Protected Culture: Low Tunnels, High Tunnels, Exclusion Netting and how to control SWD in these situations

Lake Ontario Fruit Meetings

February 5 and 6, 2018

Laura McDermott – ENYCHP Small Fruit Specialist

Many Thanks

- Funders:
  - USDA National Institute of Food and Agriculture, Specialty Crops Research Initiative
  - NY Farm Viability Institute
  - NE IPM
  - NYS Berry Growers Assoc.
  - NYS Legislature
- Individuals
  - Dale Ila Riggs, The Berry Patch, Stephentown, NY
  - Tim Stanton, Feura Farm, Feura Bush, NY
  - Dr. Marvin Pritts, Cornell
  - Kathy Demchak, Penn State Univ.
  - Dr. Andrew Landers, Cornell
  - Dr. Erik Hanson, Michigan State Univ.

- What is Protected Culture?
- How does it work?
- How can it benefit farmers in Western NY?
- Will it help control SWD – among other pests?
- Can I stop spraying?

Protected Culture

Protected Culture

- Another tool
- Doesn’t guarantee that you won’t have to spray
- Can offer protection against more than just SWD
- Has it’s own ‘down sides’

Dramatic impact on disease under tunnels

- Less gray mold
- Less powdery mildew

Some impact on insect pests

- Traditional field pests seem reduced
- Problem with pollination?

HOW?

- Reduces humidity
- Decreases the amount of moisture on the berries
- Improves vigor

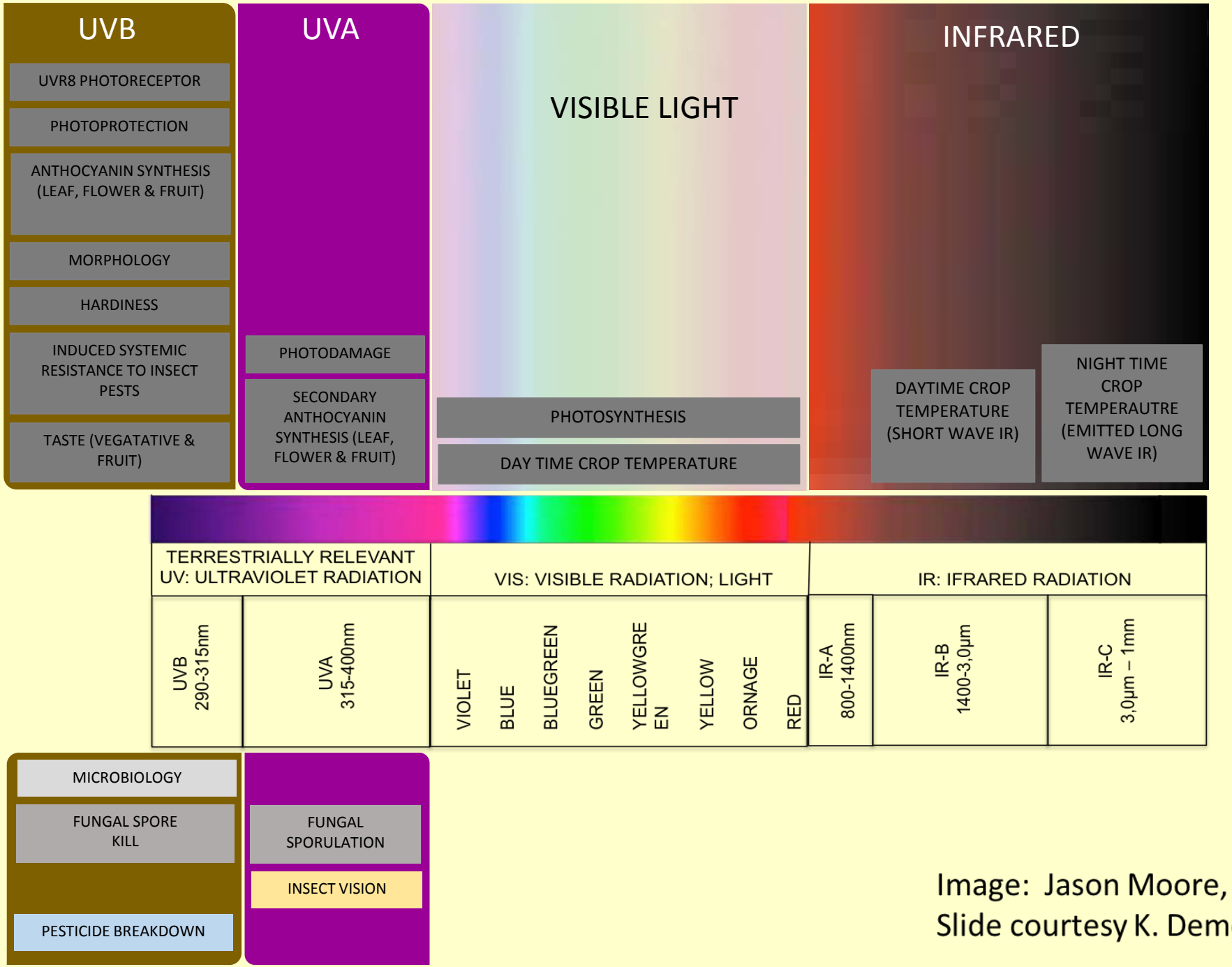
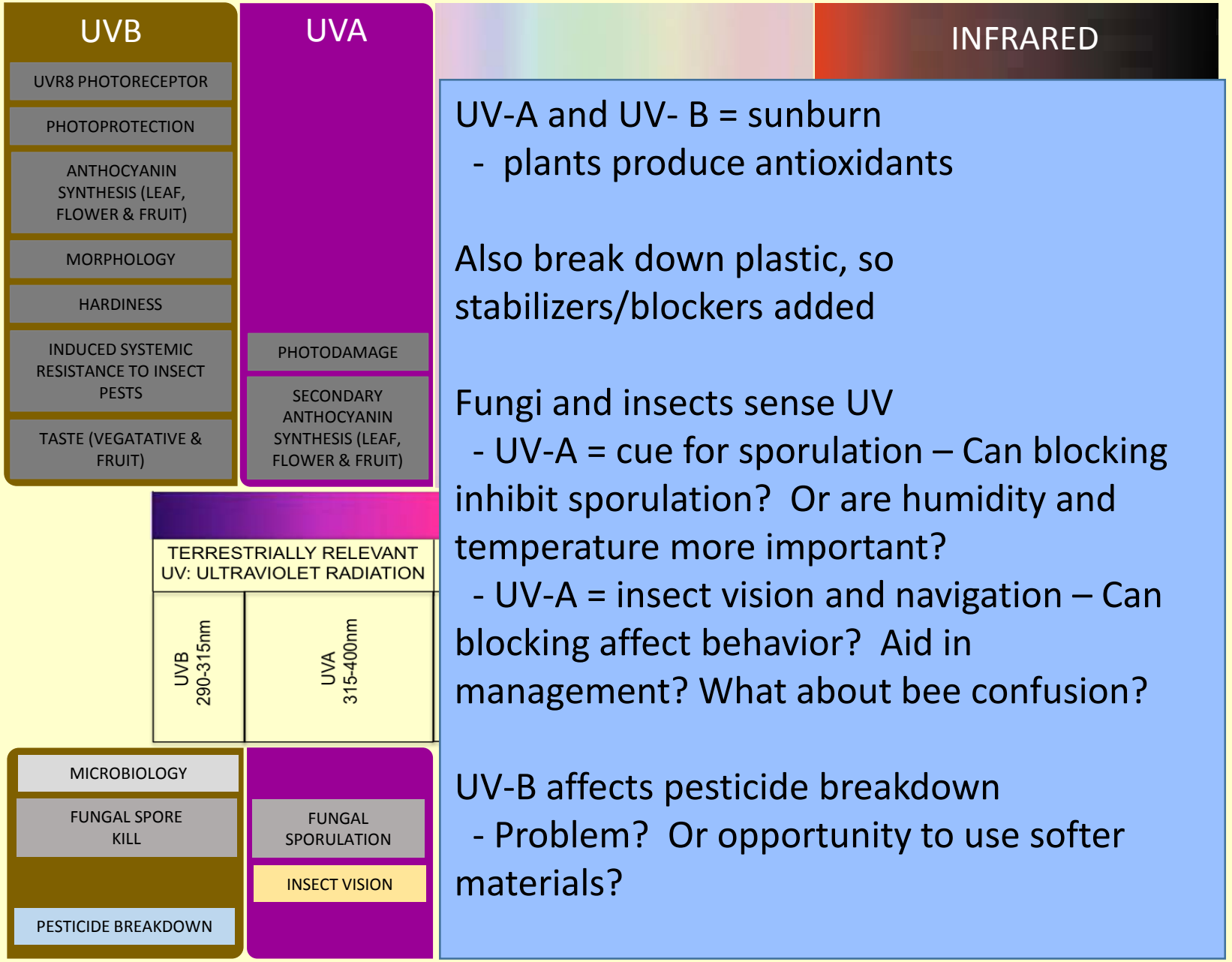


Image: Jason Moore, Arid AgriTec
Slide courtesy K. Demchak, Penn State Univ.



UV-A and UV- B = sunburn
- plants produce antioxidants

Also break down plastic, so stabilizers/blockers added

Fungi and insects sense UV
- UV-A = cue for sporulation – Can blocking inhibit sporulation? Or are humidity and temperature more important?
- UV-A = insect vision and navigation – Can blocking affect behavior? Aid in management? What about bee confusion?

UV-B affects pesticide breakdown
- Problem? Or opportunity to use softer materials?

Image: Jason Moore, Arid AgriTec
Slide courtesy K. Demchak, Penn State Univ.

Visible light – what we see and what plants use for photosynthesis

Best wavelengths for photosynthesis are in ranges we see as blue and red

Some plastics diffuse light more than others – so light is more evenly spread throughout tunnel and plant canopy

Lower leaves on tall plants receive light rather than being shaded.

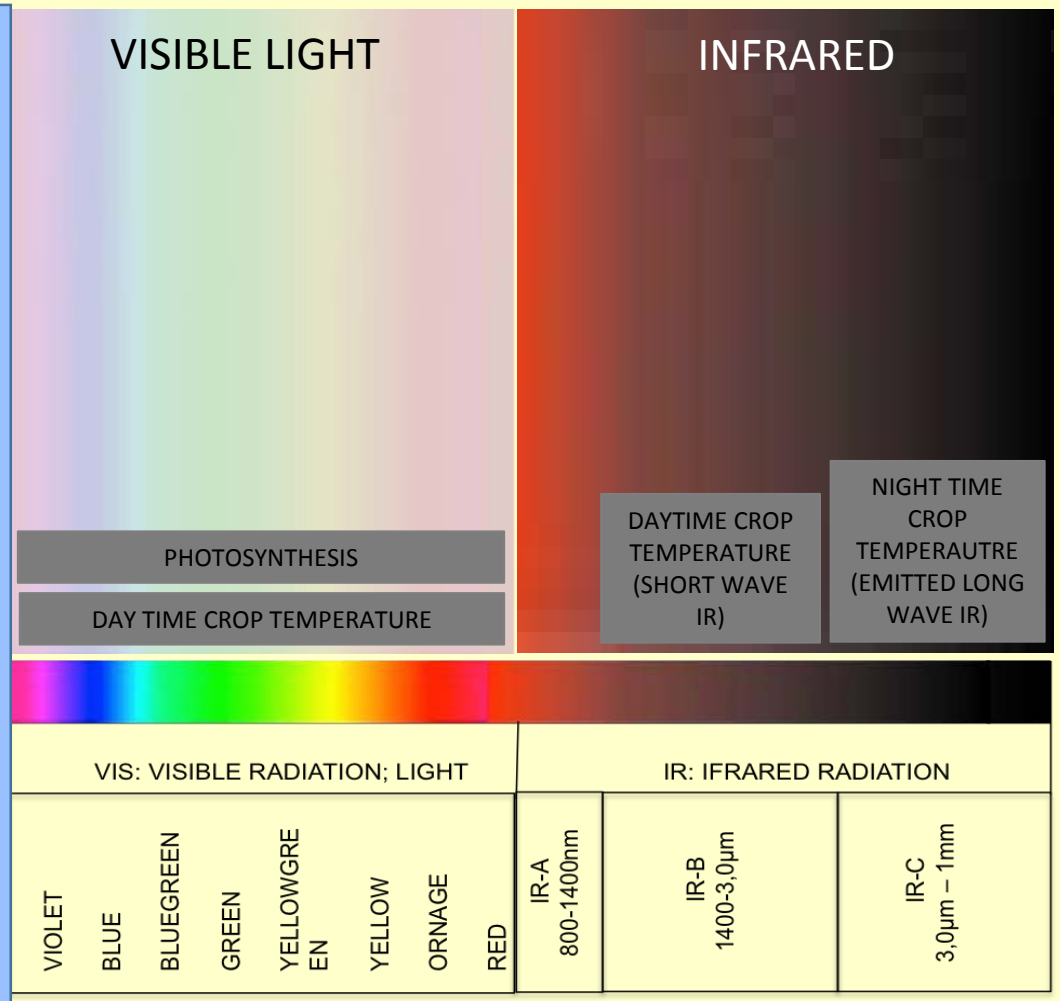


Image: Jason Moore, Arid AgriTec
Slide courtesy K. Demchak, Penn State Univ.

Most films transmit 85 to 95% - but what goes in, doesn’t necessarily emerge at the same wavelength

Infra-red = heat

Longer wavelengths of visible light and short-wave IR heat up tunnel during day, and are stored as heat

Emitted back towards plastic as long-wave IR at night

“IR” plastics contain additive to block IR. May be inside layer if two layers of covers are applied

Plastics that block short-wave IR - intent is to to reduce heat build-up during day (will market as reducing temps)
- Likely to also contain additive to diffuse light

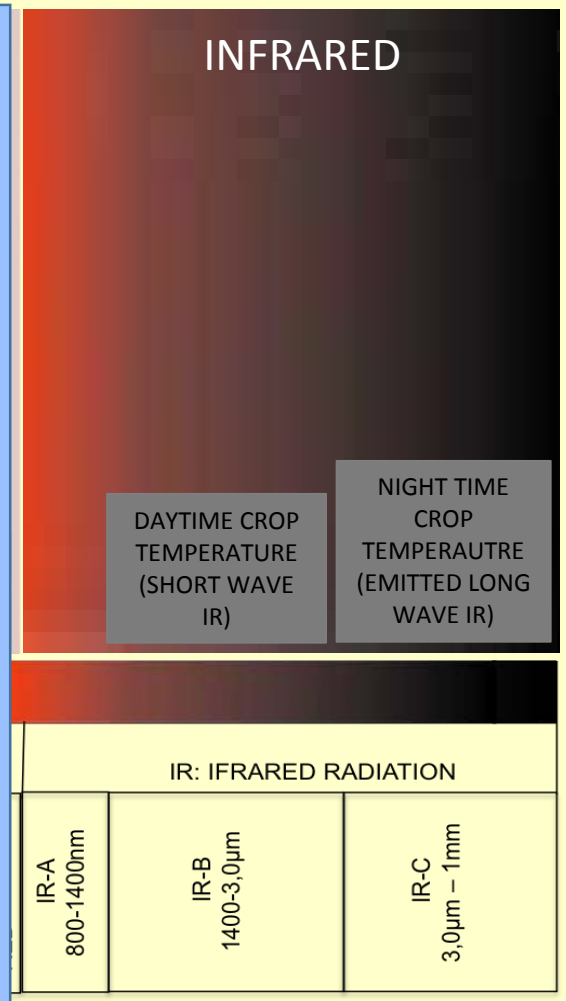


Image: Jason Moore, Arid AgriTec
Slide courtesy K. Demchak, Penn State Univ.

Low Tunnels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High Tunnels

Diseases virtually absent in tunnels

Raspberry leaf spot

Anthracnose

Spur blight

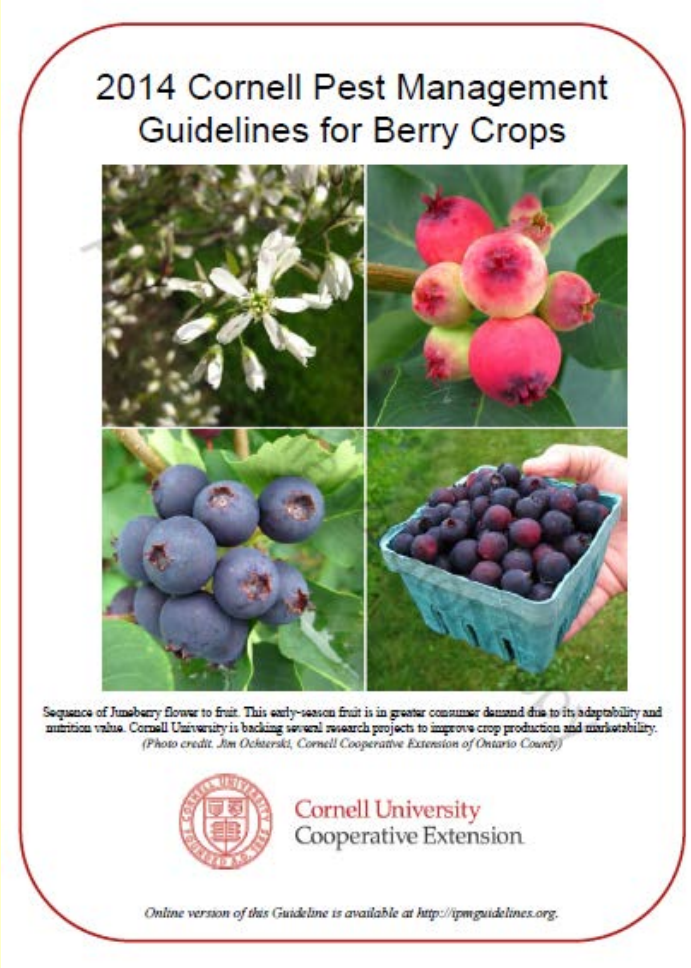
Source: Annemiek Schilder

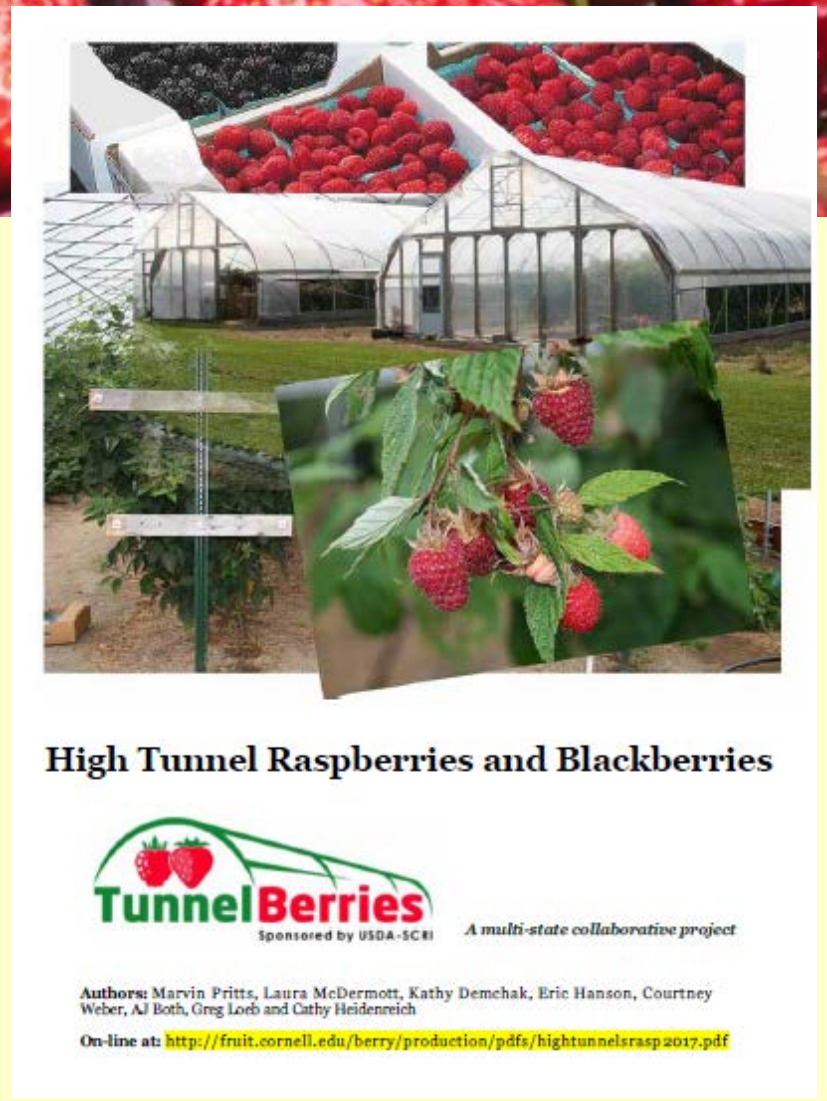
Management of diseases in tunnels

- Use resistant varieties where available
- Remove wild brambles near tunnels
- Use disease-free planting material
- Adjust row and plant spacing to reduce humidity
- Open up vents, increase airflow
- Avoid over-irrigation to avoid root rots
- Prune out diseased canes, remove plant debris
- Fungicide sprays as needed
- Frequent harvesting and rapid cooling

Source: Annemiek Schilder

Resources


2014 Cornell Pest Management Guidelines for Berry Crops
Sequence of Juneberry flower to fruit. This early-season fruit is in greater consumer demand due to its adaptability and nutrition value. Cornell University is backing several research projects to improve crop production and marketability.
(Photo credit: Jim Ochterski, Cornell Cooperative Extension of Ontario County)
Cornell University
Cooperative Extension
Online version of this Guideline is available at http://ipmguidelines.org.


High Tunnel Raspberries and Blackberries
TunnelBerries
Sponsored by USDA-SCRI
A multi-state collaborative project
Authors: Marvin Pritts, Laura McDermott, Kathy Demchak, Eric Hanson, Courtney Weber, AJ Both, Greg Loeb and Cathy Heidenreich
On-line at: http://fruit.cornell.edu/berry/production/pdfs/hightunnelsrasp2017.pdf

Exclusion Netting

Netting Infestation Summary

2014 – 0.67% infestation over 10 week harvest season

2015 – 0.37% infestation over 6 week harvest season

2016 – 0.00% infestation over 8 week harvest season

2017 - 1.20% infestation over 10 week harvest season*


SCENTRY
SWD TRAP

Netting Investment

For ½ acre blueberries (8 rows x 250 feet)

7 rolls of 13 foot wide 80 gram ExcludeNet netting

plus sewing charge $4230*

Life span 7-12 years or more

Yearly cost with life of 7 years = $604

Loss due to SWD in 2012 (40% loss) = $6200, a 40% loss in 2017 would have been over $15,000

Gives **5 way** protection – SWD, birds, hail, heavy rain, wind

**14.1 cents per square foot. Bird netting costs .06 to .28 cents per square foot.*

Understand the basics of spraying:

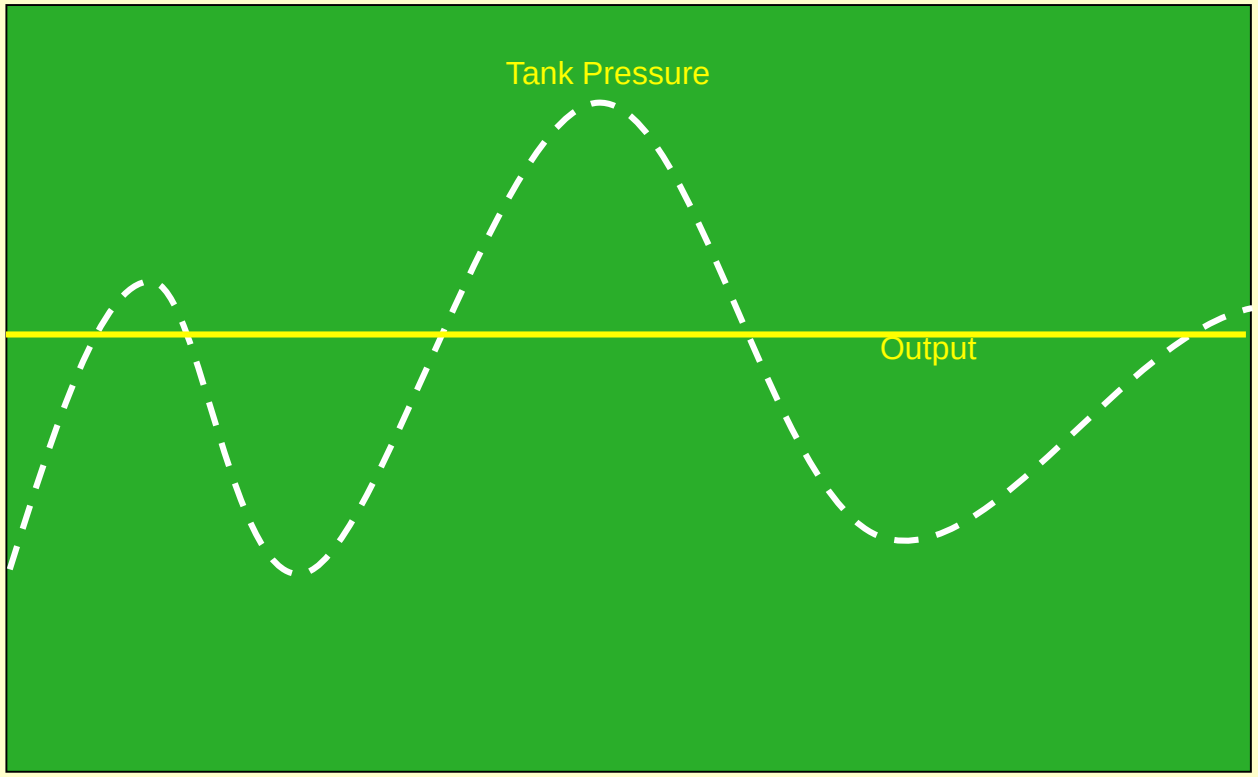
- Droplet size
- Droplet coverage on the target
- Penetration of droplets into the canopy

- Sprayer designs
- Horticultural concerns
- Rotate the appropriate sprays!

Penetration into the canopy

- Higher Pressure
  - Prone to drift
  - Need large amount of water
  - Larger hydraulic sprayers
  - Equipment long lasting
  - Up front cost is more
- Air assistance
  - Versatile
  - Less water volume
  - May not provide equal penetration and coverage

Sprayer output with CF regulator valve



Pressure at the nozzle and output remain constant while tank pressure changes

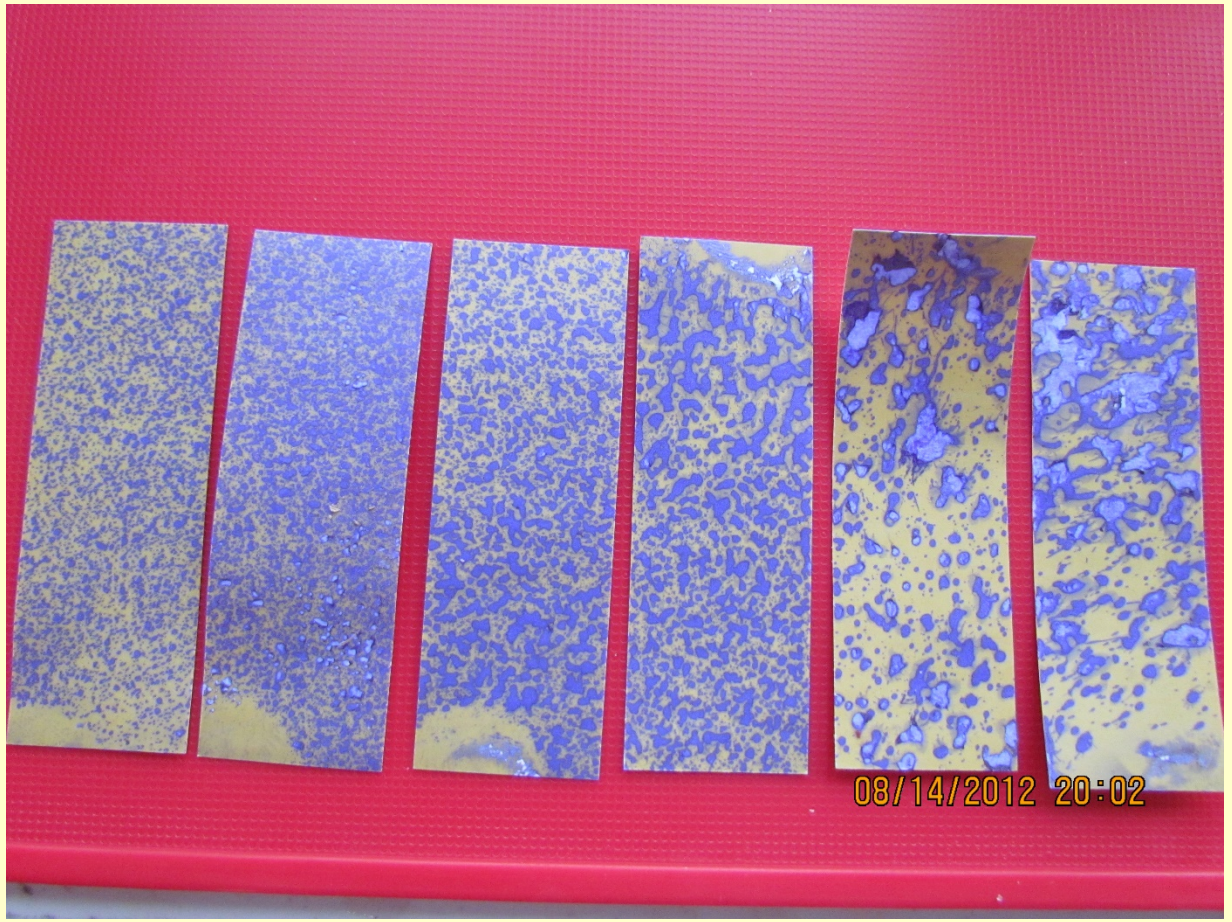
Droplet Coverage

- Use gloves to handle water sensitive cards

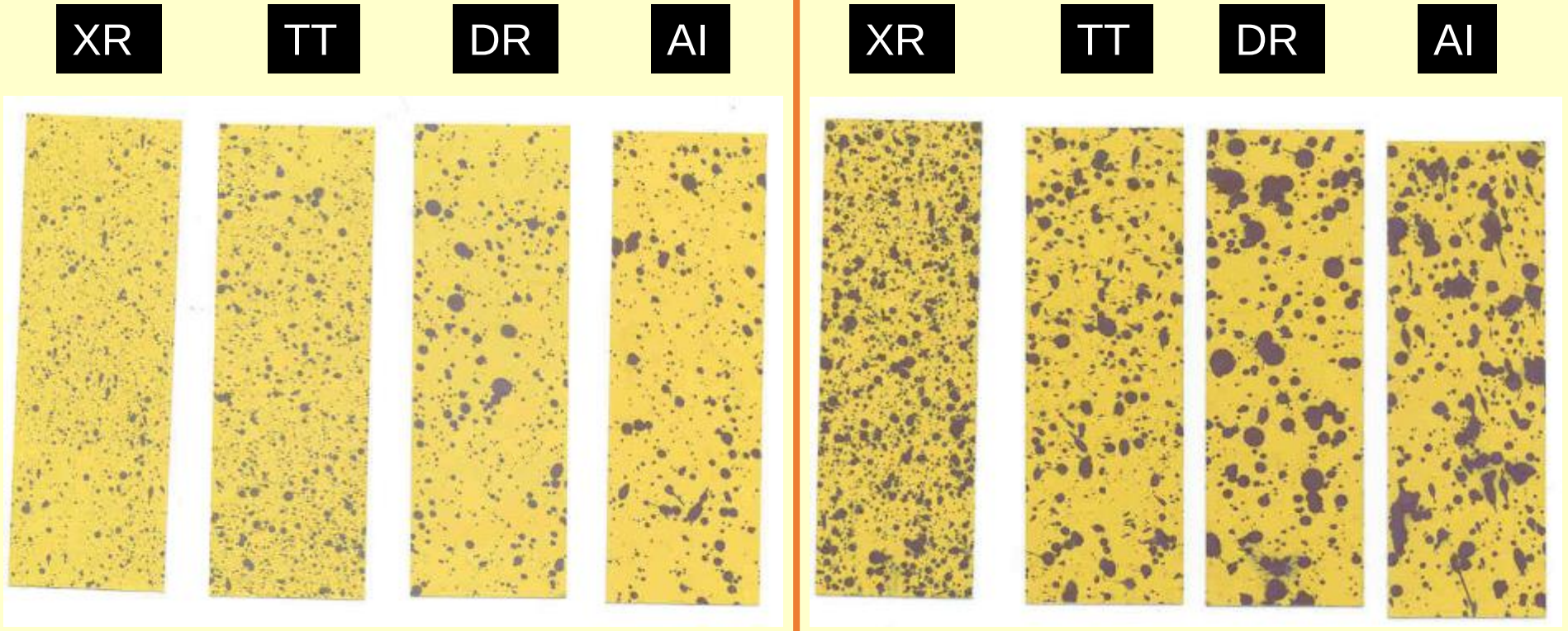
- Place cards throughout the canopy

- Look for coverage and penetration

Do your cards look like this?



Sample cards:



Different nozzles provide different coverage

June 2017 - Labeled Insecticides for Control of Spotted Wing Drosophila in New York Berry Crops – Quick Guide

Compiled by Greg Loeb, Laura McDermott, Peter Jentsch, Tess Grasswitz, & Juliet Carroll, Cornell University. Updated regularly.

STRAWBERRIES										
PRODUCT	AI[1]	IRAC group[2]	EPA#	RATE/A	REI[3]	DTH[4]	Max. Prod/A/yr (ai)	Total applic's	Spray Interval	Probable efficacy
^@Entrust Naturalyte (2ee)[a]	spinosad	5	62719-282	1.25-2 oz	4 hr	1 d	9 oz (0.45 lb)	5	> 5 d	Good to Excellent#
^@Entrust SC (2ee)[a]	spinosad	5	62719-621	4-6 fl oz	4 hr	1 d	29 fl oz (0.45 lb)	5	> 5 d	Good to Excellent#
@Radiant (2ee)	spinetoram	5	62719-545	6-10 fl oz	4 hr	1 d	39 fl oz (0.305 lb)	5	> 3 d	Excellent#
*Brigade WSB (2ee)	bifenthrin	3A	279-3108	8-16 oz	12 hr	0 d	5 lb (0.5 lb)	-	> 7 d	Excellent
*Danitol 2.4EC	fenpropathrin	3A	59639-35	16-21.3 fl oz	24 hr	2 d	42.7 fl oz (0.8 lb)	2	-	Excellent
^Pyganic EC 1.4	pyrethrin	3A	1021-1771	1 pt-2 qts	12 hr	0 d	-	-	-	Fair to Poor
^Pyganic EC 5.0	pyrethrin	3A	1021-1772	4.5-18 fl oz	12 hr	0 d	-	-	-	Fair to Poor
Assail 30SG	acetamiprid	4A	8033-36-70506	4.5-5.3 oz	12 hr	1 d	13.8 oz (0.26 lb)	2	> 7 d	Good#
Malathion 5EC (2ee)	malathion	1B	19713-217	3.2 pts	12 hr	3 d	12.8 pts (8 lb)	4	> 7 d	Good
Malathion 5EC (2ee)	malathion	1B	66330-220	3.2 pts	12 hr	3 d	12.8 pts (8 lb)	4	> 7 d	Good
Malathion 8 Aquamul (2ee)	malathion	1B	34704-474	2.0 pts	12 hr	3 d	8 pts (8 lb)	4	> 7 d	Good
Malathion 57 (2ee)	malathion	1B	67760-40-53883	3.2 pts	12 hr	3 d	12.8 pts (8 lb)	4	> 7 d	Good
^AzaSol	azadirachtin	UN	81899-4	6 oz in 50 gal	4 hr	0 d	-	-	-	Fair to Poor
^#Grandevo	*Chromobacterium subtsugae* strain PRAA4-1 and spent fermentation media	UN	84059-27	2-3 lb	4 hr	0 d	-	-	≤ 7 d	Fair to Poor

[a] In organic production, Entrust must be rotated with insecticides with different modes of action, consider using Grandevo or products containing the active ingredients azadirachtin or pyrethrin.

*Refer to label for details and additional restrictions.
#Adding sugar (sucrose) at 2 lb/100 gal water as a feeding stimulant will increase efficacy.
^Approved for organic use in NY.
@After two consecutive applications must rotate to different mode of action.

[1] Active Ingredient.
[2] Mode of Action, based on IRAC group code (UN = unknown).
[3] Re-entry Interval (hr = hours).
[4] Days to Harvest (d = days).

Resources

- Netting Supplier: *Berry Protection Solutions*, www.berryprotectionsolutions.com, berryprotection@fairpoint.net, 413-329-5031
- Low Tunnel Kits: *DuBois Agrinovation*, http://www.duboisag.com/
- Tunnel Berry Website

https://www.tunnelberries.org/

TunnelBerries
Sponsored by USDA-SCRI

Thank you!

Photo by Maria Gannett