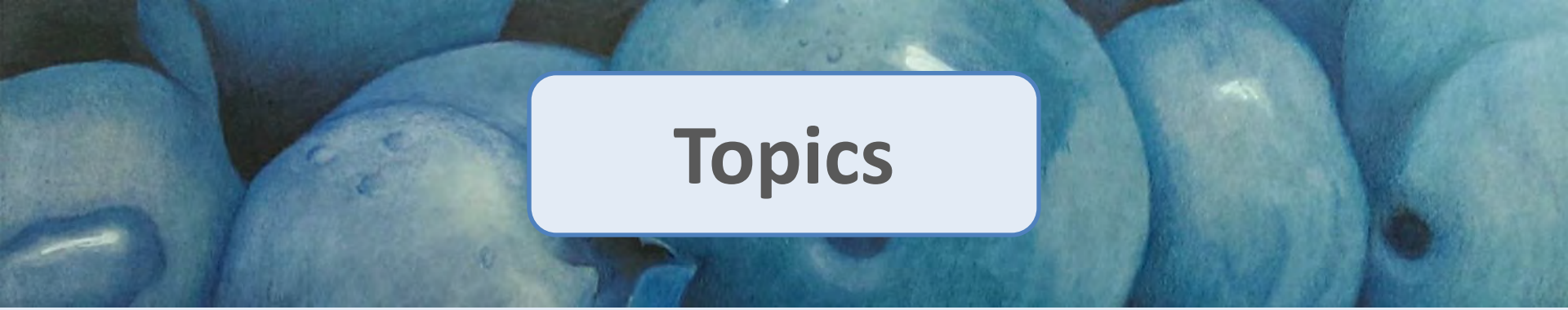
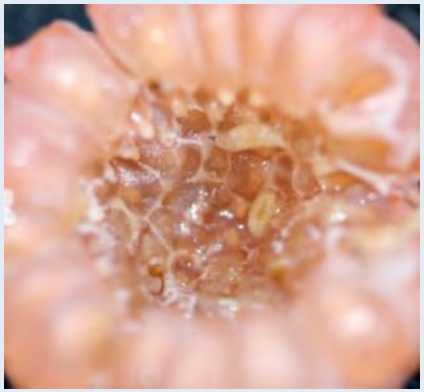


Topics

- SWD significance and impacts in the Southeastern US
- Seasonal biology in the Southeast
- Management options
  -current & future

Spotted wing drosophila significance

Damage is cryptic & seasonally difficult

Limited effective chemical management tools

Non chemical tools have unclear benefit & are potentially costly

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SWD impacts in the Southeastern US

2013	Blueberry	Raspberry	Blackberry
Maximum loss (all states reporting)	100%	100%	100%
Average loss (all states reporting)	4.7%	16.3%	12%
Estimated losses (all states reporting)	$13,003,298	$4,586,893	$5,328,768
NC Average loss	2%	19%	10%
NC Estimated losses	$1,420,000	$169,316	$561,439

More information on impacts: http://swd.ces.ncsu.edu

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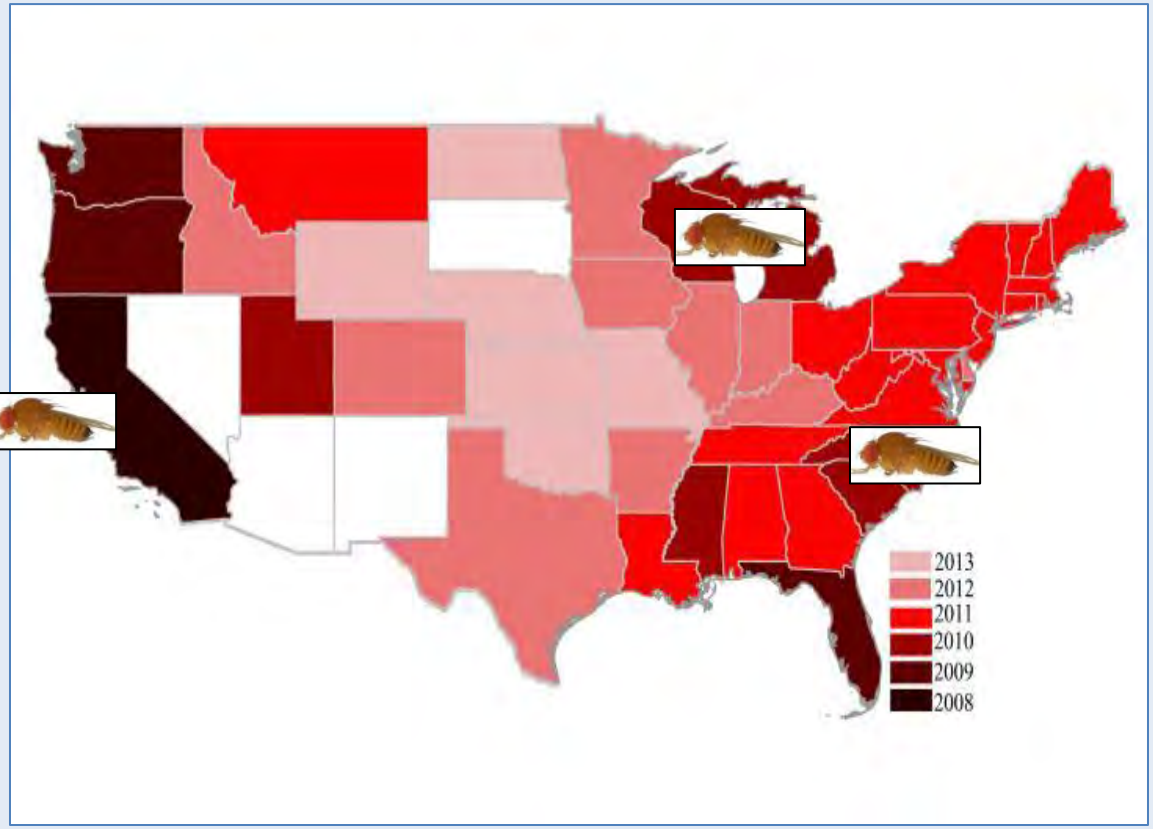
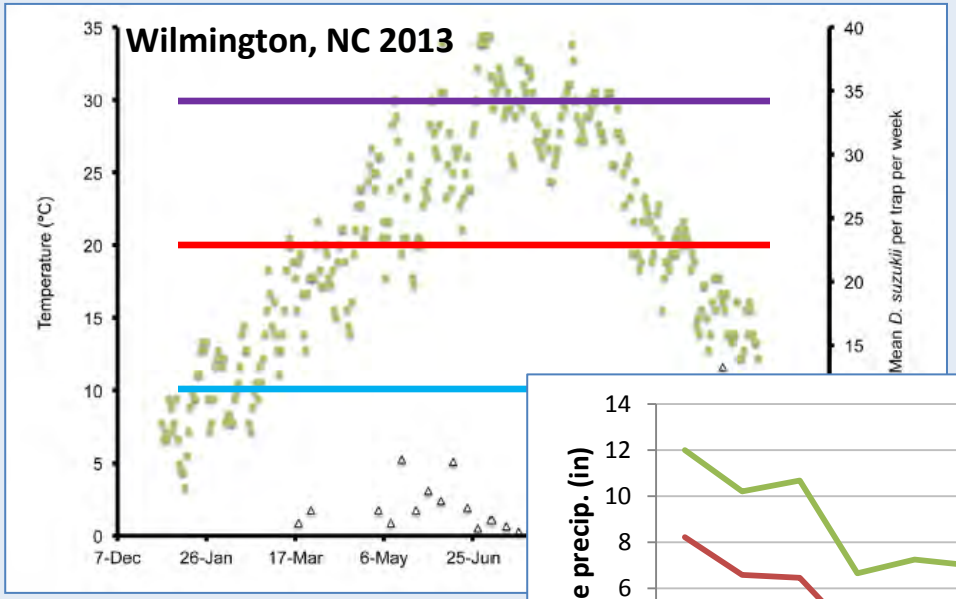
What is different about the Southeastern US?

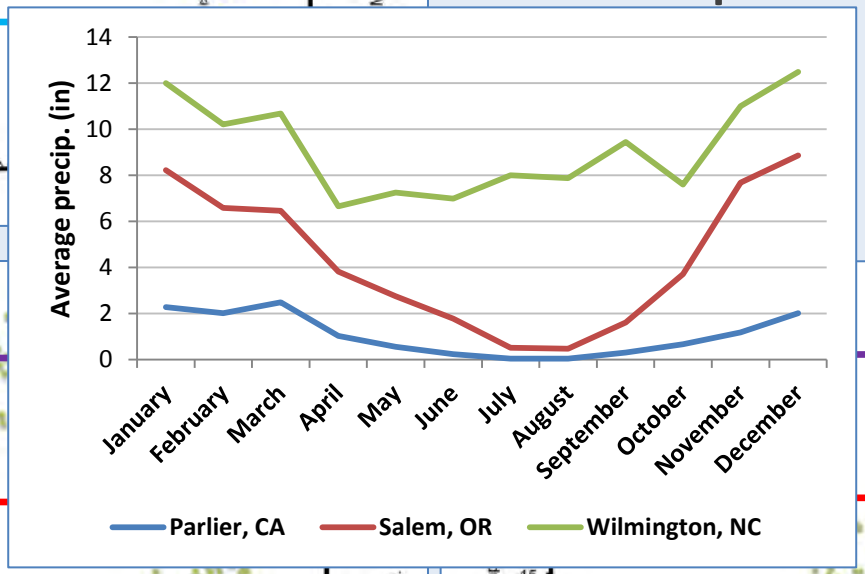


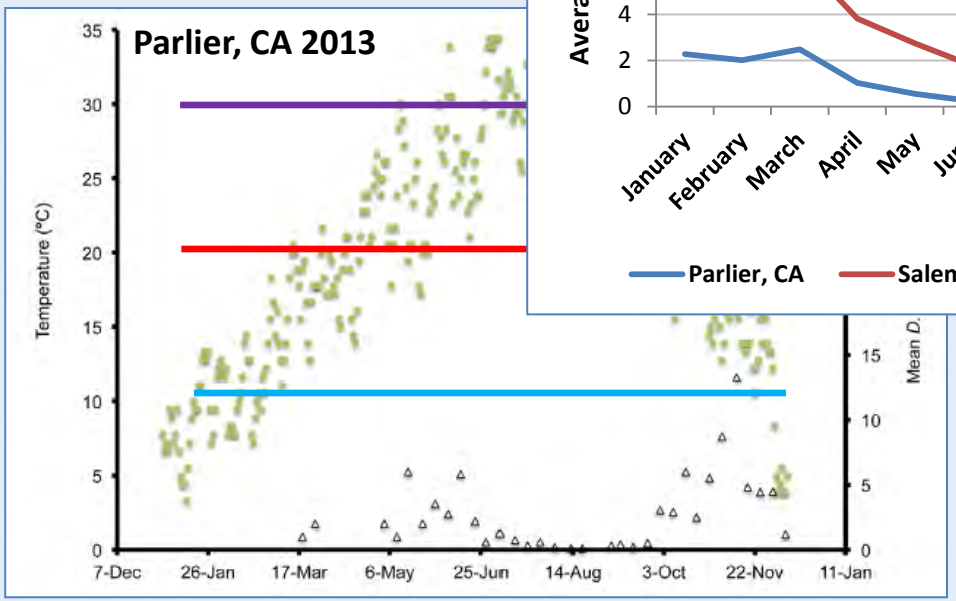
Burrack et al. 2012, map updated 2013

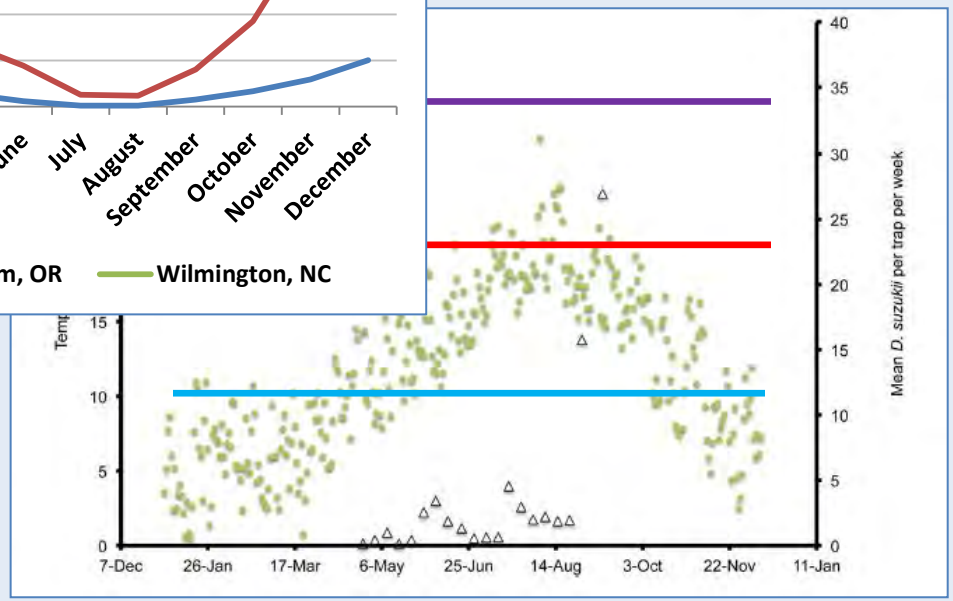


Seasonal biology differences:

- SWD most active at 20°C
- Less active above 30°C
- Low survival under 10°C
- Precipitation differences







Dalton et al 2011; Walsh et al 2011; Wiman et al. 2014

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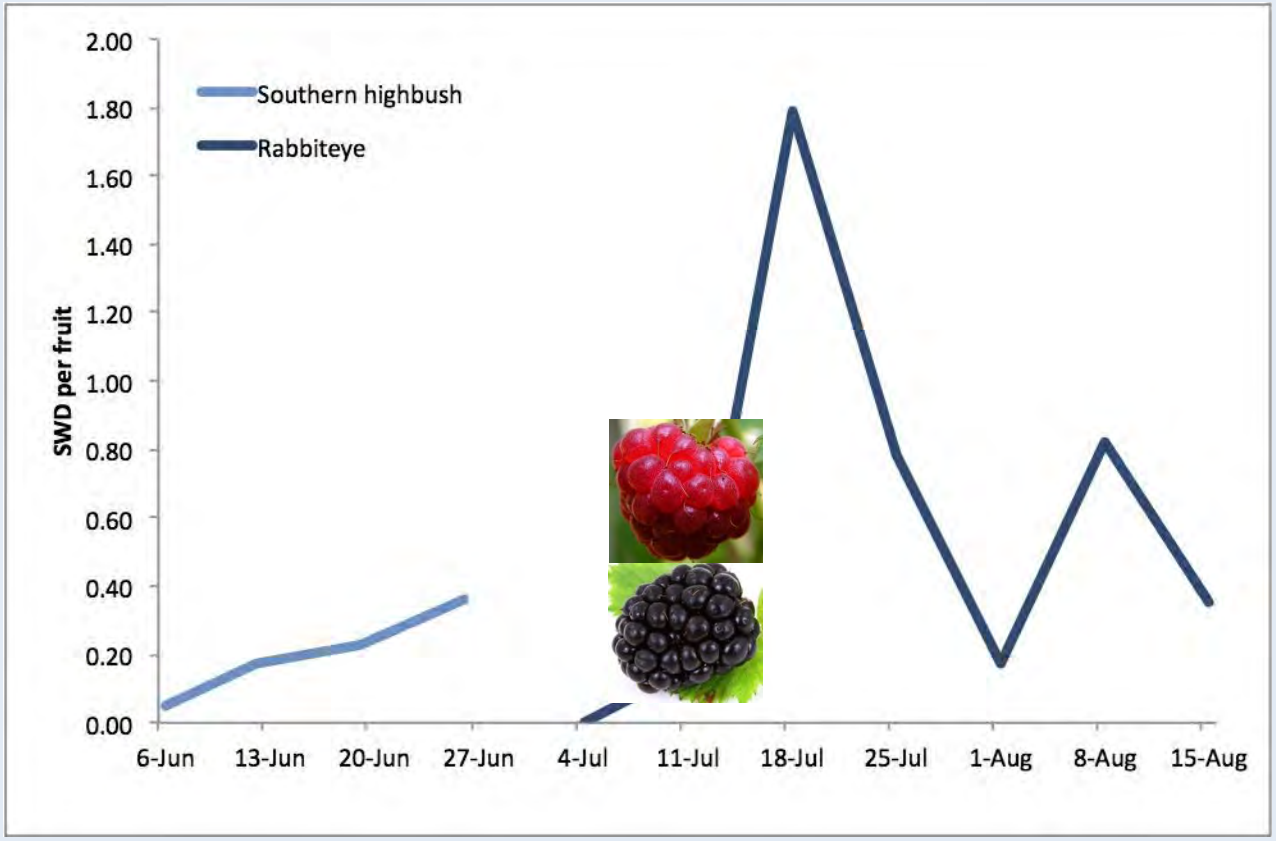
SWD seasonal biology in Southeastern blueberries



2013 fruit infestation patterns in NC blueberries

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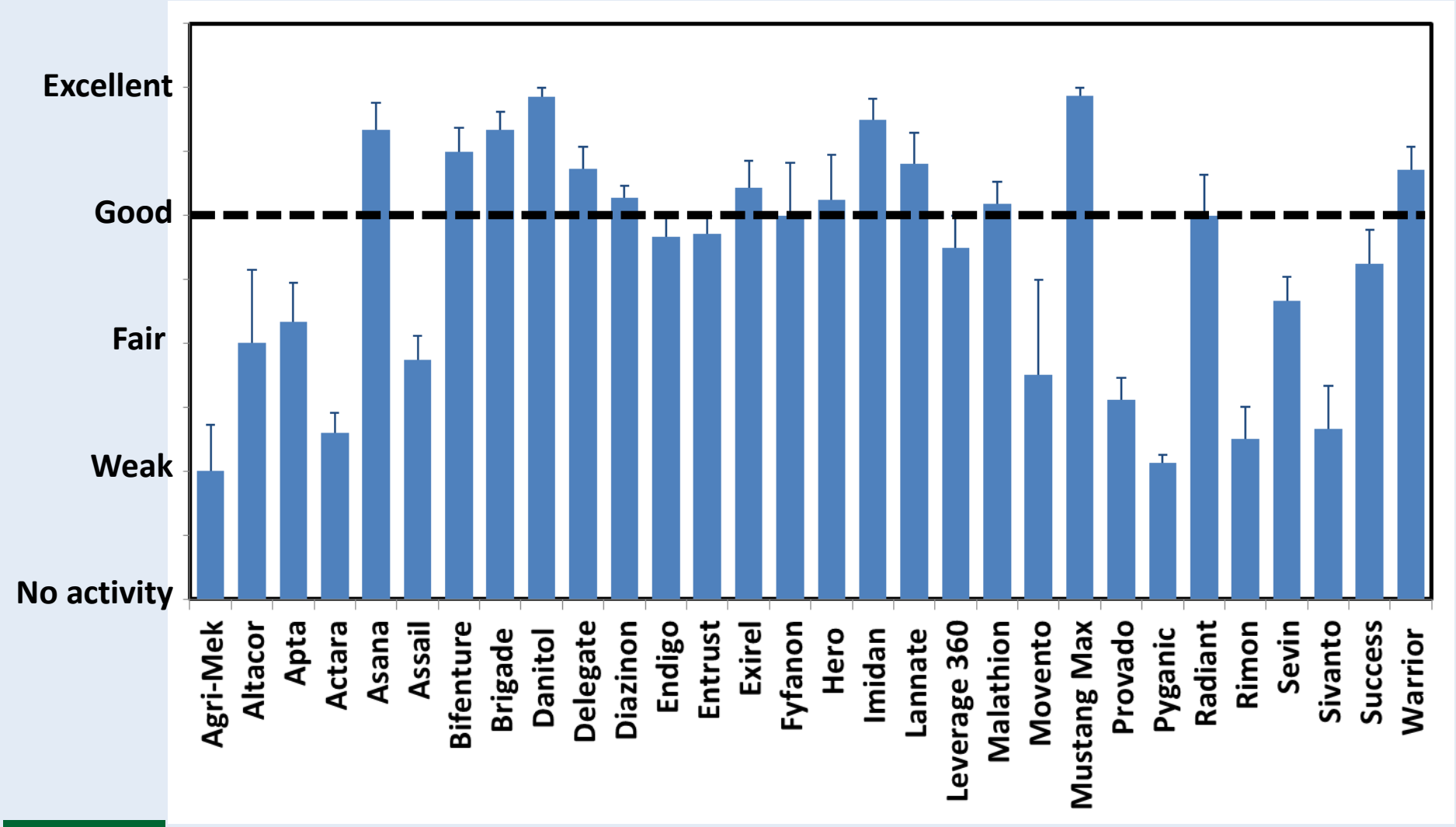
SWD Management

- **Current chemical management options**
  - **SE season-long management trials**
- **Future management options**

Summary rankings of insecticide efficacy against SWD

8 states, 15 state x crop combinations

Van Steenwyk, Burrack, Liburd, Shearer, Beers, Tanigoshi, Spitler, Isaacs,
Drummond, Collins, Loeb, Rodriguez-Saona, Nielsen, Polk, Sial



Season-long management

- Treatment program needs:
  - Effective materials
  - Safe, reduced risk
    - Minimize residue levels
    - Reduce non-target impacts
  - Short time from application to harvest

- Applicable at commercial grower scale

- Designed Rotational treatment programs:
  - Export
  - Short PHI
  - Reduced Risk

Measuring treatment efficacy

Laboratory assessment

- **Bioassays: 0DAT & 7DAT**
  - **-treated plant material and berries**
  - **-challenged with 5 male, 5 female SWD**
  - **-diet and water supplemented**
  - **-mortality check 1, 3 and 5 days**
  - **-fruit checked at 7 days for infestation**

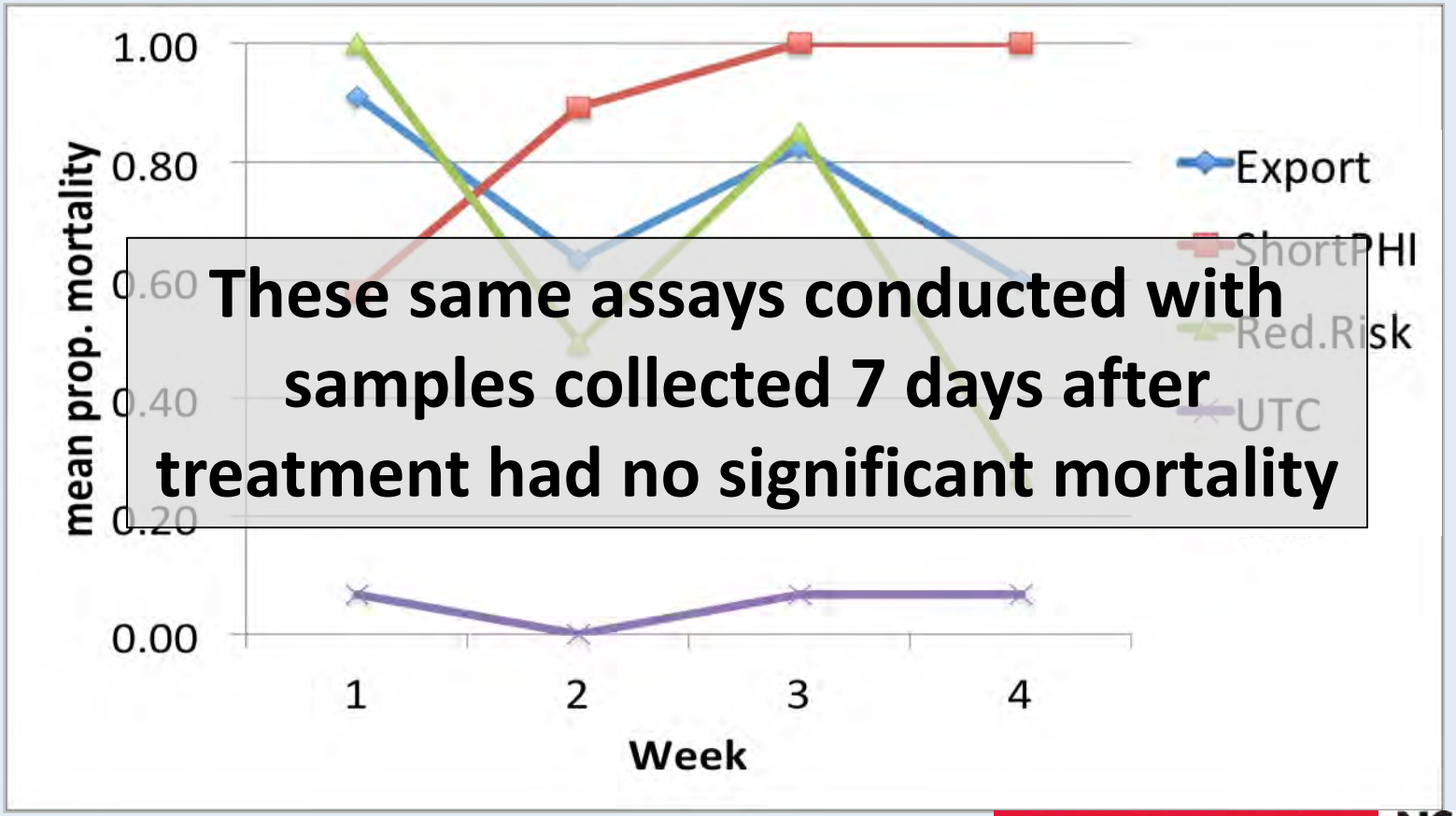
Measuring treatment efficacy

Field-level assessment

- Adult trapping
  - Yeast, sugar and water bait
  - Checked weekly
  - Adult SWD counted
- Larval infestation
  - 50 ripe berries collected weekly
  - Incubated for 7 days
  - Dissected for larvae/pupae
- Pesticide residue sampling
  - Berry samples collected 7 days after treatment
  - Analysis performed by Georgia Department of Agriculture

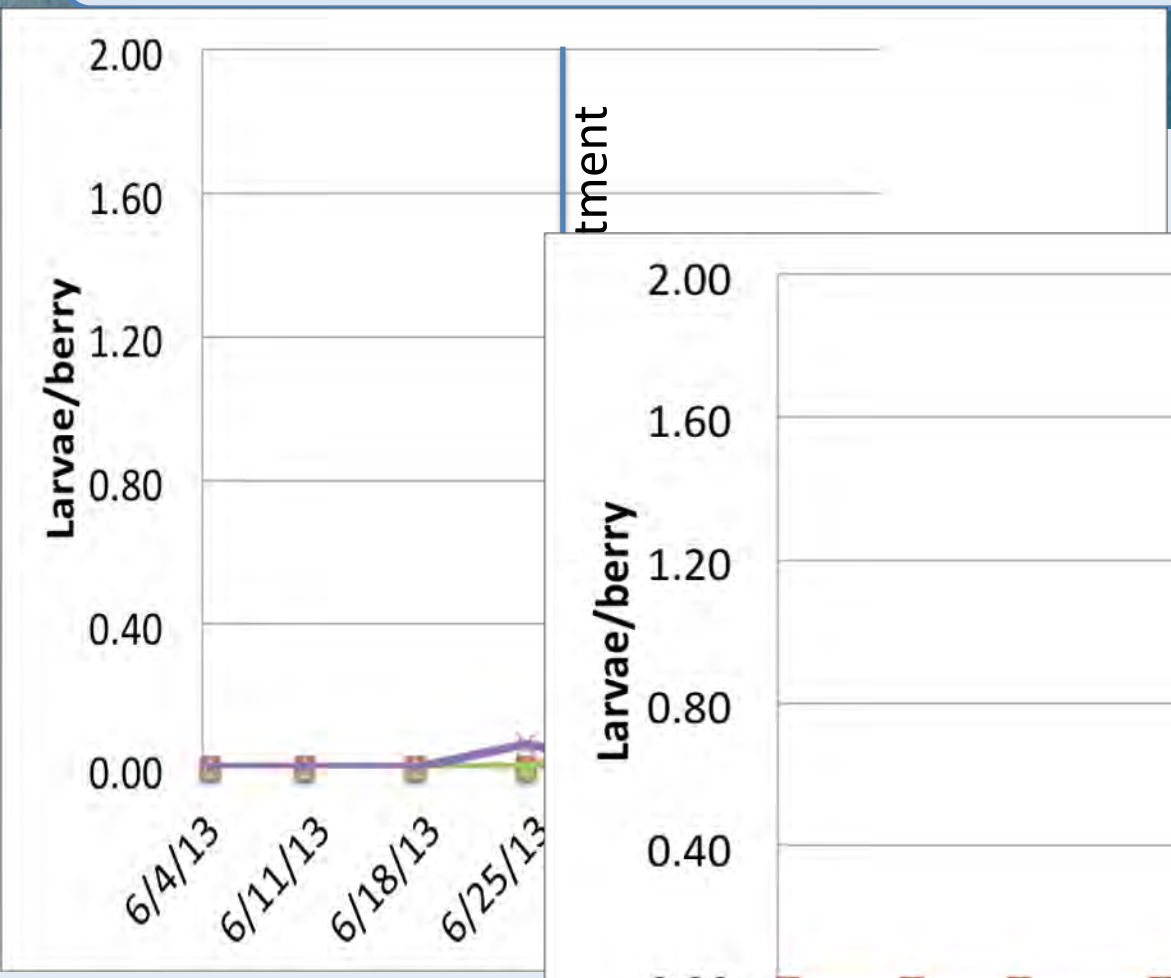
Photos by Matt Bertone

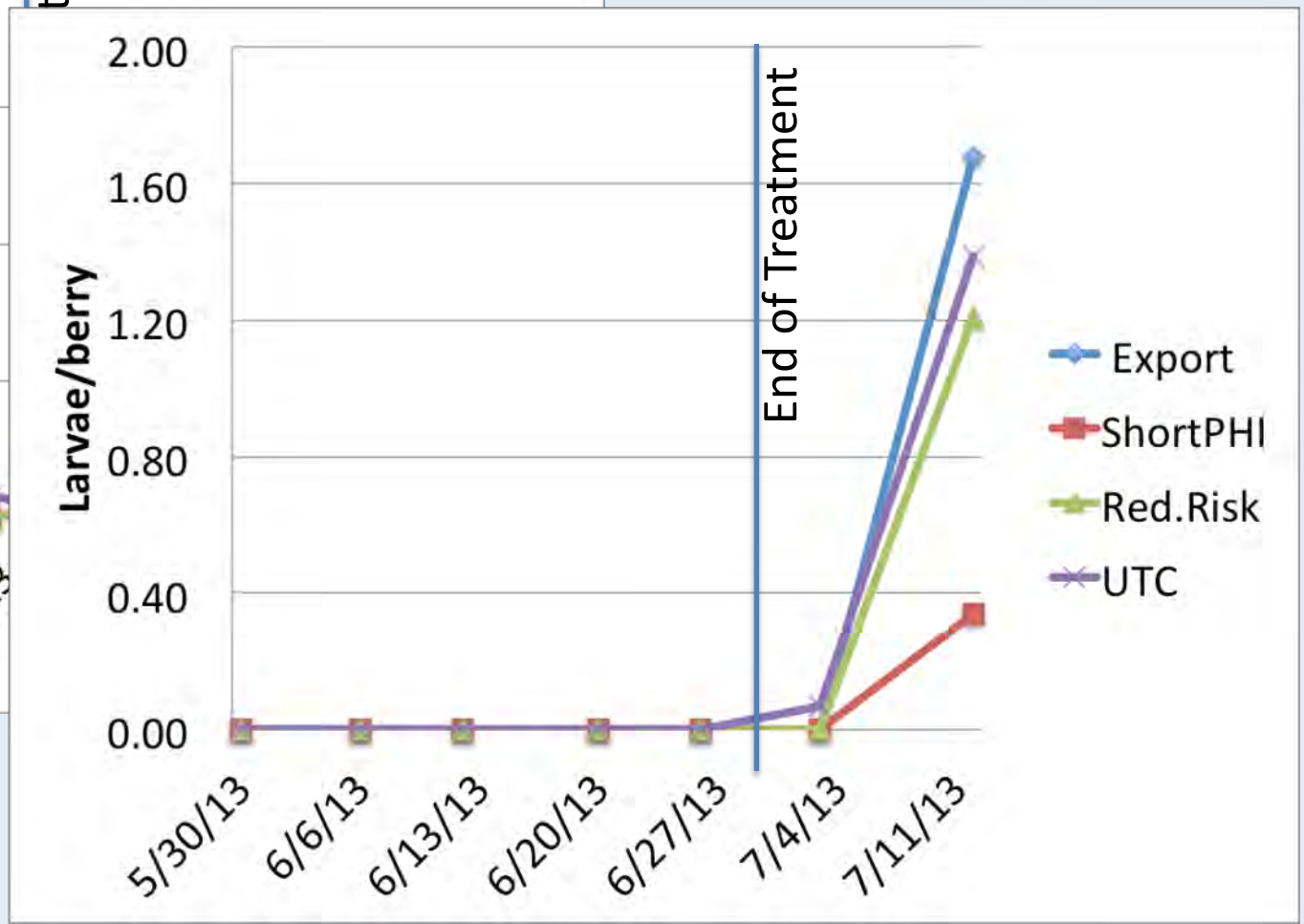
2013 Results: Acute impacts (female)



These same assays conducted with samples collected 7 days after treatment had no significant mortality

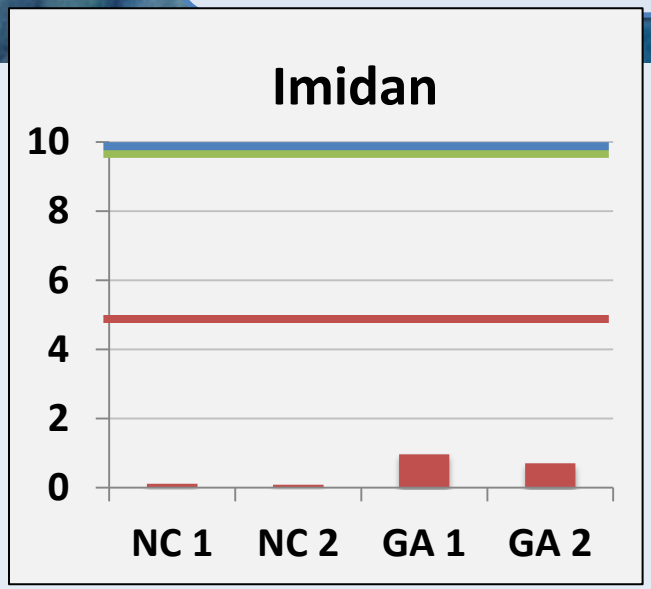
2013 Larval Infestation- Southern highbush

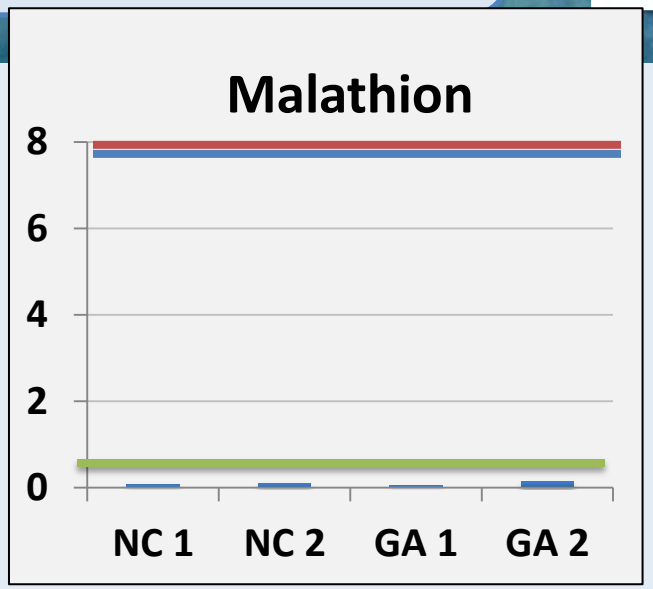


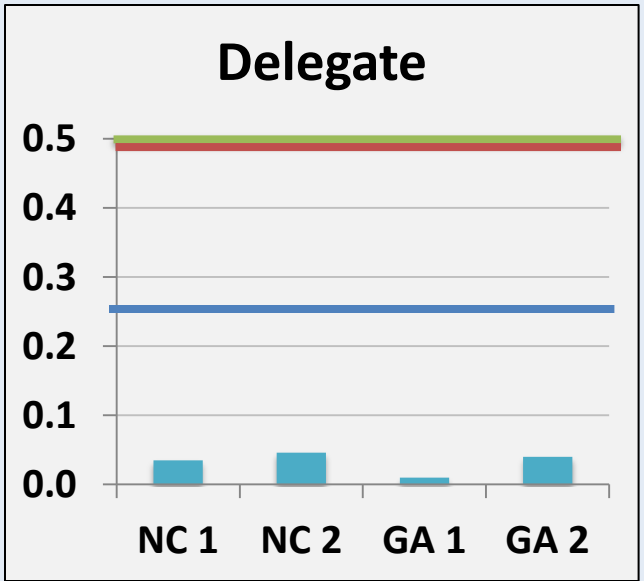


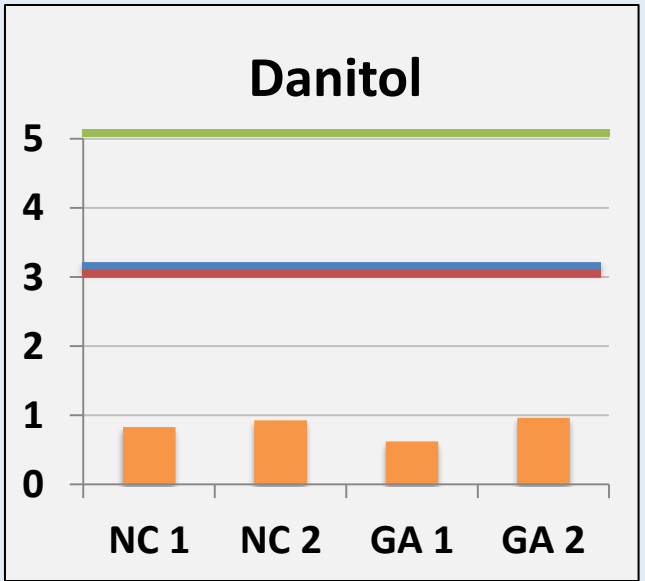
2013 Export Friendly Rotation Residue data

Parts per million (ppm)



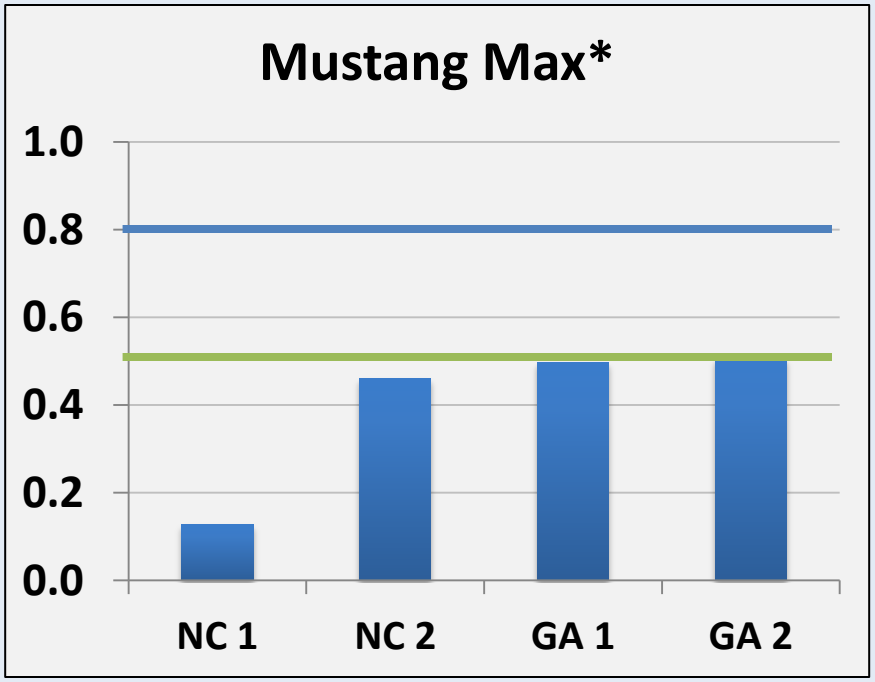


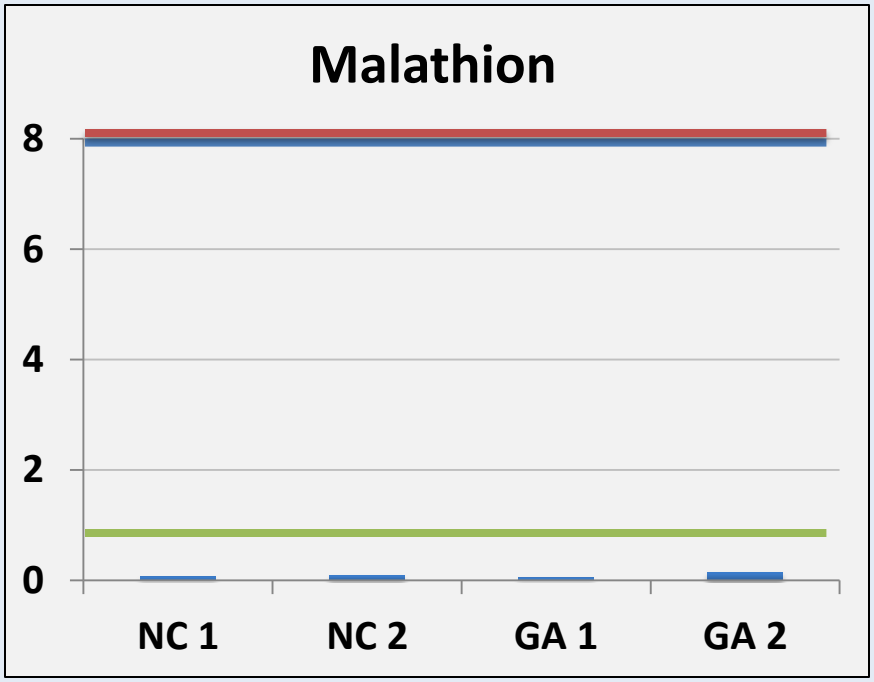




2013 Short PHI Rotation Residue data

Parts per million (ppm)





*No MRL for zeta-cypermethrin specific to Canada

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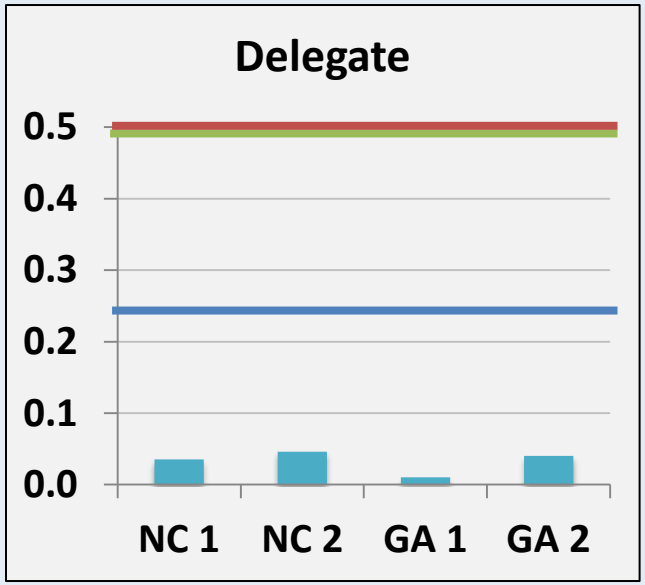
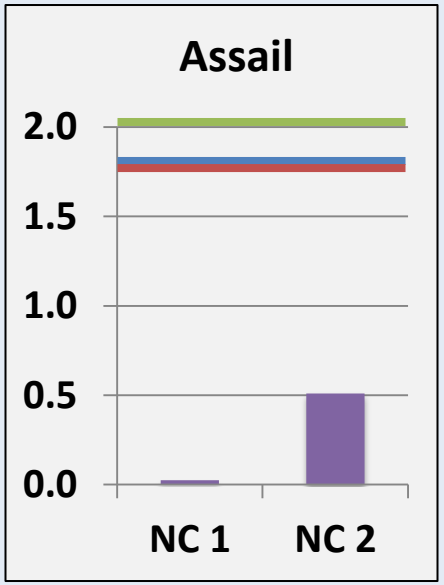
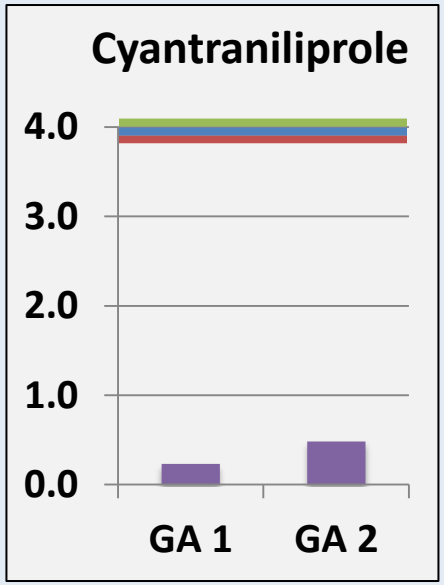
2013 Reduced Risk Rotation Residue data

Parts per million (ppm)







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Results from 2013 trials

Laboratory assessment

-All treatments killed SWD in bioassays at 0DAT

-No residual impact at 7 DAT

→ Spray schedule for 2014 set at 7 days

Field-level assessment

- **Adult trapping**
  - **Very few adult SWD**
- **Larval infestation**
  - **No infestation during treatments**
- **Residue sampling**
  - **Below limits**

→ Use a later-maturing variety of blueberry for 2014

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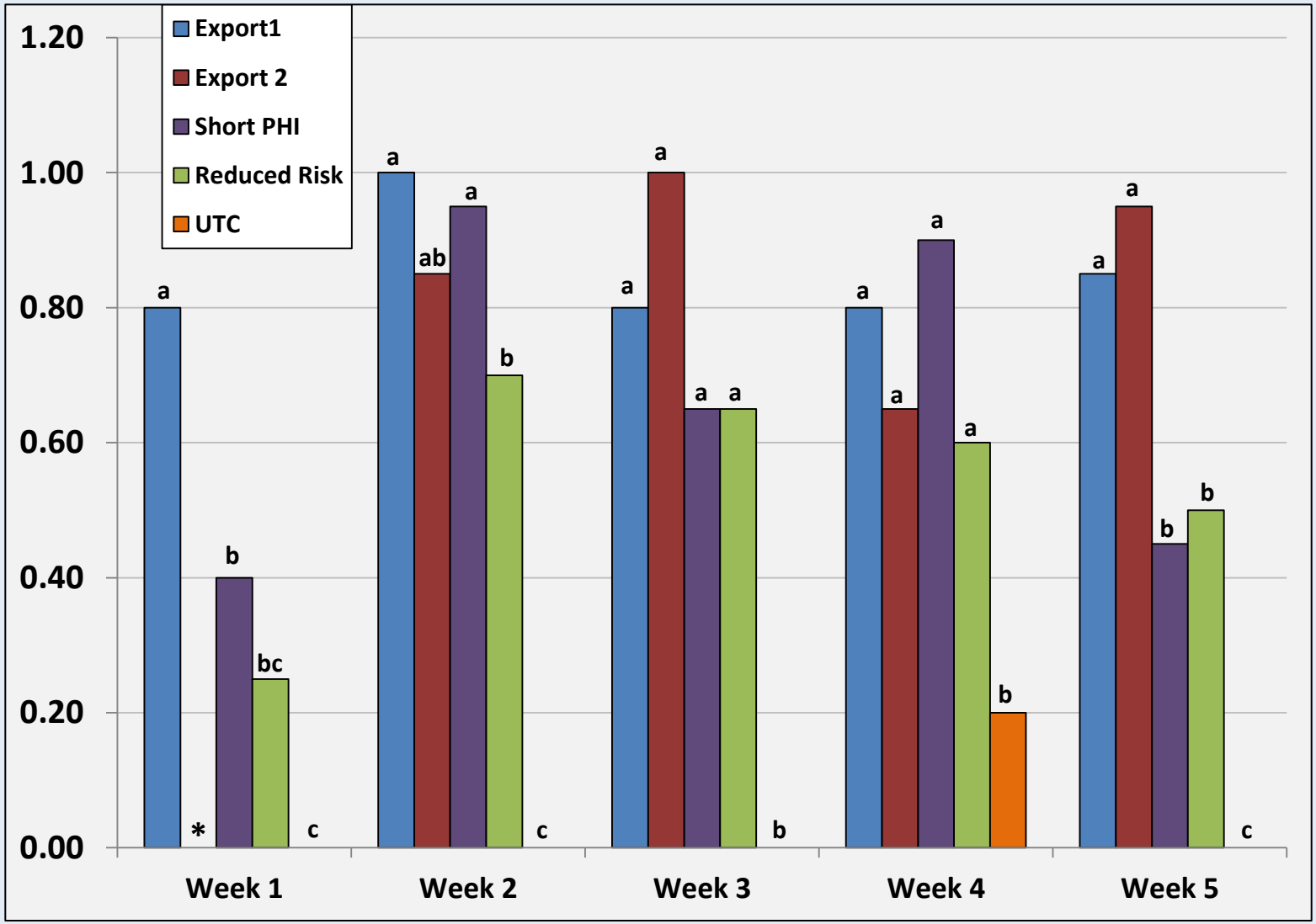
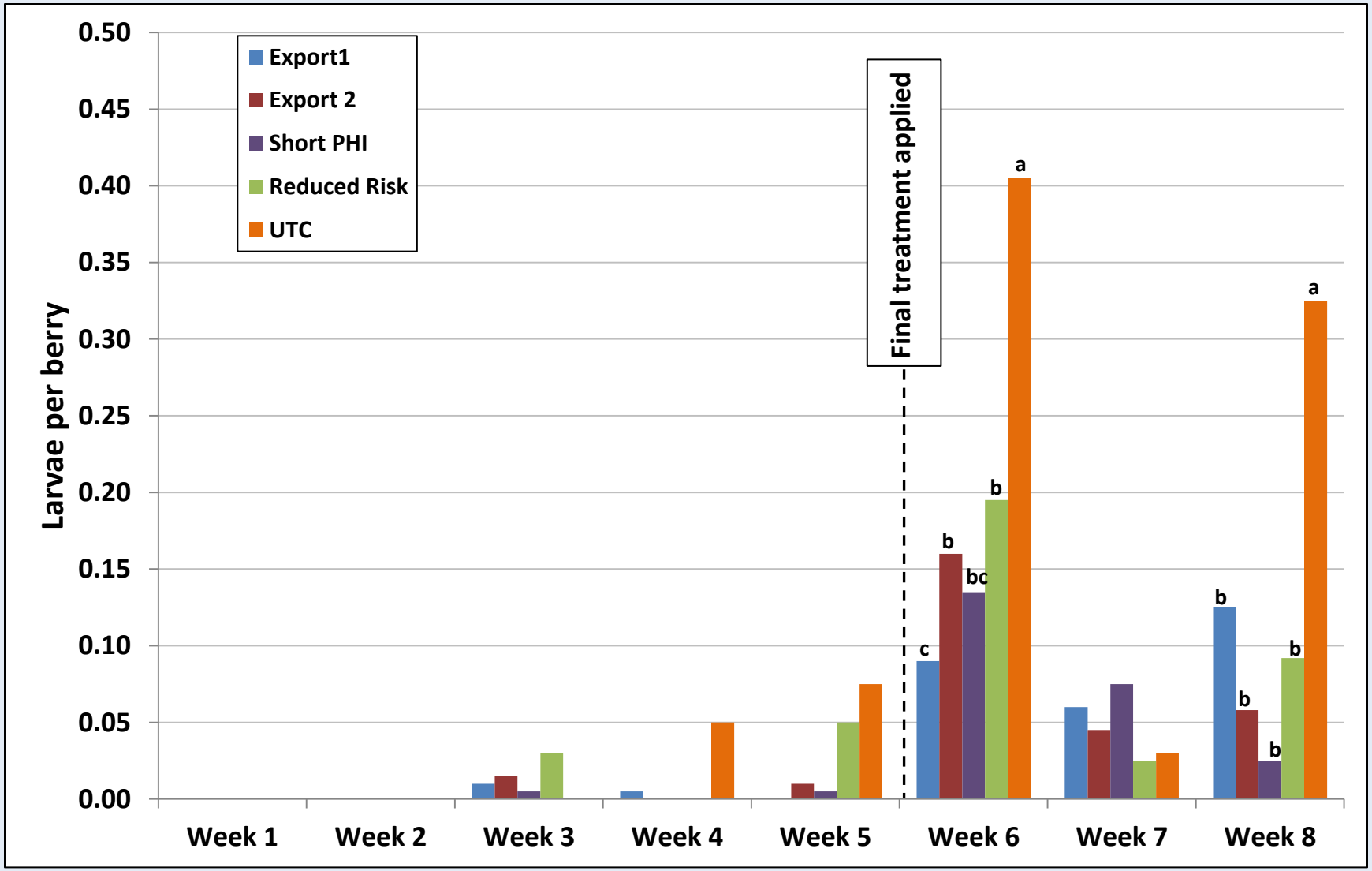
2014 Results: Acute impacts (female)



*treatment not applied

Season-long acute impacts (female): $F_{4,5} = 7.47$, $p = 0.02$a

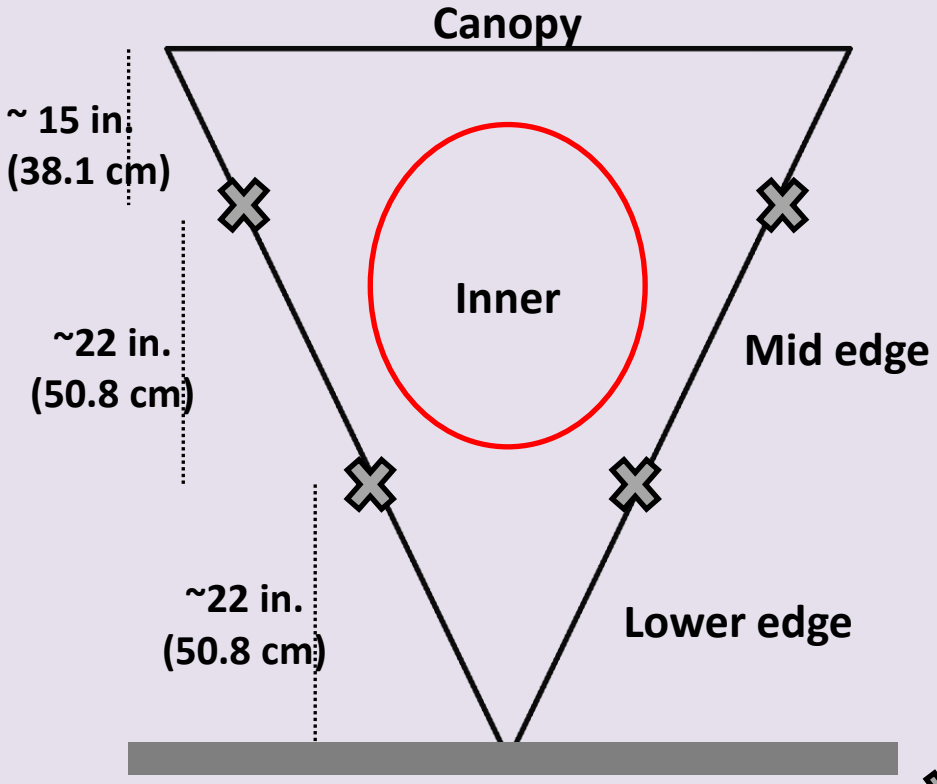
2014 Larval Infestation- Rabbiteye



Results of 2013 & 2014 chemical management trials

- **All programs are effective during harvest**
- **Residues within MRL standards (2013)**
- **Weather may impact residual efficacy**
  - **Rainfastness of materials**

Where to manage spotted wing drosophila – How should management tools be applied?



Where does SWD infestation most commonly occur in blackberries?

Fruit sampled weekly, August through October at two locations

Preliminary data, 2014

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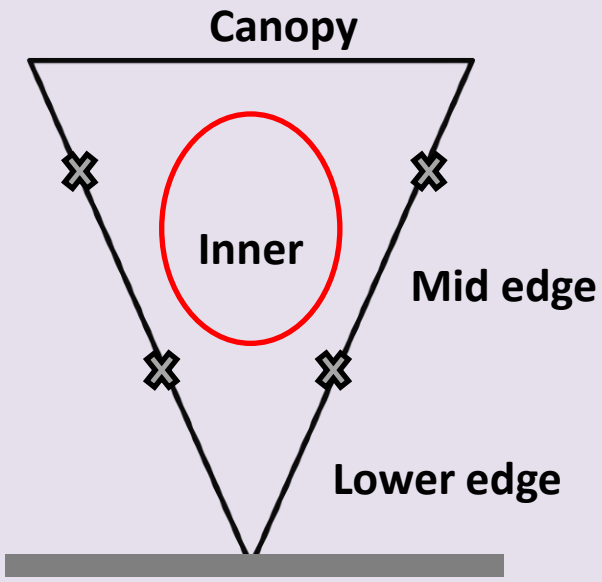
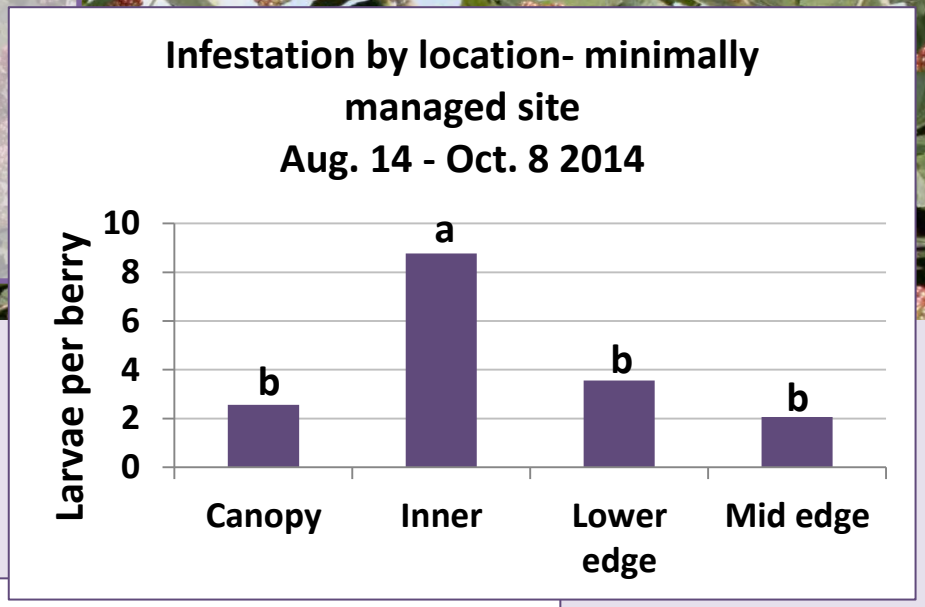
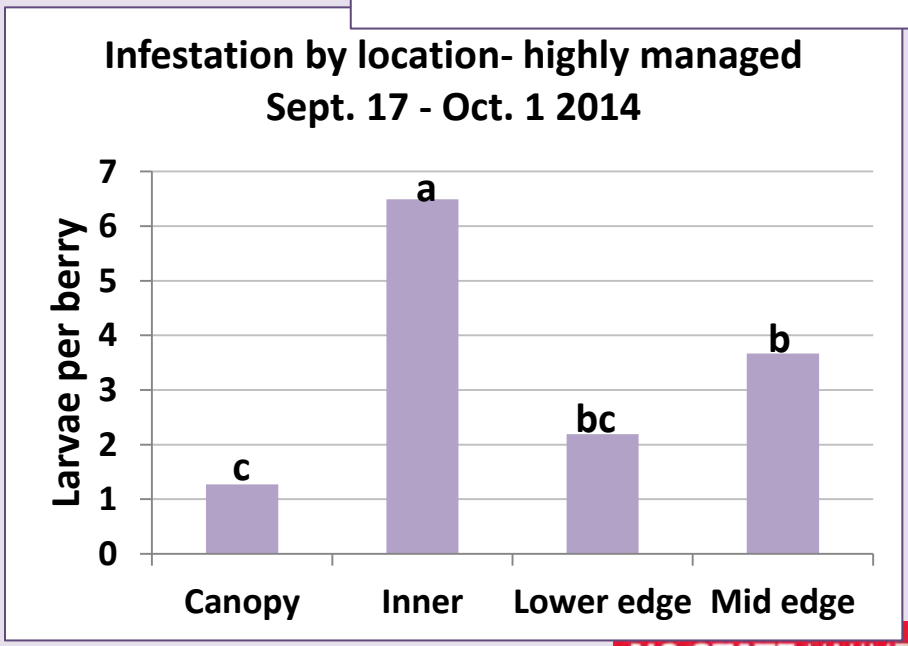
Where to manage spotted wing drosophila







Preliminary data, 2014

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Future management

- Improved monitoring/detection
- Rotational treatment programs for minimizing resistance
- Need sustainable IPM programs
  - Take advantage vegetation structure/refuges
  - Determine what biological control options exist
  - Optimize chemicals/reduced use of broad-spectrum

Acknowledgements

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  NC Blueberry Council

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  North American Raspberry & Blackberry Association

  USDA-CPHST

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- **Blueberry image (background)- Bryan Wieczorek**

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