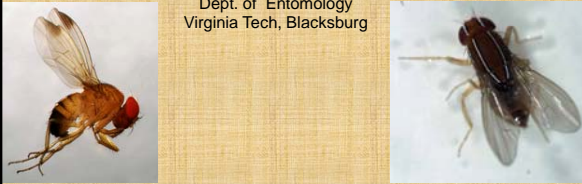
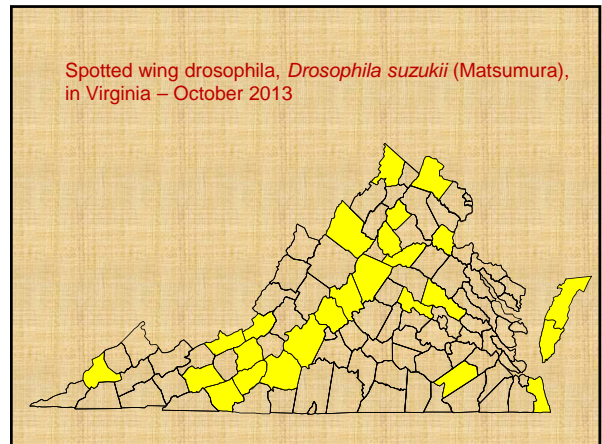


Spotted wing drosophila monitoring and management in caneberries and eastern vineyards

Douglas G. Pfeiffer
 Dept. of Entomology
 Virginia Tech, Blacksburg



NE SWD Working Group



SWD Host List – Risk?

- Raspberries, blackberries, strawberries blueberries
- Cherries, **grapes**
- Nectarines, peaches, plums
- Apple, pear
- Tomatoes?




Suitability of grape?

	Cherry	Grape
Emerge to Ovip. (days)	2.3	3.4
Body length, Female	2.5 mm	4.0 mm

Kanzawa 1939, in Walsh et al. 2011

In Japan, reported to be severe on grape

SWD Host List – Grape?

- Initial impressions in western states that grape not highly vulnerable
- Mainly seen where grapes are already split
- Impact on research in the east?
- What is the situation in eastern wine grape regions?



SWD Infestation – Amherst VA - 2012

Cultivar	Larvae / Berry
Pinot	0.03a
Chardonnay	0.00b

Means followed by the same letter are not significantly different (Tukey's HSD, P=0.018)

SWD Infestation – Crozet VA 2012

Cultivar	Larvae / Berry
Petit Verdot 1	0.24a
Petit Verdot 2	0.05b
Merlot	0.02b
Chardonnay	0.01b
Cabernet Franc	0.00b

Means followed by the same letter are not significantly different (Tukey's HSD, P=0.001)

Potential Reasons for Regional Differences in Use of Grape?

- Higher temperatures in some regions
- Higher rainfall/humidity in east affecting SWD
- Higher rainfall/humidity in east affecting insecticide residues
- Differences in fruit skin/firmness
- Abundance of wild hosts

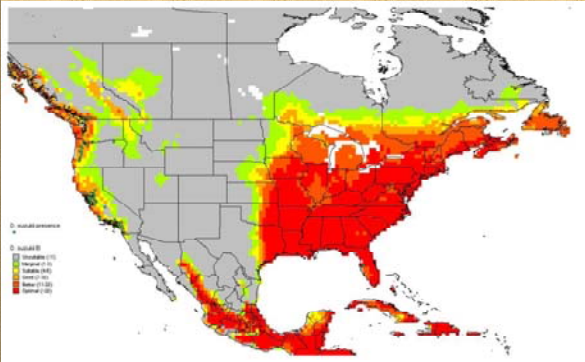


SWD preferred temperature range

- Preferred temperature of SWD 20-25° C
- Decrease of activity, oviposition, longevity above 30° C (average lethal limit, LT50)
- Average summer temps:

■ Napa	30.3
■ Virginia	22.9
■ Pennsylvania	22.8
■ New York	19.2
■ Willamette Valley	18.2 (RH?)

Potential range of SWD, based on temperature thresholds



Martin Damus, Canadian Food Inspection Agency

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SWD Host List – Non-crop hosts

- Wild blackberries
- Pokeweed
- Mock strawberry
- Asian honeysuckle
- Dogwood
- Persimmon
- Rose hips
- Porcelain berry

Trapping for SWD

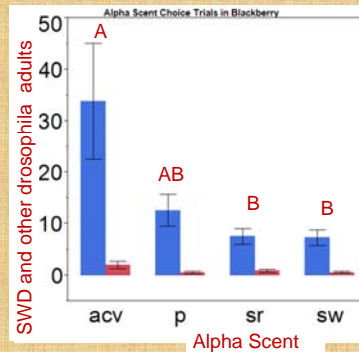


Apple cider vinegar



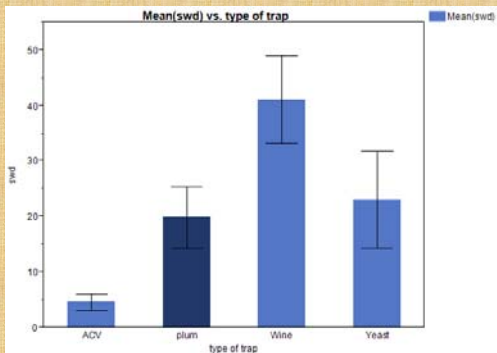
Burrack: SWD monitoring network

Preliminary Results - 2012



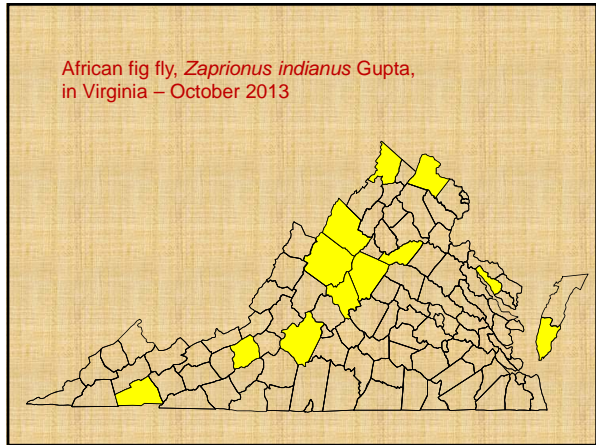
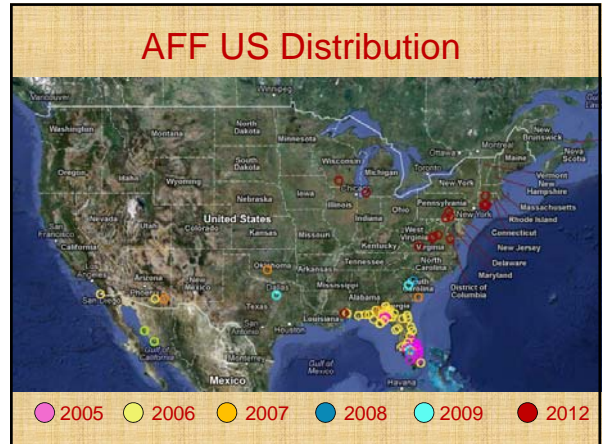
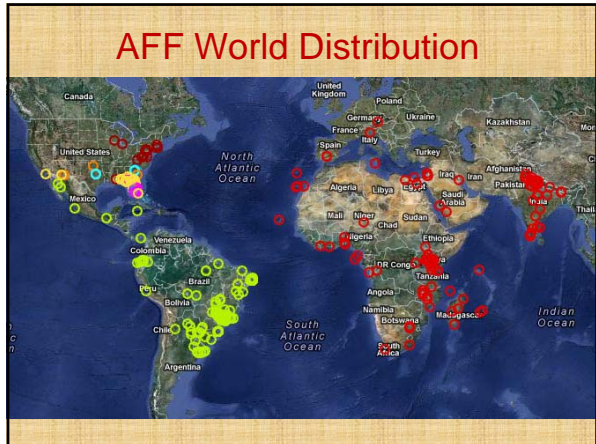
*SWD adults in blue
*Other drosophila adults in red

Preliminary Results - 2013



Zaprionus indianus Gupta, African fig fly





Incidence in wine grapes

- Weak ovipositor
- Sometimes high incidence in grape berries
 - In some Virginia clusters, 90% of emerging drosophilids were AFF
 - Sweep net samples in Pennsylvania vineyards
- How do they get into grapes?



Competition stuey of Gilpin et al. (1986)

- Paired rearing comparisons of 28 drosophilid species, at two temps, two media
- 1 *Zaprionus*, 27 *Drosophila* spp.



Gilpin et al. (1986)

- In thick food, carried out at 19° C, it was ranked 12 out of 28 in competitiveness
- In thick medium at 25° C, it was ranked 8
- But in thin food, it was ranked 5 at 25° C, and ranked 3 at 19° C.



Gilpin et al. (1986)

- Crowd out other larvae
- Liquify substrate, drowning other larvae



Geographical differences in range limits?

Summer heat limiting SWD?
Winter cold limiting AFF?

Will AFF have to reinvade each year?
Will it be a late season pest annually?



SWD Management Cultural Control

- Harvest fruit promptly to eliminate breeding sites
- Destroy nearby overripe or rotten fruit
- Proper management of pomace

SWD Management Chemical Control

- Need materials with short PHI
- Need materials of various MOA
- Need to rotate in a spray program!

- In high risk crops, need to spray weekly or more often

- Need local research on efficacy

SWD Management Chemical Control

Organophosphates:
Malathion effective in West; regional differences?
Imidan effective but long REI (14 d) in grape (watch for developments here with new formulation)

SWD Management Chemical Control

Spinosyns:
Entrust (spinosad) effective but relatively short lived

Delegate (spinetoram) very effective

SWD Management Chemical Control

Pyrethroids among most effective materials
Bifenthrin (Brigade, Bifenture) effective
Danitol performs well

Bifenthrin - PHI 30 days
Danitol - PHI 21 days

Mustang Max (zeta cypermethrin - PHI 1 day
Baythroid (beta cyfluthrin) - PHI 3 days

SWD Management Chemical Control

Pyrethroids
Problems associated with use

Most uses removed from PMG in recent years

Time to reconsider?

SWD Management Chemical Control

Kaolin (Surround)
Problems associated with use - residues

Use rates

Harvest parameters?

SWD Management Chemical Control

Effective, less-disruptive chemistry under investigation

Cyantraniliprole, related to chlorantraniliprole (Altacor), recommended for grape berry moth

SWD Management Chemical Control – Commercial Vineyards

Critical to use insecticides that have short PHI
PHI's of 0-3 days are generally acceptable

From 2014 Pest Management Guide to
Horticultural and Forest Crops:

<http://pubs.ext.vt.edu/456/456-017/456-017.html>

After veraison:

Entrust	spinosad	1.25-2.5 oz	7 d PHI
Delegate	spinetoram	3-5 oz	7 d PHI
Malathion	malathion	1.88 t	3 d PHI
Mustang Max	zeta-cypermethrin	2-4 fl oz	1 d PHI
Pyganic	pyrethrins	64 fl oz	0 d PHI
Surround	kaolin	25-50 lb	0 d PHI
Grandevo	<i>Chromobacterium</i>	3 lb	0 d PHI
Azera	pyrethrins/azadirachtin	1-2 pt	0 d PHI

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SWD Management Chemical Control – Commercial Caneberry

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Preharvest sprays

Entrust 80WP	spinosad	1.25-2.0 oz	1 d PHI
Delegate 25WDG	spinetoram	3.0-6.0 fl oz	1 d PHI
Malathion 8F	malathion	2.0 pt	1 d PHI
Mustang Max	zeta cypermethrin	4.0 oz	1 d PHI
Brigade 10WSB	bifenthrin	16.0 oz	3 d PHI
Asana	esfenvalerate	4.8-9.6 fl oz	7 d PHI
Grandevo 30	<i>Chromobacterium</i>	2 lb	0 d PHI
PyGanic 1.4EC	pyrethrins	64 fl oz	0 d PHI
Azera	pyrethrins/azadirachtin	1-2 pt	0 d PHI

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**SWD Management
Chemical Control – Commercial Caneberry**

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Questions?

<http://www.virginiafruit.ento.vt.edu/SWD.html>