
WILLAMETTE VALLEY
VINEYARDS
"One of America's Great Pinot Noir Producers."
– Wine Enthusiast Magazine
bpia
2019
Annual Meeting
and Symposium
BIO CONTROLS
USA WEST

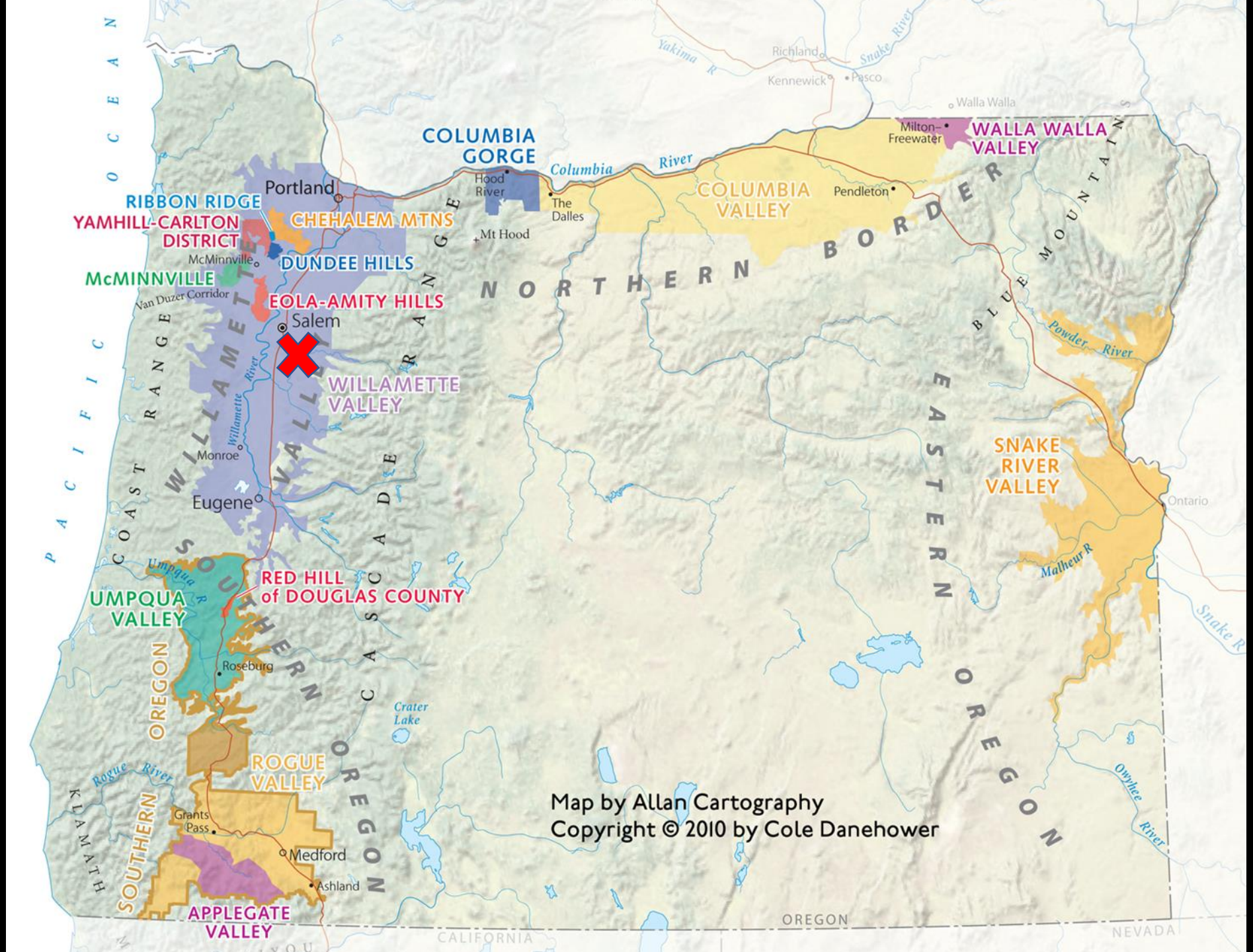
Building a Dream

Founder Jim Bernau began planting in 1983. His passion was to make Pinot Noir that would be a classic, elegant representation of the Willamette Valley growing region. Over the past 30 years, with determination and the help of many extraordinary people, Jim's dream has become a reality. We are now producing high quality, sustainably grown Pinot Noir and other cool-climate varietals in sufficient quantities to be available at the finest restaurants and wine shops throughout the world.

Sense of Place

Our terroir is unique with ancient volcanic, glacial and sedimentary flood soils on slopes where orientation, elevation and grade create unique growing conditions.

Tending the vines by hand and using minimalist winemaking techniques in small-batch fermentations, we strive to capture the unique sense of place with distinctive elegance and aromatic complexity.


COLUMBIA GORGE
WALLA WALLA VALLEY
RIBBON RIDGE
YAMHILL-CARLTON DISTRICT
CHEHALEM MTNS
DUNDEE HILLS
McMINNVILLE
EOLA-AMITY HILLS
COLUMBIA VALLEY
WILLAMETTE VALLEY
SNAKE RIVER VALLEY
RED HILL of DOUGLAS COUNTY
UMPQUA VALLEY
ROGUE VALLEY
APPLEGATE VALLEY
Portland
Salem
Eugene
Monroe
McMinnville
Van Duzer Corridor
Hood River
The Dalles
Mt Hood
Pendleton
Milton-Freewater
Walla Walla
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Grants Pass
Medford
Ashland
Ontario
Powder River
Malheur R
Owyhee River
Snake R
PACIFIC OCEAN
COAST RANGE
WILLAMETTE VALLEY
CASCADE RANGE
SOUTHERN OREGON
KLAMATH
NORTHERN BORDER
BLUE MOUNTAINS
EASTERN OREGON
OREGON
CALIFORNIA
NEVADA
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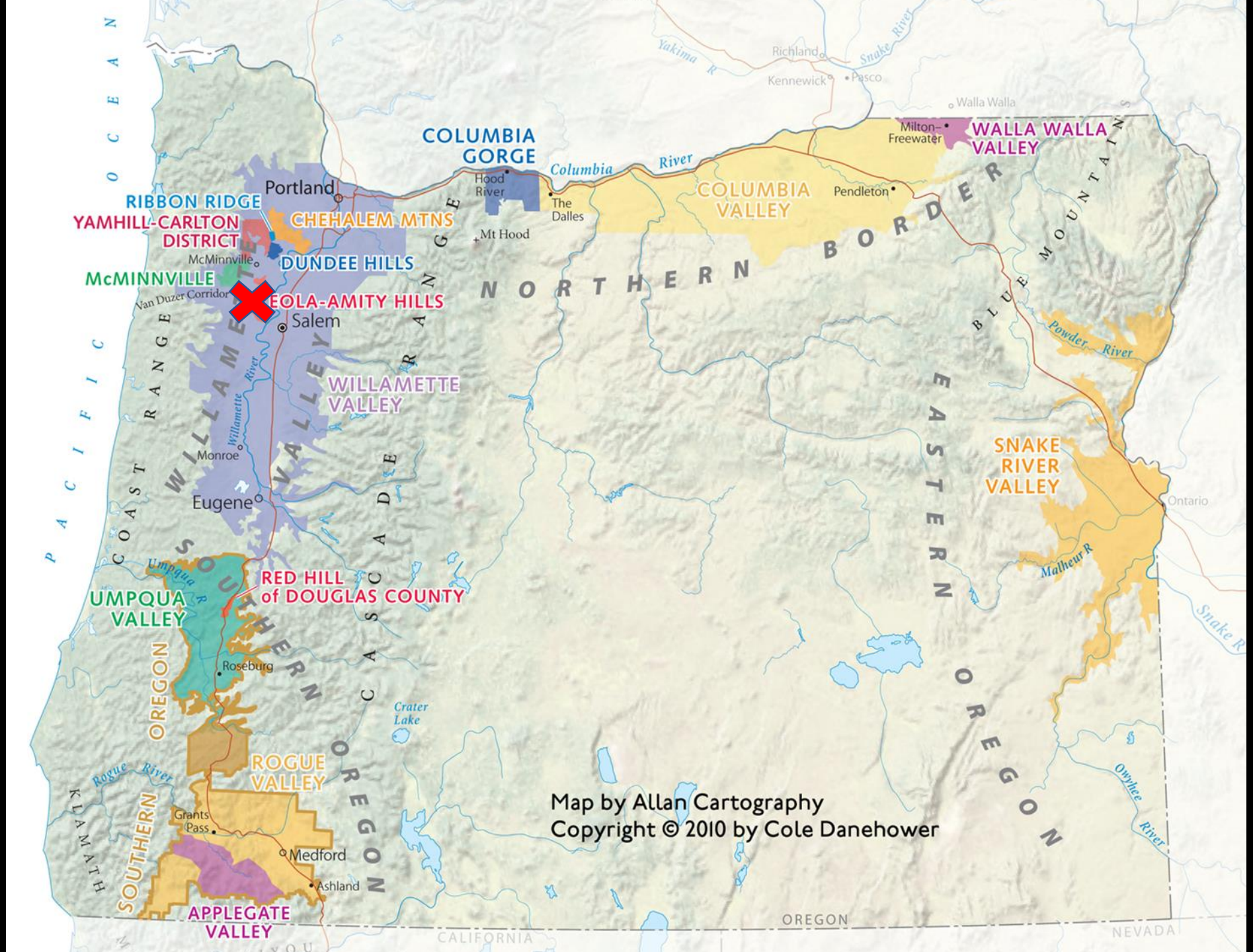
Willamette Valley Vineyards | *Above Salem*

Planted in 1983 by Founder, Jim Bernau on a south-facing volanic flow the vineyard has 53 acres of vines planted at 500 to 750 feet in elevation. The first Dijon clones were grafted in 1993. The Nekia and Jory soils are well drained to a depth of one and a half to six feet.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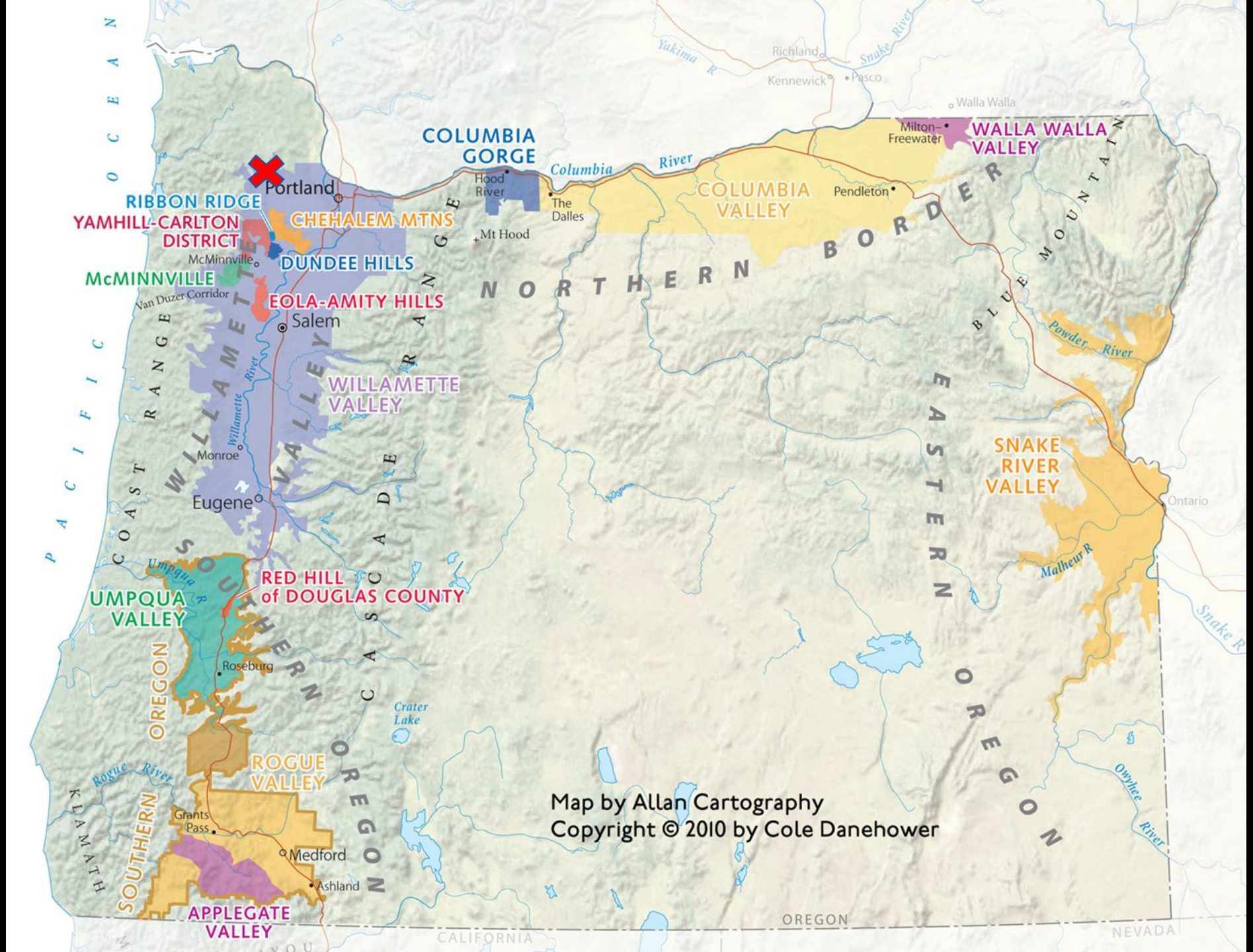
Elton Vineyard | *Above Hopewell*

In 2006, Wine & Spirits listed Elton Vineyard as one of the five key vineyards in the new Eola-Amity Hills AVA. Planted in 1983, the vineyard includes 60 acres planted on east-southeast slopes of the Eola Hills. The elevation rises from 250-500 feet, and the vineyard soil is iron-rich Jory.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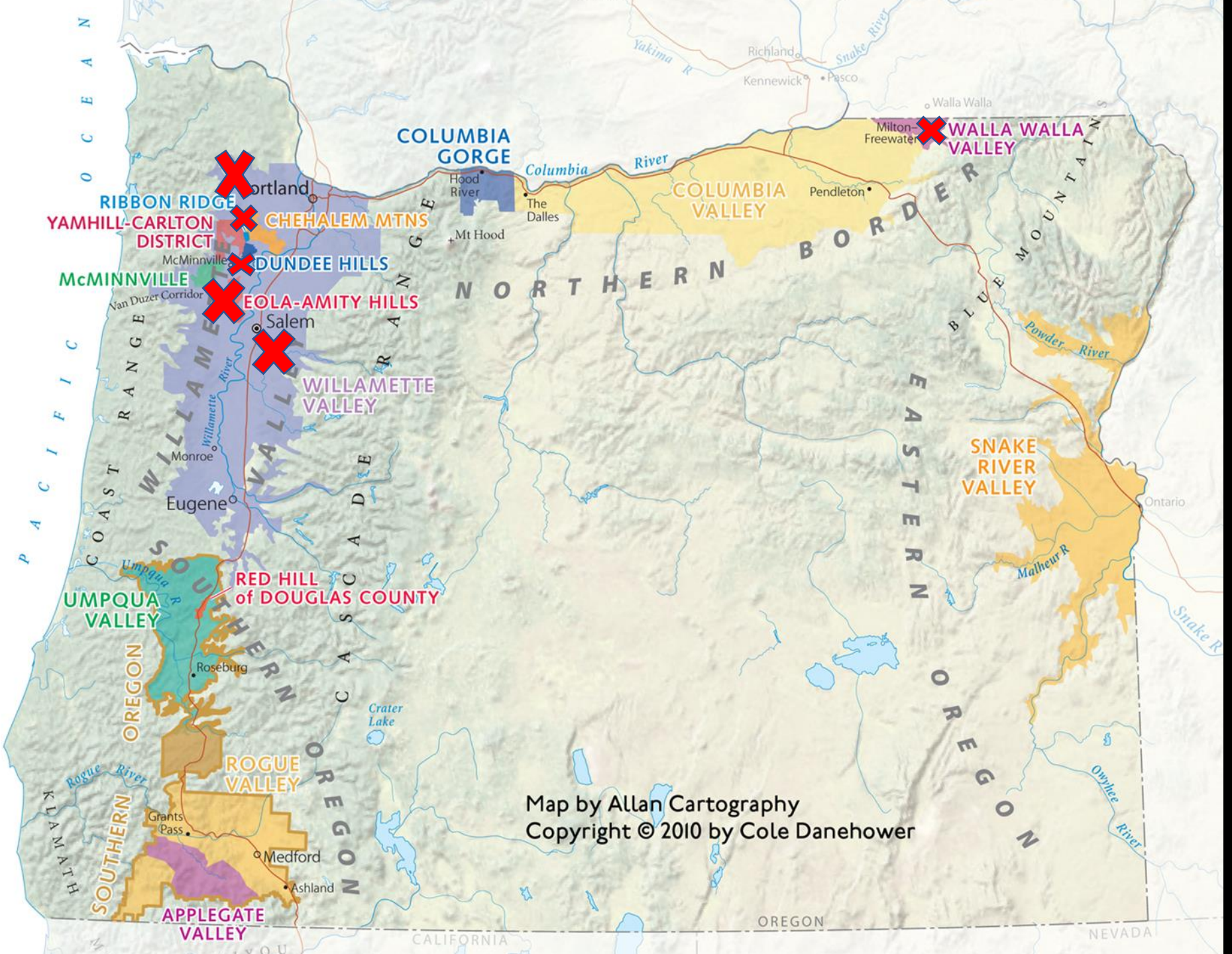
Tualatin Estate Vineyard | *Above Forest Grove*

Tualatin Vineyard, established in 1973, is one of the oldest and most respected vineyards in Oregon's Willamette Valley. Pinot Noir and Chardonnay from Tualatin took Best of Show for both the red and white categories at the London International Wine Competition in the same year, a feat unduplicated in the competition's history. Covered in Laurelwood soil, the slope is south-facing with an elevation of 250-530 feet.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OREGON SOLIDARITY TIMELINE

THE FIRE

Started July 15th, 2018

The Klondike Fire burned in the Rogue River-Siskiyou National Forest. The fire started on July 15th from a lightning strike in the area of Klondike Creek about 9 miles southwest of Selma, OR. It burned 175,258 acres with smoke the most intense before veraison.

CONTRACTS CANCELLED

September 22, 2018

Growers were expecting to harvest between September 28 - mid-October, but received their letters of cancellation dated on September 22, 2018.

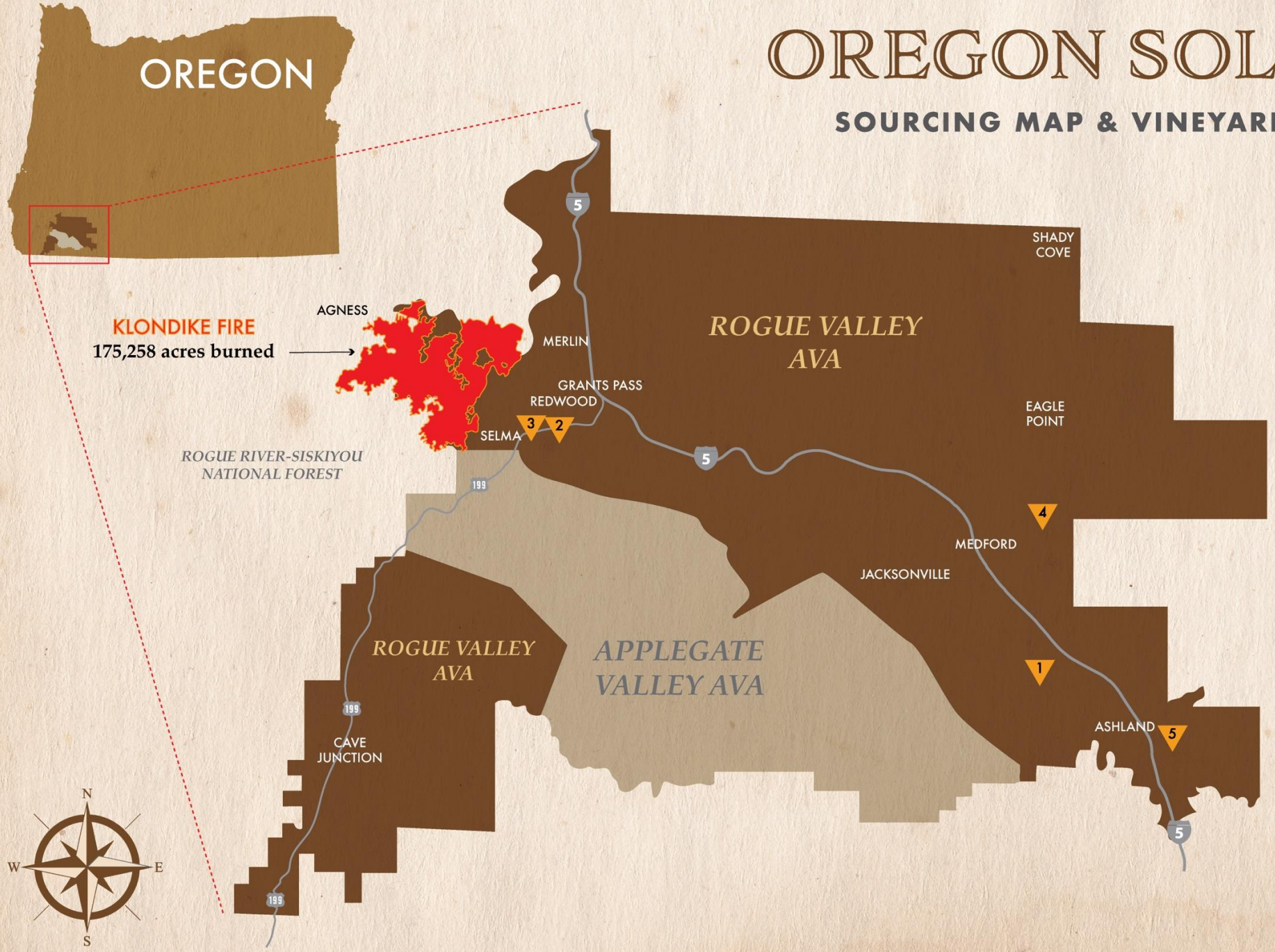
OREGON SOLIDARITY HARVEST

Harvest took place between October 4th-12th, 2018

We learned of this crisis on Thursday, September 26th, spent the weekend collecting all the grower's information and tested their fruit for smoke taint. We harvested all the fruit we could between October 4th-12th before we simply ran out of time before the grapes were getting too ripe.

OREGON SOLIDARITY

SOURCING MAP & VINEYARD INFORMATION



1. QUAIL RUN VINEYARDS

LOCATION: TALENT, OREGON
GROWER: MICHAEL MOORE
VARIETALS: PINOT NOIR & CHARDONNAY

2. VILLA NOVIA VINEYARD

LOCATION: SELMA, OREGON
GROWER: GAYLE WERDEN
VARIETAL: PINOT NOIR FOR ROSÉ

3.FIVE TROLLER VINEYARD

LOCATION: SELMA, OREGON
GROWER: JIM BALL
VARIETAL: PINOT NOIR

4. CARLOW VINEYARD

LOCATION: MEDFORD, OREGON
GROWER: MAGGIE WELLMAN
VARIETAL: PINOT NOIR FOR ROSÉ

5. MAISON TRANQUILLE

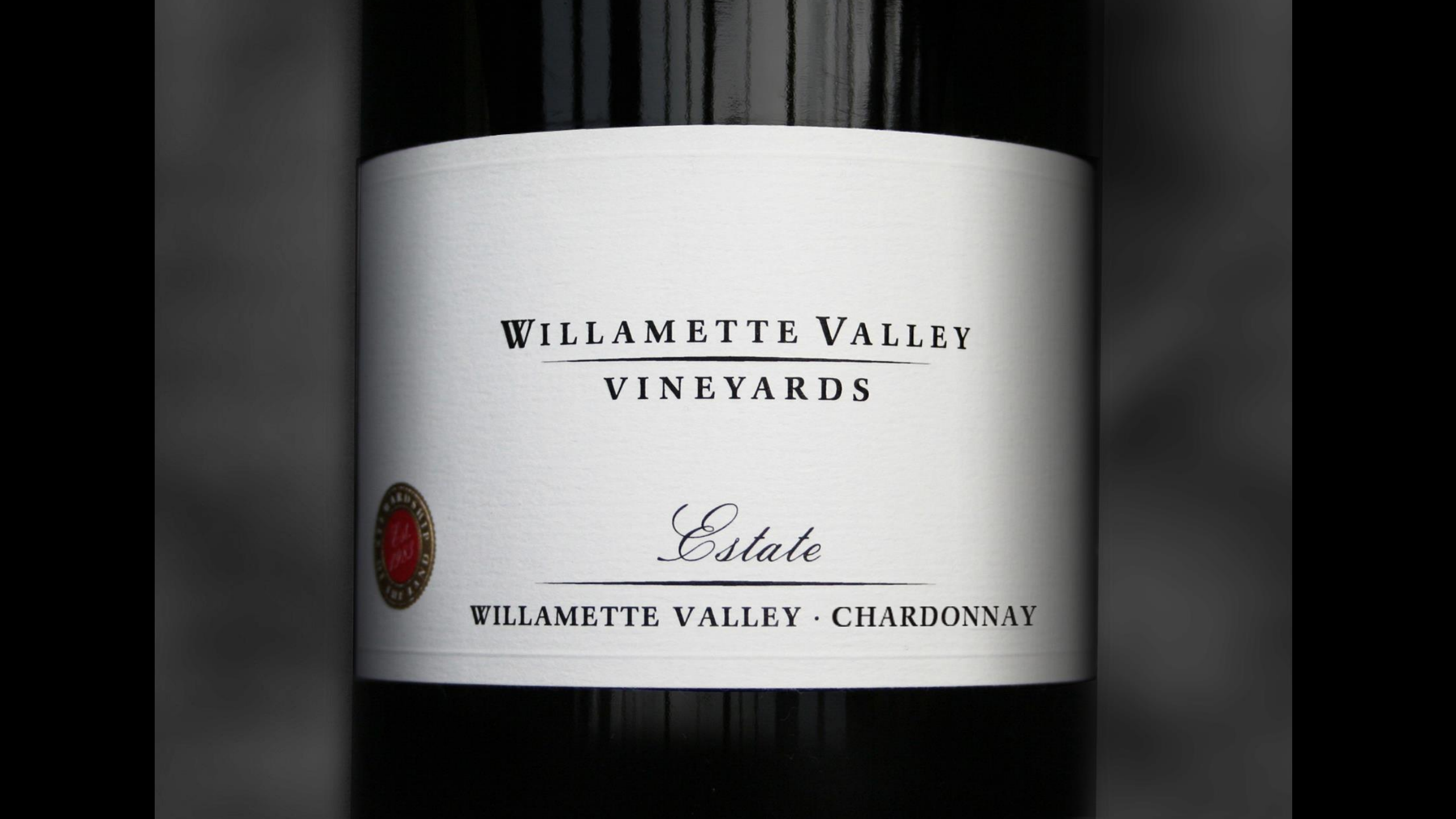
LOCATION: ASHLAND, OREGON
GROWER: LEON PYLE
VARIETAL: PINOT NOIR

OREGON

SOLIDARITY

CHARDONNAY • ROSÉ OF PINOT NOIR • PINOT NOIR

ROGUE VALLEY AVA


WILLAMETTE VALLEY
VINEYARDS
Estate
WILLAMETTE VALLEY · CHARDONNAY

Stewardship of the Land

We believe wine tastes better when made from naturally grown winegrapes. Our customers enjoy these wines with the knowledge that we have acted responsibly. WVV is now the leading producer of Oregon Certified Sustainable Wine, with all of our vineyards and winery certified LIVE (Low Input Viticulture and Enology) and Salmon Safe.

The Mediterranean cork forests are second only to the Amazon Rainforest in their importance to the earth's biosphere. We pioneered the use of Forest Stewardship Council certified sustainable cork in our bottles and have launched a consumer recycling effort, Cork ReHarvest, in partnership with Whole Foods and Rainforest Alliance.

To reduce our carbon footprint and promote energy independence all company tractors and delivery vehicles are run on biofuel and we offer up to 50 gallons a month free to our employees for commuting to work.

Bio Fungicides

-Powdery Mildew

-Botrytis

-Trunk Diseases

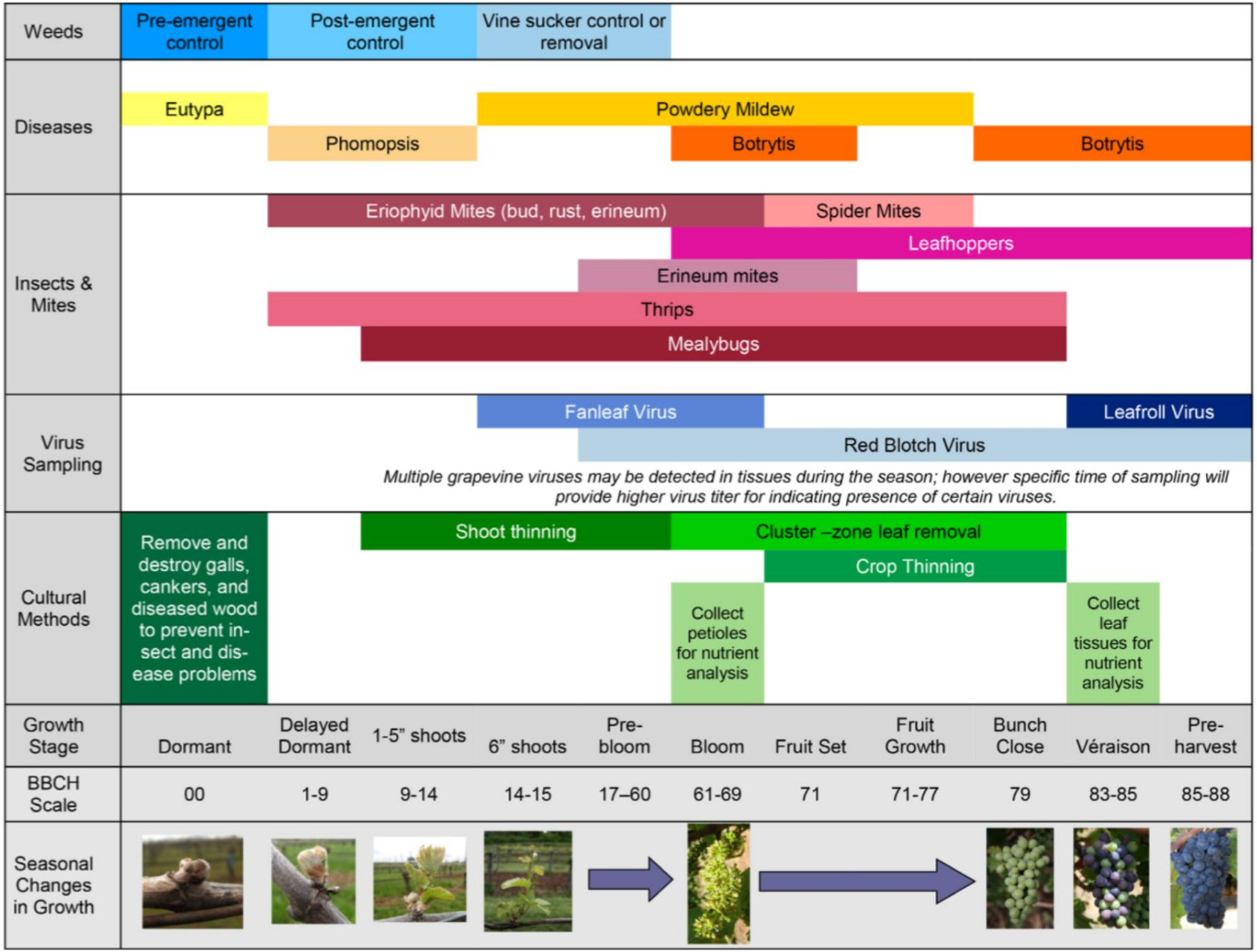


Figure 1. Seasonal timing for monitoring and management of weeds, insects, mites, and diseases in vineyards. Main pests of concern across Oregon's grape growing regions are included. Growth stages and BBCH-scale are based on the extended BBCH-scale (Figure 2, page 3). Figure by Patricia A. Skinkis, © Oregon State University.

2019 Pest Management Guide for Wine Grapes in Oregon

P.A. Skinkis, J.W. Pscheidt, M.L. Moretti, V.M. Walton, A. KC, and C. Kaiser

Photo: P.A. Skinkis, © Oregon State University

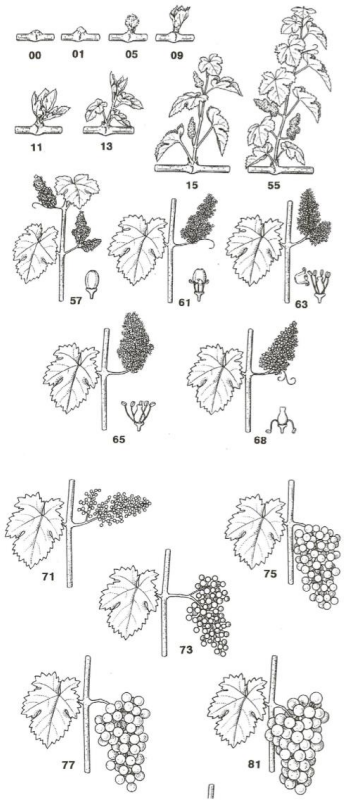
Contents

Introduction

This guide is developed for use by managers of commercial vineyards in Oregon. It provides recommendations for chemicals, formulations, and usage rates of products that are intended to prevent, manage, and control vineyard diseases, insects, mites, and weeds. When considering a pesticide, evaluate its efficacy and its impact on beneficial arthropods, honey bees, and the environment. Not all registered pesticides are listed in this guide. These recommendations are based on research, label directions, and vineyard-use experience for Oregon.

It is important to have a thorough knowledge of grapevine phenology (growth stage) in relation to the current seasonal climate and how it relates to

Principal Growth Stages of Grapevines—Extended BBCH Scale

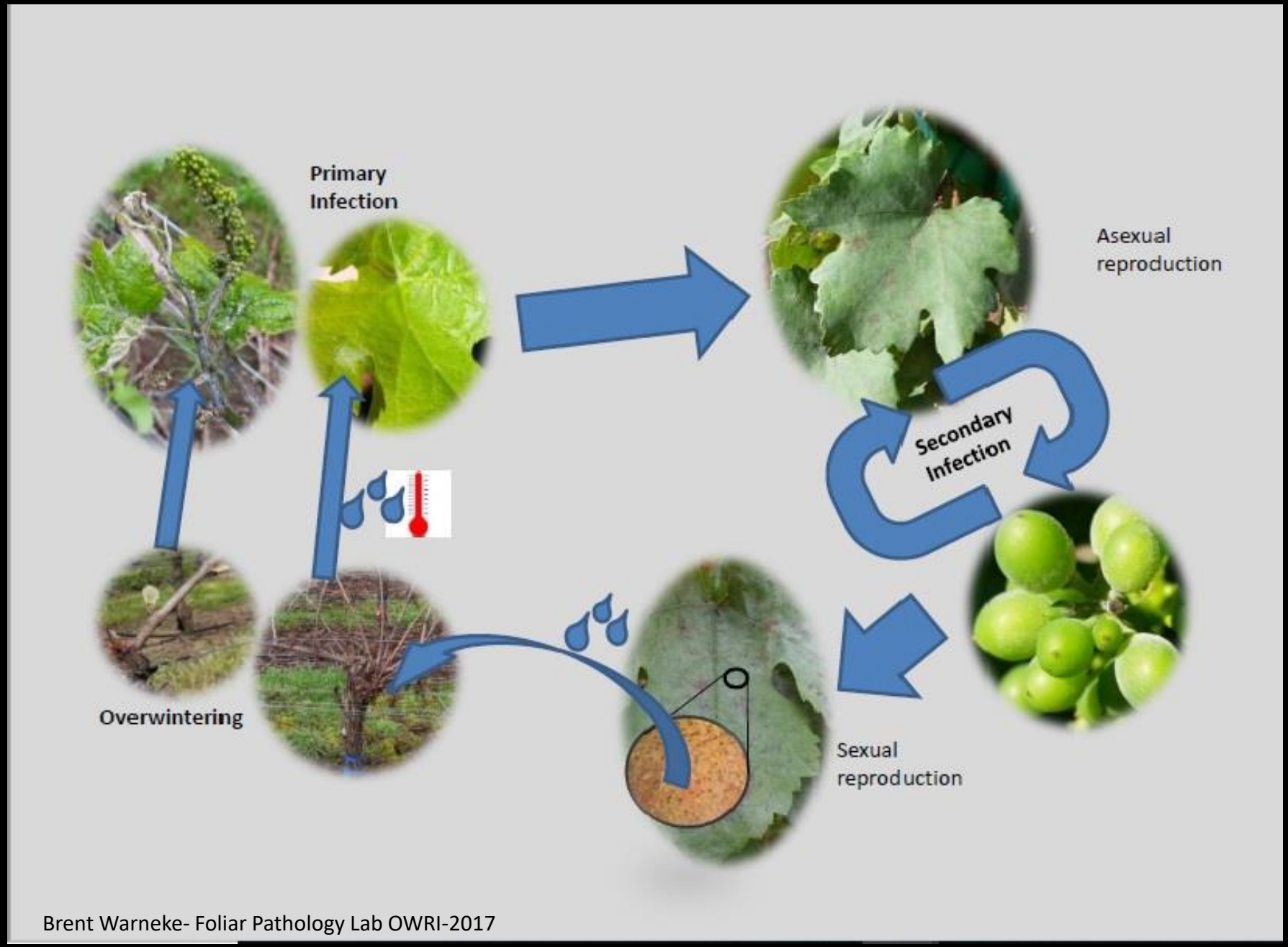


Principal growth Stage	Code	Description
0: Bud Development	00	Dormant: winter buds pointed or rounded and bud scales closed, depending on cultivar
	01	Buds beginning to swell
	03	End of bud-swell. Buds swollen but not green.
	05	"Wooly bud": brown wool visible on bud
	07	Beginning of bud-break: green shoot tips just visible
	08	Bud-break: green shoot tips clearly visible.
1: Leaf Development	11	First leaf unfolded away from shoot
	12	Second leaf unfolded
	13	Three leaves unfolded
	1_	Stages continue with additional leaves unfolded
5: Inflorescence Emerges	53	Inflorescence clearly visible
	55	Inflorescence swelling: flowers pressed together
	57	Flowers separate; inflorescence developed
6: Flowering	61	10% caps fallen
	65	50% caps fallen
	68	80% caps fallen
7: Fruit Development	71	Fruit set: fruit begins to form, flower remains lost
	73	BB-sized berries
	75	Pea-sized berries
	77	Berries begin to touch in cluster
	79	Bunch closure; berries touching
8: Berry Ripening	81	Ripening begins (véraison): berries begin to color
	85	Softening of berries
	89	Berries ripe, harvest

Figure 2. Principal vine growth stage scheme for grapes, adapted from *Phenological Growth Stages and BBCH-Identification Key of Grapevine* in *BBCH Monograph*, Meier 1997. (Lorenz et al., 1994)

Grape Powdery Mildew (*Erysiphe necator*)

Brent Warneke- Foliar Pathology Lab OWRI-2017



Brent Warneke- Foliar Pathology Lab OWRI-2017

Key Control Periods

Bloom

Bunch Closure

Traditional Management Techniques

- Sulphur
- Potassium Bicarbonate
- Oils
- Synthetics

Bio-Control for PM

- Barrier/surface area competion

  - *Bacillus subtilis, pumilis*
  - *Streptomyces lydicus*

Bio-Control for PM

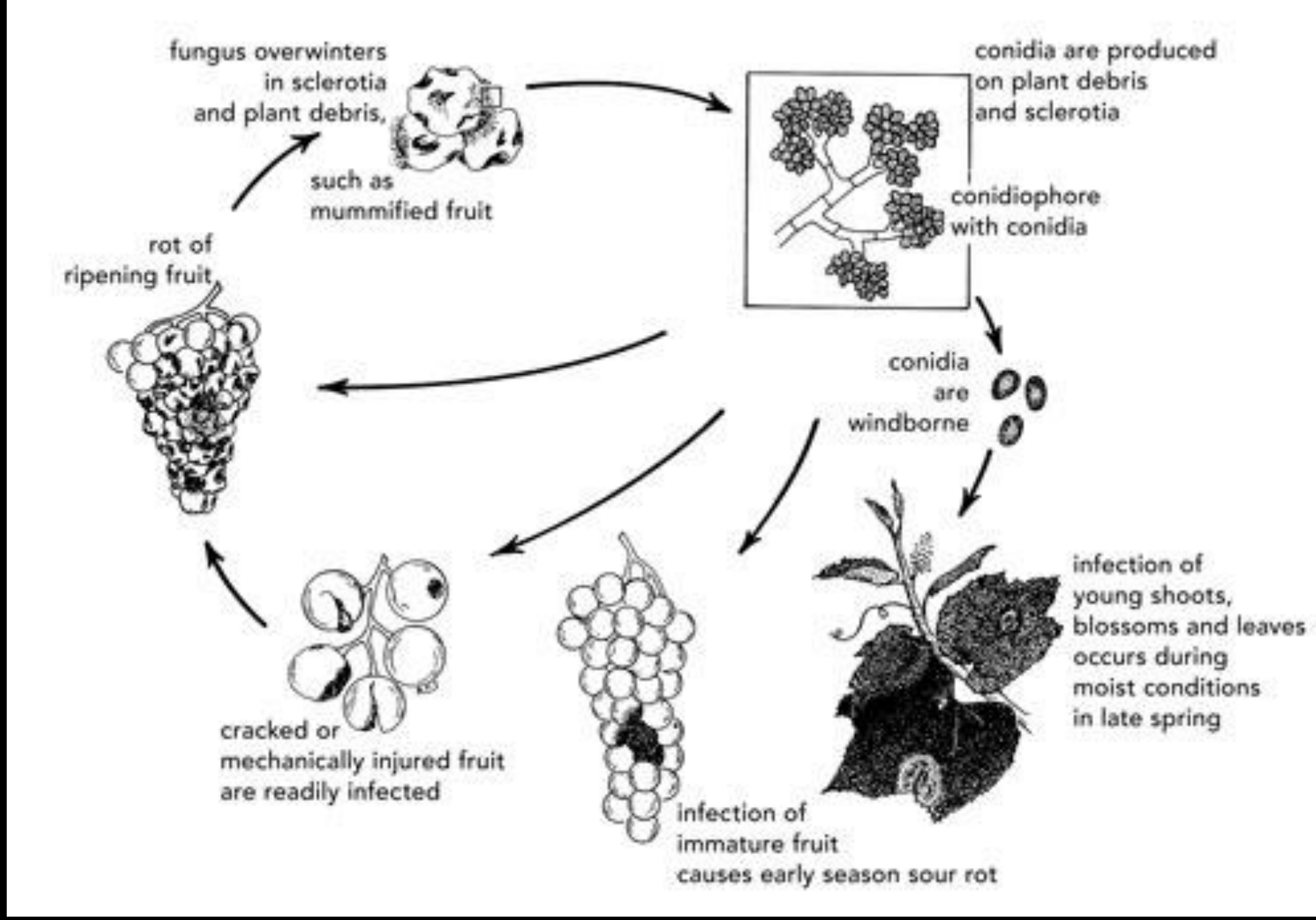
- Induced Systemic Response (ISR)
  - *Reynoutria sachalinesis* – Knotweed extract
  - *Swinglea glutinosa – Tabog extract*

Bio-Control for PM

- Physical
  - Cinnamon aldehyde
  - BLAD*
  - Plant Oils-Neem, rosemary, clove etc

Botrytis

- Life Cycle
  - Over winter-mycelium or sclerotia
  - Activated in Spring by Water
  - Wind Dispersal
  - Latent infection re-activated at veraison
  - Uses necrotic tissue as food source



https://www.evineyardapp.com/blog/2015/11/27/gray-mold-of-grape-botrytis-cinerea-pers/

Key Control Period

- Bloom, Post Bloom ,Fruit Set

Growth Stage	Dormant—Early growth	6” shoots	Pre-bloom	Bloom	Fruit Set	Fruit Growth (summer)	Véraison	Pre-harvest
EL Stage	00-12	14-15	17–60	61-69	71	71-79	83-85	85-88
	POWDERY MILDEW							
Primary Applications		Sulfur: high label rate (7-10 days)	Products from groups 3, 11, 13, 50 or U6			Sulfur: high rate (7 days) / Groups 3, 11, 13, 50 or U6 / Sulfur: half rate (7-14 days)	Groups 3, 11, 13, 50 or U6	
Supplemental Applications		M-Pede or JMS Stylet Oil; Use caution with sulfur.						
Cultural Methods		Shoot thinning and positioning			Pull leaves in cluster-zone	Shoot positioning and hedging		
	BOTRYTIS							
Primary Applications				Spray if necessary (rainy weather)			Critical to spray at bunch closure (EL 79) and véraison (EL81-83).	Spray if necessary
	During these growth stages, rotate and/or tank mix fungicides that have different mode of action (FRAC) groups so that no product is used more than two times per season to prevent fungicide resistance from developing. Always use product with a different FRAC group than was used for the previous application.							
Supplemental Applications			Fungicides that have Botrytis efficacy can be considered based on weather and cultivar susceptibility to Botrytis. Heed to warnings under “Primary Actions.”					
Cultural Methods		Shoot thinning and positioning			Pull leaves in cluster-zone	Shoot positioning and hedging		

. Example strategy for powdery mildew and Botrytis bunch rot control. Figure by Patricia A. Skinkis, © Oregon State Univ

Control Measures

- Most effective treatments are cultural
  - Air circulation (leaf removal, cleaning bloom trash)
  - MILDEW PREVENTION!

Bio-Fungicides for Botrytis

- Bacillus
- *Streptomyces griseoviridis*
- *Candida sake*
- Chitosan

Trunk Diseases - Esca

- Detection Difficulty
  - Nursery
  - Ubiquitous
  - Symptomology trails infection

Trunk Diseases - Esca

- Treatments
  - Sealant
  - Synthetic
- Biocontrols
  - Garlic oil
  - Bacterial
  - Fungal

Trunk Diseases - Esca

Unfortunate Reality in the Willamette Valley

Assume infection beyond year 5

Trunk Diseases – Eutypa

- Canker vs systemic as with Esca
- Treat similary
- Get as much production out as possibly while making a replanting plan.


WILLAMETTE VALLEY
VINEYARDS
Thank you!
Clay.Wesson@wvv.com
"One of America's Great Pinot Noir Producers."
– Wine Enthusiast Magazine

Bio pest control: Insect/Acari

Karl Mohr of Northwest Vineyard Service
kmohr@nwvineyardservice.com

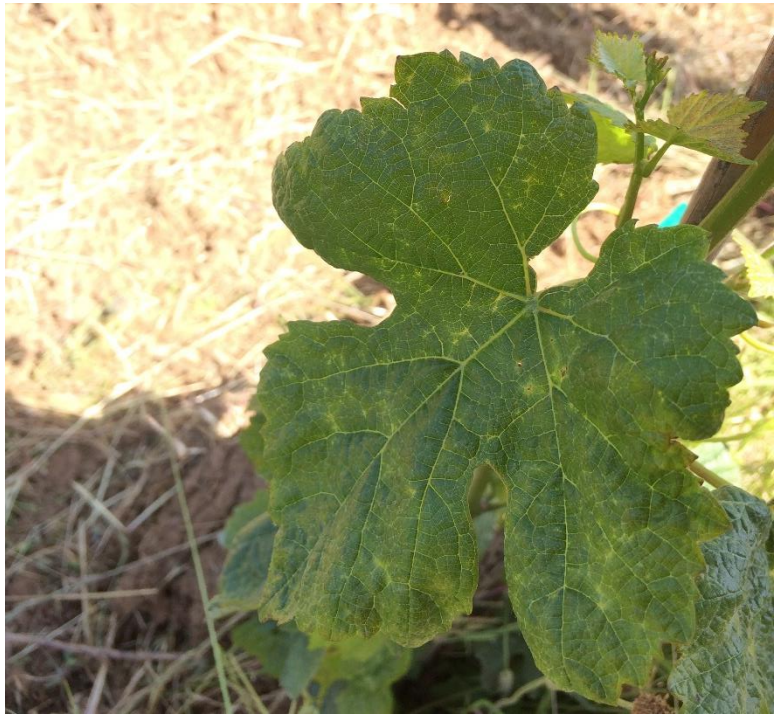
2019.03.11

Eriophyid- Rust Mite Damage Spring

- Short Shoot Syndrome
- Stunted shoot growth
- “Frosted” appearance
- Drawstring appearance of the leaves
- Possible meristem death
- Excessive pubescence

- Causal pest- **Rust Mite**
  - *Calepitrimerus vitis* Nalepa

- Leaf Stippling
- Stunted shoot growth
- Drawstring appearance of the leaves
- Curling leaf margins
- Possible cluster damage
- Causal pest- **Rust Mite**
  - *Calepitrimerus vitis* Nalepa



Eriophyid-Rust Mite Damage Mid-Season

Eriophyid- Rust Mite Damage Late Season

- Bronzed leaf colour
- Stippling on any actively growing laterals
- Canopy discolouration appears to move
- Up the row or down the plant

Eriophyid- Rust Mite Scouting

Spring:

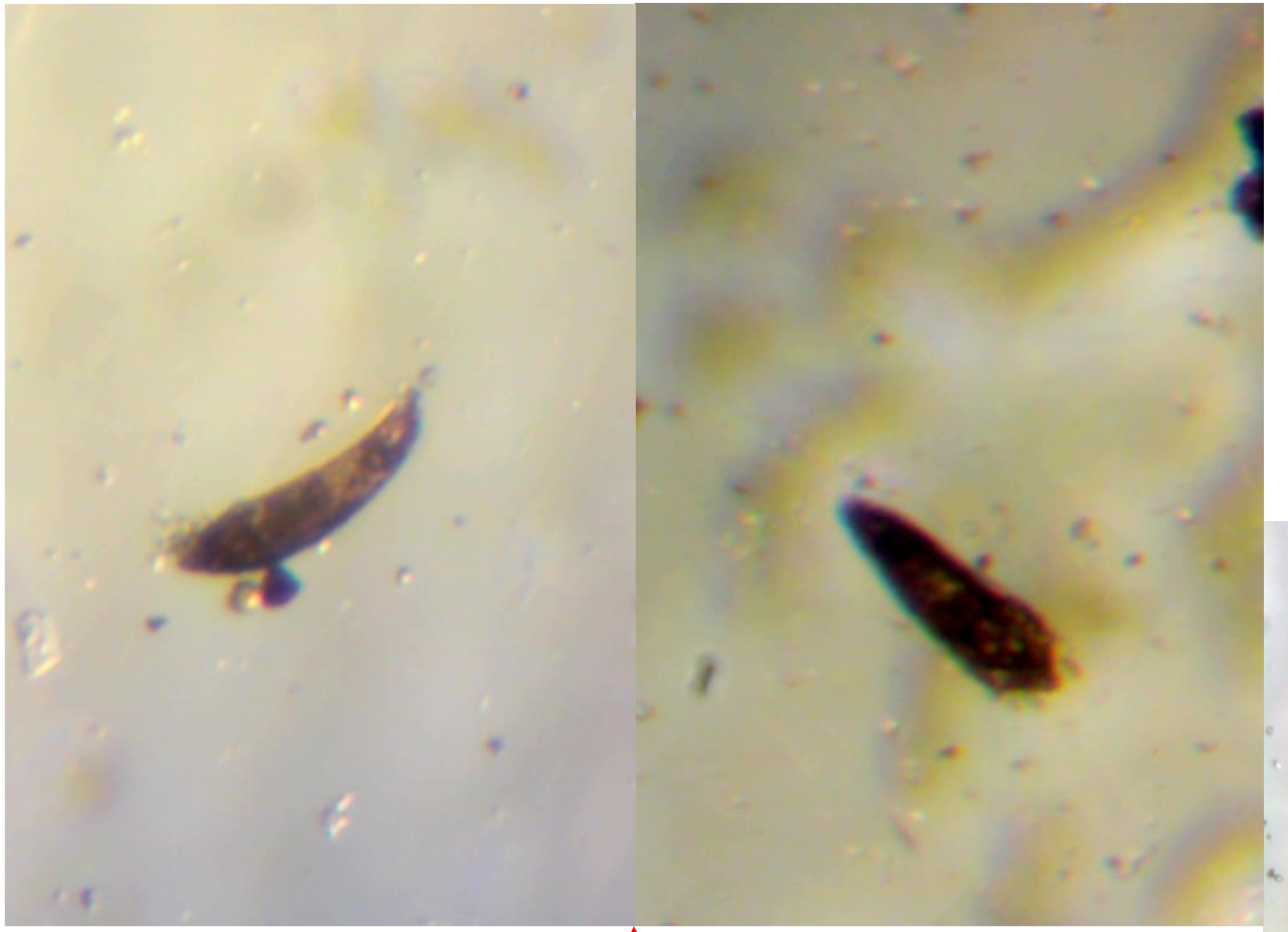
- Bud samples
  - Target known areas or high probability areas
    - Margins
    - Next to dirt/gravel roads
    - Adjacent to known infested areas
  - Collect secondary buds or expendable buds
  - Weekly sampling
  - Increase frequency based on phenology & forecast

Summer

- Leaf samples
  - Scout for leaves with stippling
  - Target mix of newer symptomatic leaves and 1-3 week old symptomatic leaves

Fall

- Target separate ⅓ of canopy samples (upper, middle, bottom third).
- Try to determine location of downward migrating mites.
- Double sided sticky tape traps.



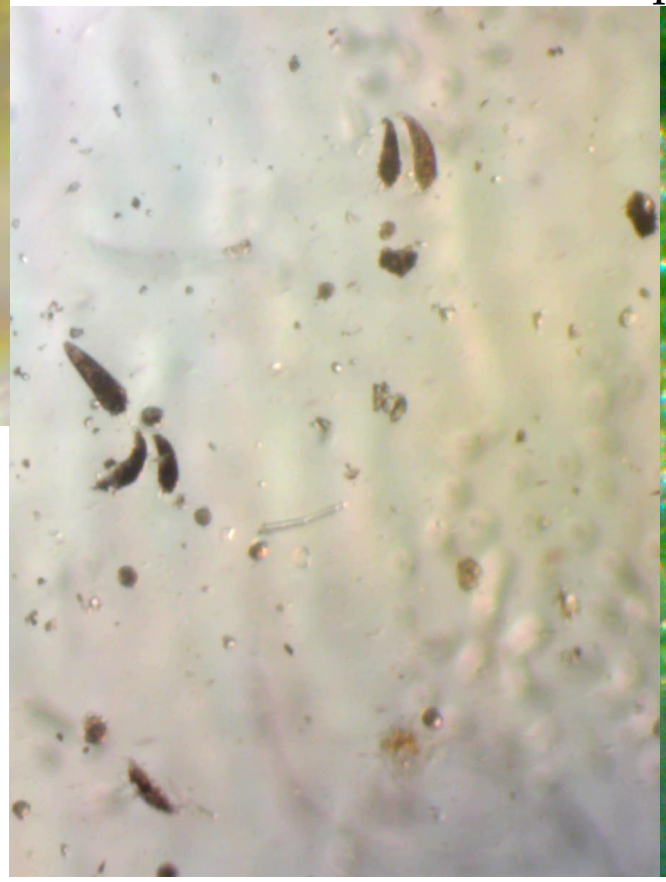
Eriophyids from ethanol wash 80x

Ethanol Wash:

- Grind/Cut sample
- Add 20-40 mL 80% ethanol
- Aggitate
- Decant onto gridded petri dish
- Count under stereoscope @ 40x

In the Field

- 60-100x hand microscope



Eriophyids 40x

Foliar Damage-

- Creation of erinea (fuzzy blisters or pockets)
- Formed on newly forming leaves
- Later, more apparent on older leaves
- May damage flower clusters early – midseason if populations are high enough.

Eriophyids- Erineum Mite

Eriophyid treatment options:

Traditional:

Sulphur at wooly bud (bud break)
- 2x applications 5-6 lbs/ac
- Every 10 days

Crop Oil at wooly bud (bud break)
- 1-2% solution
- Every 10 days

Spirodiclofen mid season (post infestation)
- 16 -34 fl oz

Bio Acaricide:

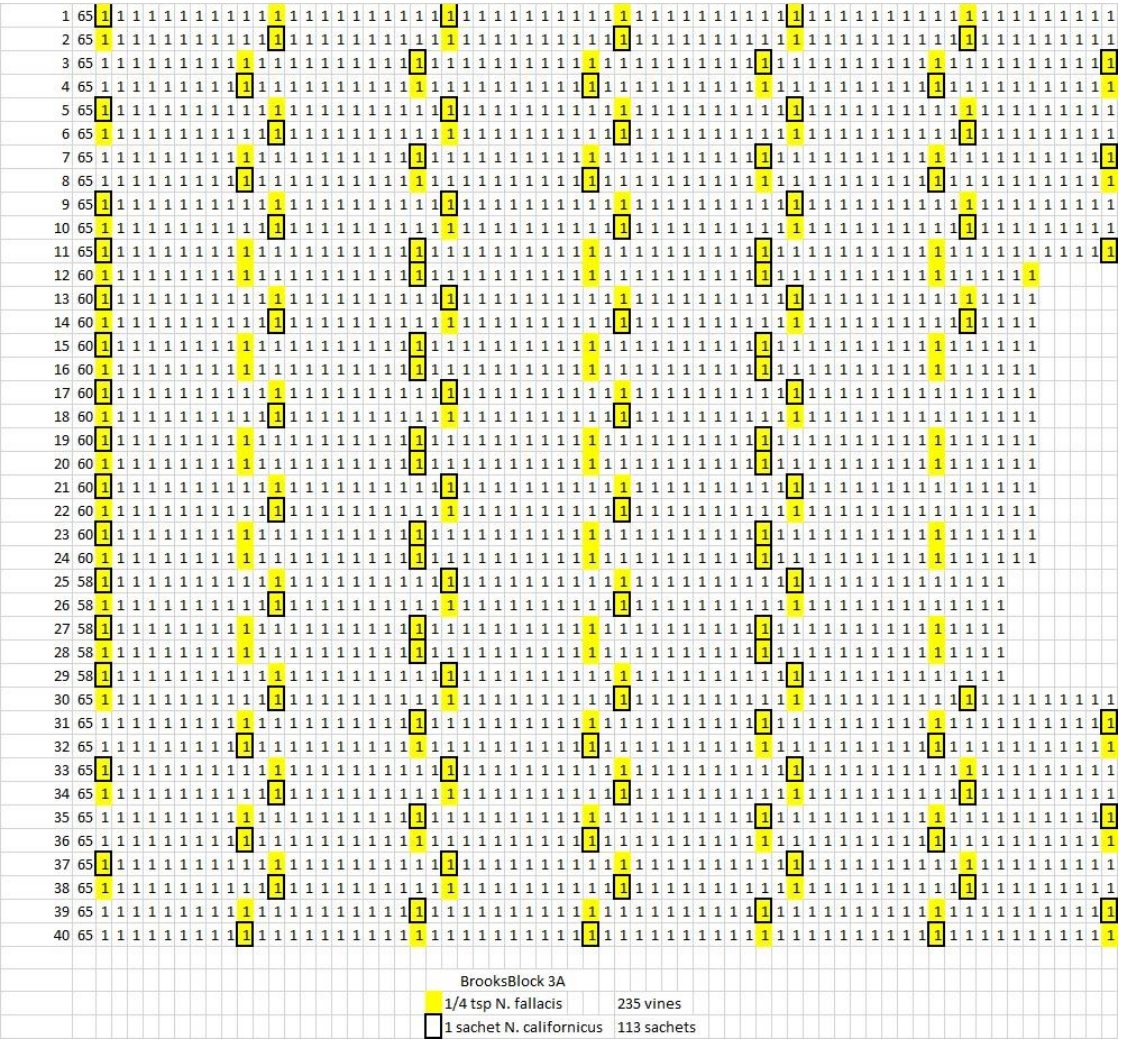
***Chromobacterium* subtsugae** strain PRAA4-1 at wooly bud (bud break)
- 1 applications 2-3 lbs/ac

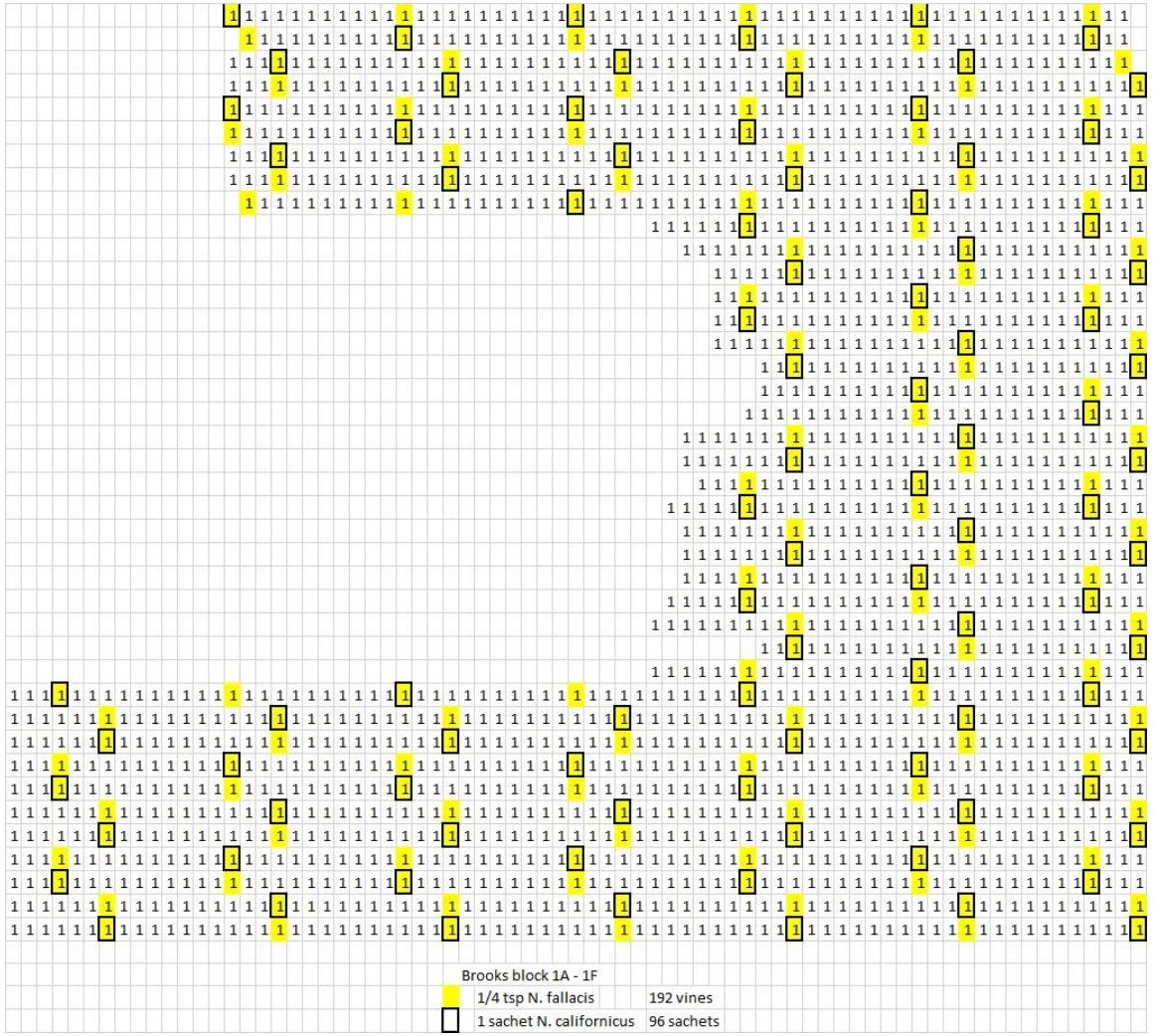
Isaria fumosorosea Apopka Strain 97
- 1 application, 1-2 lbs/ac

Pretadors released:

Typhlodromus pyri
Galendromus occidentalis 7000/acre
Neoseiulus cucumeris 2500/acre
Amblyseius californicus 3000/acre
Amblyseius andersoni
Chysopa sp 5000/acre

Case study- Rust mite & Erineum mite





Spider mites

Causal Organisms-

Two-spotted mite *Tetranychus urticae*

Willamette Mite *Eotetranychus willamettei*

Pacific Mite *Tetranychus pacificus*

McDaniel Mite *Tetranychus mcdanieli*

Damage

- Red/orange marbling on foliage
- Some stippling seen prior to leaf discolouration
- Mites visible with naked eye
- Photosynthesis disruption

Have historically shown up when there is an imbalance in predator/prey populations. Especially in Organic farming systems that heavily rely on Sulphur.

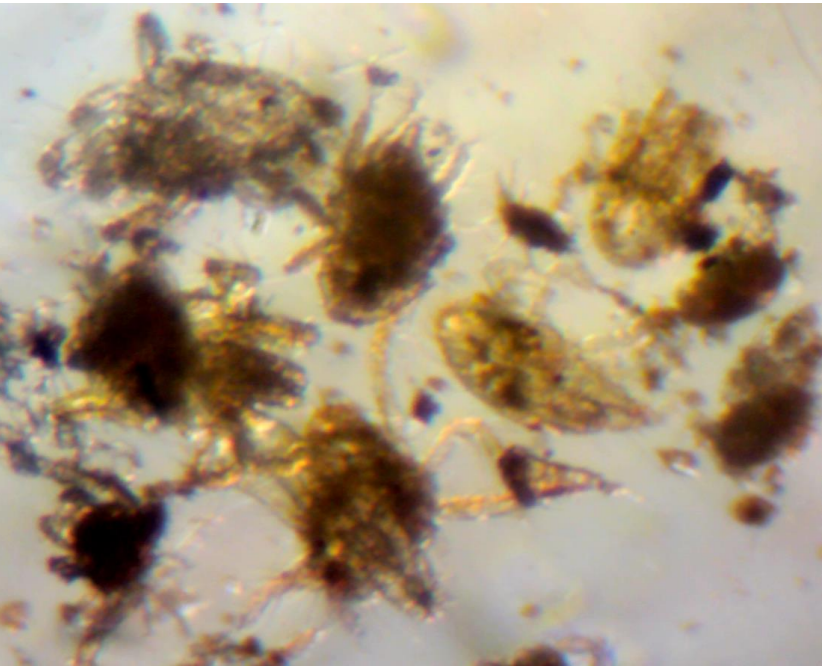
A bit like a wreck on the 5. You want to turn away….but…..

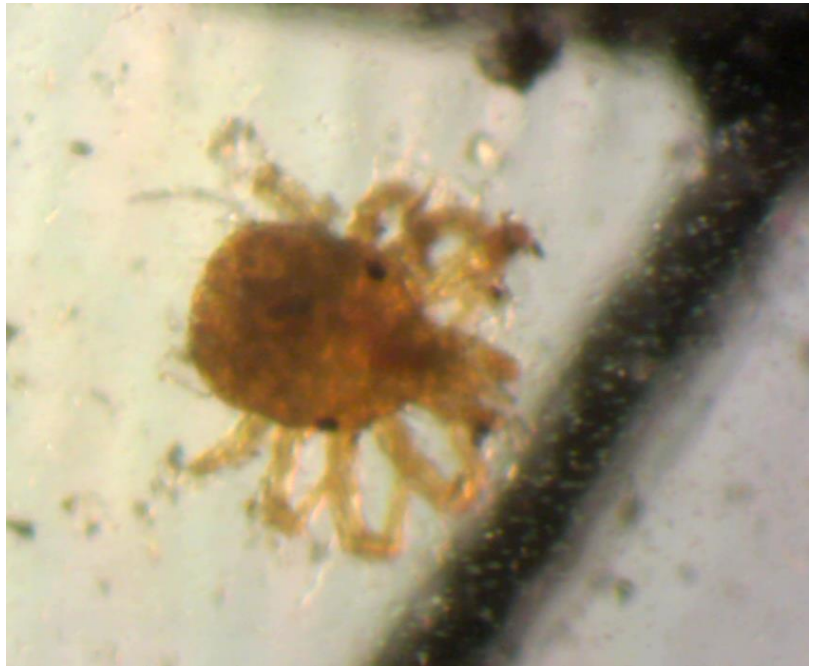
Shhhh!!! Be vehwy quiet. Hunting Tetranychidae

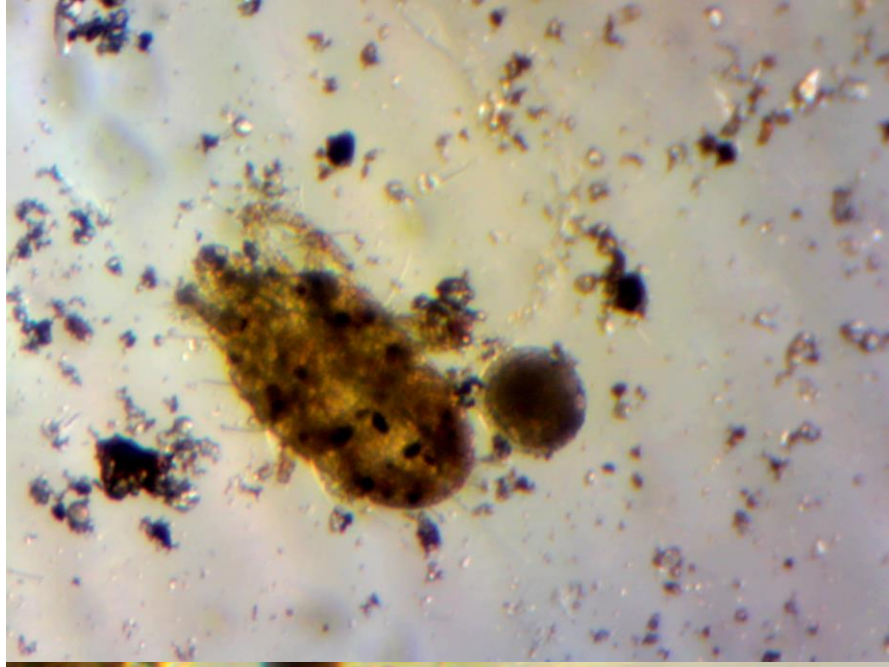
Scouting

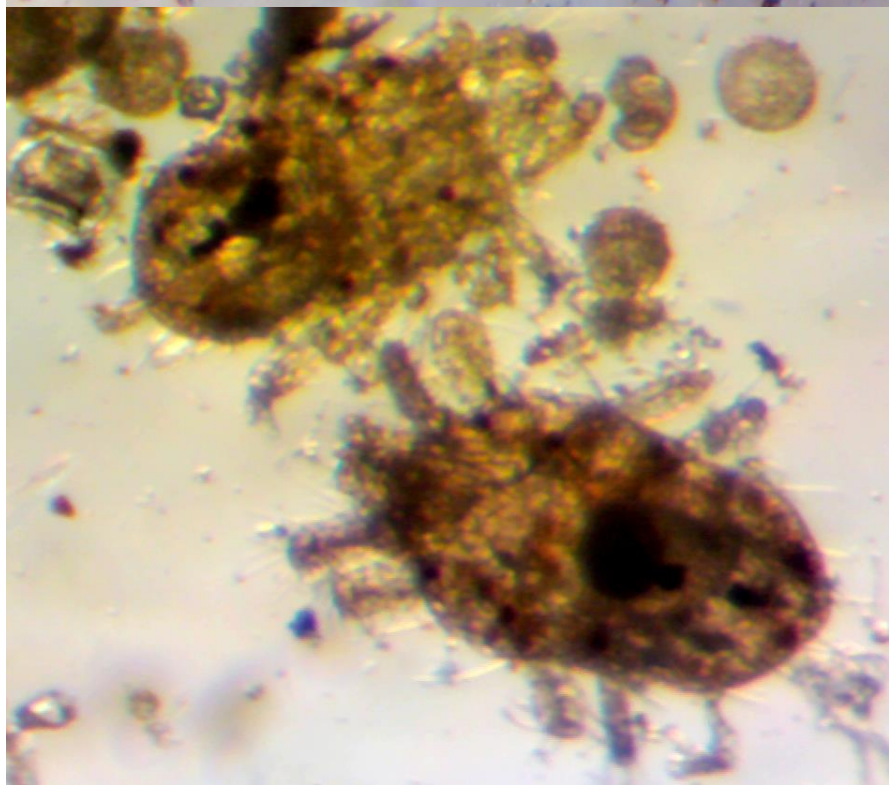
- Locations with historical populations
- Near dirt/gravel roads
- Adjacent to infested blocks
- Trap plants *Phaseolus vulgaris*
- Presence absence

Perp walk









Ethanol wash and Identification

- Samples washed and decanted as with Eriophyids
- Well-preserved samples have been taken to ODA for plating and identification
- Two spotted, Pacific, Willamette, McDaniel have all been identified in the Willamette Valley

Tetranychidae Treatments

Traditional:

Cyflumetlofen
2x applications 13.7 fl oz/acre

- Up to 2x applications 13.7 fl oz-acre
- Every 14 days

Spirodiclofen
16-24 fl oz-acre
1 application

Bio acaricide:

***Chromobacterium* subtsugae** strain PRAA4-1

- 1x applications 2-3 lbs/ac

Burkholderia spp. strain A396

- 4-8 qts-acre
- 1-3 application

Predators:

Stethorus punctillium 100/acre
Galendromus ocidentalis 10,000/acre
Neoseiulus fallacis *10,000/acre*
Stratiolaelaps scimitus 25,000-acre

Cutworms

Damage:

- Damage occurs early spring just prior to bud break through the post budbreak period.
- More damage during colder springs when shoot growth is slower.
- Higher populations in areas with infrequent cultivation and dense undervine vegetation
- Observed organism- *Noctua pronuba*
- Severe outbreaks, they even get the secondary shoots.

Scouting:

Early spring:

- Leaf litter/undervine vegetation
- Wait for damage
- Night scouting

Summer:

- Light traps
- Kick through the brush

Noctua pronuba- Large Yellow Underwing

Traditional:

Carbaryl 2 qts/acre
Cyfluthrin 2.4-3.2 fl oz/ac
Chlorantraniliprole 3–4.5 oz/ac
Bifenthrin 8–16 fl oz

Biological Insecticide:

Chromobacterium 1-3 lbs/acre
Spinosad 4–8 fl oz
Bacillus thuringiensis **subsp. kurstaki** 0.50 -1.25lbs/ac

Biological Insecticide:

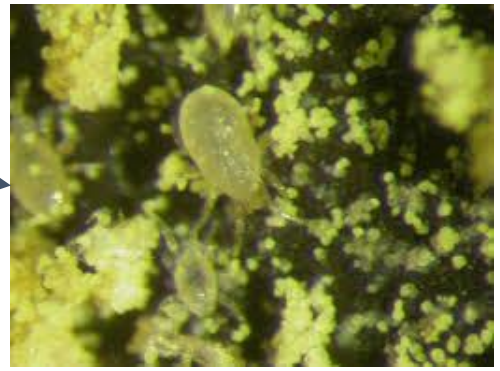
Trichogramma spp. 3x egg cards post Adult appearance

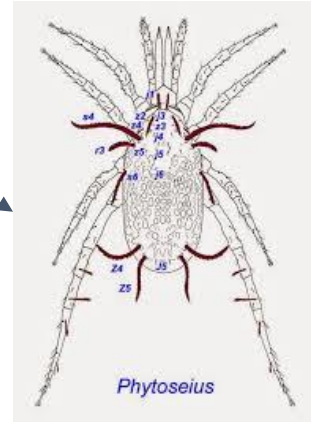
Questions going forward:

Given the Oregon Climate, which organisms would be good candidates to trial in a vineyard setting to combat eriophyidae and tetranychidae?

- *Kampimodromus aberrans*- too agressive?
- *Phytoseius finitimus*- incompatible with the climate?
- Phytoseiulus longipes

- A phytoseiid may love (to eat) tetranychidae but where will the live?!?!





Questions Going Forward

What are considerations for cover crops within the context of other farming decisions i.e. no till, potential incompatibilities?

Is an approach that favours building and retaining indigenous populations/species and supplementing more likely to succeed and be resilient than adding potentially more competitive exotics?

Ensuring distribution in the field, or, there's got to be a better way?

Questions Going Forward

What resources are available for training personnel to scout for both pests and predators in the field?

What strategies for designing and implementing a bio-pest control program are the most important:

- Matching the predatory to site?
- Modifying the site to attract and accommodate more predators?
- What effect and in what way should traditional fungicide programs be modified to amplify beneficial effects and increase predator survival?
- Should existing native plant species selections guide beneficial selection?

Do potentials for university-lead studies exist?

Which organisms show the most potential and should be investigated first?

FIN

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