



Spotted Wing Drosophila:

A New Pest of Cherries and ...

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UC Cooperative Extension
Contra Costa County

Cherry Grower Meeting, Brentwood – April 5, 2012



The Research Team

Some Key Players



In California

- Bob Van Steenwyk, UCB
- Kent Daane, UCB
- Janet Caprile, UCCE
- Bill Coates, UCCE
- Joe Grant, UCCE
- Kathy Anderson, UCCE

- David Haviland, UCCE

- Frank Zalom, UCD
- Kelly Hamby, UCD
- Mark Bolda, UCCE
- David Begun, UCD
- Rachel Goodhue, UCD

In the Pacific Northwest

- Vaughn Walton, OSU Corvallis
- Amy Dreves, OSU Corvallis
- Peter Shearer, OSU Hood River
- Jeffrey Miller, OSU Corvallis
- Wei Yang, OSU NWREC
- Flaxen Conway, OSU Corvallis

- Jana Lee, USDA-ARS, Corvallis
- Denny Bruck, USDA-ARS, Corvallis

- Elizabeth Beers, WSU Wenatchee
- Doug Walsh, WSU Prosser
- Lynell Tanigoshi, WSU Mt Vernon



Summary of 2012 Findings

- **Monitoring**
 - New trap styles
 - How do they help growers?
 - Seasonal flight summary
- **Management Tidbits**
 - Are figs a host?
 - Canopy height
 - The promise of biological control
- **Control**
 - Baits
 - Sprays
 - Do post harvest sprays help?
 - Dr. Van Steenwyk's recommendations for 2013
 - Brentwood spray-flight-damage summaries

Monitoring Adults

- Choose a “bucket” style trap
- Hang 3’-5’ high , in the shade
- Bait with real apple cider vinegar

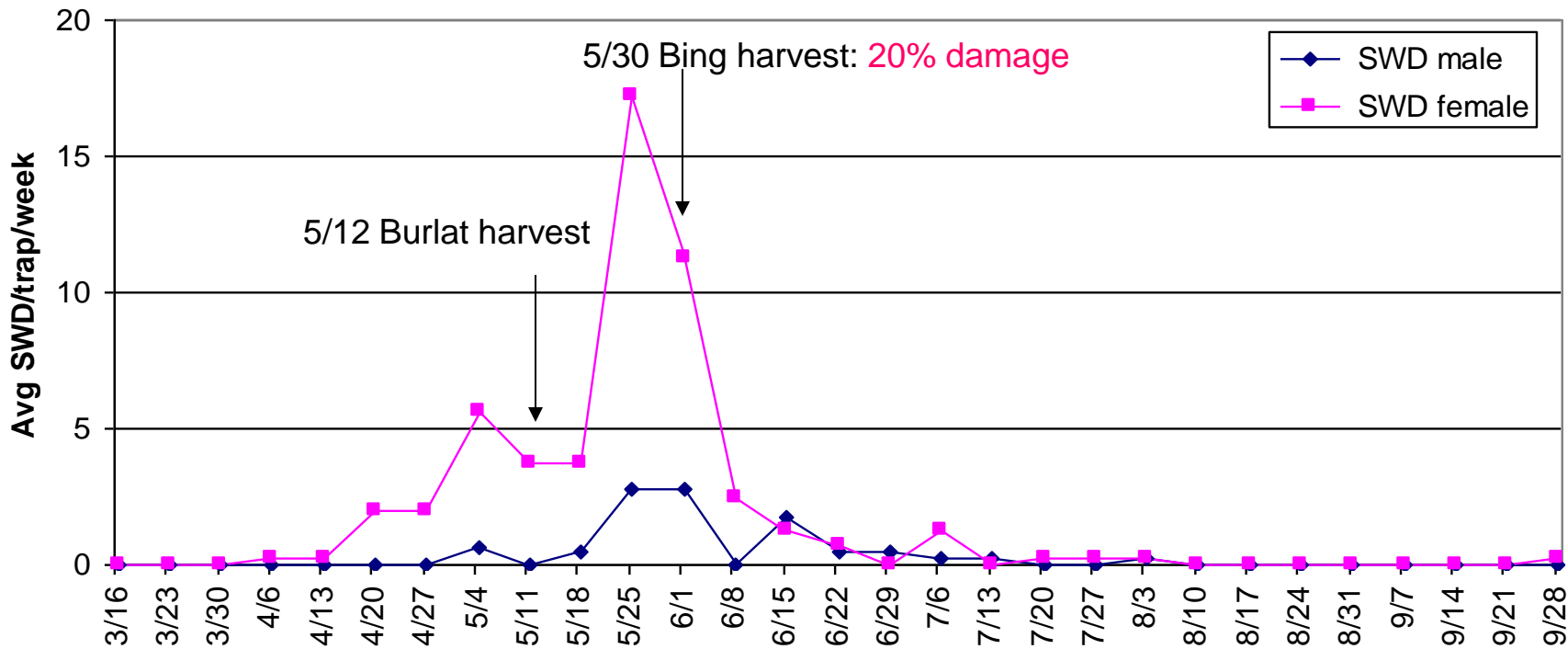


You have to count males AND females!

In some orchards, the male flight starts later than the female flight



Contra Costa County Phenology Site 2010



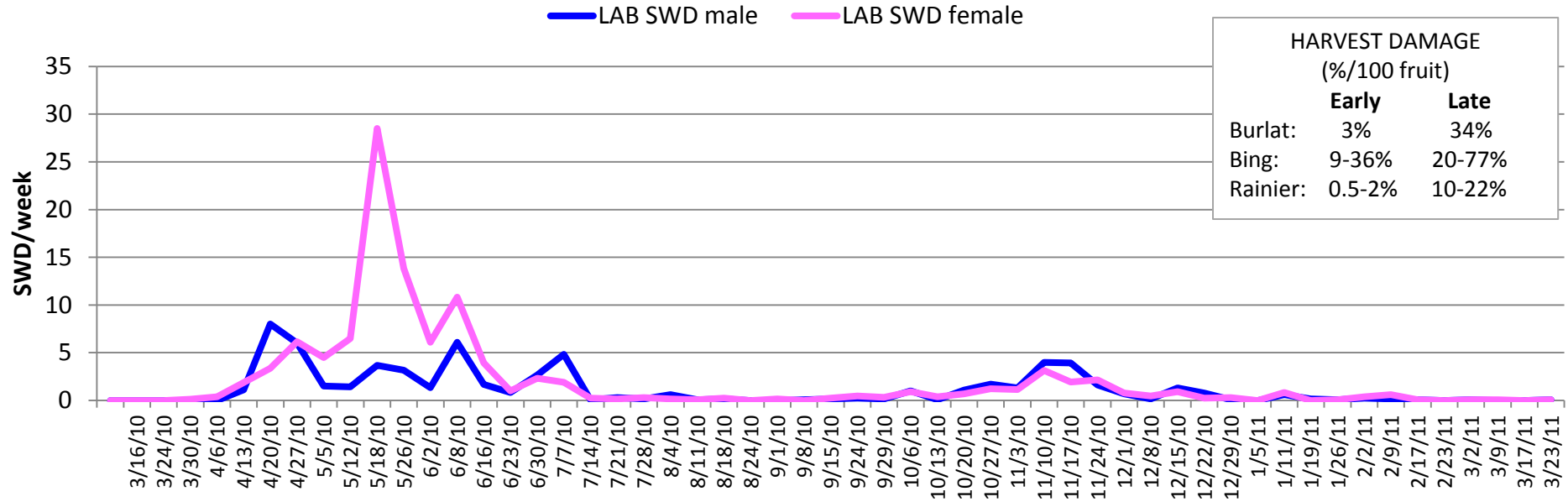


Are traps worth it?

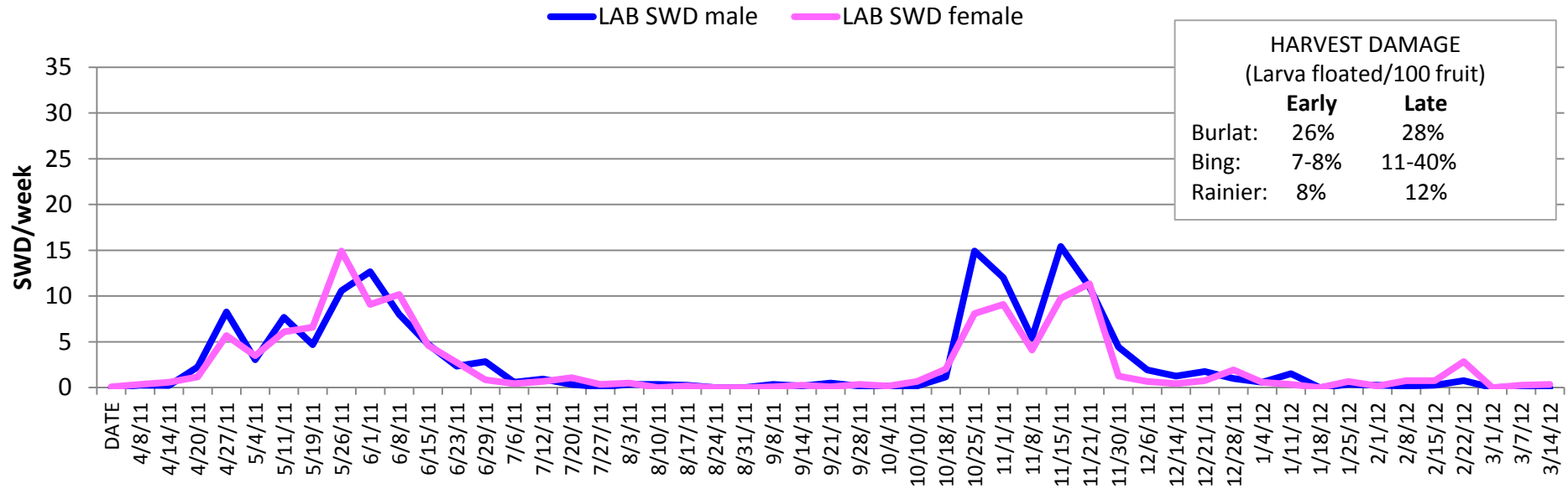


- We don't need them to time sprays
 - There aren't any trap thresholds
 - We know we have a significant population
- Can help to gauge population pressure
 - High pressure - more aggressive management
- Can help show how long your sprays last
 - In retrospect (for future planning)
- Very important tool for researchers

2010-11 Unsprayed Cherries (SJC1, CCC1, CCC2)

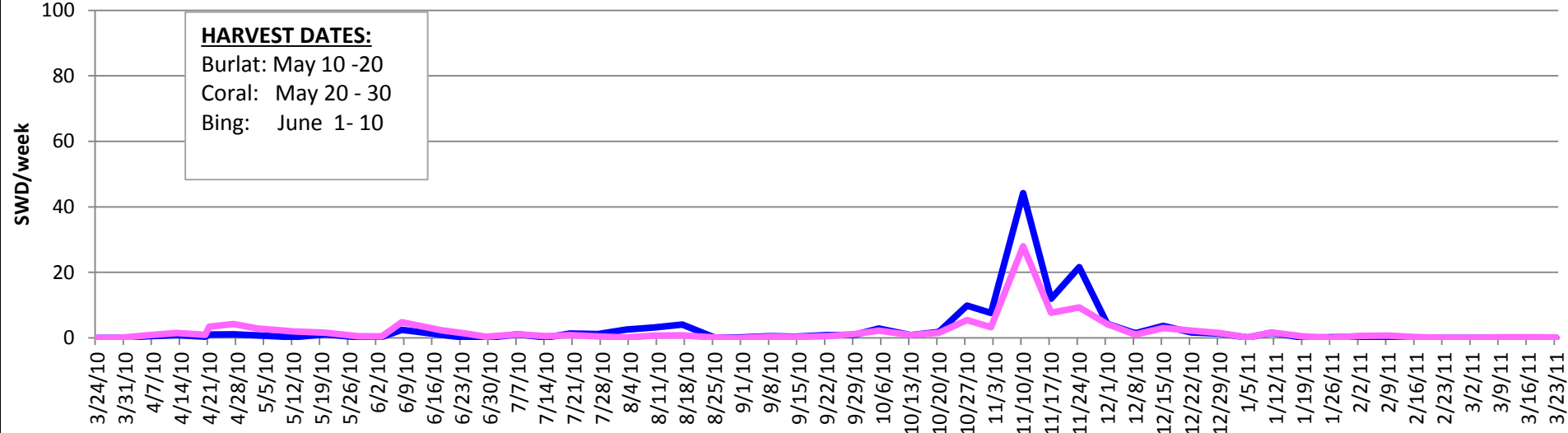


2011-12 Unsprayed Cherries (SJC1, CCC1)



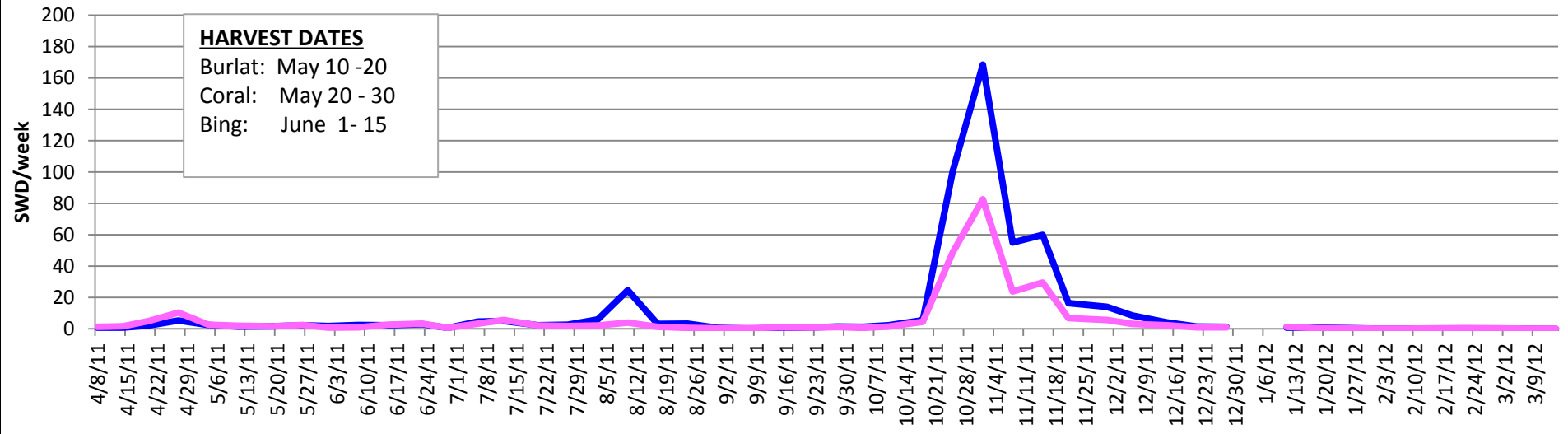
2010 Sprayed Cherries (12-14 orchards)

— SWD male — SWD female



2011 Sprayed Cherries (12 orchards)

— SWD male — SWD female



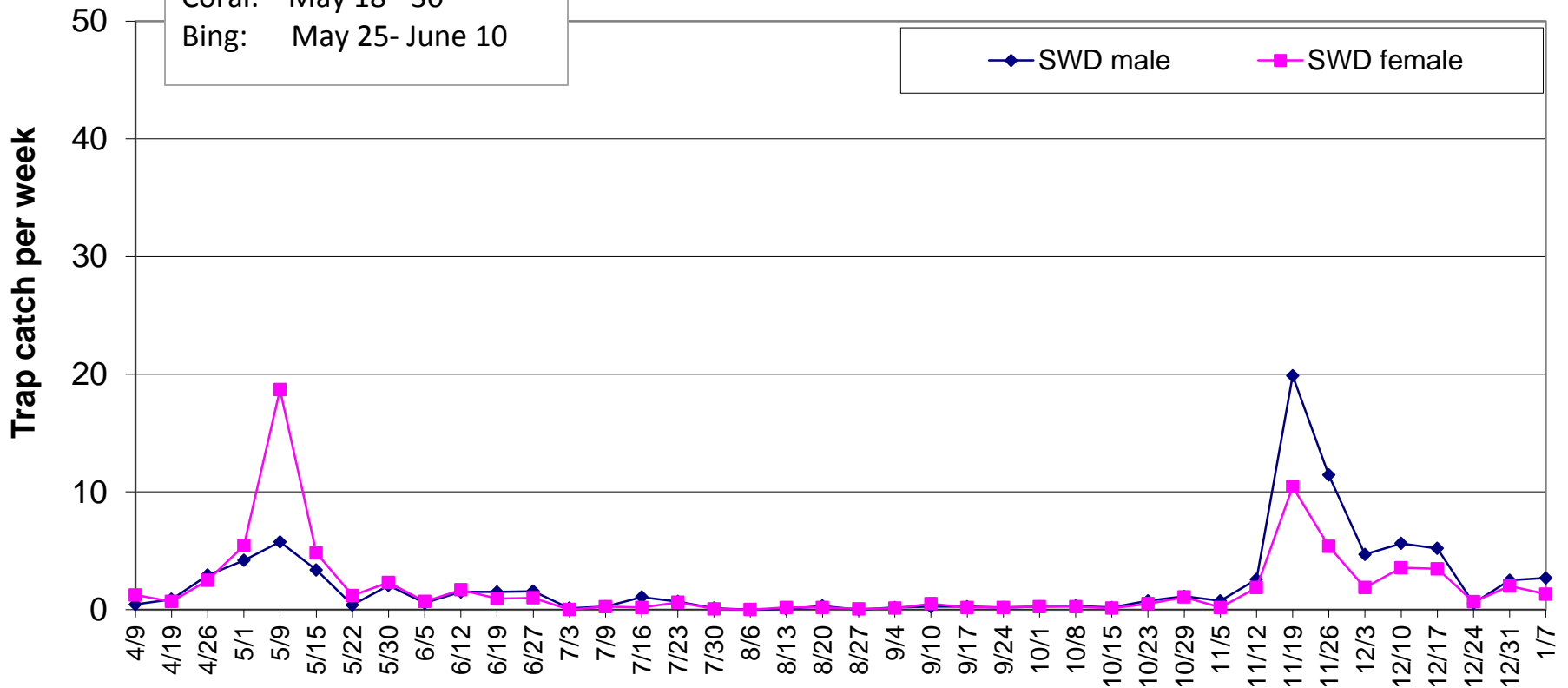
2012 Sprayed Cherries (16 orchards)

HARVEST DATES:

Burlat: May 15 -25

Coral: May 18 - 30

Bing: May 25- June 10



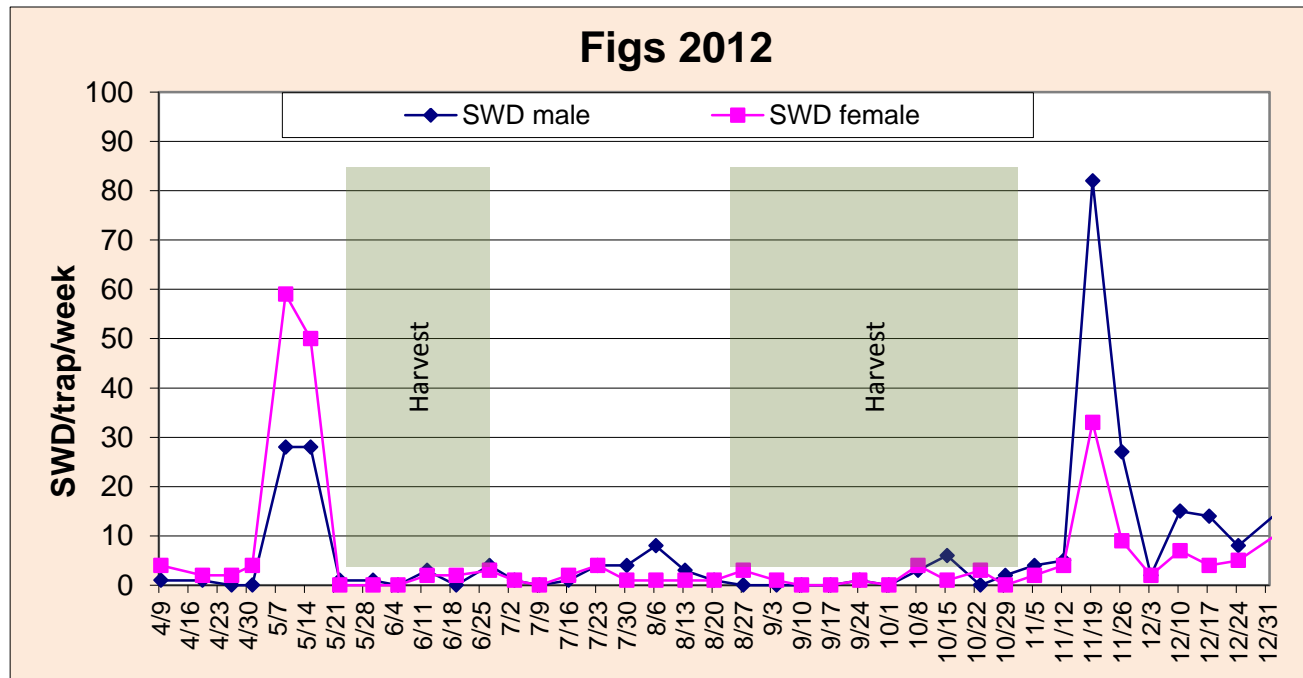


Management Tidbits

Brentwood Host Crops:



- **Cherries**
- (White nectarines)
- **Figs**
 - under shady, moist conditions
 - a fall host





Management Tidbits

Biological Control



■ In Japan

- Some identified
- Not sufficient control

■ In North America

- **Pacific NW:** Parasitoids found in Oregon (OSU) & British Columbia: 2009, 2010, 2011
- **California:** Biological control studies begin 2013
 - UCB – Dr. Kent Daane, et al.
 - CA Cherry Board funding
 - Also SWD biology & migration patterns



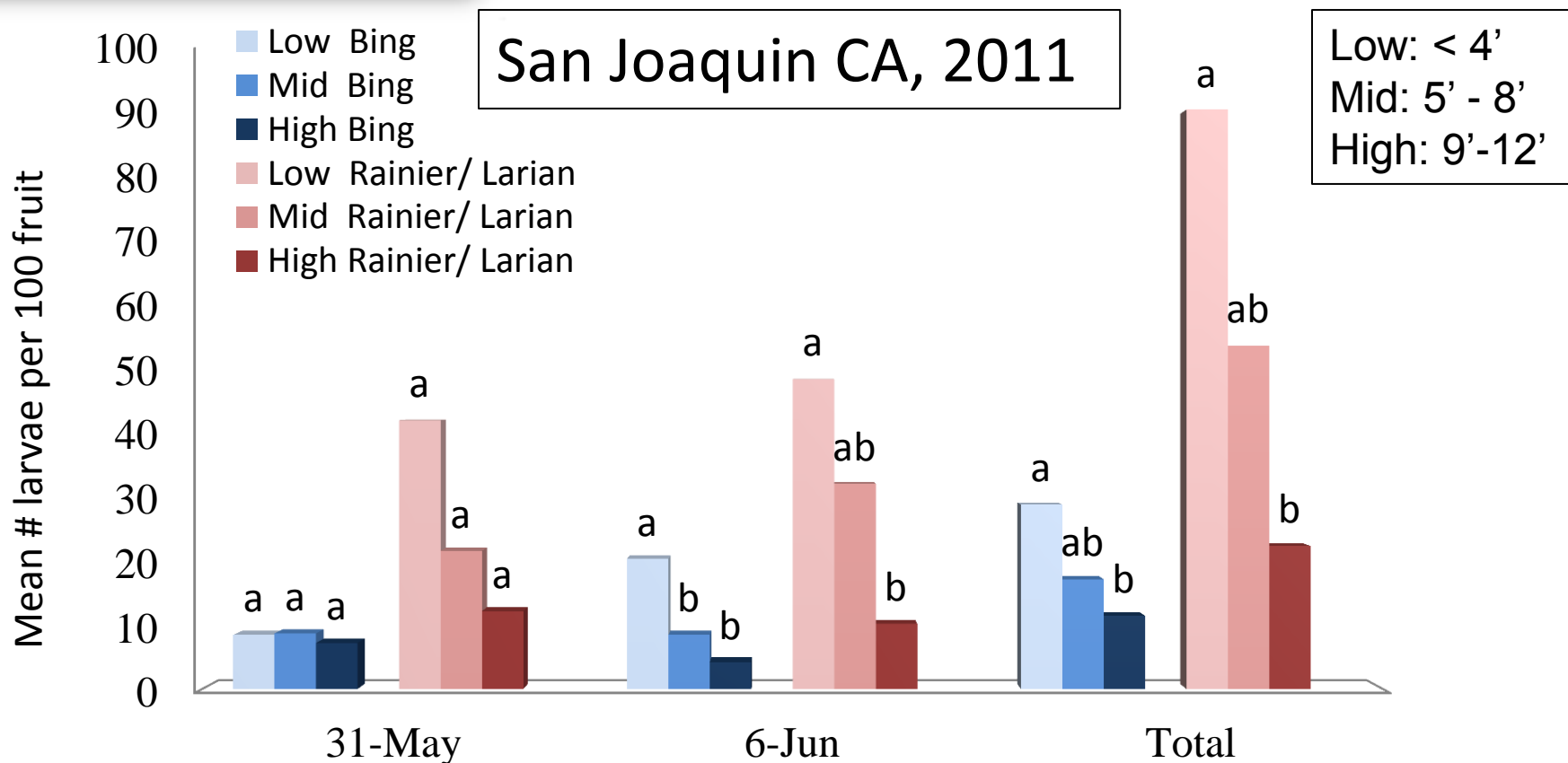
Photo courtesy of Peter Shearer, OSU



Management Tidbits

Infestation by Canopy Height

Dr. R.A Van Steenwyk, UC Berkeley



Control: Baits

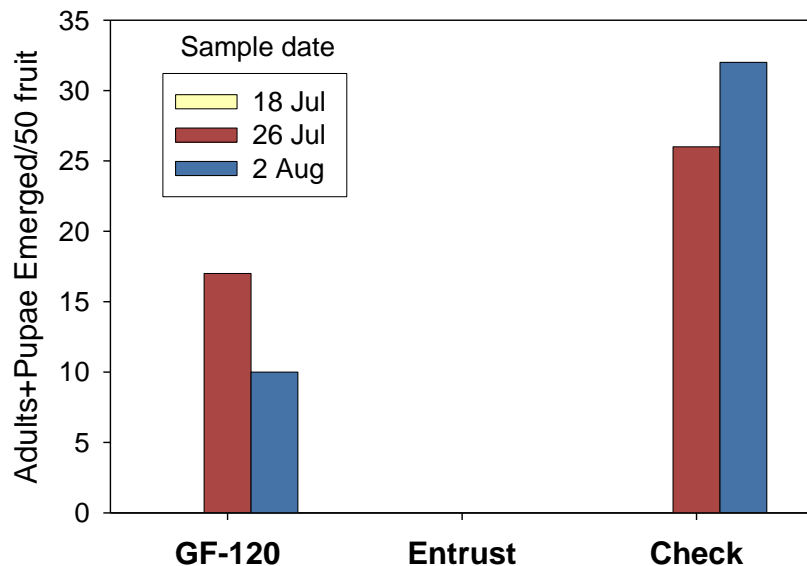
Does GF-120 work?

- Quick application with ATV
- Can direct stream to avoid fruit
- 0 days PHI (4 hr REI)



GF-120 Trial, 2011

unreplicated, large block
(E.Beers, WSU)



- NOT RECOMMENDED UNTIL BAIT IMPROVED
- Dow is NOT going to change the bait formulation
- Need research into additives
 - ACV
 - Yeast
 - Others

GF-120 Enhancement

Trial 1: Comparing additives in traps

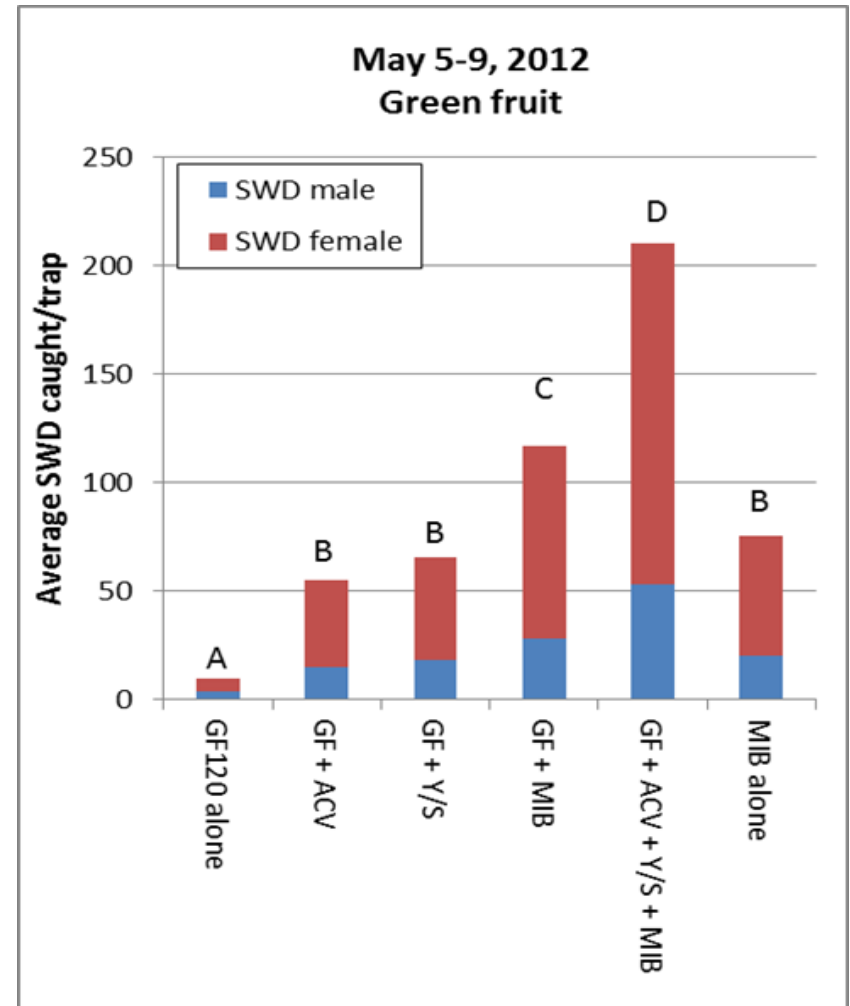
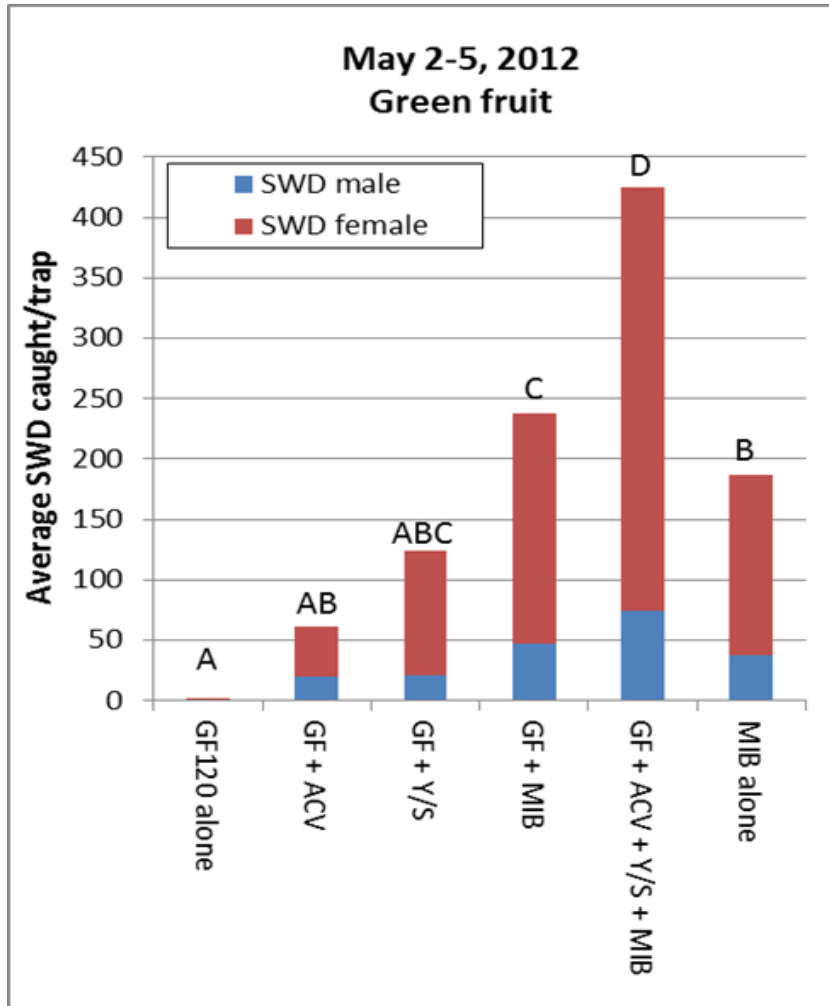
Brentwood 2012

- Screen top traps with kill strips
- 6 Treatments: 20 oz/A in a 1:4 dilution
 1. GF 120 alone
 2. GF120 + Apple Cider Vinegar (ACV)
 3. GF 120 + Yeast & sugar
 4. GF 120 + Monterey Insect Bait (MIB)
 5. GF 120 + MIB + ACV + Yeast & sugar
 6. Monterey Insect Bait alone
- 5 Replicates
- 30' apart in a high pressure orchard
- Changed every 3-4 days & rotated



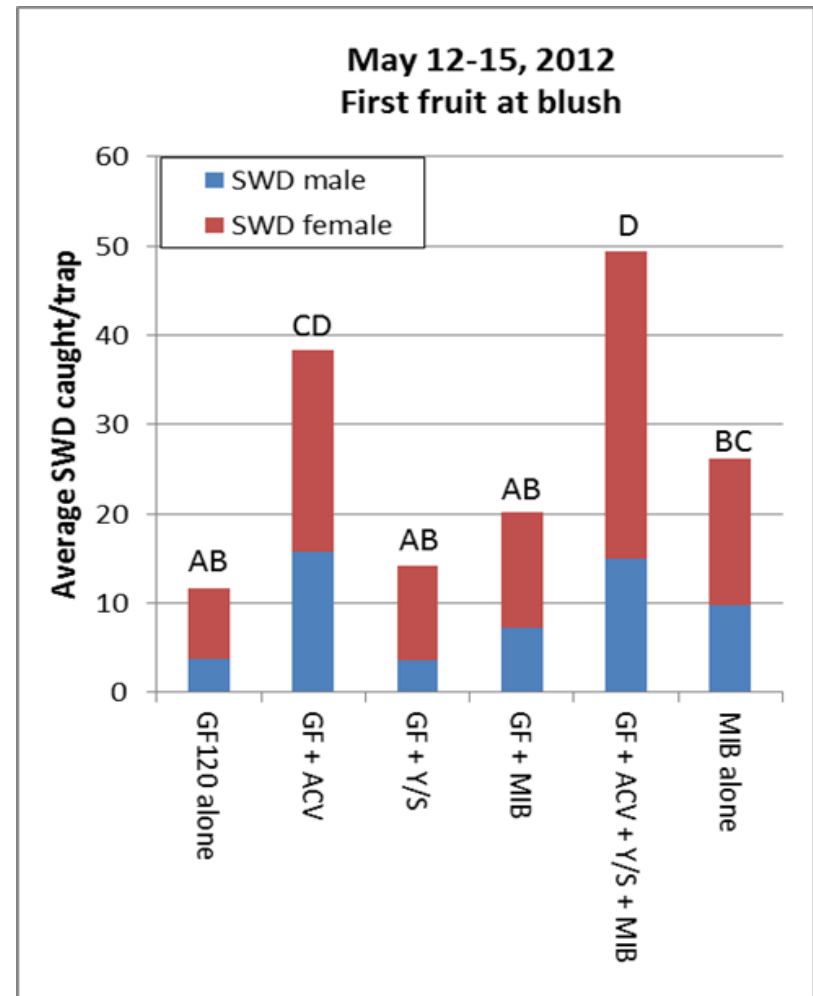
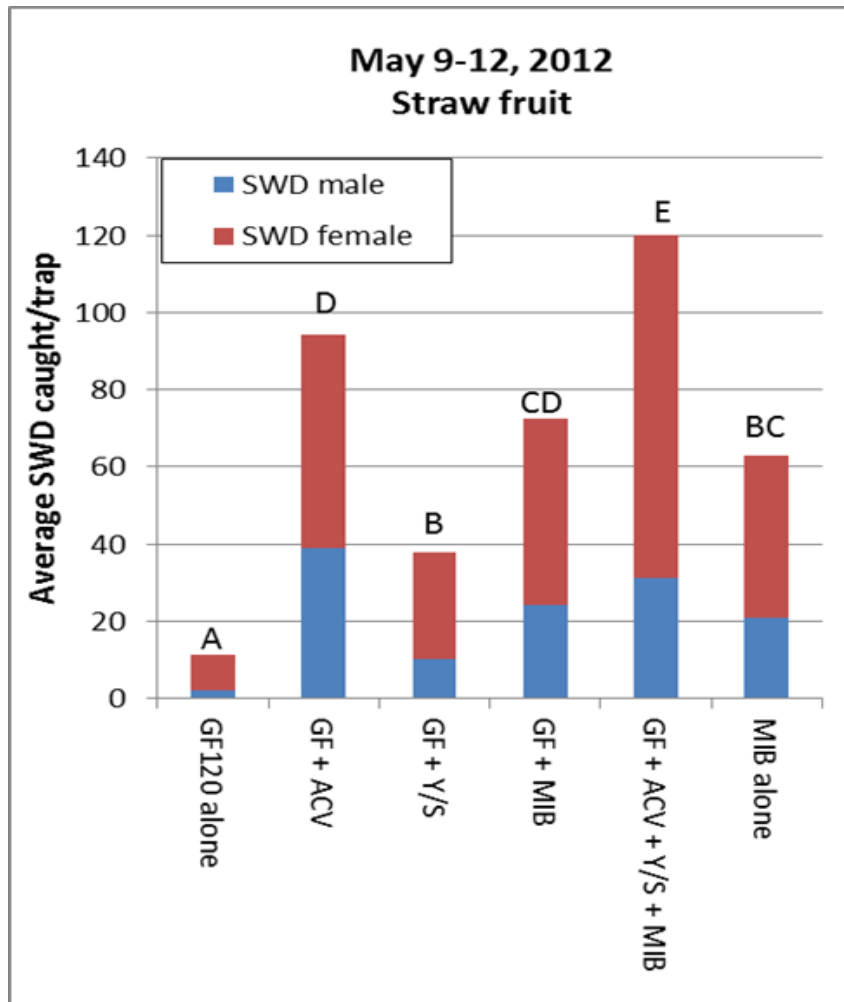
GF-120 Enhancement

Trial 1: Comparing additives in traps



GF-120 Enhancement

Trial 1: Comparing additives in traps



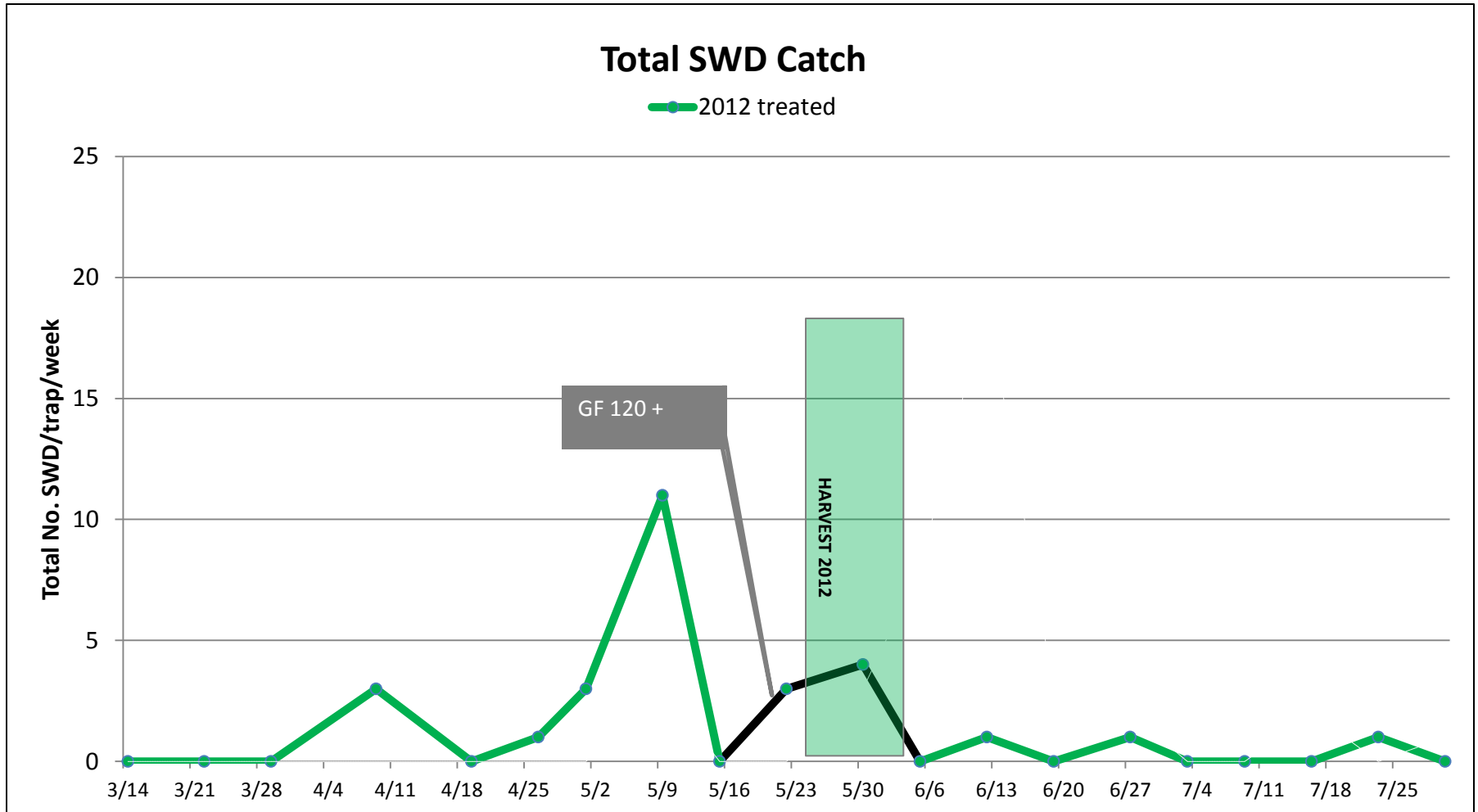
GF-120 Enhancement

Trial 2: Field control demonstration

- **Location:** Brookside Farm
 - ¼ acre block of cherries
- **Treatment:**
 - GF120 + MIB + ACV + Yeast/sugar
 - Entire block treated
 - Compare with previous year's damage
 - Begin @ straw
 - spray every 3-4 days
 - Hand pump sprayer, coarse droplets

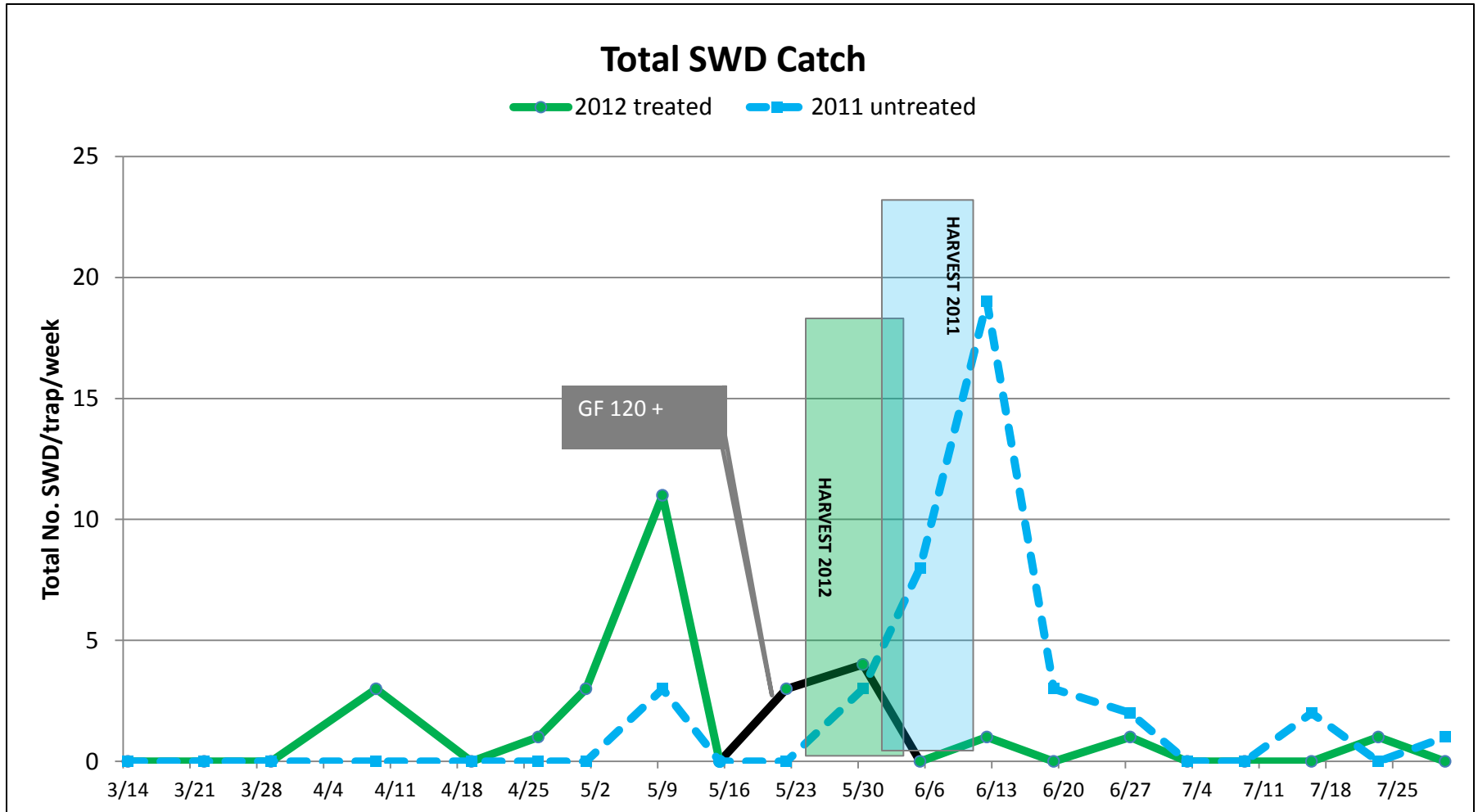
GF-120 Enhancement

Trial 2: Trap Suppression



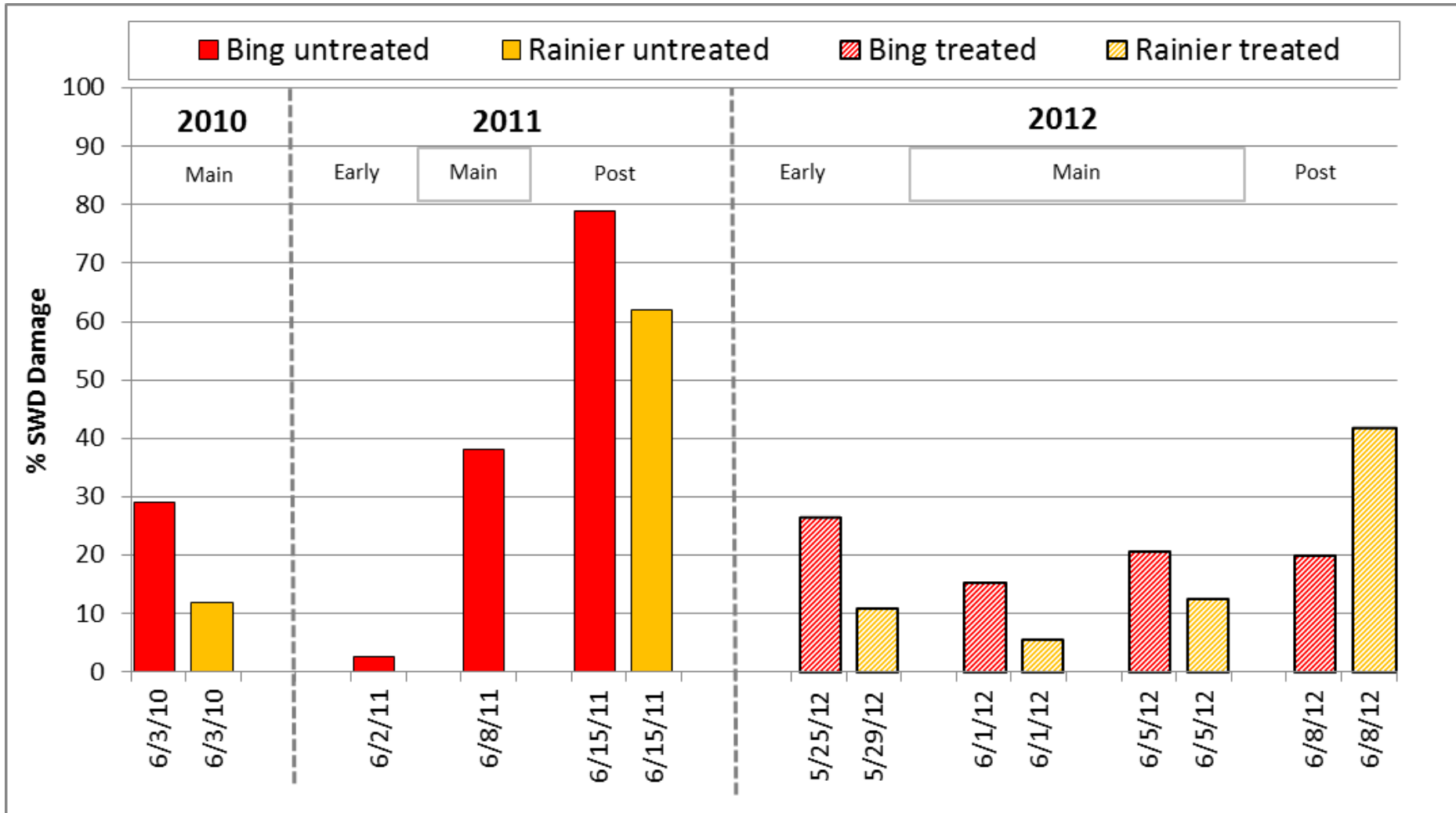
GF-120 Enhancement

Trial 2: Trap Suppression



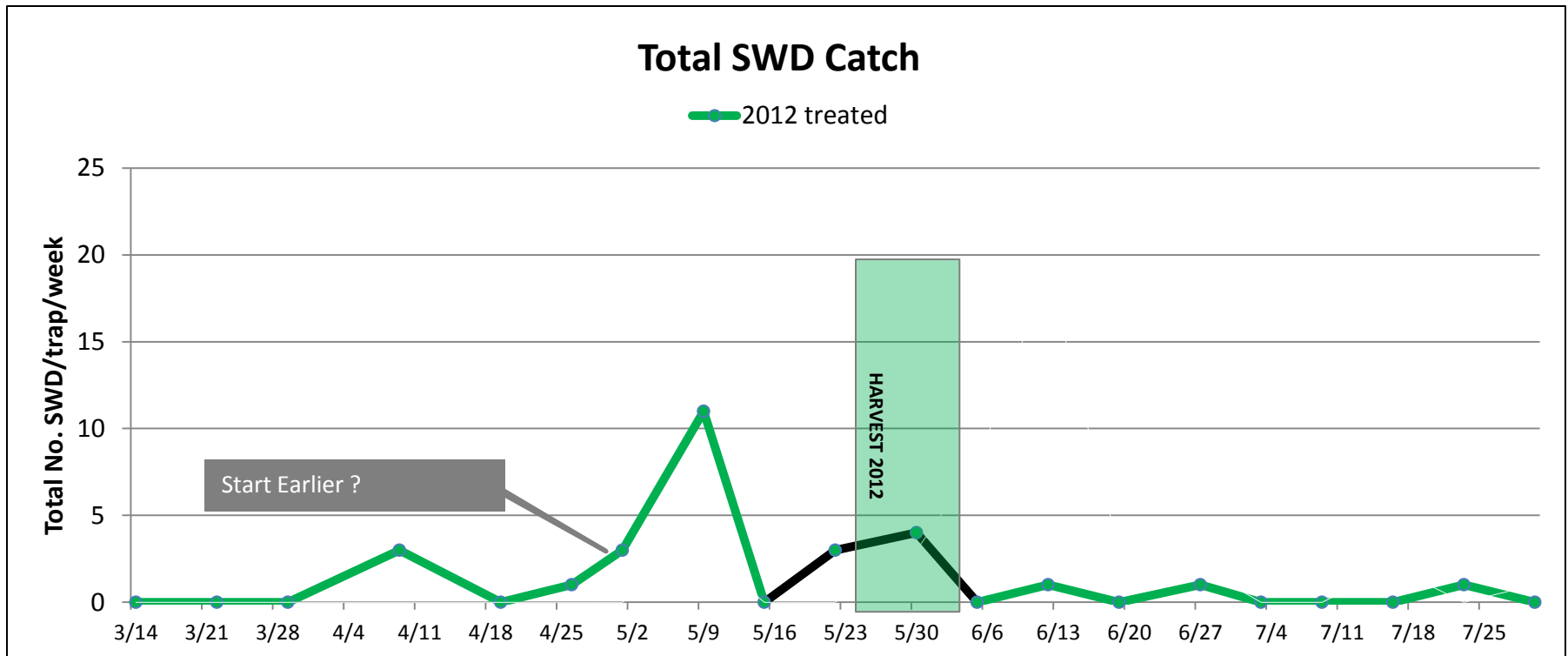
GF-120 Enhancement

Trial 2: Fruit Damage



Bait Trials for 2013

- Start bait treatment earlier?
- Use Entrust instead of GF -120
 - 3 day PHI
 - How long does bait attract
 - How long is mix toxic



SWD Control: Sprays

Spray Guidelines

- Protect fruit **BEFORE** eggs are laid in fruit
 - Start when earliest fruit changes from straw to blush
- Spray the early pollinators to keep populations low
 - Burlat & Black Tartarian are very favorable hosts
 - Eggs laid in these will result in a large population emerging as Bings become susceptible
- Maintain the spray residue until the last variety is picked
- Check with packers on materials to use for MRL concerns
- Switch chemical classes to avoid resistance
- Post harvest sprays won't help control next years SWD

Dr. Bob's 2013 Recommendations

Trade Name	Class	PHI	REI	1 DAT	7DAT
Sevin	Carbamate	1 day	12 hr	2	3
Entrust*	Spinosyn	3 day	4 hr	2	3
Malathion	Organophosphate	3 day	12 hr	1	5
Danitol	Pyrethroid	3 day	24 hr	2	1
Ambush/Pounce	Pyrethroid	3 day	12 hr	3	3
Baythroid	Pyrethroid	7 days	12 hr	2	1
Success	Spinosyn	7 days	4 hr	2	3
Delegate	Spinosyn	7 days	4 hr	2	2
Mustang	Pyrethroid	14 days	12 hr	3	2
Warrior/Lambda-Cy	Pyrethroid	14 days	12 hr	3	1
<u>Days After Treatment (DAT) Control Rating:</u>					
1 = excellent 2=good 3=fair 4= poor 5= none					

* Organically acceptable

Dr. Bob = Dr. R.A. Van Steenwyk (UCB)

SWD Damage Survey 2012

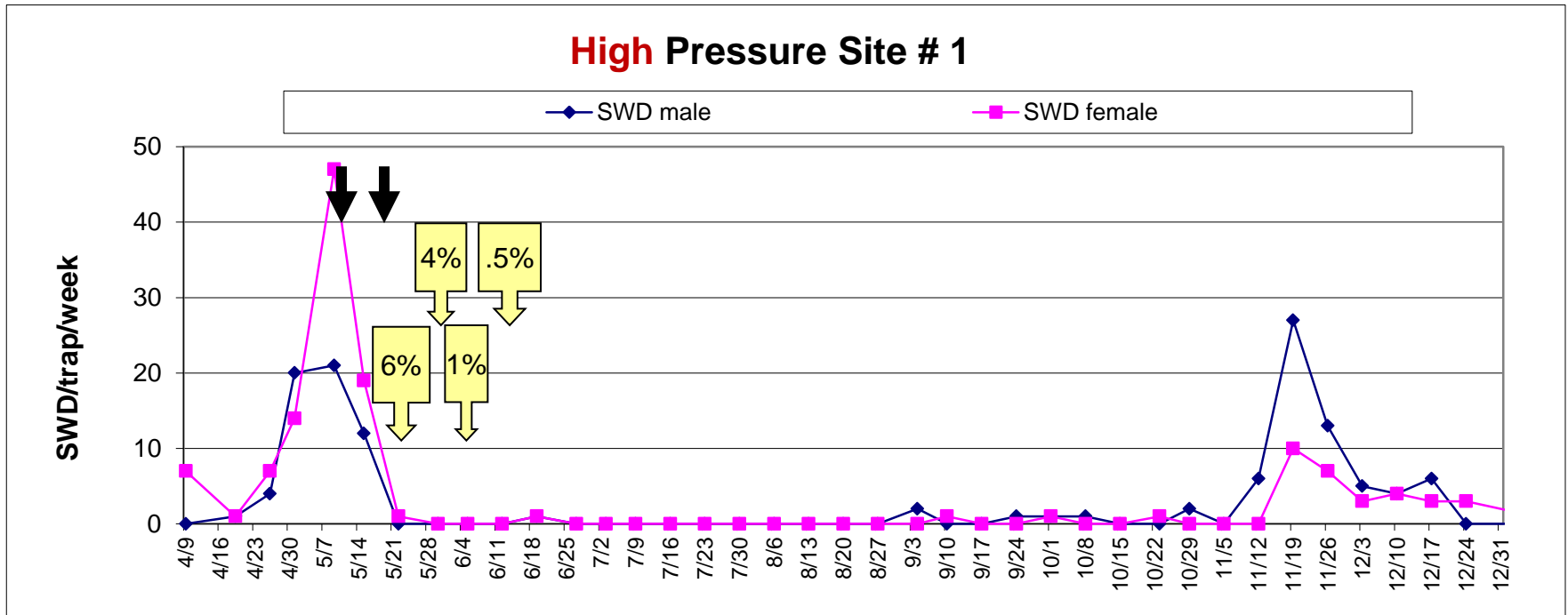
Conducted in 14 Brentwood orchards

- Collected trap data to show pressure
- Evaluated fruit damage at harvest
- Collected grower spray records
- Then put it all together in graphs:



2012 SWD Flight, Sprays, Damage

- Dense canopy
- Moist orch. floor
- Previous damage
- Near exc. habitat



Grower Sprays:

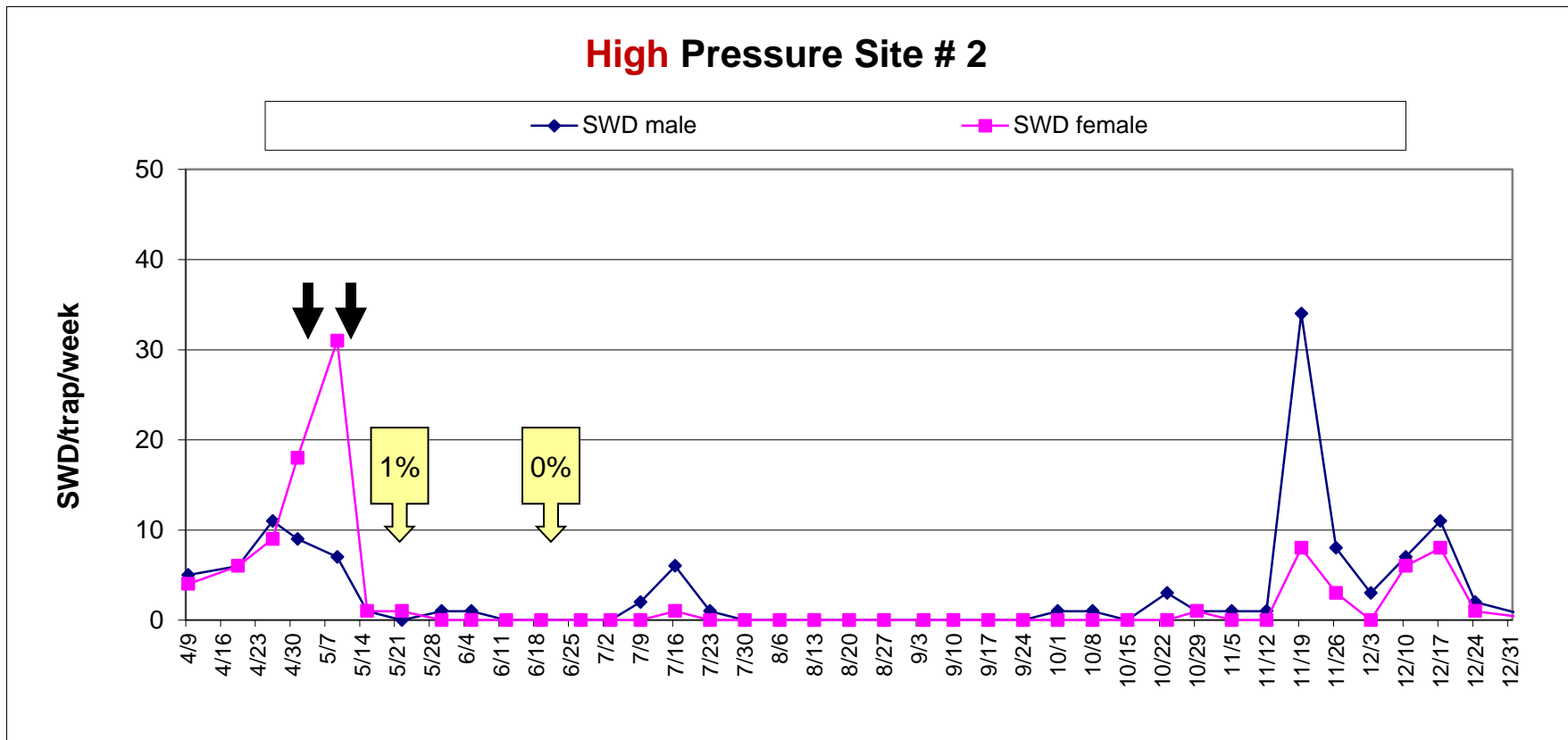
5/15	Danitol	18 oz
5/23	Danitol	18 oz

% Damage (100 fruit):

5/24	5.8%	Pre-harvest color pick
5/31	3.7%	1 day pre-harvest
6/7	0.9%	Main harvest
6/14	0.5%	Post-harvest

- Dense canopy
- Moist orch. floor
- Previous damage
- Near exc. habitat

2012 SWD Flight, Sprays, Damage



Grower Sprays:

5/3	Danitol	13 oz
5/12	Danitol	13 oz

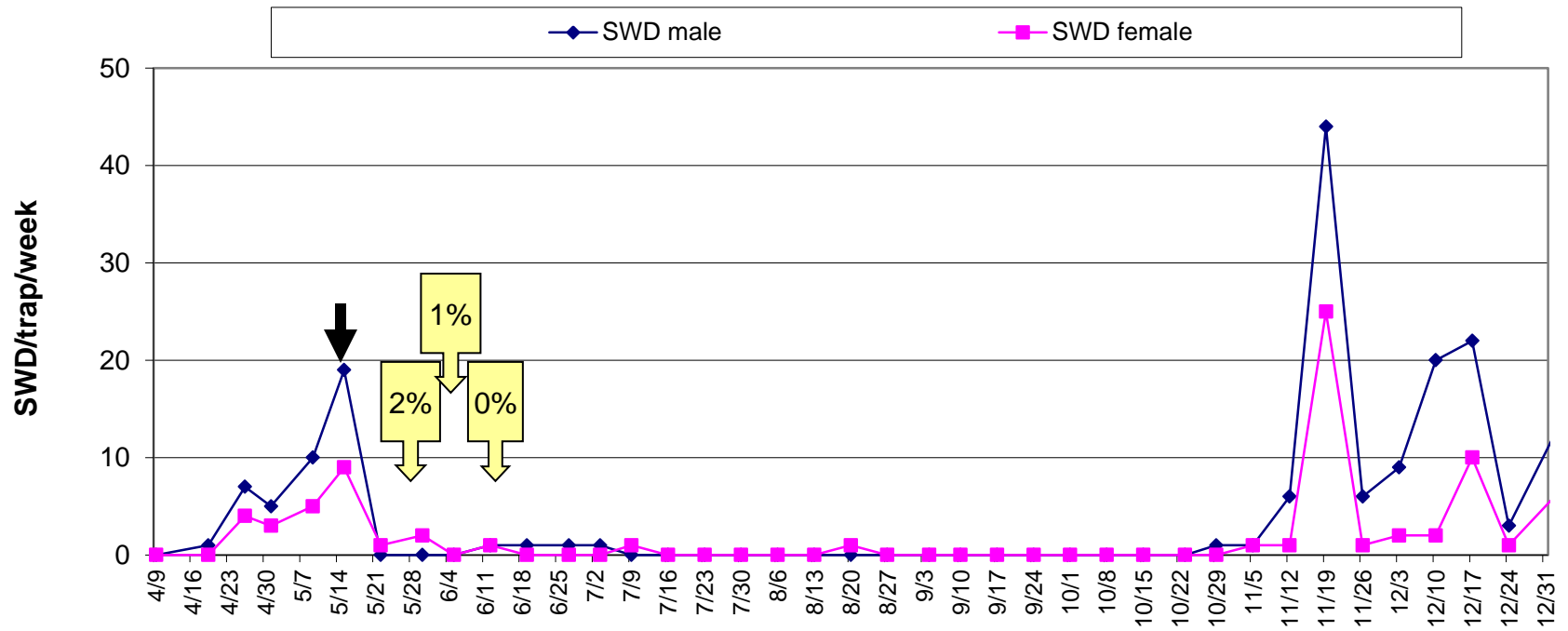
% Damage (100 fruit):

5/22	0.9%	Main harvest
6/22	0%	2 weeks post-harvest

2012 SWD Flight, Sprays, Damage

- Moderate canopy
- Moderate irrigation

Moderate Pressure Site # 1



Grower Sprays:

5/13 LamdaCy 4 oz

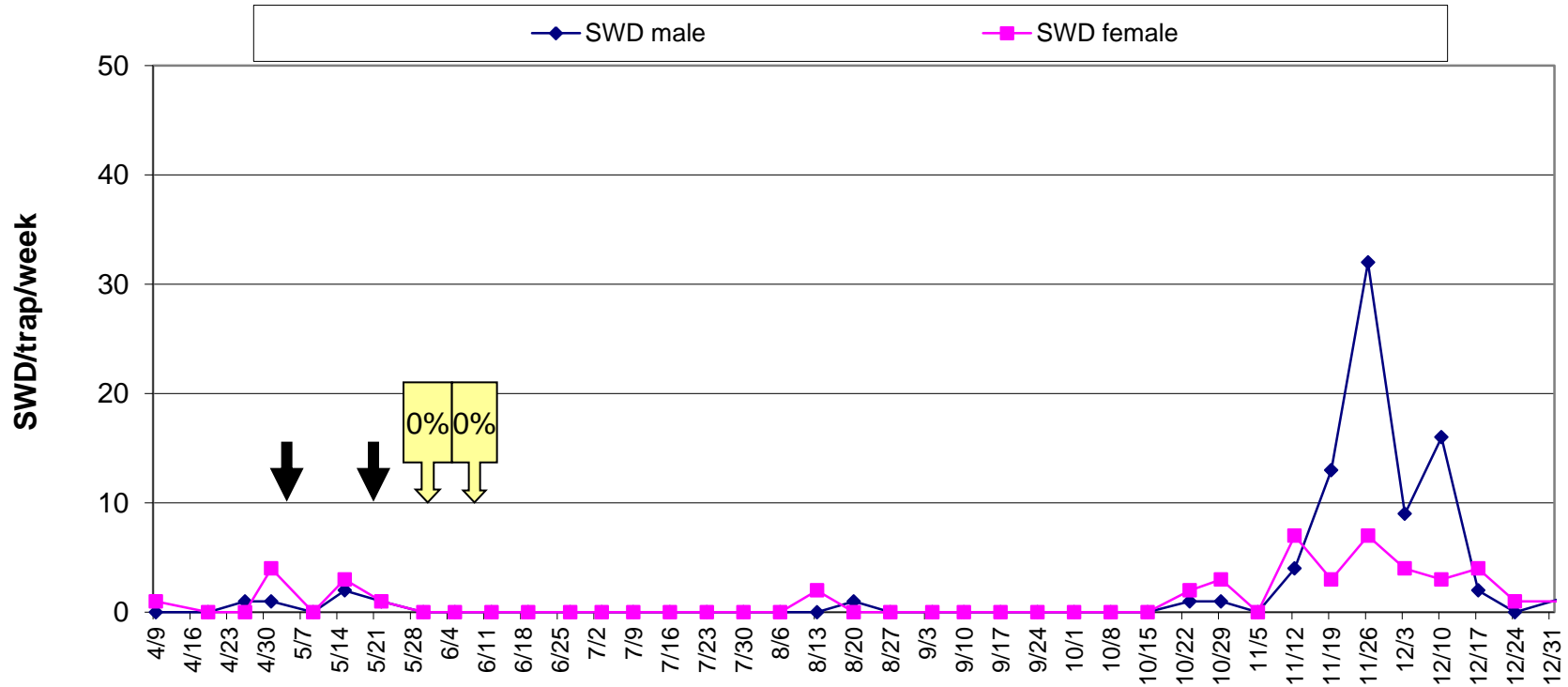
% Damage (100 fruit):

5/30	1.8%	2 days pre-harvest
6/5	0.9%	2 days post-harvest
6/12	0.0%	9 days post-harvest

2012 SWD Flight, Sprays, Damage

- Variable canopy
- Well irrigated

Moderate Pressure Site # 2



Grower Sprays:

5/2	LambdaStar	5 oz
5/22	Danitol	21 oz

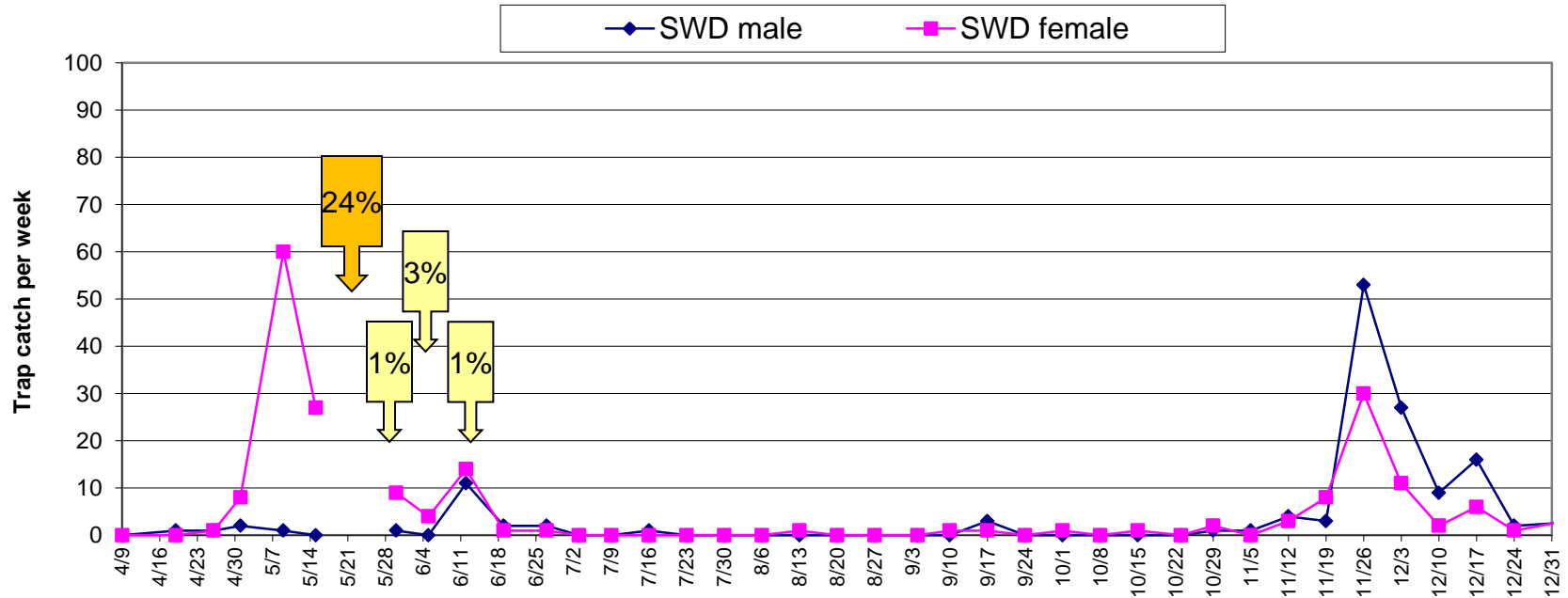
% Damage (100 fruit):

5/31	0%	Main harvest
6/8	0%	3 days post-harvest

2012 SWD Flight, Sprays, Damage

- Open canopy
- Dry orchard floor

Organic Moderate Pressure Site



No Sprays:

(irrigation began ~ 5/26)

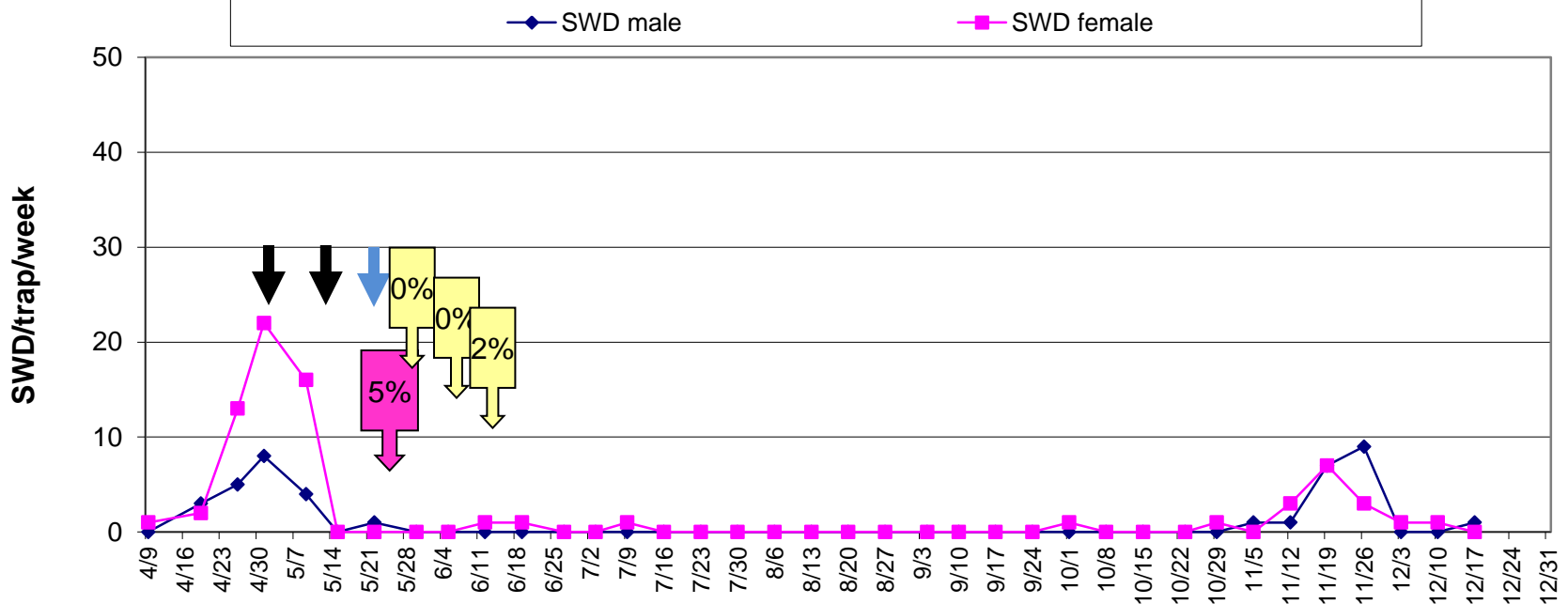
% Damage (100 fruit):

5/22	24%	main Burlat harvest
5/30	0.9%	early Bing harvest
6/5	2.7%	main Bing harvest
6/12	1.0 %	late Bing harvest

2012 SWD Flight, Sprays, Damage

- Dense canopy
- Well irrigated

Moderate Pressure Site #3



Grower Sprays:

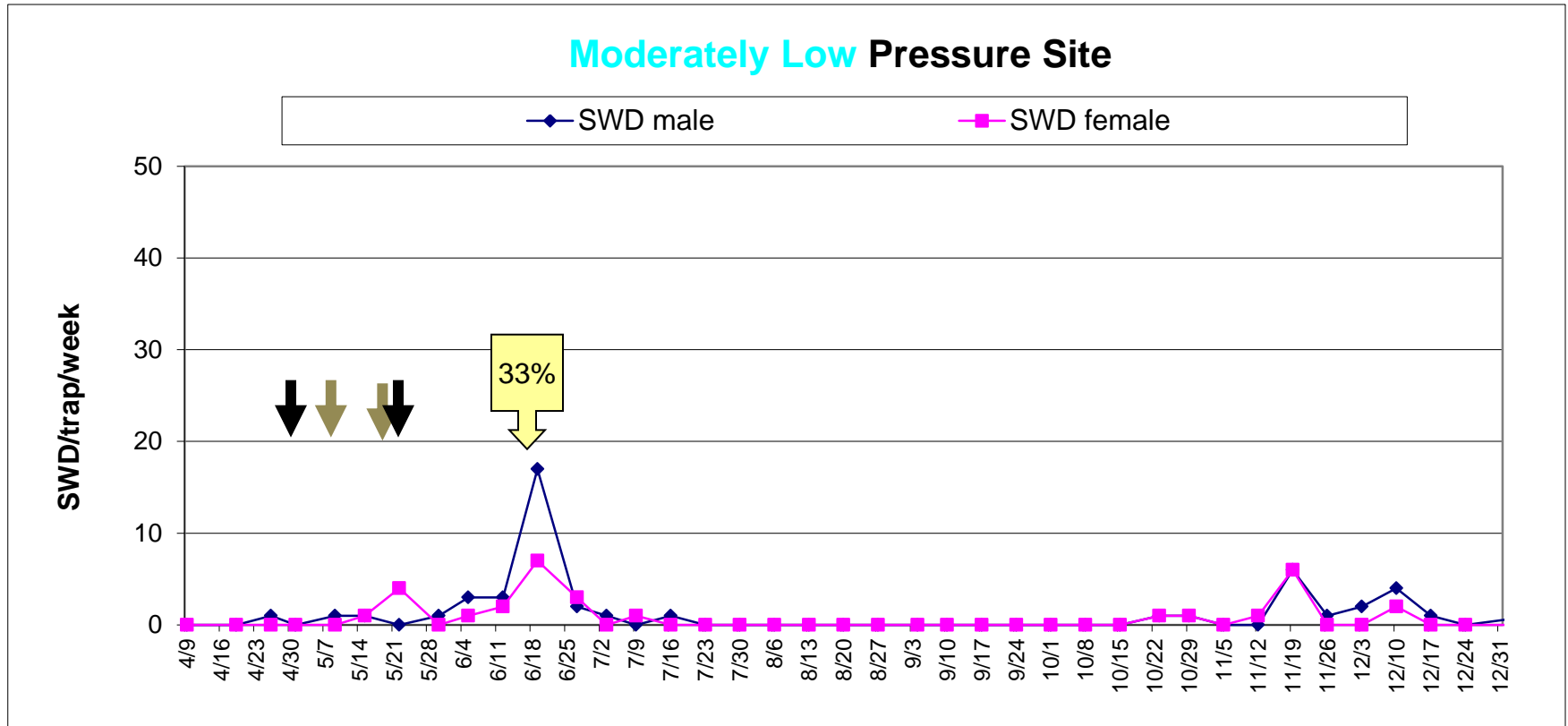
5/3	LambdaStar	5 oz
5/14	Malathion 8	1.75 pt
5/24	Fyfanon ULV by air	16 oz

% Damage (100 fruit):

5/25	5.1%	Coral: main pick
5/31	0.0%	Bing: Main pick
6/7	0.0%	Bing: 1 week postharvest
6/14	1.9%	Bing: 2 weeks postharvest

2012 SWD Flight, Sprays, Damage

- Moderate canopy
- Moderate irrigation



Grower Sprays:

5/2	Danitol	21 oz
5/10	Malathion8 (trunk strip)	1.75 pt
5/21	Malathion8 (trunk strip)	1.75 pt
5/23	Danitol	21 oz

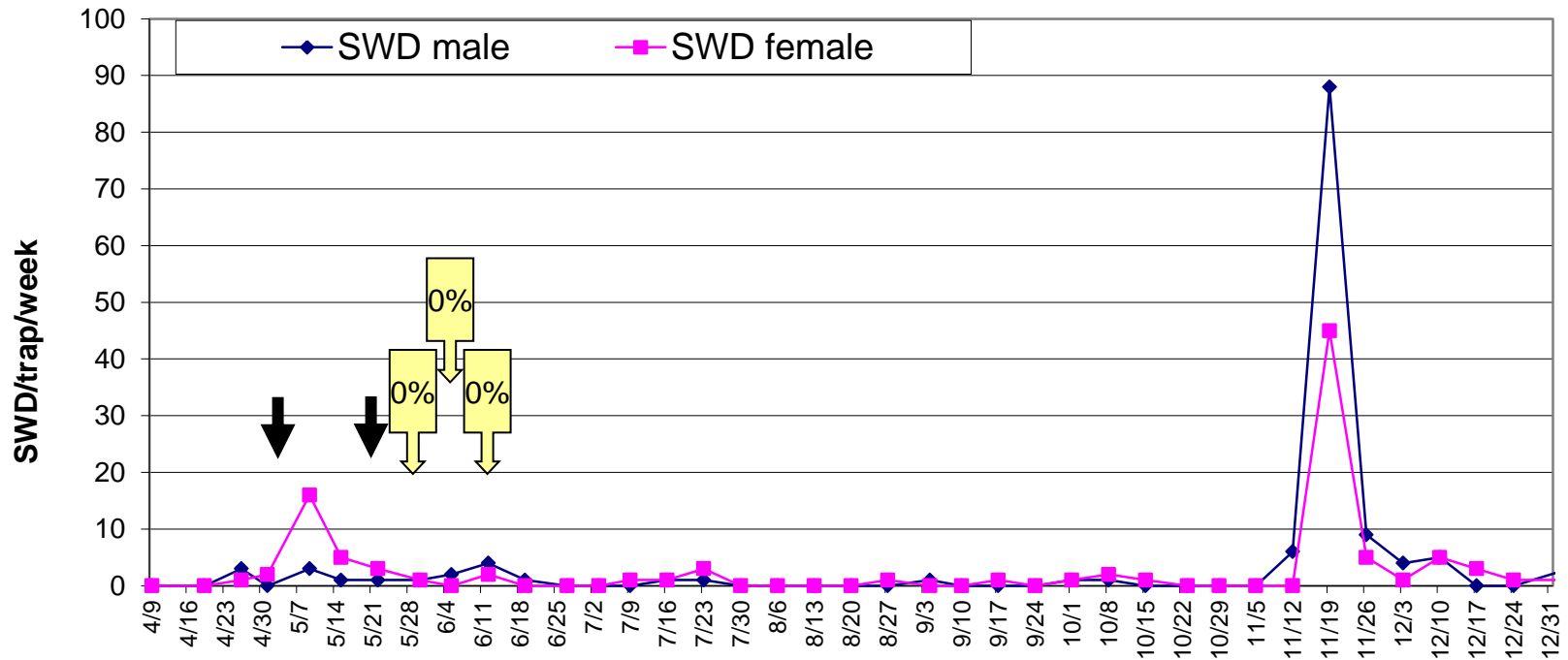
% Damage (100 fruit):

6/14	33.3%	Sweetheart
	17.6%	1 day after collection
	31.5%	4 days after collection
	33.3%	6 days after collection

2012 SWD Flight, Sprays, Damage

- Open canopy
- Dry orchard floor
- Windy

Organic Moderately Low Pressure Site



Grower Sprays - organic:

5/4	Entrust	2 oz
5/21	Entrust	2 oz

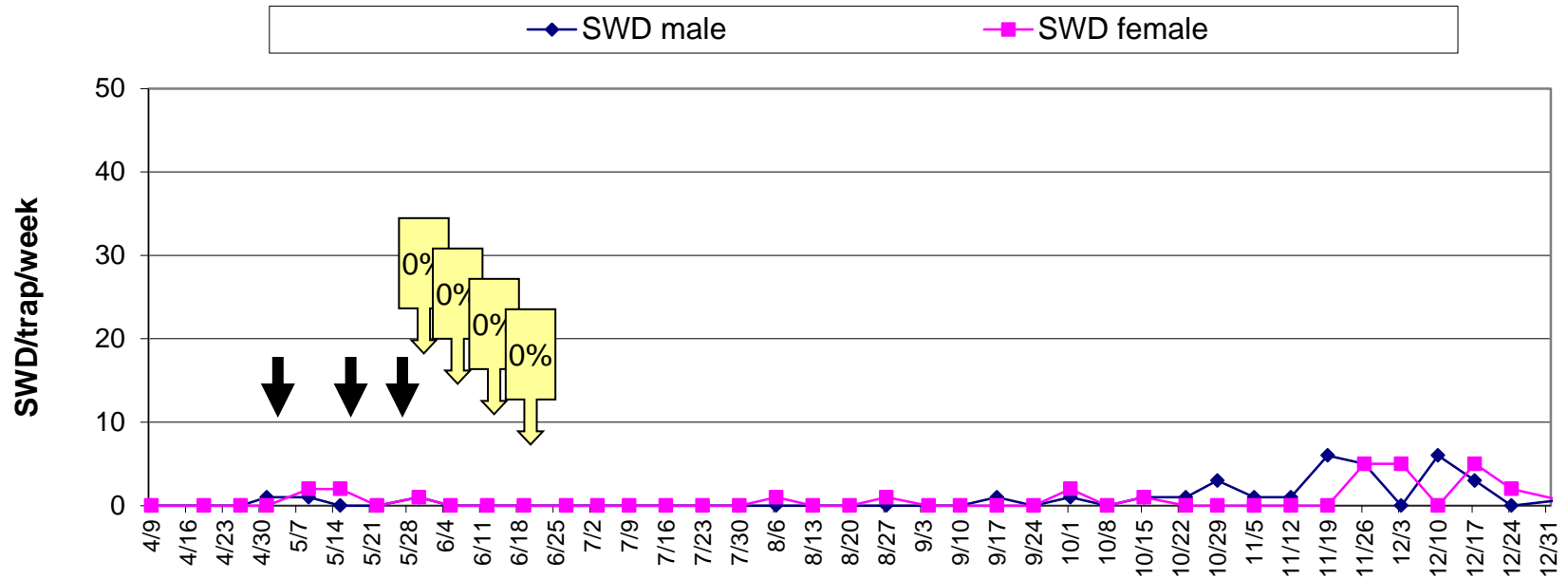
% Damage (100 fruit):

5/30	0%	Bing: Early harvest
6/5	0%	Bing: Main harvest
6/12	0%	Bing: Last harvest

2012 SWD Flight, Sprays, Damage

- Open canopy
- Dry orchard floor
- Windy

Low Pressure Site # 1



Grower Sprays:

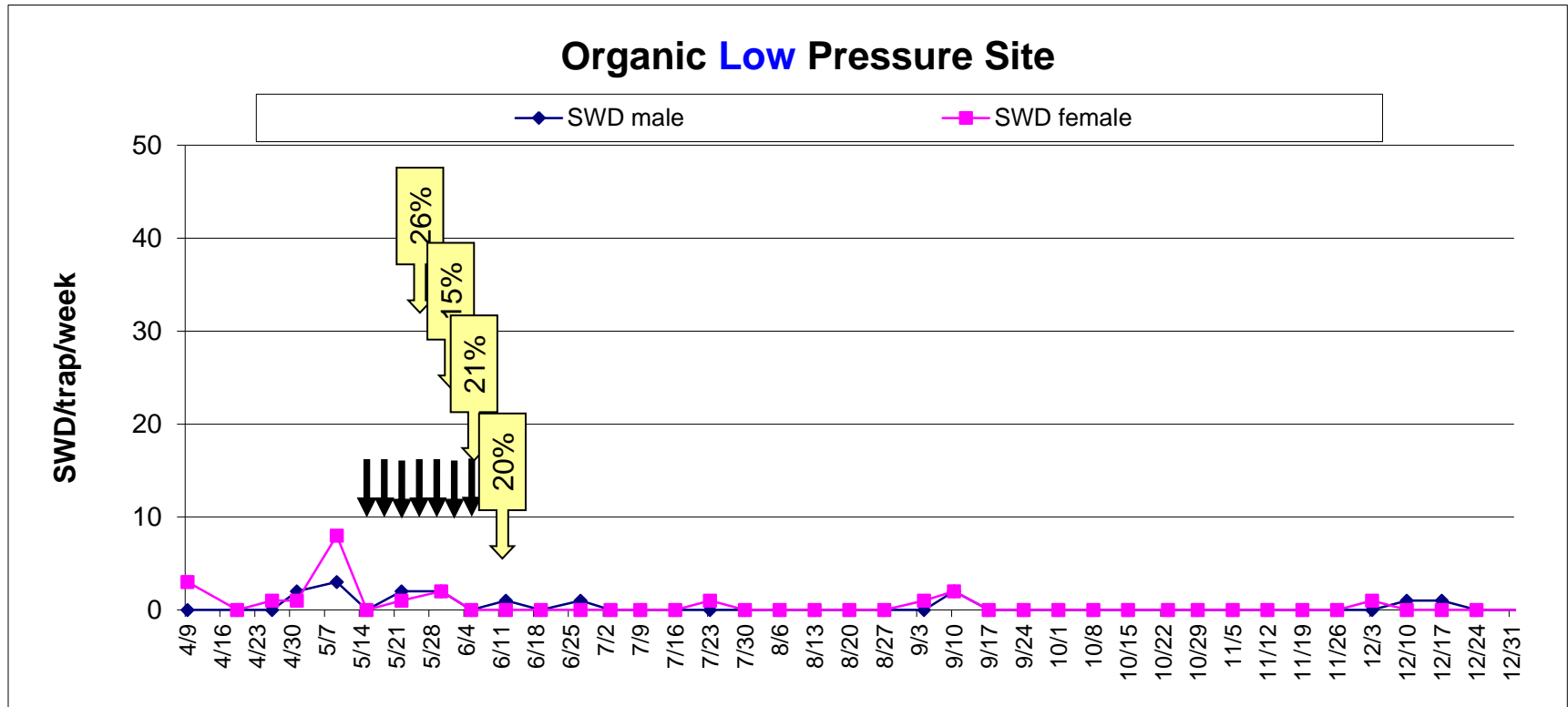
5/3	Danitol	13oz
5/17	Danitol	13 oz
5/27	Danitol	13 oz

% Damage (100 fruit):

6/1	0%	early harvest
6/7	0%	main harvest
6/14	0%	4 days post harvest
6/22	0%	12 days post harvest

2012 SWD Flight, Sprays, Damage

- Open canopy
- Dry orchard floor



Bait Sprays:

5/16 + 5/19 + 5/22 + 5/25 + 5/29 + 6/1 + 6/5

GF120+ACVinegar+Yeast/Sugar+MontereyInsBait

@1:4 20oz/A

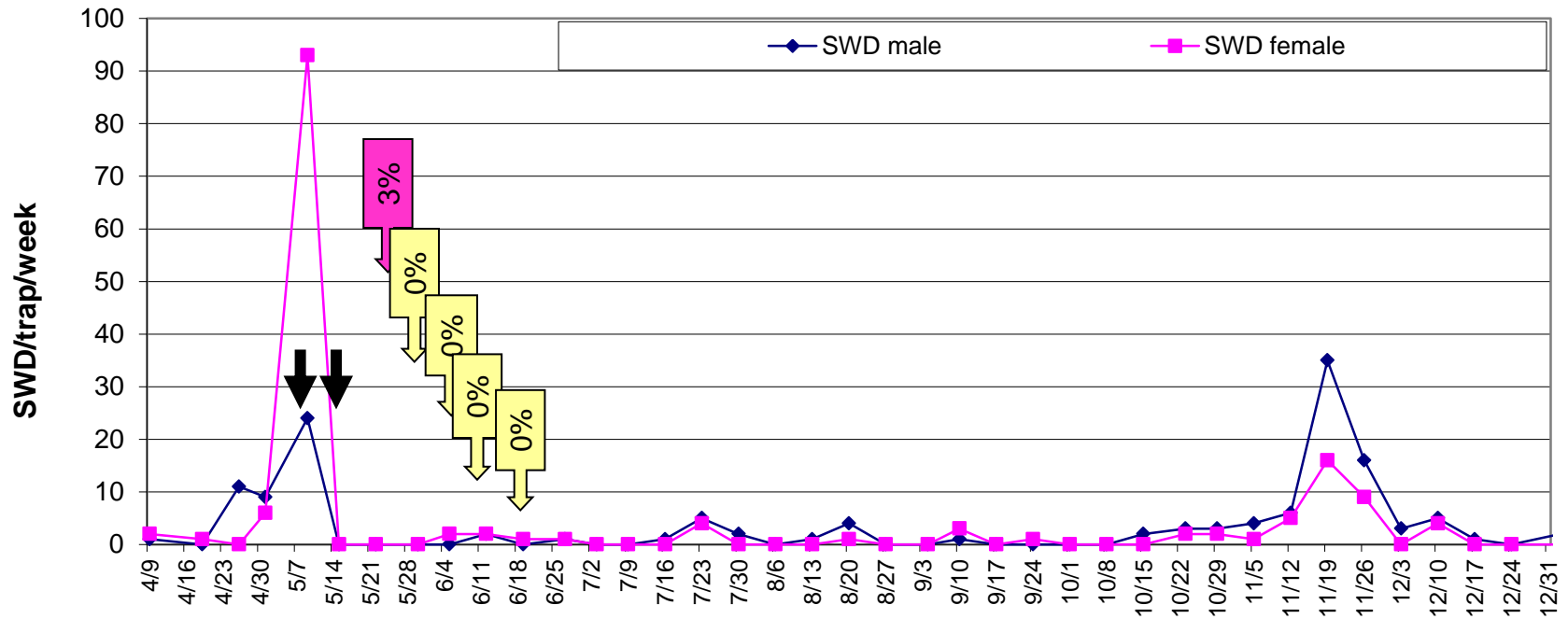
% Damage (100 fruit):

5/25	26.4%	Bing: 1 st color pick
6/1	15.4%	Bing: main harvest
6/5	20.7%	Bing: main harvest
6/8	20.0%	Bing: post harvest

2012 SWD Flight & Sprays

- Large dense canopy
- Well watered orchard floor
- Figs nearby (summer & fall flight)

High Pressure Site #3



Grower Sprays:

5/6	Danitol	13 oz
5/13	Entrust	2.5 oz

% Fruit Damage (per 100 fruit):

5/24	3%	Coral: Main harvest
5/30	0%	Bing: 7 days pre-harvest
6/5	0%	Bing: prime harvest
6/12	0%	4 days post harvest
6/19	0%	11 days post harvest

Life Cycle of the Spotted Wing Drosophila

Hambry presentation

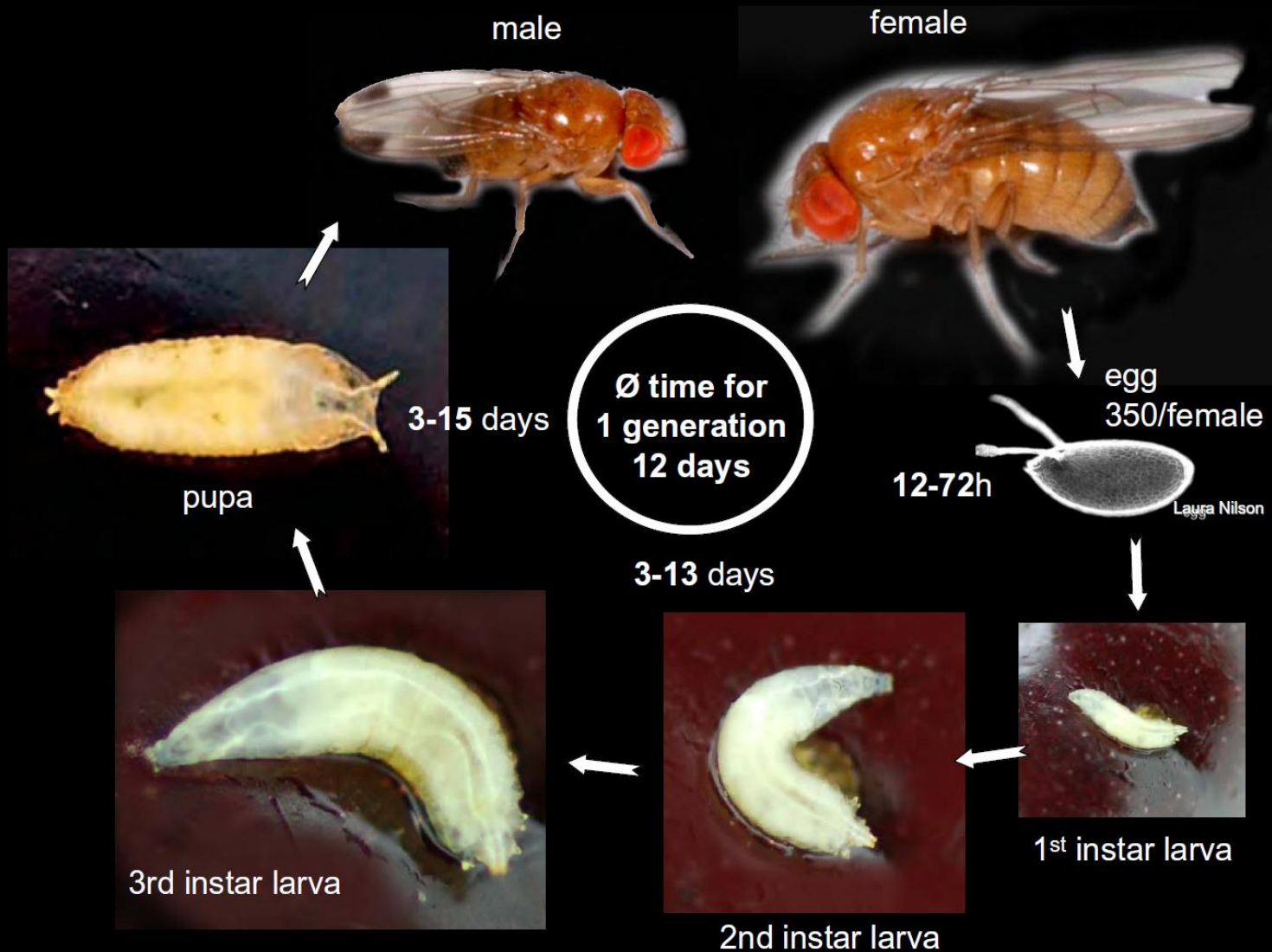




Photo: C. Arkelian