UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

II. Academic Program Review Dossier Cover Page | 2024 Cycle

Name, Lived Name: **Preferred Pronoun(s):**	Christopher Chen He/Him
Academic Title:	Include your title from the following list and delete the others: • Assistant Cooperative Extension Advisor
County/Program:	Mendocino / Integrated Vineyard Systems Advisor
Review Type:	Include your review type(s) from the following list and delete the others: • Merit • 13/24 Month Option
Current Rank/Step:	Assistant III
Requested Rank/Step:	Assistant IV
Review Time Period:	Jan 10, [__2022___] to September 30, [__2023____]
Thematic Areas:	Needs Assessment Vineyard Establishment and Management

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

UNIVERSIDAD DE CALIFORNIA
Agricultura y Recursos Naturales

Christopher Chen
Integrated Vineyard Systems Advisor
Location: Sonoma, Mendocino, and Lake Counties

Position Description
Effective January 10, 2022

NATURE AND PURPOSE

Develop and implement a comprehensive and effective regional Viticulture Extension program in Mendocino, Sonoma, and Lake Counties with individual advisor responsibilities for viticultural information and outreach (100%).

The Integrated Vineyard Systems Advisor develops programs for wine grape producers, vineyard owners and vineyard-land managers throughout Mendocino, Sonoma, and Lake Counties regardless of race, creed, sex, physical handicap, or economic level. The Advisor is a source of information on all matters relating to the management of grape vineyards and their final products. In addition, the Advisor also helps the public seeking information about viticultural science. The Advisor conducts applied research to adapt new information to specific situations and creates new knowledge. The Advisor also serves as a custodian of available resources to grape growers through maintenance of online tools and directories.

The Advisor acts in a liaison capacity with the UC Departments of Viticulture and Enology, Plant Science, Horticulture and Agronomy, and Land, Air, Water Resources and other organizations such as the Mendocino Co. RCD, Sonoma Co. RCD, Lake Co. RCD, North Coast Regional Water Resources Board, and NRCS in the solution of specialized problems concerning wine grape production matters. The Advisor cooperates with groups such as the Board of Supervisors, Farm Bureau, Lake County Winegrape Commission, Sonoma County Winegrape Commission, Sonoma County Vineyard Technical Group, Mendocino Winegrowers Association, Anderson Valley Winegrowers Association, California Grape Rootstock Improvement Commission, Master Gardeners, and others concerned with either grape or wine production in the region.

MAJOR RESPONSIBILITIES

Outreach, Education, and Professional Development - Integrated Vineyard Systems Advisor

A. Provides information and recommendations on all aspects of wine grape production, including vineyard management, economic cost analysis, digital record-keeping and decision tools/aides, and vine health and nutrition by means of consultations, demonstrations, mass media and group contacts.

B. Attends academic seminars, conferences, and events to gather novel information on recent developments in wine grape production. Reproduces information gained from such events in an accessible format for wine grape industry clientele.

C. Participates in educational seminars and courses as a speaker/lecturer to disseminate information and improve the knowledge base of current and future industry professionals.

Research and Creative Activities - Integrated Vineyard Systems Advisor

A. Conducts problem-solving applied research in wine grape production and/or climate-adaptive viticulture in cooperation with private, public, or University of California affiliated land managers, vineyard managers, and wine producers to develop answers to questions that are relevant to the region and will support the development of improved practices and climate-adaptive techniques.

B. Develops templates, web pages, and social media that creatively address issues of wine grape production and vineyard climate-adaptive practices.

- **Technical Competence & Impact**
  - Ensure clientele needs are assessed, and develops program goals to successfully meet clientele needs, in alignment with UC ANR's statewide Strategic Vision and initiatives.
  - Conduct applied research designed to solve regionally relevant problems and monitor related changes.
  - Maintain and promote UC ANR's credibility by providing science-based knowledge and skills independent of personal or parochial interests.
  - Represent UC ANR in a professional manner.
- **Communication**
  - Conduct and report regular needs assessments to identify priority issues or problems relevant to the local clientele groups being served.
  - Disseminate useful, science-based information to inform clientele, using extension methods that are responsive to clientele needs and appropriate for the audience and situation.
  - Evaluate programs and report accomplishments, results, and potential or actual impacts to relevant audiences.
  - Foster an increased understanding of UC ANR's Cooperative Extension's research and education programs in clientele, the public, and policy makers.
  - Effectively use online communication methods and associated software programs to support research and instruction.
  - Actively advocate for UC ANR program awareness and support.
- **Collaboration, Teamwork & Flexibility**
  - Interact with UC ANR Program Teams, specialists, and others within the research/extension network to develop, expand, and implement program goals.
  - Serve the California public by participating in activities of public agencies and organizations.

- Interpersonal Relationships: Be an effective listener and communicator, take responsibility for our own actions, motivate others, keep commitments, and cultivate political and industry support for UC ANR.
- Build relationships to work with diverse populations and acclimate to varying circumstances.

○ **Professional Development & Lifelong Learning**

- Participate in professional organizations and collaborate with federal, state and county governmental agencies, non-government organizations and others by providing independent science-based information and leadership.
- Maintain a program of continuous self-improvement by participating in in-service training, seminars, workshops, work group & program team meetings, short courses, professional society meetings and other relevant opportunities.
- Pursue new, professional skills to improve the efficacy and reach of UC ANR.

AFFIRMATIVE ACTION and DIVERSITY, EQUITY, AND INCLUSION (DEI)

- Comply with all applicable federal and state laws and regulations, and all University policies regarding affirmative action, including prohibition of discrimination on the basis of race, color, national origin, religion, sex, sexual orientation, physical or mental disability, age, veteran status, medical condition, ancestry or marital status.
- Promote, in all ways consistent with other responsibilities of the position, accomplishment of the affirmative action goals established by UC ANR.
- Take all measures necessary to assure any employee or volunteer workers supervised by this position fulfill their affirmative action responsibilities.
- Develop a statement of program mission and definition of potential program clientele that embody a commitment to serve diverse ethnic and gender groups.
- Plan and conduct programs in such a manner as to provide equitable service to all ethnic and gender groups that comprise the potential clientele population for the program.
- Identify any barriers to clientele participation related to ethnicity, gender, or other characteristic of concern under the University's affirmative action policies and take corrective action as needed to remove such barriers.
- Collect, and keep current, demographic data identifying the ethnic and gender distribution of the potential clientele populations for the program and describing other characteristics of the population relevant to the pursuit of the Division's affirmative action goals.
- Compile and maintain documentation of service to each ethnic and gender group within the clientele population served by the program, including statistical records of clientele contacts, quantitative evaluations of benefits realized by clientele and reports of any special efforts to serve under-represented groups.

RELATIONSHIPS

Administratively responsible to UC ANR County Director for Mendocino and Lake Counties for the conduct of the UC ANR program(s).

QUALIFICATIONS

A minimum of a Master of Science degree in horticulture and agronomy, viticulture and enology, and/or agricultural resource economics.

Ability and Skills

1. A broad understanding of wine grape production and vineyard management which includes plant nutrition, abiotic stress, vine balance and health, grape vine phenology, pests and diseases of grape vines, vineyard floor management, computer technology and applications, vineyard establishment, and vineyard economics.
2. Ability to write and speak effectively and communicate complex research and technical information to non-clientele members of the public.
3. Ability to design, conduct and evaluate applied research.
4. Ability to be an effective educator.
5. Must demonstrate:
    - An understanding of Extension policies and procedures
    - Possess the ability to evaluate program priorities related to audience needs for Mendocino, Sonoma, and Lake Counties.
    - Leadership qualities including the ability to organize, motivate, supervise, delegate, plan, project, and evaluate.
    - Knowledge of human relations is required, including the ability to work with people with diverse views and values while motivating and adapting to changing situations.
    - Literacy in internet communications and with software to support research and education programs.

Approvals:

01/19/2022

Christopher Chen — Date
Integrated Systems Vineyard Advisor

John M. Harper — Date
County Director & Livestock/NR Advisor

1/27/23

Daniel Obrist — Date
Vice Provost of Academic Personnel

Merit Review Dossier

13/24 Option

University of California Cooperative Extension
Agricultural and Natural Resources

Christopher Chen
Integrated Vineyard Systems Advisor
Sonoma, Mendocino, Lake Counties

Review Period
January 2022 - September 2023

I. Program Summary Narrative

Statement of Assignment

Program Area	Condition Change	% FTE
Viticulture	Increased ecological sustainability of agriculture, landscapes, and forestry	20%
Viticulture	Increased agriculture and forestry efficiency and profitability	30%
Viticulture	Increased preparedness and resilience to extreme weather and climate change	50%

Introduction

This program summary narrative represents the review period from January 2022 to September 2023. I am seeking advancement from Assistant Advisor III to Assistant Advisor IV based on the activities and evidence of merit presented in this dossier. Two primary themes are presented here and are Needs Assessment (Theme 1) and Vineyard Establishment and Management (Theme 2). Serving as the Integrated Vineyard Systems Advisor for Sonoma, Mendocino, and Lake Counties requires that I am available to help growers which own and/or manage commercial vineyards in the region. Collectively, this represents approximately 18% of the planted wine grape acreage in California. There are many more thousands of individual personal and home grape growers in the region as well. Because of this I have identified my clientele groups as (1) Commercial Grape Growers/Vineyard Management and (2) Commercial Grape Commodity Groups. These classifications identify my clientele as commercial grape producers and exclude home/personal grape growers; this distinction is also reiterated in my Position Description.

Theme 1 – Needs Assessment

Background, Clientele, Goals, and Inputs

The development of Cooperative Extension programs should be guided by the clientele they will serve. To better achieve the goal of serving the viticulture community of Sonoma, Mendocino, and Lake Counties, a needs assessment has been conducted over 1.5 years to better understand the issues local grape producers have faced and will face in the future. It is the goal of this needs assessment was to identify the needs and wants of the grape growing community in Sonoma, Mendocino, and Lake Counties; through this, the Integrated Vineyard Systems Program has been able to identify the areas of interest that the majority of the program should be focused on. Inputs for the Needs Assessment are particularly focused on in-person interactions, participation in commodity groups, and structured surveys.

Methods, Outcomes, and Impacts

Since January 2022, in-person interactions such as farm visits, group events, commodity group meetings, and email conversation have been utilized to identify the most common, reoccurring concerns of grape growers in Sonoma, Mendocino, and Lake Counties. Through Advisor-Client interactions, this needs assessment was designed to identify the core issues related to grape growers in this region. The most important objective of the needs assessment is that the work that is completed through this program is relevant and useable for the grape growing community within the program's

geographic territory and beyond. The needs assessment is designed to be further adaptable in the future to upcoming and novel concerns; each year it may be updated in order to address the issues of the moment.

Method: In-Person Farm Visits

The direct information that results from in-person interactions can elucidate underlying concerns which are shared by a large proportion of my clientele. Throughout the review period presented in this dossier, I had in-person interactions with 30 individual grape producers throughout Sonoma, Mendocino, and Lake Counties; I also interacted with some of these clients multiple times on different issues during this time frame. This approach to information gathering is important to better understanding the regional and seasonal variation in concerns to my clientele. In-person interactions also serve to build trust in my ability as a Cooperative Extension Advisor and in University of California Cooperative Extension as a whole.

Outcomes and impacts: In-Person Farm Visits

Through active engagement in individual, one-on-one interactions with my clientele I have identified guiding objectives for my program to focus on. These can be summarized into three categories and are based on the ongoing needs assessment I have conducted in my region of activity: (1) Climate-adaptive viticulture (2) Pest and disease management (3) Vineyard management practices.

In-person farm visits have been a core method I've used in my program to assess the needs and wants of my clientele. This has provided an opportunity for me to assess and note the most common concerns my clients face in my region of operation. These farm visits help narrow the scope of my CE program scope to the most important issues for my clientele.

Method: Active Participation in Grape Grower Commodity Groups

Through experience, it has become apparent that commodity-centered groups may have different primary objectives when compared to individual grape producers. These commodity groups are represented by the various winegrowers associations, technical groups, and winegrape commissions which operate across Sonoma, Mendocino, and Lake Counties. As Integrated Vineyard Systems Advisor, I have been invited to attend the periodic meetings of the various commodity groups within my area of service. As an active participant, I am present during meetings to listen to concerns and objectives related to each organization. Collaborative interactions like these help to improve the trust that each commodity group has in the institution and expertise of UC Agricultural and Natural Resources and the UCCE Advisors that are present to address their agricultural needs.

Outcomes and impacts: Active Participation in Grape Grower Commodity Groups

By participating in the regular meetings of these various commodity groups, I as a Cooperative Extension Advisor gain valuable insight into regional concerns and objectives of my clientele. While in-person farm visits allow me to better understand the needs of individual clients, this information gathering approach helps to elucidate the needs of each region as a whole. These interactions allowed me to identify three key needs which overlap with many grape growers in Sonoma, Mendocino, and Lake Counties: (1) Pest and disease management (2) Reputation and/or Consumer appeal (3) Improved educational opportunities for grape growers. Through active participation in general meetings, I often provide a report on the current-state of my CE Program and help keep my clientele informed on the work UC Cooperative Extension is doing to support grape and wine producers. I am also provided with a different perspective on the needs and wants of the grape growing communities in my region.

Method: Structured Surveys

The implementation of structured surveys was used as an initial data gathering tool for the Needs Assessment (Theme I) prior to being invited to actively interact with my clientele. This approach to better understanding the needs of my clientele was less successful than the prior methods mentioned in this dossier.

Outcomes and impacts: Structured Surveys

From the responses, two key concerns were identified by grape growers within Sonoma, Mendocino, and Lake Counties: (1) Pest and disease management (2) Proper implementation and improved cultural practices. Among all three methods utilized for the needs assessment, there was a consistent concern voiced regarding pest and disease management. Structured surveys help reinforce the needs of clientele found through other means.

Theme 2 – Vineyard Establishment and Management

Background, Clientele, Goals, and Inputs

Objectives and goals for the UCCE North Coast Viticulture Program are focused on developing research, outreach, and education with respect to vineyard establishment and management practices. This will improve the resilience of the grape-growing industry in northern California. This objective can be achieved through research into topics related to vineyard management and/or climate-related concepts, grower-education events centered around novel research results in vineyards, and outreach to growers to disseminate new information related to vineyard management and climate adaptation. Through grant funding for research, event organization, and in-person visits, I have made progress towards each of the avenues to achieve this goal during the review period.

Methods, Outcomes, and Impacts

The main objectives for my program are grower outreach, viticulture research, information sharing, and dissemination of new practices to improve wine grape production in northern California. The rapid pace of research and development in the wine and grape industries justify hosting multiple Extension Education events per year and creation of easily-accessible and public-facing publications such as Viticulture Newsletters or industry-accepted popular literature (i.e., industry magazines). Viticulture research may be achieved through support from private industry members, commercial grower organizations, and publicly-funded grant awards.

Method: Educational Resources

Providing educational resources for clientele is an important aspect of Cooperative Extension. Educational resources made available to the public serve as a perpetual reference for valuable information. As a UCCE Advisor, I have created and maintain a number of educational resources I utilize and disseminate to address the needs of my clientele.

Outcomes and impacts: Educational Resources

All educational resources provided to the public are available perpetually and thus may be accessed at any time by my clientele. However, there are quantifiable outcomes from the creation and dissemination of educational resources. These include four main categories of resources provided through my program: (1) Informational training videos (2) UCCE Webpage (3) Published Educational Articles (4) Educational interviews with media sources. Publicly available educational resources have been accessed numerous times during the review period. Educational YouTube videos have been viewed 665 times collectively during this time frame. Other online resources are not tracked currently but will be tracked via Google Analytics in the future.

Method: Research in Viticulture

During the review period, I made it a priority of the Integrated Vineyard Systems program to initiate research projects directly related to the topics identified by my clientele in the Needs Assessment. In particular, the research projects were designed to investigate (1) climate change resilience in vineyards through cultivar selection, (2) pest and disease solutions, and (3) novel management strategies and technology for vineyards. These three categories of research were made possible through grant funding and collaboration on the projects with my colleagues in UCCE and UC Agricultural and Natural Resource.

Outcomes and impacts: Research in Viticulture

The outcomes of research during the review period are limited; the majority of the work for each project is still in progress. However, there are some outcomes which help achieve the goals stated in Theme II: (1) Climate change resilience in vineyards (2) Pest and disease solutions (3) Novel management strategies and techniques for vineyards. Currently, all research projects related to my CE program are ongoing. Future impacts are expected to influence vineyard management practices and decisions made by my clientele regarding climate-adaptation, pest management, and/or adoption of new technologies. These research results will increase grower awareness and knowledge of these issues and may change opinions about the need to prepare for climate change in vineyards.

Method: Extension and Outreach Activities

The organization and implementation of extension and outreach activities has been a primary method of achieving the goals of Theme II. These activities serve to provide educational material for my clientele and are often organized in conjunction with colleagues at University of California, local agricultural organizations, or regional winegrape commodity groups. Extension and outreach activities have been designed to focus on the needs identified in my needs assessment (Theme I), as well as timed to align in-field observations with relevant topics addressed during these events.

Outcomes and Impacts: Extension and Outreach Activities

Extension and outreach activities I have participated in or organized may fall into one of four categories: (1) Educational seminars, (2) recurring extension series, (3) media-based outreach and extension, or (4) In-person farm visits. Each of these categories has been utilized in some way to increase the reach of my program into the various communities of Sonoma, Mendocino, and Lake counties. At this time, measurable impacts of my program's extension and outreach activities are limited to survey responses following extension events. From the events where surveys were returned between January 2022 and September 2023, 91.1% of participants would attend a similar event again. The *value of the presented material* was given an average rating of 8.18/10 by the attendees who are representative of my clientele base. Finally, the surveyed groups were asked of the *likelihood of implementing* any of the information presented at each event with an average rating of 7.05/10 in favor of implementing methods or techniques learned at the event.

II. University and Public Service

University Service

During the review period I have served the University of California through a few means. I was asked to serve on three interview committees for three separate positions directly related or adjacent to University of California. These interviews were for the following positions: (1) UC ANR Senior Videographer position, (2) Senior Agricultural Program Assistant – UCCE Sonoma County, and (3) Agricultural Program Assistant Step II – UCCE Mendocino County. Each of these searches resulted in a successful hire filling the appointment.

I have also been an active committee member on the Hopland Research and Extension Center's Research Advisory Committee (RAC) since June 2022. The term appointment for a HREC RAC committee member is three years; I have currently completed one year of the three to complete my term on this committee.

Public Service

During the review period I have offered my time to a few public service projects within my area of operation. My primary contribution to the public is through my participation as a member of the Technical Advisory Group (TAG) for the North Coast Regional Water Quality Control Board's review of their proposed Vineyard Water Permit. I was invited to the expert committee members. As a TAG member, I was requested to read through the language used in different sections of the draft order each month and provide my professional feedback to the sponsoring, public agency. Other public service was directly related to my position as Integrated Vineyard Systems Advisor. I am an active member of two winegrape commodity group committees in my region and allow me to provide input into the public services offered to my clientele by the public agencies providing resources.

III. Professional Competence

Activities related to professional competence I participated in during the review period may be classified under one of four categories: (1) Speaker - University of California, (2) Speaker - Clientele Invited, (3) Speaker – Other Organization, or (4) Other form of recognition of professional competence. For each of the categories listed, I was invited by the organizing body to participate in an external event as an expert speaker on my chosen topic. I was invited to a total of 33 unique events during the review period to participate based on my professional competence. I am also an active member of the American Society for Enology and Viticulture (ASEV) professional organization.

IV. Extension Activities

During the review period, my extension activities have included the organization and implementation of 16 unique events, some of which repeated multiple times for a total of 29 individual meetings. Beyond meetings organized, other extension activities included policy engagement through the North Coast water board TAG, educational videos, maintenance of UC ANR webpages (Selected Plant and Soil Labs *;* UCCE North Coast Viticulture), and numerous media interviews.

V. Affirmative Action

As a University of California Cooperative Extension Advisor, one of my primary objectives is to actively seek out, include, and provide resources for underserved communities in my area of operation and beyond. These communities are often underrepresented in agricultural professions and include individuals who self-identify as Hispanic, Latino, American Indian, Black, Native Hawaiian, Pacific Islander, Female, and/or Nonbinary. Through the use of mass media I am able to share the results of my research, provide accessible links to valuable resources, and advertise upcoming CE events to all of my clientele. Additionally, I maintain an email listserv reaching 60 individual clients in my area of operation; this listserv is voluntary, members must intentionally join through a link on my CE webpage. Using mass media platforms, I am able to reach a broad community of my clientele. Promotional materials are also utilized to reach both English and Spanish speaking communities when possible or relevant.

Supporting Documentation

A. Professional Competence and Professional Activity

Professional Development and Training

Begin Date - End Date	Location	Name, Description and Occurrence of Activity
Apr 7, 2022	Sonoma County	Airblast Sprayer Calibration Meeting - Sonoma
Dec 14, 2022 - Dec 15, 2022	Kelseyville, CA	Lake County Pruning School

Disciplinary Society or Professional Association

Disciplinary Society/Prof. Assoc Name	Membership/Meetings Attended/Activities
American Society for Enology and Viticulture	Member/ASEV National Conference/2022-2023

Evidence of Professional Competency

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Feb 15, 2022	UC Davis	Guest lecture: UC Davis course VEN 110
Mar 2, 2022	Zoom (Fresno State)	Lecture - CSU Fresno Viticulture Seminar
Mar 6, 2022	Murphys, CA	Calaveras Winegrape Alliance Grower Presentation
Mar 7, 2022	Zoom	Presentation - Sonoma County Winegrowers
Mar 14, 2022	Virtual Zoom	Sonoma Winegrape Commission: Presentation
Mar 18, 2022	Virtual/Zoom (Mendocino)	Fish Friendly Farming - Drought workshop Presentation
Apr 28, 2022	Lake County	Lake County Winegrape Commission Invitation to tour and participate
Jun 8, 2022	Oakville, CA	Oakville Grape Day 2022
Jun 19, 2022 - Jun 22, 2022	San Diego, CA	American Society for Enology and Viticulture - 2022 Poster Presentations
Jul 20, 2022 - Aug 30, 2023	Sonoma County	Technical Advisory Group - Vineyard Water Permit (North Coast Regional Water Quality Control Board)
Sep 9, 2022	Lake County	AgVenture - Presentation

13/24 Merit - Viticulture

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Sep 21, 2022	Online	Lake County - Master Gardener's Continuing Education Presentation
Oct 8, 2022 - Oct 11, 2022	Anaheim, CA	CAPCA Annual Conference (Presenter and Panel Member)
Oct 11, 2022	Kelseyville, CA	Lake County Winegrape Commission Meeting
Oct 18, 2022	Davis, CA	Guest Lecture - VEN 118 (UC Davis)
Nov 3, 2022	Online	Vineyard Talk - ELICIR (Attaché for Science and Technology at the French Consulate)
Nov 16, 2022	North Coast Region (Sonoma, Napa, Lake, Mendocino Counties)	North Coast IPM Seminar
Feb 27, 2023	Online/Virtual	Presentation - Crop Care Associates
Mar 1, 2023	Santa Rosa, CA	Presentation - Grow West
Mar 10, 2023	Online	Reviewer - Wine Business Monthly article
Mar 10, 2023	UC ANR - Hopland REC	Presenter - Leadership Mendocino
Mar 16, 2023	Online	Presenter / Water Stewardship Seminar
Mar 28, 2023	Philo, CA	Presentation - Anderson Valley Winegrape Association
Mar 28, 2023	Online	Presentation - UC Climate Stewards (Point Reyes National Seashore Association)
Apr 7, 2023	Santa Rosa Junior College	Guest Lecturer - Santa Rosa Junior College
May 2, 2023	Santa Rosa, CA	Sonoma County Winegrape Commission / UCCE Vineyard Advisor Report
May 18, 2023	Booneville, CA	Pinot Fest - Anderson Valley (Presenter)
May 25, 2023	Francis Ford Coppola Winery, Sonoma County	Presentation - Delicato Professional Development

Begin Date - End Date	Location	Name, Description and Occurrence of Award, Recognition, Professional Presentation, Office or Activity
Jun 6, 2023	Davis, CA	Guest Lecture: UC Davis - VEN 190X
Jun 7, 2023	Rutherford, CA	Napa Field Day
Aug 1, 2023	Shone Farm - Santa Rosa Junior College	SCVTG Field Day - Presenter
Sep 19, 2023 - Sep 20, 2023	Sacramento, CA (Westin Hotel)	Vineyard of the Future - Workshop
Oct 19, 2023	Davis, CA	Guest Lecture: UC Davis - VEN 118
Nov 16, 2023	UC Davis Campus	UC Davis Grape Day - Presenter

B. University Service

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Mar 23, 2022	Agricultural Program Assistant interview (Mendocino)	County	Interview Committee Member
May 9, 2022 - May 10, 2022	Senior Videographer - Interview Committee	University-wide	Interview Committee Member
Jun 2, 2022	HREC Board of Directors Presentation and Tour	University-wide	Presenter
Jun 9, 2022 (Ongoing)	Hopland Research and Extension Center - Research Advisory Committee	Division-wide	Committee Member
Nov 10, 2022	New Advisor - Tour (Justin Tanner)	Region	Advisor
Jan 23, 2023	Interview - (UCCE Sonoma) Senior Agriculture Program Assistant	County	Interview Committee Member

C. Public Service

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Apr 21, 2022	Lake County Winegrape Commission Research and Education Committee	County	Participant

Begin Date - End Date	Name, Description, and Occurrence of Activity	Org Level	Your Contribution and Leadership Role
Jul 20, 2022 - Aug 30, 2023	Technical Advisory Group - Vineyard Water Permit (North Coast Regional Water Quality Control Board)	Region	Advisory Group Expert
Mar 15, 2023	Mendocino Winegrowers Inc - Grower Roundtable Meeting	County	Participant
Aug 4, 2023	Sonoma County Vineyard Permit Workshop	County	Attendee
Aug 24, 2023 (Ongoing)	Pinot Fest Technical Committee - Subcommittee Chair	Region	Subcommittee Chair

D. Extension Activities

Meetings Organized

Begin Date - End Date	Meeting Name and Type	Topic/no. of repetitions	Role	Location(s)	Total No. of Attendees
Vineyard Establishment and Management (10)					
May 2, 2022	Sonoma Ant ID Workshops	Sonoma Ant ID Workshops / 3	Organizer	Santa Rosa	28
May 11, 2022 - May 12, 2022	Anderson Valley Drought and Water Meeting / Extension Seminar Event	Drought mitigation methods for viticulture / 1	Organizer; Speaker/Presenter	Zoom/Online - Mendocino, Lake, Sonoma	13
Nov 15, 2022	Portuguese Agricultural Commission - Tour of UCCE system	UCCE functionality / 1	Advisor/Presenter	9592 Sonoma Hwy Kenwood, CA, United States	6
Dec 7, 2022	UCCE North Coast Frost Protection and Management Master Class	Management Responses to Frost Damage in Vineyards / 1	Organizer and Presenter	Santa Rosa, CA	39

Begin Date - End Date	Meeting Name and Type	Topic/no. of repetitions	Role	Location(s)	Total No. of Attendees
Jan 11, 2023	UCCE Smoke Taint Seminar	Smoke Taint in Winegrapes / 1	Organizer/Presenter	UCCE Ukiah	12
Feb 8, 2023	Sonoma County Grape Day	Vineyard Management / 1	Organizer	Santa Rosa, CA	40
Feb 28, 2023	UC Davis On The Road - Seminar	Many / 1	Organizer/Presenter	Hopland Research and Extension Center	39
Mar 2, 2023 - Nov 3, 2023	Pest Control Advisor Breakfasts - Sonoma County	Pest Control in Vineyards / 7	Organizer	UCCE Sonoma	24
Mar 16, 2023 - Nov 17, 2023	Pest Control Advisor Breakfasts - Mendocino County	Pest Control in Vineyards / 7	Organizer	UCCE Mendocino	10
May 23, 2023	Masterclass - Sonoma County	Cultivars for changing climates / 1	Organizer and Presenter	Shone Farm - Santa Rosa Junior College	83
Aug 24, 2023	Olive and Grape Field Day - Lake and Mendocino Counties	Olive and Grape management / 1	Organizer and Presenter	Kelseyville, CA	20

Educational Presentations

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Vineyard Establishment and Management (6)				
May 19, 2022 - May 20, 2022	Small Vineyard Management I / Extension Class	Major Fungal Diseases in Grapevines / 1	Oakville Research and Experimental Vineyard	40

Begin Date - End Date	Meeting Name/Event	Presentation Topic/no. of repetitions	Location(s)	No. of Attendees
Jun 8, 2022	Oakville Grape Day / Extension field day	Variety Impacts on Vineyard Management / 1	Oakville Experimental Vineyards, CA	50
Jul 21, 2022 - Jul 22, 2022	Small Vineyard Management II / Extension Class	Fungal Diseases in Grapevines / 1	Oakville, CA	39
Aug 4, 2022 - Aug 5, 2022	Small Vineyard Management III / Extension Class	Winter Pruning in Wine Grapes / 1	Oakville, CA	22
Nov 16, 2022 - Nov 17, 2022	UCCE North Coast Virtual IPM Seminar	How abiotic stress can influence disease and virus expression in wine grapes / 1	Online	234
Jun 7, 2023	UCCE Napa Field Day	Shade Netting in Vineyards / 1	St. Helena, CA	105
Jul 20, 2023	Leafhopper Tailgate - UC Organic Institute	Leafhoppers in Vineyards / 1	Hopland, CA	35

Other (including websites, social media, blogs, collaborations with other agencies, organizations, policy engagement)

Begin Date - End Date	Description	No. of Instances
Vineyard Establishment and Management (8)		
Jan 18, 2022 - Feb 18, 2022	Master Gardener - Informational Training Video (Sonoma County)	1
Feb 15, 2022 (Ongoing)	Selected Plant and Soil Laboratories in Northern California - Website	5
Feb 15, 2022	Grapevines an Introduction / Informational video for clientele	1
Feb 28, 2022	Vineyard Establishment Video / Informational video for clientele	1
Mar 1, 2022 (Ongoing)	UC ANR Chen Lab Website	1
Mar 1, 2022	Pruning Grapevines / Informational video for clientele	1
Mar 29, 2022	Spring Management of Grapevines / Informational video for clientele	1

Begin Date - End Date	Description	No. of Instances
Oct 1, 2022 (Ongoing)	LinkedIn - https://www.linkedin.com/in/chris-chen-viticulturalist/	1
Mar 8, 2023 (Ongoing)	California Farm Demo Network Collaborative Activities	4
Sep 1, 2023 (Ongoing)	California Farm Demonstration Network - Grant	1
Nov 14, 2023	Cane Pruning Grapevines - University of California Cooperative Extension	1
Needs Assessment (3)		
Jan 12, 2022 (Ongoing)	Needs Assessment - 2022	10
Aug 1, 2022 - Oct 1, 2023	Sonoma County Winegrower Board Meeting	9
Sep 6, 2022 (Ongoing)	Mendocino Winegrowers Inc. Board Meeting	4

Other (including TV and/or radio interviews/programs, newspaper/trade magazine interviews)

Begin Date - End Date	Interviewed/Written By (optional)	Topic	Name of Media or Publication
Vineyard Establishment and Management (3)			
May 10, 2022	Ricardo Vela	Voiceover for Ricardo Vela	Spring Frost over Grape Crops
Aug 22, 2022	Marie Thiollet-Scholtus	Interview for Extension Advisors	INRAE Scientific Advisory Board
Sep 15, 2022	Sakkie Pretorius	Vineyards in a Changing Climate	The Big Vin Theory (Podcast)
Jan 24, 2023	Craig Macmillan	Climate Change in Vineyards	Sustainable Winegrowing - Podcast
Feb 24, 2023	Malika Nocco	Regenerative Viticulture	Water Talk - Podcast
Jul 21, 2023	Jessica Zimmer	Changing Climates and Vineyards	Ag Alert - Interview

I. Bibliography

Peer Reviewed	
B - Peer-reviewed scholarly journal publications	3
C - Other peer-reviewed publications	2

Non-Peer Reviewed	
A - Popular press articles	5
D - Technical reports and other non-reviewed articles	2

TOTAL	12

PEER REVIEWED

B - Peer-reviewed scholarly journal publications

- Martínez-Lüscher, J.; Chen, C. C. L.; Brillante, L.; & Kurtural, S. K. (2017). Partial Solar Radiation Exclusion with Color Shade Nets Reduces the Degradation of Organic Acids and Flavonoids of Grape Berry (Vitis vinifera L.). *Journal of Agricultural and Food Chemistry*. 65:49, 10693-10702.
- Martínez-Lüscher, J.; Chen, C. C. L.; Brillante, L.; & Kurtural, S. K. (2020). Mitigating Heat Wave and Exposure Damage to 'Cabernet Sauvignon' Wine Grape with Partial Shading Under Two Irrigation Amounts. *Frontiers in Plant Science*. 11, 1760.
- Valenzuela, Francisco; Reineke, Daniela; Leventini, Dante; Chen, Christopher; Barrett-Lennard, Ed; Colmer, Tim; Dodd, Ian; Shabala, Sergey; Brown, Patrick; Bazihizina, Nadia (2022). Plant responses to heterogeneous salinity: agronomic relevance and research priorities. *Annals of Botany*. Oxford University Press. February 16. https://academic.oup.com/aob/advance-article/doi/10.1093/aob/mcac022/6529474?login=false

C - Other peer-reviewed publications

- Chen, Christopher (2022). Heatwave Damage in Vineyards. *Wine Business Monthly*. D. Neel. 38-43. 07.
- Chen, Christopher (2023). Don't Be Salty: How Irrigation, Soil Health and Climate Affect Vineyard Salinity. *Wine Business Monthly*. D. Neel. 62-65. 11.

NON-PEER REVIEWED

A - Popular press articles

- Chen, Christopher (2022). Grapevines an Introduction. YouTube. Feb 18. https://www.youtube.com/watch?v=am5u7W9ppO4
- Chen, Christopher (2022). Grapevines FAQ. Online. February 22. https://www.youtube.com/watch?v=EbxqoFAl8ek&t=4s

- Chen, Christopher (2022). Pruning Grapevines. Online. March 01. https://www.youtube.com/watch?v=vaPva0XsVyU
- Chen, Christopher (2022). Vineyard Establishment - UC ANR. February 28. https://www.youtube.com/watch?v=f0LyPXFy2Ss
- Chen, Christopher (2022). Wine Without Water. *strategies for farming grapes in California's drought*. UC ANR. January. https://ucanr.edu/sites/ChenLab/files/363556.pdf

D - Technical reports and other non-reviewed articles

- Chen, Christopher (2022). Salinity and Grapevines. February 15. https://ucanr.edu/sites/ChenLab/files/363557.pdf
- Chen, Christopher (2022). Selected Plant and Soil Laboratories in Northern and Central California. UC ANR. February. https://ucanr.edu/sites/plant_soil_labs_NCal/

Don't Be Salty: How Irrigation, Soil Health and Climate Affect Vineyard Salinity

Christopher Chen, Ph.D.

Christopher Chen is the UCCE Integrated Vineyard Systems Advisor for the North Coast region of California. His work, through the North Coast Viticulture program, focuses on climate-adaptive viticulture practices to help address concerns related to climate change in vineyards and brings actionable research to the grape growing communities of Northern California. Chen received his doctorate from the University of California, Davis, focusing on climate-centric research in grapevines.

In agriculture there are many compounds that we might call "salts," most of which contain calcium or magnesium. However, these are often not concerning if present in viticultural soils; it is sodium chloride (NaCl) that is most concerning when growing grapes. While chloride is an essential nutrient for plants, it's required in such small quantities that it is rarely, if ever, applied to a field or vine on its own. Sodium is not considered an essential nutrient for plant growth and can be very problematic if present in large amounts.

Sodium may be thought of as an unintentional imposter. The size and charge of a sodium ion are comparable to those of a potassium ion. Potassium is used as the basis of many processes in plant physiology and is essential in large quantities for plant growth. It is so essential that some plants (including grapevines) have created specialized sodium entry pathways in their root systems for only potassium ions.[1] Unfortunately, due to the similarity in size and charge between sodium and potassium, these pathways often also let sodium ions enter the vascular system of the grapevine and can lead to sodium accumulation in the fruits of grapevines.[4,5,6]

Some vineyards that experience NaCl-toxicity problems may be forced to utilize dwindling sources of groundwater for irrigation; this practice can concentrate what salts already exist in the water source and allow sodium chloride to accumulate in the vineyard under driplines. Other issues with salinity in vineyards may be the result of seawater intrusion into the soils of those sites.

In any situation, when sodium chloride concentrations exceed 40 mMol, or about 4 dS/m in the soil, the site can be considered sodic or saline.[11] This is equivalent to around 5% of the average salt concentration in seawater, not particularly common in agricultural settings. However, salt levels underneath drip emitters may be higher than surrounding soils due to an evaporative concentration of NaCl from irrigation water.[12]

Impacts of Heat and Drought on Salinity

Salinity problems in vineyards are often directly related to drought and high temperatures, both of which are in abundance in California. As temperatures rise, evapotranspiration in vineyards increases, resulting in high water demand. Under drought conditions, water is less available to growers and may not be available to meet the increased vineyard water demand during heatwaves.

Additionally, it may also be the case that the water that's available is of worse "quality" and laden with salts or other compounds from agricultural runoff. During droughts, regions that rely on groundwater for irrigation may not experience adequate recharge of groundwater reserves via winter precipitation. These consequences of drought and high evapotranspiration can concentrate the salts already present in the groundwater through depletion of water for irrigation usage. Improperly recycled water may also contain high NaCl concentrations, which will be introduced to a vineyard if used as irrigation water.

Salinity in vineyards used to be less of a concern. During the era of flood irrigation for grapevines the high volume of water applied during an irrigation event, would leach the accumulated sodium chloride downward in the soil profile, past the grapevine's root zone. As an industry, vineyard management has moved away from this method of irrigation because of how inefficiently water is utilized in a flood-irrigated vineyard system.[12,13]

In California, water scarcity and developments in irrigation technologies have led to the adoption of drip or micro sprinkler irrigation systems which have a higher water use efficiency than flood irrigation. In turn, because this new irrigation system is low-input relative to flood irrigation, NaCl is no longer leached by mass influxes of irrigation water during spring and summer, leading to accumulation in the upper layers of the soil.

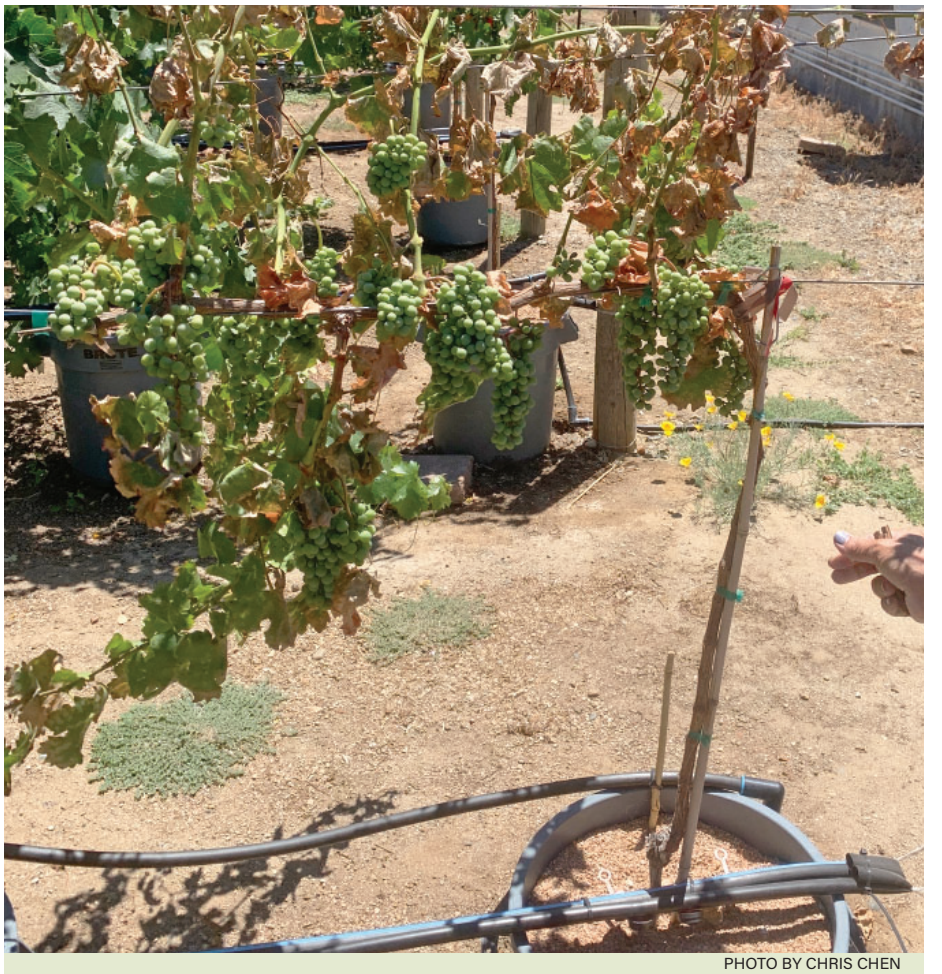

PHOTO BY CHRIS CHEN

In severely impacted plants, leaves will experience extreme necrosis and begin to senesce from the vine. This is one way grapevines are able to sequester and then remove salts from their tissues

Avoidance of salt buildup in soils is the first approach growers should take if they are worried about sodium chloride at a site. One way to avoid salt buildup is by irrigating with only high-quality irrigation water. High-quality water has little to no NaCl in the water itself. This may be recycled water (if treated properly), surface water or water from a groundwater source that is regularly recharged in winter. In some locations, growers cannot choose their irrigation source and cannot be picky about the water they're using for irrigation.

Soil Health to Reduce Salt Toxicity

Another approach is to improve the health of your soil. Soil health can be defined in many ways, depending on the objective. To improve soil health for NaCl tolerance in a vineyard, it would be beneficial to improve soil structure, limit compaction, increase cation exchange capacity and utilize cover crops to build soil organic matter.

Improving soil structure and limiting compaction serve similar purposes with NaCl management in soils. With good soil structure, low compaction, and a higher water infiltration and percolation rates, NaCl may be leached past the root zone naturally during winter rain events. California's Mediterranean climate results in hot, dry summers and cool, wet winters.

If a grower's goal is to leach NaCl from the upper layers of the soil in a vineyard and flood irrigation is not an option during the summer, that site will rely on sufficient winter precipitation to leach those salts downwards into the soil profile. Good soil structure, low compaction, and a higher water infiltration and percolation rates will encourage rapid absorption of precipitation into and movement throughout the soil profile to help leach salts.

Increasing soil cation exchange capacity is also important as it provides more binding sites for mineral nutrients. Sodium, like most plant nutrients, is a cation and requires a negatively charged binding site in the soil to stick around. Sodium will compete with other nutrients for these binding sites. A high number of cation exchange sites allows even a highly sodic soil to retain nutrients needed for plant growth and prevents nutrient problems from worsening in saline soils. Higher soil cation exchange capacity in soils can allow sodium ions to adsorb to soil particle surfaces and effectively take them out of the soil solution. This results in lower sodium availability to grapevine roots.

Cover Crops

Cover crops can be used to improve soil structure, increase cation exchange sites and sequester some of the NaCl already present in the soils. Currently, there are no useful plant species that preferentially take up sodium or chloride and can be grown in an agricultural setting. However, most plant species will absorb some of the NaCl around their roots. Some plants, such as sunflower and mustards, have been shown to have a higher uptake of sodium than other commonly grown crops.[14] If mowed and removed, cover crops can remove a small fraction of the salts in the soils. While not a solution to salt accumulation in vineyards, cover crops can help improve the situation. In years of heavy rainfall, cover crops may also improve leaching of various salt compounds from the soil profile and reduce the rate of salt accumulation in soils of irrigated cropping systems.[15]

As average temperatures increase and precipitation patterns become less predictable in California, it's likely that sodium chloride accumulation in vineyards will become more prevalent. Overuse of groundwater for irrigation can exacerbate NaCl loading introduced via a depleting water source with high salts concentrations.

Takeaways

Short-term solutions, such as salt-tolerant grapevine rootstocks, are under development; however, all plants have a limit to the amount of salt they can tolerate. If soil NaCl concentrations continue to increase, solutions related to rootstock selection and vine phenotypes will become less effective. Given the continued popularity of drip irrigation strategies, proper groundwater management, sufficient recharge rates and well-structured soils remain important tools for addressing sodium chloride accumulation in vineyard soils. **WBM**

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Powdery Mildew Field Day

A Cooperative Extension Resource for Changing Conditions

Christopher Chen, Ph.D.

Meet the Author: **Christopher Chen** is an integrated vineyard systems advisor with the University of California Cooperative Extension.

POWDERY MILDEW (caused by *Erysiphe necator*, a common fungal parasite) is a disease which negatively impacts vineyards across California. Its ability to cycle through multiple generations per year can result in major losses to crop quality and yield, making it one of the most economically important diseases of grapes worldwide.

University of California, Cooperative Extension Specialist, Dr. Akif Eskalen and his plant pathology lab have researched solutions to control pathogens in agronomic crops for the past several years; these include grapevine trunk disease (GTD) (i.e., esca, *Eutypa* and *Botrytosphaeria* canker diseases) and other fungal diseases such as powdery mildew and Botrytis bunch rot. These diseases are of constant concern for grape growers across California and are typically kept in check with a series of cultural practices and the use of different fungicides.

However, besides sulfur, horticultural oils and/or synthetic pesticides, other options for control of pathogens such as powdery mildew exist. These include soft chemicals, biologically-based formulations, and cultural management practices. Many of these alternative options are utilized in the grape-growing industry already but may lack sufficient testing to allow for confident recommendations for effective use.

UCCE plant pathologist Akif Eskalen discusses results of the powdery mildew trials with field day attendees.

The incidence of powdery mildew was exceptionally high in California in the 2023 growing season. This may be due to a high volume of precipitation in winter and spring which led to more vigorous vines, and/or spring temperatures ideal for fungal growth. The Powdery Mildew (Thomas-Gubler) Risk Index values remained high from late-April through mid-July 2023, indicating a year with conditions that support favorable development of *E. necator* in vineyards across the state.

At the end of July, amid high powdery mildew pressure, the Eskalen lab at UC Davis hosted an annual Powdery Mildew Field Day for growers and other members of the viticulture industry. On display were field trials of numerous chemical and biological controls for powdery mildew and the degree of control provided by these compounds at the site. These studies are housed at the UC Davis Plant Pathology Fieldhouse Vineyard (cv Chenin blanc) in Davis, Calif. This small research vineyard covers approximately 2.5 acres on the South Campus of UC Davis and serves as a unique and much-needed resource for research on plant pathology and best management practices for control of plant pathogens. While collaboration with private growers is a useful and valuable resource for Cooperative Extension research, dedicated sites such as these are often beneficial for destructive or disease-based studies on crops. This also helps limit the damage or incurred costs by collaborator-growers.

Two Trials at Field Day

Two trials were on display at the field event. Trial I consisted of 28 different treatments of synthetic fungicides alone or in combination with soft chemistry products. Trial II consisted of 20 combinations of soft chemistry products, including biologicals, sulfurs, nutrient applications, oils, and other organic materials. Control efficacy varied drastically among treatments in both trials, with acute contrasts in disease signs and symptoms visually apparent. Attendees of the field day included industry members specializing in pathogen control, pest control advisors, UCCE farm advisors, and graduate students.

Dr. Eskalen's description of the polycyclic nature of powdery mildew began the day and provided insight into the difficulties of mitigating damage from the multiple generations of disease that grape growers can face each year. Powdery mildew performs well in Mediterranean climates such as California, requiring wet conditions only to release spores from their overwintering structure (known as chasmothecia) and germinate; however, no moisture is needed for growth of the pathogen following the initial infections in the spring, or the production, dissemination, and germination of the "repeating" spores (conidia) produced from new infections throughout the rest of the growing

The level of the infestation covered with a few cleaner berries. It also shows the secondary symptoms of powdery mildew on the cane. Those island-looking black symptoms on the cane are also caused by a powdery mildew pathogen.

season. The time needed for a new generation of infections to develop and produce their own conidia to further disease spread is governed primarily by temperature (the basis of the Gubler-Thomas model), and is only five to seven days at temperatures of 63 to 86°F. This means most of California has ideal environmental conditions for the growth and spread of powdery mildew throughout long periods of the growing season.

"Synthetic materials are available that work most of the time," noted Akif Eskalen. "However, it is a good idea to alternate or combine different materials to reduce the risk of resistance developing. Alternating the use of fungicides with different modes of action is strongly recommended to prevent pathogens from developing fungicide resistance. Fungicides are classified by the Fungicide Resistance Action Committee (FRAC) on the basis of their mode of action, and this information is provided on product labels. All fungicides showing a common FRAC code on their label have the same mode of action. Thus, effective rotation should involve the use of products that do not have the same FRAC code."

The trials highlighted at the Powdery Mildew Field Day focused on applicable controls for management of the disease. Due to the objectives of the project, vineyard canopy management was kept to a minimum of basal leaf removal on the morning-sun side of the canopy. Previous research has shown that powdery mildew pressure can be significantly reduced by applying proper leaf and lateral removal. Canopy thinning increases airflow, incoming ultraviolet radiation, and can increase temperatures on the clusters to an unfavorable level; these impacts collectively limit development of this disease. These same practices can also greatly increase the deposition of fungicide sprays onto the clusters, further augmenting control.

In addition to Dr. Eskalen's presentation, attendees had the opportunity to discuss best management practices (BMP) for Powdery Mildew with members of the Eskalen Lab. UC Davis Ph.D. candidate Marcelo Bustamante discussed the rising interest in biological control methods for powdery mildew and the place this control method has in complimenting others. On their own, biocontrol agents of *E. necator* may have low-to-no efficacy. However, in combination with synthetic fungicides or soft chemicals they can help growers reduce the number of synthetic fungicide applications necessary to control the resident pathogen. This may help reduce synthetic fungicide application in vineyards significantly as the science behind biocontrol of fungal pathogens continues to develop.

Results for the Real-World

The event provided an opportunity for the University of California to fulfill its promise of extension and outreach to the agricultural communities of California. The importance of having access to many options for control of pathogens in vineyards cannot be overstated. As conditions change and living organisms adapt to thrive in higher temperatures and other novel environmental variables, growers of crops such as grapes will need more options for pathogen control.

While synthetic fungicides are useful in most situations, soft chemistry, biocontrol agents, and combinations of these categories are going to become more important to address the potential for fungicide resistance in pathogens. Research such as the trials described at the Powdery Mildew Field Day are more necessary than ever for maintenance of our agricultural industries in California. As climates change, growers will need new tools to address changes in pathogen pressure and researchers at the Eskalen Lab are helping to test and highlight new options for grape growers. **WBM**

A full report of this study is available: *ucanr.edu/sites/eskalenlab/files/386851.pdf*.

For more information about ongoing and completed work by the Eskalen Lab, visit their website: *ucanr.edu/sites/eskalenlab/*.

For information on the Powdery Mildew Risk Assessment Index visit the UC IPM website: *ipm.ucanr.edu/weather/grape-powdery-mildew-risk-assessment-index/*.

Summary of Publication Examples

1. **Wine Business Monthly - Articles**
   These articles are peer-reviewed but considered popular science due to their publication in the Wine Business Monthly Magazine. I have written and published two since January 2022 and currently have another set to be published in December 2023. These are useful, science-based articles about topics related to my CE program and are available to a much wide audience nationwide.

   a) Heatwave Damage in Vineyards – Wine Business Monthly (July 2022)
   URL: https://www.winebusiness.com/wbm/?go=getArticle&dataId=260260

   b) Don't Be Salty: How Irrigation, Soil Health and Climate Affect Vineyard Salinity
   (No Link – in print) – Attached to "Publication Examples" section of Dossier

2. **YouTube Educational Videos**
   These videos were originally developed to assist the Sonoma County Master Gardeners in training their new assistants. However, due to the popularity of the first few videos I continued producing more to eventually cover many of the basic principles of viticulture. These have been viewed collectively 665 times at the time of writing this

   Link: YouTube Channel – Instructional Videos

3. **Peer-Reviewed Scientific Journal - Article**
   This article was planned prior to my employment in this position. However, it was published within the review period on February 16, 2022. The topic addressed in this manuscript also aligns with my CE Program objectives and purpose. It has been cited in other peer-reviewed articles at least five times since its publication.

   Link: Plant responses to heterogeneous salinity: agronomic relevance and research priorities.

   Valenzuela, Francisco; Reineke, Daniela; Leventini, Dante; Chen, Christopher; Barrett-Lennard, Ed; Colmer, Tim; Dodd, Ian; Shabala, Sergey; Brown, Patrick; Bazihizina, Nadia (2022). Plant responses to heterogeneous salinity: agronomic relevance and research priorities. *Annals of Botany*. Oxford University Press. February 16. https://academic.oup.com/aob/advance-article/doi/10.1093/aob/mcac022/6529474?login=false

   URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9007098/