

Integrative studies of vector-related virus epidemiology

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Oregon *Wine* Research Institute

Grape Day, April 6, 2017

Oregon State University Campus, Corvallis

Management of Trunk Disease, Grapevine Viruses and Fungicide Resistance

Management of Grapevine trunk diseases: a difficult but not impossible task- *José Ramón Úrbez-Torres, Pacific Agri-food Research Centre, British Columbia*

Red Blotch in Oregon- *Vaughn Walton, OSU*

Grapevine Leafroll Disease Impact- *Laurent Deluc, OSU*

Grape Powdery Mildew Management: An Integrated Approach- *Brent Warneke, OSU*

Effects of Red Blotch on Wine Quality- *Anita Oberholster, UC Davis*

Interactive Poster Session featuring more of the latest research and information!



For more information
and registration:
<http://owri.oregonstate.edu>

Integrative studies of vector-related virus epidemiology

- The deadly triangle
- Three grapegrowing regions
- Epidemiology trends
- Insect vectors
- Best management practices

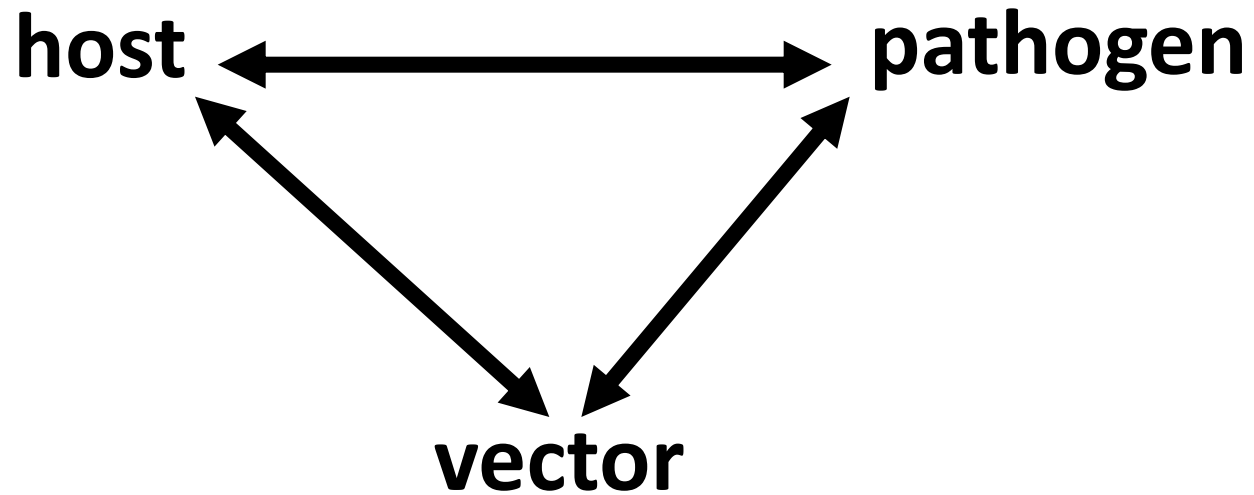


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The Deadly Triangle

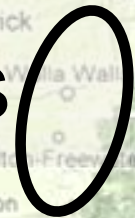


The vector feed on hosts, the pathogen is pathogenic to host

Grapegrowing regions

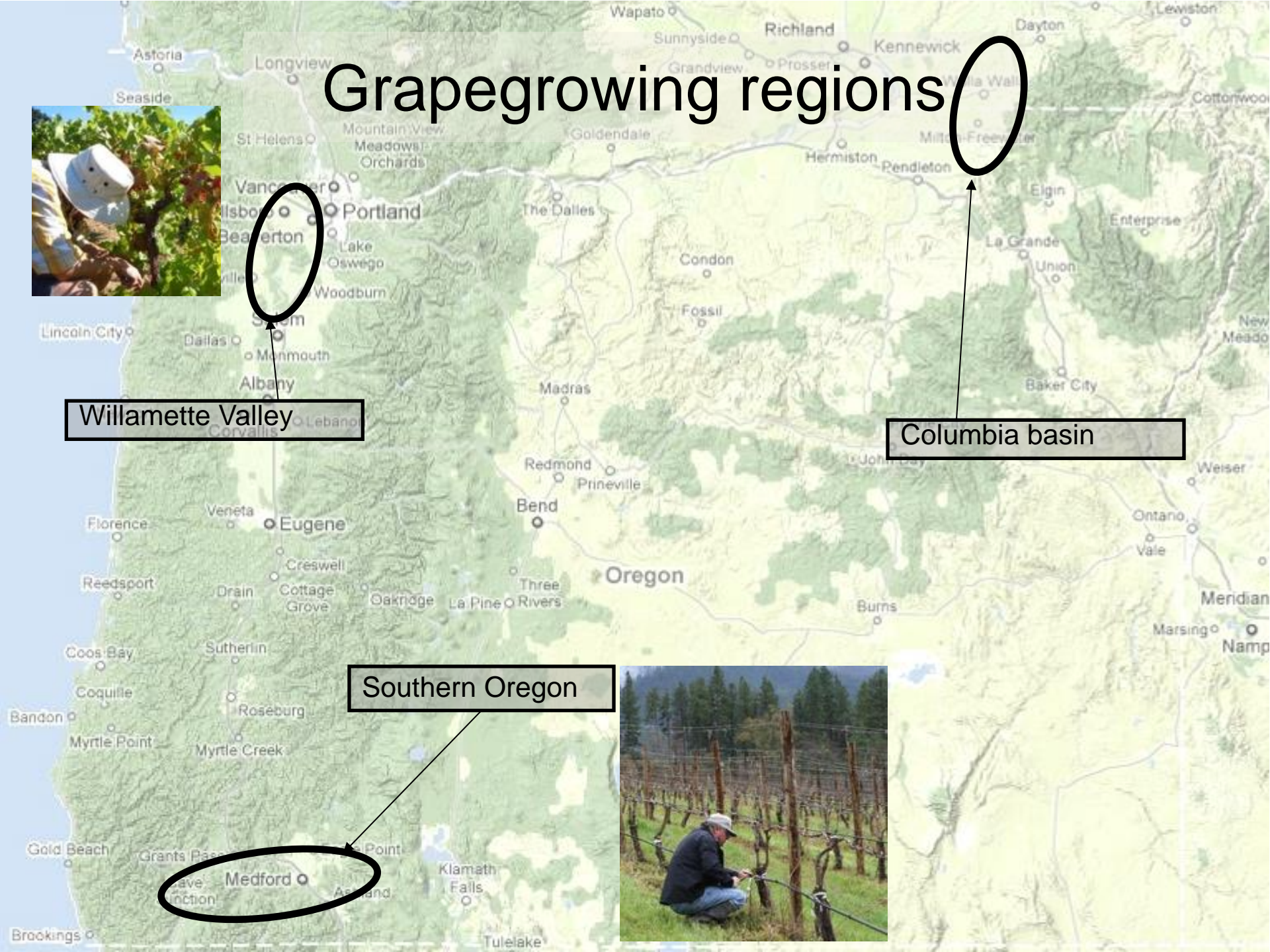


Willamette Valley



Columbia basin

Southern Oregon



Tissue collections



Surrounding vegetation



Epidemiology trends

Temporal GRBaV virus infection in three Oregon grape-growing regions as determined by PCR from 2013 to 2016. Vines sampled in 2013 and 2014 were re-tested for GRBaV in 2015 and 2016.

Location	Year	Positive vines	Assayed vines	% Infection
Willamette Valley #1	2013 & 2014	133	374	35.6%
	2015	172	374	46.0%
	2016	185	293	62%



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	2015	58	194	29.9%
	2016	121	194	62.4%



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S. Oregon #3	2014	28	193	14.5%
	2015	33	200	16.5%
	2016	37	200	18.6%



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	2016	121	194	62.4%
S. Oregon #3	2014	55	193	14.5%
	2015	33	193	16.5%
	2016	38	193	18.6%
E. Oregon (Vineyard 4)	2013 & 2014	4	396	1.0%
	2015	0	396	0.0%



Epidemiology trends

Regions surveyed in Oregon for GRBaV and GRBaV incidence levels during 2016.

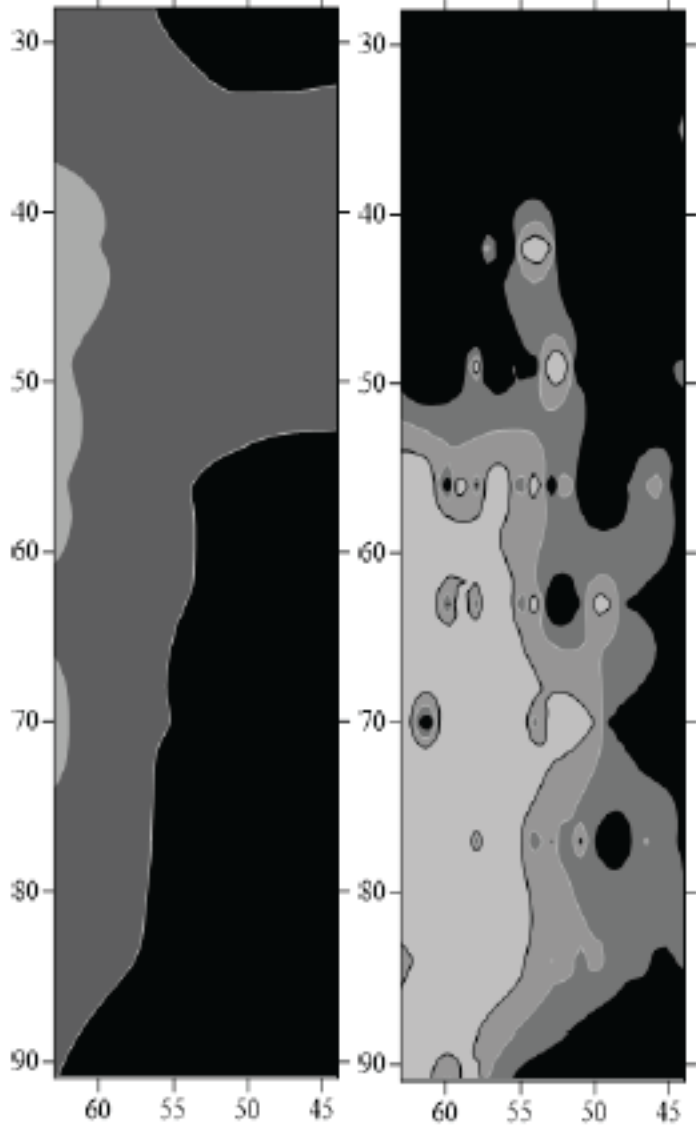
Region	Site	Vines sampled in 2016	Positive for virus	% Infected
Southern Oregon	1	75	55	73.33
	2	9	3	33.33
	3	14	0	0
	4	5	2	40
	5	2	2	100
	6	2	1	50
	7	196	37	18.88
	8	7	5	71.43
	Nursery vines	32	0	0
Seedling vines from surrounding vegetation	14	1	7.14	
Willamette Valley	1	101	13	12.87
	2	128	4	3.13
	3	177	0	0
S. Oregon total		356	106	29.78
W. Valley total		406	17	4.19
Total		762	123	16.14



Epidemiology trends

Vineyard 1, Willamette Valley

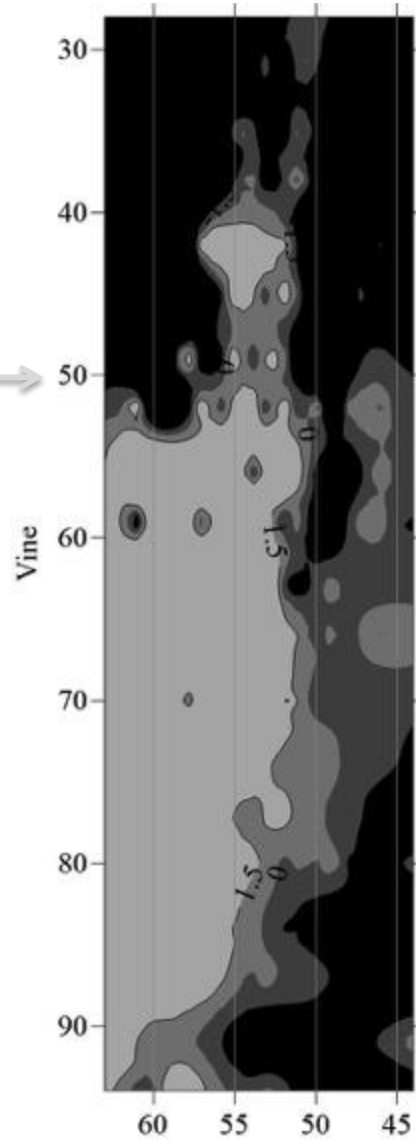
2013



Leafroll

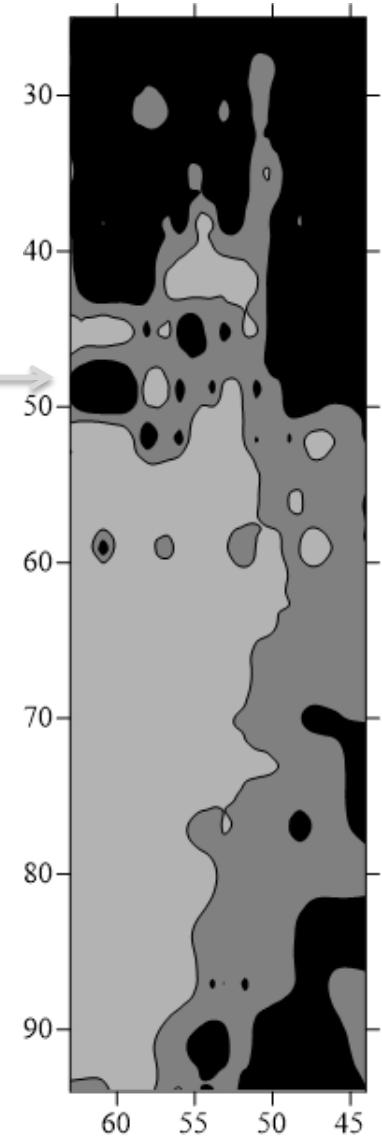
Red Blotch

2015



Red Blotch

2016



Red Blotch



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Oregon Viticulture

— edited by Ed Hellman, pub. in 2003

□ Ch. 24 Management of Insect and Mite Pests

- Grape phylloxera
- Black vine weevil
- Spider mites
- Leafhoppers
- Sharpshooters
- Threecornered alfalfa hopper
- Branch and twig borer
- Variegated cutworm
- Other lepidoptera
- Grape mealybug
- Thrips
- Grasshoppers
- Yellowjackets



Tortistilus wickhami



Insect Surveys 2016

February 2016 revelation of threecornered alfalfa hopper (*Spississtilus festinus*) as vector of GRBaV

Searched all sticky cards from 2009-2015

OSU and SOREC insect collections (1920's- present)

Found

Tortistilus wickhami

Tortistilus albidosparsus

Spississtilus festinus

Region	<i>S. festinus</i>	<i>T. albidosparsus</i>	<i>T. wickhami</i>
So. Oregon	X	X	X
Willamette Valley		X	X
E. Oregon			



Insect Surveys



T. wickhami, mostly in Southern Oregon

Insect Surveys



T. albidosparsus, mostly in Willamette Valley

Results of sampling in 2016 in S. Oregon

<u>Sampling method</u>	<i>S. festinus</i>	<i>T. wickhami</i>	<i>T. albidosparsus</i>
Sweepnet	1	0	0
Sticky card	1	4	2 (in apple orchard)
Beat tray	0	≈ 4	0
Visual search	0	> 50	≈ 2

Insect Surveys



T. albidosparsus

Treehopper feeding symptoms



Treehopper adult
feeding on cane

Girdling caused by
treehopper on cane

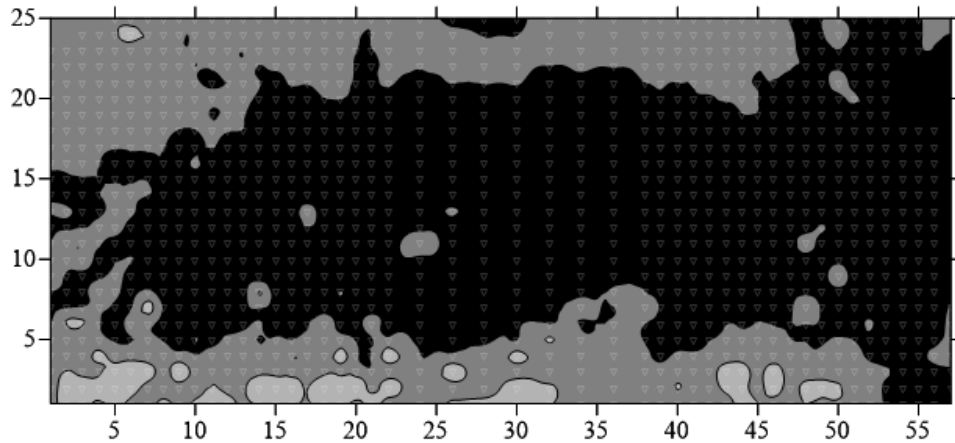
T. wickhami

Treehopper feeding symptoms

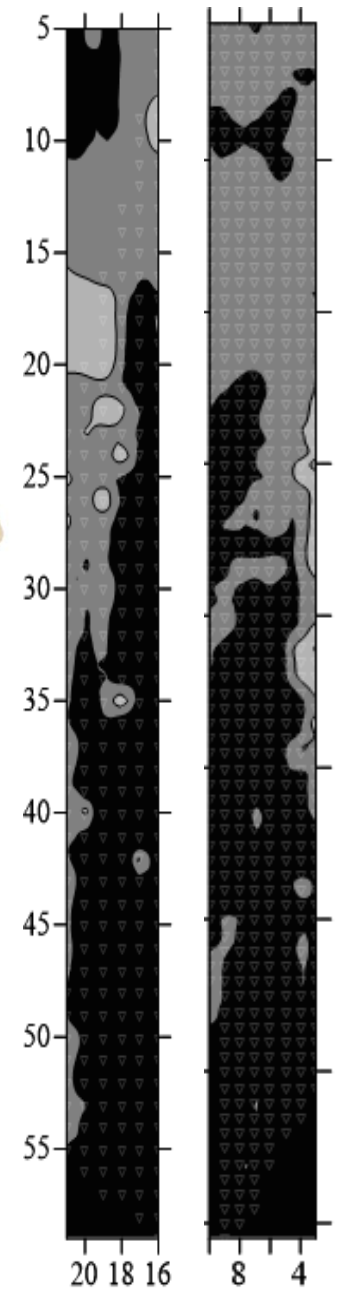


- Girdling and discolored leaves (red cultivars) are seen in 1/5 cases
- Symptoms begin to appear about 5 days after feeding

Mapping Treehopper Injury in Vineyards

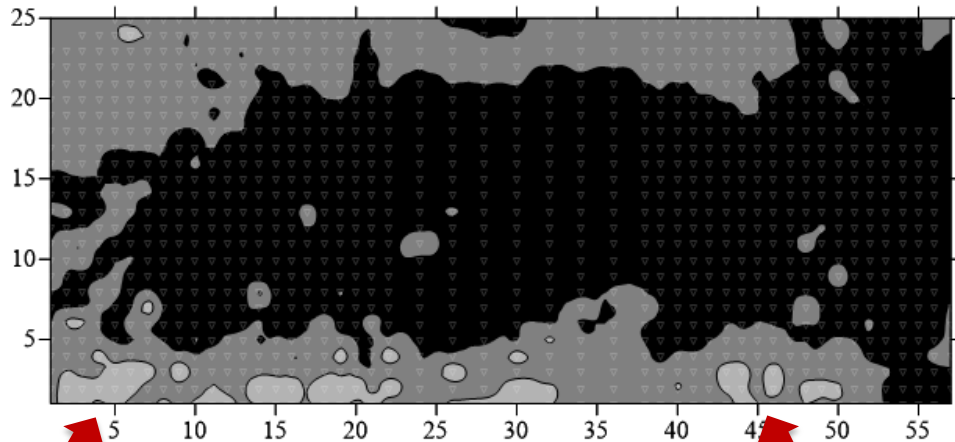


Southern Oregon Vineyard

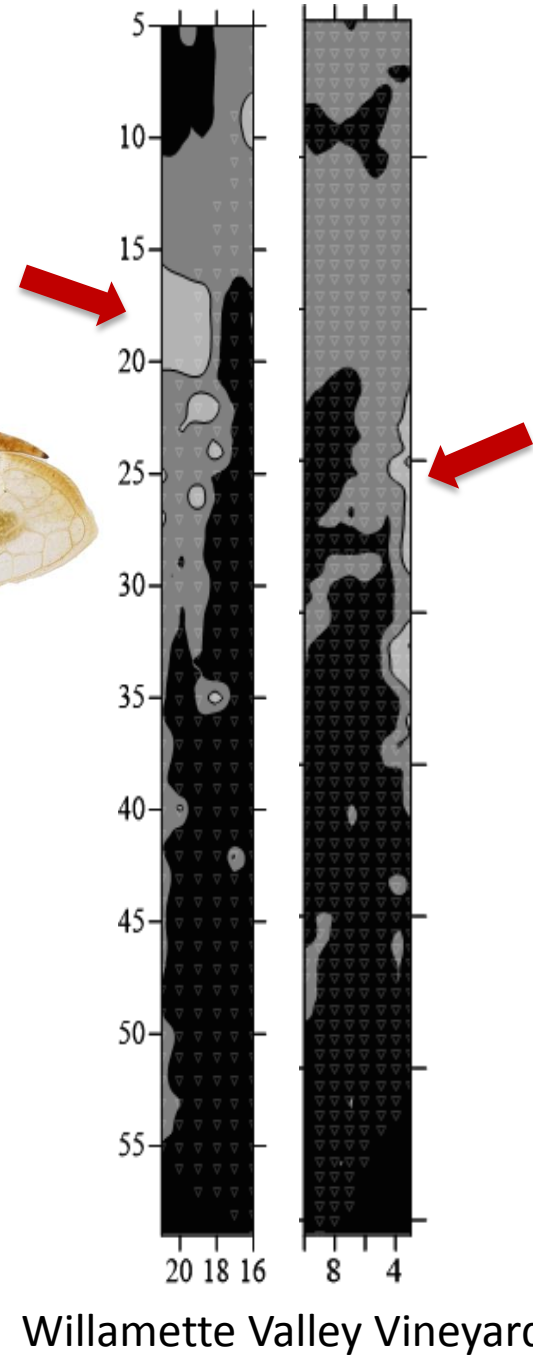


Willamette Valley Vineyard

Mapping Treehopper Injury in Vineyards



Southern Oregon Vineyard



Willamette Valley Vineyard

Surrounding non-crop vegetation



Surrounding non-crop vegetation

Findings during 2016:

Oak
Hazelnut
Rose
Apple
Pear
Blackberry

Other literature and collections:

Almond
Ceanothus
Madrone
Manzanita
Walnut
Willow
Thistles — *Cirsium californicum*, *C. proteanum*,
Cirsium arvense (Canada thistle)



Treehopper oviposition



T. wickhami ovipositing on
grape cane, Willamette
Valley





Current Best Management Practices

- 1 Use only healthy/clean stock when planting vines
- 2 Ask for virus test results from the supplier of nursery stock
- 3 When grafting vines be sure to have clean bud wood sourced
- 4 Employ regular monitoring of vine symptoms throughout the year
- 5 Monitor for symptoms of insect vector presence
- 6 If blocks test positive for the virus, do not use the bud wood for propagation nor provide it to other nurseries for propagation
- 7 Avoid planting or replanting vines in close proximity to vineyards that are positive for Red Blotch virus and that have insect vectors



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Thank you!

**Especially to our
collaborating growers,
and Andy Swan,
Lora Stamper,
Alex Soohoo-Hui,
Shannon Davis,
Mukesh Bhattarai,
Ashley Li,
Trent Lawler**

