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JUNE 2025 Volume 44 • Number 6

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UCCE advisor provides first-of-its-kind avocado irrigation data

Study findings from Southern California orchards help growers save water, money

By Michael Hsu

Perched precariously on the steep hillside of an avocado orchard in San Diego County, Ali Montazar began to form a theory as to why there are so few studies of irrigation for avocados.

"Perhaps no one likes to do research on a nearly 45% slope and erect 30-foot-high towers to collect data from sensors above the canopy!" said Montazar, University of California Cooperative Extension irrigation and water management advisor for Riverside, San Diego and Imperial counties. "But if you're on flat land looking at almonds or pistachios, everyone is happy to do such research there."

Despite the ruggedness of the terrain (avocados are often planted on hillsides in California production systems), Montazar persisted in advancing his groundbreaking research to optimize irrigation for "Hass" avocado trees. California is the #1 state in the U.S. in avocado production, with the crop valued at more than \$523 million, according to recent statistics.

A researcher with the California Avocado Commission (CAC), one of the primary funders of this project, was certainly glad Montazar finished his work unscathed.

"Water for avocado is the single biggest input, dollar-wise, that growers have – it tops harvest costs; it tops fertilizer costs," said Tim Spann, a CAC research consultant who was formerly the director of the CAC research program. "Ensuring that growers are putting out irrigation at optimal rates goes directly to their bottom line."

The need for efficient and effective irrigation scheduling is especially acute in Southern California, where most of the state's avocados are grown.

"This region is under pressure due to a variety of water issues, facing uncertain water supplies, mandatory reductions in water use and rising costs of water," said Montazar, noting that San Diego County has some of the highest water costs in the nation.

Data-based crop coefficients crucial for determining water needs

Crop coefficients are numbers used to calculate the amount of water a particular crop needs, given a variety of environmental and plant factors. Noting that as much as 50% of an avocado grower's production costs go to irrigation, Montazar set out to develop more reliable crop coefficients for avocado, based on real-world data.

"This is huge; we have never had a project like this conducted for avocados in California," Spann said. "The crop coefficient we used previously was developed out of a salinity project done 20-plus years ago."

Because avocado growers had been using that roughly estimated crop coefficient (as well as coefficients borrowed from citrus), Montazar sought to calculate "true" crop coefficients by measuring actual evapotranspiration from orchards across California's avocado-growing regions.

For three years, Montazar and his team collected data from sites scattered across the four counties where avoca-



Sensors mounted on towers high above the avocado orchard canopy were crucial in collecting real-world data for more precise crop coefficients.

Photo by Ali Montazar

dos are primarily grown: Riverside, San Diego, Orange and

"We used cutting-edge remote sensing technology and ground-based data for this research, which had never been used for avocados at this scale," Montazar added.

The scientists found that the actual evapotranspiration numbers – and therefore the crop coefficients – varied widely based on site-specific conditions and factors such as slope and row orientation, soil type and condition, canopy size and management, age of orchard and seasonal changes.

"Growers can rely on these numbers, because they come from their practices and may represent a wide range of site and environment features," Montazar said. "We conducted this study in 12 different commercial sites in actual cropping systems."

Montazar and Spann both observed that, in general, growers were likely overwatering during certain times of year.

"Overall, the biggest surprise was that Ali has shown we actually need less water than what most of us had previously thought - which is definitely a good thing," Spann said. "Even if growers don't fully utilize this information that he's produced, we can still communicate with them that: 'Look, our See Avocado irrigation data page 6

JUNE 2025 | CALIFORNIA FARM EQUIPMENT MAGAZINE 3

New video series to help new California vegetable growers



The first training video of the new series is "Contemporary and future approaches to plant breeding,"

By Pamela S Kan-Rice

To train new people to work with California specialty crops and update the skills of current workers, educators from University of California, Davis and UC Agriculture and Natural Resources, Fresno State, Cal Poly San Luis Obispo, Chico State and five California community colleges are producing educational videos. The training video series is available to the public for free on YouTube at https://www.youtube.com/@jeffreymitchell759/playlists.

"As California's farmers age, shortages of suitably trained agricultural workers increase, and workers increasingly come from non-farming backgrounds, the role of agricultural colleges in teaching both the theory and practice of agriculture is key today," said Jeff Mitchell, UC Cooperative Extension specialist in the Department of Plant Sciences at UC Davis.

"The average age of agricultural producers in California is currently about 59.2 years," said Mitchell, who is based at the UC Kearney Agricultural Research and Extension Center in Parlier in Fresno County. "Therefore, there is an urgent need to encourage and recruit young people into agriculture to sustain current and future production."

It is also vitally important that those entering the workforce receive adequate training in current production practices of the state's particularly dynamic specialty crop industries.

"In response to the growing demand for online education following COVID-19, I have strategically incorporated YouTube video clips – particularly those produced by UC Agriculture and Natural Resources – into my course material to enhance student engagement and learning outcomes," said Sophia Marin, Bakersfield College adjunct professor. "One of the greatest challenges in teaching agriculture in a virtual setting is the inherently hands-on nature of the industry."

This illustration in the video shows the process from field observations on healthy and diseased plant to confirm phenotype, growing out seedlings, extract DNA from plant tissue and analyze, PCR primers distinguish different versions of the gene of interest via an analytical machine.

Marin has been using videos produced a few years ago.

The video curriculum series currently being developed includes integrated weed management, postharvest technology, crop breeding, microgreen production, soil management, labor and specialized farm machinery.

Many key concepts, especially those related to plant pathology and crop management, are difficult to fully convey through traditional textbooks or static images alone, Marin noted.

"To address this gap, I began supplementing my lectures with real-time video recordings captured during farm visits, with the consent of local growers," she said. "These video clips provide students with invaluable exposure to real-world agricultural practices and allow them to observe phenomena such as plant diseases – including Southern Blight – in a way that is far more dynamic and informative than text-based descriptions."

"Through visual media, students can see subtle distinctions in plant symptoms, understand how and why spores develop, and gain deeper insight into diagnostic and treatment processes," Marin noted.

UC Davis professor Richard Michelmore describes plant breeding for specific genetic traits.

In addition to addressing current practices, the training video series also anticipates the challenges that producers will face.

Vegetable farmers – who tend to have greater labor needs than many in other agricultural sectors – face mounting worker shortages and need to modernize their farm workforce.

"Vegetable production systems need to be dynamic to keep pace with unpredictable economic, social, environmental and regulatory changes," Mitchell said. "These systems must continually adapt to innovations and must have a workforce that understands and can implement ever-changing technologies."

Visiting farms and viewing videos give Bakersfield College students a clearer idea of the kinds of jobs they would like to pursue, according to Marin.

UC Davis student Amber Flores shows how they culture plant tissue to study the function of genes to create lettuce that exhibits desirable qualities.

"These professionally produced clips complement textbook topics such as urban agriculture, propagation, transplanting and field packing, offering students a visual context that supports their understanding of the material," Marin said. "What I have noticed is these resources promote active learning: students tend to engage more deeply in discussion boards via Canvas, conduct independent research to supplement course content, and demonstrate increased confidence in both their academic progress and career aspirations."

Development of the teaching modules to train workers for California's vegetable crops industry is funded by the California Department of Food and Agriculture's Specialty Crop

See New Video Series page 9



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Avocado irrigation data

continued from page 3

old information that we were providing you – that avocados need about three acre-feet per year – is probably on the high side. At the very least, dial it back 10% or something like that."

Scientists share research, develop tools to aid growers

Montazar said that he is developing crop-coefficient curves and user-friendly tools that growers can refer to – factoring in those variables such as growing region, crop canopy and topography features, and soil types and conditions – and thus determine more precisely the optimal amount of water to apply.

He also said the newly developed crop coefficients will be plugged into an existing irrigation calculator, and have also been used to verify the satellite data-based models available to growers through OpenET.

In addition, Montazar and his colleagues have been sharing the results of the research in the California Avocado Commission newsletter, which goes to 4,000 growers, at CAC meetings, and during more than 10 in-person field days, workshops and webinars. The results also have been presented at several international and national conferences.

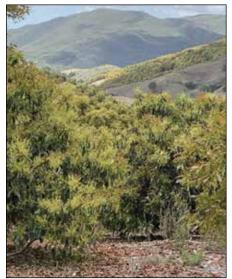
"The avocado community has been very supportive," Montazar said. "Maybe it's because of the high water-costs in this region, and the fact that this information is an immediate need for water-efficiency enhancement in avocados. Avocado growers are very interested in adopting technology and any improvement in irrigation management; I observed a strong eagerness for these results, which I find very encouraging."

In turn, Spann said avocado growers have been immensely appreciative of Montazar's attention to this much-needed area of study.

Irrigation advisor Ali Montazar explains his research while standing in avocado orchard

The avocado community has appreciated Montazar sharing his irrigation and water management expertise through a variety of venues and channels. Photo courtesy of Ali Montazar

"When he reached out, it was



Generally, avocado growers were likely overwatering their orchards during certain times of year, the researchers found. Photo by Ali Montazar

wonderful – we've never really had someone with his level of expertise, specifically on irrigation, working on avocados like this," Spann explained. "It's always nice to work with farm advisors, who don't have the additional burdens of teaching and having students and so forth – they can really dedicate themselves to a project. They're truly interested in helping the grower."

And, based on those conversations with growers, Montazar is already formulating his next research project quantifying, at several sites, the actual effects on avocado yield of following his new crop coefficients to apply irrigation water.

The avocado crop coefficient paper can be found at: https://www. sciencedirect.com/science/article/ pii/S0378377425001957. The project was also supported by the California Department of Food and Agriculture Specialty Crop Block Grant Program.

The authors are Montazar; Ben Faber, UC Cooperative Extension soils/ water/subtropical crops advisor for Ventura and Santa Barbara counties, UC ANR; Dennis Corwin, research soil scientist, USDA-Agricultural Research Service; Alireza Pourreza, UC Cooperative Extension specialist in agricultural mechanization, Department of Biological and Agricultural Engineering, UC Davis; and Richard Snyder, biometeorology specialist, Department of Land, Air and Water Resources, UC Davis.

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International Agri-Center® Farm **Credit Dairy Center Renamed to Include Livestock**



The Farm Credit Dairy Center, a long-standing venue at the International Agri-Center®, will now be known as the Farm Credit Dairy and Livestock Center. The name change reflects the facility's growing role as a year-round event facility for a variety of equestrian and livestock events, in addition to its use during the annual World Ag Expo®.

The new name reflects the International Agri-Center's dedication to serving the broader agricultural community. From equestrian to major dairy and livestock shows such as the California Youth Ag Expo, where over 500 young participants from across the state come together, the venue has become a premier facility for livestock events in the region.

During World Ag Expo®, the largest annual outdoor agricultural exposition, the renamed Farm Credit Dairy and Livestock Center aims to reach new exhibitors and attendees by representing a broader range of animal agriculture to include all areas of livestock.

"The name change highlights the facility's importance as a premier venue for events of all kinds throughout the year," said Jerry Sinift, CEO of the International Agri-Center®. "It's a more accurate reflection of the activity that takes place within the facility, and our desire to welcome new exhibitors to World Ag Expo."

Farm Credit has been the proud sponsor of the building and has held naming rights for nearly two decades. As a network of cooperatives supporting rural communities and agriculture with reliable, consistent credit and financial services, Farm Credit's partnership has helped the International Agri-Center® provide a premier venue for agricultural education and events.

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Pioneer Equipment Co11
Linder Equipment Co9
Live Earth Products5
LS Tractor Company
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Tractor City INC15
Valley Forklift INC15
Mulrooney Auction Co24
New Holland Tractor Company
Coastal Tractor Co18
Dolk Tractor Co18
Garton Tractor, Inc18
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Precision Air Systems, INC 32
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Synthetic Grass Solutions2
Taylor Ag Equipment Appraisals 24
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New Video Series

continued from page 4

Block Grant Program. The videos will be used and rigorously evaluated by the four universities and five community colleges that serve as key conduits for agricultural workers to the state's vegetable production regions.

The first training video of the new series, "Contemporary and future approaches to plant breeding," is available. New videos will be added at https://www. youtube.com/@jeffreymitchell759/playlists weekly until the 25-part series is complete.

Other project partners include Madera College, Merced College, Santa Rosa Community College, Hartnell College and Agriculture and Land-Based Training Association in Salinas.

What 100% Grass-Fed Organic Dairy Brings to Your Table



It's no secret that many grocery store dairy sections are filled with more options today. One choice continuing to gain favor with consumers is 100% grass-fed organic dairy. Nutrition, environmental awareness and animal care are some of the leading reasons consumers choose grass-fed dairy products.

Globally, the 100% grass-fed dairy market is projected to continue growing and some market experts predict annual growth rates as high as 22%. If you're curious about 100% grass-fed organic dairy, consider these benefits from Maple Hill, America's original 100% grass-fed organic dairy producer. The pioneer of 100% grass-fed organic dairy took its commitment a step further by celebrating and declaring National 100% Grass-Fed Organic Dairy Day on April 15, which recognizes the positive impact it has on consumers, cows, farmers and the environment.

1. Honoring the Farmers

Unlike large-scale corporate dairy farms, most organic farms are small, family-owned operations dedicated to traditional, sustainable farming. Small dairy farms have been disappearing, but 100% grass-fed organic dairy creates a sustainable, viable path forward for farmers who work in harmony with nature.

This more natural approach to dairy is a "craft" process favoring small family farmers who are willing to dedicate the extra focus and patience to a better product and process. These family farms are passed on to future generations to grow the "better for you, better for the planet" approach.

2. Commitment to Good Health Most consumers don't know the difference between traditional organic and 100% grass-fed organic dairy. One key distinction is the products' nutritional composition; 100% grass-fed organic dairy provides a 50% healthier ratio of omega 3:6 and 40% higher levels of CLA fatty acids, which may support heart health and provide other health benefits.

What's more, Maple Hill's products made with 100% grass-fed organic dairy are GMO free, hormone free and antibiotic free with no additives or fillers. The line of high-quality, rich-flavored products let you experience the organic difference from traditional dairy for a nutrient-dense solution that tastes as nature intended.

3. Happy, Healthy Cows Cows on a 100% grass-fed diet can live up to three times as long as grain-fed cows and

are never subjected to unnatural diets, hormones or antibiotics. More time in pastures filled with lush grass means cows have the freedom to roam, ruminate and graze on diverse, nutrient-rich grasses.

The result is happier, healthier cows, which in turn results in a richer, better-tasting and more nutrient-dense milk.

4. Sustainability and the Environment

Producing milk without grain or corn requires farmers to focus on regenerating soil and the soil life that supports everything else on the farm. In fact, the healthier the soil, the healthier the feed, so farmers have a natural incentive to be as regenerative as possible. Regenerative grazing practices are a powerful and positive tool to improve land and the web of life on farms by actively restoring soil health, promoting biodiversity and reducing the environmental impact compared to conventional dairy.

Well-managed grazing helps pull carbon from the atmosphere into the soil, fighting climate change in the process. In addition, healthier soil retains more water, reducing runoff and protecting water sources from agricultural pollution.

5. Strengthening the 100% Grass-Fed Organic Market Consumers are increasingly aware of the choices they have in dairy products and how 100% grass-fed organic supports their health, farmers, animals and the planet. Some ways to support this category's continued growth include choosing certified 100% grass-fed organic dairy, advocating for regenerative farming and helping shape a more sustainable food system.

Learn more about 100% grass-fed organic dairy products at maplehill.com. Source: Family Features



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New precision agriculture solution enhances real-time spray tracking, reducing waste and improving efficiency for growers



Fieldin, the leading platform for farm operations management, has partnered with ARAG, a leading provider of precision agricultural technologies, to deliver advanced precision solutions to growers of permanent crops. Their first joint product, a digital flow rate monitoring solution, integrates both companies' expertise to enhance orchard and vineyard spraying accuracy and efficiency. Growers will gain real-time visibility into flow rates to catch errors as they occur, along with access to aggregated spray output data for reporting and cost accounting. With rising chemical costs, shrinking margins, and increasing regulatory demands, the need for full control over spraying operations has never been more critical, according to Fieldin and ARAG.

Through this integration, Fieldin will provide growers with real-time flow data and alerts, enabling them to monitor spraying activities instantly, identify problem areas, and take immediate corrective action. Fieldin's system automatically links spray recommendations to actual applications, ensuring precision and ease of use. Additionally, the system captures weather data to enhance spraying efficacy. The result is improved efficiency, optimized crop protection, and a significant reduction in pesticide use.

A crucial part of this partnership is Precision Ag Solutions (PAS), a well-established supplier of advanced spray technologies in California's Central Valley. As an ARAG distributor, PAS brings decades of experience in developing and deploying precision ag solutions for California's permanent crop industry. This collaboration paves the way for future integrations of advanced technologies into the Fieldin platform.

"With this partnership, we are making precision spraying technology seamless and accessible for growers bringing spray data from the cockpit to the farms' dashboards and driving actionable insights," said Iftach Birger, COO and co-founder of Fieldin. "We are committed to working with innovative technology providers like ARAG to equip growers with the tools they need to maximize efficiency, meet regulatory requirements, and adopt sustainable farming practices."

Breaking down barriers to adoption

Industry estimates suggest that fewer than 10% of U.S. West Coast growers use precision spraying technologies for foliar sprays, compared to over 90% adoption in other markets such as Australia. This disparity is largely due to the complexity of implementing these solutions. Traditional spraying methods often lead to inefficient pesticide appli-

cation, resulting in chemical overuse, increased costs, and environmental harm.

By delivering real-time data on spray coverage, this partnership helps growers transition to precision spraying with minimal disruption. This results in optimized chemical application, improved compliance, and a more sustainable approach to crop protection.

"Precision agriculture is evolving rapidly, and the ability to monitor spray performance in real-time marks a turning point for growers," said Demi Mantas, Americas Sales Director at ARAG. "With this partnership, we're making it easier than ever to transition to data-driven spraying—ensuring better coverage, lower waste, and improved compliance with sustainability standards."

"Implementing new technology is never easy, but the combination of Fieldin's data platform, ARAG's state-of-theart hardware, and PAS's hands-on expertise positions this technology for success among West Coast growers," said Kris Goodman, PAS president.

The new solution is particularly beneficial for permanent crops such as vineyards, apples, cherries, and nuts. By digitizing and optimizing spraying operations, this collaboration ensures better coverage, reduces waste, and minimizes environmental impact. The partnership aims to deliver tailored precision spraying solutions to each grower based on their specific needs, ranging from chemical use monitoring to automated flow control and variable rate application.

Early adoption

Proven in the field, the technology has already been commercially deployed, with case studies highlighting its impact.

Macadamia Farm Management (MFM), Australia's largest macadamia grower, cultivates over 13,000 acres. As an early adopter of Fieldin's Flow Data solution, MFM quickly recognized its benefits. During their first spray application using the system, MFM detected an overspraying issue caused by incorrect calibration on one of their sprayers. They quickly corrected the issue, preventing excessive chemical use that could have harmed soil health.

Armand Smit, Senior Operations Manager of MFM, shared: "We partnered with Fieldin to trial their Flow Data solution because, as a large-scale operation running 24/7, we knew we needed greater precision. Since implementing the system, we've seen significant improvements in spraying consistency, and we now have comprehensive records for compliance. After seeing the results, we expanded from an initial trial of five units to more than 20 units, covering our entire fleet of foliar sprayers. The Flow Data solution provides the visibility and control we've always needed for our spraying program."

The ability to make data-driven spraying decisions in real time is expected to improve compliance with evolving regulations and position growers for long-term success.

As regulatory bodies continue to push for greater precision and accountability in pesticide application, Fieldin and ARAG's partnership delivers a timely and practical solution for the industry.





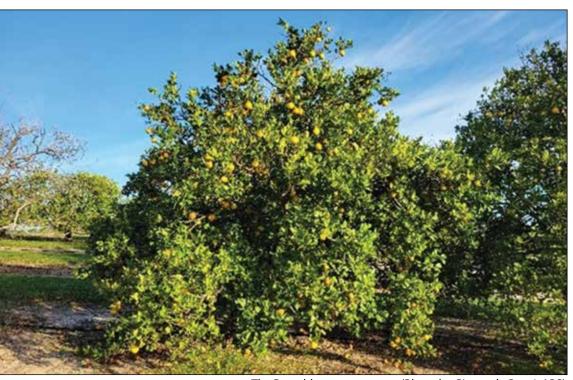
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Orange You Glad that Researchers Made a "Sweet" **Discovery for the Citrus Industry?**



The Donaldson orange tree. (Photo by Giancarlo Buzzi, ARS)

By: Jessica Ryan

ARS scientists made a "sweet" discovery that may be important to solve a major problem within the citrus industry.

Huanglongbing (HLB), also known as citrus greening disease, poses a serious threat to the Florida citrus industry. HLB is associated with tree infection by its presumed causal agent Candidatus Liberibacter asiaticus and is spreading to many citrus-growing areas worldwide. In Florida, HLB has caused about 90% of citrus production losses since it was first detected in 2005.

ARS scientists at the U.S. Horticultural Research Laboratory in Fort Pierce, FL, assessed citrus trees with oranges that could be potentially used for commercial production of orange juice. During their assessment, the scientists found a sweet orange tree named "Donaldson" at the A.H. Whitmore Citrus Research Foundation Farm in Groveland, FL. This tree is a selection from the USDA-ARS variety collection that represents over 100 years of USDA-ARS research on citrus in Florida.

"The Donaldson sweet orange tree stood out as being exceptionally healthy compared to the industry-standard trees that were planted close by and were in decline or had died," said Matt Mattia, a research geneticist. "The Donaldson tree also tested positive for the presence of Candidatus Liberibacter asiaticus, one of the presumed causal agents of HLB. This indicates that the tree may have tolerance to the disease."

Historical records show that the Donaldson tree was first planted on the farm over 30 years ago. Another tree type named "Hamlin," which has been ravaged by HLB, was also planted around the same time. Hamlin and Donaldson are

early season trees that mature from December to January. While Hamlin has been used in commercial orange juice production for years, Donaldson has remained only on the

Researchers assessed if Donaldson oranges could substitute Hamlin oranges for juice production. In the study, researchers conducted taste tests to study the differences between orange juice blends using Hamlin and Donaldson oranges.

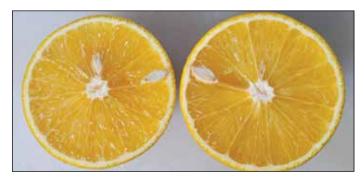
"The taste testers noted that there was a difference between the two juices," said Mattia. "However, those differences may be explained by the lower acidity in fruits from young Hamlin trees."

According to Mattia, Donaldson oranges could replace

Hamlin oranges for commercial production, maturing in the early season and presenting good orange flavor. However, future research should explore whether Donaldson fruit could replace Hamlin fruit in juice by comparing fruits from trees of the same age.

More research is underway to determine if the Donaldson trees have long-term tolerance to HLB and if citrus growers can successfully plant these trees to meet the demands of commercial production. ARS researchers plan to work with research collaborators and industry partners to assess Donaldson's tolerance to HLB in field trials and study the possible underlying genetic mechanisms responsible for tolerance.

The study was published in HortScience. The research done by ARS was in collaboration with researchers at the University of Florida Institute of Food and Agricultural Sciences' Horticultural Sciences Department.



An orange from a Donaldson tree. (Photo by Giancarlo Buzzi, ARS)



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Why Herbicide Applications Sometimes Fail and How to Improve Their Success

Herbicides remain one of the most widely used and effective tools for managing weeds in various settings. Whether you're dealing with invasive weeds on a large agricultural operation or in your own backyard, herbicides can be a great tool due to their efficiency and cost-effectiveness, especially when used correctly. On farms that span hundreds or

even thousands of acres, herbicides are often among the few viable options for broad-scale weed control.

A common guestion that is always asked is: "Why didn't the weeds die after I sprayed them?" Understanding why herbicide applications sometimes fail is key to improving their success. Several factors can contribute to herbicide failure, including improper weed identification, incorrect herbicide selection, poor application timing, wrong application rates, inadequate placement and herbicide resistance.

In addition to these user-controlled variables, abiotic factors or non-living environmental elements, play a critical role in herbicide performance including temperature, rainfall, humidity, wind, sunlight, and soil conditions, all of which are outside the applicator's control but must be carefully considered.

For post-emergence (foliar) herbicides, the best results occur when weeds are actively growing and at the correct growth stage, typically small and under six inches tall. Actively growing plants absorb and translocate herbicides more efficiently, increasing the likelihood of successful control. Larger, more mature weeds are generally harder to kill and may require higher application rates or multiple treatments.

Proper weed identification is one of the first and most important steps in achieving effective herbicide control. Misidentifying a weed can result in selecting an ineffective herbicide



or applying it at the wrong timing or label rate. There are some weeds in California, like marestail and hairy fleabane, that are resistant to commonly used foliar herbicides such as glyphosate and glufosinate. Always consult herbicide labels and other weed management resources, such as the UC ANR Integrated Pest Management website (ipm.ucanr.edu), to

ensure you're using the right herbicide for your target weed species.

Abiotic factors can influence herbicide effectiveness. High temperatures can increase herbicide volatility, leading to off-target movement (drift) and reduced efficacy. Low temperatures can slow plant metabolism, decreasing herbicide uptake and translocation. High humidity can improve herbicide absorption through leaf surfaces, while low humidity can cause spray droplets to evaporate too quickly, reducing uptake.

Rainfall is another critical factor as shortly after application, rain can wash off foliar herbicides, reducing their effectiveness. Conversely, excessive rainfall can leach some herbicides out of the root zone, potentially contaminating groundwater. Wind can also be problematic: strong winds can blow herbicides off target; while spraying during temperature inversions or still air can lead to vapor drift of volatile herbicides.

Herbicide failures are rarely caused by a single issue. More often, they result from a combination of poor timing, incorrect application, and unfavorable environmental conditions. Successful herbicide application begins with proper weed identification, selecting the correct herbicide, following label directions, and paying close attention to weather and soil conditions. Understanding and managing these variables is important for effective, safe, and responsible herbicide use.

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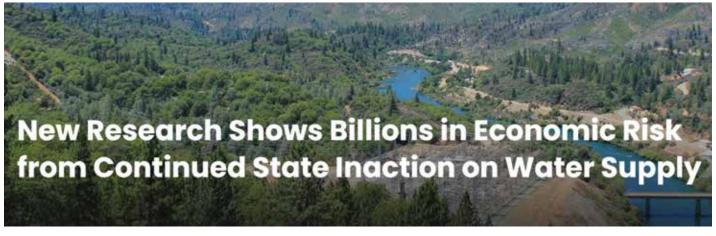
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Findings Reinforce Urgent Need for SB 72 to Ensure Long-Term Water Security for California

A groundbreaking economic analysis conducted by researchers Jay Lund (UC Davis), Josué Medellín-Azuara (UC Merced), and Alvar Escriva-Bou (UC Davis) reveals the staggering costs of inaction regarding California's ongoing water supply challenges. The study estimates that the state could lose enough water annually to supply up to 9 million households, resulting in economic losses ranging from \$3.4 billion to \$14.5 billion per year, depending on the severity of the scenario.

The report, titled *Inaction's Economic Cost for California's Water Supply Challenges*, builds on previous research indicating that California's total water supply is projected to decline by 12-25% by 2050, equating to a loss of up to 9 million acre-feet per year—comparable to one or two Lake Shastas. The findings highlight that without coordinated state action, these reductions could lead to the fallowing of up to 3 million acres of farmland, the loss of 67,000 jobs, and long-term damage to California's agricultural and rural communities.

The research underscores the critical importance of Senate Bill 72, authored by Senator Anna Caballero, which aims to establish the first-ever statewide water supply target and direct California to develop 9 million acre-feet of new water supply by 2040. This bill seeks to unite federal, state, regional, and local partners to better plan, invest, and build toward a more secure, reliable, and sustainable water future.

The study identifies four primary factors contributing to California's anticipated water supply decline:

- 1. Groundwater Management:** Implementation of the Sustainable Groundwater Management Act (SGMA) limiting groundwater extraction.
- 2. Climate Change:** Diminished snowpack reducing natural water storage.
- 3. Environmental Needs:** Increased water requirements to support ecosystems and combat sea-level rise.
- 4. Colorado River Reductions:** Decreased allocations affecting Southern California.

"We've done the math—and the costs of inaction are high economically and environmentally," said Dr. Jay Lund, Professor of Civil and Environmental Engineering at UC Davis. "California urgently needs a long-term, statewide strategy to prepare for the growing water

challenges ahead."

While conservation efforts remain vital, the research indicates that they alone are insufficient to address the projected water deficit. New investments in stormwater capture, water recycling, desalination, and storage and conveyance infrastructure are essential.

"California's water system was designed for a climate that no longer exists," said Senator Caballero. "SB 72 provides a roadmap to adapt our water strategies and tactics to meet the demands of our changing environment, expanding economy, and growing population."

"From the local perspective, a statewide strategy to improve California's water resilience that includes longterm planning and investment will not succeed without measurable outcomes and timelines," said Paul Cook, General Manager of Irvine Ranch Water District. "SB 72 represents a critical step toward aligning regional efforts with a broader, coordinated vision—ensuring that communities across California are better equipped to address ongoing and future water supply challenges."

Last year, Senator Caballero authored a similar bill that received unanimous support from the Legislature in both houses but was vetoed by Governor Newsom due to budget concerns. With a better budget year projected and increased pressure from climate-driven wildfires, the coalition is optimistic that SB 72 can garner unanimous legislative support again and secure a signature from Governor Newsom.

Co-sponsors of SB 72 include the California Municipal Utilities Association (CMUA), the California State Association of Counties (CSAC), and the California Council for Environmental and Economic Balance (CCEEB).

To learn more about SB 72, visit the state's Legislative Bill Information portal. CA Water For All is a statewide effort aimed at educating policymakers on the urgent need for a legislative solution to address California's ongoing water supply challenges. The initiative focuses on uniting the water community, policymakers, and stakeholders to ensure Californians have a sustainable and reliable water supply for all beneficial uses now and for future generations. To learn more or become a supporter, visit www.CaWaterForAll.com or http://www. CaWaterForAll.com.

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KIOTI Unveils CS30 Series Sub-Compact Tractor with Industry-First Climate-Controlled Factory Cab



The CS30 Series delivers a powerful combination of comfort, performance, and efficiency

KIOTI Tractor, a division of Daedong-USA, Inc., launches the CS30 Series sub-compact tractor, featuring the industry's first factory-installed climate-controlled cab and the highest torque in its class. The tractor also boasts the highest engine torque in its class. The new series combines unparalleled operator comfort, superior performance, and unmatched efficiency, resulting in a powerhouse machine designed to take on the toughest tasks.

"The CS30 Series is a game changer for customers who demand comfort and performance in their equipment," said Joel Hicks, product line manager for tractors at KIOTI. "With the latest addition to our line-up, we upped the ante by offering the industry's first sub-compact with a factory-installed climate-controlled cab. This is an example of KIOTI's leadership in developing solutions that address customer's needs."

Revolutionary Comfort with the Industry's First Sub-Compact Factory Cab

The CS30 Series sets a new standard in the sub-compact tractor category. The climate-controlled cab is equipped with heat and air conditioning, allowing for year-round operation in any weather condition. The premium seating improves operator comfort even during long workdays. The optional integrated AV system, which is equipped with smartphone mirroring, Bluetooth connectivity, and a rear-view camera, enables operators to stay connected and in control. Other features include ample storage space and reductions in noise and vibration for a smoother, quieter ride.

Ergonomically designed for an enhanced experience, the CS30 Series features an improved lever layout that allows for more intuitive, comfortable operation. Twin hydrostatic pedals make it easy to switch between forward and reverse movements, reducing fatigue during long workdays or repetitive tasks. The push-button four-wheel-drive, power steering, and tilt steering wheel further enhance machine operation.

Superior Power and Performance for Challenging Tasks Please move the below.

Built to perform during tough jobs, the CS30 Series features a 1.2L KIOTI diesel engine, boasting 24.5 horsepower and the highest torque in its class at 51.63 lb.-ft. The proven engine delivers large power output while also minimizing fuel consumption.

Maximize Efficiency, Simplify Operation

The new sub-compact tractor is designed with convenience and efficiency top of mind. The CS30 machine features mid and rear PTO, allowing operators to use multiple attachments simultaneously for increased versatility while working. For added convenience, the optional quick-connect systems simplify attaching and detaching implements - like loaders, backhoes, and mid-mowers.

The KIOTI Connect TMS system delivers real-time alerts and vehicle data, delivering machine updates in real-time. The illuminated digital instrument panel provides operators with critical information at a glance including vehicle status, warnings, and TMS alerts.

To learn more about the CS30 Series, contact an authorized KIOTI Tractor dealer or visit KIOTI.com.



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UPCOMING EVENTS

JUNE 2025

6: 2025 Napa Valley Barrel Auction. The Napa Valley Barrel Auction is back, offering an extraordinary opportunity to taste and bid on small lot wines while being immersed in the heart of Napa Valley's world-class wine and culinary scene. Held at the iconic Louis M. Martini Winery. Proceeds will benefit Napa Valley Vintners' Youth Wellness Initiative with a focus on empowering youth to lead healthy, balanced lives. Two packages are available: the Napa Valley Barrel Auction or the all-access weekend experience. To secure your ticket to this must-attend occasion, visit collectivenapavalley.org.

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

9-10: California Poultry Federation Summer Board Meeting and Golf Tournament at The Cliffs Resort & Spa in Pismo Beach, CA. The Summer Meeting is one of CPF's most popular meetings. Sponsor and/or register, reserve a spot in the Golf Tournament, and book hotel accommodations online! All attendees will sign up online. Please visit cpif.org for all information and links.

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-learnings-speaker-series/

SEPTEMBER 2025

11-12: California Poultry Federation Annual Conference and Meeting, Monterey Plaza Hotel & Spa Monterey, CA. The Board Meeting is Friday, September 12th. For questions about the conference, please contact the CPF office at (209) 576-6355.

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Startups to showcase irrigation, robotics, pest detection tech June 26

Ag tech to be demonstrated during VINE Connect Field Day in Fresno County



The Spornado sampler is a passive spore trap that detects crop disease pathogens in the air long before symptoms appear on plants. Photo courtesy of Spornado

Six innovative ag tech startup companies have been selected to participate in VINE Connect, a program that vets and connects emerging agricultural technology with growers who can put it to use. California growers continue to face pressing issues, from persistent drought and limited labor to crop pest concerns. These startups were chosen for their promising solutions to key challenges in California agriculture, including water, labor, disease management and pollination.

The program – run by UC ANR Innovate, the innovation arm of University of California Agriculture and Natural

Resources, in partnership with Farmhand Ventures – will host a free public Field Day on Thursday, June 26, at the UC West Side Research and Extension Center in Fresno County, where the selected companies will demonstrate their technologies.

"VINE Connect is about ensuring California farmers have access to new technologies that solve real problems on the farm," said Gabe Youtsey, UC ANR's chief innovation officer. "These six startups are developing solutions for challenges like water conservation, labor shortages, crop disease and more. We believe that by testing their innovations with growers, we can help make sure the technology truly works for farmers' needs."

The six ag tech startups participating in the VINE Connect Field Day are:

HotSpot AG – A California-based company making irrigation management smarter and simpler. HotSpot AG's system allows farmers to remotely monitor and control irrigation pumps, engines and valves via cloud-based technology, use real-time field data to schedule watering, and receive alerts to

Spornado – Creators of an early-warning disease detection device. The Spornado sampler is a passive spore trap that detects crop disease pathogens in the air long before symptoms appear on plants. Farmers place the inexpensive device in the field, send in the collected filter for analysis, and get timely

alerts if threats like mildew or late blight spores are detected.

Edete Precision Technologies – An ag tech firm addressing the pollination crisis with mechanical pollination services, currently offering its first commercial service for pistachios. Edete allows growers to manage pollination with the same control as irrigation by delivering precise amounts of pure, genetically fit pollen at optimal



HotSpot AG's system allows farmers to remotely monitor and control irrigation pumps, engines and valves.

Photo courtesy of HotSpot AG

bloom times. Edete plans to expand its services to provide solutions for bee-pollinated crops like almonds and cherries, offering an alternative or supplement to natural pollination, reducing dependence on bees and helping stabilize crop yields amid growing pollination challenges.

CropVue Technologies - A provider of integrated pest and



CropVue "smart traps" and in-field climate sensors give growers daily data on insect pest pressure and crop conditions.

Photo courtesy of CropVue Technologies

crop monitoring tools. CropVue deploys networks of "smart traps" and in-field climate sensors to give growers daily data on insect pest pressure and crop conditions. High-resolution cameras and AI software identify pests caught in traps (such as moths in a vineyard), while canopy-level weather units track temperature, humidity and microclimate trends. The system delivers real-time pest counts and microclimate data to a web app, helping farmers anticipate

pest pressure and make informed IPM decisions with less manual scouting.

Verdi - Developer of a precision irrigation and farm automation platform. Verdi combines easy-to-install hardware (wireless valve controllers and sensors) with a farmer-friendly software app to automate irrigation at scale. The technology enables precision water delivery by zone, monitors system performance (detecting leaks or blockages) and integrates with soil moisture data.

Bonsai Robotics – A startup bringing autonomy to farm equipment. Bonsai Robotics retrofits orchard machinery (like nut tree shakers and sweepers) with advanced vision and control systems, turning them into self-driving machines.

See Startups to showcase page 30



Agri-Pulse Summit Features Top California Food & Ag Leaders

As the nation's leader in farm production and home to over 400 commodities, California has often been at the forefront of many industry trends and innovations. But growers are also facing significant challenges with water scarcity, labor and an expensive regulatory environment.

"Our Agri-Pulse Food & Ag Issues Summit on June 10 provides a great opportunity to explore all of these factors and hear from some of the state's most influential leaders," said Founder and Publisher Sara Wyant. One of the panels, "Perspectives from the C-Suite: Navigating Through Uncertain Times" includes:

- Shannon Douglas, president, California Farm Bureau
- Dave Puglia, president & CEO, Western Growers
- Roger Isom, president & CEO, Western Tree Nut Association
- Alexi Rodriguez, CEO, Almond Alliance
- Natalie Collins, president, California Association of Wine grape Growers

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. You can see the agenda and register for free with promo code ME-

DIA25 at: https://www.agri-pulse.com/events/1286-2025-food-ag-issues-summit-sacramento-ca

Food & Ag Issue Summit sponsors include: Platinum: California Rice Commission. Gold: Almond Board of California, Western Growers Association. Silver: BASF, California Farm Bureau. Bronze: Bayer, CCI Marketing, CropLife America, Curious Plot, Farm Credit, Morning Star, Nutrien, Prime Time Produce, Valent, AGR Partners, Syngenta, TriCal.

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Startups to showcase

continued from page 26

Their autonomous equipment can operate 24/7 in orchards, even in dusty or GPS-denied environments, to shake trees or clear orchard floors without a person at the

The VINE Connect program supports these startups by facilitating direct engagement with farmers and real-world field trials. Participants benefit from expert-led business development and field trial workshops, grower feedback, networking opportunities and guidance from UC ANR and industry experts to refine their products and accelerate the path from early-stage development to market adoption.

"Each of these companies

has proven technology that



Bonsai Robotics retrofits orchard machinery (like nut tree shakers and sweepers) with advanced vision and control systems, turning them into self-driving machines.

Photo courtesy of Bonsai Robotics

could make a real difference for growers," said Hannah Johnson, industry lead for UC ANR Innovate. "Demonstrating their solutions on the farm and hearing directly from growers give them an opportunity to refine their innovations to better serve farmers' needs. It's a two-way street: startups get priceless feedback to improve their



Edete allows growers to manage pollination with the same control as irrigation by delivering precise amounts of pure, genetically fit pollen at optimal bloom times.

Photo courtesy of Edete Precision Technologies

products, and farmers get a sneak peek at tools that might improve their operation's profitability and sustainability."

"Startups need direct engagement with growers to make sure their solutions fit the realities of the farm," said Connie Bowen, founder of Farmhand Ventures, which co-runs the VINE Connect program. "This program is designed to bridge that gap by bringing technology developers and farmers together on the

ground. By testing new ag tech in real farming conditions, we're encouraging collaboration that speeds up adoption of the most useful innovations."

The six companies will showcase their innovations during the VINE Connect Field

Day on June 26, 2025, at the UC West Side Research and Extension Center in Five Points, Fresno County. The field day will run from 8:30 a.m. to 11:30 a.m. and feature live demonstrations of each technology in a farm setting. This free, public event offers growers, agricultural professionals, media and community members an opportunity to see the latest ag tech solutions working in the field and to interact directly with the startup teams and UC ANR researchers.

Verdi combines easy-to-install hardware (wireless valve controllers and sensors) with a farmer-friendly software app to automate irrigation at scale. Photo courtesy of Verdi

This field day is sponsored in part by F3 Local, a regional initiative committed to strengthening California's food and farming economy

through practical, farmer-focused innovation. Their support helps ensure that growers in the Central Valley have early access to new tools and technologies aimed at improving resilience and profitability.

To attend, please register at https://bit.ly/VINEconnectJune2025.

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