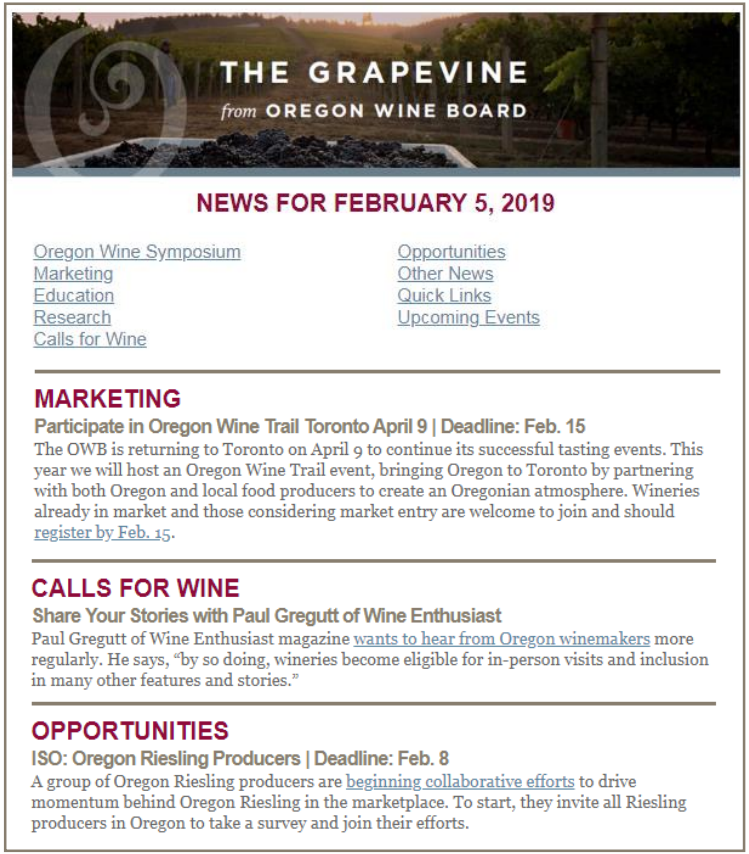
OWB UPDATE: INDUSTRY COMMUNICATIONS, INSIGHTS AND STRATEGIC PLANNING

JESS WILLEY

OREGON WINE BOARD

OREGON WINE SYMPOSIUM
FEBRUARY 12, 2019

IF YOU DO ONE THING…



THE GRAPEVINE
from OREGON WINE BOARD

NEWS FOR FEBRUARY 5, 2019

Oregon Wine Symposium
Marketing
Education
Research
Calls for Wine
Opportunities
Other News
Quick Links
Upcoming Events

MARKETING

Participate in Oregon Wine Trail Toronto April 9 | Deadline: Feb. 15

The OWB is returning to Toronto on April 9 to continue its successful tasting events. This year we will host an Oregon Wine Trail event, bringing Oregon to Toronto by partnering with both Oregon and local food producers to create an Oregonian atmosphere. Wineries already in market and those considering market entry are welcome to join and should register by Feb. 15.

CALLS FOR WINE

Share Your Stories with Paul Gregutt of Wine Enthusiast

Paul Gregutt of Wine Enthusiast magazine wants to hear from Oregon winemakers more regularly. He says, "by so doing, wineries become eligible for in-person visits and inclusion in many other features and stories."

OPPORTUNITIES

ISO: Oregon Riesling Producers | Deadline: Feb. 8

A group of Oregon Riesling producers are beginning collaborative efforts to drive momentum behind Oregon Riesling in the marketplace. To start, they invite all Riesling producers in Oregon to take a survey and join their efforts.

Read the Grapevine!

- Media calls for wine
- Webinar and workshop sign-ups and recordings
- Updates on OWB-funded research
- Marketing programs
- Partner news
- Events to attend or participate in
- Competitions to enter
- Educational seminars and conferences
- Grant opportunities

… and much, much more

SIGN UP BUTTON AT BOTTOM OF HOMEPAGE

→ INDUSTRY.OREGONWINE.ORG ←

AND ABOUT THAT WEBSITE...

INDUSTRY.OREGONWINE.ORG

- Marketplace
- Marketing toolkits
- Oregon Wine Profit Planner
- Industry events calendar
- Recordings of educational seminars
- Grapevine archives
- OWB-funded research reports
- Board of Directors information and meeting minutes
- Annual winery and vineyard census report

... and much, much more

NOT FINDING WHAT YOU'RE LOOKING FOR?

EMAIL US: info@oregonwine.org

ANNUAL VINEYARD AND WINERY REPORT

UNIVERSITY OF OREGON

Institute for Policy Research and Engagement
1209 University of Oregon
Eugene, OR 97403-1209
Phone: (541) 346-3889 | Email: rgp@uoregon.edu

2017 Oregon Vineyard and Winery Report

September 2018

Overview:

2017 saw increases in sales, revenue, and production for Oregon wineries and vineyards.

- The leading variety in planted acreage and production remains Pinot Noir accounting for 58% of all planted acreage and 59% of production.
- The overall number of vineyards increased from 1,056 to 1,144 and total planted acreage increased by more than 3,000 acres from 30,435 to 33,631, an increase of 10.5%.
- The overall number of wineries increased from 725 to 769 with the biggest increases coming from the Eastern Oregon/at large areas increasing by 18, and the Rogue Valley increasing by 13.
- Total tons crushed increased by 9.3% from 70,579 tons to 77,170 tons
- Case sales increased 6% from 3.39 million to 3.60 million, supported by increases in international sales, direct to consumer channels, and domestic sales outside of Oregon.
- Leading the export markets for Oregon wine is Canada, which accounted for 49% of export sales.

OWB'S FOUNDING STATUTE

"The Oregon Wine Board shall operate for the purpose of supporting enological, viticultural and economic research to develop sustainable business practices for wine grape growing and wine making within Oregon and supporting the promotion of Oregon's wine grape growing and wine making industries."

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OWRI / OSU WINE CLUB BEHAVIORS STUDY

Your participation needed!

- Get insights on your own wine club while helping our community gain a better understanding of Oregon wine clubs
- Next round of winery recruitment in March 2019
- All data is strictly confidential and reported in aggregate only

Want to learn about your wine club?

Have questions you'd like included in the study?

Visit Dr. James Sterns at the **OWRI booth #150** tomorrow morning or email him: **jastern@oregonstate.edu**

NEW STRATEGIC PLAN FOR VITICULTURE AND ENOLOGY RESEARCH

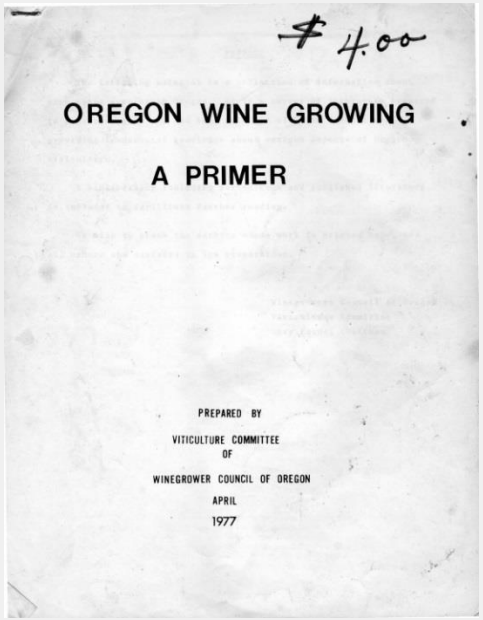
JASON TOSCH
OWB DIRECTOR & RESEARCH COMMITTEE CHAIR

OREGON WINE BOARD

OREGON WINE SYMPOSIUM
FEBRUARY 12, 2019

A BRIEF HISTORY OF OREGON WINE RESEARCH (ABRIDGED)

1970s — 1980s — 1990s — 2000s — 2010s — Today & beyond



$4.00

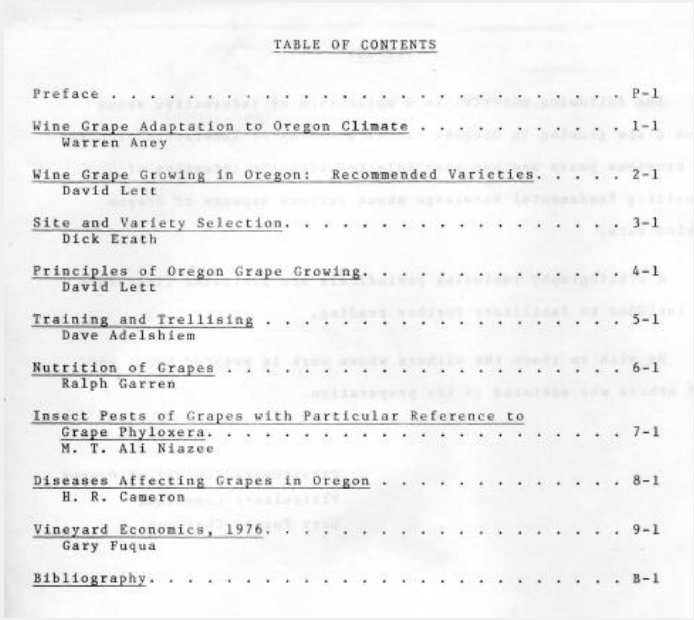
OREGON WINE GROWING

A PRIMER

PREPARED BY

VITICULTURE COMMITTEE
OF
WINEGROWER COUNCIL OF OREGON

APRIL
1977



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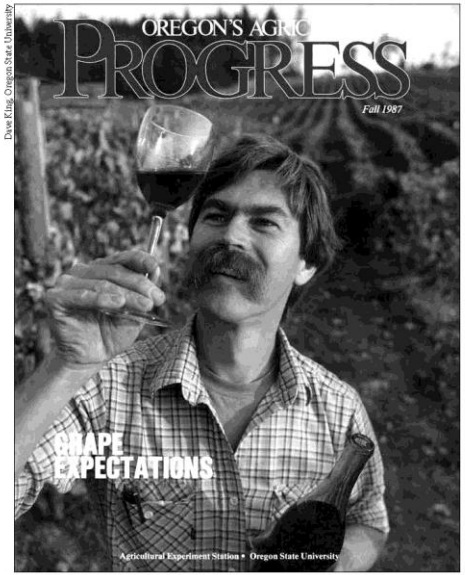


A BRIEF HISTORY OF OREGON WINE RESEARCH (ABRIDGED)

1970s — 1980s — 1990s — 2000s — 2010s — Today & beyond

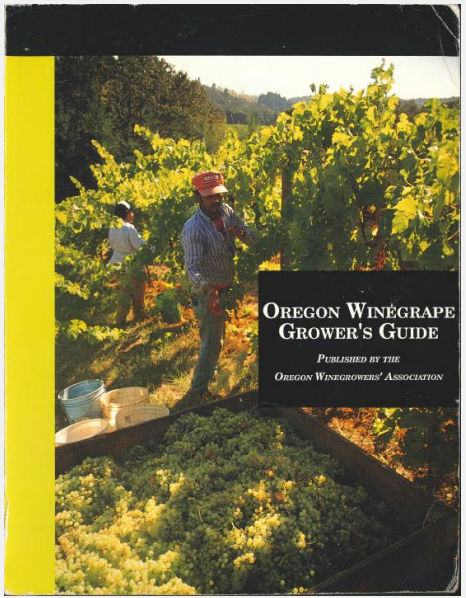
Leaf Canopy Structure and Vine Performance

M. CARMO VASCONCELOS[1]* and STEVE CASTAGNOLI[2]

Leaf canopy structure of mature Pinot noir grapevines was manipulated during two consecutive seasons: shoot tipping at full bloom (yes or no), lateral shoot length (no laterals, laterals cut back to four leaves at full bloom, laterals allowed to grow undisturbed), and cluster zone leaf removal (leaf removal in the cluster zone or no leaf removal). Treatments were carried out in factorial combinations. Shoot tipping at bloom increased percent fruit set, berries per cluster, cluster weight, yield per shoot, and yield to pruning ratio. Shoot tip removal also increased main and lateral leaf size and the contribution of lateral leaves to total leaf area. Tipping decreased total yield per vine, juice pH, leaf area per vine, pruning weight, and cane weight and sugars in the trunk during dormancy. Increasing lateral shoot length increased juice soluble solids, juice pH, skin anthocyanin content, cane weight, and sugar and total non-structural carbohydrates in the trunk during dormancy. Percent fruit set increased in the absence of vegetative growing tips, on either the main or lateral shoots. Leaf removal in the cluster zone four weeks after bloom had no impact on yield components but reduced juice soluble solids.

LIVE

Est. 1997



Acknowledgements: The authors thank the Oregon Wine Advisory Board for financial support of this project and the colleagues Bernadine Strik and Les Fuchigami for critical review of the manuscript.

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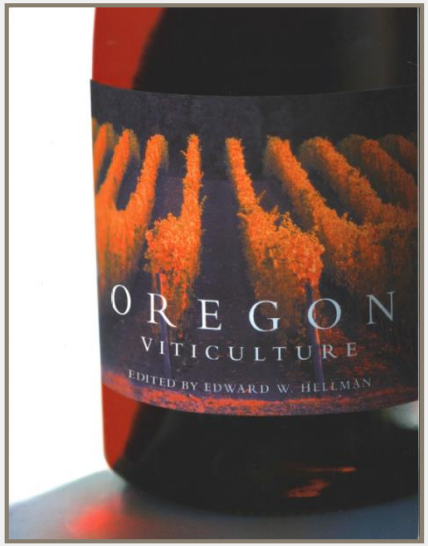
▲ **Cover crop trials at Stoller Estate, tilled vs. grass**
Photo credit: Dr. Patty Skinkis



Pot-in-pot trials Photo credit: Dr. Paul Schreiner ▲

Mycorrhizal Colonization of Grapevine Rootstocks under Field Conditions

R. Paul Schreiner*

Mycorrhizal colonization of grafted grapevines was studied during early establishment of an experimental rootstock vineyard to determine rootstock variability forming functional mycorrhizas. Roots of 10 different rootstocks were examined for the presence of arbuscular mycorrhizal (AM) fungi at the end of the second growing season (1998), and at the time of veraison (onset of ripening) of the third (1999) and fourth (2000) growing seasons. The fine root length density (primary roots with intact cortex) increased in 6

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Oregon State University
Oregon Wine Research Institute










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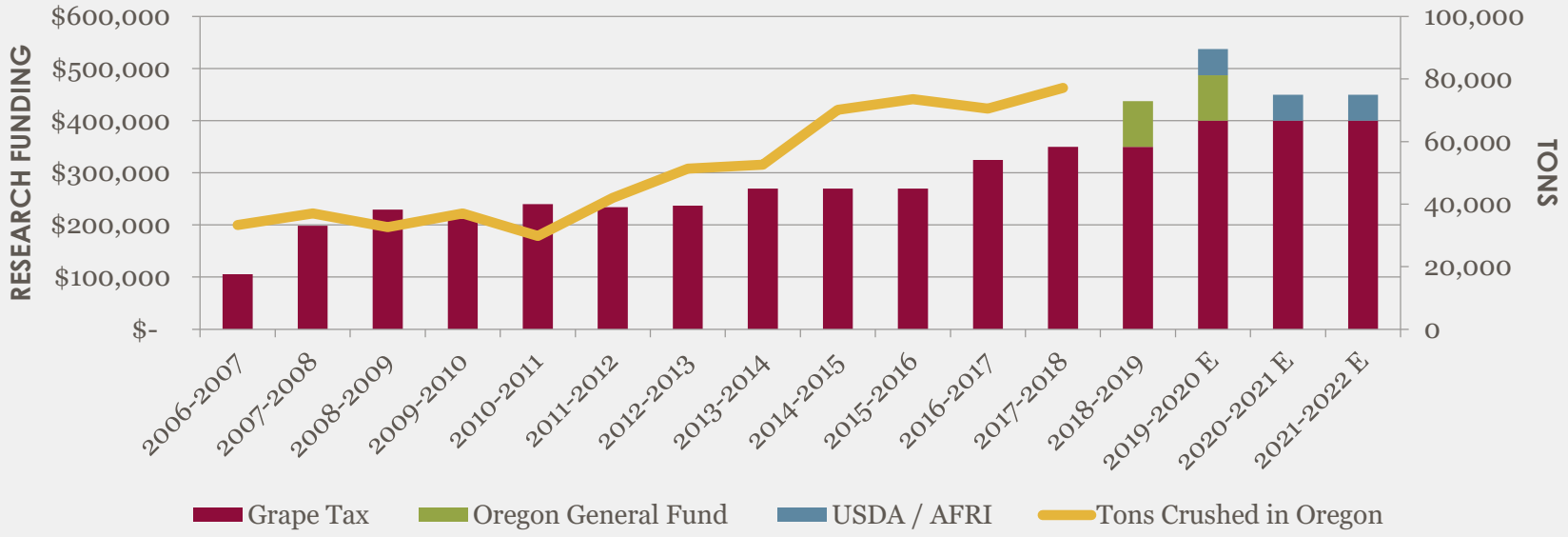


THE SITUATION

MORE INVESTMENT BEING MADE IN V&E RESEARCH THAN EVER BEFORE

RESEARCH IS AN OWB MANDATE

INDUSTRY AND LANDSCAPE ARE RAPIDLY EVOLVING

27 YEARS SINCE SILVER FALLS RESEARCH SUMMIT, 1991

THE TASK

… TIME FOR ANOTHER SUMMIT!

UPDATE VISION FOR OWB RESEARCH PROGRAM

EVALUATE CURRENT NEEDS OF GROWERS, PRODUCERS AND WINE BUSINESSES

SET STRATEGIC PRIORITIES FOR NEXT 5-10 YEARS

TIME TO PLAN A NEW RESEARCH SUMMIT!

THE STEERING TEAM

Leigh Bartholomew

Dr. David Beck

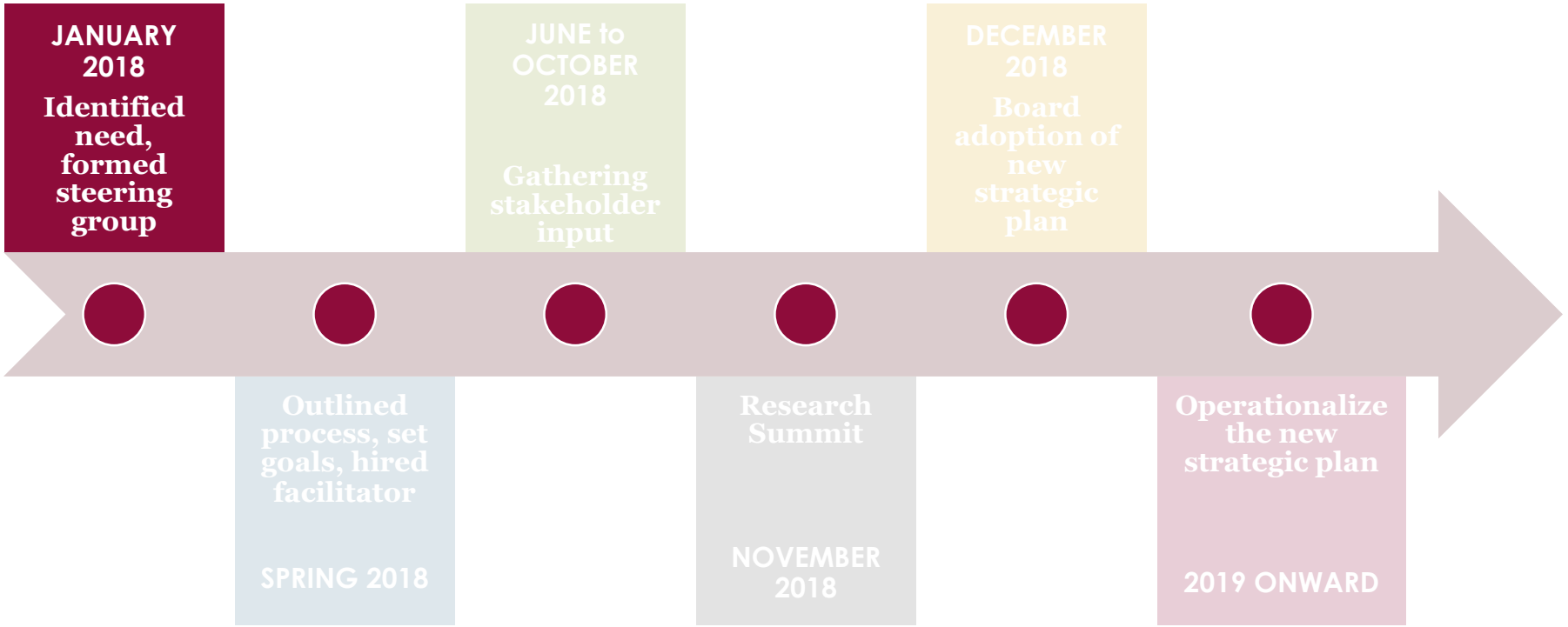
Kevin Chambers

John Pratt

Jason Tosch

J.P. Valot

PATH TO A NEW STRATEGIC PLAN



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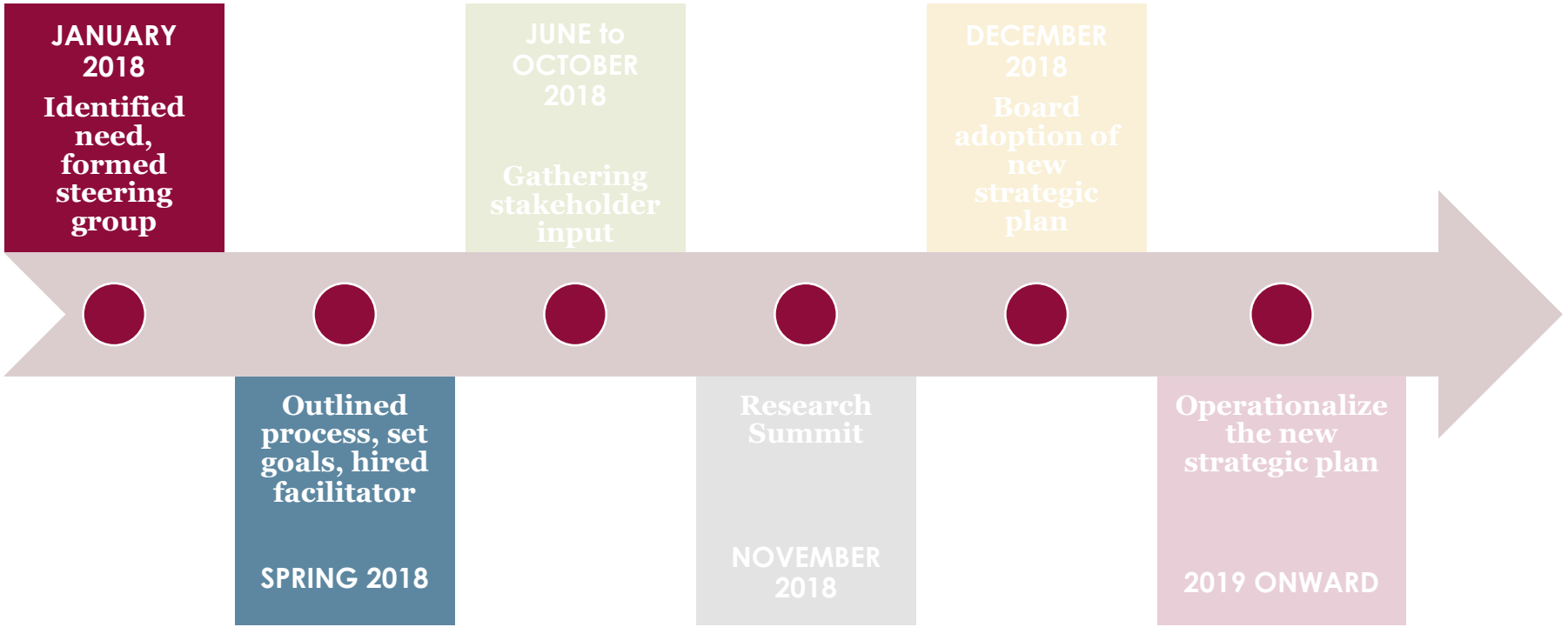

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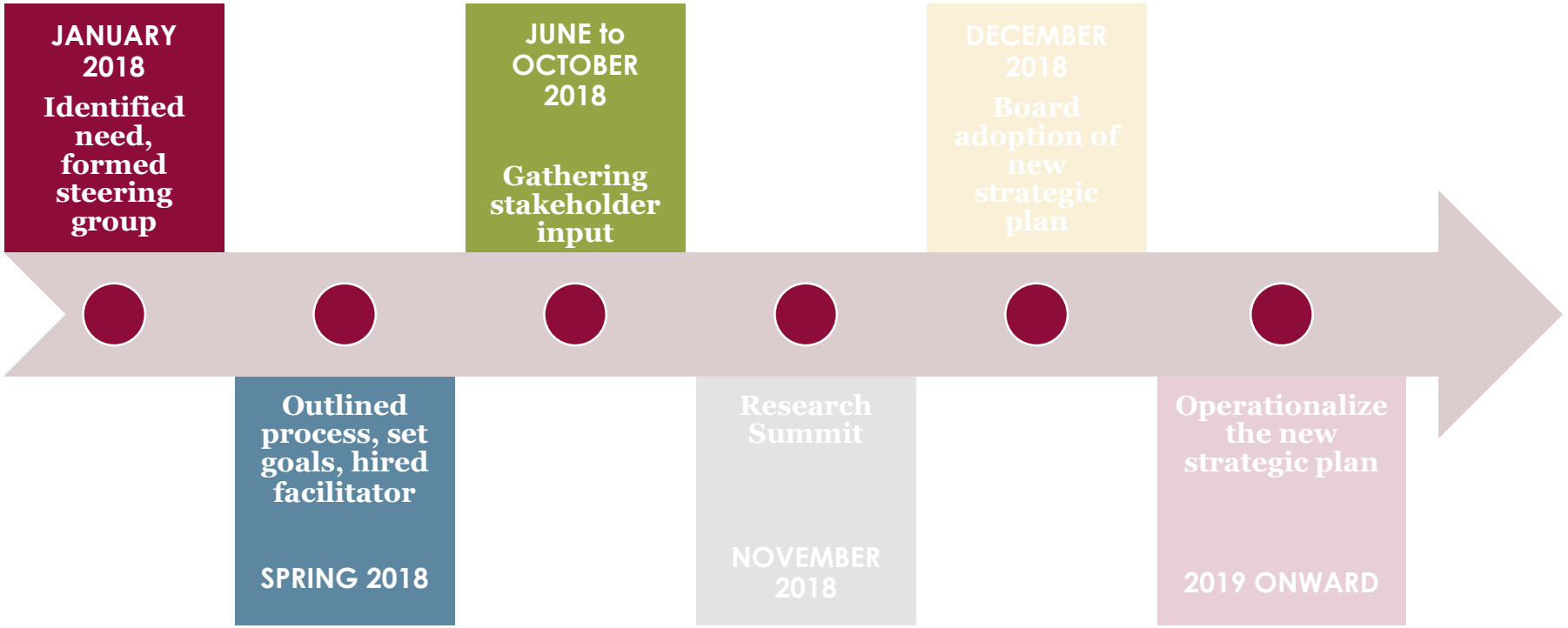


INDUSTRY INPUT INTO STRATEGIC PLAN DEVELOPMENT

INDUSTRY-WIDE SURVEY

SIX-STOP LISTENING TOUR

EXECUTIVE INPUT

What you told us:

Keep funding research: it's important and we need it!

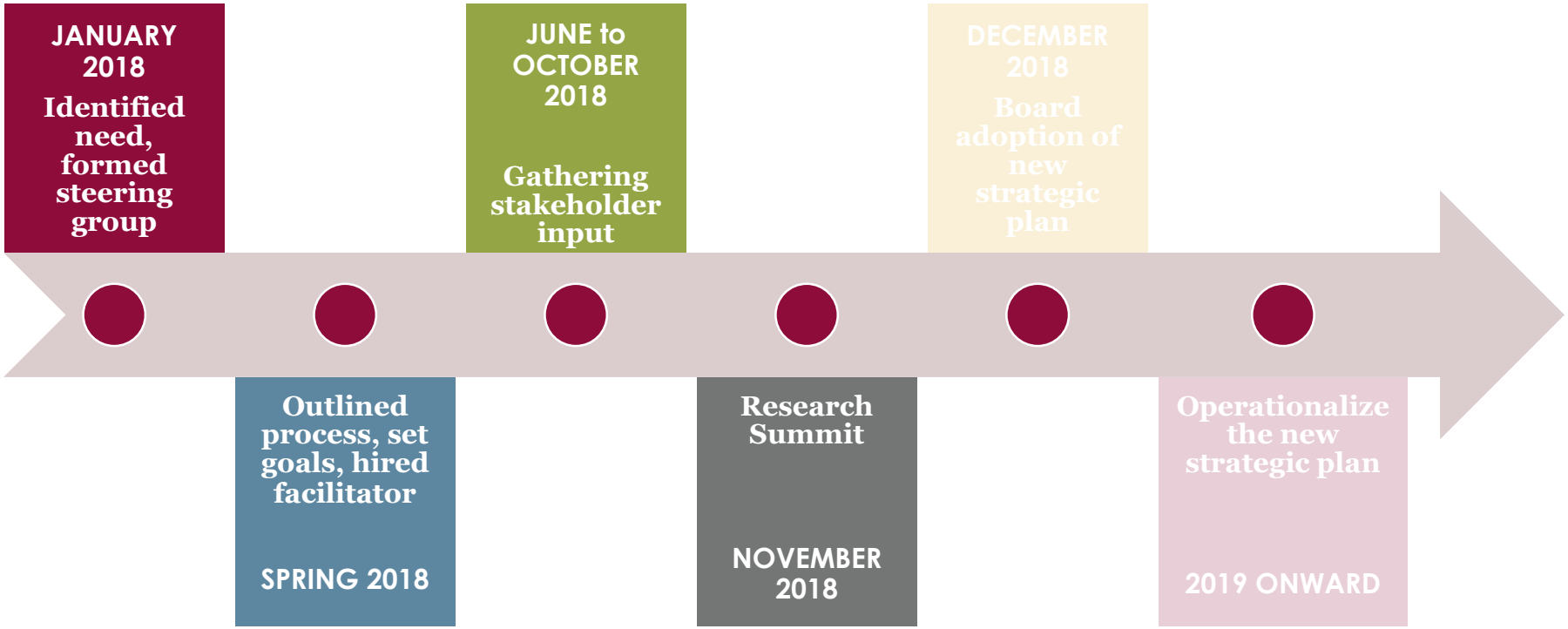
Make sure we're addressing Oregon-specific issues. Bonus points for statewide applicability.

Immediate needs must be balanced with forward-looking opportunities and threats.

Applied outcomes should be realistic for small-scale operations.

PLEASE increase our access to and education about research results.

PATH TO A NEW STRATEGIC PLAN



RESEARCH SUMMIT: NOVEMBER 1-2, 2018

Leigh Bartholomew
David Beck
Ted Casteel
Kevin Chambers
Mark Chien
Jason Cole
Dai Crisp
Sadie Drury
Gina Hennen
Greg Jones
Anthony King
Ken Kupperman
John Pratt
Herb Quady
Michael Moore
Ray Nuclo
Harry Peterson-Nedry
Julie Tarara
Jason Tosch
J.P. Valot
Chad Vargas

Facilitated by: Jessica Mozeico

LOOKING TO THE FUTURE: KEY ISSUES TO ADDRESS

IMPLICATIONS OF A CHANGING CLIMATE

DISEASE AND PEST PRESSURES

INCREASED MECHANIZATION / DECREASED SKILLED LABOR

DIVERSIFICATION OF SCALE OF OPERATIONS

INCREASING PRODUCTION COSTS

GROWING DEMAND FOR SUSTAINABLE FARMING

NEW STRATEGIC PRIORITIES FOR V&E RESEARCH

1. **WINE QUALITY**
Support advancements in wine quality and site expression by enhancing markers of quality in the vineyard and winery.

2. **SUSTAINABLE PRODUCTION**
Lead in developing sustainable practices to minimize inputs and reduce impact.

3. **CHANGING CLIMATE**
Facilitate adaptation of vineyard and winemaking practices to future climatic conditions.

4. **FOUNDATIONAL RESEARCH**
Foster viticulture and enology discovery that has the potential to provide foundations for future applications that address the other three strategic pillars.

OUR NEW VISION

Champion continuous improvement of Oregon's capacity to produce **world-class wines that reflect a sense of place** by sponsoring **industry-leading research** in the development of **sustainable practices and climate-adaptive skills**.

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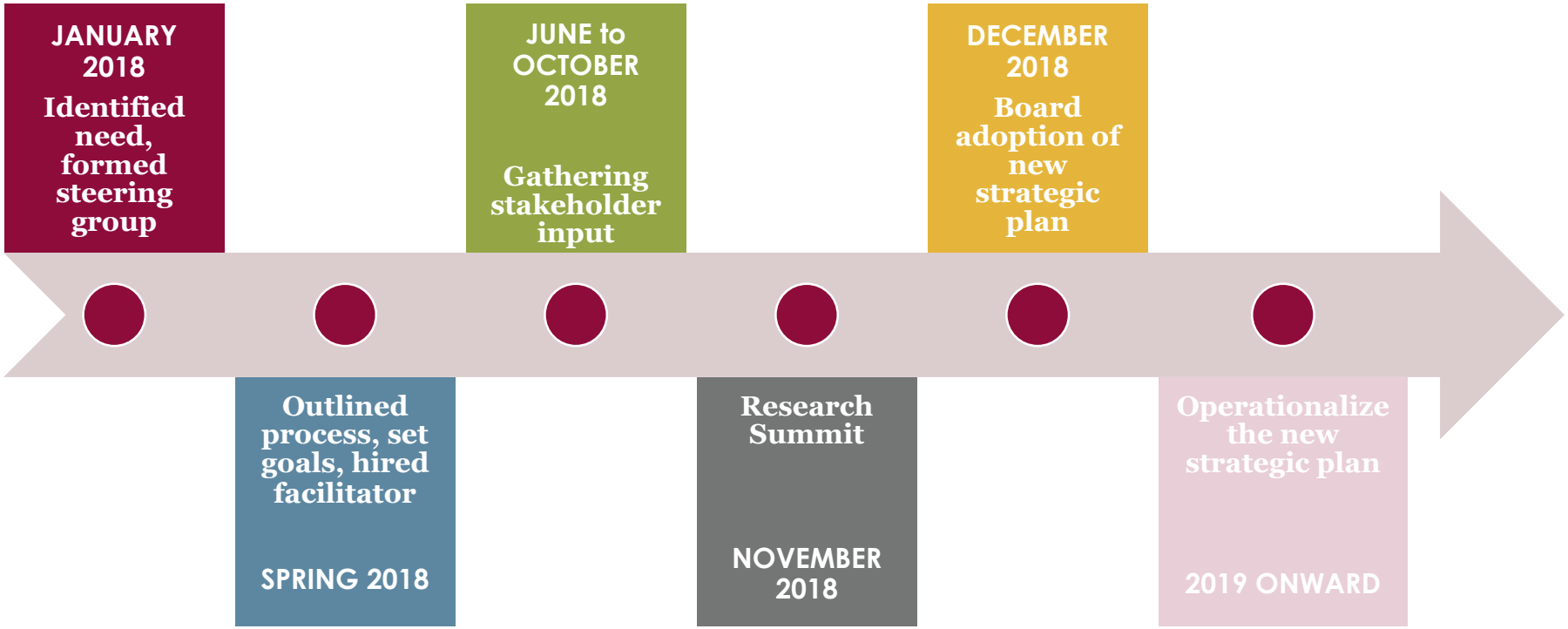
Champion continuous improvement of Oregon's capacity to produce world-class wines that reflect a sense of place by sponsoring industry-leading research in the development of sustainable practices and climate-adaptive skills.

WHAT IS REQUIRED FOR SUCCESS?

EDUCATION AND OUTREACH	TRACKED AND MEASURED METRICS	ECONOMIC IMPACT OF RESEARCH
Enable vineyards and wineries to apply research results	**Relevance of Topics** **Quality of Research** **Utility of Results**	Quantify and inform financial impact of implementation

PATH TO A NEW STRATEGIC PLAN



PATH TO A NEW STRATEGIC PLAN

WHAT'S NEXT? OPERATIONALIZING THE STRATEGIC PLAN

REVISE RFA DOC & REVIEW PROCESS

Align applications and review process with new strategic priorities

IDENTIFY NEW FUNDING OPPORTUNITIES

Matching grants

Leveraged funding

Private / public

State / federal / global?

CREATE ONLINE KNOWLEDGE CENTER

Ensure past, present and future research is easily accessible

DEVELOP SCORECARD TO TRACK PROGRESS

Track, measure and communicate how your tax dollars are invested for impact

QUESTIONS? ASK YOUR RESEARCH LEADERSHIP TEAM

Leigh Bartholomew	David Beck	Ted Casteel
Kevin Chambers	Mark Chien	Jason Cole
Dai Crisp	Sadie Drury	Gina Hennen
Greg Jones	Anthony King	Ken Kupperman
John Pratt	Herb Quady	Michael Moore
Ray Nuclo	Harry Peterson-Nedry	Julie Tarara
Jason Tosch	J.P. Valot	Chad Vargas

RED BLOTCH FUNDING APPEAL

DR. GREG JONES

EVENSTAD
CENTER *for* WINE EDUCATION
LINFIELD COLLEGE

OREGON WINE BOARD

OREGON WINE SYMPOSIUM
FEBRUARY 12, 2019

FUNDING FOR RED BLOTCH RESEARCH

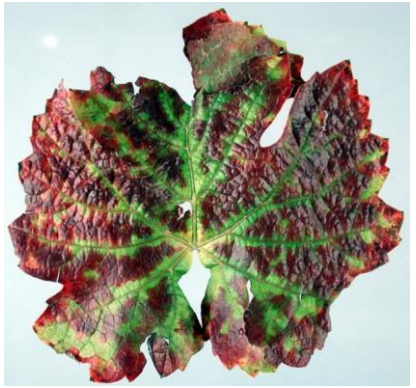
Dr. Greg Jones, Erath Family Foundation

OREGON WINE BOARD

OREGON WINEGROWERS ASSOCIATION

The Problem

- Grapevine Red Blotch Virus was discovered in 2012
- GRBV affects vineyards across Oregon
- Vineyard health and sustainability
- Wine quality
- Questions:
  - How widely spread is GRBV in Oregon vineyards?
  - Is it spreading? If so, how?



OREGON WINE SYMPOSIUM
PORTLAND

The Solution: Accelerate Research

- The OWRI Red Blotch Study Team is formed in 2017
  - Virology, entomology, plant physiology and enology
- In 2018, a $500,000 commitment from Domaine Serene
  - Enhanced GRBV research in the Willamette Valley
- Regional and multi-state research
  - OSU SOREC
  - WSU, UC Davis, UC Berkeley, Cornell
- Working towards science-based extension recommendations in the vineyard and cellar
  - A red blotch information webpage on the OSU Extension website
  - Annual red blotch meeting in November in Salem

The Team and Objectives

Team

- Jana Lee, USDA entomology
- Joyce Loper, OSU, science leader
- Bob Martin, USDA virology
- James Osborne, OSU enology
- Michael Qian, OSU flavor chemistry
- Patty Skinkis, OSU viticulture
- Vaughn Walton, OSU entomology

Other team members:

- Achala KC, OSU pathology
- Alex Levin, OSU viticulture

Project managers: Leigh Bartholomew and Mark Chien

Objectives

- Evaluate genetic diversity of GRBV
- Identify vector(s)
- Map GRBV in vineyards
- Understand vine physiology and fruit quality impact
- Determine impact on wine quality
- Develop GRBV information website

Matching Funds for Red Blotch

- Domaine Serene wine industry matching funds challenge: $ **500,000**
- Erath Family Foundation $ 30,000
- Oregon Wine Board research projects (FY ’19)
  - Bhaskar Bondada “Red blotch microscopy” $ 43,066
  - Alex Levin “Red blotch cultural practices” $ 56,314
- American Vineyard Foundation (UGMVE)
  - Michael Qian “Red blotch flavor and aroma chemistry” $ 70,800

Total matching funds $ 200,180

OREGON WINE SYMPOSIUM PORTLAND

Your Support for Red Blotch Research!

- Acting as a community against a serious threat
- Example: Pierce's disease check off in California
- Invitation to combat Red Blotch through research
  - Meeting the Challenge Grant: $300,000 to go
- How to Make a Donation
  - Donations can be made to the OSU Foundation
- Gifts of any size make a difference
- Initial research proposal and first year report available upon request (ask Mark Chien)

OREGON WINE SYMPOSIUM
PORTLAND

Make a Donation

- Visit Ben McLuen at the OWRI booth #150 from 2-3 PM TODAY!
- Contact Todd Bastian or Ben McLuen at the OSU Foundation
  - Todd.Bastian@osufoundation.org or 541-737-8724
  - Ben.McLuen@osufoundation.org or 541-737-5495
- Questions: Mark Chien, Oregon Wine Research Institute
  - 541-737-1273
  - mark.chien@oregonstate.edu

.. and YOU!

Red Blotch Proposal and Update: available upon request

Oregon State University
Oregon Wine Research Institute

Grapevine Red Blotch Research Plan

The Core Red Blotch Study Team (RBST) Members:
Robert Martin, USDA-Agricultural Research Service (plant pathology-virology)
James Osborne, OSU Dept. of Food Science and Technology (enology)
Patricia Skinkis, OSU Dept. of Horticulture (viticulture)
Vaughn Walton, OSU Dept. of Horticulture (entomology)
Mark Chien, OSU OWRI (Project Administrator)

Domaine Serene Project Leader:
Leigh Bartholomew, Results Partners (Project Coordinator and liaison)

Science Lead:
Joyce Loper, OSU CAS Associate Dean (plant pathology and molecular biology)

Other RBST members:
Valerian Dolja, OSU Dept. of Botany and Plant Pathology (plant virology)
Achala KC, OSU Dept. of Horticulture (plant pathology)
Jana Lee, USDA-Agricultural Research Service (entomology)
Alex Levin, OSU Dept of Horticulture (viticulture)
Marcelo Moretti, OSU Dept of Horticulture (weed science)
Jay Pscheidt, OSU Dept. of Botany and Plant Pathology (extension plant pathology)
Jungmin Lee, USDA – Agricultural Research Service (food technology)

Introduction
Grapevine red blotch virus (GRBV) has been identified in many vineyards in western Oregon and has been reported to impact juice and wine quality. Grapevine red blotch disease (GRBD) was first described in 2008 in California as a distinct disease, but likely was present long before that but confused with grapevine leafroll disease. GRBV was identified in 2012, and research on the virus, its vectors, and impact on yield and fruit and wine quality has been underway since then in California, New York, Oregon, and Washington. There is still very little known about the vectors of this virus, with a single report of transmission by treehoppers (CA) and leafhoppers (WA), and no documented vector transmission in Oregon. It takes time to understand the virology, vectors, transmission, and their complex relationships, and effects on vine physiology, and grape and wine quality.

Current management recommendations focus on the use of clean plant materials for new vineyards or for replanting sections of vineyards. For established vineyards, modifications to vineyard and wine making practices may provide additional solutions. Information on virus transmission and vector management is necessary before replanting can be recommended as a management strategy for the virus. The Oregon Wine Research Institute (OWRI) at Oregon State University (OSU) began initial work on RBST in 2012 and assembled a multi-disciplinary team (i.e. RBST) in 2017 to focus on GRBV, with the goal of producing science-based management recommendations for the wine industry. The RBST focuses currently on the virus, vector(s) identification and transmission, and the impact of GRBV on vine physiology and wine quality. We will also establish a comprehensive red blotch website that makes information on GRBV available to industry, outlining the research efforts underway in Oregon and nationwide.

Domaine Serene (DS) has presented the RBST with a research gift of $500,000 to accelerate current GRBV research, with the possibility of an additional $500,000 in wine industry matching funds. RBST research described herein will begin in May 2018, and will extend and supplement current projects within a two year (or less time) frame. The initial effort by core RBST members is based on an initial budget of $500,000 and will inform the future course of research as more funds become available, with the goal of understanding the nature, mechanisms and impact of the GRBV, leading towards management recommendations and a possible virus vaccine.

Objectives:
1. Develop and manage online content for GRBV – Skinkis
2. Evaluate genetic diversity of GRBV in the Willamette Valley--Martin
3. Identify the vector(s) of GRBV in the Willamette Valley – Martin, Lee (Jana), and Walton
4. Map the virus in DS vineyard – Martin
5. Understand vine physiological and fruit quality impacts in Willamette Valley Pinot noir – Skinkis
6. Determine the impact of GRBV on quality of Willamette Valley Pinot noir – Enology team (Lee (Jungmin), Osborne, Qian, Tomasino)

Expected Outcomes of this Project:
1. A website with current and comprehensive GRBV information.
2. Knowledge of the genetic variability of GRBV in the Willamette Valley, which will be used in the future to improve detection and to identify RNAi targets for development of disease management vaccines.
3. Identification of insect vector(s) and transmission of GRBV in the Willamette Valley.
4. Baseline data on GRBV actual virus distribution in the vineyard to supplement existing data based on symptoms. This information will inform efforts to assess the effects of GRBD on vineyard health, fruit quality, and chemical properties of wine.
5. Knowledge of the influence of vineyard management practices on health, physiology and fruit quality of GRBV infected vines.
6. Knowledge of the impact of GRBV on volatiles, phenolics, and sensory components of wine.

Communication is a key to a successful partnership and outcomes. Leigh Bartholomew (Results Partners) and Mark Chien (OWRI) will act as research liaisons between DS and OWRI, and offer quarterly updates and an annual report to both teams, as well as facilitate research and education needs and meetings as they arise. The goal is to provide the DS production team and growers in

Oregon State University
Oregon Wine Research Institute

December 2018

Domaine Serene Grapevine Red Blotch Virus Research Update

The OWRI Red Blotch Study Team completed the first growing season of research funded by a gift from Domaine Serene. The areas of study include virology, entomology, physiology, viticulture, and enology. The research faculty submitted research summaries in preparation for a January 4 meeting at Domaine Serene. These reports are updates and work is still in progress. We hope this information will provide further insights and elicit questions for discussion.

1. Red Blotch Transmission Study – Bob Martin and Jana Lee Labs

To identify potential vectors of Grapevine Red Blotch Virus (GRBV), we collected insects directly from vines by shake sample and vacuum, and the between-row vegetation, weeds, and surrounding vegetation (oaks and border areas). All insects were kept cool, and sorted in the laboratory by morphotype. From June to October 2018, two aphid species, one big-eyed bug, three froghopper, 11 leafhopper, two plant bug, one hemipteran, and one stink bug (*Euschistus conspersus*) species were tested for virus transmission. One froghopper species was collected repeatedly and tested each time. Insects have been pinned and submitted for species identification.

To test virus transmission, each insect morphotype was placed in a cage with a GRBV+ potted seedling for six days where they had no other food source to acquire the virus. Thereafter, four clean 'test' seedlings were added to each cage to allow insects to move and feed on them for another seven days. At the end of the feeding period insects were killed in the cage with an insecticide strip. Test seedlings were treated with systemic insecticide so they would not be fed upon further by insects, and allowed to grow outdoors. Virus tests of the vines will be done over time to check for successful virus transmission. Due to an apparent latency period, virus transmission results may not be reliable for up to two years based on research findings from Cornell. We did not detect any GRBV in test plants at the end of the 2018 growing season (mid-October).

Testing in Blocks 6 and 5E confirmed a high incidence of GRBV, and it was not possible to do experiments with GRBV + and - plants in these blocks. In Block 3, where the abscisic acid (ABA) trial was carried out, GRBV + and – plants were identified, and treatment with ABA could be compared in infected and healthy plants.

Note: We did not test virus presence in collected insects because a positive PCR result can occur when an insect feeds on an infected plant, but this does not indicate transmission ability to the plant.

2. Red Blotch Vector Research – Vaughn Walton Lab

Distribution, non-crop host plants, and seasonal phenology of candidate vector insects were confirmed during both 2017 and 2018. Work was conducted in two vineyards during 2017, and three during 2018. We found candidate vector insect species, *Tortistilus albidosparsus, t. wickhami, Osbornellus* spp., and *Melaniarus* spp., and confirmed *Spissistilus festinus* in the Willamette Valley. Earlier work showed spread of GRBV over successive years using virus testing on a grid pattern within vineyards. This trend was confirmed in one of the trial vineyards during the 2018 season.

Treehoppers primarily lay eggs in perennial suitable host plants surrounding vineyards. These plants include oak, apple and pear. Larvae from hatching eggs move to vetch and wild carrot where they develop into adults. Adults then move to green plant tissues of perennial species as soon as annual plant tissues dry out during the latter portion of the growing season. This life cycle was observed in 2017 and 2018 by a combination of collection techniques including vacuum sampling, sweep netting, sticky trap monitoring, and observing feeding symptoms on vines. Adults are able to locate and mate on perennial plants including winegrapes, but are unable to lay eggs on annual host plants. Adults feed on perennial host plants for extended periods of time, including grapevines, potentially spreading GRBV.

Feeding damage and distribution of treehoppers is concentrated on vineyard edges in close proximity to suitable wild habitat. Feeding on grapevines typically can be found on green canes or leaf petioles with a diameter of up to 0.08 inches. Feeding produces characteristic girdling and in red-fruited varieties may result in red flagging of tissues above the girdle. This information will help growers identify potential host plants, assess whether the vineyard landscape is favorable to candidate vector insects, and determine whether such vectors are present. Controlled virus transmission trials showed persistence of virus in the candidate insect vector species up to five weeks after acquisition. Transmission biology experiments were conducted and refined during 2017 and 2018. Virus testing of plants receiving virus-infected vector insects is being optimized in order to confirm transmission with the candidate vector insects.

3. Red Blotch Viticulture Trials – Patty Skinkis Lab

Symptomology/Physiology (Block 3, untreated control area)
Since this is the first year for of research on-site, we needed to closely monitor plant phenology and symptoms to make decisions about the most important viticulture data to collect. We focused our physiological data collection on a small section of Block 3 to allow us to monitor individual vines within untreated areas of Block 3.

The first visual symptoms of the virus (red blotchy leaves, only basal and at proximal shoots) was recorded just before veraison on 6 Aug 2018. Vines were selected for monitoring and physiological measures during the week of 13 Aug 2018 and we continued through to harvest as conditions and time allowed. We measured leaf greenness/chlorophyll (SPAD), photoassimilation and stomatal conductance (LICOR infrared gas analyzer) and water stress (pressure chamber). We obtained our photoassimilation and stomatal conductance measures on vines that previously had symptoms (vines flagged in 2016/2017), those to first show symptoms this year (not tagged), and those with no symptoms (not tagged and showing no symptoms).

THANK YOU

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