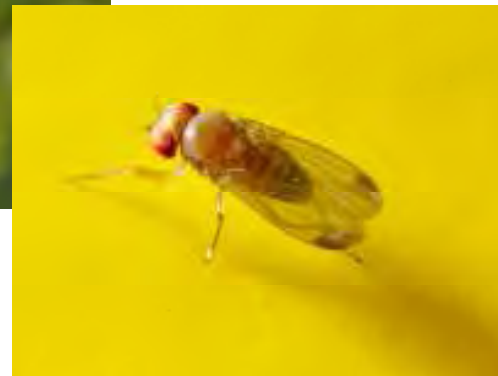




SWD in Cherry

Larry Gut and Nikki Rothwell





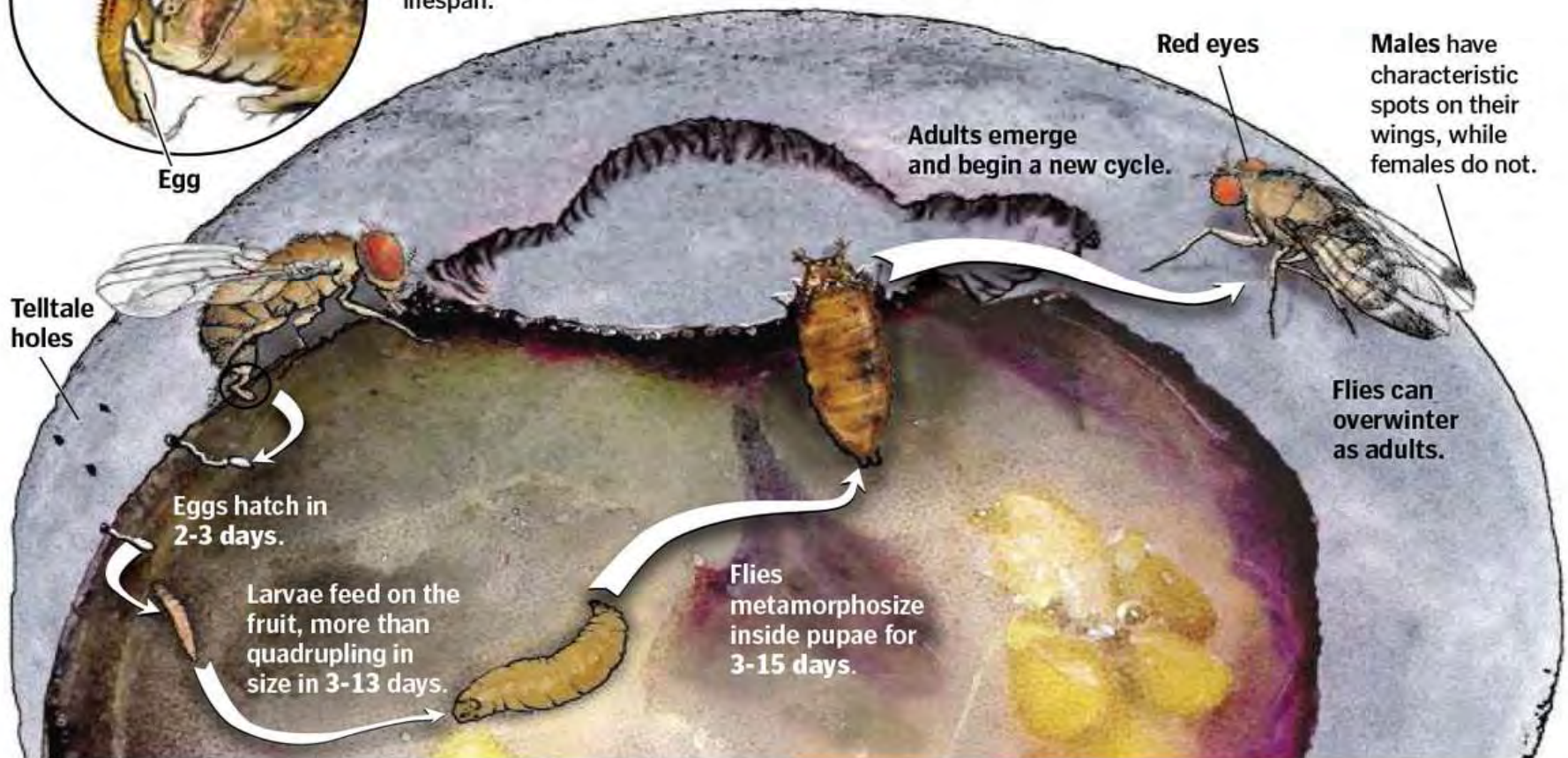
Female flies can deposit eggs through the skin of healthy, ripening fruit with a barbed ovipositor.



Females lay 1-3 eggs per laying hole and average 380 eggs over a lifespan.

Generations in lab conditions

Temperature	Adult-to-adult generation
54°F	50 days
59°F	21-25 days
65°F	19 days
77°F	8.5 days
83°F	7 days



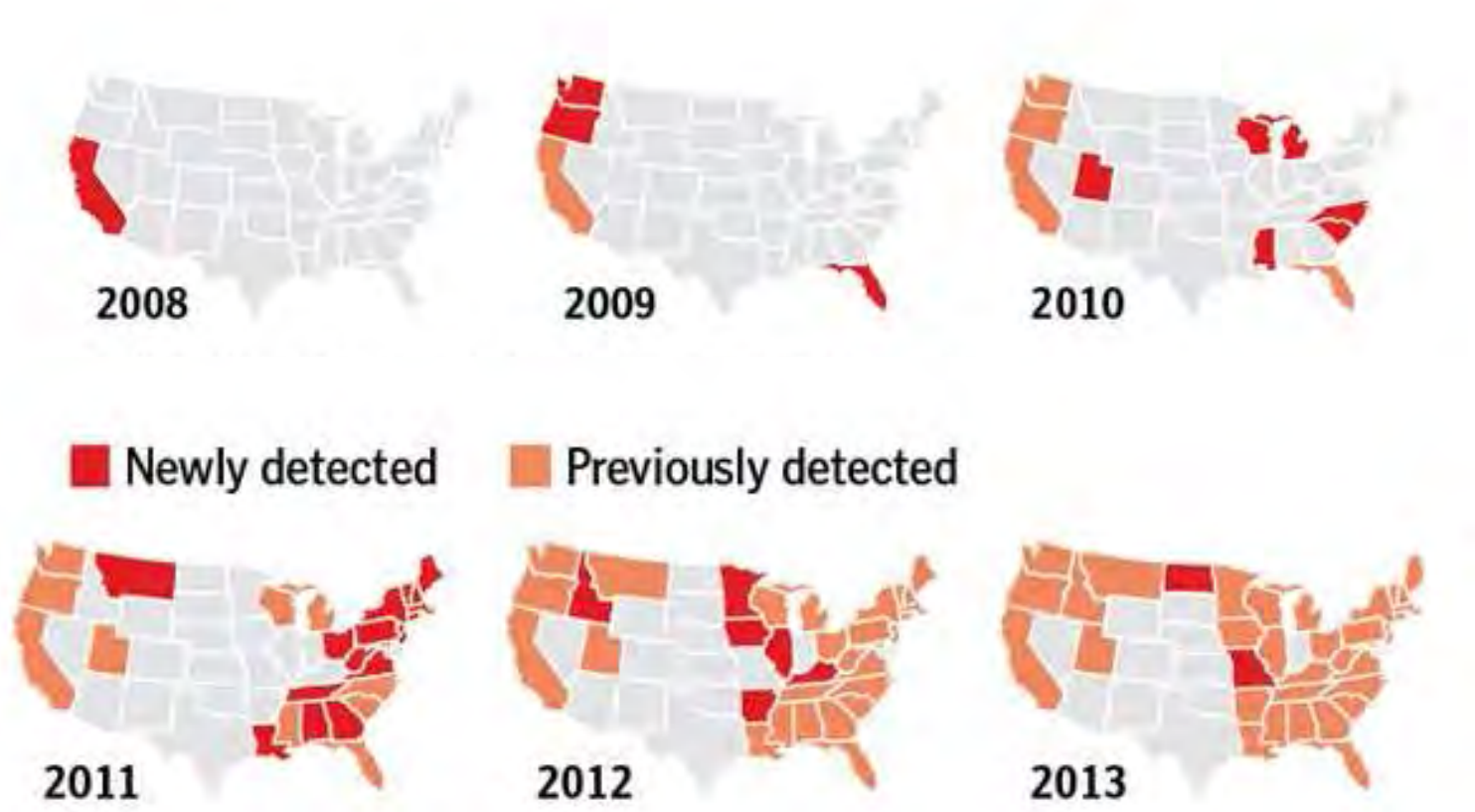
SOURCE: British Columbia Ministry of Agriculture; University of Maine

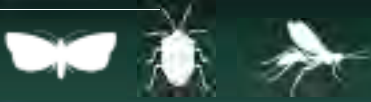
DAVID BUTLER/GLOBE STAFF

more at www.ipm.msu.edu/SWD.htm



Spread of SWD





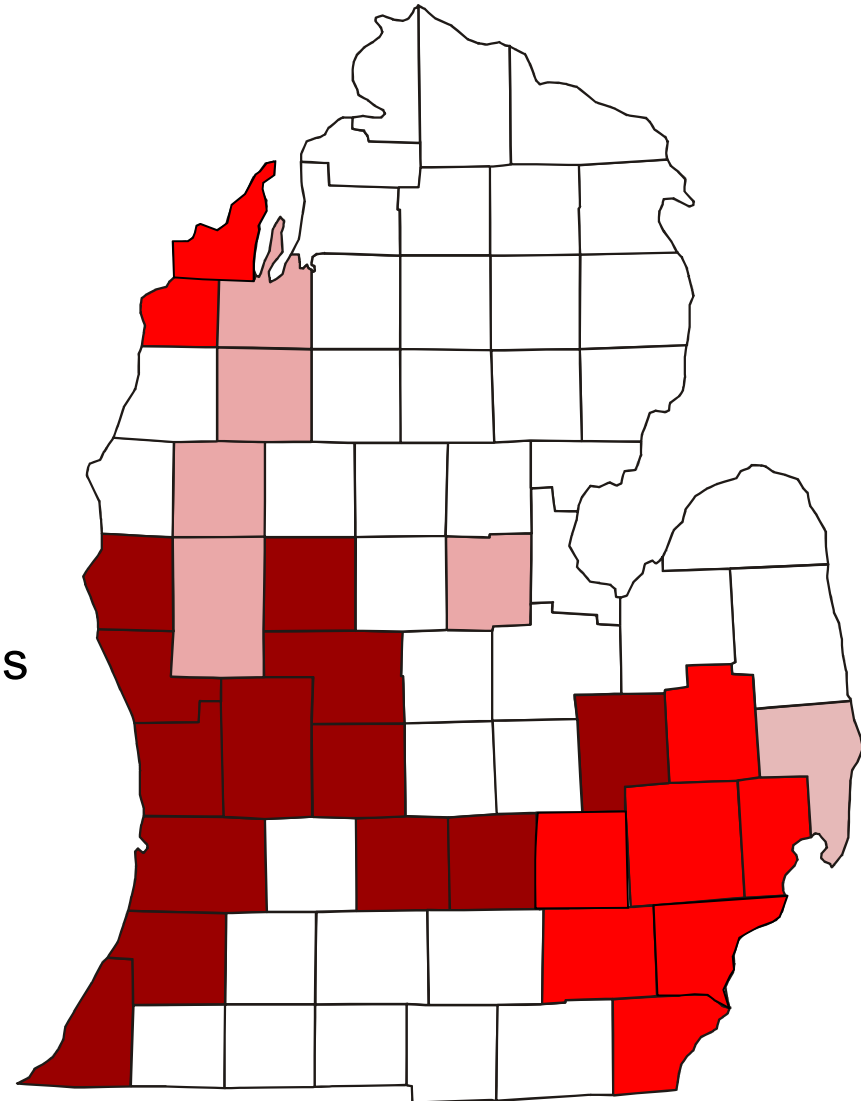
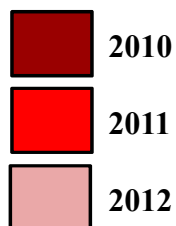
Current MI distribution

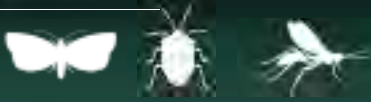
Rufus Isaacs, Larry Gut, John Wise, Steve Van Timmeren, Keith Mason, Peter McGhee, Mike Haas, Nikki Rothwell, Karen Powers, Mark Longstroth, Carlos Garcia-Salazar, Bob Tritten, Diane Brown-Rytlewski, Jeanette Yaklin



Based on APHIS–confirmed samples sent through MSU Diagnostics

SWD first detected in...

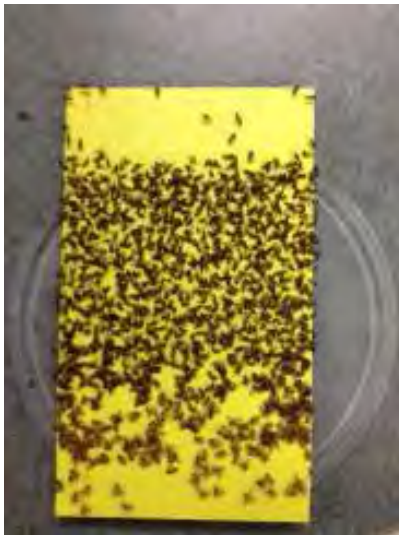




2013 Trapping Network



- Clear plastic container baited with yeast-sugar solution
- Over 60 traps deployed in 11 counties
- Over 100,000 SWD captured and identified
- Catches posted weekly online





News



Connect with experts around the country:



SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Michigan spotted wing Drosophila report for July 30, 2013

Sharp increase in spotted wing drosophila captures in the past week in southern Michigan counties, and first detection of infestation in unsprayed cherries.

Posted on July 30, 2013 by Karen Powers, and Nikki Rothwell, Michigan State University Extension

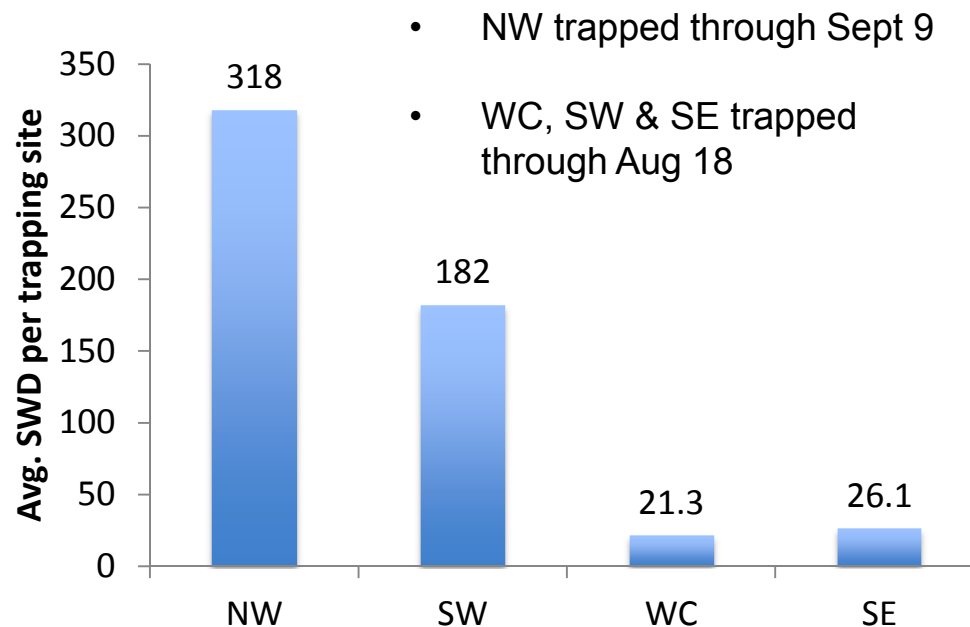
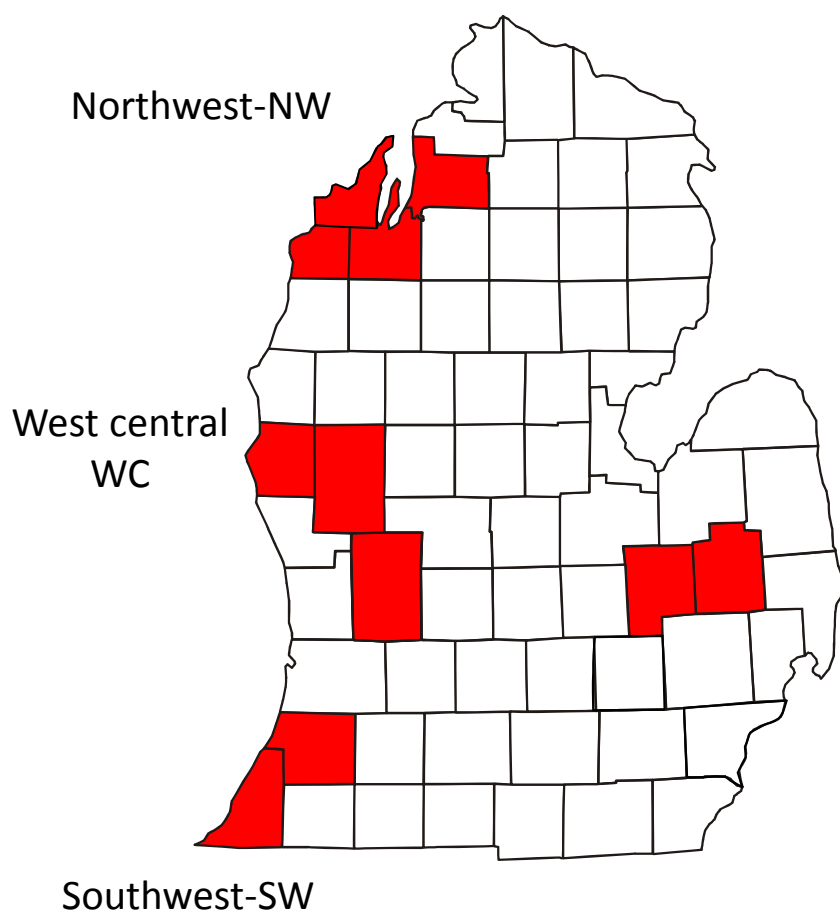


Adult [spotted wing Drosophila](#) (SWD) catch has increased over the past week, from an average of 1.6 flies per trap to 8.2 flies per trap. These are the averages across all of the 120 traps in our [Michigan State University Extension](#) SWD Monitoring Network over the past week, where 26.4 percent of the traps were positive for SWD, down slightly from 30.2 percent last week.

However, these summary numbers do not reflect the much higher levels of SWD activity observed in the southern part of the monitoring network, particularly in southwest Michigan. This can be seen by the average catch in northwest Michigan traps being 0.2 SWD per trap compared with 13.5 SWD per trap in those traps located in the rest of the state, mainly southwest and west central Michigan. In these regions, we are also observing a switch in the number of male and female flies captured in the traps, with two to three times more females than males. In some traps this was even more extreme; for example, one trap caught



Comparative catch in 4 cherry production regions



- NW trapped through Sept 9
- WC, SW & SE trapped through Aug 18

Southeast-SE

- Average catches 10-fold higher in NW and SW



Comparative catch by region and production system

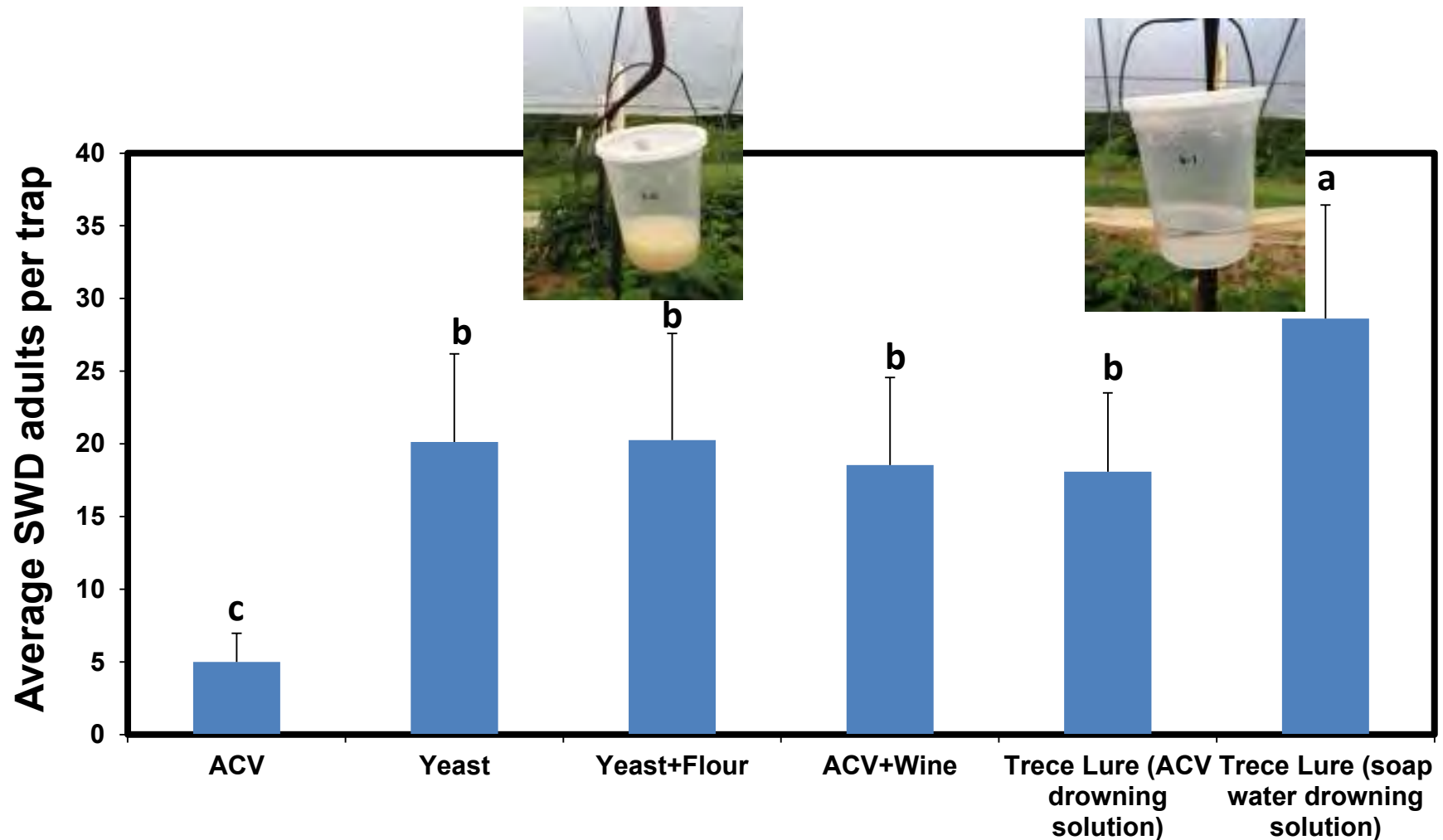
Crop	Region	Number of sites	Average SWD/site
Cherry	NW	34	318.0
	SW	9	182.0
	WC	6	21.3
	SE	7	26.1
Berry	NW	17	519.9
	SW	34	227.3
	WC	7	6.5
	SE	3	21.7
Grape	NW	12	117.7
	SW	5	270.7
Peach/Plum	SW	3	28.0
	WC	1	9.0
Apple	WC	5	10.8
	SE	5	7.2



- NW trapped through Sept 9
- WC, SW & SE trapped through Aug 18



2013 bait comparison to improve SWD capture



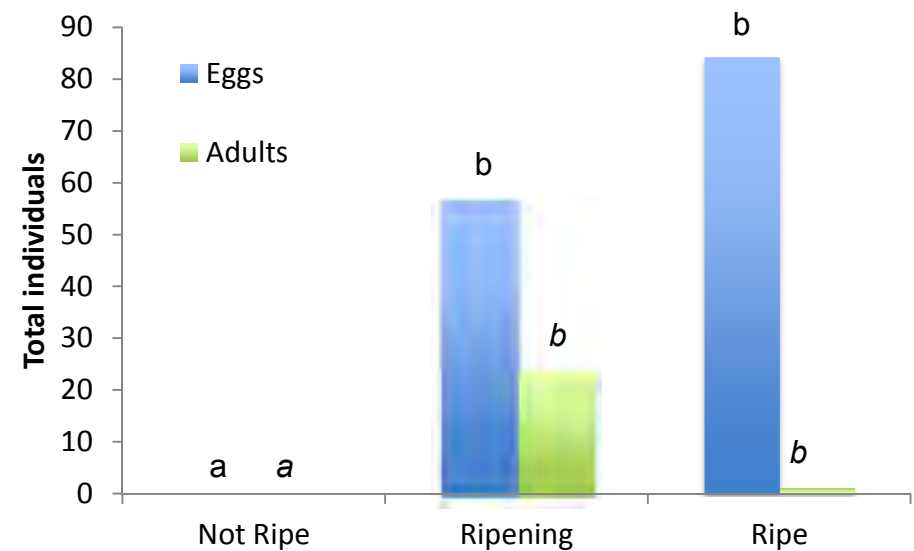
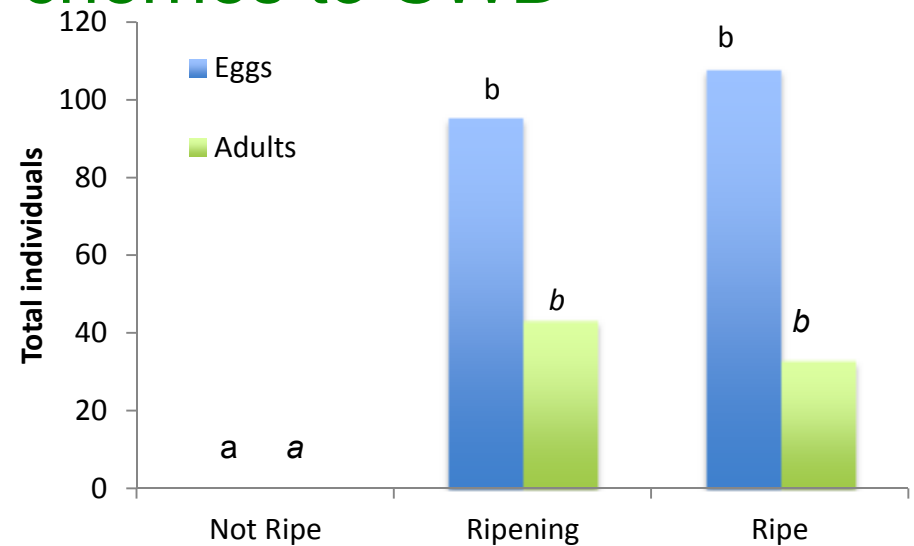
Data courtesy of Isaacs et al.



Susceptibility of cherries to SWD



- Five fruits placed into deli containers with 5 female and 5 male SWD
 - Unripe cherries (green)
 - Ripening cherries (pink)
 - Ripe cherries (red for tarts and dark red for sweets)
- 4 replicates





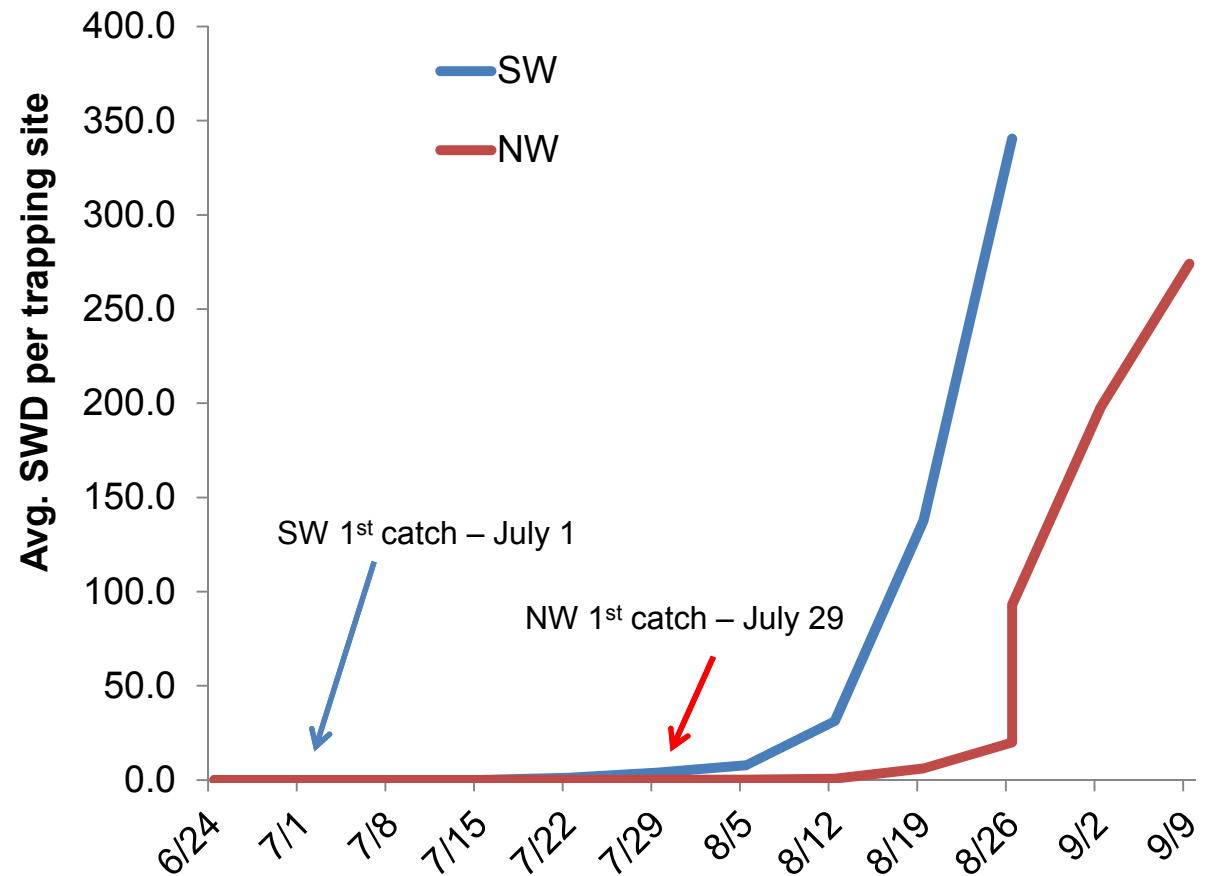
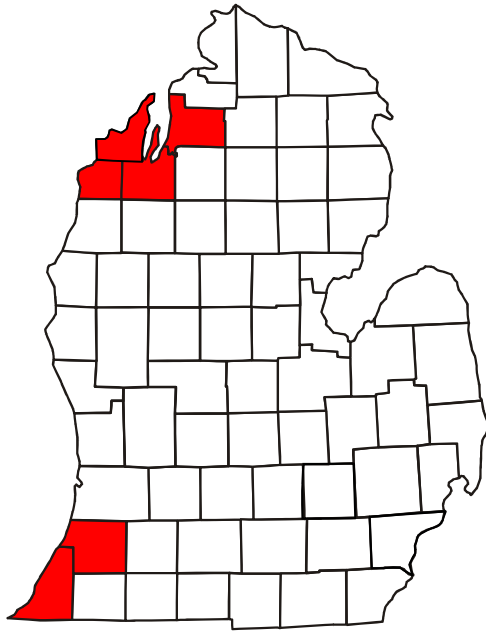
Sampling fruit for SWD

- Gather cherries (1 lb) into a ziplock bag.
- Pour salt solution (1 cup/gallon) over cherries.
- Wait an hour, and count SWD larvae.





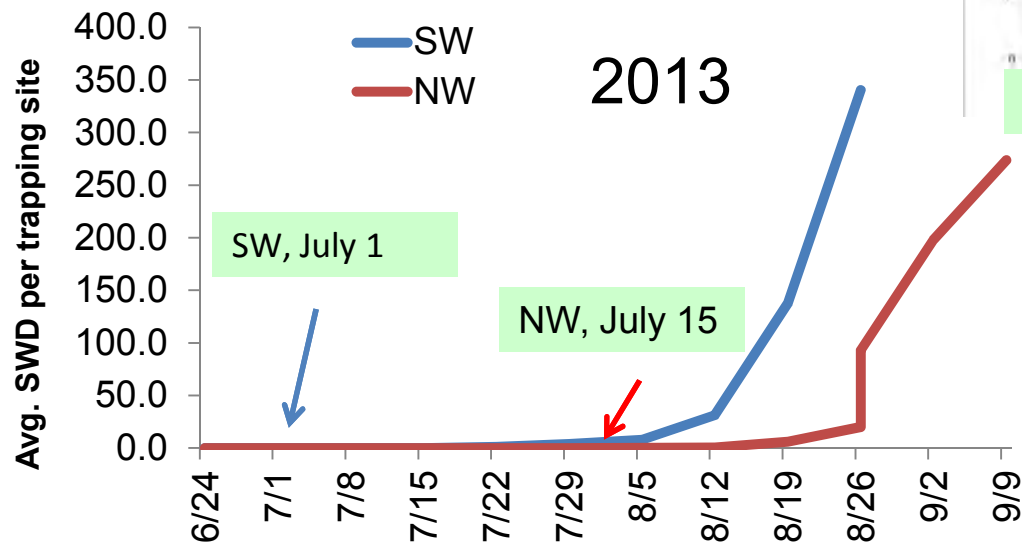
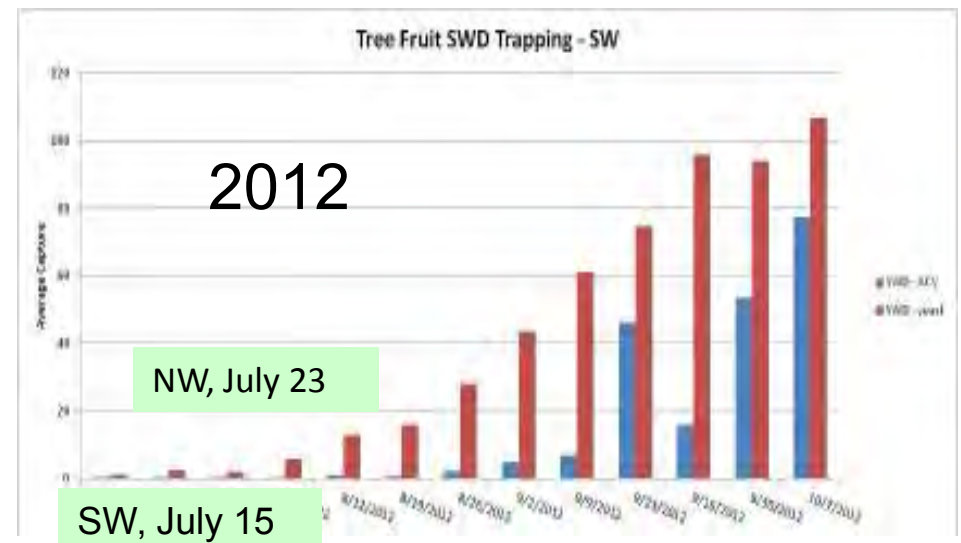
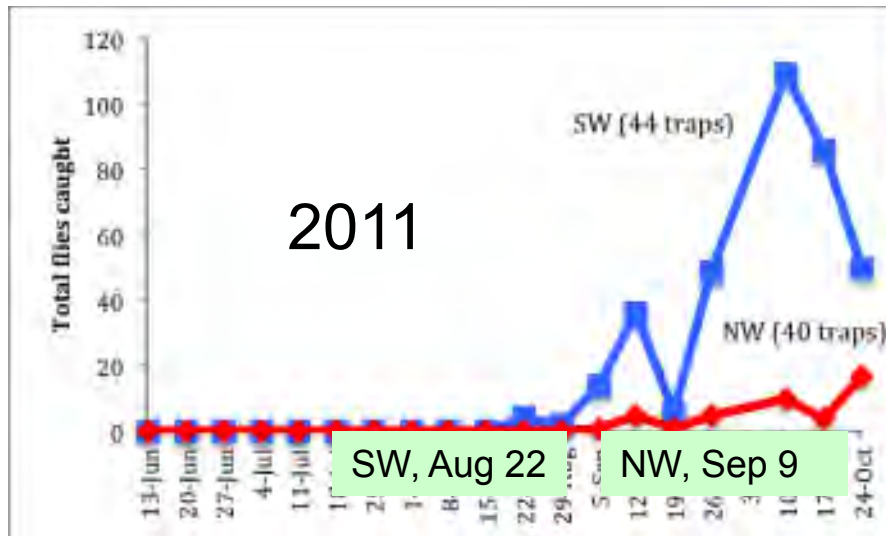
Timing of SWD activity in cherry, 2013



Larvae **were not** detected in fruit samples prior to harvest



Timing of SWD activity in MI cherry





Field-based insecticide bioassays



- Treatments applied to cherry trees with airblast sprayer.
- Cherries collected 1 and 7d post-treatment.

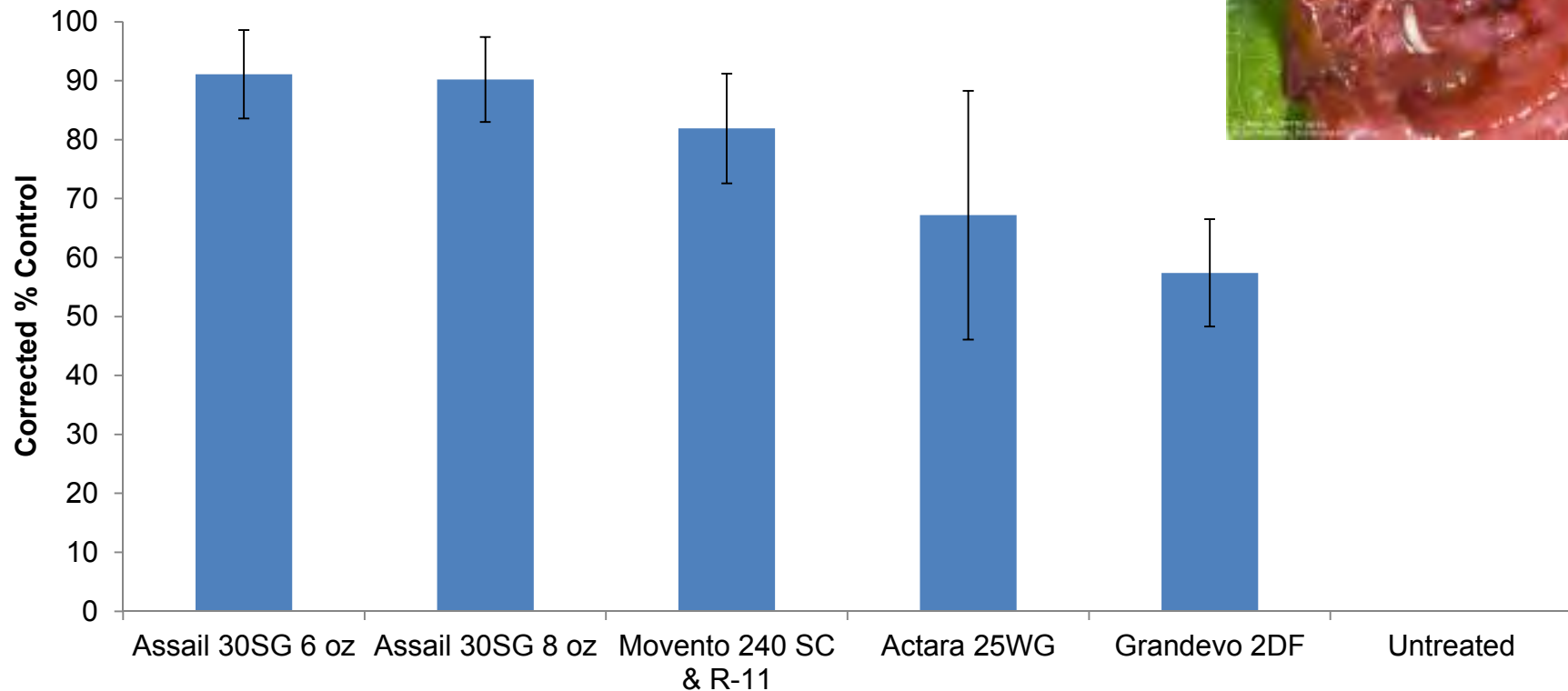
5 cherries placed in container

Add 5 male, 5 female SWD – hold for 7d.

Count larvae/pupae after 9d, calculate % mortality



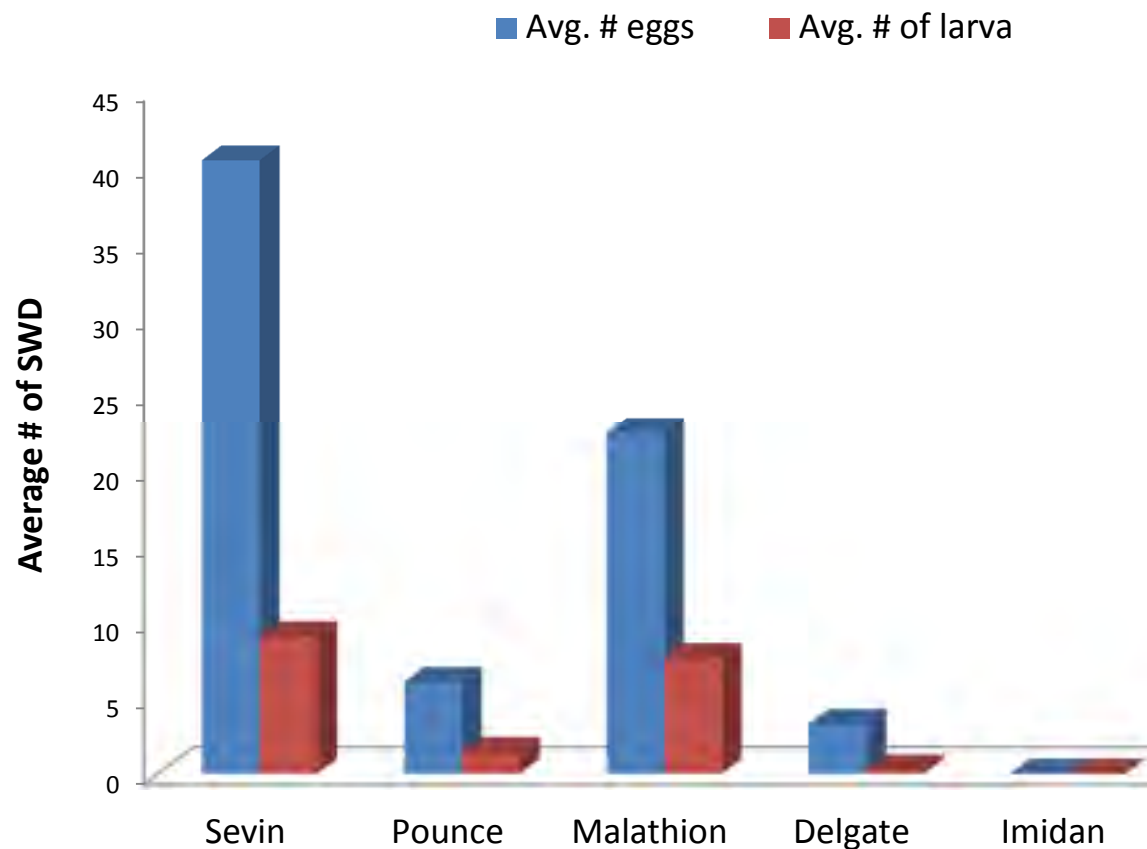
Efficacy – TNRC trial



- Assail and Movento provided highest levels of control



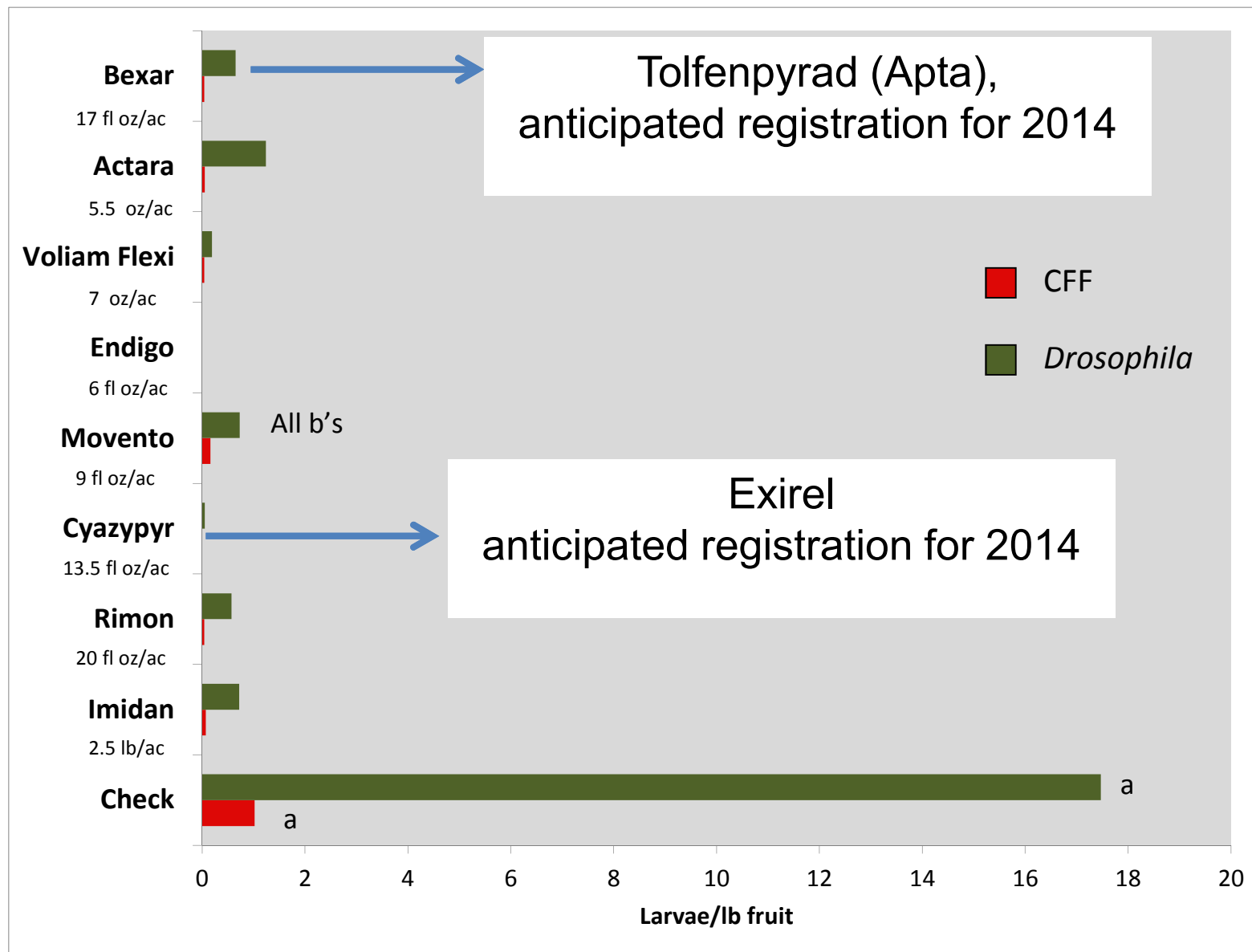
Efficacy – NW trial



- Sevin was ineffective
- Delegate and Imidan provided highest levels of control

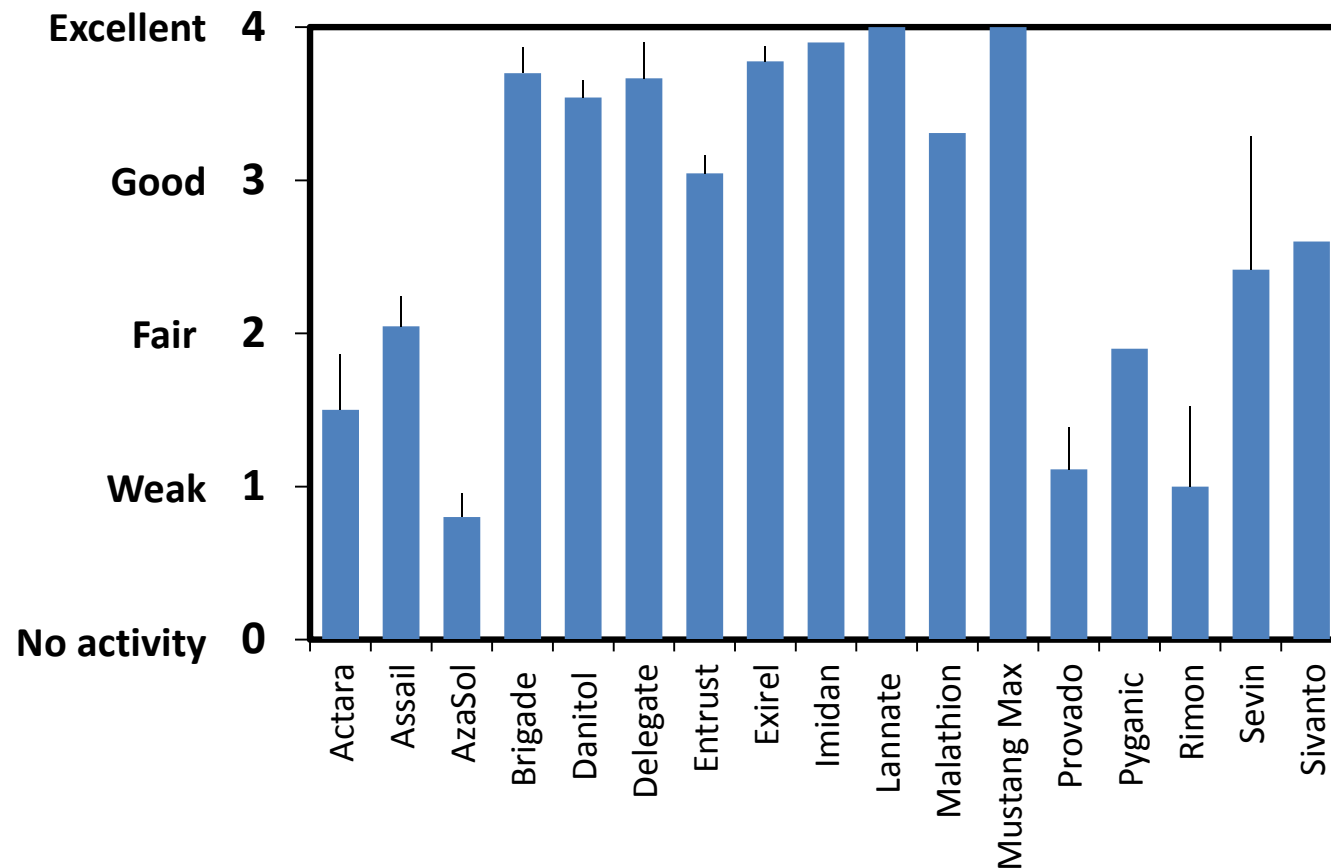


Control of CFF and *Drosophila* in tart cherry-2011





2013 SWD working group insecticide rankings



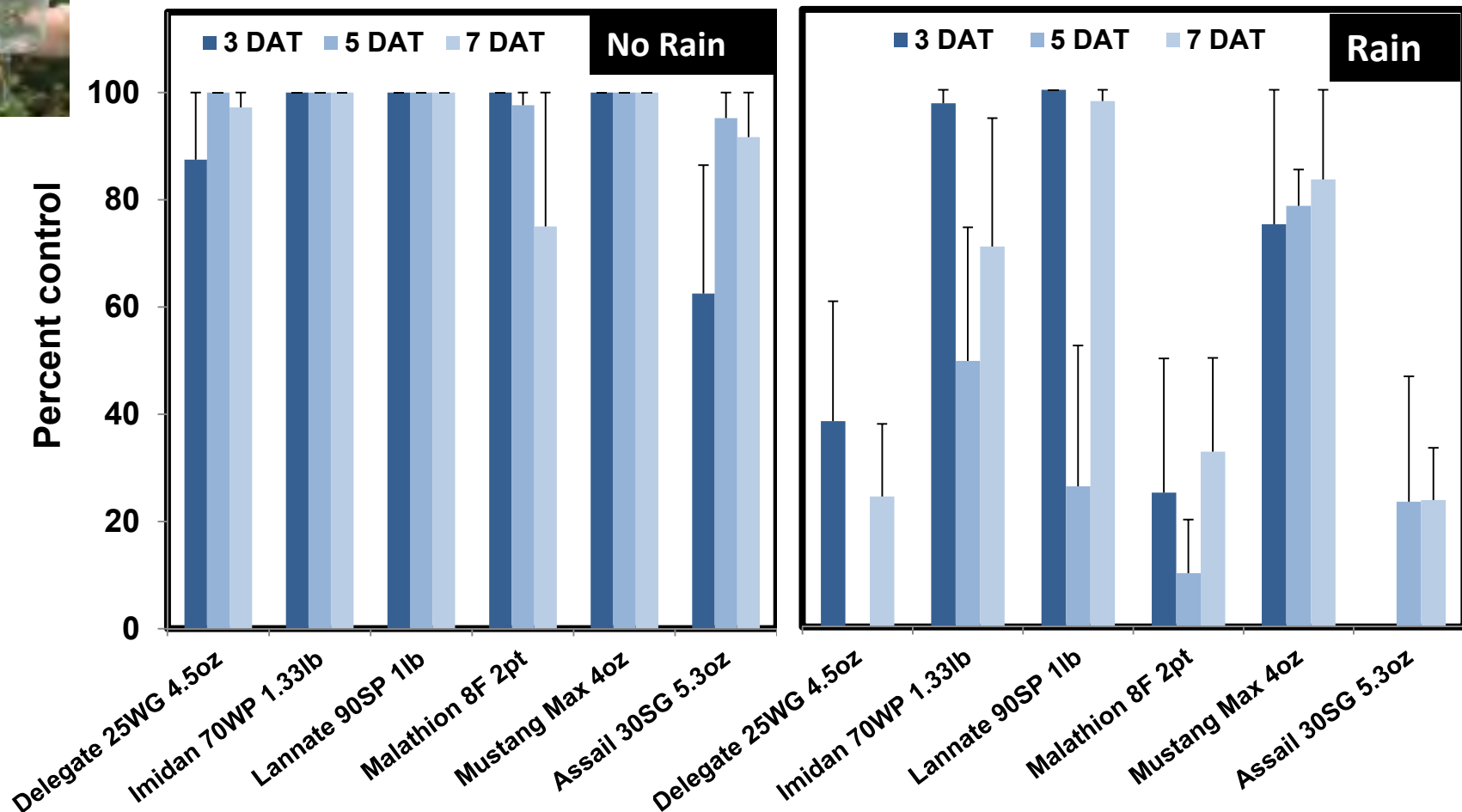
Most effective: Imidan, Delegate, Mustang Max, Danitol, Lannate

Very effective: Malathion, Brigade/Bifenture, Hero

Shorter residual: Entrust, Pyganic, Assail



Rain has severe impact on efficacy



*0.8 inches of rain on treated bushes
1 day after application*

Data courtesy of Isaacs et al.



Keeping the MI cherry industry informed

- Weekly reports in MSU AgNews (12 articles)
- Presentations
- Fruit Pest Management Guide

Michigan spotted wing Drosophila report for July 23, 2013

Spotted wing drosophila fly captures are increasing sharply at some sites. Some still have no catch, and first spotted wing Drosophila catch is reported in northwest Michigan.

Posted on July 23, 2013 by Nikki Rothwell, and Karen Powers, Michigan State University Extension



FOR COMMERCIAL FRUIT GROWERS

Michigan Fruit Management Guide 2013

MICHIGAN STATE UNIVERSITY | Extension

INSECTS

Obliquebanded leafroller	See "Third Cover"
Cherry fruit fly	See "Third Cover"
Spotted wing drosophila ¹	9e, 35, 44g, 64e, 72f, 73g, 85e, 86e

Comments:

¹ See "Invasive and Emerging Pests" section for information on spotted wing drosophila.

INSECTICIDES

- 9.** Imidan 70 W (2.125 lb)
- 35.** Pounce 25 WP (12.8 oz)
- 44.** Danitol 2.4 EC (21.3 oz)
- 64.** Entrust 80 WP (1.25 - 2.5 oz) ▲ *RR*
- 72.** Rimon 0.83 EC (20 - 40 oz)
- 73.** Baythroid XL (2.4 - 2.8 oz)
- 85.** Delegate 25 WG (4.5 - 7 oz) (6 - 7 oz for SWD) *RR*
- 86.** Mustang Max 0.8 EC (4 oz)



Control of *Drosophila* in Tart Cherry

- Know when SWD are present
- Use effective rates of effective products.
- Know the seasonal limits, PHI, REI, etc.
- Reapply after rain.



INSECTS		INSECTICIDES	PHI
Obliquebanded leafroller	See "Third Cover"	9. Imidan (2.125 lb)	7d
Cherry fruit fly	See "Third Cover"	35. Pounce 25 WP (12.8 oz)	3d
Spotted wing drosophila	9e, 35, 44g, 64g, 72g, 73g, 85e, 86g	44. Danitol 2.4 EC (21.3 oz)	3d
Comments: See "Invasive and Emerging Pests" section for information on spotted Wing drosophila.		64. Entrust 80 WP (1.25-2.5 oz)	7d
		72. Rimon 0.83 EC (20-40 oz)	8d
		73. Baythroid XL (2.4-2.8 oz)	7d
		85. Delegate 25 WG (4.5-7 oz)	7d
		86. Mustang Max 0.8 EC (4 oz)	14d

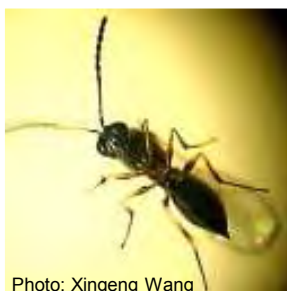


Foreign exploration for natural enemies

Larval Parasitoids



Asobara sp.
(Braconidae)

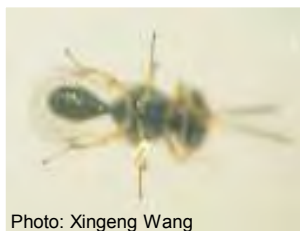


Ganaspis sp.
(Figitidae)

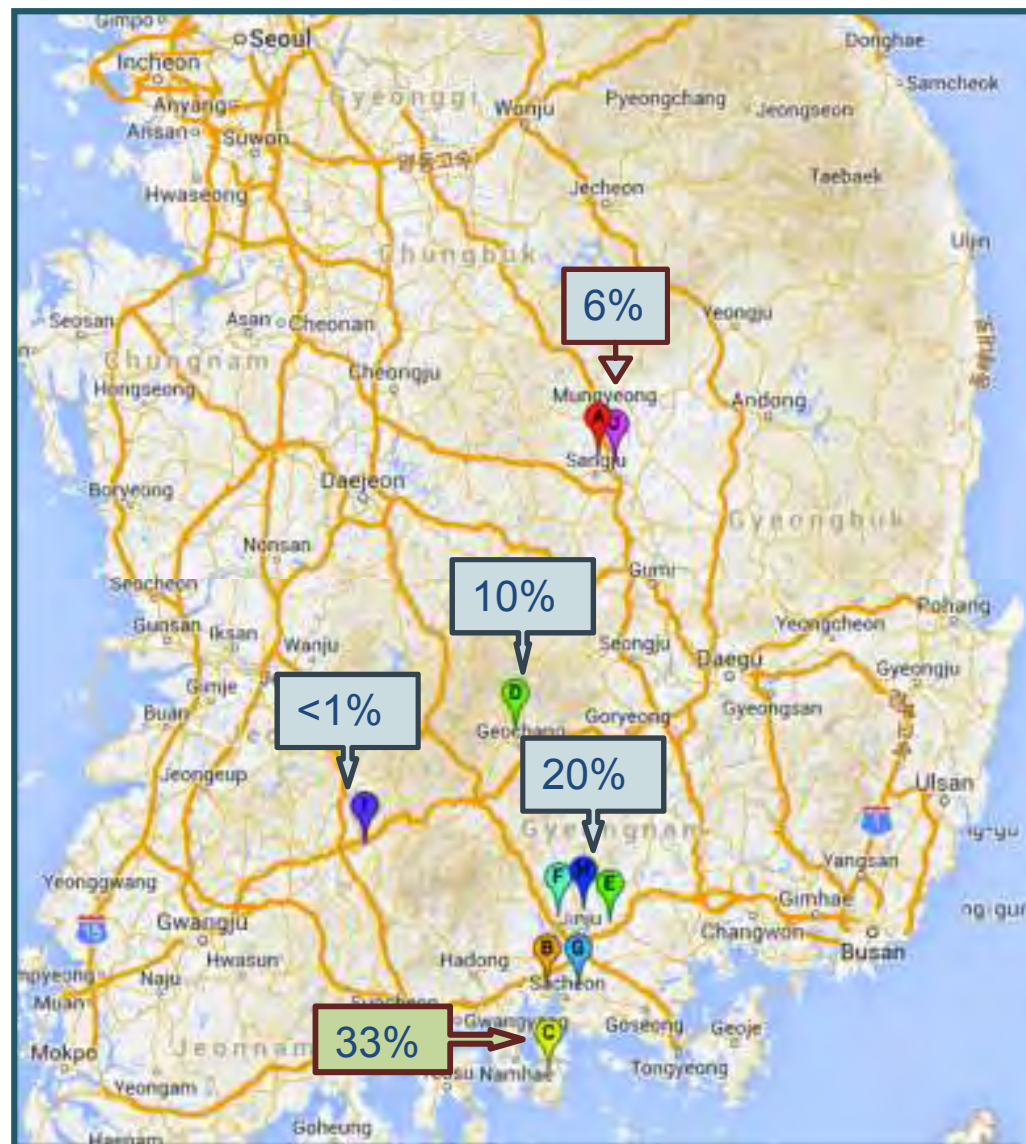
Pupal Parasitoids



Trichopria sp.
(Diapriidae)



Pachycrepoideus sp.
(Pteromalidae)





Summary: Classical biological control

1) OSU researchers collected in So. Korea and parasitoids reared are currently in the UCB Quarantine;



2) 4-5 parasitoid species were recovered, with all species easily reared on SWD and one species appearing to be a specialist on SWD

3) Focus now is to conduct quarantine studies, obtain USDA APHIS release permits.





Thanks to:

- Funders:
 - MI Cherry Committer
 - MI Horticultural Society
 - MI Project GREEN
 - MI Project GREEN AABI
- Terrific staff
 - Gut lab: Michael Haas, Peter McGhee
 - Rothwell lab: Karen Powers, Elise Carolan, Chris Beiser
 - Isaacs lab: Steve Van Timmeren, Keith Mason

- MSU field team:
 - Educators: Mark Longstroth, Diane Brown, Carlos Garcia, Bob Tritten

