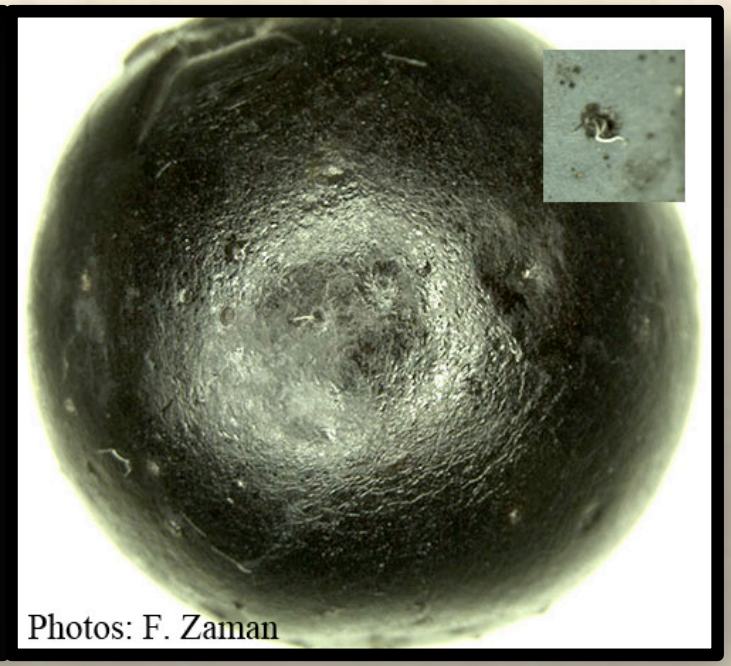
Spotted Wing Drosophila in Grape

SWD Adult Male

Infected Pinot Noir



Fruit Fly Egg 'Respitory Horns' Merlot

2016 Hudson Valley Commercial Fruit Growers' School

Best Western Plus

Kingston, NY

February 18th, 2016

Peter Jentsch

Senior Extension Associate – Entomology

THE JENTSCH LAB

INSECT BIOLOGY, ECOLOGY, AND MANAGEMENT IN HUDSON VALLEY AGRICULTURAL COMMODITIES

Welcome to the Jentsch Lab

Recent presentations:

Spotted Wing Drosophila in Grape. 2016 Winter Fruit School, Kingston, NY. February 18th

Review of the 2015 Insect Pest Management Season in ENY

Update & Annual Meeting for the Hudson Valley Research Laboratory, Inc. Peter Jentsch, Superintendent, Cornell Hudson Valley Research Laboratory, Inc., Highland, NY February 16, 2016

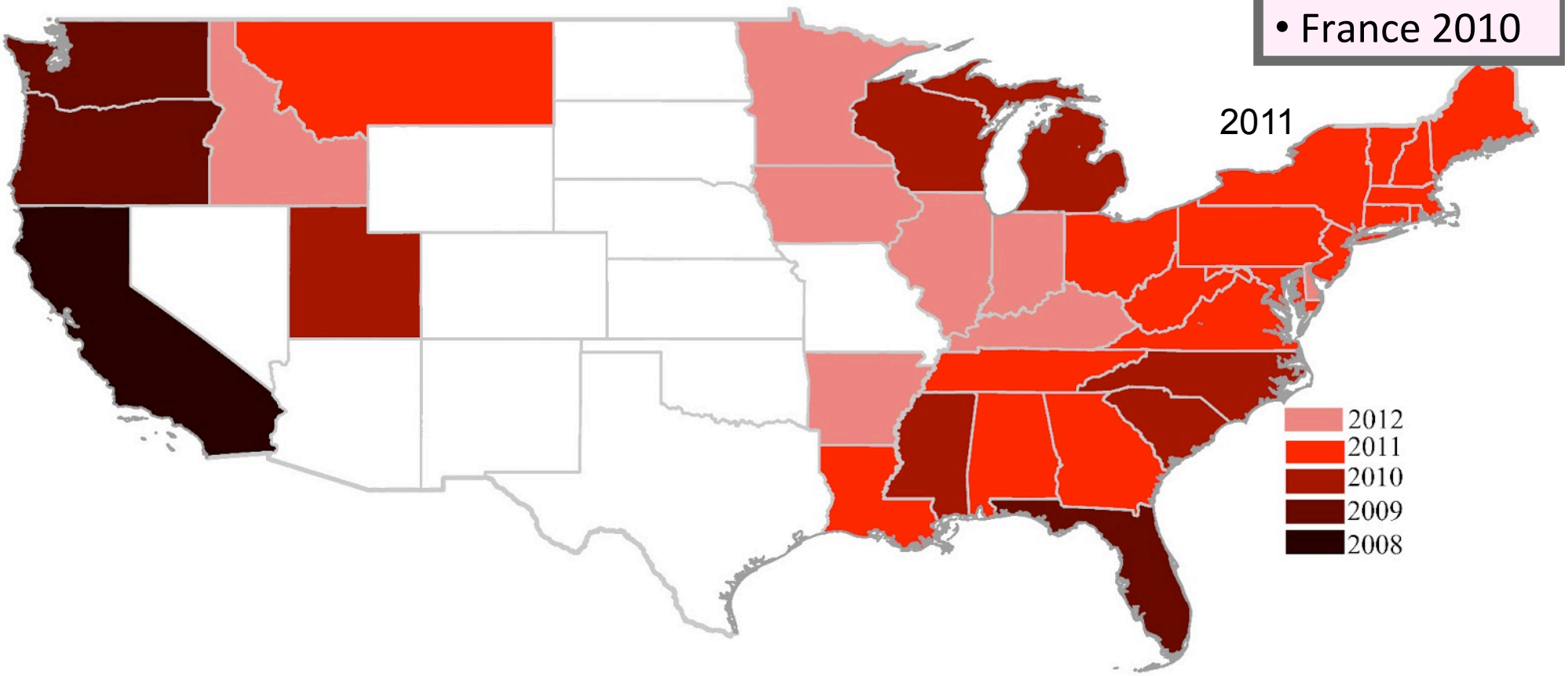
Native and Emerging Insect Management for Tree Fruit In Eastern NY; Long Island Agricultural Forum, January 14, 2016

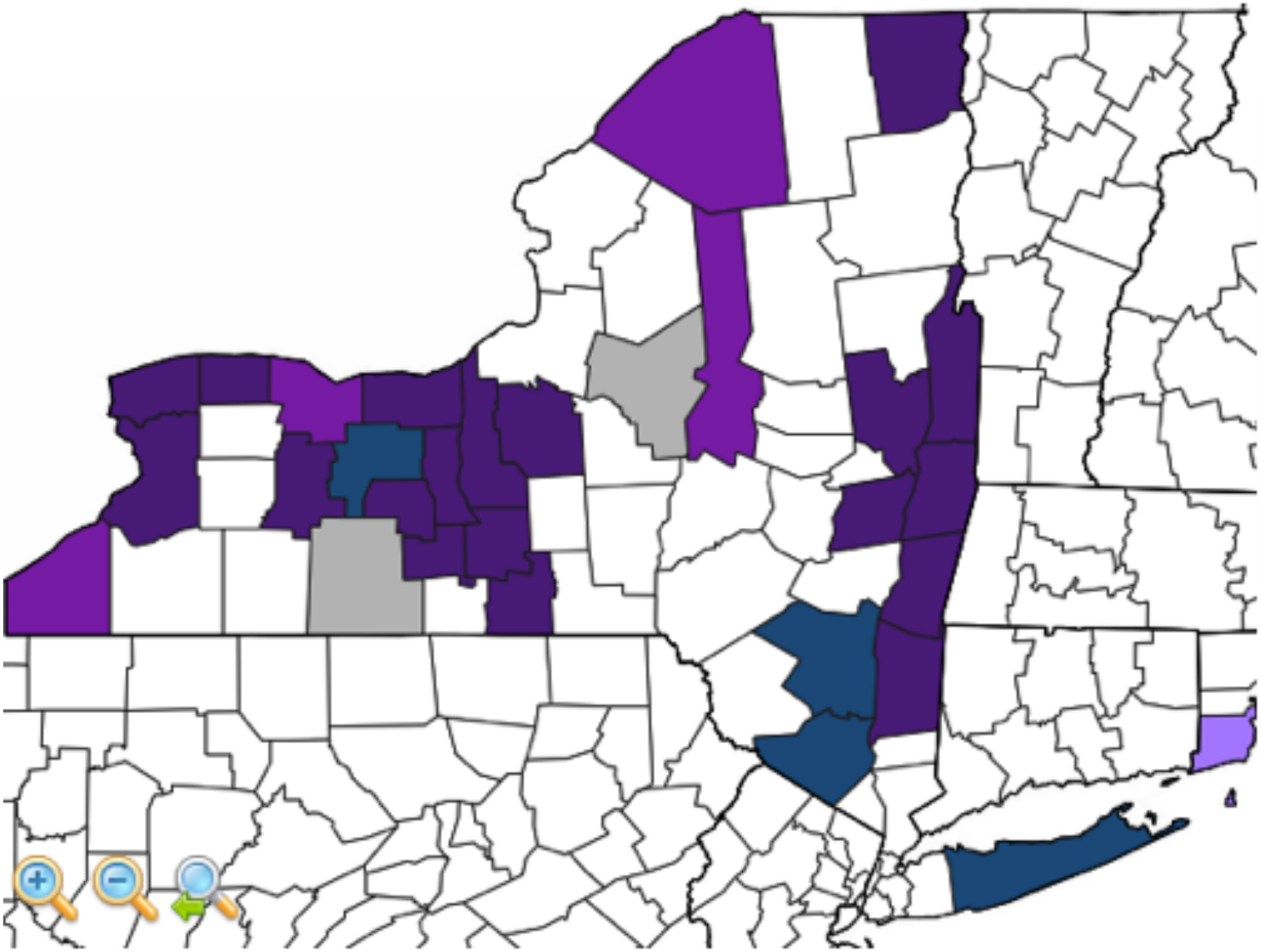
http://blogs.cornell.edu/jentsch/presentations/

Current state level spotted wing drosophila in the United States.

Burrack, et al. 2012. Journal of Integrated Pest Management.

SWD found in:
- Italy 2009
- Russia 2009
- Spain 2009
- France 2010





Legend

January February March April May June July
August September October November December
Not Found

2013

ACV
Whole wheat
Brewers yeast

SWD Trap Network
2015 Results

white Counties - no traps

2015

ACV
Whole wheat
Brewers yeast
Synthetic lures
Trece Traps

Legend

January February March April May June July August

September October November December Not Found

Life Cycle of the Spotted Wing Drosophila

Drosophila suzukii (Matsumura)

Pupation 4-15 days
Inside or outside of fruit

Adults
20-30 days

Eggs 12-72 hours
350+ eggs in a lifetime

Three Larval Instars
5-7 days

Development Range
10d – 4 weeks

Female Drosophila species

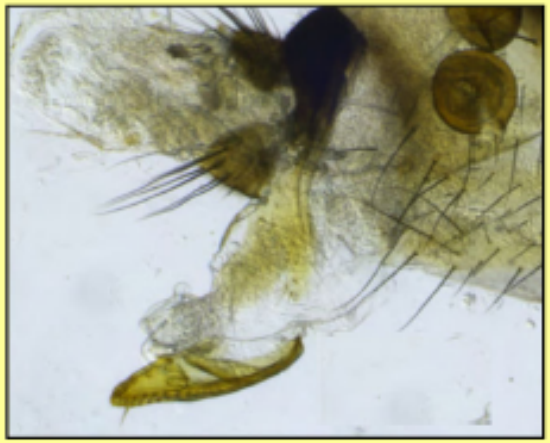
UC Berkeley & UC Cooperative Extension *Photos:* M. Hauser, CDFA

Spotted Wing Drosophila (D. suzukii)

SWD has a large, saw-like, serrated ovipositor with two even rows of teeth that are much darker than rest of ovipositor

Other Drosophila spp.

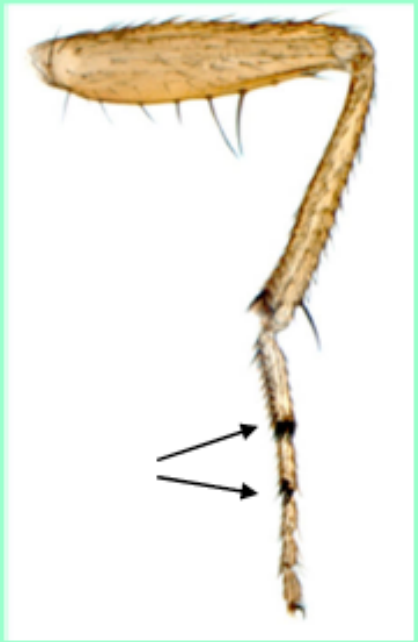
have smaller, more rounded ovipositors, sometimes with irregular, poorly defined teeth



Male Spotted Wing Drosophila (SWD)

UC Berkeley & UC Cooperative Extension

Photos: M. Hauser, CDFA



Double stripes on tarsi of front legs

Leading edge of wing has dark spot

Unbroken abdominal bands

Spotted Wing Drosophila Infestation of Grape: Pinot Noir Dijon Clones.

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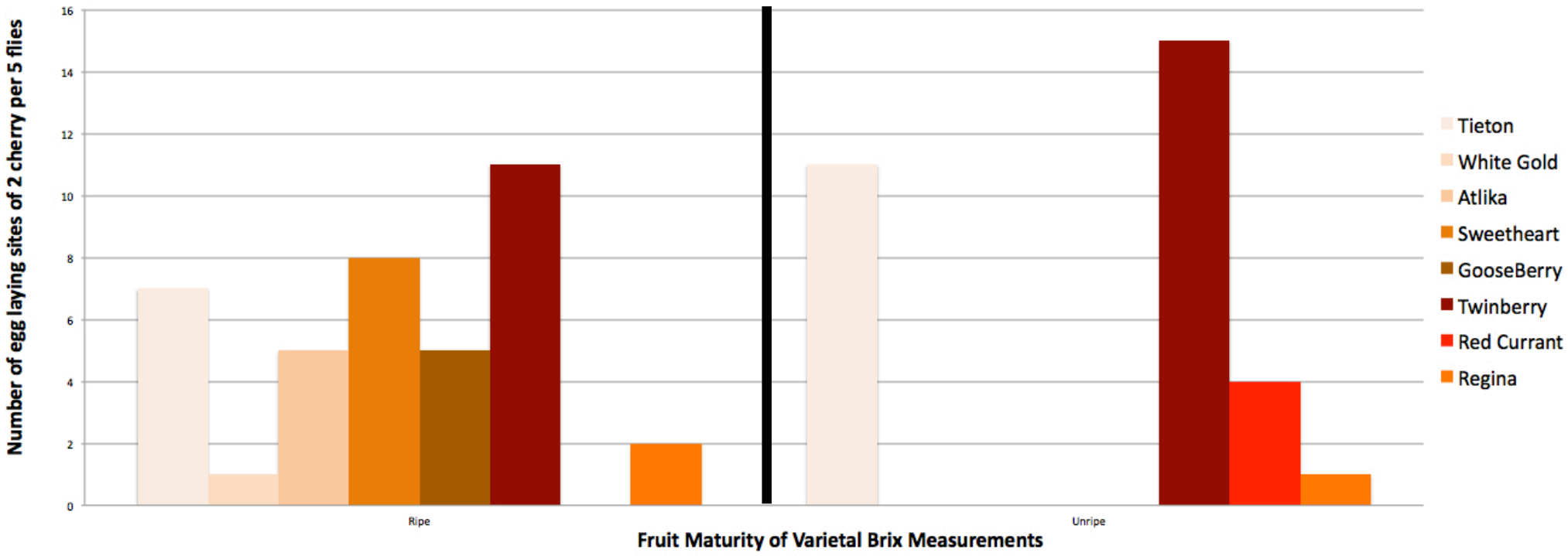
Hudson Valley Research Laboratory

SWD Oviposition Into Ripe and Unripe Sweet Cherry, Gooseberry and Current Varietal and Maturity Preference
Hudson Valley Lab, Highland NY. July 1, 2013



SWD oviposition during pre-harvest and ripened development.

Male and Female flies were introduced to fruit, and allowed 48 hours to oviposit before they were removed and eggs were counted.

Each fruit was isolated with 2 cherry of each V. and
5 female SWD adults.

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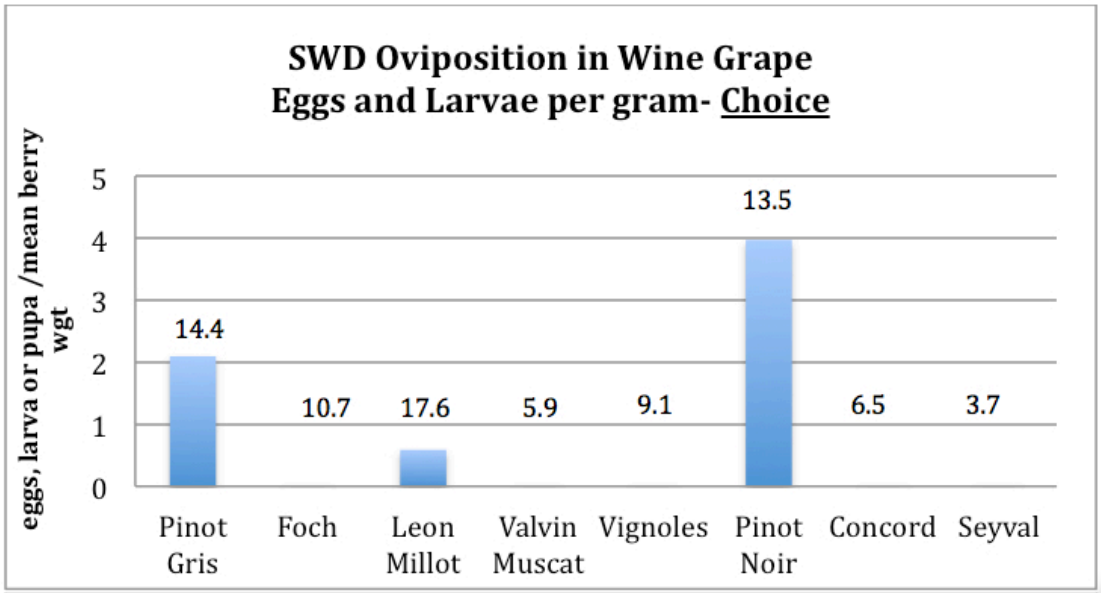
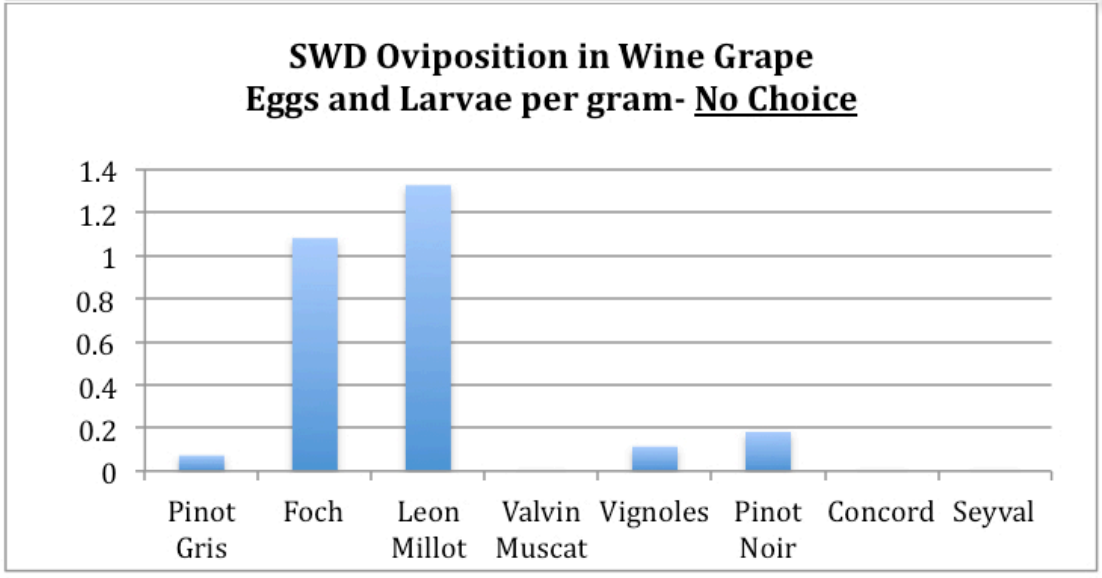


Choice Test

- Grape varieties placed in same container.
- 40 female SWD



- Choice Test
- Grapes varieties placed in individual containers.
- 5 female SWD

- SWD ovipositional preference in pre-ripened grape varieties.
- Allowed 48 hours to oviposit.

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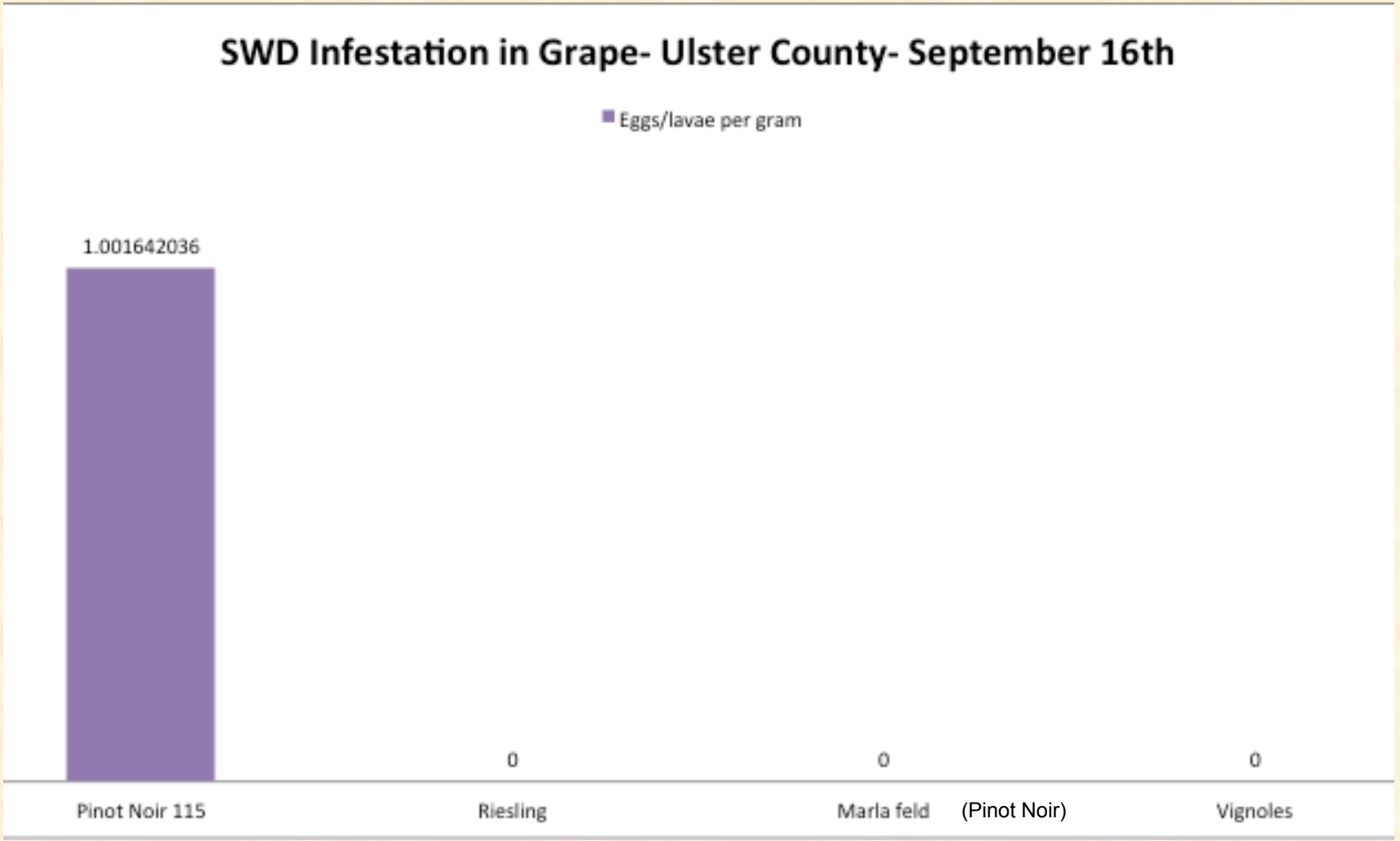

- Grapes collected and analyzed from an Ulster County vineyard indicated that Pinot Noir 115 is at high risk of SWD infestation.

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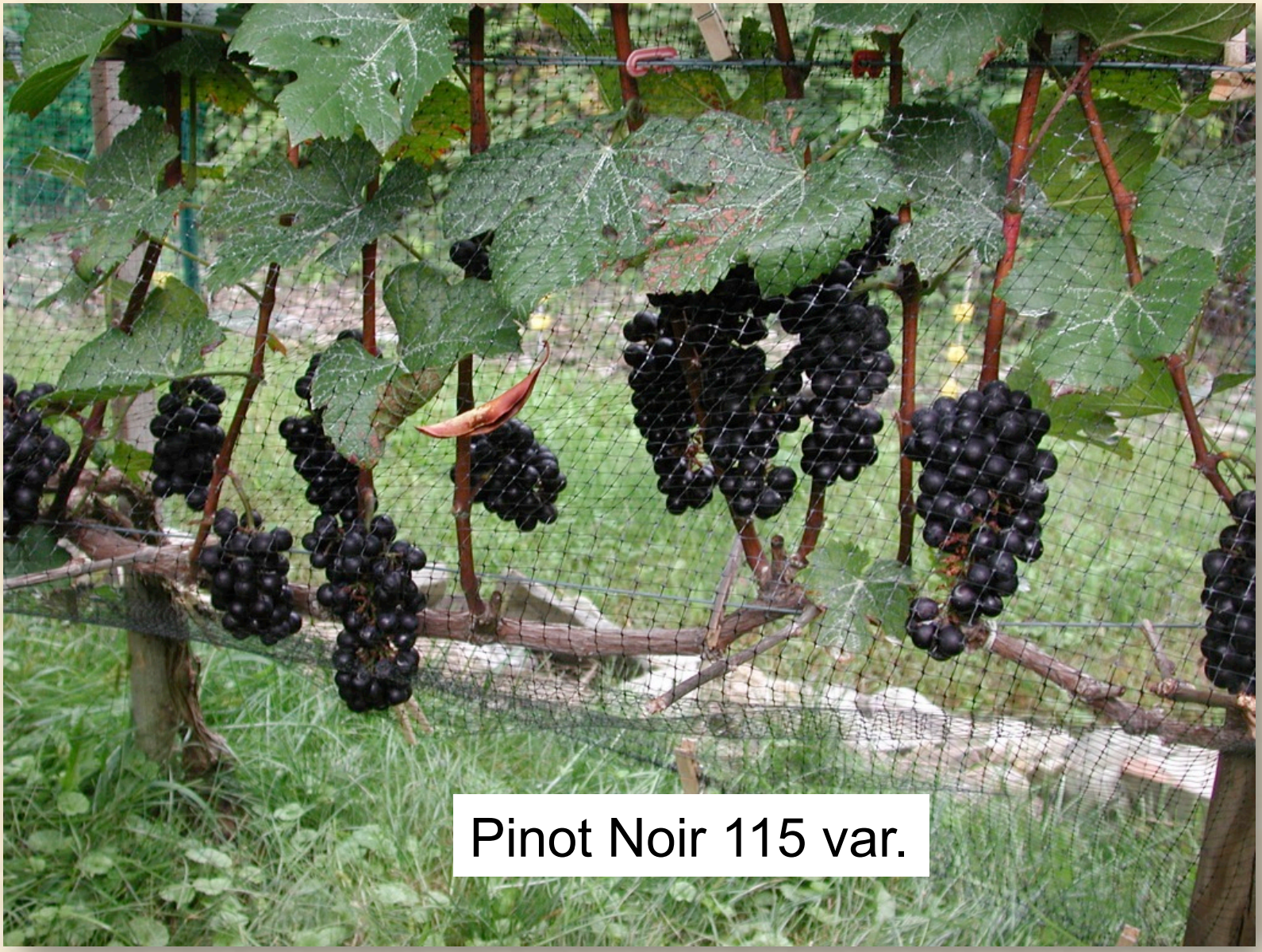

Vineyard with P115 with 100% berry infestation in 2012.

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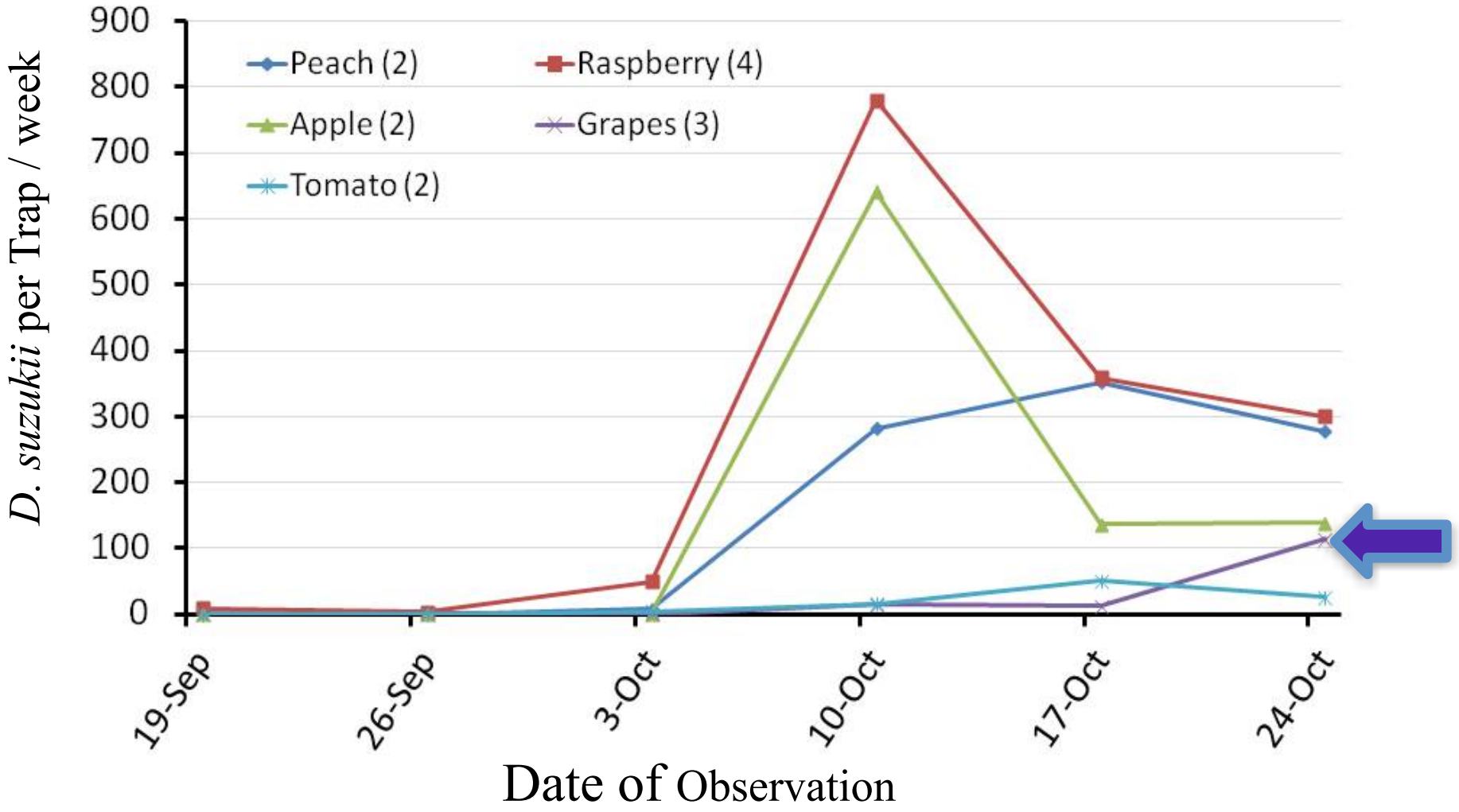
Cornell Cooperative Extension
of Suffolk County

D. suzukii Monitoring Results in Eastern Long Island, NY

Dan Gilrein, IPM / Entomologist
Faruque Zaman, Entomology Program Associate

Long Island Horticultural
Research & Extension Center

D. suzukii Monitoring Results in Eastern Long Island, NY - 2011



* Numbers in parenthesis are the total traps set in each crops

An overview of the spotted wing drosophila, *Drosophila suzukii*, in western USA

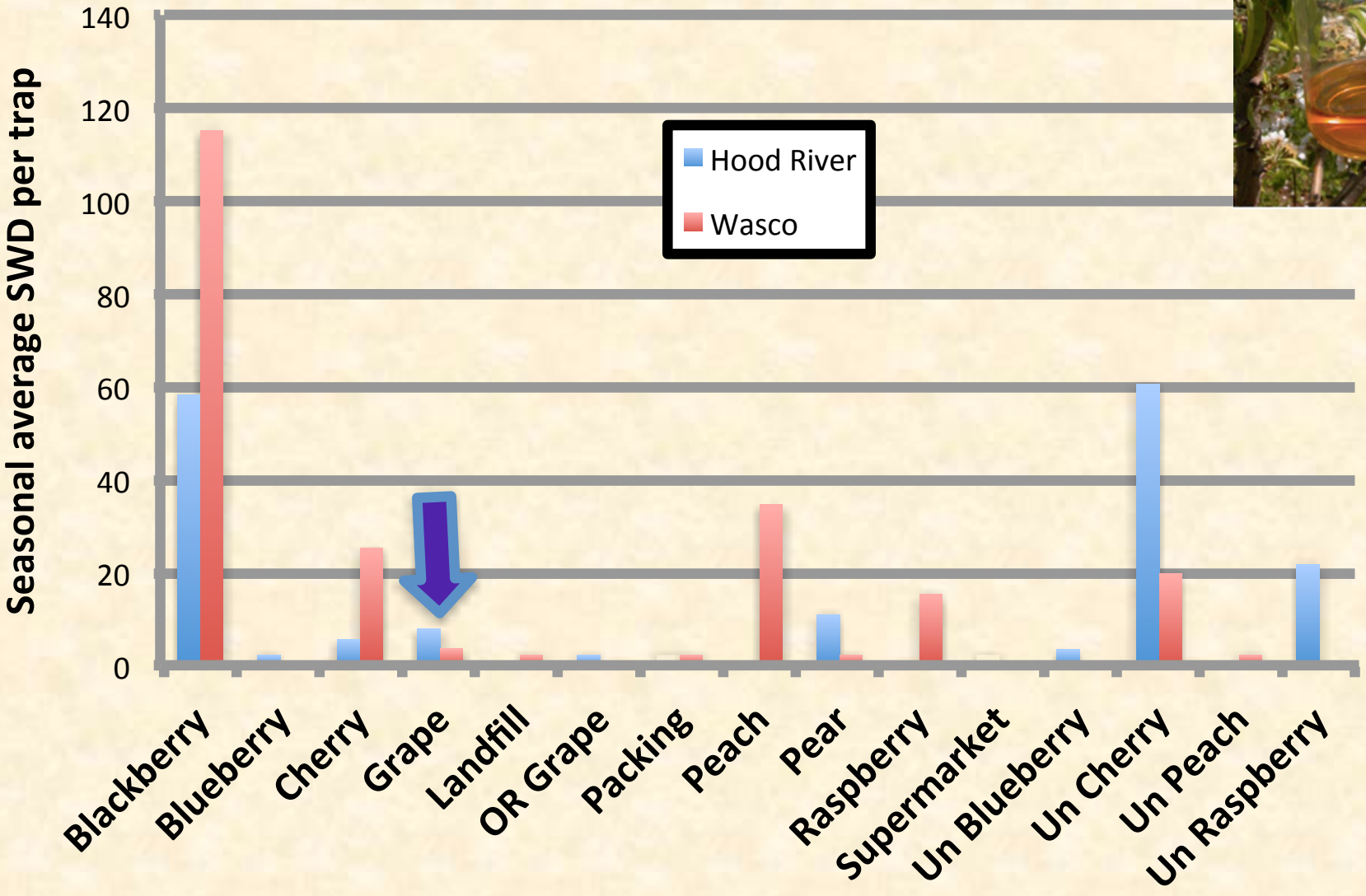
Peter W. Shearer, Ph.D.

Oregon State University
Mid-Columbia Agricultural Research & Extension Center
Hood River, OR

Cornell University
College of Agriculture and Life Sciences

Hudson Valley
Research Laboratory

Seasonal average number of SWD/ trap in various locations: 2010

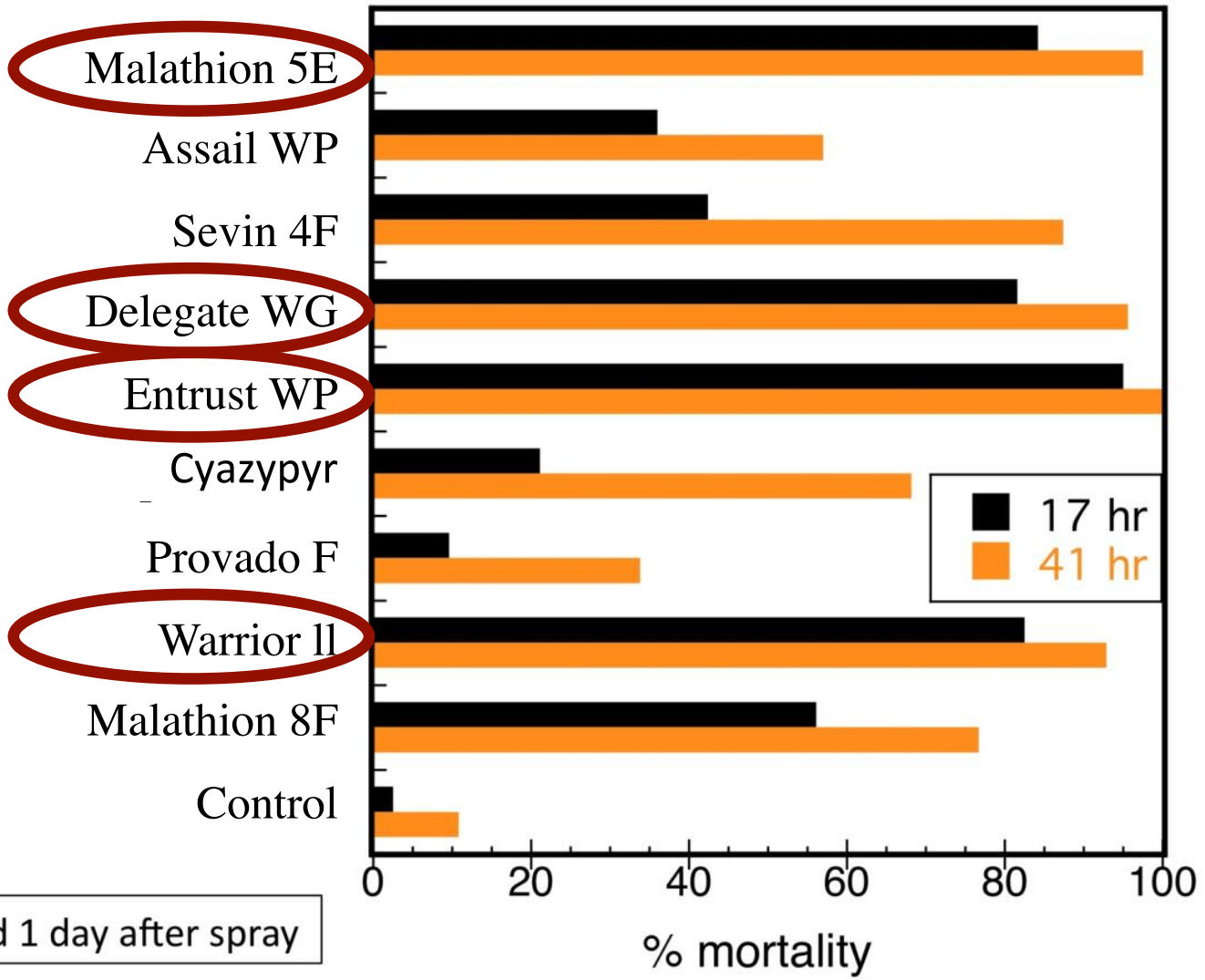


Field - Laboratory Efficacy Assays

- Procedures
  - Treatments were applied with a research airblast sprayer
  - Fruit and leaves were collected and brought back to the lab and exposed to flies
  - Assay types
    - Leaf assays
    - Fruit assays

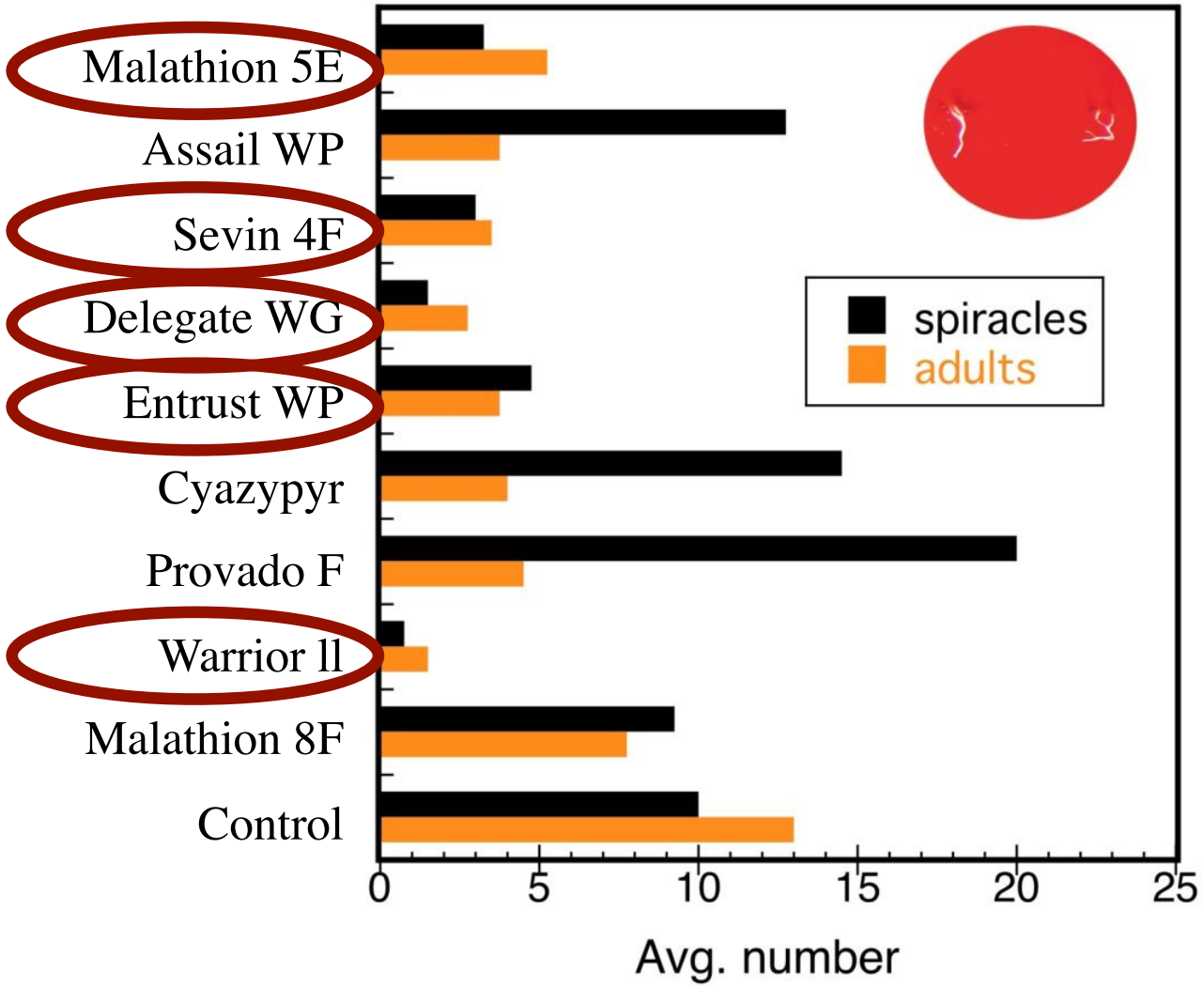
PW Shearer

Adult *D. suzukii* mortality after placement on treated fruit: Sweet cherry



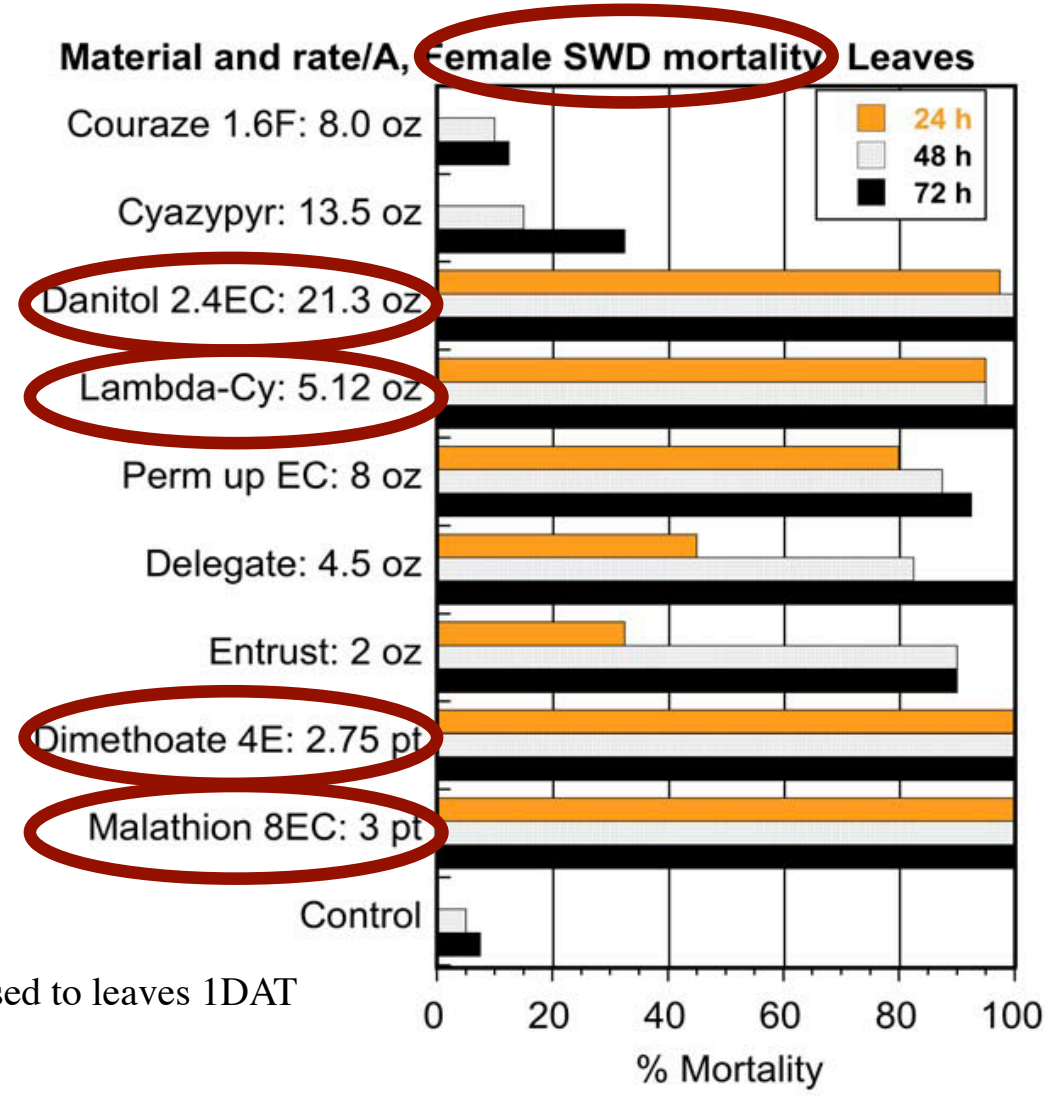
Fruit collected 1 day after spray

Average number of egg spiracles after 5 day exposure and emerged adults from treated sweet cherries



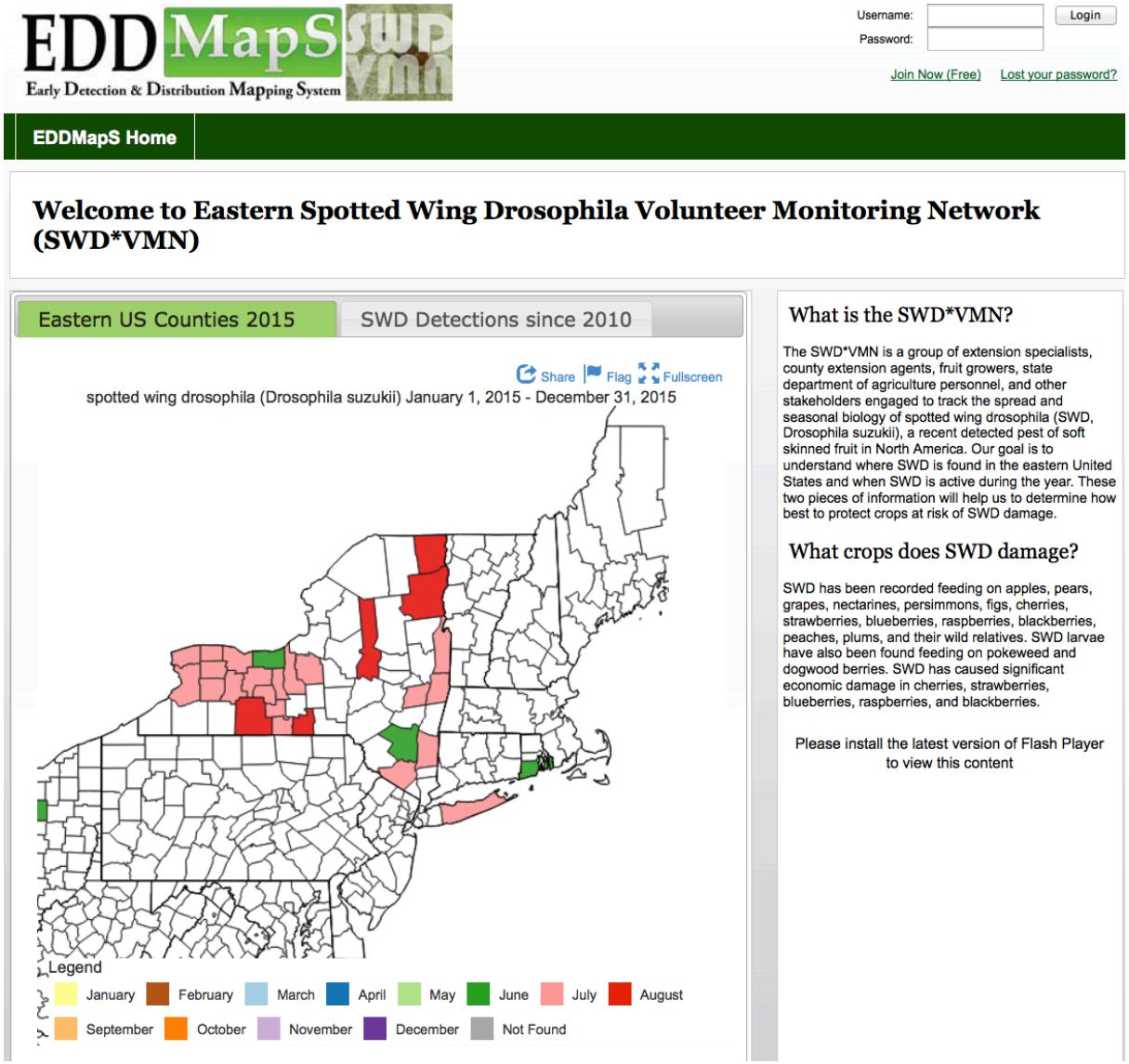
Field-Laboratory Studies on Sweet Cherries: Hood River, OR 2011

Flies exposed to leaves 1DAT



Shearer & Brown 2011

SWD State-Wide Monitoring, 2015



http://www.eddmaps.org/project/project.cfm?proj=9

ENY Trap Sites: 15
HVRL & ENY Hort. Team

- Albany
- Central Washington
- Columbia
- Dutchess (3 sites)
- Orange
- Rensselaer (3 sites)
- Saratoga
- South Clinton
- Ulster (3 sites)

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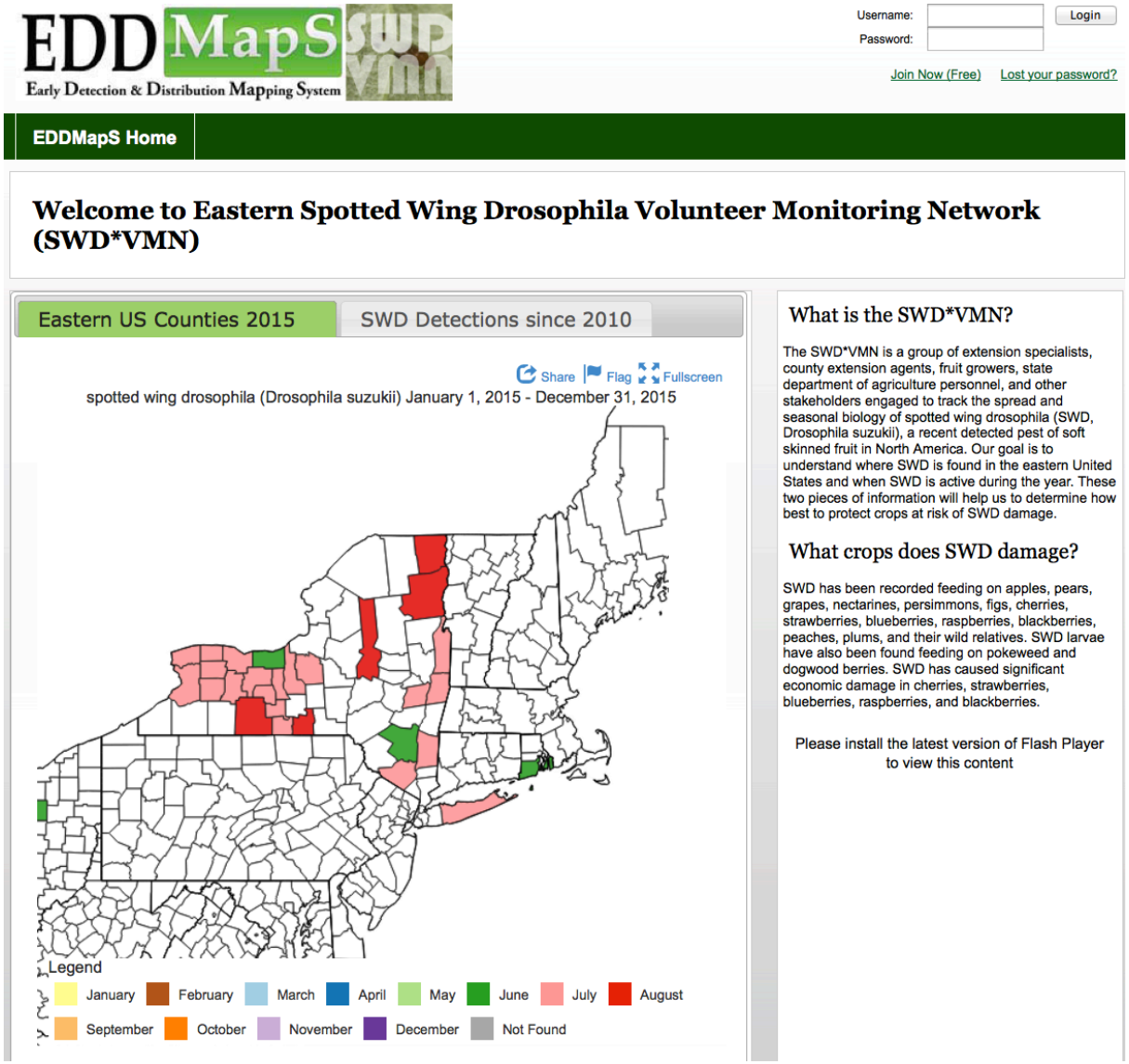
SWD State-Wide Monitoring, 2015



http://www.eddmaps.org/project/project.cfm?proj=9

- First adult SWD captured
  Wayne County, 24 June
  Ulster County, 31 June

ENY Trap Sites: 15
HVRL & ENY Hort. Team

- Albany
- Central Washington
- Columbia
- Dutchess (3 sites)
- Orange
- Rensselaer (3 sites)
- Saratoga
- South Clinton
- Ulster (3 sites)

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Use of Attract and Kill to Control Spotted Wing Drosophila (*Drosophila suzukii* Matsumura).

Peter Jentsch, Tim Lampasona, Mike Fraatz, ENY Hort Team: Dan Donahue

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SWD Attract and Kill Stations: 2015

- 3.5” substrate woven polypropylene netting
- Raspberry concentrate, cider vinegar, yeast, gelatin,

  Super Absorbent Polymer (SAP) liquid holding (60:1 V/V)
- 1% A.I. solution of insecticide active ingredient @ 2 mL/disk

- SWD Monitoring
- Weather Resistant & PYO

SWD Attract and Kill Stations: 2015

- **Placed in succession: 1st** honeysuckle, 2nd perimeter and 3rd rows of raspberry
- W-pattern alternating at 3’ intervals, 18” and 36” within canopy

2015

- SWD Monitoring
- Weather Resistant & PYO

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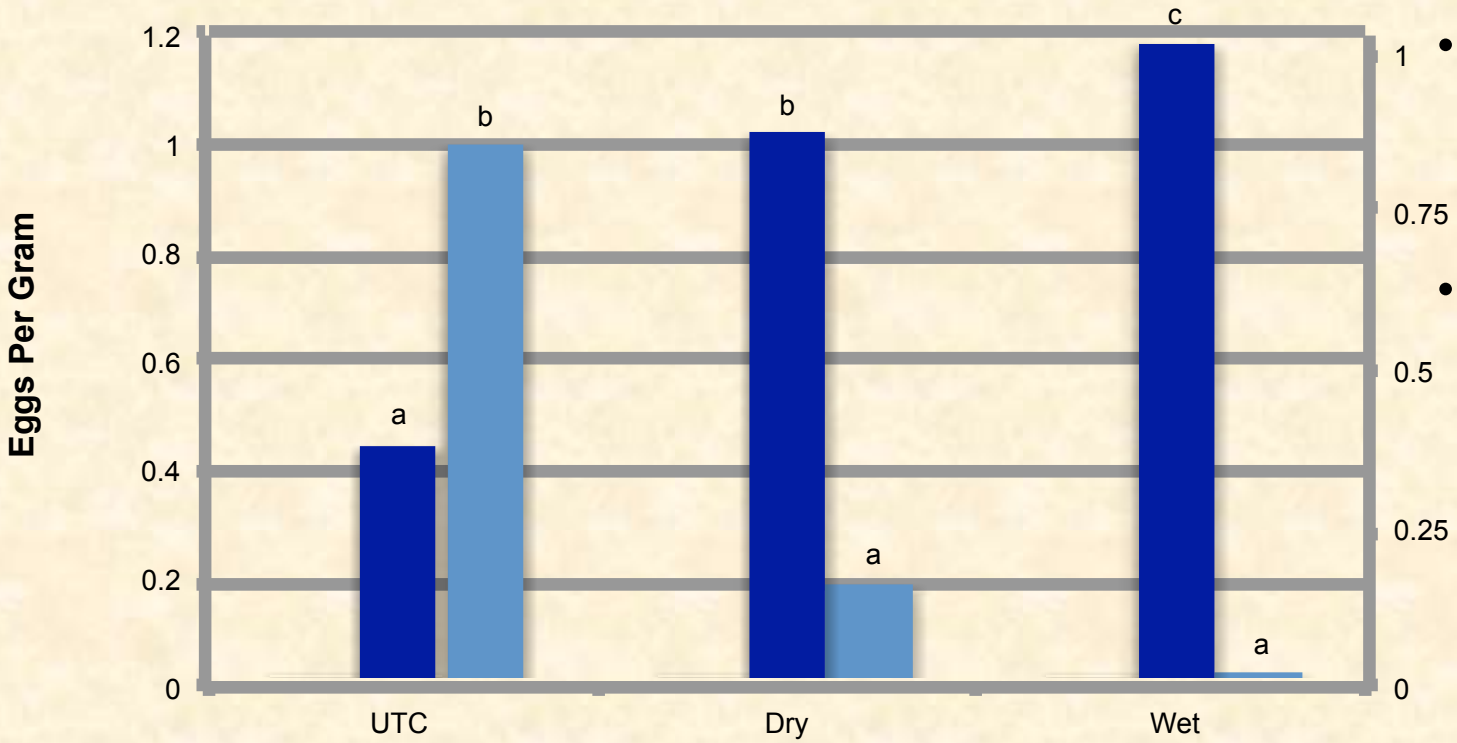
ATK Insecticide Screening Studies: Entrust

- ATK disc + solution (RRC/ACV+yeast); Entrust 1% AI



- Placed into SWD cage within 24h (wet) or after 30d (dry)
- Maintains high attractiveness and ovipositional deterrence

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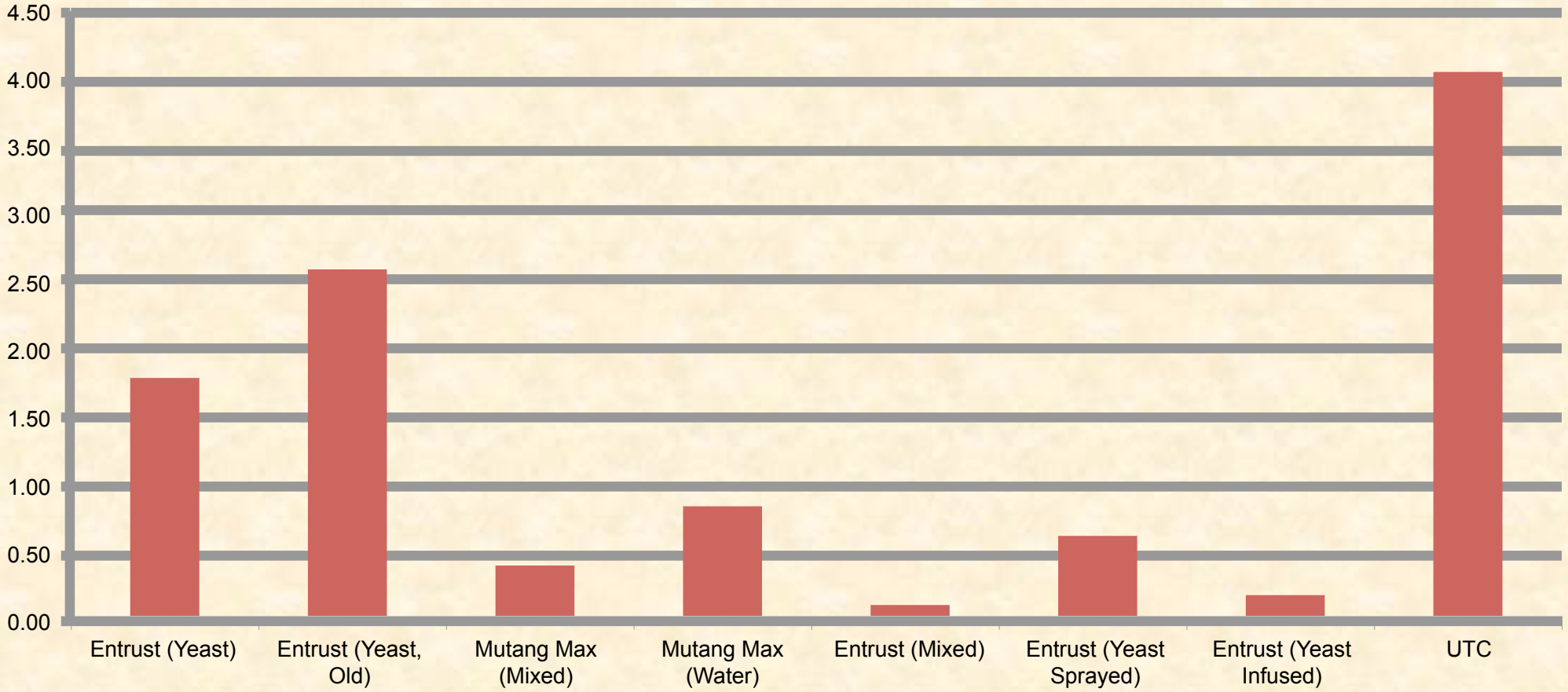
Chamber Study
SWD Ovipositional Deterence
Eggs Per Gram/48 hour



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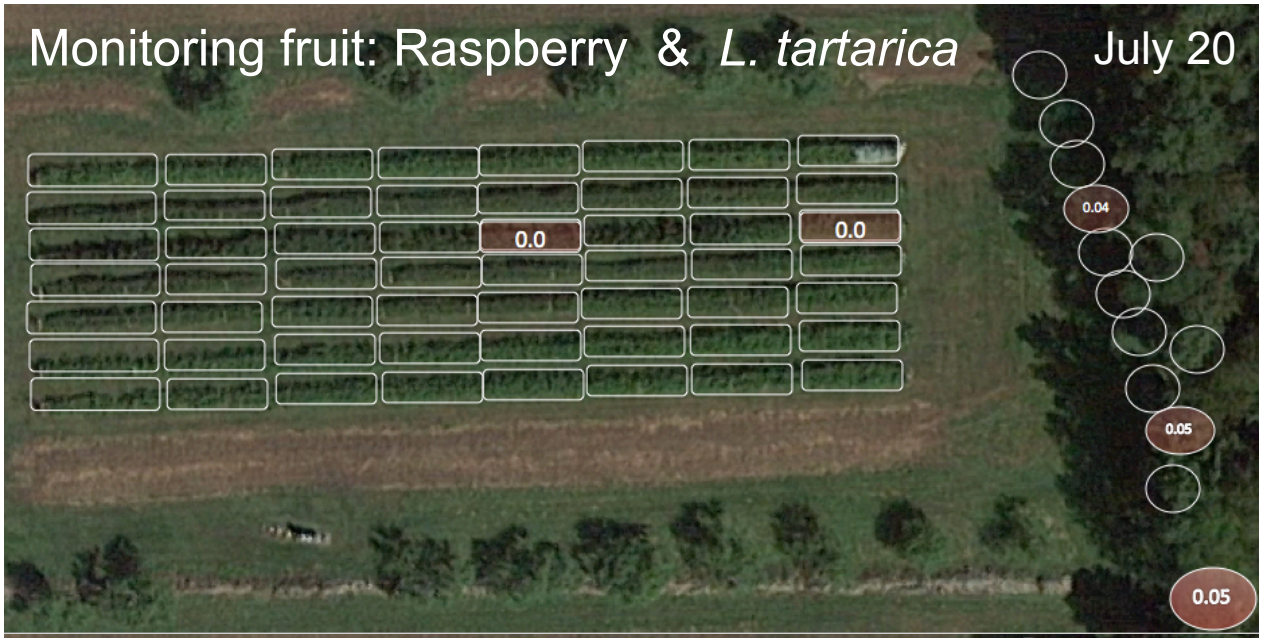
SWD Attract and Kill Management 2015

Manage SWD in both landscape and agricultural crops

- Honeysuckle is a primary host for SWD; *L. tartarica* fruit favored over raspberry in June-August.

SWD Attract and Kill Management 2015



WestWind Farm, Accord NY

- Honeysuckle is a primary host for SWD; *L. tartarica* fruit favored over raspberry in June-August
- First SWD eggs found in *L. tartarica* on 20 July
- SWD populations build over several weeks prior to migration to commercial fruit.

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SWD Attract and Kill Management 2015

WestWind Farm

- Honeysuckle is a primary host for SWD; *L. tartarica* fruit favored over raspberry in June-August
- First SWD eggs found in *L. tartarica* on 20 July
- SWD populations build over several weeks prior to migration to commercial fruit.
- First SWD eggs found in raspberry on 4 August.
- Raspberry collections taken through to the end of season.

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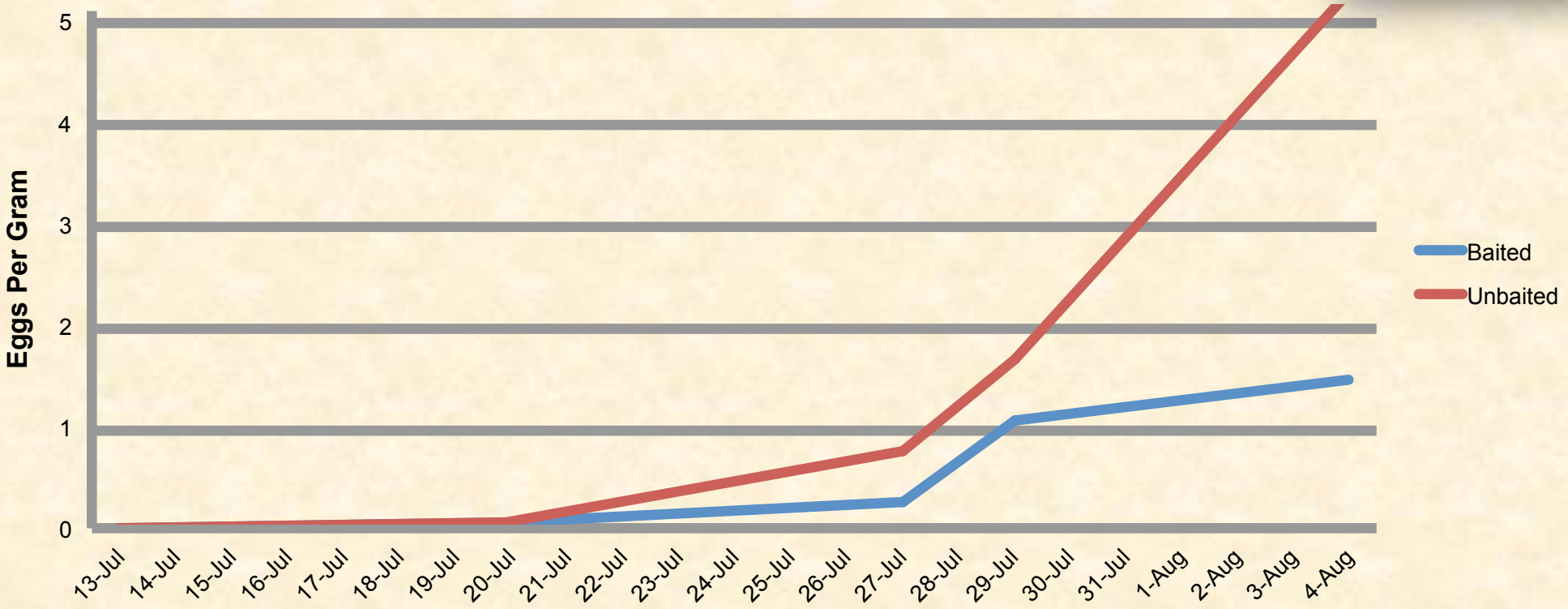
Assessment of ATK Stations in *L. tatarica*

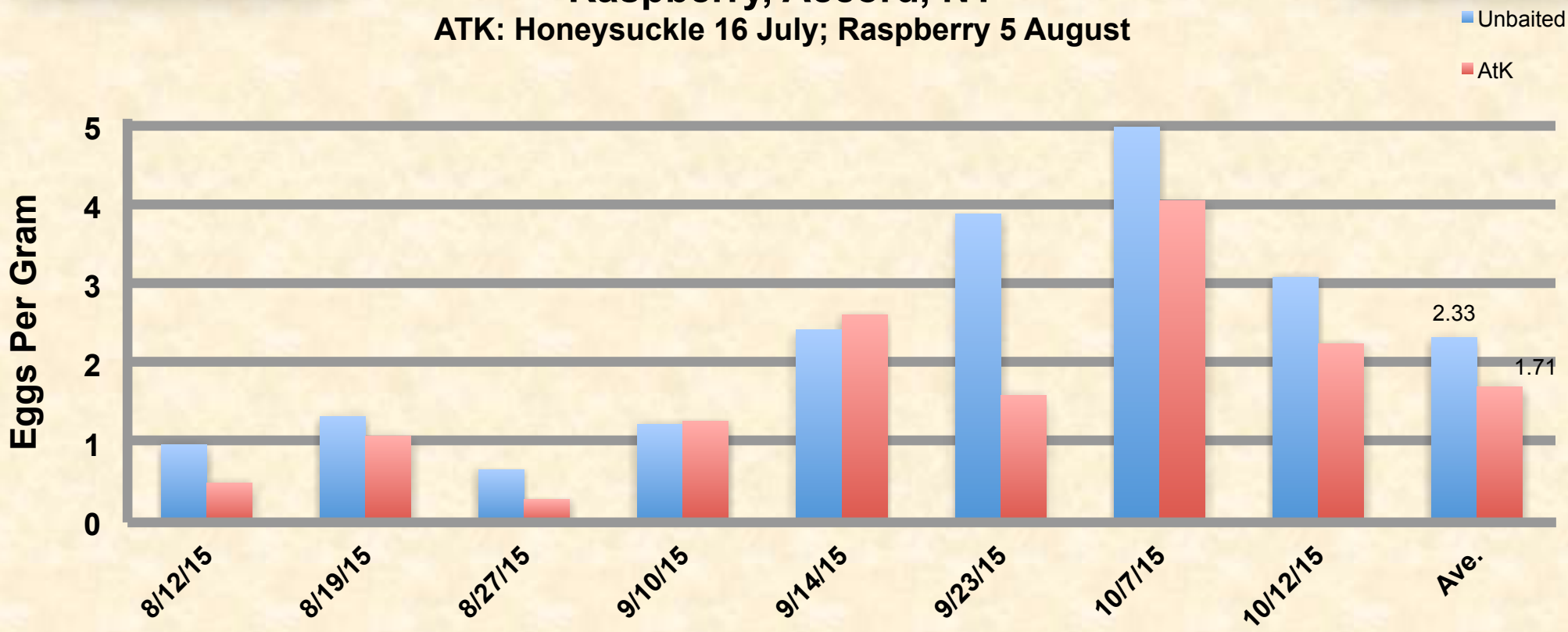
Goal: To reduce SWD populations prior to migration into raspberry fields



WestWind Farm

Raspberry, Accord, NY

ATK: Honeysuckle 16 July; Raspberry 5 August



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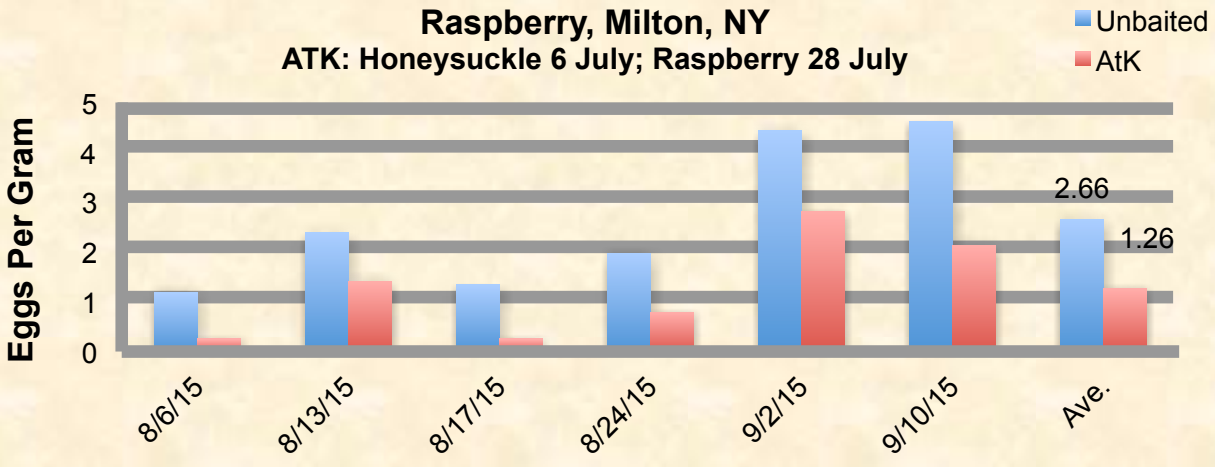
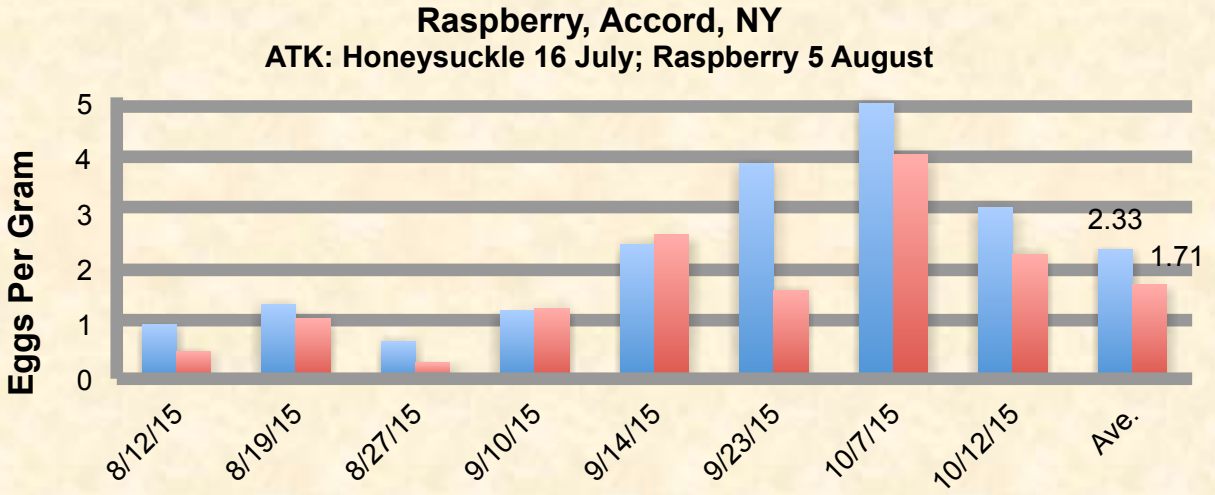
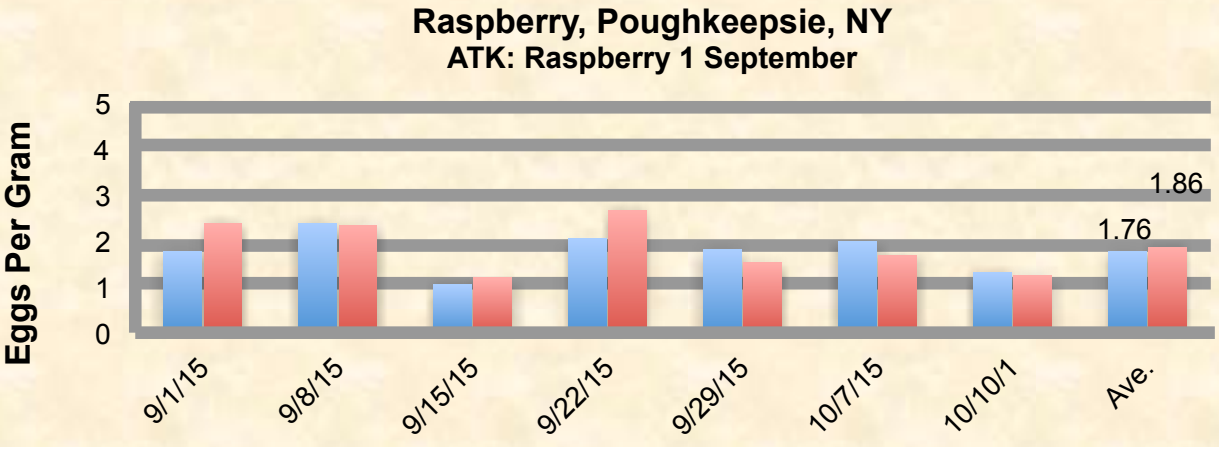


ATK Placement: <u>Early</u> (SWD Adults)
52.6% reduction in eggs/gram fruit

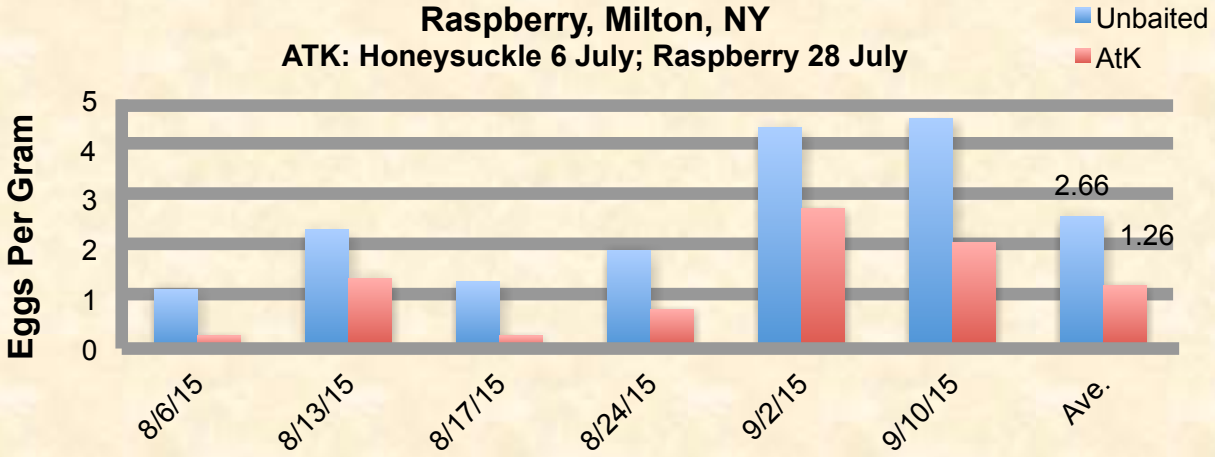


ATK Placement: Mid
26.6.0% reduction

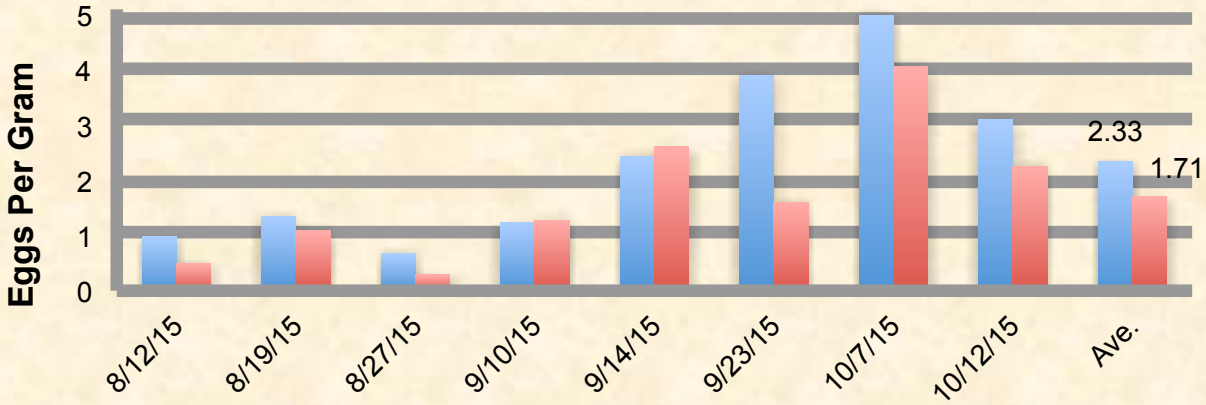


ATK Placement: Late
5.4% increase

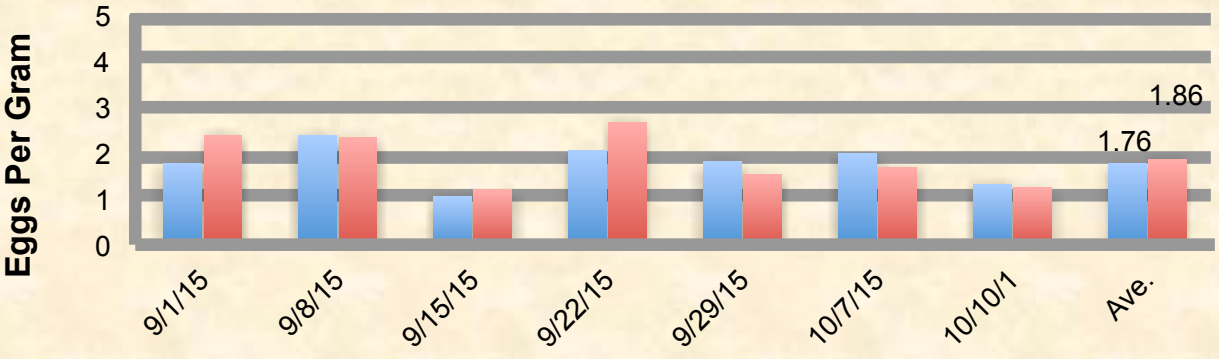
Raspberry, Milton, NY
ATK: Honeysuckle 6 July; Raspberry 28 July



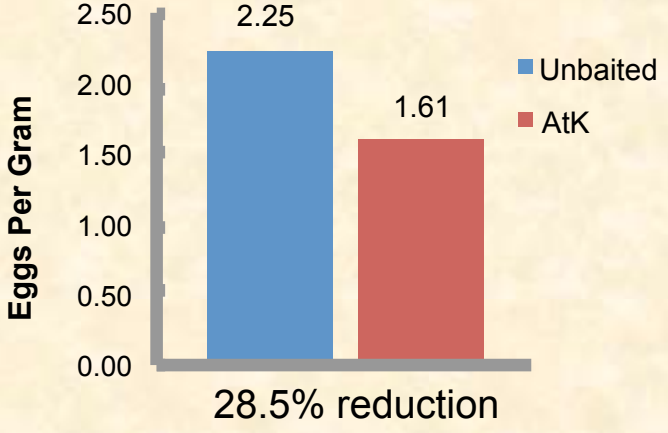
Raspberry, Accord, NY
ATK: Honeysuckle 16 July; Raspberry 5 August



Raspberry, Poughkeepsie, NY
ATK: Raspberry 1 September



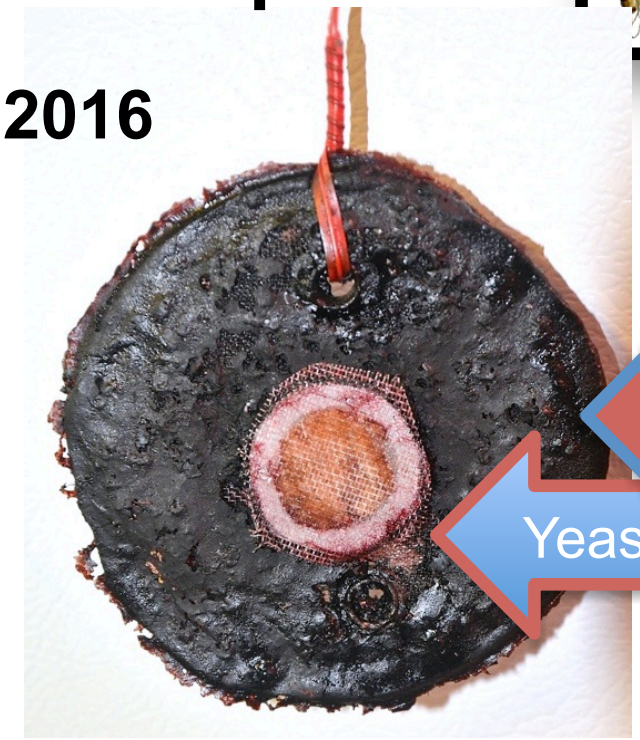
3 Farm Average Using ATK Mgt.
SWD Eggs / gram raspberry fruit



Attract and Kill Developemnt

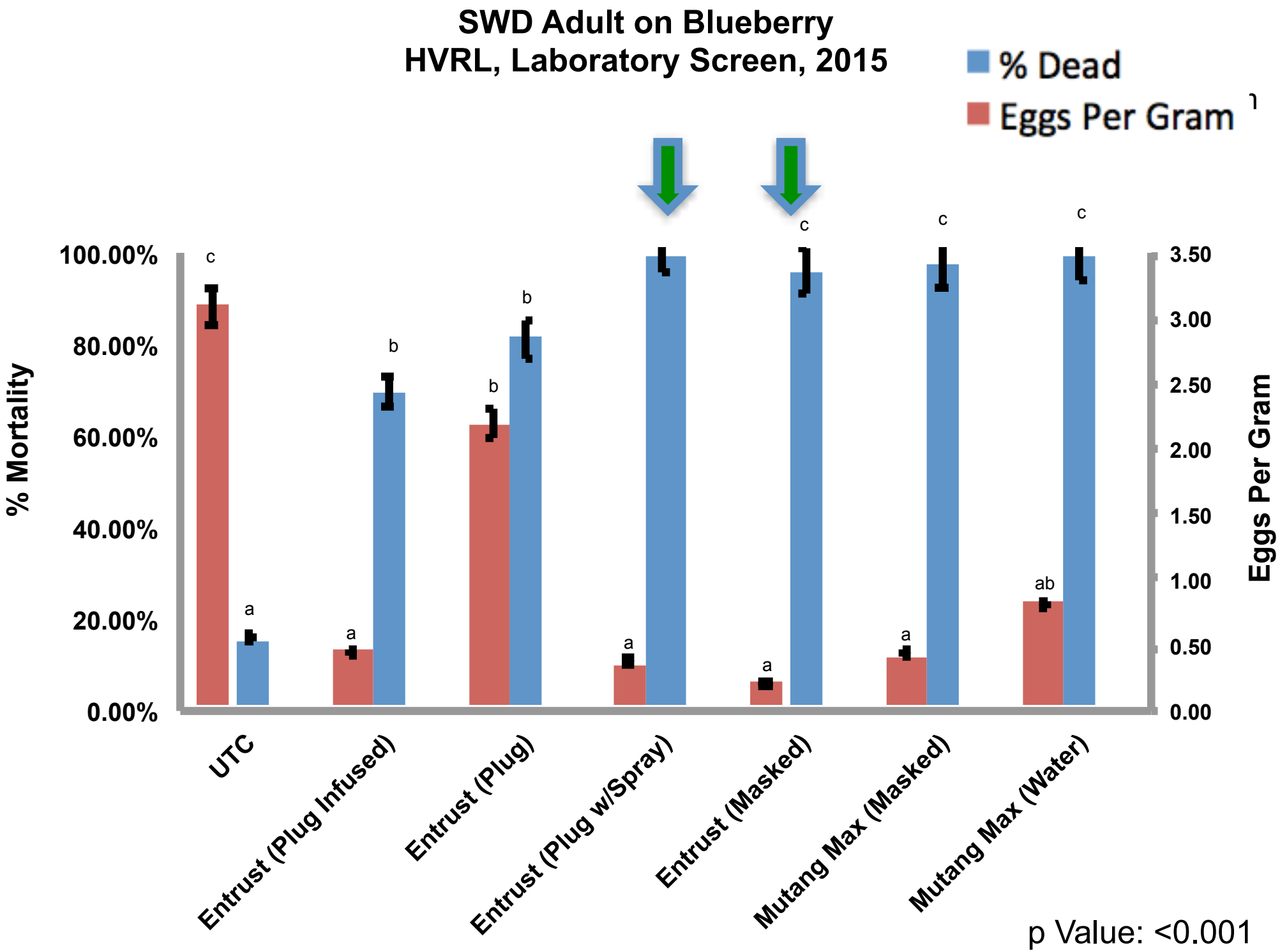
2015

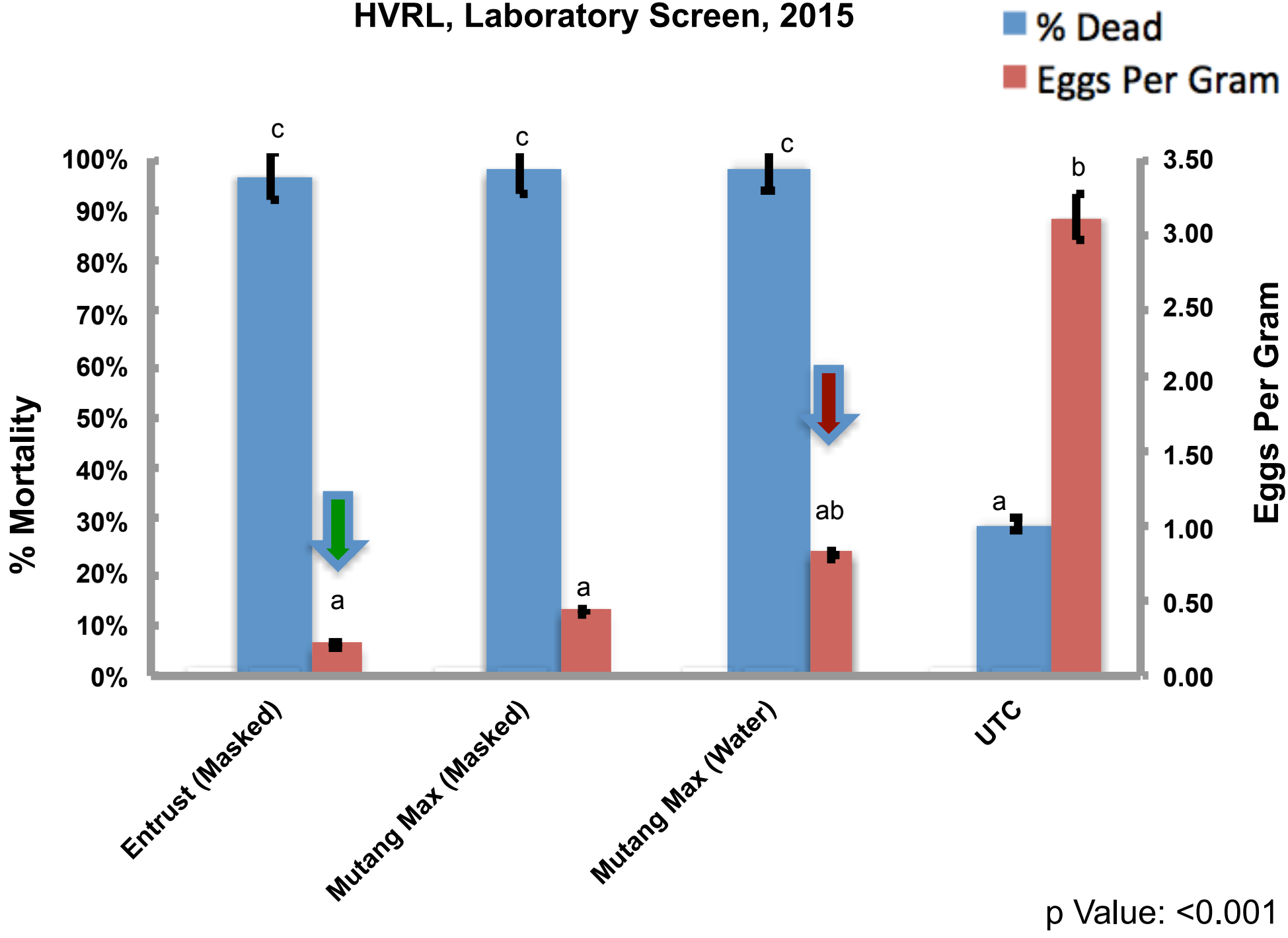
2016



SWD Adult Management Comparisons of ATK Stations (ATK vs. ATK + Plug)

- Plug attracted SWD without alighting onto ATK disk
- Masked = ATK solution + insecticide
- No significant difference between masked **Mustang Max (**Zeta-Cypermethrin) and masked Entrust (Spinosad).
- Mustang Max mixed with water slightly less effective at preventing oviposition compared to masked (but still superior to untreated check, and not statistically significant).
- Mustang Max's strong odor may account for repellency to disk and higher fruit injury.


SWD Adult on Blueberry
HVRL, Laboratory Screen, 2015
% Dead
Eggs Per Gram
% Mortality
Eggs Per Gram
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
c
a
b
a
b
b
a
c
a
c
a
c
ab
UTC
Entrust (Plug Infused)
Entrust (Plug)
Entrust (Plug w/Spray)
Entrust (Masked)
Mutang Max (Masked)
Mutang Max (Water)
p Value: <0.001


SWD Adult on Blueberry
HVRL, Laboratory Screen, 2015
% Dead
Eggs Per Gram
% Mortality
Eggs Per Gram
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
c
c
c
b
a
a
ab
a
Entrust (Masked)
Mutang Max (Masked)
Mutang Max (Water)
UTC
p Value: <0.001

Yeast Plug

- **Yeast plugs:** No significant difference between disks with sprayed yeast plugs and disks without plugs.

- HOWEVER, yeast plugs without insecticide significantly *weakened* performance of disk.

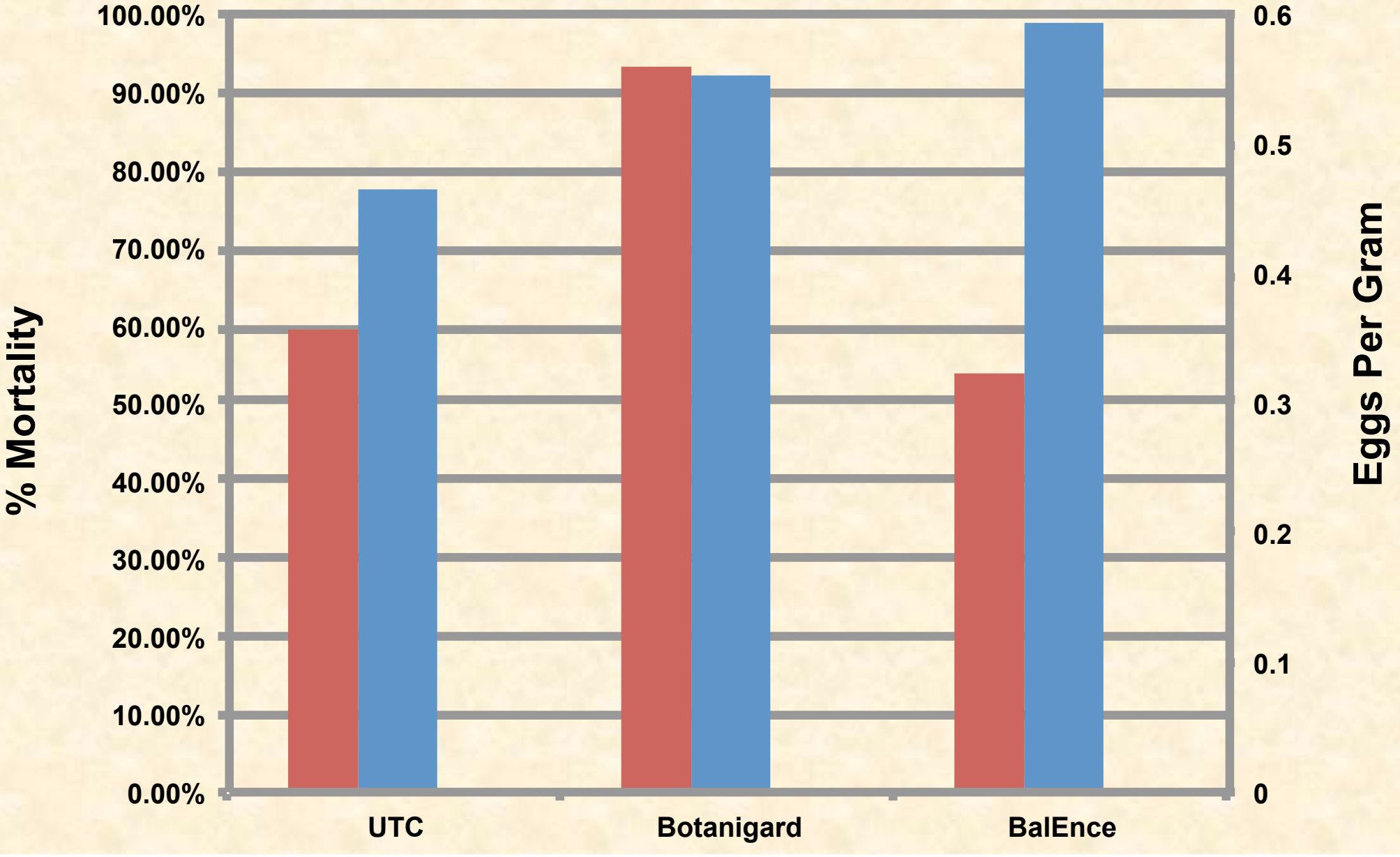
Mustang Max -

- Mustang Max is a Pyrethroid rated highly against SWD (Tanigoshi et al., 2013).

- In AtK form, it was applied in same manner as the Entrust (1% active ingredient to 99% spray).

- Mustang Max (Water) – Mixed with water
- Mustang Max (Masked) - Mixed with ATK solution

ATK & Biological Control: Beauvaria bassiana



Thanks for your attention

Questions ???

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Thank You

Technical staff and assistants