



# Update on SWD & Seven Years of Implementing “Reduced Risk” Tart Cherry IPM: Report Card

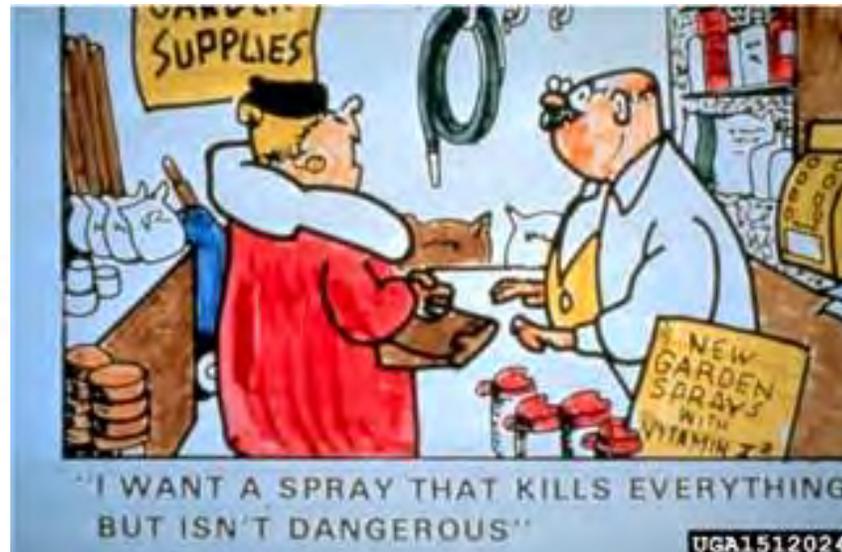


## Mark Whalon

Entomology

Michigan State University

MICHIGAN STATE  
UNIVERSITY



[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)



# Spotted Wing **Drosophila** Update: First season's experience & Recommendations

809,611,003 passengers/year  
32,000 Flights/day US  
1.73 Million/day Globally

**'Stop Invasive Species,  
You must be doing something!'**

**This Means Not Just  
More Insects, But  
Microbes Too**

>70,000 Trucks/day CA &

**And we  
Are**

**ES**

**Research  
figure???**

3500 Containers  
Per Ship

**You know what! There is no way, the US won't get all of the world's worst pests... 'just in time!'**

# Identifying male and female SWD [www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)



**MALE**

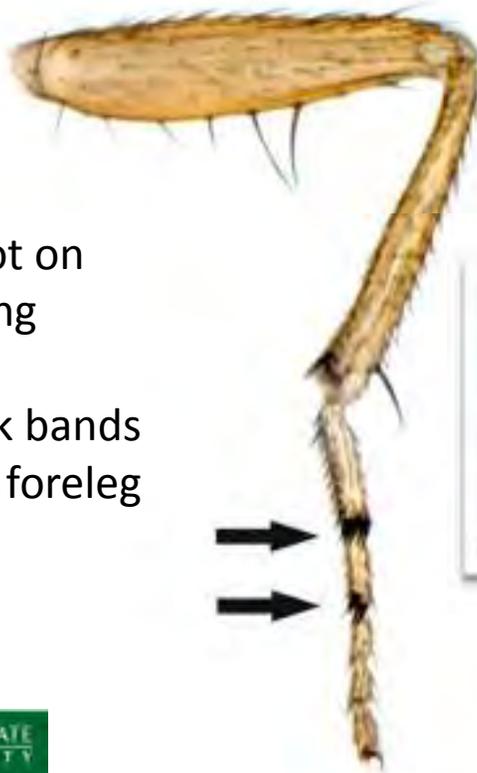
**FEMALE**



M. Hauser, CDFA

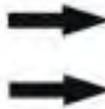
two rows of serrations on ovipositor

no dark spots on wings



dark spot on each wing

two dark bands on each foreleg



M. Hauser, CDFA

# Phenology in unmanaged fields, 2011

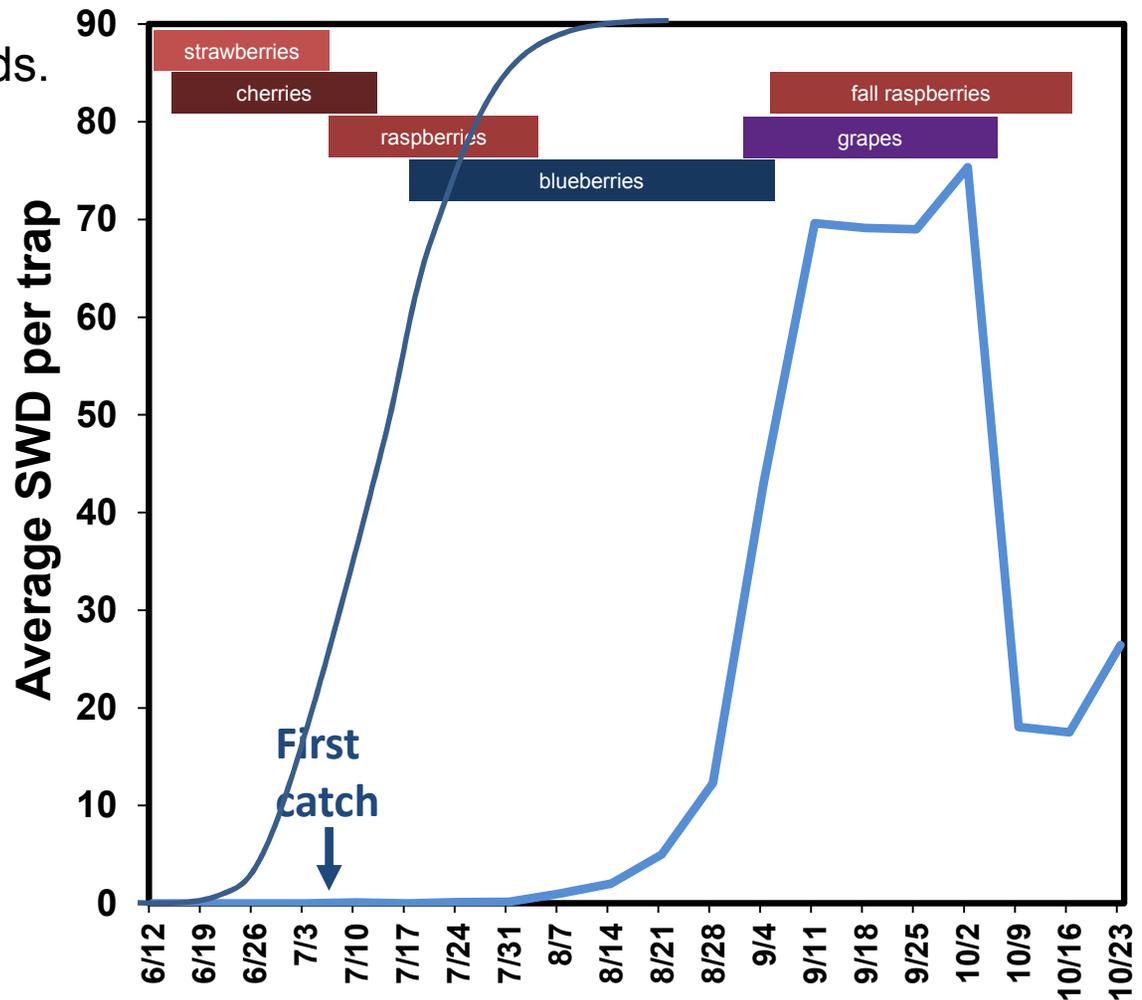
SWD was sampled all season at 3 non-sprayed blueberry fields.



First catch on July 3.

Low catch through July with increasing catch in August.

Highest pressure in Sept.

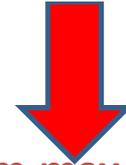


[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)



# Eggs, larvae, and pupae of SWD

[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)



# SWD distribution

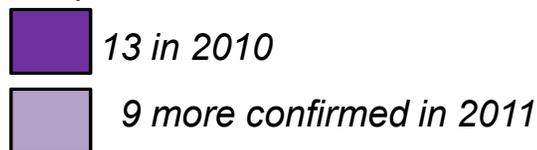
SWD has now been found in Europe, all U.S. west coast and most east coast states, and in Canadian provinces.

SWD flies detected in multiple Michigan crops and habitats:

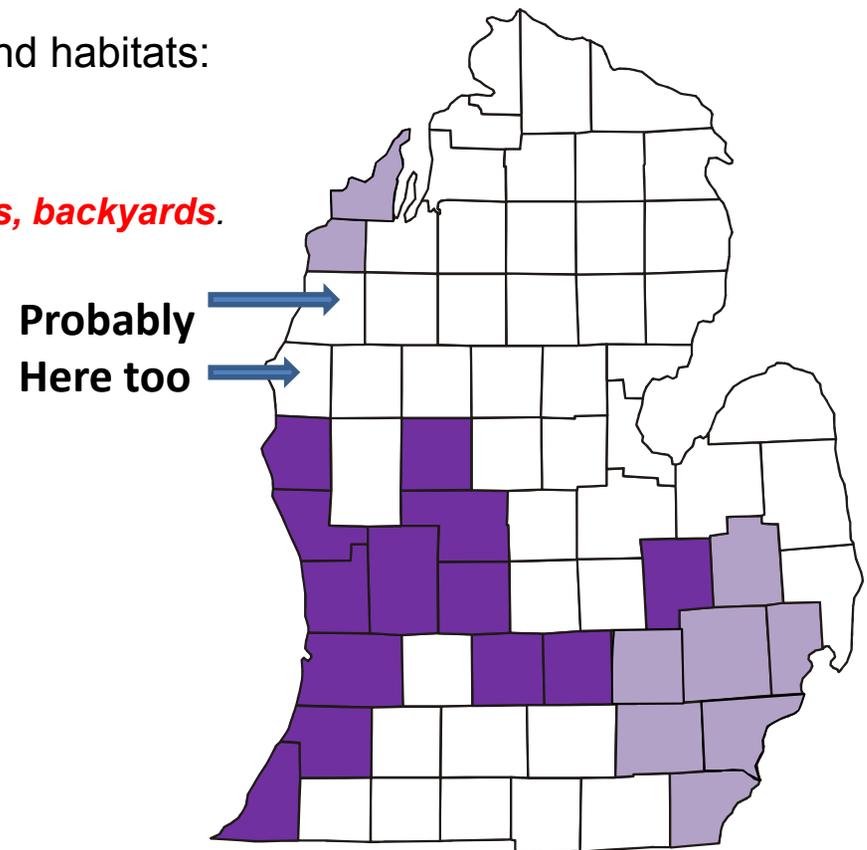
*Strawberry, raspberry, blueberry, grape, cherry, peach, cranberry (flies only), wild areas, rest areas, backyards.*

Distributed widely in Michigan.

*Counties positive for SWD*



Online reporting system is in place for weekly updates of fly activity in 2012.



# Comparison of monitoring trap baits

Pairs of monitoring traps deployed in June.

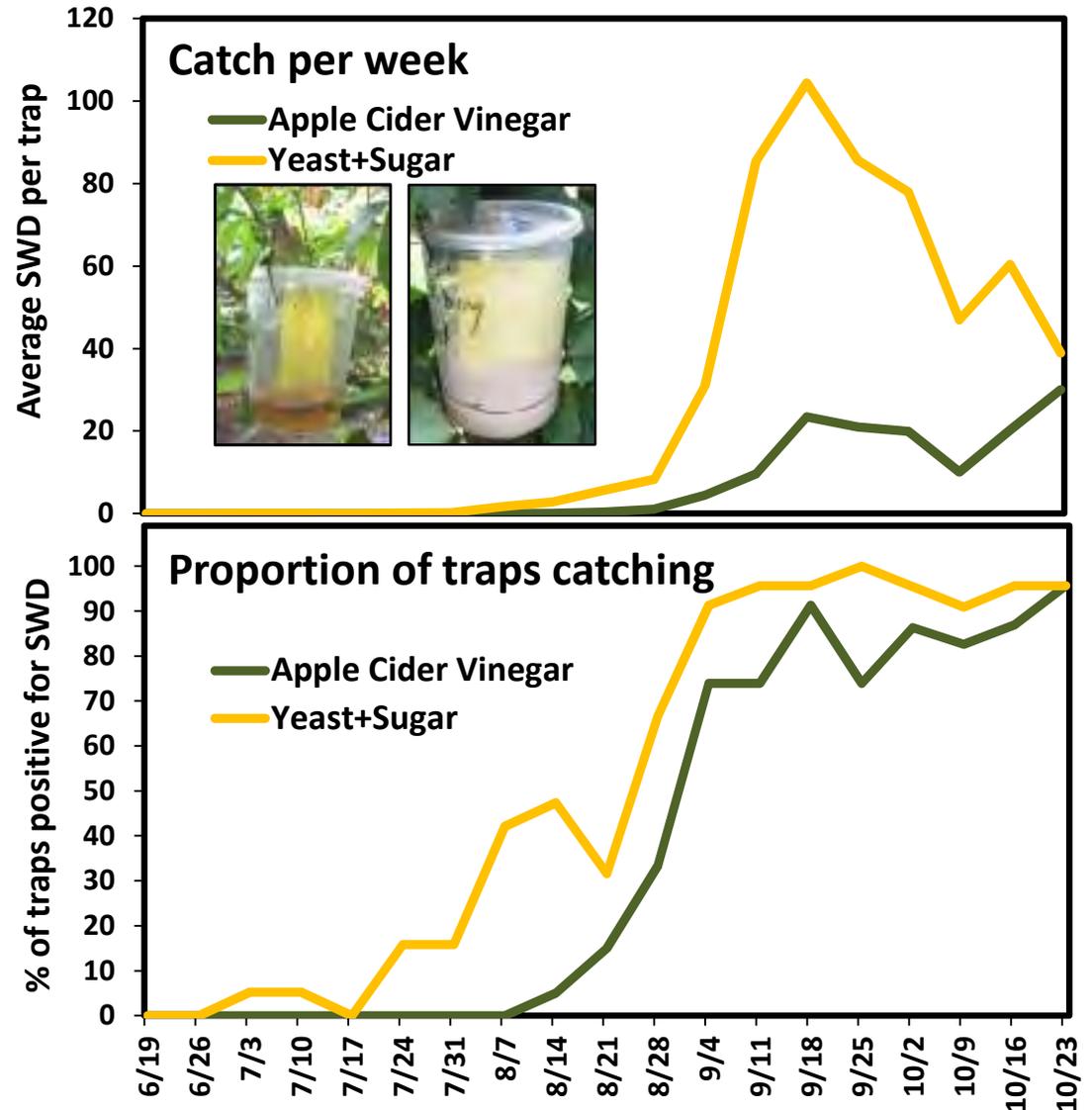
Baited either with apple cider vinegar or a yeast-sugar solution, checked weekly for the number of SWD.

Yeast mix: 1 Tbsp yeast, 4 Tbsp sugar, 12 oz water

Average date of first catch

	Yeast	ACV
Woods	8/7	9/4
Fields	8/14	8/28

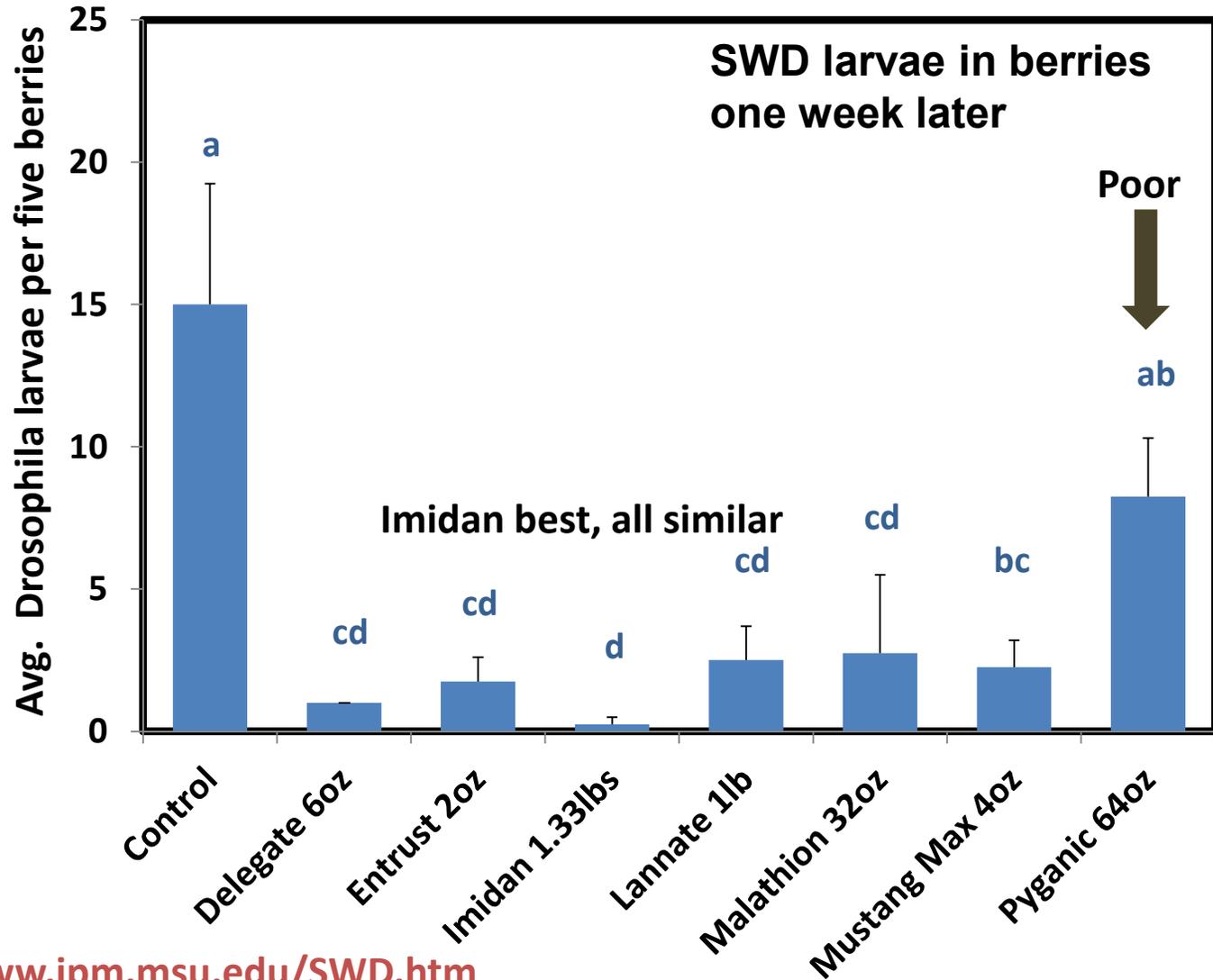
[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)



# Drosophila larval infestation – 1 day residues

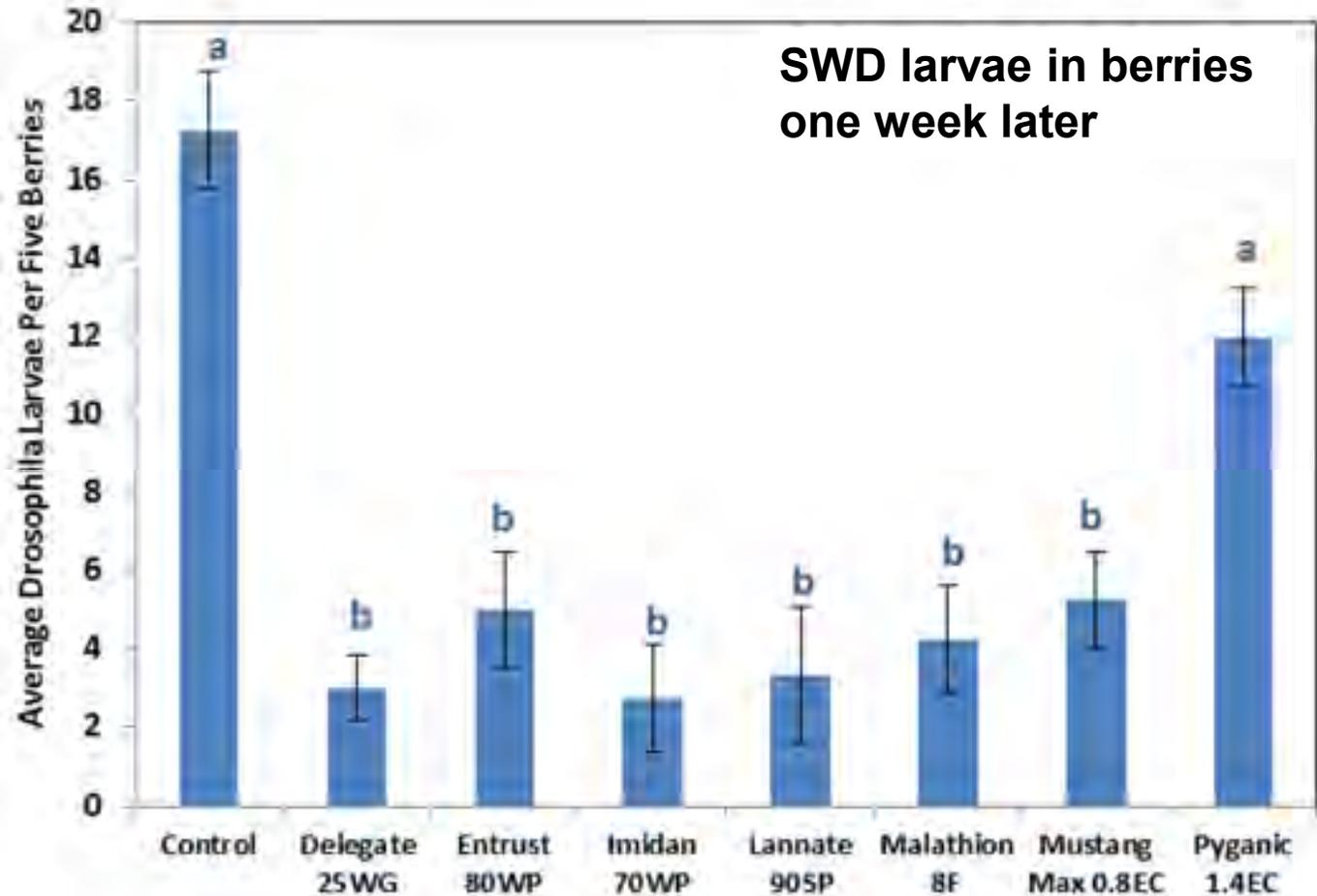


Blueberry Assays



[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)

# Drosophila larval infestation – 4 day residues



[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)

# IPM for SWD

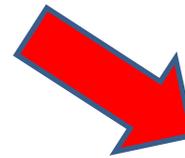
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1. Monitor for SWD using yeast baited traps

**Invasives =  
Spray, Spray, Spray  
Extend the Season  
Resistance, Eco-Impact  
Disruption = > Problems**

[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)

# SWD Resources from MSU



[www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)

Local extension educators

**IPM Integrated Pest Management Resources**  
MICHIGAN STATE UNIVERSITY

**Welcome to MSU's Spotted Wing Drosophila site**  
This site contains information and links for growers and homeowners about a new invasive pest in Michigan, the Spotted Wing Drosophila.

**Give us your priorities for spotted wing Drosophila research and education**  
A group of research and Extension staff at Michigan State University and across the state's United States are seeking input from growers, consultants and other industry stakeholders on the priority areas for which focus and attention on SWD should be given. This will only take 10 minutes of your time and it will be very helpful, especially as we develop responses to this new challenge for fruit producers. The survey ends December 1.

**Quick links to:**

- Find them
- Manage them
- Control them

**Background**  
The Spotted Wing Drosophila (SWD) is a species of fruit fly that can cause damage to many fruit crops. This small insect has been in the US since the 1980s, was detected in California in 2005, spread through the West Coast last year, and was detected in Florida last fall. The University and Michigan for the first time in 2010. Because the flies are only a few millimeters long and cannot fly very far, natural dispersion between areas is unlikely. Human-assisted transportation is a more likely cause of the recent spread.

**What crops are affected?**  
In other regions, SWD has been reported to most berry crops, grapes, cherries and many stone fruits, with a preference for soft-skinned fruit.

**Status in Michigan**  
In late 2010, SWD was detected in Michigan for the first time as part of a widespread Early Detection and Rapid Response program. SWD has been detected in 17 counties in the eastern part of the state, and only after that survey. In 2011 there is widespread monitoring underway for this pest in susceptible fruit crops and nearby habitats.

**What is being done?**  
Because of these first detections it is important that growers and others with responsibility get aware of this pest and know how to manage it. A SWD Response Team has been formed that convenes the expertise of MSU entomologists, horticulturists, Extension educators, and Michigan Department of Agriculture staff. This website will be the central location for dissemination of information about this insect. Check back for updates.

**Managing SWD**  
We are confident that the Integrated Pest Management (IPM) programs available for SWD control can be implemented to enable continued harvest of high-quality crops. See our fact sheets for English and Spanish information on monitoring for this pest, and recommendations for management in Michigan (June 2011).

**Important links**

- 1) Fact sheet from MSU: How to identify SWD
- 2) SWD information from Michigan State University
- 3) A link for identifying SWD

**Funding for the SWD Response Team**  
The SWD Response Team is funded by Project GREEN and the Michigan Department of Agriculture.

**Spotted Wing Drosophila**  
A new invasive pest of Michigan fruit crops

**La Drosophila de las alas manchadas**  
Una nueva plaga invasora en los frutales de Michigan

**Introduction**  
The Spotted Wing Drosophila (SWD) is a species of fruit fly that can cause damage to many fruit crops. This small insect has been in the US since the 1980s, was detected in California in 2005, spread through the West Coast last year, and was detected in Florida last fall. The University and Michigan for the first time in 2010. Because the flies are only a few millimeters long and cannot fly very far, natural dispersion between areas is unlikely. Human-assisted transportation is a more likely cause of the recent spread.

**Management**  
We are confident that the Integrated Pest Management (IPM) programs available for SWD control can be implemented to enable continued harvest of high-quality crops. See our fact sheets for English and Spanish information on monitoring for this pest, and recommendations for management in Michigan (June 2011).

**Michigan State University | Extension**

**Michigan SWD  
Detection Survey**



We are Ascending Mt Food Quality Protection Act  
Fraught with Unforeseen Consequences  
**Dangers for Growers**

**Faced With the Specter of  
Invasive Species, Does US  
Society Really Understand  
Environmental, Ecological &  
Economic Costs of Trade  
Under Our Current Pesticide  
Statutes? FIFRA & FQPA  
Are “Outgunned” by the  
Shear Scope of Invasives!**

W  
Feder

**POLICY** = The Dirty Dozen: The Role of Exploitive Environmental Organizations = Scare Tactics For \$\$\$

**Apples are #1 in 2012! & Who Wins?**

- Some people use pesticide inputs as a means of exploiting ignorance & fear
- EWG uses a Pesticide Toxicity

1. Apples



2. Celery



3. Strawberries



**Irony of Irony:**

**Although EWG is Still Lobbying Against Pesticides  
And Taking Every \$\$\$ Donated**

**Today's apple & cherry residues are those that**

**EWG Lobbied For Before & During the**

**Passage of the FQPA (1990-1996)!**

# FQPA: Totally Changed Cherry Growing Forever!

## FQPA + PRIA I & II = Massive Change

- Endocrine Disruption (**went missing**)
- Accumulation of Toxic Exposure (sun light)
- Environmental/Ecology Processes
- Focus on “At Risk” groups in society
- Long-term Ambient Population  
Exposure Monitoring & 21<sup>st</sup> Cent. Tox.
- Pesticide Reregistration Every 10 yrs...
- **> 10,000 Reregistration Reviews / 10 yrs**
- Emphasis on Reduced-Risk ‘RR’  
Materials
- Quarterly Reporting to Congress

## Cherry RAMP GOALS

- Introduce RR Cmps
- Facilitate Transition
- Retain IPM
- Eliminate OP Use
- Ecological Impacts
- Economic Impacts
- Retain Cherry  
Production?

**Who can argue with protecting the unborn, babies, children, elderly , infirm people and the environment?**  
Unless the Consequences of Over-Regulation outstrip the ability of people to purchase healthy foods...

# USEPA = 17,384 Employees

2010 Budget = \$10 Billion + 400 Million in Change



Is there something 'out-of-whack' here?

**Total USDA Pest Management & Invasives Budget =  
\$180 M**

# USDA: Risk Avoidance and Mitigation Program

## RAMP I & II PI's, Growers & Advisors

Diane Alston, Utah State University  
George Bird, MSU  
Barbara Dartt, Salisbury Management Services  
David Epstein, OPMP-USDA, WA, DC  
Jim Flore, MSU  
Larry Gut, MSU  
Jean Haley, Haley Consultant Services  
Amy Iezzoni, MSU  
Alan Lakso, Cornell  
Patricia McManus, U Wisconsin, Madison  
Nikki Rothwell, MSU  
George Sundin, MSU  
Suzanne Thornsberry, MSU  
Mark Whalon, MSU

**Cherry Marketing Institute**  
**Phil Korson & Grower Boards**

**Field Consultants & IPM**

Jim Laubach, Romain Lalone  
Francis Otto, Mike Haas, Eunice Boulet

Total Budget for 7 Years =  
\$3.8 Million  
MSU took 26% in  
overhead \$988,000  
\$2.8 M Research  
\$401,000/Yr  
Or ~ \$29,000/PI/Yr

**MI Grower Cooperators:**

Bardenhagen, Evans, Garthe,  
Gregory, Laubach, Meachum,  
Smeltzer, VanAgtmael, Winkel

**Grower Cooperators**

MI- 12 sites with 20A each- 2 10A blocks  
Wisconsin- 2 grower's farms  
Utah- several grower's farms  
NY- lab & extension only

# So What Did Cherry Growers Get?

## Your Tax \$\$\$'s At Work?

- **Grower/Consultant/Input Suppliers/Processors/Researchers Communication**
- **Policy Presence...in DC:** Phil Korson, M. Whalon & D. Epstein, Plus all the MI Entomology PI's in DC Once/yr to Give Our 'Report-Card' of EPA's efforts...
- **FQPA & PRIA I & II Education of Cherry Industry**
- **Attention of 14 Researchers for 7 years or 1,400 hrs/Year of Researcher Focus**
  - 20A / Grower in 10 Locations from SW to NW MI
  - Voluntary Cooperation!!!!!!!!!! The REAL HEROs
- In Lab –to– On-Farm Research (20:80 ratio)
- **8 Graduate Students @ 50% Time**
- **11 Research Technicians ~ 25% time**
- **~166,400 Miles of Travel**
- **Communications:** Numerous Talks, Emails, Calls, 41 Reports, 9 Pubs, etc
- **MRL Issue Engagement:** a partial Key to the Industry's Long-term survival
- **Viable Cherry Industry For ?? Years...**
- **Dave Epstein @ USDA/OPMP...watch dog and advocate of MI Cherries in DC**
- **Incredible Attention of USEPA's Key Players in the Tart Cherry Issues**
  - Reflected in the 2011 Decision Maker's Tour in the TC Area = Phil Korson!!!!

**What Were Some of the Highlights of  
the Cherry RAMP Years?**

**We Caught USEPA in a “Slight of Hand” Maneuver  
Without Eco-Impact Incident Data From the Upper Midwest,  
For AZM---USEPA Used Other Crop’s OP  
Ecological Impact Data!**

**Principle Eco-Targets**

**For FQPA Action =**

- Beneficials
- Pollinators
- Fish: N  
Midwest
- Endan

**USEPA FIFR**

- Data A
- Res

OR

- Data Unavailable? = **No!...**
- **USEPA is Authorized to use alternative data sets!**
- = e.g. Rice/Apples for fish kills
- = e.g. Sugarcane for Bees

**What is An Ecological Risk Assessment?**

- 1- **Ecological Risk Assessment:** Evaluation of the likelihood that a pesticide will harm wildlife or the environment.
- Ecosystem:** The complex of a community of organisms and its environment functioning as an ecological unit.
- 2- **Environmental Fate:** What happens to the pesticide in soil, water, and air after being released into the environment.
- 3- **Non-target species:** Organisms other than that which the pesticide is intended to kill.
- 4- **Target species:** The organism the pesticide is intended to kill.
- 5- **Toxicology:** The harmful effects of a poison on living systems.

In an ecological risk assessment, we evaluate the likelihood that exposure to one or more pesticides may cause harmful ecological effects. The effects can be direct (e.g., fish die from a pesticide entering waterways, or birds do not reproduce normally after pesticide poisoning). We

**Cherry RAMP Grant  
SAID “Here is the data answer”  
To the USEPA**

- **Residue chemistry:** How much pesticide remains after application over time. Helps determine how much pesticide is present in the environment over time.
  - **Spray drift:** How much the pesticide drifts off-site when sprayed from the air. Helps determine exposure of non-target organisms.
- (See also: [Technical Overview of Ecological Risk Assessment](#))
- **Wildlife/Plant Toxicity**

<http://www.epa.gov/pesticides/ecosystem/ecorisk.htm>

FQPA, led to cancelation of the **Carbamates** , **Organophosphate** & **some SPs** insecticides.  
FQPA & **PRIA-1 & 2** helped industry introduce >9 new modes of action into cherries in 10yrs

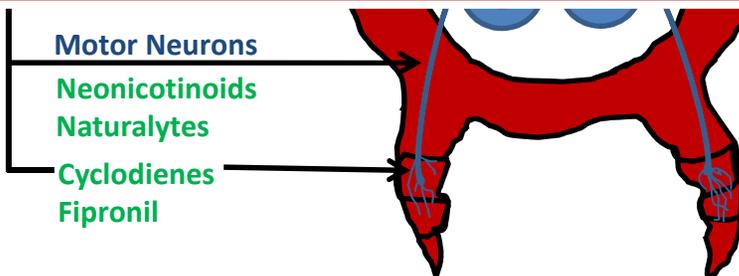


**Historically Unprecedented  
Explosion of New Modes  
Of Action**

**Explosive Proliferation of New  
Pesticide Modes of Action & over  
400+ New Pesticide Products**

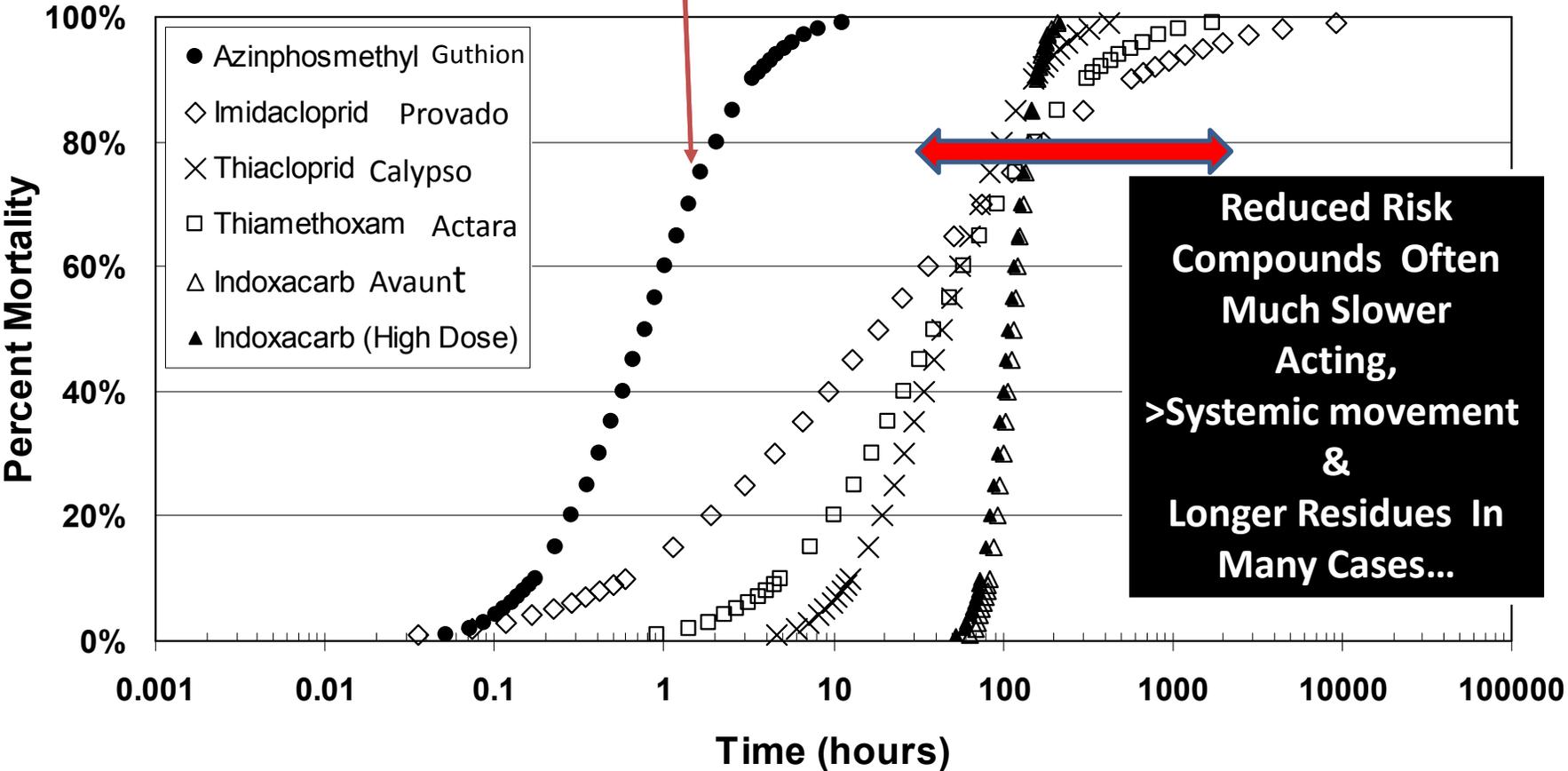
Since  
"OP  
Have  
1

Chemis  
Prior to FQPA



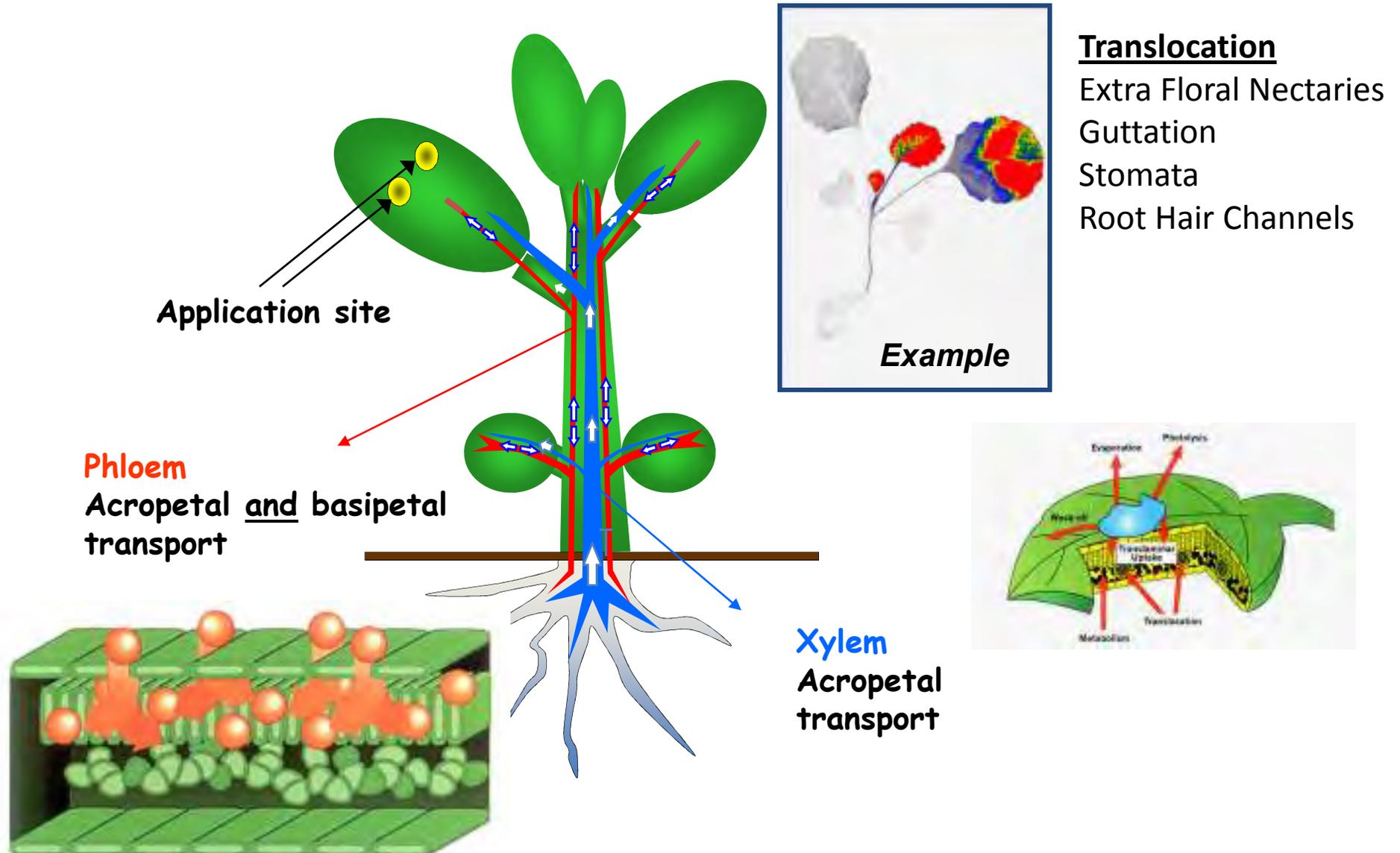
**Before FQPA new pesticides were trialed through University Research + Minor USE process, before registration.** Under PRIA-1 and 2, USEPA provided the Means to **'Fast Track'** registrations, **circumventing significant University & On Farm research.**

# Lethal Time: AZM Vs. RR & OP AIts



# MANY FQPA **REDUCED RISK** COMPOUNDS ARE

## SYSTEMICALLY ACTIVE:



# Ecological Principle 102: Plants Make 'Free Water' and 'Sugar' in Nature

Photosynthesis

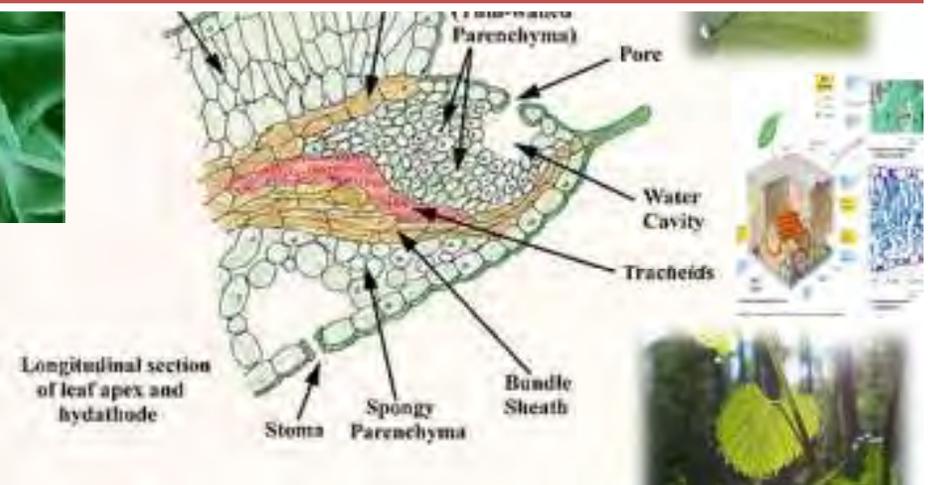
Hydathodes

Guttation

If Most Insects (Bees Too)  
Get Lots of their Water from Plants  
What Happens When this Water Contains Translocated  
Insecticides, Growth Regulators and  
Fungicides that last longer?

In most Plants, Leaf Stomata  
Excrete Free Water

How do most arthropods  
get sufficient moisture &  
energy?



[http://vizonline.visitationacademy.org/upperSchool/essig/images/35\\_17-LeafAnatomy\\_CL.jpg](http://vizonline.visitationacademy.org/upperSchool/essig/images/35_17-LeafAnatomy_CL.jpg)

# Can Policy Makers Actually Make Wise Judgments Without Real Field Ecological Impact Data?

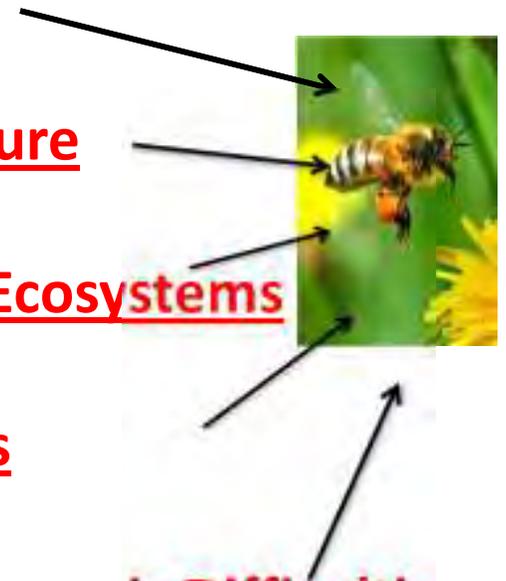


Michigan Cherries

We just don't know what we don't know!

## Pre-FQPA      Post FQPA & PRIA

- Refined IPM System      Vs. 2-3x Greater Spray Programs
- Simple Pest Mngt.      Vs. >> Complexity
- Solid Efficacy = low risk      Vs. > Risk of Crop Failure
- Stable Agro. Ecosyst's      Vs. Destabilized Agr Ecosystems
- Known Enviro Impacts      Vs. Unknown Impacts
- Global Residue Stds      VS MRLs & some Economic Difficulties



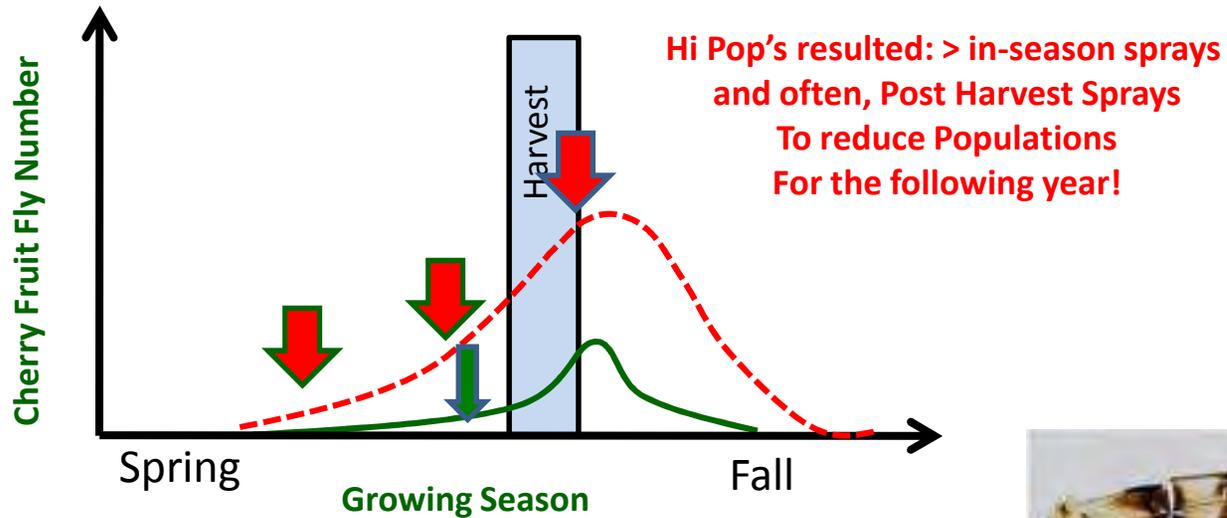


# Introductory IPM 101



No combination of FQPA Insecticides Controlled CFF or Plum Curculio like AZM

Cherry Fruit Fly Population Size: **Small & Large**



High Populations Require **More Sprays**  
Low Populations Require **Less Spray**



Graphic was presented to USEPA in 2005, 2006, 2007, 2008, 2009, 2010 & 2011 depicting how pest populations were increasing = economic & ecological impacts...

Demonstrated this 'First Hand' at **The Decision Maker's Tour 2011!**

# Ecological Effects Measures: Cherry Orchard Transition to RR-Pesticides = Species Differences

2001-11 S. & West Central Data  
From 8 Orchards = Reference

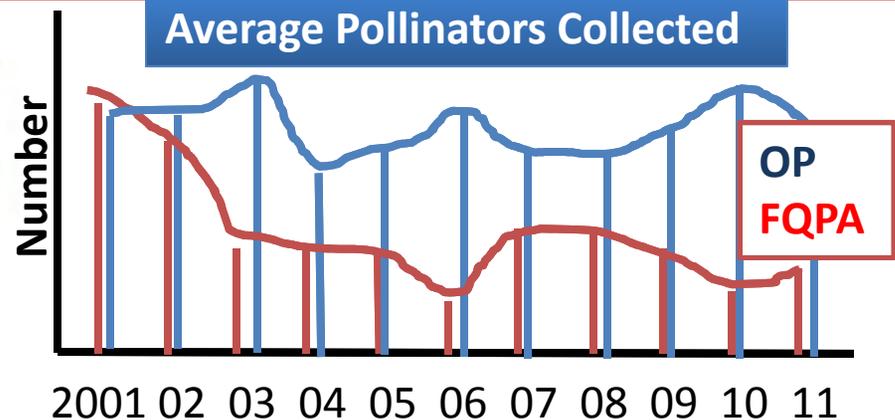
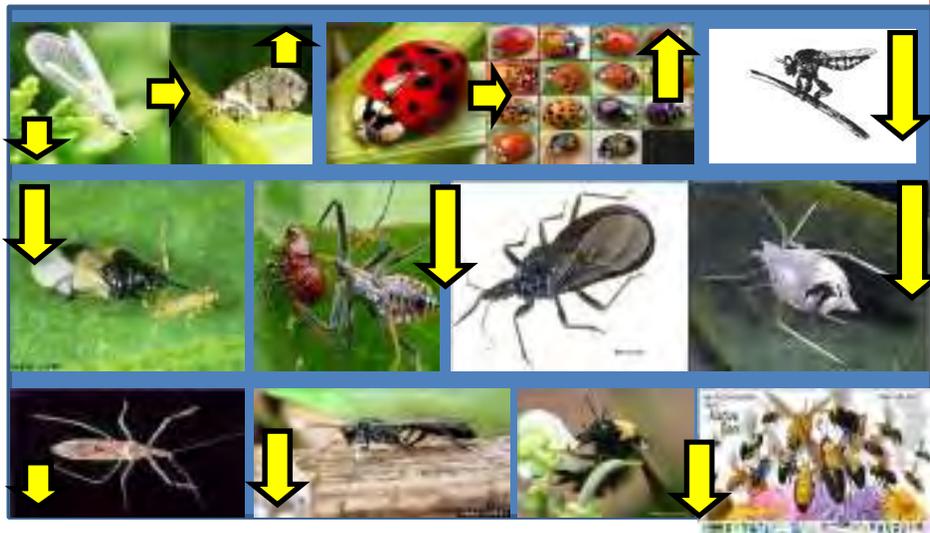
After FQPA = 2001--2011  
From 11 N. West Orchards

2001

2011

- <<< Green lacewing
- <<< Minute Pirate Bugs
- >> Brown Lacewing
- <<< Parasites & Bees

- Green lacewings way down...
- Ratio Ladybeetle Spp's changed
- <<< Fewer aphid parasitoids
- **Fewer domesticated & native pollinators...**

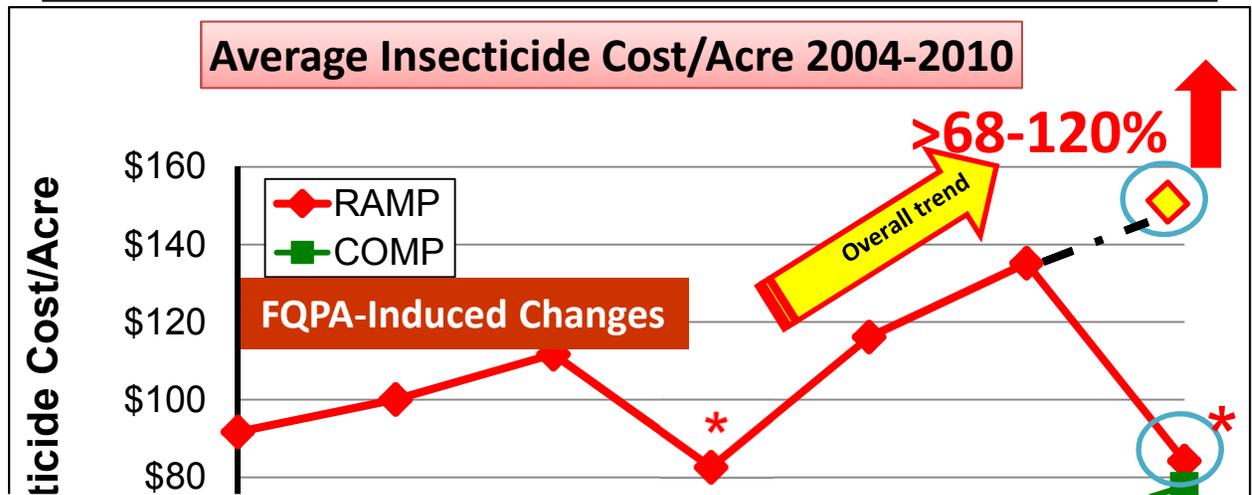


# USDA-RAMP ECONOMIC Results **Cherry:** **EPA's Estimated cost of FQPA transition ~16%**

## The Reality of FQPA Transition in the Tart Cherry Industry

**\$ = Just Insecticides!**

Actual insecticide cost increase was more like 60 to 120%...over inflation



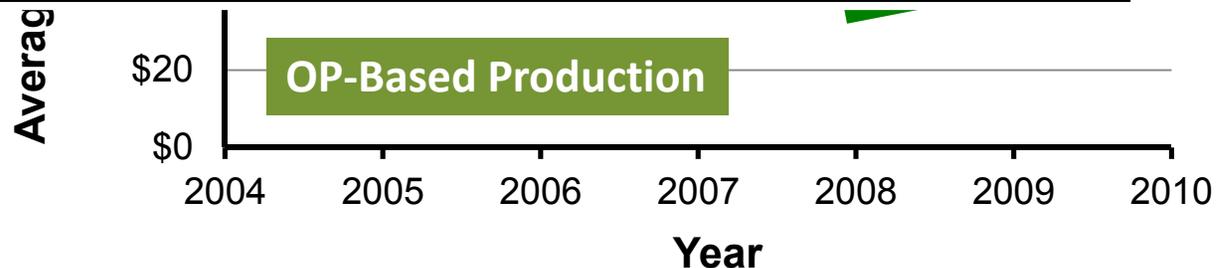
**USEPA Predicted a 16% Increase**

**RAMP**

- FQPA "Reduced Risk" or OP-Alternative IPM

**COMP**

- "Comparison" OP-Based IPM



\*Reduced crop size in 2007 & 10 caused 6 of 8 of the RAMP growers to abandon their late-season spray programs, while only 10% of the COMP growers abandoned their late-season spray programs = emerging problems with Post-FQPA IPM Programs.

the Agency assessed whether revocations might significantly impact a substantial number of small entities and concluded that... "these actions do not impose a significant economic impact on a substantial number of small entities." <http://www.federalregister.gov/articles/2000/06/22/00-15745/withdrawal-of-certain-tolerance-actions>

# Maximum Residue Limits (MRLs) In Tart Cherry's Principal Markets

AZM Residues were and are not a problem in these markets

**But** nearly everything else is...

		OPs			Neonicotinoids		IGRs		Carb.	Anthranilic diamide	S.P.	Oxad.	S.P.	Spinosyn	
<u>Chemical</u>		Chlorpyrifos	Malathion	Phosmet	Acetamiprid	Thiamethoxam	Novaluron	Pyriproxyfen	Carbaryl	Chlorantraniliprole	Esfenvalerate	Indoxacarb	Permethrin	Spinetoram	Spinosad
Export Market	US	1	8	10	1.2	0.5	8	1	10	2	3	0.9	4	0.2	0.2
	EU	0.3	0.02	1	0.5	0.5	0.01	1	0.05	1	0.02	1	0.05	0.05	1
	Japan	1	6	0.1	2	5	-	1	10	1	2	0.9	5	-	0.2
	Codex	-	-	-	-	-	-	-	-	1	-	1	2	-	0.2
	Canada	-	6	7	0.7	0.02	-	-	10	1	-	-	-	0.2	0.2

**Blue Color** indicates that a U.S. MRLs are higher than a foreign market's = **Export Issues!** **Canada** is a particular problem since a high % of MI tart cherries are exported through Canada. **England** is even more difficult, since any shipment with **3 or more 'detectable' residues** is automatically rejected.

The Only 'No Problem' Compounds

# Cherry USDA-RAMP Grant: Report Card

- **Delivered Hard Data to Update, Rejoin and Counter USEPA Regulatory Assumptions for Cherries**
  - Caused USEPA to Categorically Recognize **Processed Cherries Separately from Fresh Cherries**
    - Helped the Processed Cherry Industry Educate Key USDA & USEPA Personnel Regarding Primary Pest Management Issues
    - **3 Federal Committee Testimonies and 4 Formal Documents submitted in specific USEPA Comment Periods: Tart Cherries**
      - 1) Worker Exposure, 2) Pesticide Use, 3) Key Pest-Pesticide Efficacy, 4) Environmental/Ecological Fate and Effects
    - Countered USEPA's use of **Invalid Ecological Data** in OP and "Reduced Risk" Pesticide Reregistration Reviews
    - Questioned the Suitability of USEPA's Rush to Register "Reduced Risk" Insecticides as a "Stand Alone" OP substitution
    - Facilitated **USEPA's Replacement of Unrealistic Economic Data Describing FQPA's Impacts** in Tart & Sweet Cherries
- **Helped to Persuade USEPA to 'Fast Track' or Accelerated Cherry Insecticide Registrations**
  - This action also influenced USEPA's policy in Sweet Cherry, Peaches, Plums and Almonds
- **Helped the Cherry Industry Interact With USDA: Office of Pesticide Programs** by providing data and reports
  - Pest Management Strategic Plans, IPM Programs, Grower IPM Self-Assessment Tool
- **Helped Cherry Industry Interact With USEPA-- Provided numerous 'Ad Hoc' reports, testimony and delivered key data in usable formats for different Agencies**
- **Helped to Foster Two-Way Communication with USEPA: Endangered Spp Act (ESA): Karner Blue Butterfly**
  - Biological Opinion (BIOP), - ESA Input Sessions, -ESA Comment Periods, -Minor Crop Farmer Alliance
- **Helped Facilitate USDA & USEPA Personnel Attending key Michigan Decision Maker's Tours**
  - Culminating in the 2011 Decision Maker's Tour = Very, Very Successful Interaction...perhaps ever achieved with USEPA...
- **USEPA Region 5 Relationships: RAMP became the Key Mechanism for Regional 5 feedback to USEPA: FQPA**
  - **5 Related Outreach Grants:** FQPA Pesticides, Monitoring Systems, Insect Growth Regulators, Alternatives, Education
  - Helped to raise the processed cherry industry's recognition of FQPA's Impacts: **FQPA Precipitated MRL Dangers**
  - **Helped inform US MRL Policy for Cherries internationally** = USEPA's role in Codex Alimentarius Processes
- **Published USEPA FQPA Implementation Impacts in Tart Cherries** in a Recent Book: **Chemophobia**
- **Worked with the American Farmland Trust to Raise Awareness in Wash. DC: "No Farmers No Food" Campaign**
- **Helped USDA/NASS to Present T. Cherry Data to USEPA** Vis Pesticide Use Surveys: Update USEPA's Data
- **Participated in Several Minor Crop Farmer Alliance Efforts to Educate the US Congress on Specialty Crops**
- **3 Extension Publications, 9 Refereed Journal Articles, 12 CFR Testimonies & an IPM Grower Assessment Tool**

**Without RAMP I & II: The MI Cherry Industry Would Be Very, Very Different Today**

# Tart Cherry Industry Will STRUGGLE for Another 10 yrs W/Out > Changes

- LOSS of IPM & BIO-CONTROL with FQPA!
- FQPA Cmpds = REDUCED EFFICACY in Cherries!
- FQPA Yields RESIDUES & HARD CHOICES
  - MRLs IN INTERNATIONAL MARKETS
  - Very, Very Expensive to the Industry = 38 to 120% increase \$
- PC, CFF, OBLR & INVASIVE Spp = > Sprays into the Fall Post-Harvest
- Insect & Disease RESISTANCE issues: OBLR, Leaf Spot & Brown Rot
- New CHEMISTRIES = Good to have new materials, but a Curse not to have AZM



**Future: Pest Management Instability**

**Invasives, in Wave(s)**





**Cherry Decision Maker's Tour 2011**

# Endangered Species Act, Karner Blue Butterfly & MI **Cherry** Producers: **Look Out!**

- **Biological Opinion: BIOP**
  - Land Owners Forced out of the picture: Totally Arbitrary & Without Consultation
- **Services**
  - Fish & Wildlife
  - National Marine Fisheries & Wildlife Service
- **Height of Bureaucracy?**
  - Agency Warfare: EPA/USF&W/NMFWs
- **Total Dis-incentive for Citizen Involvement**
- **Incidental Take Provision Protection  
Bureaucratically Denied to Growers who  
Grow KBB and get KBB Delisted!**
- **RAMP got the data, we presented it & Bureaucracy Stopped it...they couldn't loose territory & West Central growers are now fearful that the Government will come for a visit...**



**Hundreds & Hundreds of Pages  
Just to Address US Agency Needs!**

# Functional Ecology Studies are showing that some FQPA-RR Pesticides have more impacts than did the OP's...

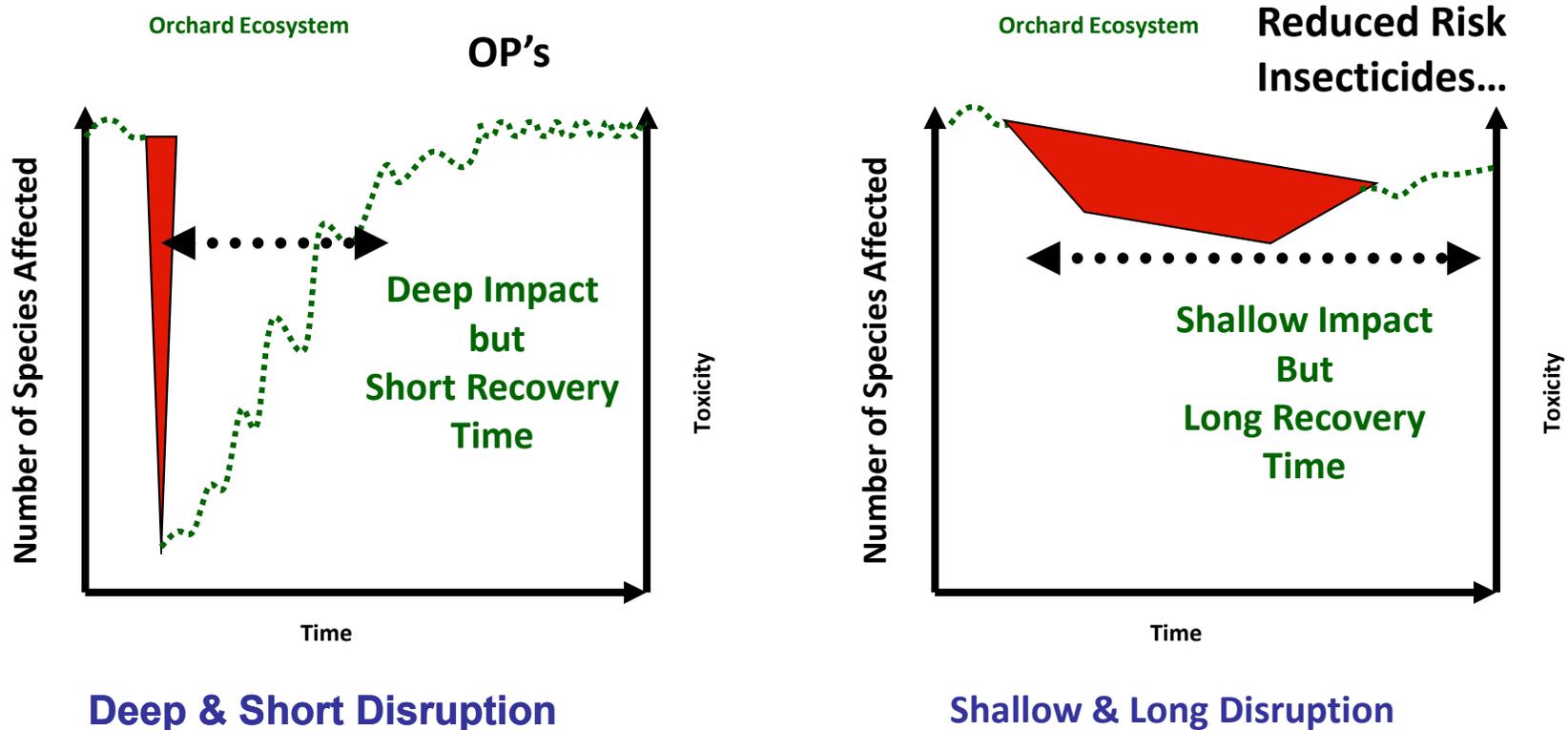


Figure 1. Some Reduced Risk (RR) insecticide impacts on the ecology of orchards.