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A. EDUCATION AND EMPLOYMENT INFORMATION

1. Education

PhD, University of California, Davis, 2016.
Major: Horticulture and Agronomy
Dissertation Title: Effects of Water Deficits on Growth and Productivity of Seventeen *Vitis vinifera* L. Cultivars

Coursework (2010-2012), Washtenaw Community College, 2012.
Major: Life Sciences

Coursework (2009-2010), Napa Valley College, 2010.
Major: Viticulture and Winery Technology

BA, University of Michigan, Dearborn, 2008.
Major: Psychology

2. Employment history

(2022 - Present) Associate Professor (Viticulturist), Oregon State University.

(2016 - 2022) Assistant Professor (Viticulturist), Oregon State University.

(2015) Associate Instructor, University of California, Davis.

(2014) Teaching Assistant, University of California, Davis.

(2013 - 2014) Course Reader, University of California, Davis.

(2010 - 2012) Server/Assistant Sommelier, The Chop House and La Dolce Vita.

(2010) Winery Harvest Intern - Napa Valley, California, O'Shaughnessy Estate Winery.

(2008 - 2010) Hospitality Specialist II, Beringer Vineyards.

(2008) Winery Harvest Intern - Napa Valley, California, Boeschen Vineyards.

B. TEACHING, ADVISING AND OTHER ASSIGNMENTS

1. Instructional Summary

i. Credit courses

Summary table of guest lectures given:

Course	Title	Enrollment	Term	Year
Since hire				
HORT 605	Virus Effects on Grapevine Physiology and Metabolites	1	Winter	2021
AEC 475	Introduction to Viticulture	19	Fall	2018
HORT 507/607	Deficit Irrigation of Pinot noir in a Warm Climate	5/2	Winter	2018
HORT 454	Vineyard Water and Irrigation Management	15	Spring	2017

ii. Non-Credit Courses and Workshops

Summary table of presentations to clientele since hire/last promotion:

Type	No. events inside region	No. events outside region		Invited teaching events			Total no. of attendees
		Statewide	National	State wide	National	International	
Class Series/Short Course	5	1	0	0	0	0	261
Field Days/Tours	7	0	0	0	0	0	284
Presentations	14	2	2	2	2	0	515
Conferences or Symposia	15	5	4	4	4	1	1,831
Workshops	7	5	0	4	0	0	442
TOTAL	**48**	**13**	**6**	**10**	**6**	**1**	**3,333**

[DEI] *Presentations related to work with underrepresented populations*

2022

Southern Oregon Viticulture. SOREC 111th Anniversary. Central Point, OR. October 17, 2022. (110 adult educational contacts). **Invited**.

The "No-Touch" Vineyard for Complete Mechanization. SOREC Grape Day. Central Point, OR. July 19, 2022. (40 adult educational contacts).

Vine Water Stress Monitoring. OWRI Vineyard Scouting Workshop. Umpqua, OR. June 29, 2022. (63 adult educational contacts).

Optimizing Irrigation Initiation in Vineyards. Walla Walla VIT TECH. Milton-Freewater, OR. May 25, 2022. (16 adult educational contacts). **Invited**.

Crop Water Status: Precipitation, Soil Moisture & Crop Water Use. Medford Irrigation District Board Meeting. Jacksonville, OR. May 11, 2022. (15 adult educational contacts). **Collaborative Effort.**

Viticultural Practices for Drought Preparedness. RVWA Viticulture Technical Meeting. Central Point, OR. May 4, 2022. (31 adult educational contacts).

Irrigation District Update and Water Supply Situation. Central Point, OR. May 3, 2022. (11 adult educational contacts). **Invited**.

Optimizing Irrigation Initiation in Oregon Vineyards. OWRI Grape Day. Corvallis, OR. April 26, 2022. (100 adult educational contacts).

Optimizing Irrigation Initiation in Oregon Vineyards [DEI]. Southern Oregon Grape Symposium. Central Point, OR. March 15, 2022. (68 adult educational contacts).

Water Use Survey, Irrigation Initiation Trial, Irrigation Scheduling How-To [DEI]. Oregon Wine Symposium. Remote/Online platform. February 17, 2022. (207 adult educational contacts). **Invited.**

2021

Diagnosis of Grapevine Mineral Nutrition Deficiencies. Bilingual Field Day for Vineyard Workers [DEI]. Rogue Valley, OR. August 13, 2021. (26 adult educational contacts).

Grapevine Red Blotch Virus: Research Updates Leading to Improved Management. Knight's Grapevine Nursery Open House. Phoenix, OR. August 12, 2021. (24 adult educational contacts).

Using Dye Test to Understanding Irrigation Wetting Front Depth. Southern Oregon Wine Grape Field Day. Central Point, OR. July 20, 2021. (40 adult educational contacts).

Highlights of Irrigation Initiation Experiment. Southern Oregon Wine Grape Field Day. Jacksonville, OR. July 20, 2021. (53 adult educational contacts).

Efficient Irrigation Scheduling and Trade-offs of Vineyard Irrigation Management with a Limited Water Supply [DEI]. Southern Oregon Spring Viticulture Technical Meeting. Zoom. April 27, 2021. (62 adult educational contacts).

Southern Oregon Viticulture. Jackson County Commissioners Meeting. Zoom. April 27, 2021. (5 adult educational contacts).

Irrigation Research and Management Strategies [DEI]. Oregon Wine Symposium. Remote/Online platform. February 19, 2021. (164 adult educational contacts). **Invited.**

2020

Does Water Deficit Negatively Impact Wine Grape Yield Over the Long Term? [DEI] Merano Wine Festival. Zoom. November 8, 2020. (50 adult educational contacts). **Invited.**

Where Are We Now? A Deeper Understanding of Grapevine Red Blotch Virus Effects on Grapevine Physiology [DEI]. 2020 Oregon Wine Research Institute (OWRI) Red Blotch Webinar Series. Zoom. October 20, 2020. (95 adult educational contacts).

Viticulture Research in Southern Oregon [DEI]. Fresno State University Viticulture and Enology Seminar Series. Zoom. October 7, 2020. (30 adult educational contacts). **Invited.**

Grapevine Water Stress and Monitoring Thereof [DEI]. Willamette Valley Viticulture Technical Meeting. Zoom. July 8, 2020. (40 adult educational contacts). **Invited.**

Irrigation Management: Art or Science? [DEI] VIEN 2610: Spring Vineyard Practicum. Cornell University. Zoom. May 8, 2020. (15 adult educational contacts). **Invited.**

Current Understanding of GRBV Infection on Grapevine Physiology. iQ Conference. St. Helena, CA. February 27, 2020. (402 adult educational contacts). **Invited.**

Update on Viticulture Research in Southern Oregon. OVS Grower Meeting. Medford, OR. February 6, 2020. (50 adult educational contacts).

2019

Current Understanding of Grapevine Red Blotch Virus Effects on Grapevine Physiology. OWRI Red Blotch Workshop. Salem, OR. November 20, 2019. (50 adult educational contacts). **Invited.**

How to Use a Pressure Chamber to Schedule Irrigation. Bilingual Field Day for Vineyard Workers [DEI]. Rogue Valley, OR. August 13, 2019. (30 adult educational contacts).

New viticulture research blocks at SOREC. Southern Oregon Wine Grape Field Day. Rogue Valley, OR. July 23, 2019. (45 adult educational contacts).

Grapevine Irrigation and Nutrition Management. Grape Growing in Southern Oregon: A Comprehensive Viticulture Education Program. Central Point, OR. July 9, 2019. (30 adult educational contacts). **Collaborative Effort.**

Grapevine Canopy Management. Grape Growing in Southern Oregon: A Comprehensive Viticulture Education Program. Central Point, OR. May 30, 2019. (23 adult educational contacts). **Collaborative Effort.**

Grapevine Water Relations. Vineyard Water Management Short Course. Napa, CA. May 22, 2019. (40 adult educational contacts). **Invited.**

How Much Should I Irrigate? Scientific Irrigation Management [DEI], Central Point, OR. May 2, 2019. (28 adult educational contacts). **Collaborative Effort.**

Water Footprint, Productivity, and Drought Responses of 17 Wine Grape (*Vitis vinifera* L.) Cultivars in the San Joaquin Valley. Symposium Honoring Larry Williams. Davis, CA. April 18, 2019. (100 adult educational contacts). **Invited.**

Grapevine Pest and Disease Management. Grape Growing in Southern Oregon: A Comprehensive Viticulture Education Program. Central Point, OR. April 16, 2019. (23 adult educational contacts). **Collaborative Effort.**

Red Blotch Disease Update. Oregon Wine Research Institute Grape Day. Corvallis, OR. April 3, 2019. (120 adult educational contacts). **Collaborative Effort.**

Research Update on Grapevine Red Blotch Trials in Southern Oregon. 5th Annual Southern Oregon Grape Symposium. Central Point, OR. March 12, 2019. (85 adult educational contacts). **Collaborative Effort.**

So, What're Ya Gonna Do About Red Blotch? Oregon Wine Symposium. Portland, OR. February 13, 2019. (200 adult educational contacts). **Invited.**

Scheduling Irrigation with a Pressure Chamber. United Wine Grape & Fruit Outreach Day. Walla Walla, WA. February 5, 2019. (22 adult educational contacts). **Invited.**

Grapevine Pruning. Grape Growing in Southern Oregon: A Comprehensive Viticulture Education Program. Central Point, OR. January 29, 2019. (28 adult educational contacts). **Collaborative Effort.**

Southern Oregon Viticulture Research Update. Rogue Valley Winegrowers Association (RVWA) Annual Dinner. Jacksonville, OR. January 26, 2019. (55 adult educational contacts).

2018

(Potentially) Mitigating GRBD with Management Practices. OWRI Red Blotch Workshop. Salem, OR. November 29, 2018. (50 adult educational contacts). **Invited.**

OSU Viticultural Research in Southern Oregon. RVWA Annual Vineyard Tour. Rogue Valley, OR. July 24, 2018. (50 adult educational contacts).

Beyond ET: Irrigation Management Fundamentals. 2018 Walla Walla Valley Viticulture Workshop. Walla Walla, WA. July 11, 2018. (35 adult educational contacts). **Invited.**

Irrigation Management Fundamentals. RVWA Technical Meeting. Jacksonville, OR. June 5, 2018. (25 adult educational contacts).

"Clean" and "Certified" Vines: Where You Can Get Them, and Why Source Matters. Regionalizing Grape Quarantine and Certification Programs in the Pacific Northwest. Central Point, OR. May 2, 2018. (19 adult educational contacts).

Sustainable Management of Grapevine Red Blotch Disease. OVS Grower Meeting. Medford, OR. February 12, 2018. (78 adult educational contacts).

Southern Oregon Viticulture Research Update. RVWA Annual Dinner. Jacksonville, OR. January 28, 2018. (60 adult educational contacts).

2017

Grapevine Water Relations. 2017-18 Pete Christensen Wine Grape Short Course. Davis, CA, December 12, 2017. (200 adult educational contacts). **Invited.**

Vineyard Irrigation in Southern Oregon: Principles and Practices. Southern Oregon Wine Institute Spring Seminar Series. Roseburg, OR. April 12, 2017. (20 adult educational contacts).

Management of Grapevine Red Blotch Disease. OWRI Special Seminar. Online Delivery. March 2, 2017. (50 adult educational contacts). **Invited.**

Viticulture Research in Southern Oregon. OVS Grower's Meeting. Medford, OR. February 2, 2017. (75 adult educational contacts).

Plans for Viticulture Research in Southern Oregon. RVWA Annual Dinner. Jacksonville, OR. January 29, 2017. (75 adult educational contacts).

Summary table of workshops/tours/events organized since hire/last promotion:

Type	Total events	Role	Total attendees
Field Days/Tours	8	Coordinator/Organizer/Facilitator	312
Meetings	8	Coordinator/Organizer/Facilitator	297
Presentations	2	Coordinator/Organizer/Facilitator	87
Workshops	1	Coordinator/Organizer/Facilitator	35
Conferences or Symposia	5	Coordinator/Organizer/Facilitator	423
TOTAL	**24**		**1,154**

2022

Bilingual Workshop for Vineyard Workers [DEI]. Rogue Valley, OR. August 30, 2021. (26 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

SOREC Grape Day. Rogue Valley, OR. July 19, 2021. (40 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

7th Annual Southern Oregon Grape Symposium [DEI]. Central Point, OR. March 15, 2022. (68 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

2021

Bilingual Field Day for Vineyard Workers [DEI]. Rogue Valley, OR. August 13, 2021. (26 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Southern Oregon Wine Grape Field Day. Rogue Valley, OR. July 20, 2021. (55 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Southern Oregon Spring Viticulture Technical Meeting [DEI]. Zoom. April 27, 2021. (62 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

2020

Willamette Valley Viticulture Technical Group Meeting [DEI]. Zoom. July 8, 2020. (40 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

6th Annual Southern Oregon Grape Symposium. Central Point, OR. March 11, 2020. (80 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

2019

Bilingual Field Day for Vineyard Workers [DEI]. Rogue Valley, OR. August 13, 2019. (30 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Southern Oregon Wine Grape Field Day. Rogue Valley, OR. July 23, 2019. (45 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

OSU Spring Vineyard Mechanization Workshop. Central Point, OR. May 17, 2019. (35 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

5th Annual Southern Oregon Grape Symposium. Central Point, OR. March 12, 2019. (85 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

2018

Southern Oregon 2018 Harvest Wrap-up. RVWA Technical Meeting. Medford, OR, November 14, 2018. (45 adult educational contacts). **Collaborative Effort**. *Role: Coordinator/Organizer/Facilitator.*

Smoke Taint in Grapes and Wines: 2018 Pre-harvest Seminar. Oregon Wine Board Special Seminar. Central Point, OR. August 27, 2018. (37 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

RVWA Vineyard Tour. Rogue Valley, OR. July 24, 2018. (50 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Vineyard Nutrition and Irrigation Management Fundamentals. RVWA Technical Meeting. Jacksonville, OR. June 5, 2018. (25 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Strategies for Controlling Powdery Mildew, Insects, and Weeds. RVWA Technical Meeting. Central Point, OR. April 24, 2018. (20 adult educational contacts). **Collaborative Effort**. *Role: Coordinator/Organizer/Facilitator.*

4th Annual Southern Oregon Grape Symposium. Central Point, OR. March 13, 2018. (90 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

The Lombard Block: Honoring Porter Lombard. Central Point, OR. March 12, 2018. (50 adult educational contacts). *Role: Coordinator/Organizer/Facilitator.*

2017

Southern Oregon 2017 Harvest Wrap-up. RVWA Technical Meeting. Medford, OR. November 14, 2017. (45 adult educational contacts). **Collaborative Effort.**
Role: Coordinator/Organizer/Facilitator.

Managing Viral Disease in Vineyards/Whole Farm Revenue Protection. RVWA Technical Meeting. Central Point, OR. August 22, 2017. (35 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Technology in Wine Grape Production Systems. RVWA Annual Vineyard Tour. Rogue Valley, OR. July 20, 2017. (40 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

Vineyard Pest and Disease Management: Floor to Canopy. RVWA Technical Meeting. Jacksonville, OR. June 6, 2017. (25 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

3rd Annual Southern Oregon Grape Symposium. Central Point, OR. March 14, 2017. (100 adult educational contacts). **Collaborative Effort.** *Role: Coordinator/Organizer/Facilitator.*

iii. Curriculum Development

Credit

Not applicable

Non-Credit

Scheduling Irrigation with a Pressure Chamber

Situation: The pressure chamber is the gold standard instrument for plant-based irrigation scheduling – considered to be the most precise type of irrigation scheduling. However, there is a lack of methodological consensus among pressure chamber users (among scientists in the literature). Additionally, a needs assessment showed that there was lack of theoretical understanding and consistent practical technique (among commercial users). Therefore, detailed, easy-to-follow, and concise materials describing the theory and practice of pressure chamber-based irrigation scheduling needed to be developed.

Approach: After successful completion of experiments testing commonly used methods against one another, I produced instructional videos describing pressure chamber usage. I produced two videos – theory (part one) and practice (part two). I wrote the entire script for each video, as well as sketched out and designed storyboards/shot sequence. After contacting OSU Extension Communications, I collaborated with an animator to produce all animations per storyboard direction. After scripts were peer-reviewed (see below), videographer and I shot all live scenes together in vineyard and laboratory. Each video was then edited together as group.

Outcomes and Impact: The two resulting videos were published online in July 2018. Since that time, they have collectively received ~11,500 views or ~16 per day and have been highly regarded by both industry and academic colleagues across five continents. The local Oregon-based company that produces the instrument I feature in the videos informed me that their sales increased by 300% in the year following video publication, with continued steady growth after that.

Scholarship: The scripts of each video went through two rounds of peer review for Extension publications (at OSU level first, then at PNW level), and were published as official PNW Extension publications (Section C).

iv. Graduate and Undergraduate Students and Postdoctoral Trainees

Postdoctoral Trainees

Dr. Suraj Kar		2022 – Present

Graduate students advised

Cody Copp	MS	2021	Current position: Extension Horticulturist Umatilla

Graduate students, committee member

James Wirth	MS	2023	(expected)
Ling Huang	PhD	2022	
Justin Litwin	MS	2020	

Awards received by graduate students. ARCO-Swallow Fellowship (Copp); Graduate School Thesis Completion Award (Copp)

Undergraduate students advised

Ian Ivey	2022 – present	(project mentor)
Bryson Goto	2021 – 2022	(project mentor)
Cameron Clonch	2020 – 2021	(project mentor)
Claire Kirk	2020	(project mentor)
Carlee Wormington	2019	(project mentor)
Reese Crebbin	2018 – 2019	(project mentor)
Ray Schireman	2018 – 2019	(project mentor)
Garrett Greenway	2018	(project mentor)
Nels Wedin	2018	(project mentor)
Rebecca Lake	2017	(project mentor)
Tannar Williams	2017	(project mentor)

Postdoctoral trainees

Manuel Garcia-Jaramillo	2018-2020	Current position: Asst. Professor at OSU

Visiting scientists hosted/trained

Glenn McGourty. County Director/Viticulture & Plant Science Advisor. University of California Cooperative Extension – Mendocino County. USA. August 6, 2017 - August 10, 2017.

v. Team or Collaborative Outreach Efforts

Credit

N/A

Non-Credit

This section provides additional detail to events previously listed above.

OSU Wine Grape Field Day(s) [DEI]. Rogue Valley, OR. Held every July (English) and August (Bilingual).
Description of Efforts: These events bring together OSU researchers and local growers for a tour of various vineyard projects, including, but not limited to new developments, research trials, and innovative production practices being conducted throughout the Rogue Valley winegrowing region. Often featuring presentations from local growers and OSU scientists, the event provides an opportunity for scientific outreach as well as socialization for growers and an opportunity to gain experience from one another directly. A sister event also features a bilingual field day, with most programming in Spanish, allowing for improved learning outcomes for farmworkers. The events are organized in collaboration with the RVWA Technical Committee, which includes Randy Gold (RVWA board member and committee chair), Jason Cole (Grower and RVWA technical committee member), Sean Naumes (Grower and RVWA technical committee member), Achala KC (OSU-SOREC), and Gordon Jones (OSU-SOREC).

Southern Oregon Grape Symposium [DEI]. Central Point, OR. Held every March.
Description of Efforts: This day-long symposium is the premier educational event for the Southern Oregon wine grape industry. The event features academic-style seminars, grower discussion panels, and tasting of wines from research trials. The purpose is to provide up-to-date science-based information to wine grape growers from the research and extension community, while also providing a forum for a technical discussion of relevant production-focused topics. The symposium is organized in collaboration with the RVWA Technical Committee (members described above).

Southern Oregon Viticulture Technical Meetings [DEI]. Rogue Valley, OR. Held regularly from April through November.
Description of Efforts: These 2- to 3-hour workshops are held regularly throughout the growing season from April through November and focus on the technical aspects of wine grape production in the Rogue Valley. Speakers (from either academia or industry) are invited to present on diverse topics relevant to production viticulture such as pest and disease management, irrigation management, and nutrition management. The workshops are organized in collaboration with the RVWA Technical Committee (members described above).

Grape Growing in Southern Oregon: A Comprehensive Viticulture Education Program.
Description of Efforts: Held regularly from February to July. A new program developed in 2019 that focuses on basic viticultural instruction for home and beginning growers in the Rogue Valley. This four-course series covers basic principles of viticulture, from pruning and training to irrigation management. The program is offered through the Master Gardener program and relies on a demonstration vineyard located at SOREC to provide hands-on learning experiences that complement the classroom component. This series is organized by me together with Erika Szonntag (Master Gardener Coordinator; OSU-SOREC).

OSU Spring Vineyard Mechanization Workshop. Central Point, OR, May 17, 2019.
Description of Efforts: This workshop was the second one in a series of three offered by the OWRI in 2019 that all focused on various vineyard mechanization practices. This Spring workshop focused specifically on mechanical under-vine weed management and featured several short talks together with field equipment demonstrations. This specific event was organized by me in collaboration with Drs. Marcelo Moretti and Patty Skinkis (OSU).

Smoke Taint in Grapes and Wines: 2018 Pre-harvest Seminar. Oregon Wine Board Special Seminar. Central Point, OR. August 27, 2018.
Description of Efforts: A short seminar (2 hours) was organized by ETS Labs, the Oregon Wine Board, and OSU-SOREC to bring together growers and winemakers in the Rogue Valley to discuss issues related to smoke taint in grapes and wines. The presenters characterized the problem and discussed potential management solutions.

OWRI Red Blotch Webinar [DEI]. OWRI Special Seminar. Online Delivery. March 2, 2017.
Description of Effort: This webinar was coordinated to present vital information to industry on an emerging issue faced by commercial wine grape growers. Dr. Patty Skinkis (OSU) coordinated the group of presenters who provided content on various aspects of the disease. The webinar was delivered online to a state and regional audience (Oregon and Pacific Northwest). Other collaborators included: Drs. Bob Martin (USDA-ARS), Daniel Dalton (OSU), Achala KC (OSU-SOREC), Richard Hilton (OSU-SOREC), and Clive Kaiser (OSU-Umatilla County Extension).

2. Student and Participant/Client Evaluation

i. Credit Courses

N/A

ii. Non-Credit Courses and Workshops

Summary of client evaluations of teaching (CET):

Date	Teaching event	No. of Respondents	Quality of event*	Quality of instruction*
March 15, 2022	7th Annual Southern Oregon Grape Symposium	17	5.6	5.7
April 27, 2021	Southern Oregon Spring Viticulture Technical Meeting	17	5.5	5.5
March 11, 2020	6th Annual Southern Oregon Grape Symposium	32	5.5	5.5
March 12, 2019	5th Annual Southern Oregon Grape Symposium	27	5.4	5.4
March 13, 2018	4th Annual Southern Oregon Grape Symposium	25	5.6	5.6
March 14, 2017	3rd Annual Southern Oregon Grape Symposium	41	5.4	5.3

*Mean ratings on a scale of 1-6: 1=poor, 6=excellent

3. Peer Teaching Evaluations

Summary letter available upon request

4. Academic Advising

N/A

5. Other Assignments

Improving Irrigation Management of Wine Grapes in Southern Oregon

Situation: With surface water supply becoming more limited, little to no groundwater supply, and rapidly increasing wine grape acreage in Southern Oregon, wine grape irrigation management practices are being more closely scrutinized. Fortunately, there is potential for wine grape crop quality to be improved without

a negative impact on yield by reducing applied water amounts and improving timing of irrigation events. Most previous research on wine grape irrigation management has been conducted in other regions, or on other cultivars that are not commonly grown in Southern Oregon. A preliminary needs assessment of the local industry confirmed that regional producers are not as well-versed in the fundamental principles of irrigation management. Therefore, more regional research and extension efforts should be focused on determining how wine grapes respond to irrigation to help local growers use water most efficiently.

Approach: A combination of research and extension efforts were initiated to assist growers in improving timing and volume of irrigation events in Southern Oregon vineyards. A field trial was started (together with a local grower) to evaluate the impact of various timings and irrigation rates on vine productivity and water-use efficiency as well as on crop quality. In collaboration with on-campus faculty, wines were made and subjected to sensory analyses. To assist growers with irrigation scheduling, experiments testing methodology and validity of commercially available tools – as well as development of new tools – were conducted utilizing the same experimental plots as established in the experiment. Several workshops and informational videos were developed to extend research findings and improved techniques to growers. In addition, numerous farm calls and grower visits have been made to regional vineyards to follow-up and consult on proper usage and application of irrigation management technologies such as the pressure chamber and scheduling using spreadsheet programs.

Outcomes and Impact: Results from early field trials (2017-2019) have shown that reducing applied water amounts by up to 35% compared to estimated crop evapotranspiration did not significantly reduce yields under Southern Oregon growing conditions, and wine grape crop quality was improved regardless of water deficit timing. In addition, methodological evaluation of various irrigation scheduling tools showed that grapevine crop coefficients must be reformulated for Southern Oregon to schedule irrigation more accurately, and that techniques for plant-based measurement tools require re-evaluation. Notably, our new crop coefficients represent a 44% reduction in estimated crop water use compared to AgriMet (US Bureau of Reclamation) estimates, and an 11% reduction compared to estimates from California-developed crop coefficients. Finally, a new crop water stress index (CWSI) model was validated using proximal sensing of canopy temperatures in collaboration with USDA scientists. Thus far, a regional manufacturer of irrigation scheduling equipment has reported that sales of their instruments have increased by 300% as of July 2018, with all units shipping to Southern Oregon. This would suggest that growers are taking a more active role in precision irrigation management because of our research and extension efforts. Finally, applying our new crop coefficients and deficit irrigation results to all Southern Oregon wine grape acreage (~9,200 ac) would amount to a water savings of ~9,000 ac-ft compared to US Bureau of Reclamation estimates of crop water use.

Scholarship. Grant funds for this project were obtained from the Oregon Wine Board, Oregon Wine Research Institute, and the Agricultural Research Foundation (ca. $150,000). Two refereed papers on proper pressure chamber sampling techniques, and one on modelling were published in water management/engineering journals (Section C.1.a.i). In addition, two peer-reviewed PNW extension publications – instructional videos on how to schedule irrigation using a pressure chamber – were developed and published in early July 2018 (Section C.1.a.ii). Since that time, they have received ~12,000 combined views or an average of ~16 views per day. With the completion of these early field trials, the final two manuscripts are in preparation for submission – one describing new crop coefficients, and one on effects of water deficit timing and severity on crop yield and quality. Information has been disseminated to clientele within and outside the region (Section B) and to peers at professional meetings (Section C).

Sustainable Management of Grapevine Red Blotch Disease in Oregon

Situation. Wine grapes are the most valuable fruit/nut crop in Oregon and are produced throughout the state. Since 2015, Grapevine Red Blotch Disease (GRBD), has been an important problem for wine grape producing regions statewide, but particularly in Southern Oregon. Its effect on fruit and wine quality has been reported to reduce profit margins for both growers and wineries, and thus affects whole-industry sustainability. Moreover, there is documented viral spread throughout Oregon vineyards. Though a potential insect – the three-cornered alfalfa treehopper (*Spissistilus festinus*) – has been identified as a competent vector in California greenhouse trials, field transmission has yet to be demonstrated. Without

clear guidelines for vector management, growers' only options are to remove vines or whole vineyards (very costly) or continue to farm infected vineyards.

Approach. A trans-disciplinary approach was used to develop a suite of best management practices for the management of GRBD in Oregon vineyards. A multi-institutional team was assembled that consisted of virologists, entomologists, horticulturists, enologists, chemists, and extension specialists from the OWRI, USDA, and ODA, together with commercial producers across the state. Research objectives included (1) determine disease distribution and incidence, (2) determine presence/role of identified vectors as well as other potential vectors, (3) determine best cultural practices to mitigate negative effects of GRBD, (4) determine effects of cultural practices on wine quality, and (5) disseminate information to statewide growers through a collaborative extension program.

Outcomes and Impact. A preliminary survey of statewide growers (in 2018) indicated that most had heard of and/or had vineyards that were negatively impacted by GRBD. However, there were far fewer that knew of appropriate management strategies (< 35%). Numerous sites across Oregon were surveyed for GRBD symptoms and indicated that disease incidence ranged widely, from 0 to 100%, although the disease was more prevalent in Southern Oregon. Vector transmission and biology work has thus far failed to find alternative GRBV vectors outside of *S. festinus* – and even the latter species has not consistently shown competent transmission in subsequent greenhouse trials on campus at OSU. Further study into the distribution and behavior of this (and related) species is ongoing, and new species are being evaluated. Studies on effects of cultural practices – such as supplemental irrigation/fertilization, crop load reduction, and spraying plant growth regulators – have yielded mixed results. Currently, reducing abiotic stress (i.e., due to drought or malnutrition) seems to be the only effective strategy, and though this may in part mitigate negative effects of GRBD, it will not eliminate them completely. Nevertheless, early data from Southern Oregon experiments coupled with outreach involving wine tasting has changed some growers' attitude regarding management, and in some cases encouraged them to continue farming existing vineyard blocks. This has resulted in a savings of approximately $17,000 per acre per year when considering replanting costs, lost crop, and wine revenue. Follow-up surveys support this anecdotal information with now > 90% of growers understanding potential management strategies.

Scholarship. Grant funds for this project were obtained from the Oregon Wine Board, American Vineyard Foundation, and the Oregon Department of Agriculture (ca. $450,000). Recently, a large grant from the USDA-NIFA Specialty Crops Research Initiative (SCRI) was secured (ca. $3.2 million) by several collaborating institutions including OSU – with me as the institutional lead. The first refereed paper on interaction of water deficits and GRBD has been published, the second paper has been accepted, the third one is in review, and the last two are in preparation. Information from the first three publications has been disseminated to clientele within and outside the region (Section B) and to peers at professional meetings (Section C).

Increasing Insured Wine Grape Acreage in Southern Oregon

Situation. Compared to California and Washington, a strikingly low proportion of grape acreage is covered by crop insurance. Whereas more than 75% of grape acreage is insured in the two other aforementioned states, less than 15% of Southern Oregon's grape acreage was insured when I was hired in 2016 (State of Oregon average was about 30% for grapes). Crop insurance is an affordable, federally subsidized form of risk management that can aid growers in the event of yield loss due to traditional disasters (e.g., drought and frost) as well as for emerging disasters (e.g., damage to fruit due to wildfire smoke exposure). Most recently, the latter situation (smoke exposure) has caused great strain across the wine industry due to increasing fruit rejection by contracting wineries that cite quality concerns in smoke-exposed fruit. Notably, in 2018, a contracting winery from California rejected ~2000 tons of fruit – nearly all of which was grown in Southern Oregon – valued at ~$4 million. Most of the growers whose fruit was rejected did not carry the appropriate crop insurance that would have protected their loss.

Approach. Working with an agricultural economist at OSU, a series of outreach events and products were organized and developed beginning in early 2017. In April of that year, a planning meeting was held with the economist to determine the programs/products we would develop. In August 2017, a viticulture

technical meeting was held in collaboration with the RVWA in which the economist presented current information regarding the USDA's new crop insurance program – Whole Farm Revenue Protection (WFRP). With limited time and only 35 attendees, we were only able to cover the basics of the WFRP program. The following March, the same economist was given more time to present the information (with vineyard examples/case studies) to a larger group (90 attendees) at the 4th Annual Southern Oregon Grape Symposium. Later that year in July (filmed during a smoke event no less), the economist and I directed an informational video with more detail and testimonials from growers who carried crop insurance and explained why. The video was distributed to local/regional growers.

Outcomes and Impact. The relative proportion of insured grape acreage in Southern Oregon has steadily increased to more than 25% since I was hired and began the outreach work in 2017 – nearly 8% per year.

Development of New Research Vineyards at SOREC

Situation. When I was hired as Viticulturist at SOREC in 2016, total vineyard acreage at the experiment station was 0.25 acres of >30-year-old table grapes (mixed cultivars). While conducting on-farm research is important and has many advantages, one the main disadvantages is experimental control. Thus, new research vineyards were planned that would allow for sustained viticultural research for years to come.

Approach. Initially, the idea of planting new research blocks at SOREC was discussed with the RVWA board. The local growers had some concerns about the station's ability to manage vineyards to an industry standard. This was due to past bad experiences with the previous research vineyards at SOREC. Nevertheless, the board was convinced that for the research program to have long-term stability and success, new vineyards would have to be planted on-station. Due to the high cost of vineyard establishment (~$35,000 per acre), industry donations were solicited for trellising, plants, and some irrigation materials.

Outcomes and Impact. The wine grape industry in Southern Oregon (and beyond) overwhelmingly stepped forward and donated a vast majority of the required materials to develop new vineyard blocks. As of Spring 2021, an estimated ~$50,000 of trellising materials were donated by a single grower – enough to plant five acres. In addition, 3,400 grafted plants (valued at ~$17,000) have been donated, with another donation of 2,500 larger plants (valued at ~$20,000) committed for planting in Spring 2022. Local farm labor contractors have also provided labor at cost to reduce installation and development costs. Currently, there are five research blocks and one demonstration block planted (~6 acres).

Decision Support for Local Irrigation Districts

Situation: In early 2021, successive years of far below normal winter rainfall and snowpack left water storage reservoirs in the mountains at historic lows leading into the growing season. Following a warm and dry Spring, irrigation districts reluctantly began deliveries on June 1. Deliveries ended in the second half of July (after a 2-week systemwide shutdown at end of June), with farmers receiving a 20% allocation compared to a normal year. In early 2022, a similar, if not slightly worse, scenario faced districts, as they predicted – at best – another 20% allocation year. With Spring fast approaching, there were questions about when to supply water – early or late? The different patrons of the districts had different preferences on when to receive the water based on their agricultural needs. In the face of this difficult situation, the districts were feeling pressure to make a data-based decision but were not confident in how they would do it.

Approach: I formed a group at SOREC including myself, our extension agent Gordon Jones, and my postdoctoral scholar Suraj Kar. Our group partnered with a large local pear grower who had soil moisture sensors in multiple orchards of different soil types. He generously shared his data with our group, and together with publicly available weather station data, we modeled crop development and soil moisture withdrawals to predict when soil moisture levels would reach similar levels in 2022 as they had in 2021. We then shared the results of our analyses with the various districts so that they could use the information to determine when deliveries should begin.

Outcomes and Impact: We were fortunate that Spring 2022 was significantly cooler, and wetter compared to 2021. Thus, despite the lower reservoir storage compared to the previous year, we were starting with more water in the soil profile in 2022. We used the unusually warm and dry Spring of 2021 as a "worst case scenario" for our modelling exercise. In early May, our predictions showed that both from a crop development *and* a soil moisture perspective, we were approximately 2 weeks behind 2021 *at worst*. At best – meaning if May 2022 was not to be as warm and dry as May 2021 – we were 3-4 weeks behind 2022. We presented our results to the board of directors at the Medford Irrigation District and provided them with a pamphlet summarizing our findings. In response to our presentation, the board shared our findings with the Talent Irrigation District, and both districts adopted a "wait and see" approach, while simultaneously making our work available to their patrons. May 2022 continued to be cool and wet, and deliveries were begun on July 1, and lasted until August 19. Though this only represented a 35% water allocation, district managers reported that their patrons felt more at ease knowing that their districts were working with OSU to help make decisions. Moreover, the delay of starting deliveries increased the amount of time that water was captured in the reservoirs, accounting for that 35% number (original predictions were 20% or less).

Scholarship. While no peer-reviewed publications were produced, the pamphlet of our modeling work was shared with both main irrigation districts, and they subsequently shared it with their patrons in their respectively newsletter postings on their websites. Thus, those responsible for the 20,000 acres of land irrigated by these two districts were well-informed. We made presentations to the irrigation district boards to explain our work, and I also made targeted outreach efforts to both the pear and grape grower communities (Section B).

C. SCHOLARSHIP AND CREATIVE ACTIVITY

Summary of peer-reviewed papers:

Time frame	Refereed papers	Extension publications	Other peer-reviewed materials
Since hire	14	3	22
TOTAL	**14**	**3**	**22**

1. Publications

a. Peer-reviewed

i. Refereed publications

To best reach my peers, I typically publish in plant science, irrigation management, and viticulture/horticulture journals, with an emphasis on open-access publishing. Journals such as Frontiers in Plant Science (Impact factor = 4.4), Agricultural Water Management (Impact factor = 4.0), and the American Journal of Enology and Viticulture (Impact factor = 2.1) publish most of my work.

Role: As lead author, I solicited funding for project, analyzed data, and wrote draft and edited manuscript. As a co-author (corresponding) author to graduate students or others advised in my lab (indicated by a ""), I solicited funding for the project, developed or co-developed the methodology and data analysis and edited or authored the paper. Papers for which I was a co-author and a co-PI on grant for that project are indicated by a "z."*

Williams, L.E., **A.D. Levin**, and M.W. Fidelibus. 2022. Crop coefficients (K_c) developed from canopy shaded area in California vineyards. Agricultural Water Management 271, https://doi.org/10.1016/j.agwat.2022.107771.

KC, A.N., J.B. DeShields, **A.D. Levin**, R.J. Hilton, and J. Rijal. 2022. Epidemiology of grapevine red blotch disease progression in southern Oregon vineyards. American Journal of Enology and Viticulture 73(2):116-124, https://doi.org/10.5344/ajev.2022.21031.

Copp, C.R.*, A.N. KC, and **A.D. Levin.** 2022. Cluster thinning does not improve fruit composition in grapevine red blotch virus-infected *Vitis vinifera* L. American Journal of Enology and Viticulture 73(1):56-66, https://doi.org/10.5344/ajev.2021.21016.

[z]García-Jaramillo, M.*, K.M. Meyer, C.L. Phillips, V. Acosta-Martínez, J. Osborne, **A.D. Levin,** and K.M. Trippe. 2021. Biochar addition to vineyard soils: effects on soil functions, grape yield, and wine quality. Biochar, https://doi.org/10.1007/s42773-021-00118-x.

Copp, C.R.* and **A.D. Levin.** 2021. Irrigation improves vine physiology and fruit composition in grapevine red blotch virus-infected *Vitis vinifera* L. American Journal of Enology and Viticulture 72(4):307-317, https://doi.org/10.5344/ajev.2021.21007.

Levin, A.D. and L. Nackley. 2021. Principles and practices of plant-based irrigation management. HortTechnology 31(6):650-660, https://doi.org/10.21273/HORTTECH04862-21.

[z]McCauley, D., **A.D. Levin**, and L. Nackley. 2021. Reviewing mini-lysimeter-controlled irrigation in container crop systems. HortTechnology 31(6):634-641, https://doi.org/10.21273/HORTTECH04826-21.

[z]King, B.A., K.C. Shellie, D.D. Tarkalson, **A.D. Levin**, V. Sharma, D.L. Bjorneberg. 2020. Data-driven models for canopy temperature-based irrigation scheduling. Transactions of ASABE 63(5):1579-1592, https://doi.org/10.13031/trans.13901.

Levin, A.D. and A.N. KC. 2020. Water deficits do not improve fruit quality in Grapevine Red Blotch Virus-infected grapevines. Frontiers in Plant Science 11:1292, https://doi.org/10.3389/fpls.2020.01292.

Levin, A.D., A. Deloire, and G.A. Gambetta. 2020. Does water deficit negatively impact wine grape yield over the long term? International Viticulture and Enology Society: Technical Reviews, https://doi.org/10.20870/IVES-TR.2020.4029.

Levin, A.D., M.A. Matthews, and L.E. Williams. 2020. Effect of preveraison water deficits on the yield components of 15 winegrape cultivars. American Journal of Enology and Viticulture 71(3):208-221, https://doi.org/10.5344/ajev.2020.19073.

Levin, A.D. 2020. Improvement of pressure chamber protocols - Response to Hochberg (2019). Agricultural Water Management 227, https://doi.org/10.1016/j.agwat.2019.105837.

Levin, A.D., L.E. Williams, M.A. Matthews. 2019. Continuum of stomatal responses to water deficits among 17 wine grape cultivars (*Vitis vinifera* L.). Functional Plant Biology 47(1):11-25, https://doi.org/10.1071/FP19073.

Levin, A.D. 2019. Re-evaluating pressure chamber methods of water status determination in field-grown grapevine (*Vitis spp.*). Agricultural Water Management 221, https://doi.org/10.1016/j.agwat.2019.03.026.

ii. Extension publications

[z]Dalton, D.T., J. Buser-Young, S. Nizich, **A.D. Levin**, V.M. Walton, R.J. Hilton, and L.J. Brewer. 2021. Testing and tracking the spread of Grapevine Red Blotch Virus in Oregon vineyards. EM 9306.

Levin, A.D. 2018. Scheduling Irrigation with a Pressure Chamber, Part 2. PNW 713. https://www.youtube.com/watch?v=s1GJUgvx7t4.

Role: Wrote and edited script and storyboard, including design of animations and shot sequence. Directed filming and editing of video, including live action and animated scenes.

Levin, A.D. 2018. Scheduling Irrigation with a Pressure Chamber, Part 1. PNW 712. https://www.youtube.com/watch?v=uABpZfRnau0

Role: Wrote and edited script and storyboard, including design of animations and shot sequence. Directed filming and editing of video, including live action and animated scenes.

iii. Abstracts from conferences without published proceedings

DeShields, J.B.*, A.N. KC., and **A.D. Levin**. 2022. Foliar potassium application increases fruit total soluble solids by dehydration in Grapevine Red Blotch Virus-infected grapevines. American Society of Enology and Viticulture.

Levin, A.D., M. Stowasser*, R.W. Clark*, and J.B. DeShields*. 2022. Delaying irrigation initiation linearly reduces yield with little impact on maturity in Pinot noir. TerClim: 14th International Terroir Congress.

Levin, A.D., M. Stowasser*, R.W. Clark*, and J.B. DeShields*. 2022. Optimizing irrigation initiation in Oregon Vineyards. OWRI Grape Day.

Copp, C.R.*, J.B. DeShields*, R.W. Clark, M. Stowasser, and **A.D. Levin.** 2021. Grapevine Red Blotch Virus alters leaf carbon metabolism and export but not chlorophyll fluorescence in *Vitis vinifera* L. American Society for Horticultural Science.

Levin, A.D., J.B. DeShields*, and A.N. KC. 2021. Foliar potassium application has limited effect on berry composition in Grapevine Red Blotch Virus-infected grapevines. American Society of Enology and Viticulture.

[z]KC, A.N., J.B. DeShields*, and **A.D. Levin.** 2021. Comparative diagnostic methods Grapevine Red Blotch Virus (GRBV). American Society of Enology and Viticulture.

[z]Clonch, C., M. Huynh, B. Goto, J.S. Selker, C. Udell, and **A.D. Levin.** 2020. Low-cost, low-profile dendrometer optimized for grapevines. AGU Fall Meeting 2020. American Geophysical Union.

Levin, A.D. 2020. Plant water potential-based irrigation management. American Society for Horticultural Science.

Copp, C.R. and **A.D. Levin.** 2020. Response of fruit growth and composition of *Vitis vinifera* L. cv. Pinot noir to pre- and postveraison water deficits in a warm climate. American Society for Horticultural Science.

Copp, C.R., A.N. KC, and **A.D. Levin.** 2020. Efficacy of cultural practices for mitigating negative effects of grapevine red blotch disease in Oregon Pinot noir. American Society for Horticultural Science.

[z]Garcia-Jaramillo, M.*, K. Spokas, **A.D. Levin**, J. Osborne, V. Acosta-Martinez, and K.M. Trippe. 2020. Soil phosphorus content determines grapevine glyphosate uptake and accumulation in wine. American Society for Horticultural Science.

[z]Garcia-Jaramillo, M.*, K. Spokas, **A.D. Levin**, and K.M. Trippe. 2019. Sustainable biochar-based vineyard practices in grape production: improving vineyard productivity while reducing the uptake of pesticides into grapes and wine.

Levin, A.D. and A.N. KC. 2019. Deficit irrigation reduces fruit quality in GRBV-infected Pinot noir grapevines. American Society of Enology and Viticulture.

Copp, C.R.*, A.N. KC, and **A.D. Levin.** 2019. Supplemental vineyard inputs may partially mitigate negative effects of grapevine red blotch disease in Pinot noir. American Society of Enology and Viticulture.

Levin, A.D., A.N. KC, D.T. Dalton, and V.M. Walton. 2018. Exogenous application of abscisic acid (s-ABA) does not influence fruit ripening in red blotch-infected grapevines. American Society of Enology and Viticulture.

Levin, A.D. and A.N. KC. 2018. Interaction of deficit irrigation and grapevine red blotch virus (GRBV) on disease development and grapevine physiology. American Society of Enology and Viticulture.

Levin, A.D. and C.A. Jenkins. 2018. Postveraison water deficits improve Pinot noir fruit quality without a yield penalty. American Society of Enology and Viticulture.

Levin, A.D. 2018. Re-evaluating field methods of water status determination in the vineyard. American Society of Enology and Viticulture.

Levin, A.D., C.A. Jenkins, J. Chiginsky, A.L. Rasmussen, A.N. KC, D.T. Dalton, and V.M. Walton. 2018. Exogenous application of abscisic acid (s-ABA) does not improve fruit composition in red blotch-infected grapevines. OWRI Grape Day 2018.

Levin, A.D., C.A. Jenkins, J. Chiginsky, A.L. Rasmussen, and A.N. KC. 2018. Interaction of deficit irrigation and grapevine red blotch virus (GRBV) on disease development and grapevine physiology. OWRI Grape Day 2018.

Levin, A.D., J. Chiginsky, and C.A. Jenkins. 2018. Postveraison water deficits improve Pinot noir fruit quality without a yield penalty. OWRI Grape Day 2018.

Levin, A.D., T. Williams, and R. Lake. 2018. Re-evaluating field methods of water status determination in the vineyard. OWRI Grape Day 2018.

b. Other Publications – Not peer reviewed

i. Newsletters

Copp. C.R.* and **A.D. Levin.** 2020. Pinot leaf curl disorder. Oregon Wine Research Institute, July Vine to Wine Newsletter.

Copp. C.R.*, A.N. KC, and **A.D. Levin.** 2020. Effects of grapevine red blotch disease (GRBD) on vine physiology and potential vineyard management strategies for symptom mitigation. Oregon Wine Research Institute Technical Newsletter, Spring 2020.

Levin, A.D. 2019. Keeping them fed and happy: Mitigating Grapevine Red Blotch Disease with Cultural Practices. Oregon Wine Board Research Update, February Newsletter.

Levin, A.D. 2019. Determination of Pre- and Postveraison Water Status Targets for Deficit Irrigation of Pinot Noir in a Warm Climate. Oregon Wine Board Research Update, June Newsletter.

KC, A.N. and **A.D. Levin.** 2018. How do deficit irrigation and grapevine red blotch virus influence disease severity, water status, yield, and fruit composition? Oregon Wine Research Institute Technical Newsletter, Summer 2018.

Levin, A.D. 2018. Summer grape daze: meetings, conferences, and podcasts, oh my! Rogue Valley Winegrowers Association, July Newsletter.

Levin, A.D. 2018. Irrigation strategies to improve quality and reduce water use. Oregon Wine Research Institute, June Vine to Wine Newsletter.

Levin, A.D. 2018. Not too early, Oregon Tempranillo is right on time. Rogue Valley Winegrowers Association, February Newsletter.

Levin, A.D. 2017. Management of vine water status under irrigated and non-irrigated conditions. Oregon Wine Research Institute, August Vine to Wine Newsletter.

[z]Martin, R., J.W. Pscheidt, C. Kaiser, R.J. Hilton, P.A. Skinkis, A.N. KC, **A.D. Levin**, and V.M. Walton. 2017. Strategies to manage red blotch virus spread in vineyards. Oregon Wine Research Institute, June Vine to Wine Newsletter.

ii. Websites

Levin, A.D. 2017. Southern Oregon Viticulture Facebook. Menlo Park, CA: Facebook, Inc. https://www.facebook.com/SORECVit

iii. Other authored content (not peer reviewed)

Digital Media

Levin, A.D. Levin Lab Instagram. Instagram. https://www.instagram.com/levinlab/

Research Reports

Levin, A.D. 2021. Sustainable Management of grapevine red blotch disease in Oregon. Oregon Department of Agriculture Specialty Crop Block Grant Program Final Report for 2017-2020 Funding Cycle.

Levin, A.D. 2021. Determining optimal irrigation initiation time. Oregon Wine Board Annual Report for 2020-2021 Funding Cycle.

Levin, A.D. 2020. Sustainable Management of grapevine red blotch disease in Oregon. Oregon Department of Agriculture Specialty Crop Block Grant Program Bi-annual Report for 2017-2020 Funding Cycle.

Qian, M. and **A.D. Levin**. 2020. Effect of Grapevine Red Blotch Disease on Flavor and Flavor Precursor Formation in the Grape and on Wine Quality. California Department of Food and Agriculture Annual Report for 2019-2020 Funding Cycle.

Moretti, M., G.B. Jones, and **A.D. Levin**. 2020. Moving away from herbicides and towards sustainable vineyard weed management. Oregon Wine Board Annual Report for 2019-2020 Funding Cycle.

KC, A.N. and **A.D. Levin**. 2020. Interaction of Red Blotch-associated virus and deficit irrigation on grapevine water relations, disease development, and vine productivity. American Vineyard Foundation Final Report for 2019-2020 Funding Cycle.

Levin, A.D. 2019. Sustainable Management of grapevine red blotch disease in Oregon. Oregon Department of Agriculture Specialty Crop Block Grant Program Bi-annual Report for 2017-2020 Funding Cycle.

Levin, A.D., and A.N. KC. 2019. Keeping them fed and happy: Mitigating Grapevine Red Blotch Disease with Cultural Practices. American Vineyard Foundation Annual Report for 2018-2019 Funding Cycle.

Levin, A.D. 2019. Determination of Pre- and Postveraison Water Status Targets for Deficit Irrigation of Pinot Noir in a Warm Climate. Oregon Wine Board Final Report for 2018-2019 Funding Cycle.

KC, A.N. and **A.D. Levin.** 2019. Interaction of Red Blotch-associated virus and deficit irrigation on grapevine water relations, disease development, and vine productivity. American Vineyard Foundation Annual Report for 2018-2019 Funding Cycle.

Levin, A.D. 2019. Development and validation of seasonal crop coefficients for Southern Oregon vineyards using the Paso Panel method. Agricultural Research Foundation Final Report for 2017-2019 Funding Cycle.

Levin, A.D. 2018. Sustainable Management of grapevine red blotch disease in Oregon. Oregon Department of Agriculture Specialty Crop Block Grant Program Bi-annual Report for 2017-2020 Funding Cycle.

Levin, A.D. 2018. Determination of Pre- and Postveraison Water Status Targets for Deficit Irrigation of Pinot Noir in a Warm Climate. Oregon Wine Board Annual Report for 2017-2018 Funding Cycle.

KC, A.N. and **A.D. Levin.** 2018. Interaction of Red Blotch-associated virus and deficit irrigation on grapevine water relations, disease development, and vine productivity. American Vineyard Foundation Annual Report for 2017-2018 Funding Cycle.

Levin, A.D. 2018. Development and validation of seasonal crop coefficients for Southern Oregon vineyards using the Paso Panel method. Agricultural Research Foundation Interim Report for 2017-2019 Funding Cycle.

Technical Reports

Skinkis, P.A. and **A.D. Levin.** 2018. Oregon – Viticulture & Enology Extension Report. National Viticulture and Enology Extension Leadership Conference State Report.

Levin, A.D. 2017. Grapevine Red Blotch Disease: An emerging threat to the American wine industry. Risk Management Education Report. USDA Risk Management Agency.

iv. Trade/industry journal articles

Levin, A.D. 2021. Does water deficit negatively impact wine grape yield over the long term? Wine Business Monthly, February 2021.

Levin, A.D. 2019. Can the Effects of Grapevine Red Blotch Disease be Mitigated with Cultural Practices? Wine Business Monthly, July 2019.

Levin, A.D. 2018. Post-harvest vineyard operations and preparing for 2019. The Applegater: Fall 2018.

2. Presentations to peers

Summary table of presentations to peers at professional meetings:

Year	National	International	Annual TOTAL	Invited
Since hire				
2022	2	1	3	None
2021	3	1	4	None
2020	4	0	4	1 national
2019	3	1	4	1 international
2018	6	0	6	1 national
2017	1	0	1	1 national
Total	**19**	**3**	**22**	**3 national/1 international**

i. National presentations

Oral Presentations

Role: Presenters are underlined. Students, Postdocs, and other lab member authors are denoted with '.'*

Levin, A.D., National Viticulture and Enology Extension Leadership Conference, "State of Oregon regional wine industry report," Fresno, CA. (August 2022).

DeShields, J.B., A.N. KC, and **A.D. Levin**, 73rd ASEV National Conference, "Foliar Potassium Application Increases Fruit Total Soluble Solids by dehydration in Grapevine Red Blotch Virus-infected Grapevines," San Diego, CA. (June 2022).

Levin, A.D., ISHS Symposium on Grapevine Physiology and Biotechnology, "ISHS: a worldwide horticultural network," Stellenbosch, RSA (presented online). (October 2021).

Copp, C.R.*, J.B. DeShields*, R.W. Clark*, M. Stowasser*, and **A.D. Levin**, ASHS National Conference, "Grapevine Red Blotch Virus alters leaf carbon metabolism and export but not chlorophyll fluorescence in *Vitis vinifera* L.," Denver, CO. (August 2021).

Levin, A.D., ASHS National Conference, "Plant water potential-based irrigation management," Orlando, FL (virtual). (August 2020). **Invited.**

Copp, C.R.*, A.N. KC, and **A.D. Levin**, ASHS National Conference, "Efficacy of Cultural Practices for Mitigating Negative Effects of Grapevine Red Blotch Disease in Oregon Pinot Noir," Orlando, FL (virtual). (August 2020).

Garcia-Jaramillo, M.*, K.A. Spokas, **A.D. Levin**, and K.M. Trippe. Biochar and Bioenergy 2019, "Establishing sustainable biochar-based vineyard practices in grape production.," Fort Collins, CO. (June 2019).

Levin, A.D. and A.N. KC, 70th ASEV National Conference, "Deficit irrigation reduces fruit quality in GRBV-infected Pinot noir grapevines," Napa, CA. (June 2019).

Garcia-Jaramillo, M.*, K.A. Spokas, **A.D. Levin**, and K.M. Trippe, USBI Biochar 2018, "Prevention of pesticide infiltration or translocation: an integrated approach to sustainable grape production.," Wilmington, DE. (August 2018).

Levin, A.D., 14th Annual VESTA Curriculum Retreat, "Production viticulture: a west coast perspective," Stevenson, WA. (June 2018). **Invited**

Levin, A.D., National viticulture and enology extension leadership conference, "State of Oregon regional wine industry report," Oakville, CA. (April 2017). **Invited**

Poster Presentations

Levin, A.D., J.B. DeShields*, and A.N. KC, 72nd ASEV National Conference, "Foliar potassium application has limited effect on berry composition in Grapevine Red Blotch Virus-infected grapevines.," Virtual. (June 2021).

KC, A.N., J.B. DeShields*, and **A.D. Levin**, 72nd ASEV National Conference, "Comparative diagnostic methods Grapevine Red Blotch Virus (GRBV)," Virtual. (June 2021).

Clonch, C.*, M. Huynh*, B. Goto*, J.S. Selker, C. Udell, and **A.D. Levin**, AGU Fall Meeting, "Low-cost, low-profile dendrometer optimized for grapevines," (virtual). (December 2020).

Garcia-Jaramillo, M.*, K. Spokas, **A.D. Levin**, J. Osborne, V. Acosta-Martinez, and K. Trippe, ASHS National Conference, "Soil phosphorus content determines grapevine glyphosate uptake and accumulation in wine," Orlando, FL (virtual). (August 2020).

Copp, C.R.* and **A.D. Levin**, ASHS National Conference, "Response of Fruit Growth and Composition of *Vitis vinifera* L. Cv. Pinot noir to pre- and postveraison water deficits in a warm climate," Orlando, FL (virtual). (August 2020).

Copp, C.R.*, A.N. KC, and **A.D. Levin**, 70th ASEV National Conference, "Supplemental vineyard inputs may partially mitigate negative effects of grapevine red blotch disease in Pinot noir," Napa, CA. (June 2019).

Levin, A.D., C.A. Jenkins*, J. Chiginsky*, R. Schireman*, A.L. Rasmussen, A.N. KC, D.T. Dalton, and V.M. Walton, 69th ASEV National Conference, "Exogenous application of abscisic acid does not improve fruit composition in red blotch-infected grapevines," Monterey, CA. (June 2018).

Levin, A.D., C.A. Jenkins*, J. Chiginsky*, R. Schireman*, A.L. Rasmussen, and A.N. KC, 69th ASEV National Conference, "Interaction of deficit irrigation and grapevine red blotch virus (GRBV) on vine water status, yield, and fruit composition," Monterey, CA. (June 2018).

Levin, A.D., C.A. Jenkins*, J. Chiginsky*, T. Williams*, R. Lake*, 69th ASEV National Conference, "Postveraison water deficits improve Pinot noir fruit quality without a yield penalty," Monterey, CA. (June 2018).

Levin, A.D., T. Williams*, and R. Lake*, 69th ASEV National Conference, "Re-evaluating field methods of water status determination in the vineyard," Monterey, CA. (June 2018).

ii. International presentations

Oral Presentations

Levin, A.D., M. Stowasser*, R.W. Clark*, and J.B. DeShields*, "Delaying Irrigation Initiation Linearly Reduces Yield with Little Impact on Maturity in Pinot noir," Bordeaux, France. (July 2022).

Walton, V.M., D.T. Dalton, M.V. Rossi Stacconi, R.J. Hilton, **A.D. Levin**, K. Daane, F. Zalom, M. Sudharshana, MSc Plant Health Scholarship, "Vineyard IPM," Padova, Italy. (January 2019). **Invited.**

3. Grant and contract support

Since hire (September 26, 2016), I have generated $12,828,726 in total grant support $1,907,215 of which went to my program.

Grant support since hire:

Year(s)	Agency	Title	Total Award	My Portion	My Role
2022 - 2023	Oregon Wine Board	Determining optimal irrigation initiation time	$41,290	$41,290	Principal
2022-2025	USDA-NIFA-SCRI	Assessment and management of risk associated with wildfire smoke exposure of grapes in the vineyard	$7,779,229	$630,054	Co-Project Director
2021-2022	USDA-ARS	Identification and Mitigation of smoke exposure-related compounds in grapes and wine	$489,469	$70,422	Co-Principal
2021-2023	USDA-ARS - Northwest Center for Small Fruits Research	Taking Proof of Concept to Wide-scale Field Use: The OSU High Performance Dendrometer	$95,504	$95,504	Principal
2021-2024	Oregon Department of Agriculture	Optimizing Irrigation Initiation Time in Oregon Vineyards	$174,682	$174,682	Principal
2021 - 2022	Oregon Wine Board	Determining optimal irrigation initiation time	$39,490	$39,490	Principal
2021 - 2023	OSU Agricultural Research Foundation	Ground-truthing Satellite-based Water Use Efficiency Estimates for Oregon Vineyards	$15,000	$15,000	Co-Principal
2020 - 2021	California Department of Food and Agriculture	Effects of Grapevine Red Blotch Disease (GRBD) on flavor and flavor precursor formation in the grape and on wine quality	$50,000	$30,000	Co-Principal
2020 - 2021	Oregon Wine Board	Determining optimal irrigation initiation time	$20,619	$20,619	Principal
2020	Rogue Valley Winegrowers Association	Southern Oregon Viticulture Research Support	$5,000	$5,000	Principal
2020	Erath Family Foundation	Southern Oregon Viticulture Research Equipment Support	$13,600	$13,600	Principal
2019 - 2023	USDA-NIFA-SCRI	Ecobiology, impact and management of Grapevine Red Blotch Virus and its vector(s) in California and Oregon vineyards	$3,200,000	$232,398	Principal
2019 - 2020	American Vineyard Foundation	Interaction of Red Blotch-associated virus (GRBaV) and deficit irrigation on grapevine water relations, disease development, and vine productivity	$30,154	$15,077	Co-Principal

Year(s)	Agency	Title	Total Award	My Portion	My Role
2019 - 2020	American Vineyard Foundation	Effects of Grapevine Red Blotch Disease (GRBD) on flavor and flavor precursor formation in the grape and on wine quality	$50,000	$30,000	Co-Principal
2019 - 2020	Oregon Wine Board	Moving away from herbicides and towards sustainable vineyard weed management	$46,020	$22,000	Co-Principal
2019 - 2020	Oregon Wine Research Institute	Low-cost dendrometer to measure vine water status and related pest pressure	$5,000	$5,000	Co-Principal
2019	Erath Family Foundation	Southern Oregon Viticulture Research Equipment Support	$9,300	$9,300	Principal
2019	Rogue Valley Winegrowers Association	Southern Oregon Viticulture Research Support	$5,000	$5,000	Principal
2018 - 2020	USDA-NIFA-AFRI	The Prevention of Pesticide Infiltration or Translocation (PPINOT) Project: An Integrated Approach to Sustainable Grape Production	$129,757	$64,878	Co-Principal
2018 - 2019	Oregon Wine Board	Keeping them fed and happy: Mitigating negative effects of Grapevine Red Blotch Disease (GRBD) through cultural practices	$56,314	$50,000	Co-Principal
2018 - 2019	Oregon Wine Board	Determination of pre- and postveraison water status targets for deficit irrigation of Pinot noir in a warm climate	$49,760	$49,760	Principal
2018 - 2019	American Vineyard Foundation	Interaction of Red Blotch-associated virus (GRBaV) and deficit irrigation on grapevine water relations, disease development, and vine productivity	$73,500	$35,750	Co-Principal
2018 - 2019	American Vineyard Foundation	Effects of Grapevine Red Blotch Disease (GRBD) on flavor and flavor precursor formation in the grape and on wine quality	$70,800	$31,152	Co-Principal
2018	Rogue Valley Winegrowers Association	Southern Oregon Viticulture Research Support	$6,000	$6,000	Principal

Year(s)	Agency	Title	Total Award	My Portion	My Role
2018 - 2019	Oregon Wine Research Institute	Evaluation of variability in the measurement of vine water status across instruments, phenology, and plant water deficits	$5,000	$5,000	Principal
2018 - 2019	Hoecker Innovative Grant	Grape growing in Southern Oregon: A comprehensive viticulture education program	$1,000	$500	Co-Principal
2017 - 2020	Oregon Department of Agriculture	Sustainable management of Grapevine Red Blotch Disease in Oregon vineyards	$174,936	$55,187	Principal
2017 - 2019	OSU Agricultural Research Foundation	Development and validation of seasonal crop coefficients for Southern Oregon vineyards using the Paso Panel method	$12,500	$12,500	Principal
2017 - 2018	Oregon Wine Board	Determination of pre- and postveraison water status targets for deficit irrigation of Pinot noir in a warm climate	$53,802	$53,802	Principal
2017 - 2018	American Vineyard Foundation	Interaction of Red Blotch-associated virus (GRBaV) and deficit irrigation on grapevine water relations, disease development, and vine productivity	$73,500	$35,750	Co-Principal
2017	Erath Family Foundation	Southern Oregon Viticulture Research Equipment Support	$45,000	$45,000	Principal
2017	Rogue Valley Winegrowers Association	Southern Oregon Viticulture Research Support	$7,500	$7,500	Principal
Total			**$12,828,726**	**$1,907,215**	

4. Patent awards, releases, and inventions

None

5. Other information appropriate to the discipline.

Membership in professional societies

International Society for Horticultural Science. (2017 – Present)

American Society of Enology and Viticulture. (2015 – Present)

American Society for Horticultural Science. (2015 – Present)

Professional development activities

Conference attendance

TerClim International Viticulture Conference. Bordeaux Sciences SupAgro. Years attended: 2022.

ASHS National Conference. American Society for Horticultural Science. Years attended: 2020, 2021.

ASEV National Conference. American Society of Enology and Viticulture. Years attended: 2017-2022.

Oregon Wine Symposium. Oregon Wine Board. Years attended: 2017-2022.

National Viticulture and Enology Extension Leadership Conference. National Grape Research Alliance. Years attended: 2017, 2018, 2022.

UC-Davis Grape Day. UC-Davis. Years attended: 2018, 2022.

OSU Extension Service Annual Conference. Oregon State University Extension Service. Years attended: 2018.

Continuing education/professional training

Data Programming in R. Non-credit course, Oregon State University. (September 2020 – November 2020). Corvallis, OR (virtual).

Core Curriculum for Managers and Supervisors. Management Training, Oregon State University. (April 2020). Corvallis, OR (virtual).

Faculty Success Program. Continuing Education Program, National Center for Faculty Development & Diversity. (January 2019 - April 2019).

Search Advocate Training. Workshop, Oregon State University. (November 18, 2017 - November 19, 2017). Klamath Falls, Oregon, USA.

D. SERVICE

1. University Service

i. Department/Unit

(2022), Member, SOREC Strategic Planning Committee.

(2022), Member, SOREC Office Specialist II search committee.

(2019), Member, SOREC Plant Pathology Postdoc search committee.

(2018 – 2019), Member, Horticulture Mentoring Committee.

(2016 – 2017), Chairperson, SOREC Viticulture FRA Search Committee.

(2016 – Present), Journal Article Internal Reviewer, Horticulture Department.

(2016 – 2020), Member, SOREC safety committee.

ii. College

(2020), Member, Biological and Ecological Engineering (BEE) Statewide Irrigation Extension Specialist Search Committee.

(2020 – 2022), Member, OWRI Strategic Planning Committee.

(2019 – Present), Member, OWRI Undergraduate Scholar Committee.

(2016 – Present), Member, OWRI Core Faculty.

iii. University

(2017 – Present), Extension publication reviewer, Internal.

2. Service to the Profession

i. Committee Chair

(2019 – Present), Grape Genetics, Physiology and Management working group, International Society for Horticultural Science.

ii. Committee Member

(2022 – Present), ASEV Best Paper Committee.

(2021 – Present), Northwest Center for Small Fruits Research Viticulture Priorities Committee.

(2021 – Present), ASEV Best Student Presentation Committee.

(2021 – Present), Oregon Wine Symposium Education Committee.

(2016 – Present), RVWA Technical Committee.

iii. Papers reviewed

(2021 – Present), OenoOne, 1 paper/year.

(2021 – Present), Frontiers in Plant Science, 1 paper/year.

(2021 – Present), ASEV Catalyst, 1 paper/year.

(2019 – Present), HortScience, 1 paper/year.

(2019 – Present), American Journal of Enology and Viticulture, 1 paper/year.

(2017 – Present), Australian Journal of Grape and Wine Research, 1 paper/year.

3. Service to the Public – Professionally-related

i. Board of Directors

(2016 – Present), Board of Directors, RVWA.

ii. Committee Member

(2017 – Present), Rogue Valley Pear Research Advisory Committee.

(2016 – Present), Rogue Valley Winegrowers Association Technical Committee.

iii. Mentor

(2016 – Present), Jackson County Master Gardeners' Vineyard

E. AWARDS

1. University and Community Awards

For rapid response to wildfire impacted wines in 2020 as member of OWRI Smoke Exposure Team:

2021, Industry Partner (as member of OWRI Smoke Exposure Team), Oregon Wine Board.
https://industry.oregonwine.org/oregon-wine-industry-awards/past-recipients/

2020, Stay at Home Hero, College of Agricultural Sciences, OSU.
https://agsci.oregonstate.edu/newsroom/stay-home-hero-award#owri-smoke

F. DIVERSITY, EQUITY, AND INCLUSION

Since hire, there have been several efforts in which diversity, equity, and inclusion (DEI) have been included in the viticulture research and extension program in Southern Oregon. The various workshops and educational events were organized in collaboration with OSU colleagues and have been intended to provide a more inclusive environment at SOREC. All events that promoted DEI are noted above with footnotes.

Notably, there have been targeted Spanish-language workshops for farmworkers during each of the Southern Oregon Grape Symposia that were organized in collaboration with OSU colleagues Achala KC (Plant pathologist, OSU-SOREC), Luisa Santamaria (Plant pathologist, OSU-NWREC), and Rick Hilton (Entomologist, OSU-SOREC). These workshops were tailored in scope and content, covering the fundamentals of grapevine physiology, irrigation management, and pest and disease management. The workshops were well received by the audience, who was thankful and appreciative that there were educational opportunities in their native language. Having taken place on the same day as the main symposia, these workshops also allowed for increased interaction between the farmworkers and growers. A natural outgrowth of the two Spanish-language workshops during the symposia was the Bilingual field day that has now become a separate event. This course provides farmworkers with field-based instruction on grapevine pest and disease identification and concludes with a short laboratory course on fungal species identification.

Second, I led a grant submission together with Achala KC, Rick Hilton, and Richard Roseberg (Soil scientist/Director, OSU-SOREC) for the USDA National Needs Fellowship (NNF). This program was developed to provide funding for the graduate education of underrepresented minorities in the agricultural sciences. We developed a graduate training program that would recruit minority fellows in a targeted manner and provide them with several advisory committees to increase retention and graduation rates and create a supportive atmosphere that encourages professional development. While the grant was not funded, it was highly ranked, and we will re-submit in the next cycle.

Finally, as the COVID-19 pandemic continues in 2021 with little clarity regarding renewed in-person meetings, we have developed an inclusive virtual outreach plan for viticulture extension. Capitalizing on the preliminary success of the OWRI Red Blotch Webinar series (nearly 1000 attendees from three continents over the 10-week course), we will continue to provide virtual meeting spaces for a diversity of industry stakeholders. Importantly, the virtual meetings allow for broader stakeholder reach and improved engagement, particularly for those who were previously unable to attend traditional in-person meetings. Virtual outreach in the digital space also allows for closed captioning of presentations, improving accessibility for many participants.