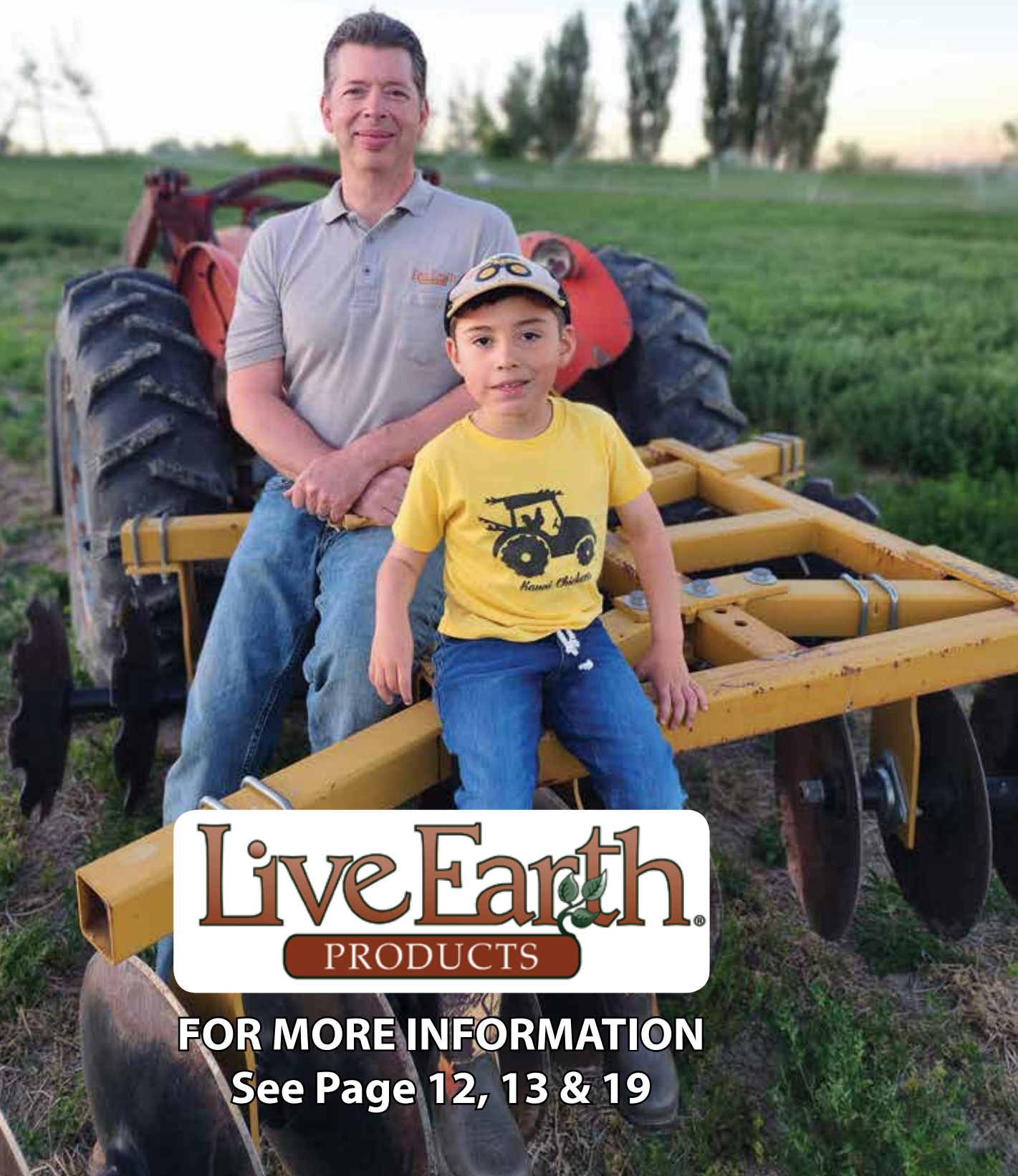




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Survey: Water system consolidations improve water quality, infrastructure

UCCE specialist studying projects that help secure safe, reliable drinking water

By Michael Hsu

"Nino, the water's not coming out right; something's going on with the well."

Those words – from Michael Prado Sr.'s goddaughter – are reflective of longstanding water concerns in Monson, a rural community of about 100 people in Tulare County.

"I was one of those people who just used to turn the faucet on and expected the water to come on – I didn't know where it came from, or what was in it," said Prado, a retired machine operator.

But during 29 years on the Community Services District (CSD) board of Sultana, a town four miles north of Monson, Prado became a self-described "water nerd" who learned about local water systems and the troubles faced by his neighbors. Monson historically has relied on private wells – some of which had high nitrate contamination levels. Then, during the drought of 2014-15, many of the wells ran dry and residents had to rely on bottled water or water tanks filled periodically by truck.

That's when Maria Herrera of Self-Help Enterprises, a community development organization serving the San Joaquin Valley, approached Prado about tying Monson into Sultana's water system that serves about 1,000 people, and giving Monson representation on the Sultana CSD board.

"I spoke to my board and it was a no-brainer," said Prado, who has served as board president of the Sultana CSD for the past 14 years. "We share the school with Monson; it's the Monson-Sultana School – the school was actually in Monson before it came to Sultana, so our board felt the need was urgent. Our kids were in that community, and we thought, 'You know what, let's bring them in.'"

The Sultana-Monson project – which included building new wells, laying piping and annexing Monson into the special district – was among those studied through a groundbreaking survey conducted by Kristin Dobbin, a University of California Cooperative Extension specialist in water justice policy and planning.

Dobbin is studying the consolidation of water systems, which can entail creating physical connections (such as pipelines) between water systems like in the Sultana-Monson project or administrative mergers that leave the physical infrastructure unchanged. About 250 consolidation projects have been completed across the state since 2015 – many of them in small, rural communities with tenuous access to safe and reliable drinking water.

"Water system consolidation has really become, in the last eight years, a top solution in California for addressing the chronic challenges facing smaller water systems," said Dobbin, who is based at the UC Berkeley Department of Environmental Science, Policy and Management.

Smaller communities pursue economies of scale through mergers

Although the U.S. Environmental Protection Agency defines a small water system as serving fewer than 3,300 people (with "very small" systems serving fewer than 500), many of the systems undergoing a consolidation serve only a couple hundred residents. At such a small scale, maintaining a water system is prohibitively expensive – and smaller communities often lack the technical capability and staffing to install and adequately maintain the infrastructure.

Consolidation aims to create economies of scale for the participating systems, which can help ensure a better quality, more sustainable water supply for all community members. To better understand the motivations – and results – of consolidation projects (both completed and in-progress), Dobbin sent a survey to 434 water systems across California in early 2024.

Remarkably, of the 78 systems that responded, 100% of them reported that their consolidation was a success, and 82% indicated their motivations for pursuing consolidation were fully addressed. The top reason for consolidating, reported by about two-thirds of respondents, was a desire to improve water quality – not surprising, given the state's tight regulation of water.

"There are a lot of regulatory steps and potential penalties you're incurring, to incentivize you to get into compliance, so there's a lot of pressure for you to solve the problem," said Dobbin, noting that common contamination concerns include arsenic, nitrates and 1,2,3-trichloropropane (TCP).

Significantly, 74% of respondents said they were seeing or expected water quality improvements from the consolidation effort. Dobbin also highlighted that half of the systems were motivated to pursue the mergers to address future water supply and quality issues, indicating managers' desire to secure their system from climate change-fueled impacts like drought and flooding.

"While we do see those regulatory pressures, we also see those forward-looking desires to reduce risk and futureproof systems – and that's a positive," Dobbin said.

Funding processes, long timelines present challenges for water systems

In analyzing survey responses, Dobbin also noted some common roadblocks faced by the systems – namely, sufficient and timely funding for their efforts. Given California's emphasis on system consolidation as a preferred way to address water challenges, most of the projects received funding from the State Water Resources Control Board. But the bottleneck – and a challenge acknowledged by the board itself – has been the process of making those funds accessible to the systems.

It was certainly a hurdle for the Sultana-Monson project. Prado noted that, at the advice of their technical assistance provider, his community's CSD took out a bank loan to get their project started, rather than wait for the state to allocate

See Drinking Water page 6

Olive growers, enthusiasts invited to UC olive webinar April 4



Olive trees grow on a slope with drip irrigation lines running down the rows. An olive orchard in Sonoma County. On the North Coast, olives are grown in medium-density plantings for making oil. Photo by Cindy Kron

By Pamela S Kan-Rice

Author - Assistant Director, News and Information Outreach

Growers and others interested in growing table olives or olives for making olive oil are invited to a California Statewide Olive Seminar on Friday, April 4. The online seminar, a series of presentations from 8 a.m. to 1 p.m., is sponsored by the University of California Cooperative Extension and UC Integrated Pest Management Program.

"This webinar is free and open to anyone interested in learning more about the current knowledge and research happening in olive production," said Cindy Kron, University of California Cooperative Extension IPM advisor, noting that people from other states and countries are welcome to attend.

UC Cooperative Extension scientists will present the latest research information on pest management, irrigation, weeds, fertilizer needs, harvest, olive quality and alternate bearing of table olive trees.

With 34,000 acres of olive orchards, California grows 100% of U.S. commercial olives, which are valued at \$63.1 million, according to the most current California Crop Report. The export value of California olives and olive oil is \$13 million.

Green and black olives in a bin.

Olives can be grown with less water than other tree and vine crops such as grapes and almonds.

"Olive production requires an estimated 1.5 to 2-acre-feet of water per year, making it an ideal crop for lower water demand," Kron said. "To put this into perspective, wine

grapes require about 2 to 3-acre-feet per year and almonds about 3 to 4-acre-feet per year."

Olive orchard owners, orchard managers, people who do pest management or other work in olives, olive processors, people who make olive-based products, operators of olive tree nurseries, people who have olive trees in their yards and olive enthusiasts may find topics of interest.

"There is general knowledge that anyone can benefit from in the webinar," said Kron. "We are also offering continuing education units for those holding California licenses or certificates (PCA, QAL, QAC, PAC) and Certified Crop Adviser units."

California grows olives to press for oil and table olives to eat. On the North Coast, olives are grown in medium-density plantings for oil. In the Central Valley, both table and oil olives are grown mostly in high-density plantings.

"The majority of UC olive researchers are in the Central Valley," said Kron, who works in Sonoma, Napa, Mendocino and Lake counties, "so I have developed a program that addresses the needs of not only my clientele but also the clientele of the UC olive

researchers."

Please register for the webinar at bit.ly/Olive2025.

The agenda is below. California Statewide Olive Seminar

- 7:55 a.m. Welcome and Introduction - Cindy Kron, UC Cooperative Extension North Coast IPM Advisor
- 8 a.m. Olive Fruit Fly: Testing Organic and Conventional Pesticides for Registration - Kron
- 9 a.m. Irrigation Management Strategies for Olive Orchards in California - Giulia Marino, Associate Professor of Cooperative Extension
- 9:30 a.m. Mitigation of Alternate Bearing of Table Olives - Elizabeth Fichtner, UC Cooperative Extension Farm Advisor for Tulare County
- 10 a.m. BREAK
- 10:15 a.m. Macro- and Micro-Fertilization in Olive - Richard Rosecrance, Professor, California State University, Chico
- 11:15 a.m. Mechanical Harvest of Table Olives: An Update - Becky Wheeler-Dykes, UCCE Orchard Systems and Weed Ecology Farm Advisor for Glenn, Tehama and Colusa counties
- 11:45 a.m. Yield and quality of olives and olive oil - Selina Wang, Associate Professor of Cooperative Extension at UC Davis
- 12:15 p.m. UC Davis Olive Center Updates and Programming - Javier A Fernandez Salvador, Director of UC Davis Olive Center

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The desire to improve water quality was the primary motivation for water systems to pursue consolidation projects, according to a survey conducted by UCCE specialist Kristin Dobbin. Photo by Jacek Dylag on Unsplash

Drinking Water

continued from page 3
the funds.

Despite the funding challenges and delays due to supply-chain disruptions during the pandemic, the pipeline connecting Monson to Sultana is complete and the system overall will benefit from more reliable and resilient water sources. But Monson residents are still waiting to connect their homes to the water system and to have their meters installed – nearly a full decade after the project was conceived.

Extended project timelines were another frequently mentioned challenge; for projects in implementation or construction, respondents reported that they already had been working on the consolidation for an average of nine years. One key factor to help expedite that work, Dobbin noted, is the role of technical assistance providers (TAPs) – often nonprofits or community-based organizations that help water systems apply for grants and fill out crucial paperwork, from financial statements to environmental impact reports.

"They're often an important lifeline for the smallest systems who don't have staff," Dobbin explained. "A lot of our smaller water systems don't have a general manager or a secretary; they instead have community volunteers – so these technical assistance providers play an important role in filling those gaps."

As just one example: 79% of water systems with TAP involvement reported improved water quality, whereas 56% of water systems without TAPs reported the same.

Researcher aims to take deeper look at system-consolidation case studies

Dobbin pointed out that system consolidation is not a one-size-fits-all panacea for water challenges in California, but just one among a variety of options that need to be tailored to each unique community and circumstance.

"Our survey provides really good evidence that consolidation is an important solution set in the state and that it is beneficial," she said. "So next we need to do that contextualizing – figuring out in what cases it is the best fit."

In addition to studying long-term effects of consolidation on household water rates (in most cases, there appears to be an increase in rates in the short term, likely due to the need to cover infrastructure upgrades), Dobbin will be taking a deeper dive into representative case studies during the next phase of her research.

While the survey respondents were overwhelmingly positive about their consolidation projects, Dobbin suspects there may be some selection bias – with only "successful" systems electing to report their results. In the future, Dobbin also wants to find and research those "failed" projects to better understand the factors that make consolidation efforts more or less likely to succeed.

For Prado, however, the Sultana-Monson is already a success – even as Monson residents still wait to be connected into the consolidated system. In fact, Prado had this advice for any community considering helping a nearby town that is struggling with reliable, safe water supply.

"Please be a friendly neighbor and good Samaritan – whatever you want to call yourself – and help out with the water for a community in need," Prado said.

"Water is life," he added.

The California Water System Consolidation Survey is supported by a two-year Early Career Research Grant from the California Institute for Water Resources, a statewide institute of UC Agriculture and Natural Resources.

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Date production workshop set for April 23 in Palm Desert

Scientists to present date research on irrigation, nutrients, disease, pests and regulations

By Pamela S Kan-Rice

Author - Assistant Director, News and Information Outreach

The 2025 California Date Palm Workshop will be held on April 23 in Palm Desert at the UC Riverside Palm Desert Center. Anyone who is interested in growing dates is welcome to attend.

"This workshop brings together researchers, growers and stakeholders to discuss recent research data on the 'state of the date' crop in California," said workshop organizer Ali Montazar, UC Cooperative Extension irrigation and water management advisor for Imperial, Riverside and San Diego counties.

The international date research workshop runs from 8 a.m. to 2 p.m. Scientists will share the latest research and information on various aspects of date production, including irrigation and nutrient management, disease and pest management, and laws and regulations.

Abdelouahhab Zaid, secretary general of the Khalifa International Award for Date Palm and Agricultural Innovation in Abu Dhabi, United Arab Emirates, will speak about the development of date palm cultivation regionally and internationally.

Ricardo Salomon-Torres, research professor at Universidad Estatal de Sonora San Luis Río Colorado, will discuss the status of the date palm industry in Mexico.

Montazar will discuss irrigation management. Mark Hodde, UC Cooperative Extension biological control specialist based at UC Riverside, will give a presentation on South American palm weevil in California. Spider mites, date nutrition and the aspergillus species causing black mold of dates are among other topics that will be discussed.

"We also will have a grower panel discussion on the concerns and the needs of the California date industry," Montazar said.



Dates are an important crop in the low-desert region.

Photo by Ali Montazar

zar said. "This event is such a great opportunity to showcase how impactful date palm production and agriculture is in the low-desert region."

Participation is free, but registration is requested at <https://ucanr.edu/datepalm2025>. Onsite registration begins at 7:30 a.m. at the UCR Palm Desert Center at 75080 Frank Sinatra Drive, Palm Desert, CA 92211.

For more information, contact Ali Montazar at amon-tazar@ucanr.edu or Kristy Kneiding at kkneiding@date-saregreat.com.



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Eligibility: The 2025 National 4-H Beekeeping Essay Competition is open to active 4-H Club members only.

Any 4-H Club member who placed first, second or third in previous years of the national competition is NOT eligible to win in 2025; however, state competition winners remain eligible to enter the national competition. Essays entered must encompass the designated topic only. There will be no exceptions.

Competition Rules & Essay Requirements: Any 4-H Club member interested in writing an essay should contact their local 4-H office for competition details. The state selection process must be completed through the 4-H system.

Are you using the wrong soil amendment?

Rethinking Soil Amendments in California: Salinity, Sodicty, Proper Leaching, and the Potential of Humates



By Russell Taylor, CCA

California farmers often rely on the same soil amendment practices year after year, assuming what worked in the past must still be helping today. But what if that well-intentioned routine—piling on gypsum or sulfur-based products—has been adding soluble salts rather than solving the problem? Worse yet, could you be trading a manageable pH issue for a more serious salinity problem by using the wrong amendment?

Determining whether you genuinely have a salt or pH issue starts with simple observations. Does your soil form a crust or become compacted? Is there a ring of discoloration at the field's edge, or do crops struggle to absorb water no matter how often you irrigate? These symptoms point to deeper concerns with soil pH, salinity, or sodicity. Yet guesswork won't cut it—testing your soil for pH, electrical conductivity (EC), and sodium adsorption ratio (SAR) is the only way to know whether you're dealing with a saline, sodic, or alkaline environment. Did you test your sulfates and soluble salts? Without those insights, any amendments you add may inadvertently worsen the situation.

A recent University of California (UC) publication highlights a fundamental oversight: most amendments require thorough leaching to flush out the salts they mobilize. Skipping this step, or applying insufficient water, can do more harm than good. Gypsum, for instance, is often regarded as a “universal fix,” but it doesn't lower pH and can compound soluble salts if misapplied. Even sulfur-based treatments that do reduce alkalinity introduce additional salts in the process—again pointing to the critical need for adequate leaching.

In this article, we'll explore a range of soil amendments, including humates—an emerging tool for adding low-salt acidity—and

walk through how pH, soil structure, and leaching work as an interconnected system. By understanding these dynamics and recognizing the trade-offs involved, you'll be better equipped to safeguard your soil's long-term health and productivity.

Understanding Soluble Salts in Different Products

It's easy to assume that “high salt” refers exclusively to sodium, yet soluble salts can come from many places—irrigation water, soil amendments, and fertilizers high in chlorides, sulfates, or nitrates. Even products meant to correct pH or displace sodium—like gypsum (calcium sulfate) and elemental sulfur—can contribute to overall salt loads if they're not carefully managed and followed by adequate leaching. Each amendment has a distinct “salt footprint,” which may accumulate in the root zone if repeated applications aren't paired with thorough water flushing.

A single high-salt application can create just as much osmotic stress as several smaller ones, so it's vital to monitor the cumulative salt load from all sources rather than treating each input in isolation. This includes paying attention to the electrical conductivity (EC) of your irrigation water; if the water is already saline, adding amendments that boost soluble salts can quickly push the soil toward more severe salt stress. In short, how you use

water alongside pH balancers—and how you gauge overall water quality—are often as critical as the amendments themselves. Making informed decisions on product choice, timing, and leaching practices can help ensure you're not unintentionally stacking salts in an already stressful environment.

Salt Rings Under Drip Irrigation

In California drip systems are lauded for water efficiency, but they can also concentrate salts at the edges of the emitter. As emitters repeatedly wet the same zone, salts migrate to the perimeter, forming a ring around the drip zone. Roots venturing into that area experience higher salt levels, making water uptake more difficult despite seemingly adequate soil moisture.

In a recent field inspection near Firebaugh, California, a crusty “salt ring” was sampled around pistachio trees which tested at 15.5% sulfate along with 5% magnesium. For the roots, this forms a virtual “ring of death” that no plant root can easily penetrate. When the sulfate level spikes in the soil—especially alongside magnesium—it creates a hardened, high-salt barrier that effectively traps water and makes it harder for roots to establish or expand. According to the Western Fertilizer Handbook, “sulfate has no characteristic action on soil except to contribute to the total salt content.” In other words, while gypsum or other sulfate-bearing products may be useful in certain contexts (such as sodic soils), the sulfate itself simply adds to the overall salt burden if not adequately leached or managed—potentially leading to severe crusting scenarios like the problem observed in Firebaugh.

Adjust Soil pH to Maximize Hydration

Sometimes, soil amendments also interact poorly with plant hydration and, therefore, the ability for nutrients to be absorbed. California's dry climate and parent materials frequently produce

alkaline soils (pH above 7.5), which can lock up essential micronutrients. Many growers respond by applying sulfur-based acidifiers to lower soil pH and improve nutrient availability.

While these amendments can indeed alleviate micronutrient deficiencies, they also introduce sulfate salts that must be leached out of the root zone. If proper leaching is neglected, the resulting surge in salts can negate any gains in nutrient uptake. Because a plant's top priority is hydration, this trade-off can transform a relatively manageable micronutrient issue into a more severe water-stress problem, ultimately impacting yields. Interestingly, Epsom salts (magnesium sulfate) are even used—in high concentrations—as plant, weed, and even tree killers because of how effectively they can draw moisture out of a plant's root system.

When soluble salt levels climb too high, roots expend additional energy to extract water, essentially mimicking drought stress in irrigated fields. Correcting pH for micronutrient availability offers little benefit if elevated salinity from the added sulfates undermines water uptake. In such situations, a grower may be better served by using foliar nutrition to address micronutrient deficiencies rather than adding sulfur and other soluble salts that could exacerbate dehydration.

Gypsum Myths and Realities

If, like many California farmers, the use of gypsum was grandfathered into your methods but doesn't appear to be as effective as you would like, there is a reason why. The UC Davis Yolo County document "Using Soil Amendments in Yolo County Gardens" clarifies that gypsum (calcium sulfate) is chemically neutral in most alkaline soils and does not meaningfully reduce pH.

Where sodicity is the culprit, or a salt content level that damages soil structure and prevents water retention, gypsum can be invaluable. In this situation, gypsum works to deliver calcium to displace sodium on the soil exchange sites. By mitigating the effect of sodium, improvements in soil aggregation and water infiltration can be observed.

However, if the chief concern is high pH without excessive sodium, gypsum offers no benefit for acidification. Amendments like elemental sulfur or sulfuric acid are better suited to lowering pH in these instances. Remember, gypsum is itself a soluble salt, albeit one that can help sodic soils. When overall salinity is already high (saline soils), adding gypsum may increase the total salt load unless careful leaching measures are taken.

Growers should confirm whether sodicity or simple salinity is driving soil problems; applying gypsum to a saline (rather than sodic) soil can compound double salt issues rather than resolve them. If soluble salts are a problem, the real priority is to leach those salts below the root zone, ensuring the soil's total salinity does not climb to levels that restrict water uptake and stress plants.

Proper Leaching After Gypsum

Even when gypsum is the best choice for sodic soils, the requirement to provide sufficient water to carry salts below the root zone is ignored. According to ANR Publication 8519, "Drought Tip: Reclaiming Saline, Sodic, and Saline-Sodic Soils," growers should apply roughly three to four inches of irrigation water for each ton of gypsum per acre. Some agronomists instead recommend delivering 110% of the soil's water-holding capacity in a single event to effectively flush displaced salts due to varied soil types. Missing this key leaching step leaves the soil's sodium (and other salts) in the upper layers, wasting the resources spent on amendments.

Humates: A Naturally Acidic, Low-Salt Alternative

If you are looking for an alternative to gypsum, humates are worth consideration. Humates stand apart because they provide mild acidity without the need for sulfur oxidation or generating large amounts of sulfates. Their humic and fulvic acids can help lower pH near the root zone while adding organic matter that stabilizes soil aggregates and enhances microbial activity.

Humates improve soil structure, helping to store applied nutrients and water. Unlike many acidifying amendments, humates do not contribute significant soluble salts, making them attractive in settings where salinity is already borderline. In fact, humates can attract and hold some soluble salts from the soil solution, reducing their impact on plant root systems. If you are growing in a sandy or clay-concentrated area, humates can help reduce plant stress, make nutrients more available, and improve soil structure.

Practical Suggestions for Growers

Though it goes without saying, soil analyses should be performed regularly to clarify whether salinity or sodicity is most pressing. Regular assessments allow you to track changes in pH, EC, and sodium adsorption ratio (SAR). Pre-existing management practices could have contributed to a buildup of soluble salts in soil. Understanding your soluble salts will help you make informed decisions when selecting amendments and fertilizers.

When sodic soils demand gypsum, prioritize thorough leaching. Use three to four inches of water per ton of gypsum to prevent sodium and salts from lingering. The addition of water after gypsum application creates important chemical reactions, which are then ferried through the soil while salts are flushed away.

If the primary issue is high pH, sulfur-based amendments can help but must also be used judiciously to avoid salt buildup. In keeping with the prescription metaphor, the dosage of sulfur amendments for your farm must be accurate if it is expected to be effective. In certain areas, water quality contributes to rising pH levels in soil, and sulfur-based amendments utilized well in advance of planting seasons work to maintain ideal soil balance.

Foliar micronutrient sprays often offer an immediate fix for in-season nutrient deficiencies, especially when environmental extremes—excess moisture, humidity, or high temperatures—compromise soil balance. By applying nutrients directly to leaves, foliar feeding bypasses issues like high pH and salinity, providing quick solutions without adding more sulfates. This approach is particularly useful when conditions fluctuate, reducing the risk of compounding salinity with sulfur-based amendments.

Meanwhile, humates deserve serious consideration for mild alkalinity adjustments without the risk of large spikes in salinity. So far, research shows that humate use improves soil health and structure. Humates and humic acid do not contribute to soil salt deposits or pose a threat to salt buildup issues. Their biological structure makes them a clear front-runner when it comes to building soil structure that allows plants to enjoy maximum nutrient absorption potential.

Conclusion

In California's arid environment, simply adding amendments like gypsum or elemental sulfur rarely solves salinity or sodicity outright. Instead, effective soil management demands a comprehensive approach—thorough leaching, targeted use of the right amendments, and the strategic incorporation of humates for low-salt acidity and improved soil structure. Ongoing soil testing is paramount to ensure that each amendment serves its intended purpose rather than compounding existing issues. Certified Crop Advisers (CCAs) and Pest Control Advisers (PCAs) should actively challenge routine amendment recommendations without proper analysis. By integrating these practices, growers can maintain adequate hydration, stable soil conditions, and balanced nutrient availability, positioning their fields and orchards for long-term success.

References for Further Reading

- "Using Soil Amendments in Yolo County Gardens" (UC Davis/Cooperative Extension)
 - ANR Publication 8519, "Drought Tip: Reclaiming Saline, Sodic, and Saline-Sodic Soils"
 - (anrcatalog.ucanr.edu)
- Additional UC ANR resources on saline



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Those visiting Commodity Classic can learn more by attending the What's New educational session – Efficient and Economic: Introducing a New Crop Protection Technology from Case IH – on Sunday, March 2 at 2 PM in the Mile High Ballroom 4AB. Attendees can also visit booth #4802 to speak with a Case IH expert about how SenseApply technology can drive efficiency in their operation.

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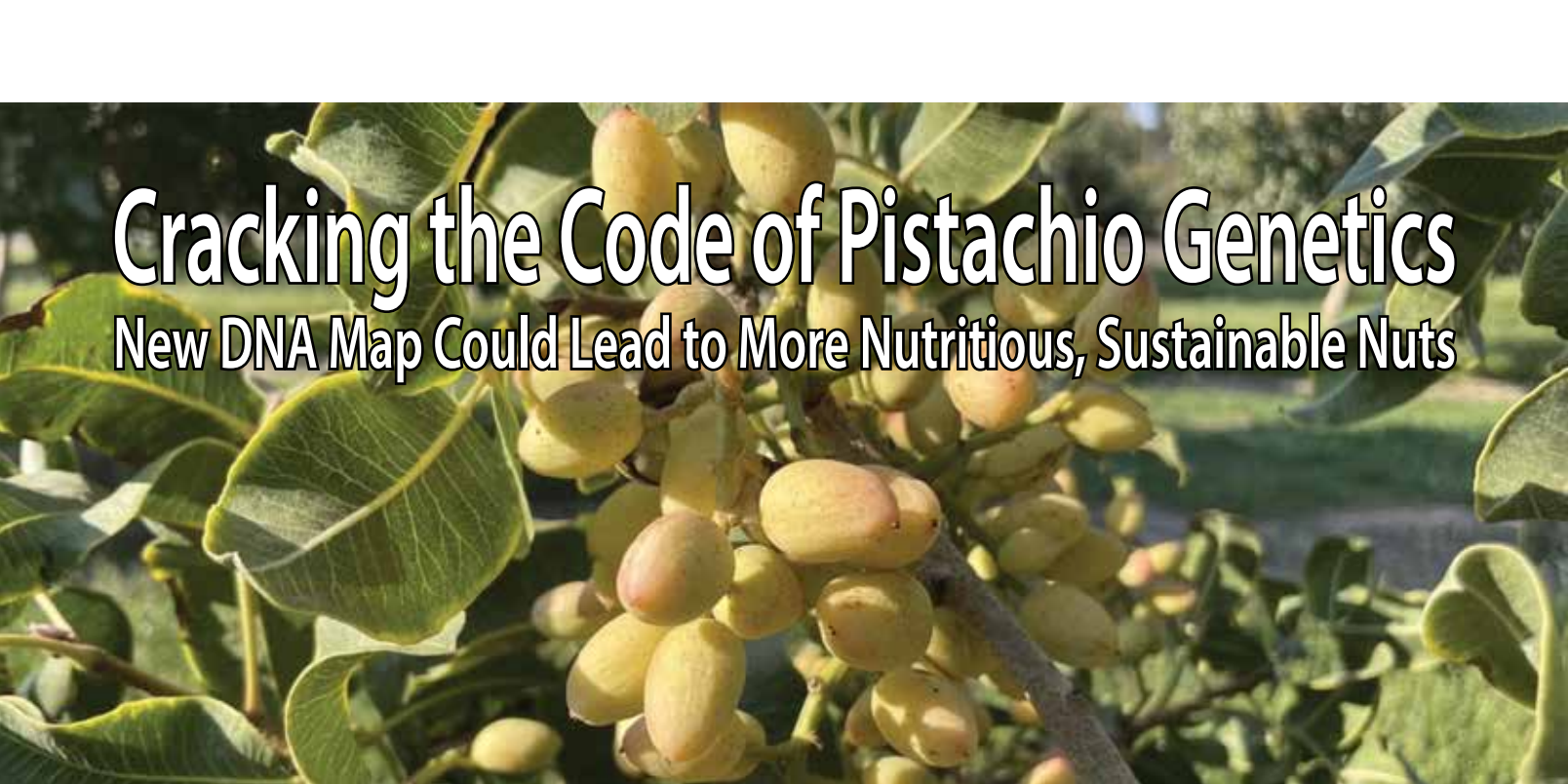
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Cracking the Code of Pistachio Genetics

New DNA Map Could Lead to More Nutritious, Sustainable Nuts

Researchers have generated the most comprehensive genome sequence of the pistachio, allowing plant breeders to create better varieties.

(Bárbara Blanco-Ulate / UC Davis)

by Amy Quinton

California produces 99% of the nation's pistachios, generating nearly \$3 billion in economic value in the state. But pistachios have been slightly understudied in part because of the lack of a high-quality map of their DNA. University of California, Davis, researchers have now generated the most comprehensive genome sequence of the pistachio, allowing plant breeders to create better — perhaps more nutritious — varieties. They've also detailed how pistachio nuts develop, which will help farmers manage their crop more sustainably.

New Phytologist published the study today.

Scientists have sequenced the DNA of pistachios before, but co-corresponding author J. Grey Monroe, an assistant professor with the Department of Plant Sciences, said this new genetic map is vastly more detailed and accurate.

"The improvement in accuracy of the new reference genome is like going from a hand-drawn map of a landscape to a satellite image from Google Earth," he said.

Monroe and the research team sequenced the genome of the Kerman cultivar, the most common pistachio variety grown in California.

Climate change challenges pistachio yields

Pistachio trees are resilient to drought and salinity, but they require cold winters to flower properly. As climate change brings warmer winters, growers need new pistachio varieties that can thrive in higher temperatures. Warm winters, combined with the dissipation of fogs that cool California's Central Valley, have caused significant losses for pistachio growers.

Given that establishing a pistachio tree requires a commitment of up to 50 years, researchers said California growers are understandably concerned about the impacts of climate change on their crops.

A nutty development

The study also identifies four key stages of nut growth from flower to harvest, providing a complete physiological as-

essment, including shell hardening and kernel growth.

"Knowing how the nut changes through development will help farmers make better decisions, like when to water their trees, leading to more sustainable pistachio production," said co-corresponding author Bárbara Blanco-Ulate, an associate professor with the Department of Plant Sciences.

A more accurate assessment of its development could also help provide growers better strategies for harvest and avoid issues such as insect damage and fungal infections.

Blanco-Ulate said it was important to also detail not just the physical changes of the pistachios, but also the genetic and molecular drivers of those characteristics. The genomic sequence includes precedent-setting information on how different genes behave in nuts over the growing season.

Nutritious nut

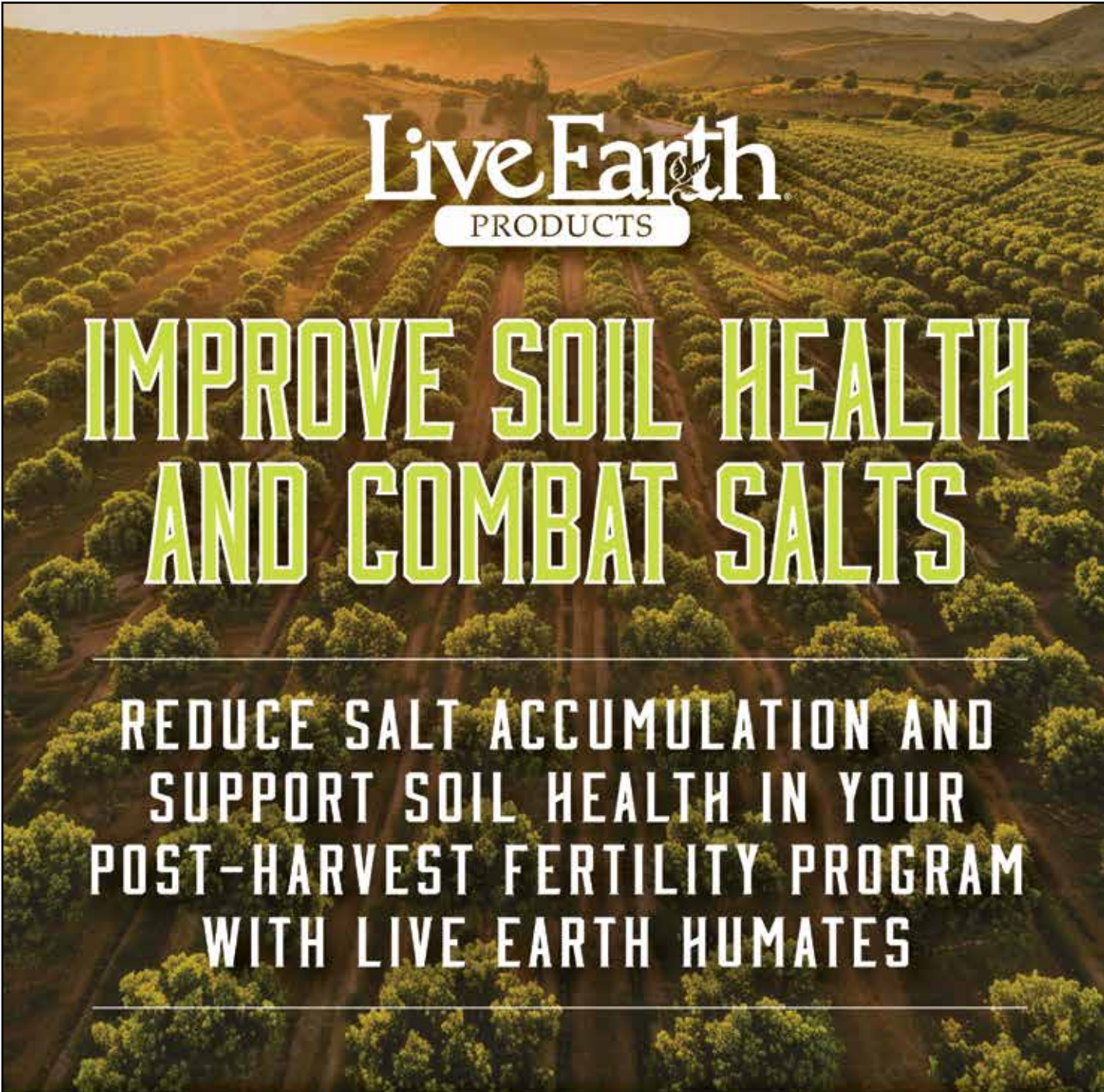
Pistachios have always been a nutritious food, but researchers have now discovered the genes and pathways that influence their nutritional value. This includes insights into how protein and unsaturated fatty acids accumulate, which is crucial for both their shelf life and dietary benefits.

"We're getting information about how all these nutritional characteristics are gained in pistachios and how we can improve that from a management perspective," said Blanco-Ulate.

This understanding could help scientists breed more nutritional pistachios in the future.

The first authors of the paper are Jaclyn Adaskaveg and Chaehee Lee of UC Davis. Other UC Davis authors include Yiduo Wei, Fangyi Wang, Saskia D. Mesquida-Pesci, Matthew Davis, Louise Ferguson, Giulia Marino, Patrick J. Brown, Georgia Drakakaki, Selina Wang and Filipa S. Grilo.

Research was funded by the California Pistachio Research Board, the U.S. Department of Agriculture's National Institute of Food and Agriculture and the Foundation for Food and Agricultural Research.



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SprayDays Information Sheet for Growers and Pesticide Applicators

The new regulations, approved by the Office of Administrative Law on December 13, 2024 and effective February 24, 2025, enable the implementation of SprayDays California, a statewide restricted material pesticide application notification system developed by the California Department of Pesticide Regulation (DPR). This system has been designed with input gathered from extensive public outreach and engagement efforts over a four-year period.

DPR anticipates implementing the statewide system in late March 2025.

The new SprayDays system will provide the public with timely information in advance of restricted material pesticide applications in production agriculture.

The system will feature a web-based map and option to sign-up for email or text message notifications sent 48 hours prior to the intended use of soil fumigants and 24 hours prior to the intended use of other restricted material pesticides.

The SprayDays website will include:

- Pesticide safety information, including reminders to avoid application sites and follow any posted warning signs.
- Notices that applications may begin within a four-day window or may not occur at all.
- Information on the restricted material pesticides included in the system.
- Context on how pesticides are regulated in California.

What do the regulations require for growers and applicators?

Starting February 24, 2025, the regulations require the electronic submission of all Notices of Intent (NOIs) for the use of restricted material pesticides in production agriculture to the County Agricultural Commissioner (CAC) through CalAgPermits, or third-party tools currently used to submit NOIs to CalAgPermits.

If a grower or applicator cannot submit an NOI electronically due to undue hardship (e.g., internet outage, limited access to electricity, or a declared emergency), the CAC may authorize alternative submission formats, including allowing paper submission of NOIs.

In such cases, the CAC will upload select NOI data into CalAgPermits.org on behalf of the grower or applicator.

Will this change how growers and applicators currently submit NOIs to their CAC?

The only change is that NOIs must be submitted electronically to the CAC through CalAgPermits except in cases of

undue hardship. Growers who already use CalAgPermits to submit NOIs, or thirdparty tools currently used to submit NOIs to CalAgPermits, will experience no change to their process.

What information will be shared with the public from the NOI through SprayDays California?

The SprayDays California website will share:

- The intended date and time of the pesticide application. (Notifications and the website will clearly state that applications may begin within a four-day window or may not occur at all.)
- The location of the application within a 1x1 mile grid, consistent with information listed on NOIs and reported through Pesticide Use Reports (PURs).
- Application information including pesticide product name(s), active ingredient(s), application method, number of treated acres, and U.S. EPA registration number.

This information will be publicly accessible concurrent with NOI submission and will remain on the website for four days following the intended application date.

What information will be shared with the public to support public safety near pesticide applications?

The SprayDays system provides information on the safe and legal use of pesticides in California and reminders to stay away from fields and follow posted warning signs when pesticides are in use.

What additional information will be provided on the SprayDays website?

The SprayDays website will also provide responses to frequently asked questions about the notification system and restricted material pesticides, including context on pesticide regulation in California, explanations of how pesticides are evaluated before registration, and pesticide safety tips, such as reminders to avoid application sites and adhere to posted warning signs.

If a grower or applicator submits an NOI but the application does not occur, is the information removed from SprayDays California?

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SprayDays shares NOI information concurrent with its submission to the CAC. If a grower or applicator decides not to proceed with the application, the information will not be removed. However, the SprayDays website and notifications note prominently that the application may not occur or may be rescheduled for a variety of reasons, including a decrease in the pest presence or changes in weather conditions.

Will the system be updated or changed in the future in response to feedback received after SprayDays launches?

The regulation requires DPR to collect broad public comment, along with comment from the State Board of Food and Agriculture and DPR's Environmental Justice Advisory Committee, on an annual basis to inform a final report on the effectiveness and impact of the regulation issued three years after the system is launched. DPR encourages growers, applicators, all interested parties and the public to provide comments to be included in the annual status update and inform any future adaptations necessary to meet the goal of increased transparency and continued safe, legal pesticide use in California. The comment period will be open in late 2025 or early 2026 and more information will be available on DPR's website (www.cdpr.ca.gov).

How does SprayDays California work in conjunction with

the annual pesticide use notification requirements near schools and childcare facilities?

The new regulations do not exempt growers or applicators from providing annual notification to school sites within ¼ mile of their production agricultural properties, as required by 3CCR 6692. For more information on pesticide use near school sites: www.cdpr.ca.gov/cac-letter/complianceassistance-for-agricultural-pesticide-use-nearschool-sites

Who should I contact if I have questions about the system or how it works?

- For information on submitting your NOI electronically or regarding hardship exceptions, please contact your County Agricultural Commissioner.
- For questions about the SprayDays California website, contact the Department of Pesticide Regulation at spray-days@cdpr.ca.gov



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Large square baler operation typically demands long hours of continuous focus, adjusting steering to follow the swath, and observing crop flow to prevent overloads and blockages by changing tractor speed to match. In addition, to ensure production of consistent bales the driver must observe the bale fill indicator and correct the tractor path accordingly, while also monitoring bale slice numbers and weights.

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UPCOMING EVENTS

APRIL 2025

11-13: California Antique Farm Equipment Show™

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12: Orange Blossoms Festival, Redlands CA. Billion Blossoms is a celebration of your local farmers, rural culture, and Redlands in full bloom! It's a farm-forward fundraiser that supports farmer-facing organizations. It's a day of shared farm experiences, farm exploration, and FUN for your families and friends! For more information visit: www.billionblossoms.org/

17: Yolo Groundwater Workshop. This event is meant to help farmers understand what the Sustainable Groundwater Management Act (SGMA) is, how it works in Yolo County, and what to be on the look-out for in the years to come. Our speakers include: Annie Main, Good Humus Farms Rich Collins, Collins Farm Conor Higin, Yolo RCD Mobile Irrigation Lab Kristen. For more information visit: <https://actionnetwork.org/events/yolo-groundwater-workshop>.

JUNE 2025

10: 2025 Agri-Pulse Food & Ag Issues Summit. The event will offer a full day of speeches and panel discussions, with both in-person and virtual attendance options at the Sheraton Grand Sacramento. Information: <https://www.agri-pulse.com/2025-West-Summit>

JULY 2025

16: Sustainable Groundwater Panel – Center for Land Based Learning's Speaker Series. Center for Land Based Learning 40140 Best Ranch Rd, Woodland, CA. Come enjoy wood-fired pizza and beverages as we discuss the present and future of sustainable groundwater in the region, featuring panelists from CAFF. Suggested donation \$20. For more information visit: <https://caff.org/event/sustainable-groundwater-panel-center-for-land-based-learning-speaker-series/>

To list your special event in California Farm Equipment send details to CFEM, PO Box 1128, Visalia, CA. 93279. or email to: info@cfemag.com.

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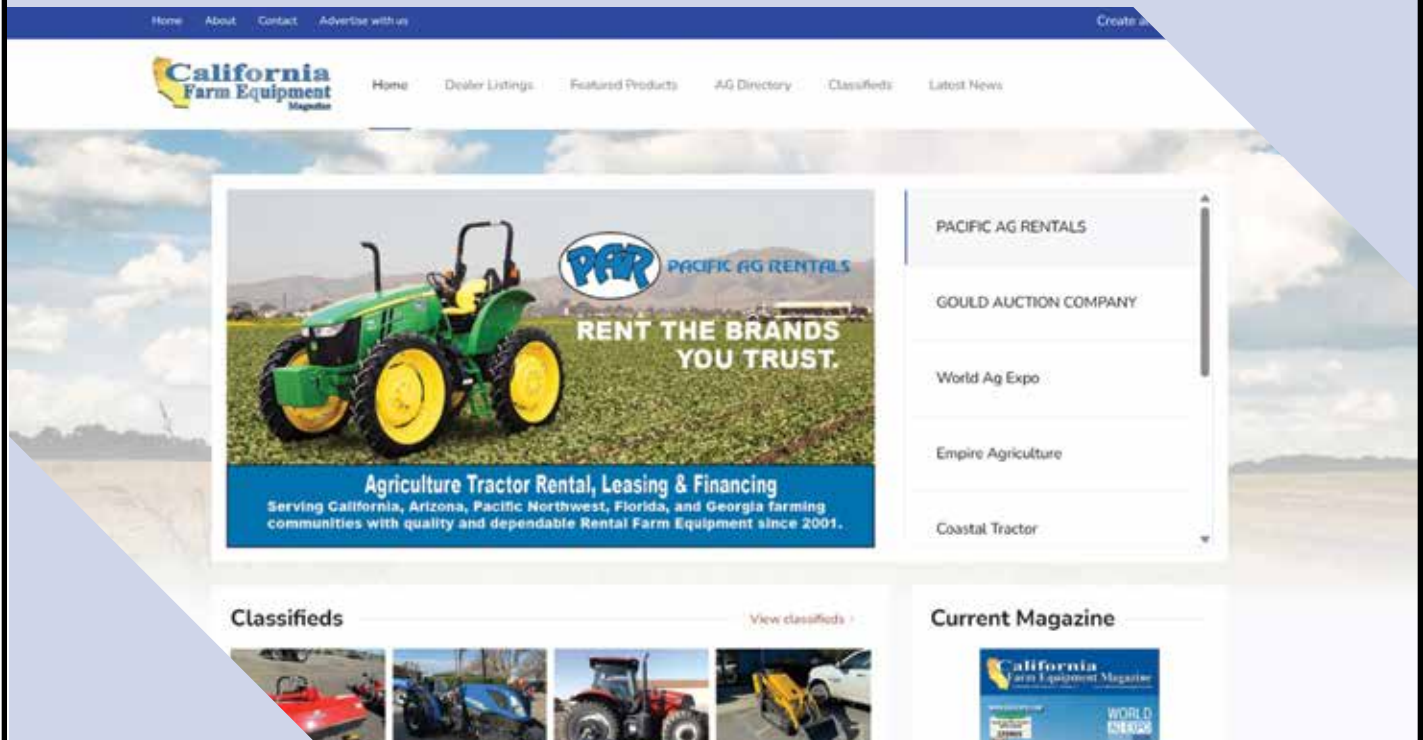
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Five agtech companies selected to grow with VINE Connect



Ag-Bee drone can assist with crop monitoring, pollination and targeted chemical application.

Five agtech startups have been selected to participate in the VINE Connect Program, which vets and connects emerging agricultural technology with growers to accelerate the adoption of practical, farm-ready solutions. The program, run by UCANR Innovate, Farmhand Ventures, and UC Agriculture and Natural Resources (UC ANR), will host a public field day on April 10 at the UC Hansen Agricultural Research and Extension Center in Camarillo, where these companies will demonstrate their technologies on farm.

"Our goal with VINE Connect is to ensure farmers have access to technologies that solve their problems," said Hannah Johnson, industry lead at UCANR Innovate. "These startups are developing solutions that can directly impact labor efficiency, water conservation and a farmer's bottom line. The VINE Connect Field Day is an opportunity for growers to see these tools in action and provide feedback in real time."

California farmers face ongoing challenges including labor shortages, water constraints and climate pressures. VINE Connect brings together technology developers with the farming community to help new companies refine their products based on feedback from growers, making them more practical.

The selected startups were chosen for their potential to address key challenges facing California agriculture::

Ag-Bee – Ag-Bee uses autonomous aerial drones to assist farmers with precision crop monitoring, pollination support and targeted chemical application. Their drone technology helps reduce the need for manual field scouting, saves time and enables more precise input application.

L5 Automation – L5 Automation specializes in automated systems tailored for unstructured environments, with a primary focus on agriculture. Their flagship service offers automated strawberry harvesting, using advanced robotics to determine optimal picking times based on

fruit readiness rather than human schedules.

Lumo – Lumo is a precision irrigation company that develops smart valves and software that automate water distribution and help growers achieve block-level precision. With built-in flow meters, real-time fault detection and AI-driven insights, farmers are able to reduce water waste, save time, improve sustainability and optimize crop quality and yields.

Verdi Ag – Verdi provides an affordable, customizable platform that allows growers to automate precision irrigation and other farm management tasks. Designed to be easy for everyday farmworkers to use, their system integrates with

popular sensors and provides tools that allow growers to remotely monitor their equipment for leaks and breaks, down to the specific row.

Verdant Robotics – Verdant Robotics has developed the SharpShooter, a multi-function, precision application system that combines computer vision, artificial intelligence and robotics. The only system of its kind that aims before it shoots, the SharpShooter hits targets that are difficult to reach -- from small weeds to large crops -- at speed. This advanced platform enables ultra-precise input application, reducing labor costs, minimizing chemical use and improving crop outcomes.

The VINE Connect program supports startups by facilitating direct engagement with farmers, enabling them to refine their technologies based on real-world needs. Participants benefit from networking opportunities and expert guidance to help transition from early-stage development to broader market adoption.

"Startups need direct engagement with growers to make sure their solutions fit the realities of the farm," said Connie Bowen, founder and managing partner of Farmhand Ventures. "This program is designed to bridge that gap, bringing together technology developers and farmers in a way that encourages collaboration and accelerates adoption."

"California farmers face enormous challenges, from labor shortages to climate pressures, and technology plays a critical role in keeping farms competitive and sustainable," added Gabe Youtsey, chief innovation officer at UCANR Innovate. "The VINE Connect Field Day is about making sure the most promising innovations get the real-world exposure they need to be useful and accessible to growers."

The VINE Connect Field Day event is free to attend, and registration is encouraged. Farmers, industry professionals and journalists can learn more and register at <https://thevine.io/event/vine-connect-field-day-ventura>.

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