

# Handling Spotted Wing Drosophila a New Pest in Peaches

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## Why are we here?

- **Mating disruption for OFM is coming back**
- MD replaces repeated whole block insecticide sprays
- Can be supplemented w/border sprays for BMSB
- In conventional (wholesale) orchards this works
  - Reduces insecticide use
  - Conserves bio-controls
  - Helps manage secondary pests like scale
- **But some farms are more diverse**
- These may also have small fruit crops
- SWD loves small fruit
- And can attack peaches
- **This talk really applies to those who are using MD, and/or are pulling back on late season insecticides.**





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- Individual, highly susceptible crops are monitored and treated.
- Other, less susceptible crops may not be monitored for SWD & and may have other treatment/IPM systems.
- Peaches - Critical pests are:
  - Plum Curculio - early season only.
  - Tarnished plant bugs, native stink bugs - early season and ground cover.
  - Oriental fruit moth - model timed sprays and mating disruption.
  - Peachtree borers - Single application end of season or mating disruption.
- Diverse crops often means direct markets, PYO, close neighbors or other "incentives" to minimize insecticide use.
- Low insect pressure and mating disruption practices = No insecticide use from late June through mid- August
- Alternate and wild hosts can contribute to high SWD pressure.

- A little bit about Spotted Wing Drosophila - SWD
- An invasive pest from Asia, like BMSB
- Can use peach as a host, but never has in NJ....until last 2017.
- Like your native fruit fly that reproduces on overripe fruit on your kitchen counter,  
But SWD can lay eggs in ripening fruit still on the bush or tree.

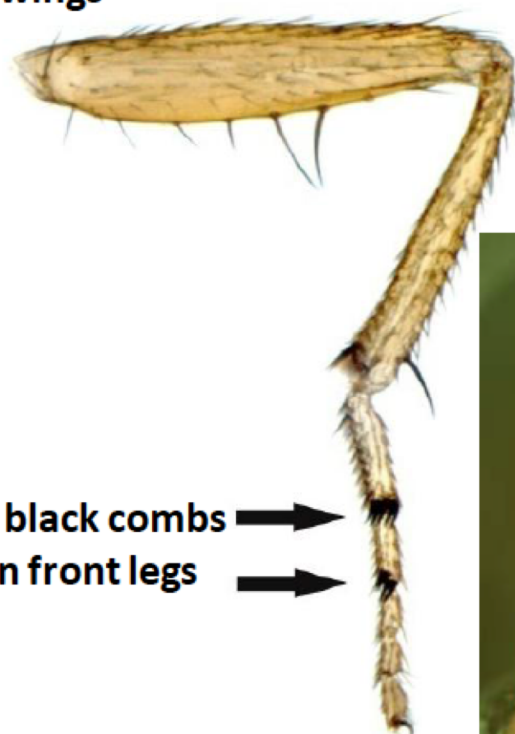


# SWD Identification – key characters

**Male**



Black spot  
on wings



2 black combs  
on front legs



**Female**



She inserts saw-like device  
into fruits and lays eggs

# Mistaken Identity

Common fruit flies feed  
on rotting decaying fruit



*Drosophila melangaster*

Cherry fruit fly lays eggs  
in cherries

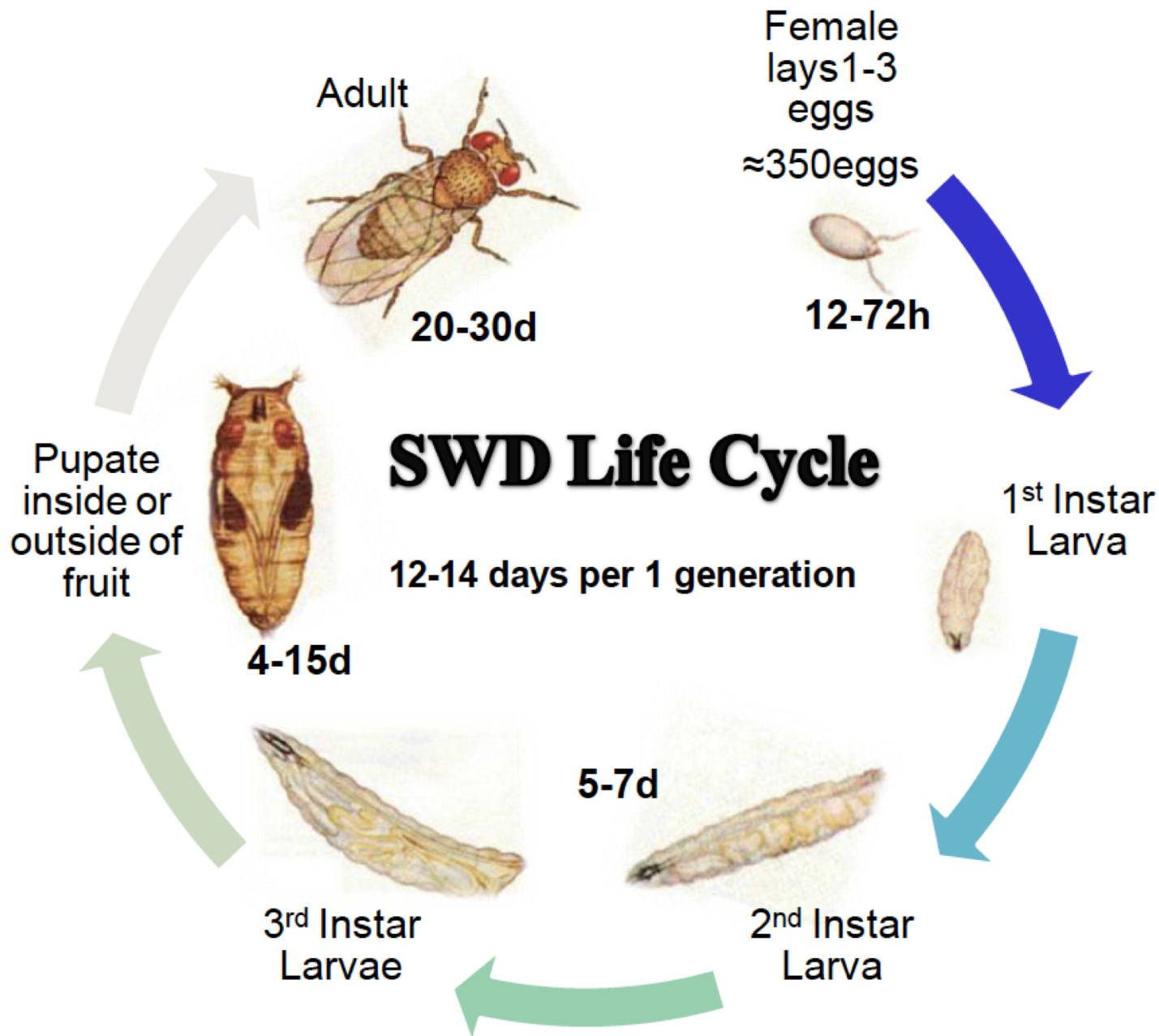


*Rhagoletis indifferens*



**Watch out!** Be careful NOT to  
mistake common fruit or vinegar flies  
for the Spotted wing Drosophila







# Wild and Ornamental Hosts of the Spotted Wing Drosophila, *Drosophila suzukii*, in Southern New England <sup>1,2</sup>- *Chris Maier, Connecticut Agricultural Experiment Station, New Haven, CT*

<u>Family</u>	<u>Common Name</u>	<u>Genus species</u>
<b>Annonaceae</b>	Pawpaw	<i>Asimina triloba</i>
<b>Aquifoliaceae</b>	Catberry	<i>Ilex mucronata</i>
<b>Araliaceae</b>	Devil's Walkingstick	<i>Aralia spinosa</i>
<b>Berberidaceae</b>	Mayapple	<i>Podophyllum peltatum</i>
<b>Caprifoliaceae</b>	Japanese honeysuckle	<i>Lonicera japonica</i>
	Morrow's honeysuckle	<i>Lonicera morrowi</i>
	American black elderberry	<i>Sambucus nigra canadensis</i>
<b>Celastraceae</b>	Burningbush	<i>Euonymus alatus</i>
<b>Cornaceae</b>	Kousa dogwood	<i>Cornus kousa</i>
	Silky dogwood	<i>Cornus obliqua*</i>
	Gray dogwood	<i>Cornus racemosa</i>
<b>Ebenaceae</b>	Common persimmon	<i>Diospyros virginiana</i>
<b>Elaeagnaceae</b>	Autumn olive	<i>Elaeagnus umbellata</i>
<b>Ericaceae</b>	Black huckleberry	<i>Gaylussacia baccata</i>
	Blue huckleberry	<i>Gaylussacia frondosa</i>
	Highbush blueberry	<i>Vaccinium corymbosum</i>
	Blue ridge blueberry	<i>Vaccinium pallidum</i>



<b>Liliaceae</b>	Garden asparagus	<i>Asparagus officinalis</i>
<b>Moraceae</b>	Edible Fig	<i>Ficus carica</i>
<b>Phytolaccaceae</b>	American pokeweed	<i>Phytolacca Americana</i>
<b>Ranunculaceae</b>	Red Baneberry	<i>Actaea rubra</i>
<b>Rhamnaceae</b>	Glossy buckthorn	<i>Frangula alnus</i>
	Common buckthorn	<i>Rhamnus cathartica</i>
	Purple chokeberry	<i>Photinia floribunda</i>
<b>Rosaceae</b>	Beach plum	<i>Prunus maritima</i>
	Black cherry	<i>Prunus serotina</i>
	Chokecherry	<i>Prunus virginiana</i>
	Alleghany blackberry	<i>Rubus allegheniensis</i>
	Northern dewberry	<i>Rubus flagellaris</i>
	Bristly dewberry	<i>Rubus hispidus</i>
	Black raspberry	<i>Rubus occidentalis</i>
	Purpleflowering raspberry	<i>Rubus odoratus</i>
	Wine raspberry	<i>Rubus phoenicolasius</i>
	Climbing nightshade	<i>Solanum dulcamara</i>
<b>Solanaceae</b>	Japanese yew	<i>Taxus cuspidate</i>
<b>Taxaceae</b>	Amur peppervine	<i>Ampelopsis brevipedunculata</i>
<b>Vitaceae</b>	Fox grape	<i>Vitis labrusca</i>
	Riverbank grape	<i>Vitis riparia</i>

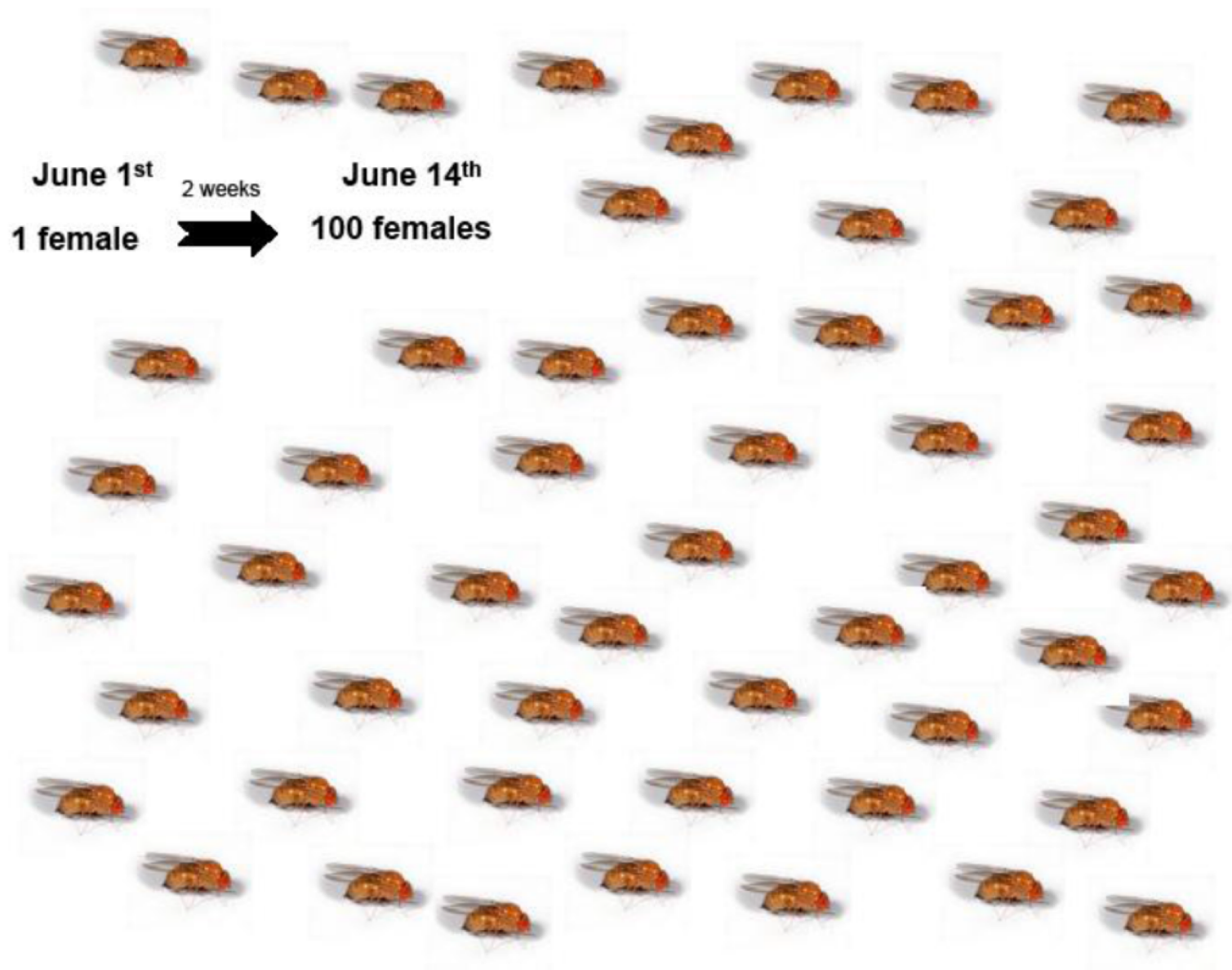
June 1<sup>st</sup> 2 weeks  
1 female →

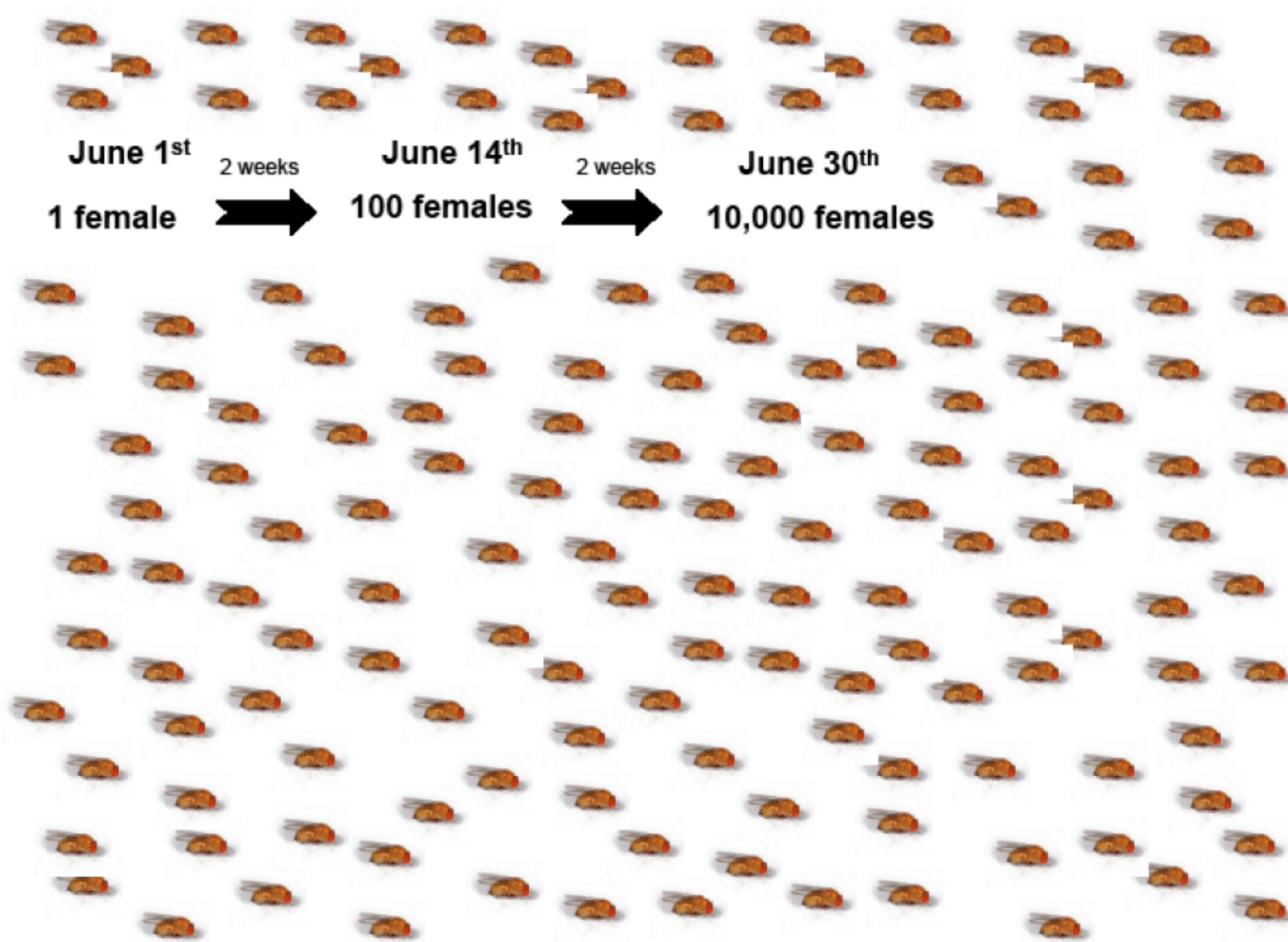


If a female lays 350+ eggs

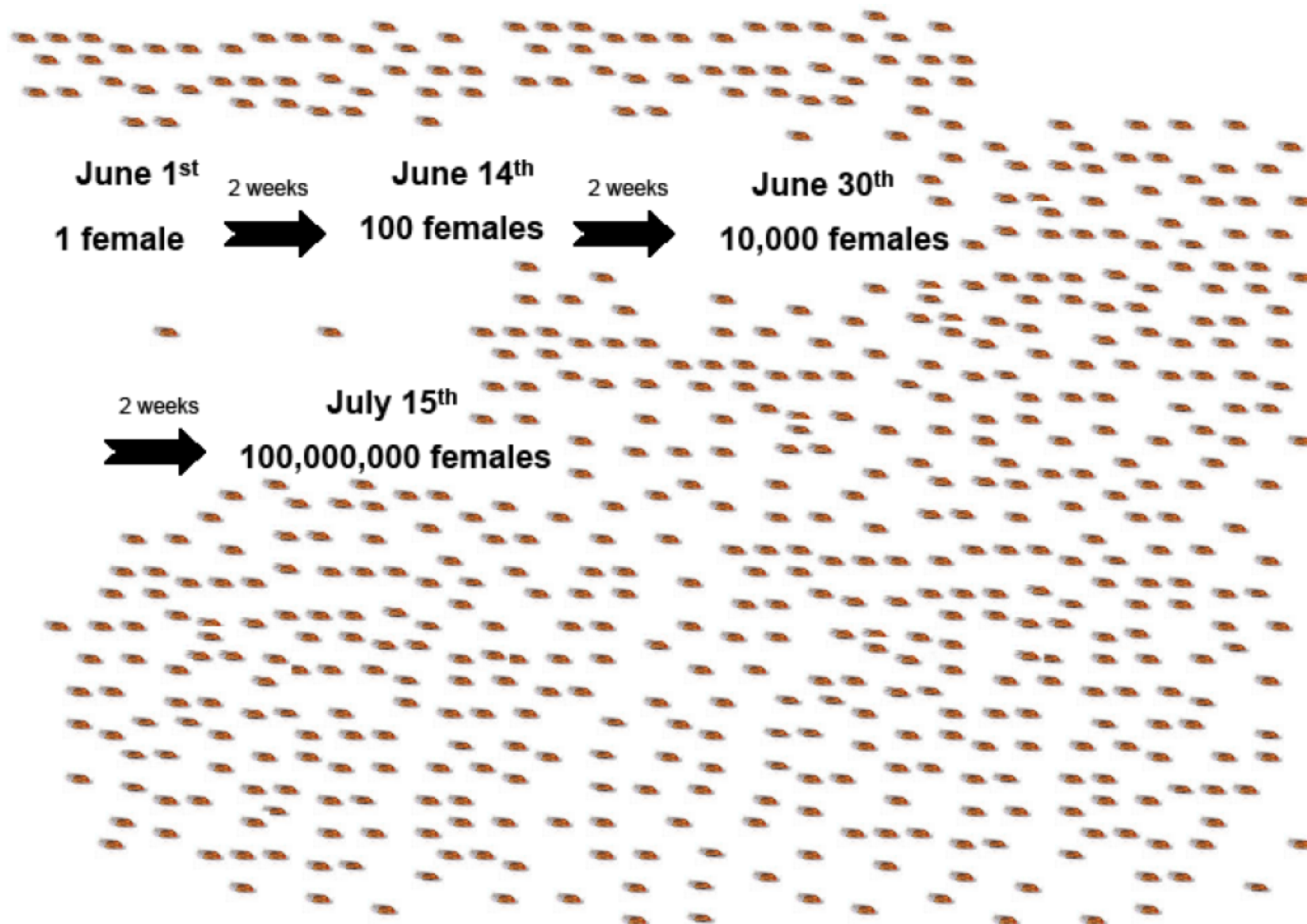
with sex ratio of 1:1

One female can give rise to  
22,500 egg-laying daughters in  
2 generations









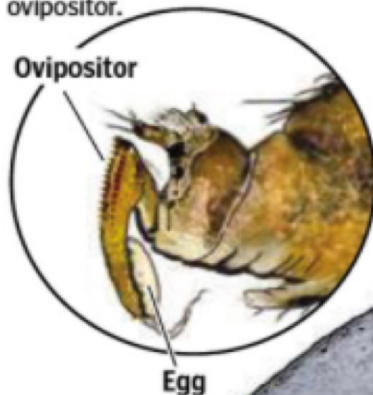
# Spraying Can be A Challenge Because

- The adult is the primary target.
- Eggs cannot be contacted, although they are close to the surface and some insecticides penetrate the skin.
- Larvae usually cannot be contacted, except very young ones, or when they come to the fruit surface.
- Pupae are on the ground and cannot be contacted.
- As the population builds there are numerous overlapping generations; therefore the ration of adults to other stages is very low.

## Life cycle

The pest is not a strong flier and has probably spread across the country through the transport of infested fruit. Flies have produced 15 generations a year in captivity, meaning just a few flies can seed to enormous populations.

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

**Normal sized blueberry**

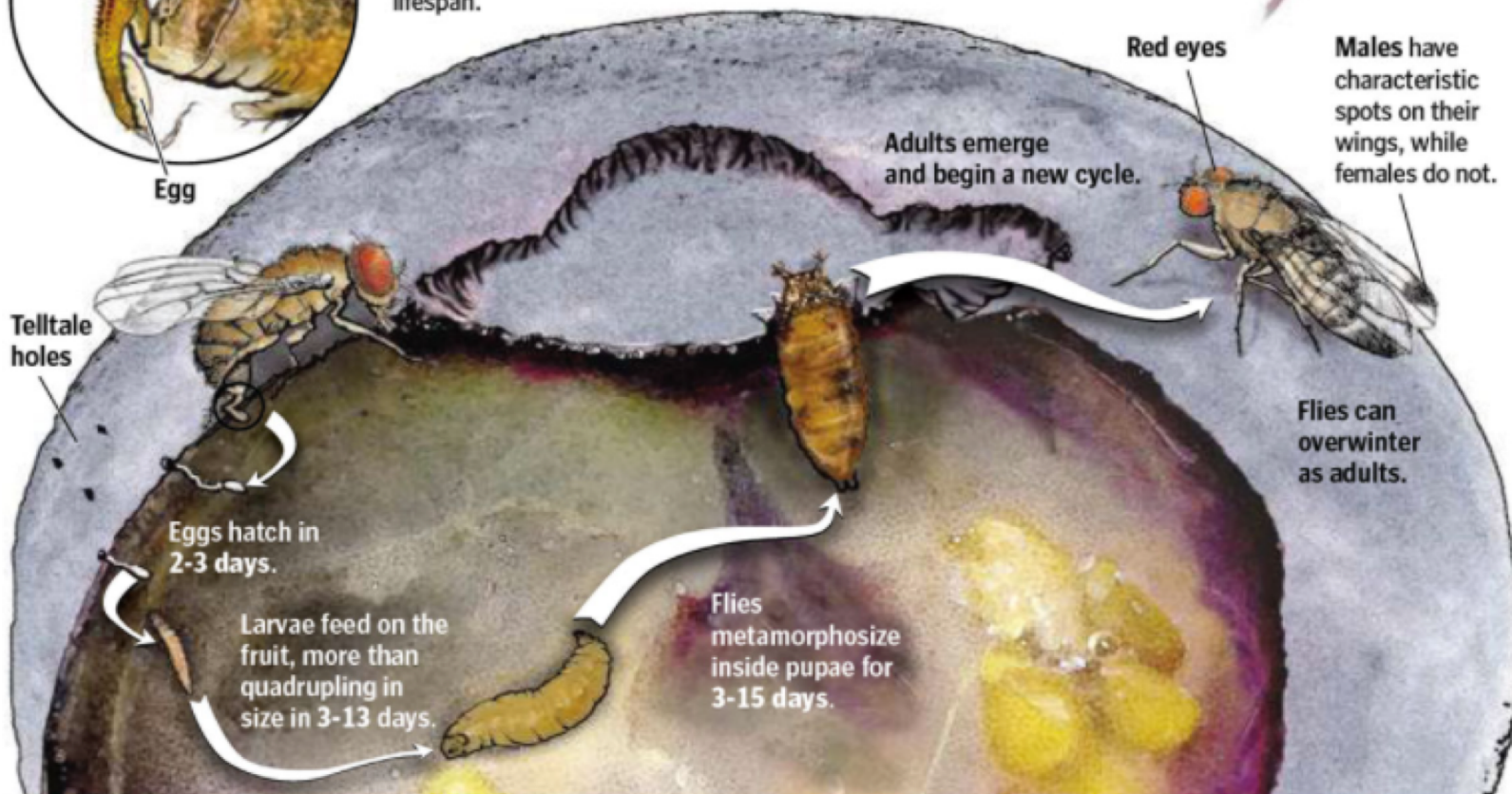


**Red eyes**

**Males have characteristic spots on their wings, while females do not.**

**Adults emerge and begin a new cycle.**

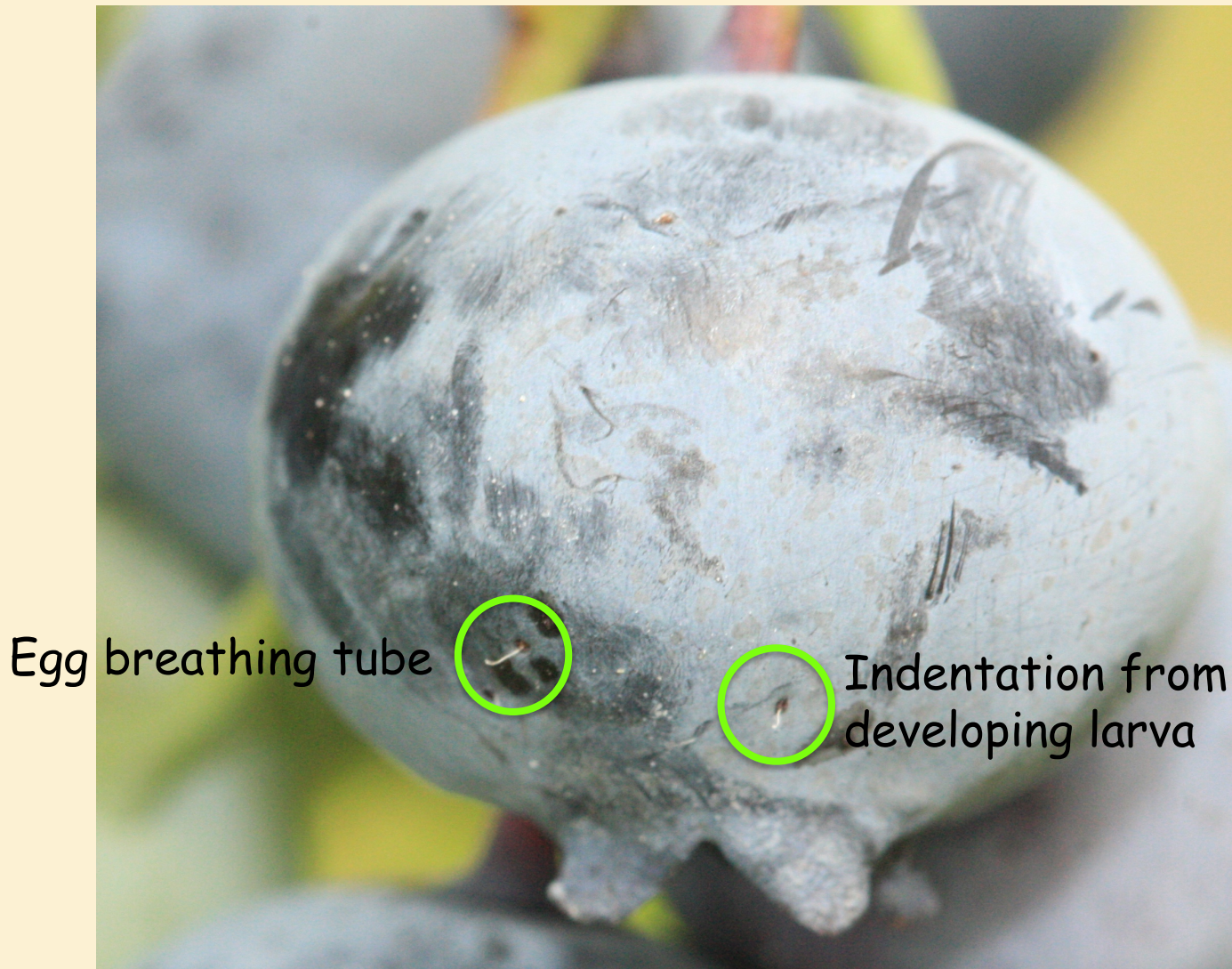
**Flies can overwinter as adults.**

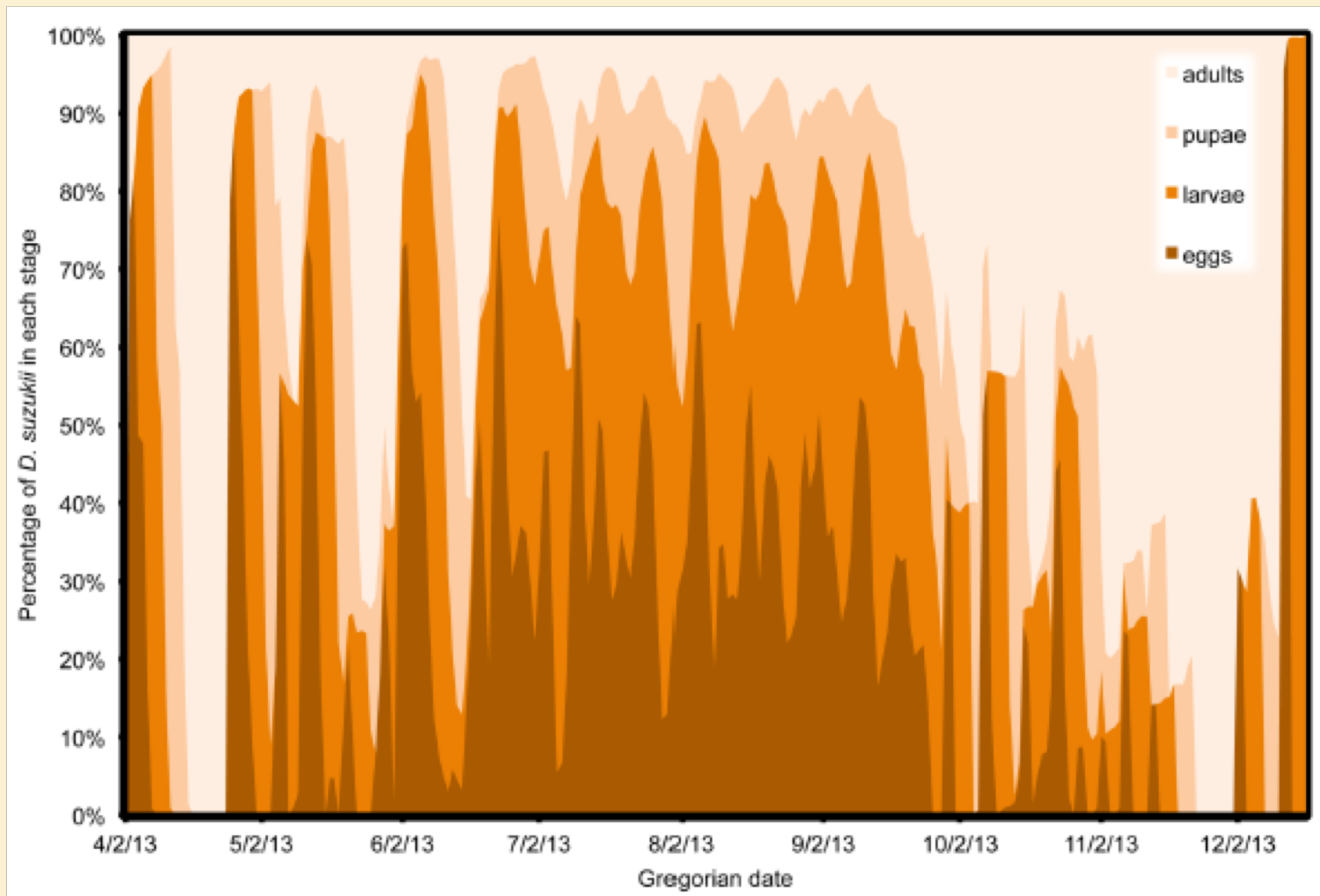




# Where are the maggots? They're in there!

But you can't see them and you can't contact them.





Est. of *Drosophila suzukii* population structure in Salem, OR during 2013.

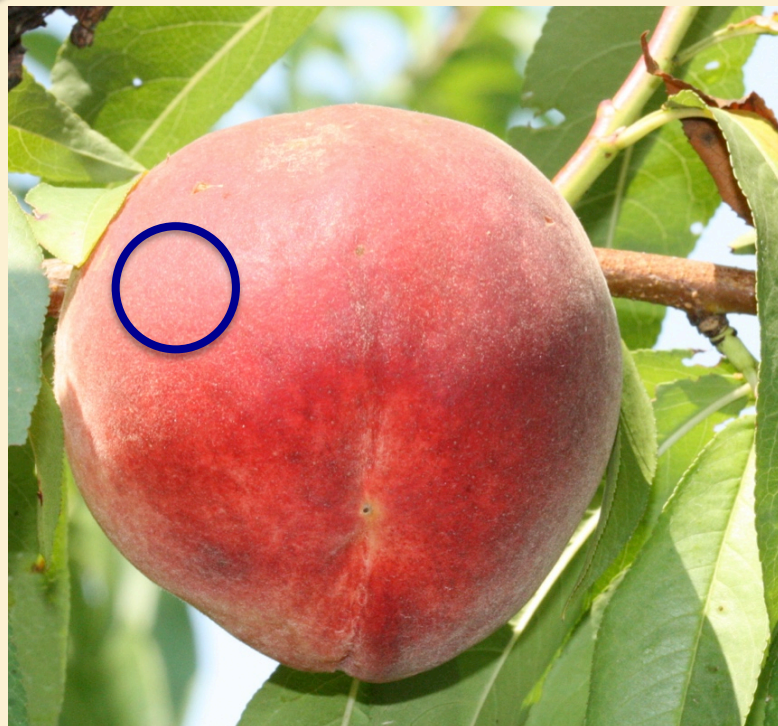
## SWD "Factoids"

- SWD has many wild hosts, and may overwinter near them, so can be found near those hosts early in the season.
- Adults spend very little time on green fruit and aerial plant parts.
- Adult females prefer to lay eggs on ripening fruit.
- Females can lay eggs on dropped fruit.
- SWD pupates on the ground.
- SWD likes the shade, which is augmented by weeds.
- They are most active just after sunrise and again at dusk.
- As the population builds during mid summer, mid season and late fruit is more likely to get infested.

- In Mid August 2017, 1 commercial farm reported SWD larvae in donut peaches, picked tree ripe for green markets in NY.
- Peach blocks were under MD, and had not been treated with insecticide for 6 weeks.
- Diverse fruit crops, many hosts on the farm and off the farm.
- Fruit was sampled from farm, but SWD not recovered.



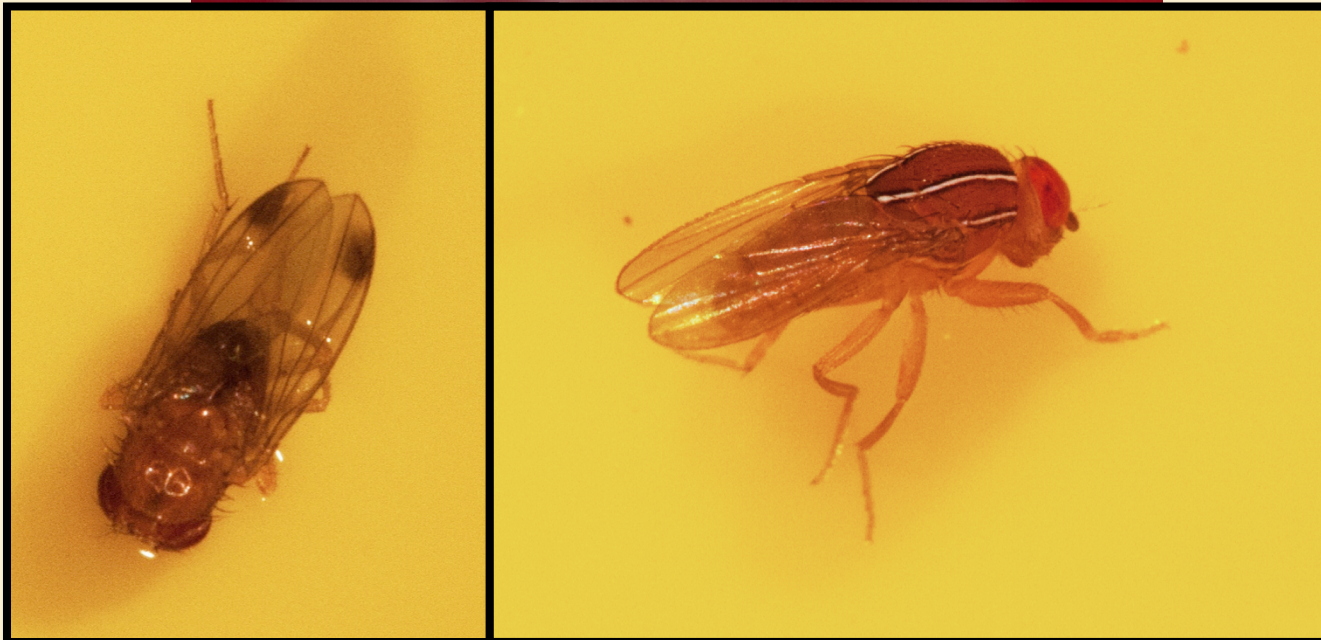
Donut peaches often prematurely soften at calyx end, encouraging rot and insect infestation, Other peaches can start to soften when permitted to get 'table ripe', or produce skin splits or small holes.





- 10 days later intact 'Encore' were sampled from a research block at RAREC - No insecticides for at least 6 weeks.
- Solid ripe, but softening fruit was picked at the end of August.
- Fruit was placed in 1 gal emergence jars with yellow cards, for 2 weeks.





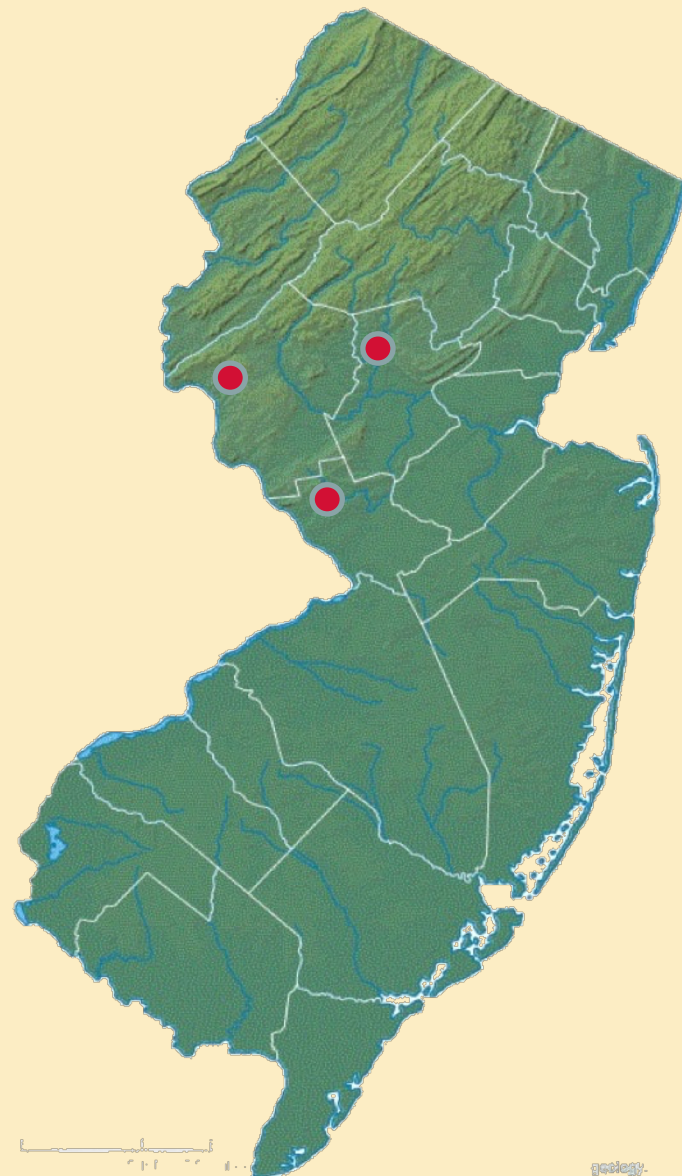


## 2018

- Are there SWD in Commercial Peaches?
- Late in the season?
- Where insecticide use is low?

## 2018 Methods

- 3 farms chosen in northern NJ counties, each with diverse small fruit crops and tree fruit, including multiple peach varieties.
- SWD cup traps placed during the 1<sup>st</sup> week of July.
- Counts in the field by straining adults & counting males.
- Sampled late variety fruit starting in mid-August, incubated for possible adult emergence.

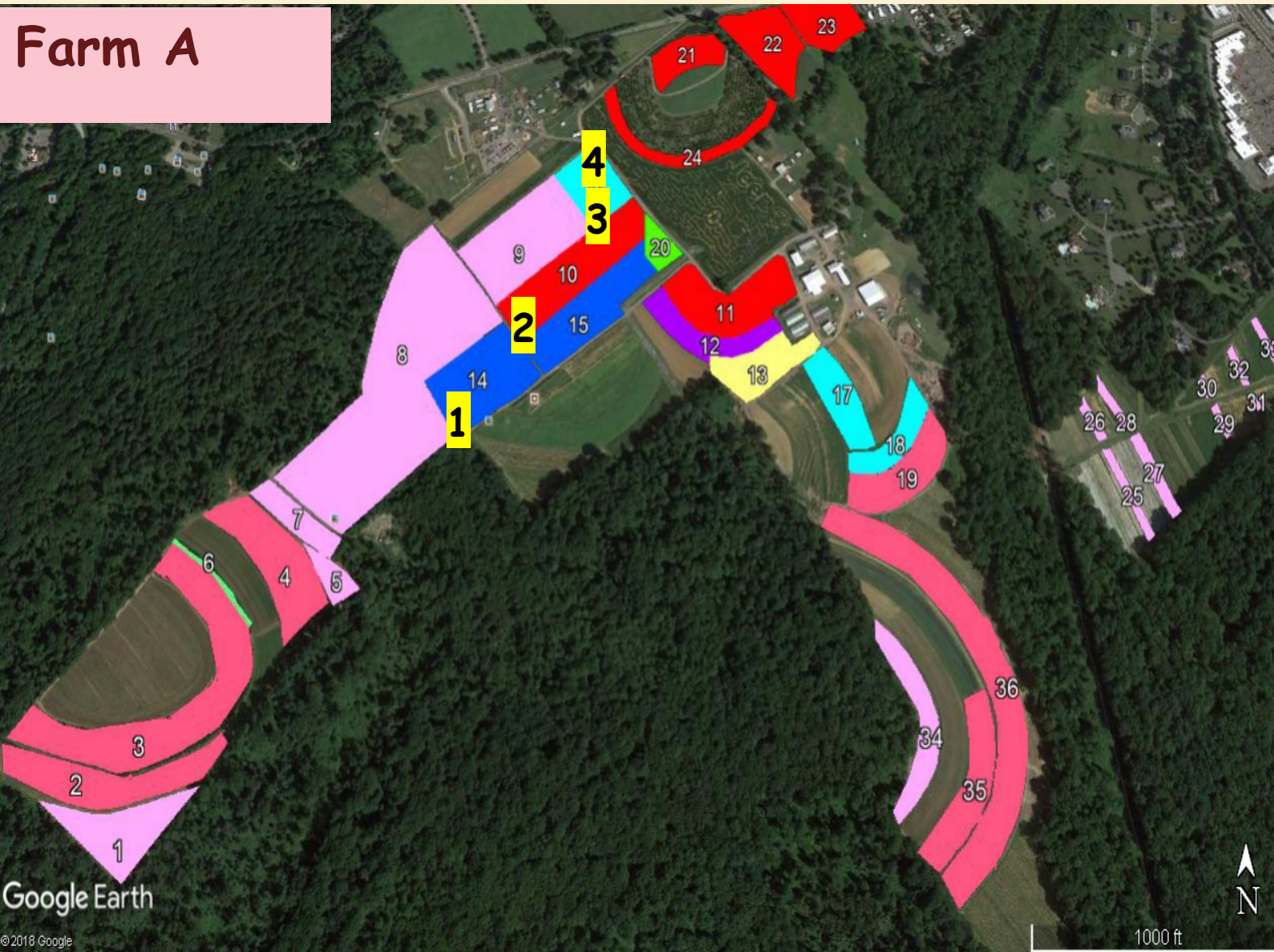


SWD traps placed on the edges of peach and small fruit plantings. Using Scentry SWD lure above ACV. placed 30" above ground. Monitored 1/wk, sieved and read for adult males.





# Farm A and SWD Trap Locations: 1=BB, 2=P, 3=RB, 4=BlkB



## Legend

- 1,5,7,8,9,25-34 Apples
- 2,3,4,19,35,36
- Strawberries
- 6 Nectarines
- 10,11,21-24 Peaches
- 12 Pears
- 13 Tart Cherries
- 14,15 Blueberries
- 16,17,18 Raspberries & Blackberries
- 20 Plums



# Farm B and SWD Trap Locations: 1=BB, 2=BlkB/RB, 3=P border

## Farm B

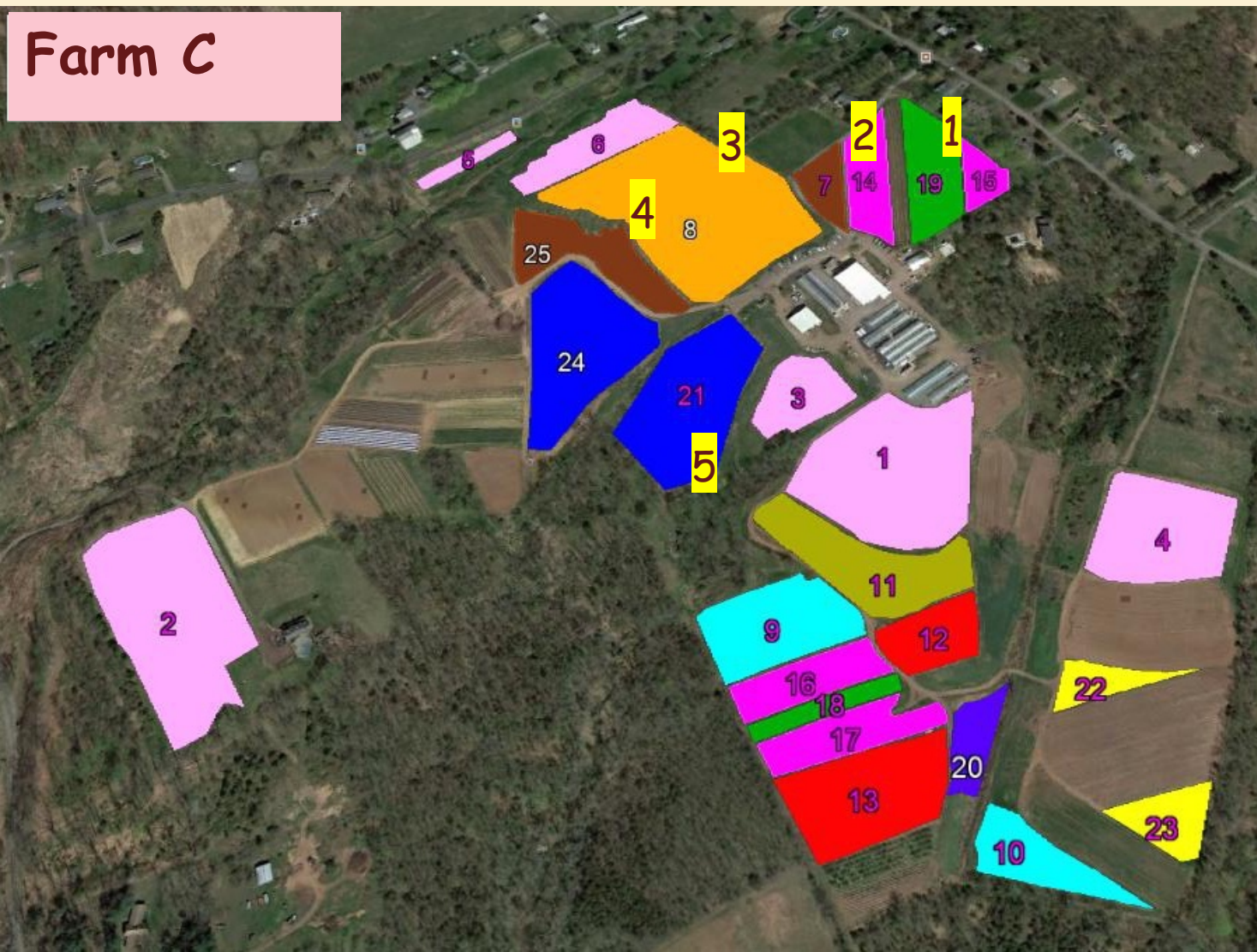


## Legend

- 1, 2 Peaches
- 3, 4 Apples
- 9 Blueberries
- 10 Blackberries
- 11, 12, 13  
Strawberries

## Farm C and SWD Trap Locations: 1=BlkB, 2=RB, 3=P, 4=P, 5=BB

### Farm C



- 1 Apples by greenhouse
- 2 Apples by house
- 3 Apples by barn
- 4 Gate 4 Apples
- 5 Young apples
- 6 Apples with tall Fuji
- 7 Nectarines
- 8 Peaches main block
- 9 As & Eur pears
- 10 European pears
- 11 Plums
- 12 Sweet & tart cherry
- 13 Sweet cherries
- 14 Raspberries
- 15 Raspberries
- 16 Raspberries
- 17 Raspberries
- 18 Blackberries
- 19 Blackberries
- 20 Black currants
- 21 Blueberries
- 22 Gooseberries & curr.
- 23 Gooseberries & curr.
- 24 Blueberries
- 25 Nectarines



## Peach Insecticide Use in MD Blocks - 2018

Farm	Date	Insecticide	Rate/A	# SWD Materials > Mid June
A	5/14	Leverage	2.8 oz	
	5/21	Avaunt	6 oz	
	6/6	Avaunt	6 oz	
	6/16	Delegate	6 oz	1
B	4/13	Esteem	3 oz	
	5/8	Assail	7 oz	
	5/20	Assail	7 oz	
	6/7	Delegate	7 oz	
	6/14	Altacor	4 oz	0
C	5/10	Assail	4 oz	
	5/15	Imidan	3 lbs	
	5/21	Avaunt	5 oz	
	6/2	Imidan	2.5 lbs	
	6/11	Delegate	6 oz	
	6/21	Leverage	2.7 oz	
	7/2	Altacor	4 oz	
	7/16	Delegate	6 oz	2



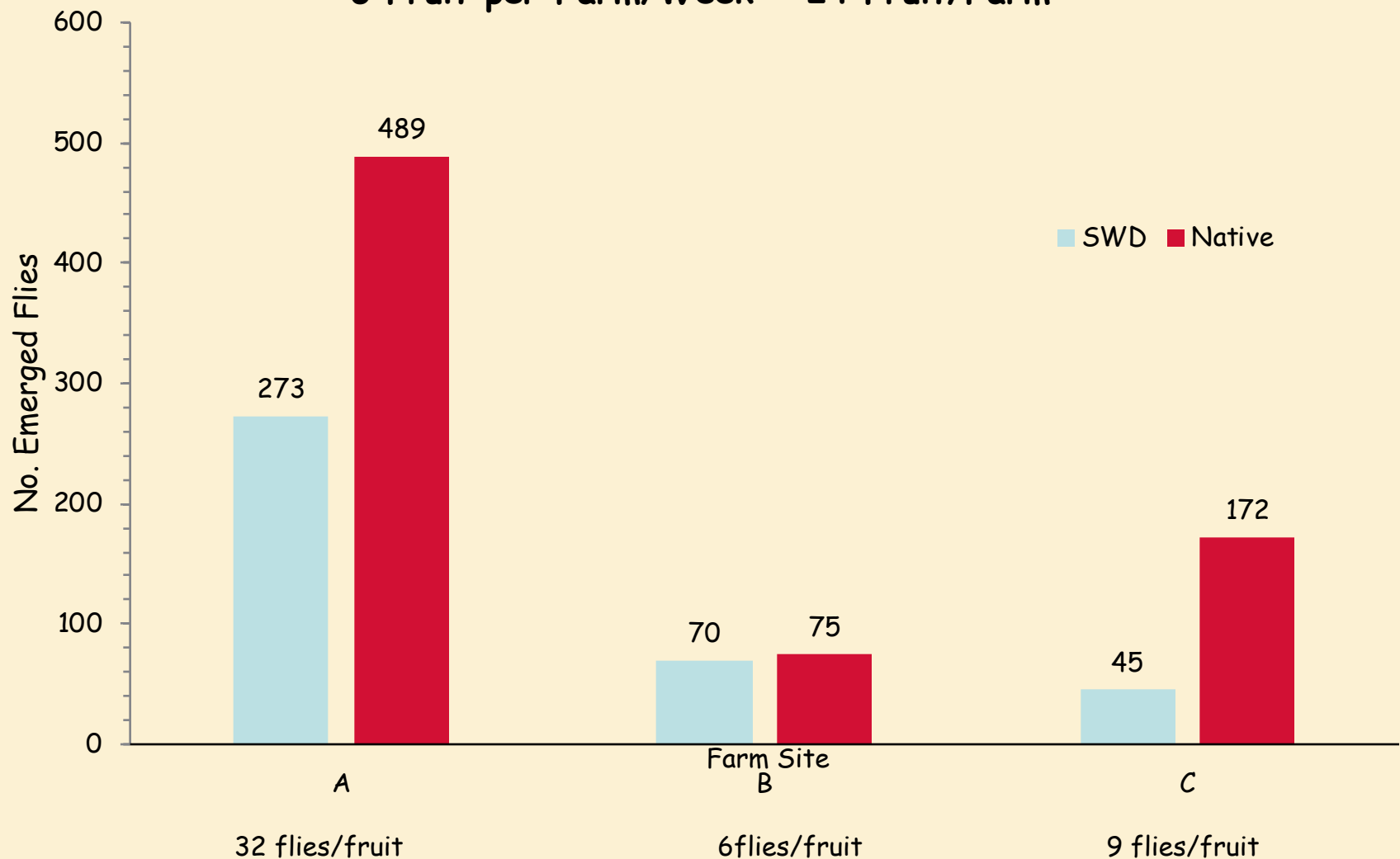
6 fruit/farm/last picking of late varieties starting 8/12 for 4 weeks. Incubated @ 72F° 21 days for P+F1 generations

- 2-3 peaches placed in incubation jars & sealed.
- All flies aspirated out, counted and ID'd at end of period.



# Total Internal Drosophila 8/12-9/8/18

6 Fruit per Farm/Week - 24 Fruit/Farm



# Insecticides for SWD, Peach - 5/6 MOA's +(Org and Assail)

Product	Grp	AI	Rate	Season Max	Max Apps	Days btn Apps	PHI (d)	REI (h)	Resid (d)	Rating
Imidan Malathion 8F <sup>1</sup>	1B	phosmet malathion	2.13-4.25 lb 1.25 pt, 3 Nec	17 lb 5 pt	8 3	- 11/7N	14 7	96 24	7-10 5	**** ***
Asana	3A	esfenvalerate	4.8-14.5 oz	75 oz	8	--	14	12	5-7	***
Mustang Maxx		z-cypermethrin	4 oz	24 oz	6	7	14	12	5-7	****
Danitol		Fenpropathrin	10.6-21.3 oz	42.6 oz	2	10	3	24	5-7	****
Baythroid		β-cyfluthrin	2.4-2.8 oz	5.6 oz	2	14	7	12	5-7	***
Warrior		λ-cyhalothrin	1.28-2.56 oz	10.24 oz	8	5	14	24	5-7	***
Lannate SP	1A	methomyl	1 lb	6 lb	6	5-7	4/3N	96	5-7	****
Exirel	28	cyazypyr	13.5-20.5 oz	61 oz	--	7	3	12	7	****
Delegate WG	5	spinetoram	4.5-7 oz	28 oz	<u>4.8@5</u>	6	1	4	7	***
Entrust SC		spinosad	4-6 oz	29 oz	<u>5.8@5</u>	6	1	4	3-5	**
Assail 30SG	4A	acetamiprid	5.3-8 oz	32 oz	4	10	7	12	5-7	*
Pyganic EC5	3A	pyrethrum	17 oz	--	10	3	0	12	2-3	*
Grandevo WDG	UN Bio	chromobacterium	2-3 lb	--	--	3-4	0	4	3-4	*



## Provisional Recommendations - If you have diverse hosts

- Include insecticides starting 2-3 weeks prior to 1<sup>st</sup> picking, or when pre-harvest brown rot fungicides are started.
- Use full cover (ER) sprays.
- Repeat every 7 days.

## The Next Steps

- Evaluate fruit earlier in the season after pit hardening.
- Compare infestation with insecticide programs.

# Thank You

