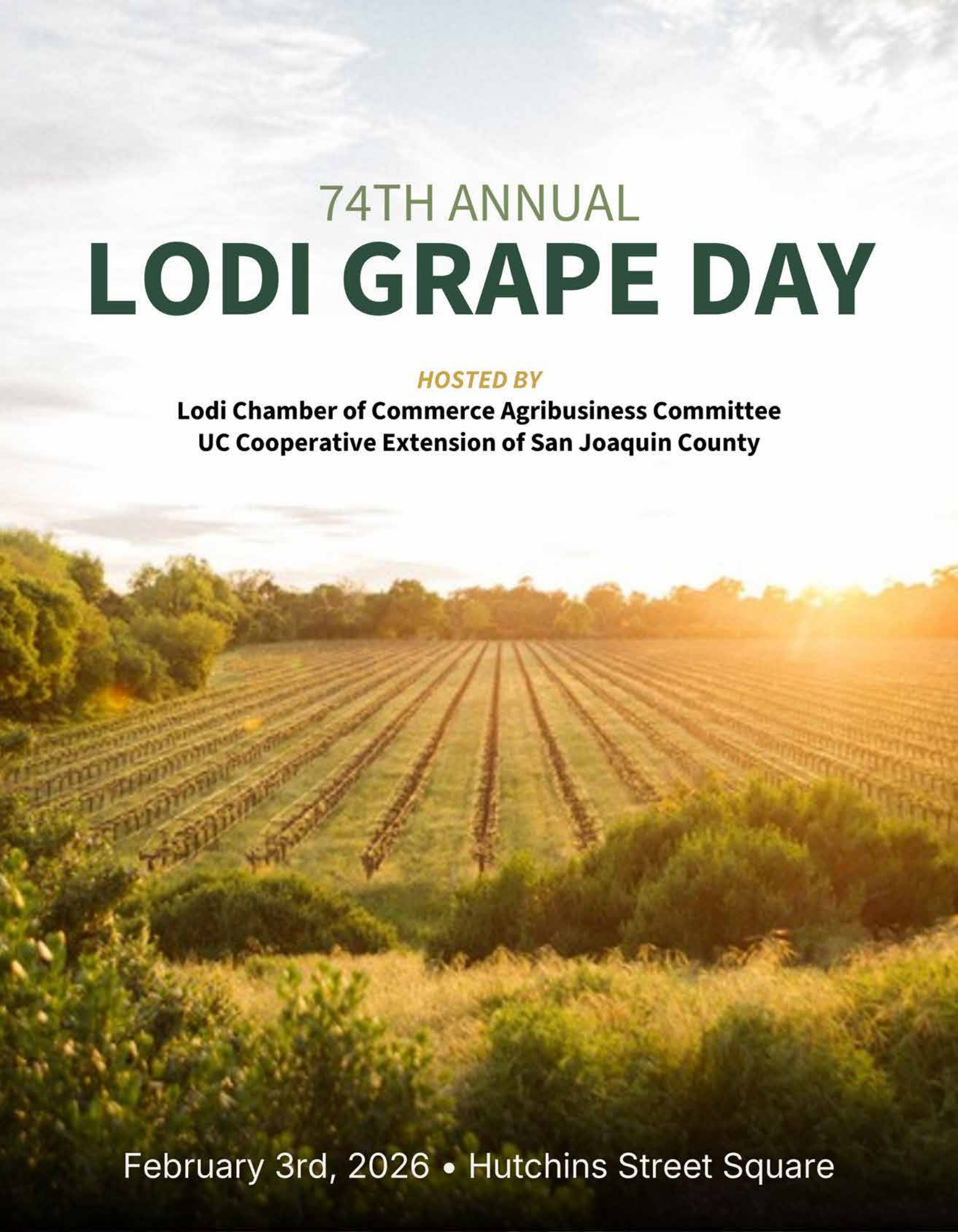
74TH ANNUAL

LODI GRAPE DAY

HOSTED BY

Lodi Chamber of Commerce Agribusiness Committee
UC Cooperative Extension of San Joaquin County



February 3rd, 2026 • Hutchins Street Square

WELCOME

JP Doucette

President & CEO
Lodi District Chamber of Commerce

On behalf of the Lodi District Chamber of Commerce, it is my honor to welcome you to the 2026 Lodi Grape Day. This annual gathering is a celebration of the people, partnerships, and shared commitment that make Lodi one of the most respected winegrowing regions in the world.

Lodi Grape Day serves as an example of what can be accomplished when our agricultural community works together. It is the result of the synergy between the Lodi Chamber's Agribusiness Committee, the Lodi Winegrape Commission, the Lodi District of Winegrape Growers, and Visit Lodi that reflects the shared mission to elevate Lodi's appellation. Each organization plays its part in advocating for smart and balanced policies that protect businesses and workers and educating policymakers and consumers about the value of local production and local consumption.

At a time when agriculture faces increasing regulatory, economic, and market pressures, this collaboration is more important than ever. By working together, we ensure that decision-makers understand the real-world impacts of policy, that consumers appreciate the quality and sustainability behind every cluster grown here, and that Lodi continues to be recognized for its leadership, innovation, and environmental stewardship.

Today's program also underscores our commitment to bringing growers and industry professionals together with researchers, advisors, and experts who help keep our operations resilient, efficient, and competitive. That exchange of knowledge is essential to the long-term strength of our industry and our region.

Events like Grape Day do not happen without an extraordinary amount of dedication behind the scenes. My sincere thanks go to the volunteers, presenters, sponsors, and committee members whose time, expertise, and passion make this event possible year after year. Your commitment to this industry and to one another is what truly sustains Lodi agriculture.

John P Doucette

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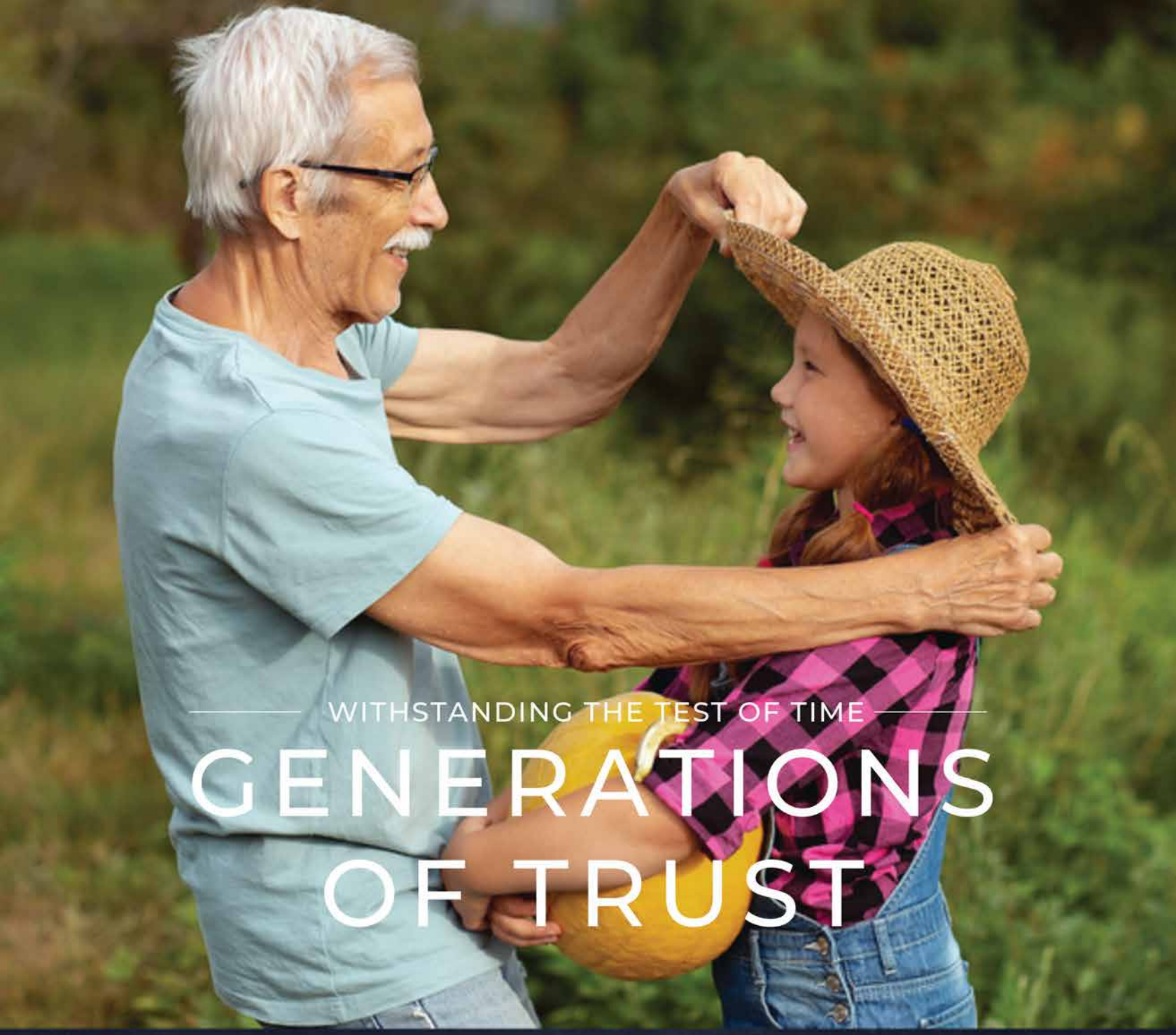

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AGENDA

7:30 AM	**Registration and DPR Credit Sign-In**
8:00 AM	**Welcome & Introduction** *Justin Tanner, PhD, Northern San Joaquin Viticulture Farm Advisor, UCCE*
8:05 AM	**Drones in Viticulture: Faster Scouting, Targeted IPM Decisions, and FAA Compliance** *Justin Tanner, PhD, Northern San Joaquin Viticulture Farm Advisor, UCCE*
8:35 AM	**Drip Irrigation System Maintenance** *Moniem Mohamed, PhD, Irrigation and Soils Advisor, UCCE*
9:05 AM	**Integrated Management of Powdery Mildew and Botrytis, Preparing for Late-Season Rots** *Afik Eskalen, PhD, Professor, Plant Pathology, UCCE, UC Davis*
9:35 AM	***Break***
9:50 AM	**Control of Leafhoppers and Vine Mealybug in Grapes with Organic and Conventional Reduced Risk Insecticides** *Robert Van Steenwyk, PhD, Research Entomologist and Emeritus Faculty at UC Berkeley Dept. of Environmental Science, Policy and Management*
10:20 AM	**On the Lookout for Spotted Lanternfly** *Cindy R. Kron, PhD, North Coast IPM Advisor, University of California Statewide IPM Program and Cooperative Extension*
10:50 AM	**Predict Grapevine Stem Water Potential by Integrating Soil Moisture and Above-Ground Weather Conditions** *Cliff Yu, PhD, Assistant Professor, Fresno State University Department of Viticulture and Enology*
11:20 AM	**Closing Remarks** *Justin Tanner, PhD, Northern San Joaquin Viticulture Farm Advisor, UCCE*
11:30 AM	**Lodi Wine Sensory Evaluation**
12:00 PM	**Lunch**
12:20 PM	**Luncheon Keynote Speaker: Chris Bitter** *Senior Wine & Grape Analyst, Terrain / American AgCredit*

Meeting Credits = 2.5 hours DPR CE credits in OTHER category

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This meme was brought to you by a local leader in the winegrape industry. Think you know who it is? ***Email us at events@lodichamber.com****. First one with the correct answer wins a free lunch ticket to next year's event!*

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1995 Claude Brown
1996 Tom Hoffman
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1998 Gall Kautz
1999 George Barber
2000 Bruce Mettler
2001 Brad & Randy Lange
2002 Steve Furry
2005 Pat Stockar
2006 Joe Valente
2007 Stanton Lange
2008 Jack Hamm
2009 Rod Schatz
2010 Paul Verdegaal
2011 Joe Peterson
2012 Kim Ledbetter-Bronson
2013 The Phillips Family
2014 Bruce Fry
2015 The Stokes Family
2016 Joe & Sherry Cotta
2017 Brad Goehring
2018 John Anagnos
2019 Amy Blagg
2020 Jennifer L. Spaletta
2021 Paul Burkner
2023 Aaron Lange
2024 Daniel Meza
2025 Natalie Collins

2026 Agribusiness Person of the Year

Natalie Collins

President
California Association of Winegrape Growers

Natalie's extraordinary advocacy for California's winegrape industry is rooted in dedication, innovation, and a genuine passion for growers. Her ability to champion the needs of growers while fostering collaboration and future-focused solutions has strengthened the industry statewide and inspired our local community.

"I'm deeply honored to be recognized by the Chamber as the Agribusiness Person of the Year and humbled to be counted among so many of Lodi's agricultural leaders and personal mentors. Lodi is where I grew up, where my roots are, and where I've chosen to raise my family. Now, serving as president of the California Association of Winegrape Growers, I've had a front-row seat to the resilience and leadership of Lodi's growers, and I'm proud to advocate for them in Sacramento and Washington, D.C. Their commitment to quality, community, and innovation is the foundation of our region's success. This acknowledgement from a community I care so deeply about is incredibly meaningful, and it only strengthens my commitment to serving Lodi's growers and giving back to the place that has shaped my life."

Currently, Natalie is a central force behind the development of AB 1585, legislation aimed at strengthening the integrity of "American" wine labeling. She has been a leading advocate for truth in labeling, helping shape and advance the bill to ensure that wines labeled as "American" are made from 100 percent U.S.-grown grapes. Drawing on California's long-standing standard for "California" wine, she has worked closely with legislators and industry partners to align consumer expectations with transparent sourcing practices. Her leadership and advocacy place her at the forefront of this effort, reinforcing her role as a trusted voice for winegrape growers and a key architect of policy that protects both producers and consumers.

California Association of Winegrape Growers

Luncheon Keynote Speaker

Chris Bitter, PhD

Senior Wine & Grape Analyst
Terrain / American AgCredit

Chris Bitter, Ph.D., is Terrain's senior wine and grape analyst. As a part of the Terrain team of economists, he delivers expert analysis to the customers of American AgCredit, AgCountry Farm Credit Services, Farm Credit Services of America and Frontier Farm Credit. Chris leads the publication of Winescape™, a report series that shares research and insights for the business of vineyards and wineries.

With more than 20 years of experience as an economist and market analyst, Chris is a former faculty member of the University of Washington's Runstad Center for Real Estate Studies. Prior to joining Terrain, he had his own market research and consulting firm focused on the wine industry, Vintage Economics. Chris earned his Ph.D. in economic geography with a minor in agricultural and resource economics from the University of Arizona. His research has been published in a variety of national and international publications, including the Journal of Wine Economics, and he has delivered presentations at wine industry conferences around the globe.

Scan the QR code to view his latest issue of Winescape.

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Drones in Viticulture: Faster Scouting, Targeted IPM Decisions, and FAA Compliance

By **Justin Tanner, PhD**
Northern San Joaquin Viticulture Farm Advisor, UCCE

Drones are rapidly becoming a valuable tool on vineyards of all sizes. These unmanned aerial vehicles can scout fields in a fraction of the time it takes on foot, giving growers a bird's-eye view of their field (**Figure 1**). Equipped with cameras and sensors, drones can quickly help you identify underperforming areas. Such underperformance can then be targeted for on the ground evaluation to identify the cause of the issue, be it pests, nutrient deficiencies, irrigation problems or other issues. What once required days of field walking can now be accomplished in minutes, and specialized cameras can detect subtle changes in plant health even before symptoms are visible. Drones help growers monitor conditions more efficiently and respond to issues faster.

High-resolution drone imagery allows early detection of field problems. Even a standard RGB camera can identify weed patches, water pooling, or irrigation leaks, details that help pinpoint where action is needed (**Figure 2, opposite page**). Drones help farmers take targeted steps before small issues spread, saving time, labor, and inputs by focusing efforts only where they're actually needed. Many growers find that early detection improves yield, crop quality, and overall management decisions.

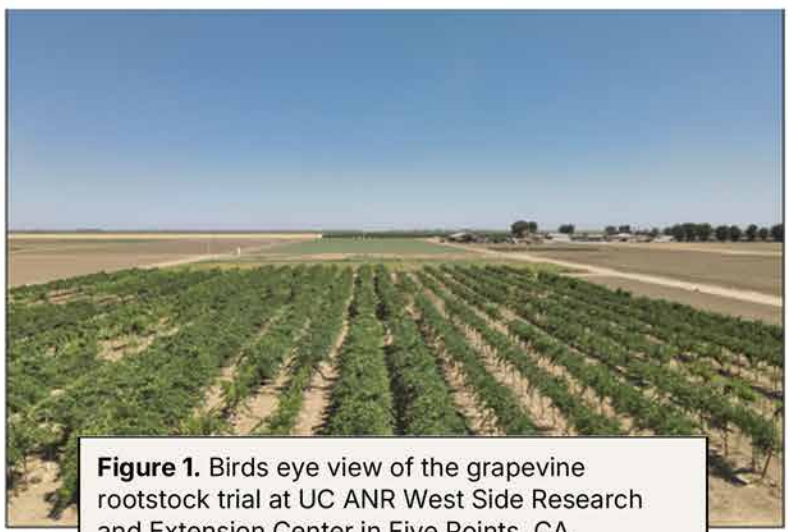

Figure 1. Birds eye view of the grapevine rootstock trial at UC ANR West Side Research and Extension Center in Five Points, CA

Know the Rules

Before launching a drone, it's essential to understand the rules that come with operating one. The Federal Aviation Administration (FAA) considers any drone use that isn't purely recreational to be a commercial operation, and that includes all agricultural uses. If you're flying a drone for any beneficial purpose such as scouting, irrigation checks, or vineyard mapping, it is a commercial activity. Under FAA regulations, all such flights fall under Part 107, which governs small Unmanned Aircraft Systems (sUAS). Even if no money changes hands, using a drone "in furtherance of a business" (for example, managing your own farm or assisting a neighbor) requires compliance with Part 107 and a valid Remote Pilot Certificate. And remember—while it might be tempting to 'fly under the radar,' the FAA doesn't have much sense of humor about unlicensed operations. Non-compliance can result in significant fines and penalties, so it's best to stay in compliance and aboveboard on every flight.

Drones in Viticulture: Faster Scouting, Targeted IPM Decisions, and FAA Compliance

Figure 2. Bindweed growing over a grapevine canopy (left). Shoot stunting caused by grapevine trunk disease (right).

To become certified, operators must pass the Unmanned Aircraft General – Small (UAG) exam at an FAA-approved testing center. The test costs $175, covers aeronautical knowledge such as airspace, weather, and safety and is open to applicants at least 16 years old. After passing, pilots complete an online application and background check to receive their certificate. Maintaining certification requires a free online refresher course every 24 months, rather than retaking the full exam.

Each drone used must also be registered with the FAA, regardless of weight. Registration costs $5 per drone for three years and can be completed online through the FAA DroneZone website (**https://faadronezone-access.faa.gov/#/**). Once registered, you'll receive a unique number that must be visibly marked on the aircraft.

All registered drones must also comply with the FAA's Remote ID rule, which functions like a digital license plate broadcasting a drone's identity and location while in flight. Most new drones include Remote ID capability, while older models may require an add-on broadcast module. Remote ID is mandatory for nearly all drones flown under Part 107, except when operating exclusively in FAA-Recognized Identification Areas (FRIAs)—designated zones for hobby and educational flying. Because agricultural operations occur outside these zones, compliance is required.

Part 107 also limits flight altitude to 400 feet above ground level, requires the operator to maintain visual line-of-sight, and allows night operations only if the drone is equipped with anti-collision lighting visible for at least three statute miles. It also restricts flying over people. These rules are designed to maintain safety in shared airspace and protect both pilots and bystanders. Operating commercially without a Part 107 license or an unregistered drone can result in fines and enforcement actions.

Fortunately, the licensing process is straightforward, and once certified, growers gain access to an invaluable management tool. Drones can provide insights that improve efficiency, reduce costs, and support data-driven decisions that enhance both productivity and sustainability.

Drones in Viticulture: Faster Scouting, Targeted IPM Decisions, and FAA Compliance

If you're interested in incorporating drones into your vineyard operations, you don't have to navigate the process alone. I'm available as a local resource for San Joaquin County growers, consultants, and pest control advisors who have questions about drone technology, the Part 107 certification process, or FAA compliance. Whether you're selecting your first drone, preparing for the exam, or planning safe flight operations, feel free to reach out. With the right knowledge and guidance, drones can become a cornerstone of your precision agriculture toolkit—helping you farm smarter, save time, and stay compliant with FAA rules.

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Drip Irrigation System Maintenance

By **Moneim Mohamed, PhD**
Irrigation and Soils Advisor with the UC Cooperative Extension

Introduction

Drip irrigation is one of the most efficient irrigation systems to manage water and nutrients in vineyards, but it performs best only when it is maintained well. Small problems—like worn pump components, inaccurate pressure gauges and flow meter readings, or partially clogged emitters can reduce system efficiency which can translate into yield loss, uneven growth, and increased input costs. Some growers perform maintenance only when they have an issue, which is repair, not maintenance. Regular maintenance is the key to efficient irrigation system and avoiding expensive repairs. This article provides a practical, season-long maintenance program to keep the drip system operating smoothly throughout the season.

Distribution Uniformity (DU)

First recommended task before you add any inches of water is to run a catch can test to evaluate DU. Run the test annually or at least every other year. DU is commonly used irrigation performance measures of how evenly water is applied across a field during irrigation so same amount of water received by each vine. The more DU can be improved, the more water will be conserved and the better the crop will perform. Gross irrigation amounts are often increased to account for poor DU by dividing the net irrigation required by the DU as a decimal. A system with poor DU wastes water and creates stress zones that cut yield. Target DU ≥ 0.80. To improve DU, flush laterals, clean filters on schedule, replace clogged emitters, correct pressure variation (regulators, valve zoning), and fix leaks (discussed later).

Pump

Even though filtering and flushing get most of the attention, the efficiency of the drip system begins at the pump station and needs to be well maintained. Pumps deliver the design flow rate to each irrigation block and maintain stable pressure. Verify operating pressure and flow at system start-up and periodically during the season. Listen for abnormal vibration/cavitation and watch for pressure fluctuations that can create inconsistent downstream pressure. Periodically have a professional, conduct a pump test. Pump test will give you flow rate (gpm), pressure to irrigation system(psi), and energy use (kilowatts, fuel burn rate, or Natural gas therms). Also, pump test will give you pump efficiency a ratio of horse power out to the horse power into the pump.

Drip Irrigation System Maintenance

Pressure Gauges and Flow Meters

Pressure gauges and flow meters are your early warning systems. Clogged filters, damaged valves and uneven pressure can be detected by regular checks of flow meters and pressure gauges which is your early warnings and the best way to stay ahead of these issues.

Pressure gauges are only useful if they are accurate, which require proper installation, calibration, and routine maintenance. Pressure gauges do go bad, and gauges in key locations (e.g., upstream/downstream filters and downstream pressure regulators) need to be accurate; sun-exposed gauges may need annual replacement.

Flow meters require periodic maintenance/calibration, and you should follow manufacturer recommendations rather than assume the meter stays accurate forever. Flow increases at constant pressure often indicates leaks and flow decreases at constant pressure often indicates clogging.

Clogging and Filtration

Emitters have very small flow paths, which makes them highly susceptible to clogging (**Figure 1**). When clogging occurs, application uniformity and delivered water decline, and salt leaching near the drip lines can also be reduced, leading to uneven vine growth and potential yield losses. Because clogging is the most common problem in drip systems, it should be monitored routinely. Growers can often detect it by watching for uneven or shrinking wetted patterns around emitters, and they can confirm it by evaluating system performance, such as measuring emitter discharge or flow rates during an irrigation system evaluation.

Figure 1. Clogged emitter from sand

Clogging can be caused by three different causes:

1. Physical cause: [Inorganic (sand, silt, and clay) organic (algae, bacteria, plant debris, fish, insect larvae, etc.)], if irrigation water has suspended solids concentration over 50 ppm, the plugging chance is high, and filtration is the solution to this clogging problem. Generally, sand media filters are used to remove algae and other organic materials.

A two-stage filtration setup is recommended. The primary filters (Media tank, sand separators, disk filters) remove suspended material from the water. A secondary, smaller "backup" (screen filters) filter installed downstream from the primary filter protects the drip irrigation system if the primary filter fails. The degree of filtration is expressed as mesh size.

Drip Irrigation System Maintenance

Mesh size refers to the number of openings per inch; for many microirrigation systems, a 200-mesh screen is commonly used. Many filters options are available, and industry-developed recommendations are summarized in **Table 1**. In media (sand) filters, a normal design pressure loss is about 3–5 psi. The filter should be backflushed when the pressure drop becomes about 10 psi. One cleaning option is a shock chlorination of the tank: add about ½ gallon of chlorine bleach to the filter tank, isolate the field with the valve closed, allow the tank to fill, shut the system down, and let the solution sit for around six hours before thoroughly backflushing the tanks. If the pressure drop remains high or backflushing becomes excessively frequent, it's usually a sign the media needs to be replaced.

Table 1. Filtration Guidelines

Flow rate (gpm)	Concentration		Filtration
	Organic	Inorganic	
< 50 gpm	L	L	A
	L	M	A+C
	L	H	A+C
	M	L	D or A
	M	M	C+D or C+A
	M	H	C+D or C+A
	H	L	D or A
	H	M	C+D or C+A
	H	H	C+D or C+A
50 to 200 gpm	L	L	A
	L	M	C+A
	L	H	C+A
	M	L	B or E
	M	M	C+B or C+D
	M	H	C+B, C+D, or C+E
	H	L	B, D, or E
	H	M	C+D or C+E
	H	H	C+B, C+D or C+E
> 200 gpm	L	L	A
	L	M	C+A
	L	H	C+F or E, C+A or C+E
	M	L	B or E
	M	M	C+B or C+E
	M	H	C+B, or C+E
	H	L	B or E
	H	M	C+B or C+E
	H	H	C+B, or C+E

Key:
L = less than 5 ppm
M = 5-50 ppm
H = more than 50 ppm
A = pressurized screen or disk filter
B = suction screen filter
C = centrifugal sand separator
D = gravity flow screen filter
E = sand media filter

Note: Letter sequence indicates the sequence of filters: C+E means a centrifugal separator followed by a sand media filter

Source: *Bruce 1985.*

Drip Irrigation System Maintenance

Even with excellent filtration, very fine silt and clay can still move through the system—so routine flushing remains one of the most effective and least expensive defenses against clogging. Flush in sequence from mainlines to submains, then laterals. Use flush valves on mains and submains and periodically open the ends of laterals (as often as every two weeks, depending on water quality and system conditions). Self-flushing laterals still benefit from occasional manual flushing. Finally, it's good practice to run water to flush the lines after fertigating or injecting chlorine.

2. **Chemical Precipitates:** Lime (calcium carbonate) is the most common problem. Lime occurring naturally or through calcium amendments which can cause calcium carbonate ($CaCO_3$) to precipitate and increase clogging. The correction is through acid injection [Sulfuric acid, hydrochloric acid, Citric acid (more expensive)].

3. **Biological Sources:** Algae and bacteria are the common problems for biological sources clogging and the solution is good filtration to remove the suspended biological materials, combined with /chemigation with a biocide [chlorination: Sodium hypochlorite (liquid; not recommended for sodic soil) or Calcium hypochlorite (solid); not recommended for hard water] to further clean up the biological contaminants.

Start by identifying what's plugging the emitter. If flushing or chemical treatments like chlorination or acid injection don't clear clogging, leave the clogged emitter in place and install a replacement emitter close by.

Routine Maintenance Tasks	
Check for leaks	Daily or Weekly
Check flowmeters & pressure gauges	Daily or Weekly
Inspect emitters for clogging	Daily or Weekly
Backflush filters	As needed; variable; can be automated
Inspect media filter, replace sand if caked	As needed; variable; can be automated
Flush lateral lines	About every two weeks
Inject acid (moderate lime risk)	Every 2-4 weeks
Inject acid (high lime risk)	During every irrigation
Inject chlorine or other biocide (moderate biological contamination)	Monthly
Inject chlorine or other biocide (severe biological contamination)	During every irrigation

Drip Irrigation System Maintenance

Less Frequent Tasks	
Measure application rate & distribution uniformity	Once or twice per year
Inspect & adjust pressure-regulating valves	Once or twice per year
Inspect & replace pressure gauges	Once or twice per year

Source: Morris and Schwankl (2008).

More Information

For more information on drip irrigation system maintenance, scan QR code or visit this website.

https://ucanr.edu/site/maintenance-microirrigation-systems

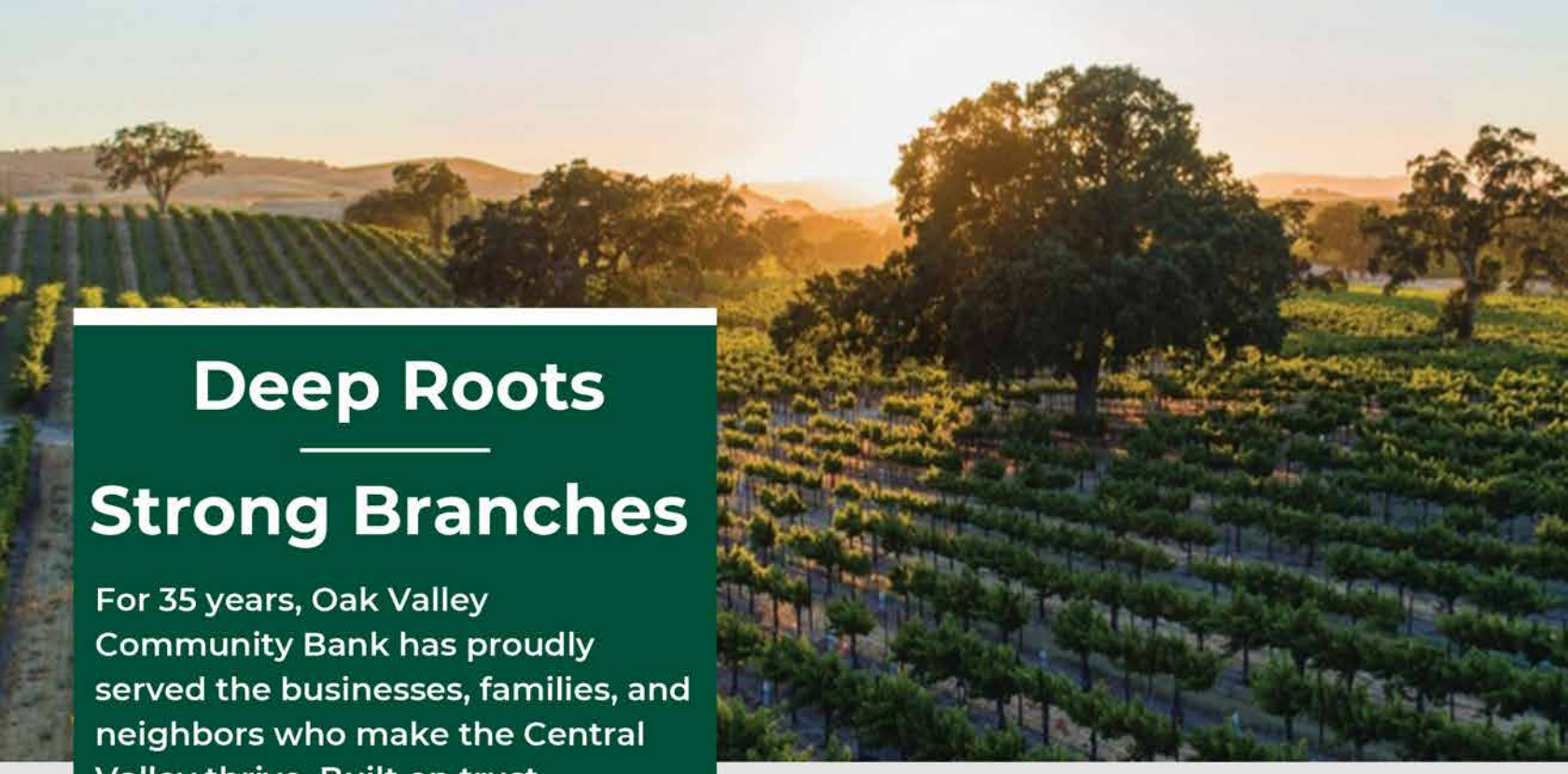
References:

Bruce, D. A. (1985). Filtration analysis and application, Drip/Trickle irrigation in action. In Proc. of the third international Drip/Trickle irrigation congress, 1985 (Vol. 1, pp. 58-68).

Morris, M., and Schwankl, L. (2008). The California microirrigation pocket guide: system management & maintenance. National Center for Appropriate Technology.

Schwankl, L., Hanson, B., and Prichard, T. (2008). Maintaining Microirrigation Systems. Publication 21637, University of California Division of Agriculture & Natural Resources.

Dr. Abdelmoneim Mohamed (Moneim) is the Irrigation and Soils Advisor with the University of California Cooperative Extension. He holds a Ph.D. in Biological and Agricultural Engineering from Washington State University. His work focuses on precision irrigation technology, irrigation scheduling, deficit irrigation, soil health, and groundwater sustainability in orchard and vineyard cropping systems.



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Integrated Management of Powdery Mildew and Botrytis and Preparing for Late-Season Rots

By **Akif Eskalen, PhD**
Professor, Plant Pathology, UC Cooperative Extension, UC Davis

Across California vineyards, the "finish" of the season often determines whether clean fruit makes it to the winery. Powdery mildew sets the trajectory early, especially from bloom through bunch closure, while Botrytis can establish at bloom and then express later when clusters stay wet and shaded. As fruit softens and sugar rises, a complex of late-season rots can accelerate quickly, particularly when canopy density slows drying or berries are injured by insects, birds, or operations.

Quick look: When Each Disease Hits

Powdery mildew is a continuous-season threat once infections begin, driven by mild to moderate temperatures and shaded canopies. Botrytis risk is often anchored around bloom and bunch closure (cluster trash and latent infection), with renewed concern near harvest when clusters remain wet. Late-season rots increase as berries soften and are frequently triggered by berry injury and slow drying in dense canopies.

Field diagnostic note: multiple organisms may be present in the same cluster late in the season. Treat the problem as a system (canopy, injury, timing), not a single pathogen.

Powdery Mildew Plan: Build the Season on Early Control

The most cost-effective mildew program is the one that prevents establishment early and protects clusters through bunch closure. Once mildew is established, it multiplies quickly and can leave lasting quality impacts, berry scarring, and skin cracking, which also increase vulnerability to late-season rot complexes.

Operational priorities *(early season through bunch closure):*

- **Start clean:** scout early and address hotspots before bloom.
- **Protect clusters early:** maintain coverage from bloom through bunch closure, when berry infections translate into later quality loss.
- **Coverage is a canopy issue:** fruit-zone leafing and canopy management improve spray deposition and shorten wetness periods.
- **Resistance stewardship:** rotate effective modes of action and avoid repeated use of the same high-risk group in consecutive sprays.

Figure 1. Powdery mildew on grape leaf and cluster: diffuse white growth and light chlorosis in the infected area

Botrytis Plan: Timing Plus Airflow Fundamentals

Botrytis bunch rot management works best when you align fungicide timing with the biology of infection and use canopy architecture to keep clusters dry. A spray program cannot compensate for a tight, shaded fruit zone that stays wet after fog, dew, or rain.

Figure 2. Botrytis bunch rot and Aspergillus rot: gray and black sporulation and cluster breakdown in a shaded, wet microclimate. (*Photo: Akif Eskalen*)

Integrated Management of Powdery Mildew and Botrytis and Preparing for Late-Season Rots

High-value decisions:

- **Bloom to fruit set:** target protection when flowers/cluster trash increase susceptibility and latent infection potential.
- **Bunch closure:** tight clusters and limited penetration make pre-closure decisions especially important in high-risk blocks.
- **Fruit-zone microclimate:** leaf removal, shoot thinning, and hedging should prioritize airflow without creating sunburn risk.

Cool-Season Tweaks: When the Year Runs Late

Cooler seasons and delayed harvests stretch cluster-rot risk. When fruit hangs longer into periods with heavy dew or rain, the effective window of prior applications may expire while clusters are still exposed. In those years, tighten scouting in the fruit zone, shorten spray intervals when humidity persists, and revisit canopy density to speed drying.

Decision triggers that justify adjustments:

- Forecasted rain or extended dew periods within 2–4 weeks of harvest.
- Persistent shaded fruit zone or tight clusters with limited airflow.
- Evidence of berry injury (insects, birds, mechanical operations) that can seed rot complexes.

Late-Season Rots: Manage Injury and Drying to Protect the Finish

Late-season rots are often opportunistic. As berries soften, fungal growth can expand rapidly when clusters stay wet and when entry points are available. Powdery mildew scars, insect feeding, bird damage, and mechanical injury commonly initiate outbreaks. The most reliable late-season strategy is to reduce injury and keep clusters dry and exposed to air movement.

Figure 3. Late-season rot with Cladosporium-like growth on berries; often associated with prolonged humidity and delayed harvest windows. (*Photo Credit: Charlie Star*)

Integrated Management of Powdery Mildew and Botrytis and Preparing for Late-Season Rots

Late-Season Operational Levers:

- Avoid creating new wounds late (especially with aggressive mechanical leaf removal or rough passes).
- Manage insects that contribute to berry injury and can amplify sour rot complexes.
- Keep the fruit zone "open enough": reduce cluster wetness duration through targeted canopy work and good irrigation management.

Annual Fungicide Efficacy Trials to Support California IPM Programs

Our lab conducts annual field trials that evaluate synthetic, biological, and organic fungicides and programs for grape powdery mildew and Botrytis bunch rot. These reports provide California-specific performance data that can help producers and advisors select materials, set intervals, and refine rotation strategies within an IPM framework.

GET MORE INFORMATION

Access the trial reports by scanning the QR Code or visiting the website:
https://eskalenlab.ucdavis.edu/fruit-crop-fungicide-efficacy-trials

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Control of Leafhoppers and Vine Mealybug in Grapes with Organic and Conventional Reduced Risk Insecticides

By **Robert Van Steenwyk, PhD**
Research Entomologist and Emeritus Faculty at UC Berkeley Dept. of Environmental Science, Policy and Management

Wine grapes are attacked by many insect pest species which include mealybugs, grape phylloxera, leafhoppers, spider mites and many other pests. However, the one pest that stand out as being the bug from hell is the vine mealybug (VMB). The characteristics that make VMB most problematic is that it has multiple generations per year and all the life stages spend most of their life under the grape bark feeding on the grape phloem tissue. Thus, populations can expand greatly through the year and it is difficult to control vine mealybug with topical insecticides. Insecticides with systemic activity have proven to be more effective. In addition, the vine mealybug produces a great deal of honeydew and thus sugar feeding ants protect the mealybugs from parasitoid attack. Also, the honeydew allows for the development of sooty mold on the grape bunches. Vine mealybugs overwinter in the base of the vine and move up the vine as the season progresses. As they reach the cordon they start moving out from under the bark to the foliage and grape bunches making the grape bunches unmarketable. Our lab has investigated numerous control methods over the years from mating disruption to new reduced risk/organic insecticides.

First pheromone mating disruption, in 2025, our lab in conjunction with the Daane Lab, evaluated the efficacy of Suterra® Celada™ VMB pheromone dispensers for use in a VMB mating disruption control program. Suterra® pheromone dispensers were deployed in a commercial vineyard near Selma, CA on May 13. The dispensers were deployed in a 5 acre plot at a density of 162 dispensers per acre. A 5 acre untreated plot was included as an untreated check. In each plot, VMB populations were monitored using 5 Trece traps which were checked biweekly until late September. At harvest (on August 14), 300 grape clusters per plot were scored for VMB presence and damage. Grape clusters with no evidence of honeydew or mealybugs were scored as 0; grape clusters with honeydew but no visible mealybugs were scored as 1, clusters with 10 or fewer mealybugs were scored as 2, and clusters with 10 or more mealybugs were scored as 3. Clusters with a VMB score greater than or equal to 2 are considered unmarketable.

Throughout the season, VMB pheromone trap catches were significantly lower in the Suterra® plot compared to the untreated check. Mean trap catch in the untreated plot rose from 0.75 VMB per trap per day onMay 21 to a peak of 3.75 VMB per trap per day on 16 July. Mean trap catch in the Suterra plot was maintained at around 0.25 VMB per trap per day throughout the monitoring period. From the harvest survey, the grape clusters in the untreated check plot had a mean VMB score of 8.47 and 36.67% of clusters surveyed were unmarketable. Infestation was significantly lower in the Suterra plot, with a mean VMB score of 2.80 and 10.67% unmarketable clusters. Thus, mating disruption using Suterra VMB pheromone dispensers is effective for suppression of VMB populations, but complete control will require insecticide treatment in conjunction with mating disruption.

Control of Leafhoppers and Vine Mealybug in Grapes with Organic and Conventional Reduced Risk Insecticides

The Van Steenwyk Lab has conducted numerous field trials in commercial vineyards throughout California over the past 15 plus years to evaluate insecticide products for control of VMB and other insect pest of grapes. These field trials have assisted chemical manufacturers in the registration of numerous products for control of not only VMB but many other insects that attack grapes. These include Admire Pro, Platinum, Movento, Assail, Sequoia, Sivanto and most recently Arino.

In 2021, a study was conducted to investigate Arino as compared to Venerate and Assail. Each treatment had Movento 2SC at 1-3 mm berry. Arino or Venerate were applied at delayed dormant, verasion and preharvest and a grower standard of Applaud at delayed dormant, Assail at verasion and preharvest. The Venerate provided no control, Arino provided in moderate control and the grower standard provided excellent control.

Leafhoppers (Western grape leafhopper (WGLH), Variegated leafhopper (VLH), and Virginia creeper leafhopper (VCLH)) remove the contents of individual leaf cells, causing loss of photosynthetic activity and leaf drop at high densities. Additionally, dense leafhopper populations can be a nuisance to workers at harvest. Grape vines can tolerate moderate leafhopper populations, and natural predators and parasites can maintain populations below tolerance levels. However, when populations are high chemical control may be required. WGLH is found in the San Joaquin, Sacramento, and North Coast Valleys, VLH is found in Southern California and the Central Valley, and the VCLH is found in North Coast Valleys and north of Sacramento.

In 2024, a study was conducted to investigate the efficacy of a large number of organic insecticides for the control of WGLH and VCLH in Mendocino County. Excellent control of WGLH was achieved with Pyganic, moderate control with Aza-Direct, Grandevo, and horticultural oil (Pure Spray Green and PureCrop 1), and little or no control with Arino and Venerate. Also in 2024, a study was conducted to investigate the efficacy of conventional insecticides. Excellent control was achieved by all insecticides (Admire Pro, Sequoia and a high and low rate of Sivanto Prime). In 2025, a study was conducted to investigate the efficacy of both organic and conventional insecticides for the control of WGLH and VLH in San Joaquin Valley. Moderate control was achieved with Movento and Arino when applied at 1-3 mm berry size while excellent control was achieved with Sequoia, Sivanto Prime and Assail when applied at veraison.

Bob Van Steenwyk was a Cooperative Extension Entomology Specialist at UCB from 1982 until 2012. After retiring, Bob was then rehired as a Research Entomologist at UCB Rausser College of Natural Resources from 2012 until present. His statewide research and extension program has focused on insect pest management of deciduous fruit, nut and vine crops. Bob earned his BA in biology at UC Riverside in 1970 and his PhD in Entomology at UC Riverside in 1975. He served as a Professor of Economic Entomology at UCR from 1977 to 1982 before transferring to UCB.

Bob's research focus is on the development of integrated pest management programs, development and evaluation of reduced risk insecticides and control and monitoring of new invasive insect pests in California, which includes Mediterranean fruit fly, olive fruit fly, European grapevine moth, spotted wing drosophila and others.

On the Lookout for Spotted Lanternfly

By **Cindy R. Kron, PhD**
North Coast IPM Advisor, University of California Statewide IPM Program and Cooperative Extension

On March 27th, 2024, a flatbed truck carrying a metal art structure originating in New York and headed to Petaluma, California was stopped at the California Department of Food and Agriculture (CDFA) Agricultural Inspection Station in Truckee, California due to live spotted lanternfly (SLF) egg masses being present on the structure. Entry of the structure was denied, and the truck reported to the Nevada Department of Agriculture for inspection and treatment for SLF eggs on April 2nd, 2024. Approximately 30 egg masses were removed and destroyed. The structure was power washed with soap and water and cleared to enter California with instructions to not offload the structure at the destination until inspected and released by the Sonoma County Department of Agriculture/Weights & Measures. Upon arrival for inspection, the Sonoma County agricultural inspector found the structure already offloaded from the truck and during an in-depth inspection of the structure, 3 more SLF egg masses were discovered. Additional inspectors were called in, and with the help of operators and equipment at the destination site, the agricultural inspectors were able to inspect all surface areas and ensure the structure was free of SLF egg masses. To put this into perspective, spotted lanternfly egg masses contain 30 to 50 eggs each, meaning that this structure had between 990 to 1,650 live SLF eggs arriving about 1 month prior to expected hatching and emergence of the immature life stages.

In July of 2021, the CDFA established a quarantine to prohibit the introduction of the spotted lanternfly into California (Release #21-077). The quarantine prohibits the entry into California of SLF, its host plants and plant parts (including firewood), shipping containers, and a variety of articles, including outdoor household articles and conveyances (cars, boats, trailers, tractors, etc.) originating from any area where an SLF infestation exists without a certificate of treatment issued by an authorized state agricultural official, appropriate permit, phytosanitary certificate, compliance agreement, or checklist for individuals moving from a SLF-infested area into California. From 2022 to present, there have been 48 interceptions of SLF entering into California with 38 of these finds on aircrafts during airport inspections. Spotted lanternfly eggs have been intercepted on firewood, metal plates for construction, military equipment, and incoming nursery shipments.

The spotted lanternfly (Lycorma delicatula) is an invasive insect pest that was first detected in Pennsylvania in 2014 (**Figure 1**). As of July 31st, 2024, confirmed sightings and/or infestations of SLF have been reported in 20 states: Pennsylvania, New York, Delaware, New Jersey, Maryland, Virginia, Connecticut, Illinois, Iowa, Indiana, Kentucky, Massachusetts, Michigan, North Carolina, Ohio, Rhode Island, Tennessee, West Virginia, New Hampshire, and Vermont.

On the Lookout for Spotted Lanternfly

Figure 1. Spotted lanternflies on grapevines.
Photo Credit: Heather Leach, Penn State University.

SLF is a sizable planthopper (about 1 inch long and about 0.5 inch wide) that originates from southeastern Asia including parts of China, Taiwan, and Vietnam. It is invasive in Japan and South Korea. This planthopper has a wide host range consisting of 103+ plant species with 56 feeding hosts identified so far in North America. SLF has caused economic damage to grapevines along with feeding on fruit trees (apple, cherry, fig, stone fruits), walnuts, blueberries, hops, oak, maple, birch, sycamore, ash, beech, hickory, poplar, willows, and woody ornamentals. Its preferred hosts are the invasive tree of heaven (Ailanthus altissma), grapevines, maple, and black walnut. SLF have piercing-sucking mouthparts and produce large quantities of honeydew that acts as a substrate for growth of sooty molds. In addition to being an agricultural pest, SLF may also be a nuisance pest in urban areas due to their aggregation behavior.

In Pennsylvania, the spotted lanternfly has one generation per year. Nymphs emerge starting in May and go through four immature stages. Adults emerge by late July. SLF overwinter as eggs, which are laid from September to November on smooth tree surfaces and inanimate objects such as telephone poles, stones, pallets, outdoor equipment, firewood, railway cars, vehicles, etc. Spotted lanternfly's behavior of laying eggs on non-plant items contributes to their wide dispersal ability and likelihood of unintentional introduction into new areas.

Figure 2. A) Spotted lanternfly eggs covered with waxy deposit. B) Seed-like eggs with holes where spotted lanternfly nymphs have emerged. *Credit*: A) Pennsylvania Department of Agriculture, Bugwood.org (left) and B) Kenneth R. Law, USDA APHIS PPQ, Bugwood.org (right). Licensed under a Creative Commons 3.0 License.

Each female produces one to two egg masses of 30 to 50 eggs each. Seed-like eggs are laid in multiple successive rows and covered with a yellowish-brown waxy deposit (**Figure 2**). The first three immature stages are black with white spots and lack wings. The fourth immature stage is red and black with white spots and possess small wing pads (**Figure 3**).

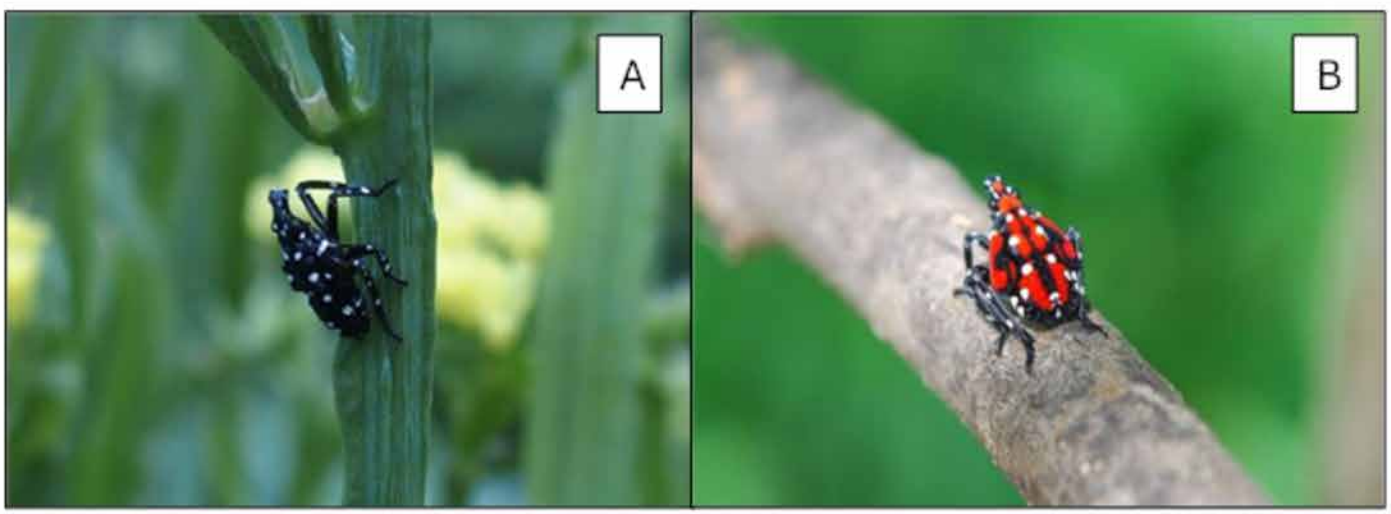

Figure 3. A) The first three immature stages are black with white spots. B) The fourth immature stage is red and black with white spots. *Credit*: A) Emelie Swackhamer, Penn State University, Bugwood.org (left) and B) Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org (right). Licensed under a Creative Commons 3.0 License.

Adults have a stout yellow abdomen with incomplete black bands (**Figure 4**) and two sets of wings: the forewings and the hindwings. The forewings are a tannish-cream color with black spots changing to small black rectangles toward the tips. The hindwings are primarily black and red, with black spots appearing in the red portions. The hindwings are not noticeable when at rest.

Figure 4. Adult spotted lanternfly with wings spread.
Credit: Richard Gardner, Bugwood.org. Licensed under a Creative Commons 3.0 License.

Predict Grapevine Stem Water Potential by Integrating Soil Moisture and Above-Ground Weather Conditions

By **R. Cliff Yu, PhD**
Assistant Professor of Viticulture, Department of Viticulture & Enology, Cal State University, Fresno

Introduction

Water represents one of the most pivotal environmental determinants influencing grapevine physiology across California's viticultural landscapes. Given the California's dry climate in summer, supplemental irrigation during the growing season is often essential to sustain vine productivity and optimize both berry development and wine quality across most viticultural regions. Achieving production goals depends not only on understanding the quantity of water required but also on determining the precise timing of its application.

Accordingly, two key dimensions must be addressed to maximize irrigation accuracy:

- First, the volume of water needed must be clearly quantified. Traditional approaches such as the shade-cast method to estimate crop coefficients, or the use of surface renewal stations to measure evapotranspiration, primarily capture vineyard-level water loss. However, these methods do not directly reflect the physiological water demand or status of the grapevines themselves.
- Second, the timing of irrigation remains inadequately studied. Although the pressure chamber method is often employed to monitor vine water status, it is labor-intensive and time-sensitive, making it impractical for large-scale commercial vineyards where representative spatial data are crucial.

With the increasing availability of advanced agricultural technologies, sensor fusion presents new opportunities for improving irrigation precision. Despite soil moisture being a critical link in the soil–plant–atmosphere continuum, a longstanding disconnect between soil moisture data and grapevine water status has limited its usefulness for irrigation scheduling. To overcome this limitation, the present study integrates in-situ soil moisture sensors with localized above-ground weather stations to predict grapevine water status. This approach enables a mathematical, sensor-based estimation of vine water needs, minimizing reliance on manual measurements and allowing irrigation decisions to be more directly informed by the physiological responses of grapevines.

Modeling to Connect Soil Moisture Content to Grapevine Water Status

In 2024, the two years' field data was compiled together to test the modeling (**Figure 1**). Due to the consistent performance and its simplicity, PLS (Linear) was selected when using 2023 and 2024 data to further process the data for grapevine water status regression analyses. When looking at what factors contributed the most to the models selected to predict grapevine water status by Permutation Feature Importance (PFI) analyses (**Figure 2**), soil moisture content (monitored by sensors installed at 75 cm), air temperature, and air humidity, along with some of the other factors were the of the most important to contribute to the models while predicting grapevine water status (i.e. stem water potential).

Predict Grapevine Stem Water Potential by Integrating Soil Moisture and Above-Ground Weather Conditions

A

Date	Frequency
20230530	9
20230606	6
20230613	9
20230620	13
20230627	7
20230711	6
20230718	6
20230725	13
20230801	14
20230808	13
20230815	5
20230822	15
20230829	12
20230905	8
20230911	8
20240605	12
20240612	10
20240613	7
20240617	4
20240619	9
20240626	13
20240701	10
20240703	8
20240708	5
20240711	7
20240715	9
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20240731	10
20240805	10
20240807	8

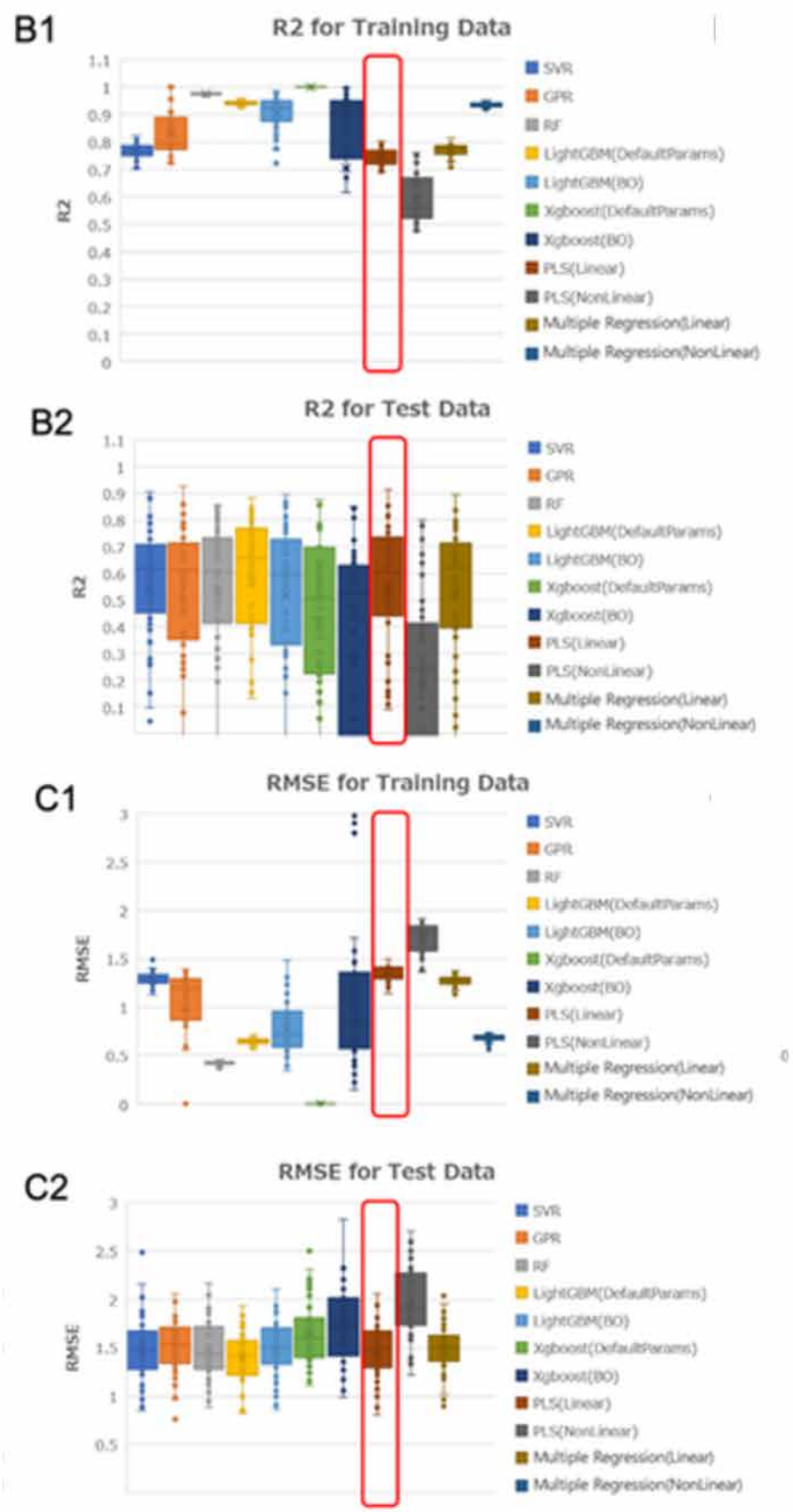
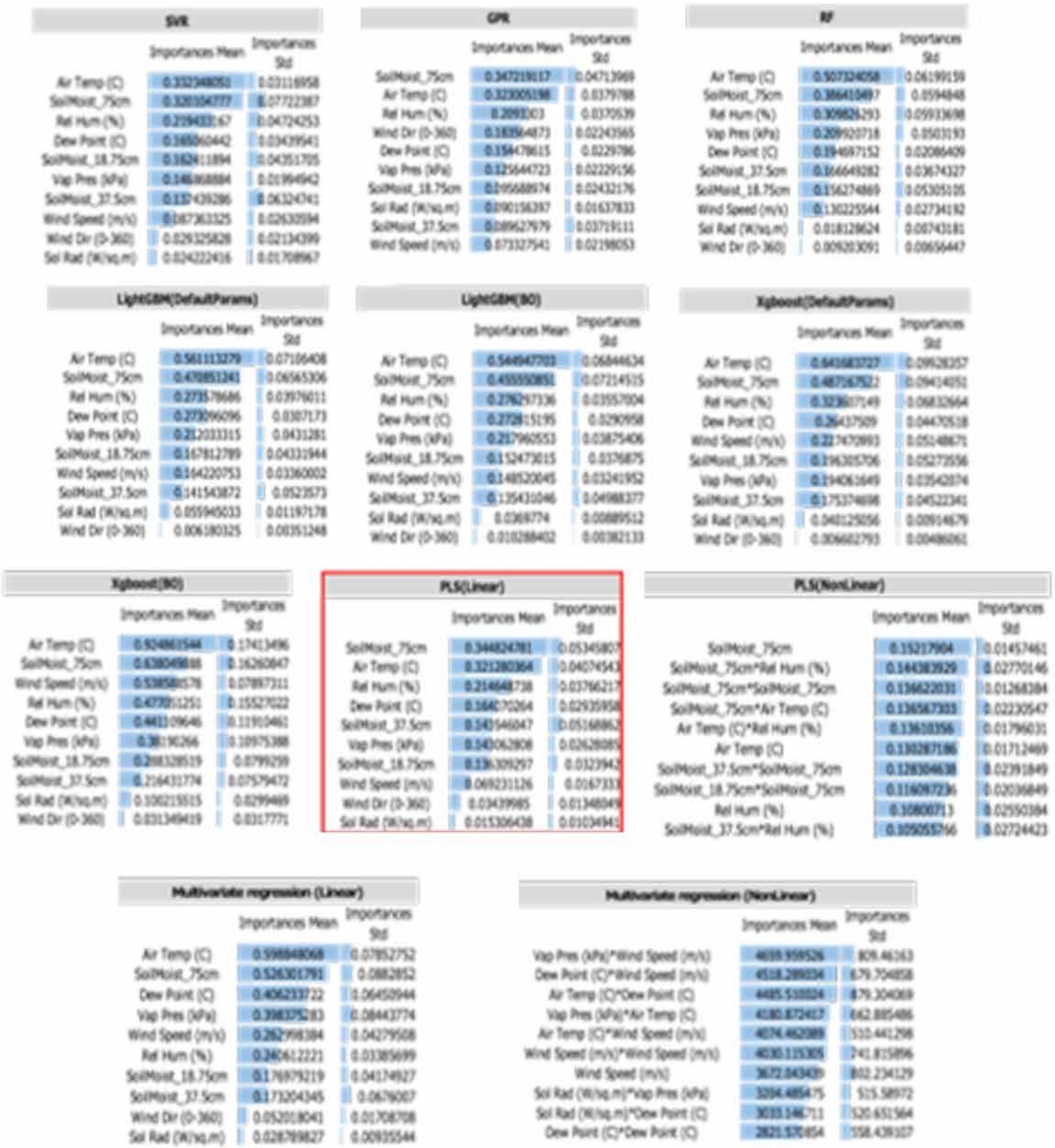


Figure 1. (A) Test data sampling dates and frequency (B) R^2 distribution for training data and test data. Explanatory variables included soil moisture content measured by SFDT sensors and all climatic variables from local CIMIS station (#80, Fresno State). (C) Root-mean-square deviation (RMSE) values for training data and test data. (1) Training data. (2) Test data. Test data were randomly sampled 50 times to compare accuracy. SVR and PLS (Linear) seem to be good in terms of accuracy and suppression of over-learning. Multiple regression (Linear) is also good with risk of multicollinearity. PLS(Linear) model was eventually selected (circled) to be moved further for regression analyses.

Predict Grapevine Stem Water Potential by Integrating Soil Moisture and Above-Ground Weather Conditions



SVR

	Importances Mean	Importances Std
Air Temp (C)	0.332348051	0.03116958
SoilMoist_75cm	0.320354777	0.07722387
Rel Hum (%)	0.219433167	0.04724253
Dew Point (C)	0.16850442	0.0343941
SoilMoist_18.75cm	0.16241894	0.04351705
Vap Pres (kPa)	0.14686884	0.01964942
SoilMoist_37.5cm	0.13743928	0.0632474
Wind Speed (m/s)	0.08736325	0.02630594
Wind Dir (0-360)	0.029325828	0.02134399
Sol Rad (W/sq.m)	0.024222416	0.01708967

GPR

	Importances Mean	Importances Std
SoilMoist_75cm	0.347219117	0.04713969
Air Temp (C)	0.323005198	0.0379788
Rel Hum (%)	0.209303	0.0370539
Wind Dir (0-360)	0.18356473	0.02243565
Dew Point (C)	0.15447815	0.0229786
Vap Pres (kPa)	0.12564723	0.02229156
SoilMoist_18.75cm	0.09568974	0.02432176
Sol Rad (W/sq.m)	0.090156287	0.01637833
SoilMoist_37.5cm	0.08962979	0.03719111
Wind Speed (m/s)	0.073327541	0.02198053

RF

	Importances Mean	Importances Std
Air Temp (C)	0.507324058	0.06199159
SoilMoist_75cm	0.386410497	0.0594848
Rel Hum (%)	0.309826293	0.05933698
Vap Pres (kPa)	0.209920718	0.0503193
Dew Point (C)	0.194697152	0.02086409
SoilMoist_37.5cm	0.166649282	0.03674327
SoilMoist_18.75cm	0.156274869	0.05305105
Wind Speed (m/s)	0.130225544	0.02734192
Sol Rad (W/sq.m)	0.018128624	0.00743181
Wind Dir (0-360)	0.009203091	0.00656447

LightGBM(DefaultParams)

	Importances Mean	Importances Std
Air Temp (C)	0.561113279	0.07106408
SoilMoist_75cm	0.470851241	0.06565306
Rel Hum (%)	0.273578686	0.03976011
Dew Point (C)	0.273096096	0.0307173
Vap Pres (kPa)	0.212033315	0.0431281
SoilMoist_18.75cm	0.167812789	0.04331944
Wind Speed (m/s)	0.164220753	0.03360002
SoilMoist_37.5cm	0.141543872	0.0523573
Sol Rad (W/sq.m)	0.055945033	0.01197178
Wind Dir (0-360)	0.006180325	0.00351248

LightGBM(BO)

	Importances Mean	Importances Std
Air Temp (C)	0.564947703	0.06844634
SoilMoist_75cm	0.455550851	0.07214515
Rel Hum (%)	0.276297336	0.03557004
Dew Point (C)	0.272815195	0.0290958
Vap Pres (kPa)	0.217960553	0.03875406
SoilMoist_18.75cm	0.152473015	0.0376875
Wind Speed (m/s)	0.148520045	0.03241952
SoilMoist_37.5cm	0.135431046	0.04988377
Sol Rad (W/sq.m)	0.0369774	0.00889512
Wind Dir (0-360)	0.010288402	0.00382133

Xgboost(DefaultParams)

	Importances Mean	Importances Std
Air Temp (C)	0.643683727	0.09928357
SoilMoist_75cm	0.487567522	0.0941405
Rel Hum (%)	0.323607749	0.06832664
Dew Point (C)	0.26437509	0.04470518
Wind Speed (m/s)	0.227470993	0.0514867
SoilMoist_18.75cm	0.196305706	0.05272556
Vap Pres (kPa)	0.194061649	0.03542074
SoilMoist_37.5cm	0.175374698	0.04522341
Sol Rad (W/sq.m)	0.040125056	0.00914679
Wind Dir (0-360)	0.006682793	0.00486061

Xgboost(BO)

	Importances Mean	Importances Std
Air Temp (C)	0.924861544	0.17413496
SoilMoist_75cm	0.638049888	0.16260847
Wind Speed (m/s)	0.538580578	0.07897311
Rel Hum (%)	0.477051251	0.15527022
Dew Point (C)	0.441109646	0.11910461
Vap Pres (kPa)	0.38190266	0.10975388
SoilMoist_18.75cm	0.288328519	0.0799259
SoilMoist_37.5cm	0.216431774	0.07579472
Sol Rad (W/sq.m)	0.100215515	0.0299469
Wind Dir (0-360)	0.031349419	0.0317771

PLS(Linear)

	Importances Mean	Importances Std
SoilMoist_75cm	0.344824781	0.05345807
Air Temp (C)	0.321280364	0.04074543
Rel Hum (%)	0.214648738	0.03766217
Dew Point (C)	0.164070264	0.02935958
SoilMoist_37.5cm	0.141546047	0.05168862
Vap Pres (kPa)	0.140062808	0.02628085
SoilMoist_18.75cm	0.136309297	0.0323942
Wind Speed (m/s)	0.069231126	0.0167333
Wind Dir (0-360)	0.03439985	0.01348049
Sol Rad (W/sq.m)	0.015306438	0.01034941

PLS(NonLinear)

	Importances Mean	Importances Std
SoilMoist_75cm	0.15217904	0.01457461
SoilMoist_75cm*Rel Hum (%)	0.14438929	0.02770146
SoilMoist_75cm*SoilMoist_75cm	0.13662031	0.01268184
SoilMoist_75cm*Air Temp (C)	0.13656703	0.02230547
Air Temp (C)*Rel Hum (%)	0.13618356	0.01796031
Air Temp (C)	0.13028786	0.01712469
SoilMoist_37.5cm*SoilMoist_75cm	0.12830468	0.02391849
SoilMoist_18.75cm*SoilMoist_75cm	0.11609736	0.02036849
Rel Hum (%)	0.10800713	0.02550184
SoilMoist_37.5cm*Rel Hum (%)	0.10505576	0.02724423

Multivariate regression (Linear)

	Importances Mean	Importances Std
Air Temp (C)	0.598648068	0.07852752
SoilMoist_75cm	0.526301791	0.0882852
Dew Point (C)	0.406233722	0.06450944
Vap Pres (kPa)	0.398375283	0.08443774
Wind Speed (m/s)	0.262998384	0.04279508
Rel Hum (%)	0.240612221	0.03385699
SoilMoist_18.75cm	0.176879219	0.04174927
SoilMoist_37.5cm	0.173204345	0.0676007
Wind Dir (0-360)	0.052018041	0.01708708
Sol Rad (W/sq.m)	0.028789827	0.00935544

Multivariate regression (NonLinear)

	Importances Mean	Importances Std
Vap Pres (kPa)*Wind Speed (m/s)	4659.959526	809.46163
Dew Point (C)*Wind Speed (m/s)	4518.289024	879.704858
Air Temp (C)*Dew Point (C)	4485.530024	879.304069
Vap Pres (kPa)*Air Temp (C)	4080.872417	662.885486
Air Temp (C)*Wind Speed (m/s)	4074.462089	910.441298
Wind Speed (m/s)*Wind Speed (m/s)	4030.135305	741.815896
Wind Speed (m/s)	3672.043429	802.234129
Sol Rad (W/sq.m)*Vap Pres (kPa)	3204.485475	515.58972
Sol Rad (W/sq.m)*Dew Point (C)	3033.146711	520.651564
Dew Point (C)*Dew Point (C)	2821.570854	558.439107

Figure 2. Permutation Feature Importance (PFI) analyses. Explanatory variables included soil moisture content measured by SFDT sensors and all climatic variables from local CIMIS station (#80, Fresno State). PLS(Linear) was highlighted as the selected model, and soil moisture at 75cm depth, air temperature, and relative humidity were selected to be the focused variables to be moved forward for regression analyses.

Predict Grapevine Stem Water Potential by Integrating Soil Moisture and Above-Ground Weather Conditions

Further, two and three variables were selected due to accessibility to the grape growers, regression analyses were tested on the data collected in 2023 and 2024 (**Figure 3**). From the models created by using the two years' data, the regression analyses by using two and three variables, one included soil moisture at 75 cm and air temperature and the other one included soil moisture at 75 cm, air temperature, and relative humidity. The regression analyses showed strong relationships with R^2 of 0.7084 with two variables and R^2 of 0.7150 with three variables.

The data collection was repeated in 2025 for the third consecutive season, and the same model generated by using 2023 and 2024 seasons was utilized with 2025 season's data added to its regression analyses (**Figure 4**). The results aligned really well with what was observed in the first two years, the regression analyses showed strong relationships with R^2 of 0.6121 with two variables and R^2 of 0.6275 with three variables.

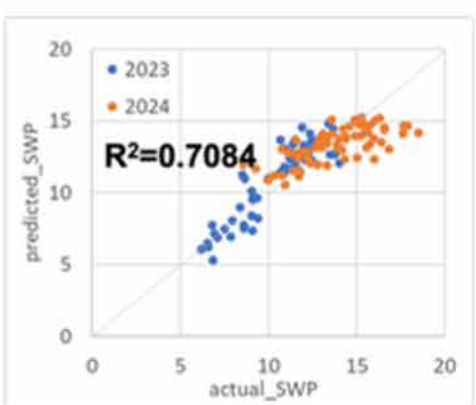
Overall, this study showed that by integrating soil moisture sensing with above-ground weather condition monitoring, wine grape growers in hot viticultural regions in California can be able to predict grapevine stem water status for precise and accurate irrigation scheduling.

A

PLS(Linear) Model

Explanatory variables: SSMS SoilMoist @75 cm, Air Temp

	Standard Regression Coefficients	Regression Coefficients	VIP
SoilMoist_75cm	-0.459309165	-0.314785124	0.978808378
Air Temp (C)	0.47899124	0.268562688	1.020751762
intercept		7.914999389	



B

PLS(Linear) Model

Explanatory variables: SSMS SoilMoist @75 cm, Air Temp, Rel Hum

	Standard Regression Coefficients	Regression Coefficients	VIP
SoilMoist_75cm	-0.451315367	-0.309306616	1.038491948
Air Temp (C)	0.572522997	0.32100444	1.076959958
Rel Hum (%)	0.110119052	0.035556989	0.872749519
intercept		4.924832076	

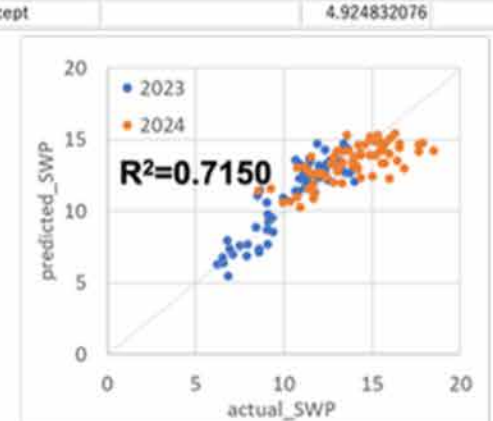


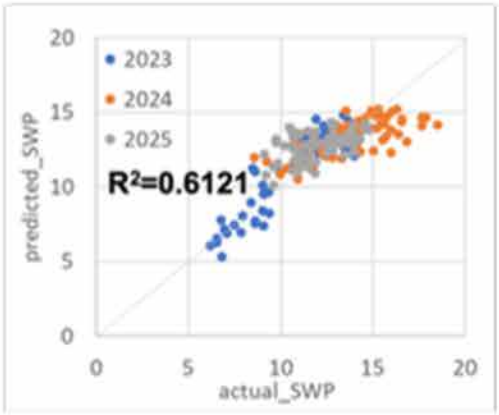
Figure 3. The scatter plots of the actual values and the predicted values by compiling data collected in 2023 and 2024 with (A) 2 environmental variables [soil moisture content (%) and air temperature (°C)], (B) 3 environmental variables (soil moisture content (%), air temperature (°C), and relative humidity (%)]. X axis shows the actual Ψ_{stem} values and Y axis shows the predicted Ψ_{stem} values. The units for actual and predicted variables are expressed in bars for Ψ_{stem}.

Predict Grapevine Stem Water Potential by Integrating Soil Moisture and Above-Ground Weather Conditions

A **PLS(Linear) Model**

Explanatory Variables: SSMS SoilMoist_75cm, Air Temp

	Standard Regression Coefficients	Regression Coefficients	VIP
SoilMoist_75cm	-0.459309165	-0.314785124	0.978808378
Air Temp (C)	0.47899124	0.268562688	1.020751762
intercept		7.914999389	



B **PLS(Linear) Model**

Explanatory Variables: SSMS SoilMoist_75cm, Air Temp, Rel Hum

	Standard Regression Coefficients	Regression Coefficients	VIP
SoilMoist_75cm	-0.451315367	-0.309306616	1.038491948
Air Temp (C)	0.572522997	0.32100444	1.076959958
Rel Hum (%)	0.110119052	0.035556989	0.872749519
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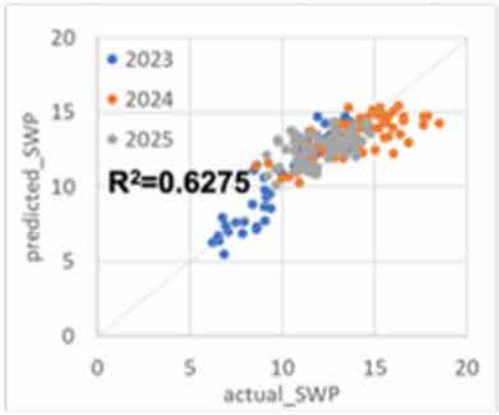

Figure 4. The scatter plots of the actual values and the predicted values by compiling data collected in 2023 2024, and 2025 with (A) 2 environmental variables [soil moisture content (%) and air temperature (°C)], (B) 3 environmental variables (soil moisture content (%), air temperature (°C), and relative humidity (%)]. X axis shows the actual Ψ_{stem} values and Y axis shows the predicted Ψ_{stem} values. The units for actual and predicted variables are expressed in bars for Ψ_{stem}.

2026 EVENTS

Lodi District Chamber of Commerce 2026 Events

Lod Grape Day	Tuesday, February 3rd
Farm Safety Day	Tuesday, March 3rd
May Street Faire	Sunday, May 3rd
Downtown Lodi Certified Farmer's Market	Thursdays, May 14th - August 27th
Vine & Vibes BBQ & Member Celebration	Thursday, September 10th
October Street Faire	Sunday, October 4th
Mayor State of the City	Wednesday, October 28th
Awards Gala	Saturday, December 5th

SAVE THE DATE

FARM SAFETY DAY

Receive continuing education units (Laws & Regulations) for Agricultural Pest Control Advisers and pesticide applicators.

Classes Available in English and Spanish

TUESDAY MARCH 3RD

7:00am - 12:00pm

Grape Festival Grounds

QUESTIONS? CONTACT THE LODI CHAMBER OF COMMERCE AT 209.367.7840.

PURCHASE TICKETS ONLINE

$25 BY FEBRUARY 15TH · $30 AFTER · $35 AT THE DOOR