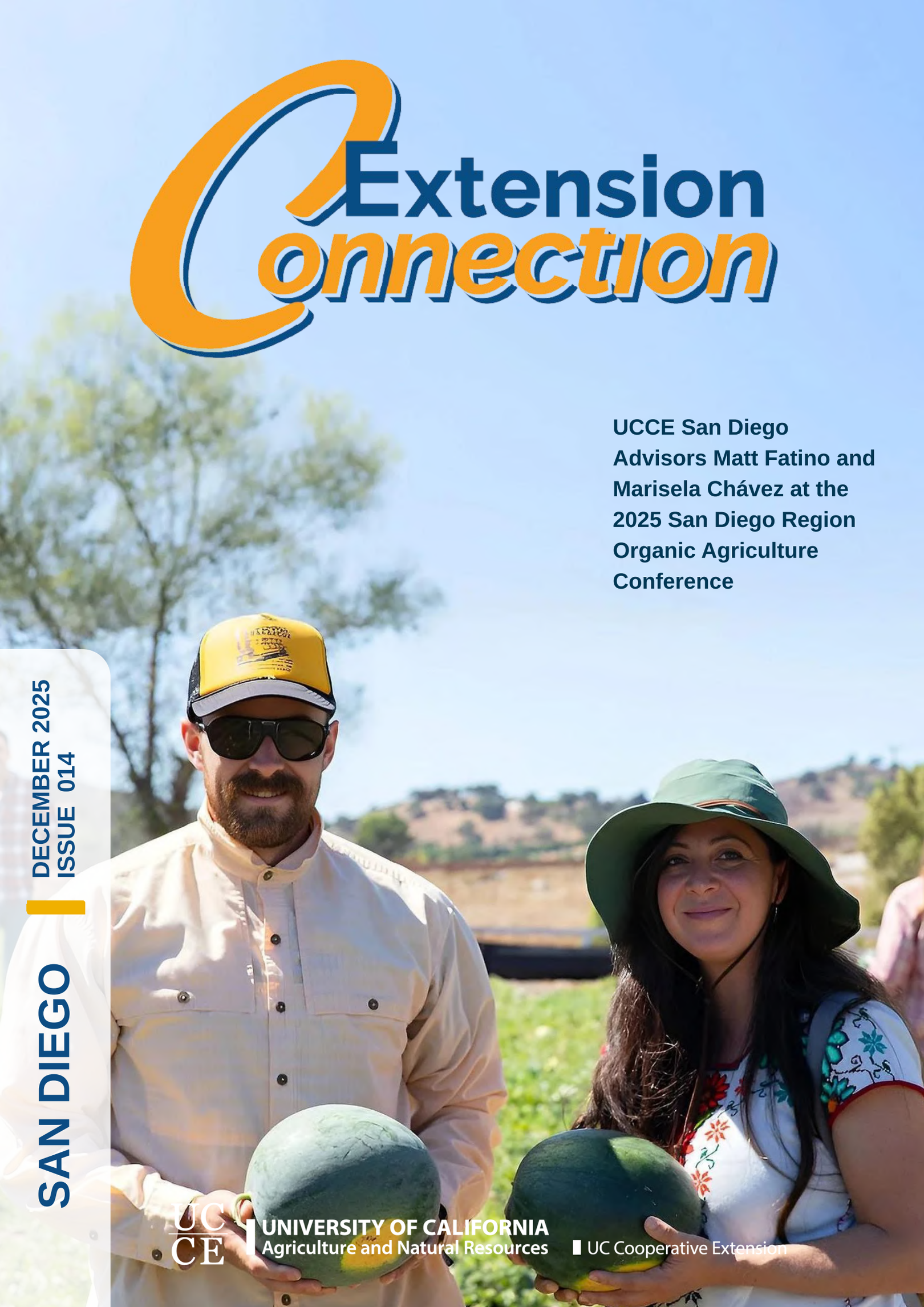
Extension Connection



UCCE San Diego Advisors Matt Fatino and Marisela Chávez at the 2025 San Diego Region Organic Agriculture Conference

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Contents

DECEMBER 2025

ARTICLES

NEWS & EVENTS

Click article to jump to page.

Introduction from our
County Director

Dear Readers:

As winter approaches and the year winds down, we reflect on a season of growth, collaboration, and innovation in agriculture and natural resource management. Our team at UCCE San Diego remains committed to supporting growers with research-based solutions and practical tools for success. In this issue, discover highlights from recent events, and dive into resources on integrated weed management and irrigation system design for urban agriculture. I hope you also explore resources on our website to prepare for 2026 and join us in shaping a sustainable future for our San Diego communities.

This fall, Lexie Wilson, Michael Jaquez, and Darlene Ruiz, along with UC ANR colleagues and local partners, co-led the San Diego Regional Organic Agriculture Conference at farms across the county. If you'd like to be a part of the next regional conference, connect with our team, explore opportunities, and read more about upcoming events at the UC Organic Agriculture Institute.

In November, our team also brought warmth and knowledge to local viticulture clientele and professionals through a workshop on Advances in Vineyard Management at the San Diego Farm Bureau office in Escondido. Advisors Ana Pastrana, Eric Middleton, Val Mellano, and Matt Fatino, alongside experts from UC Davis, UC Riverside, and UC Cooperative Extension, shared practical strategies for managing vineyard pests and diseases, meeting water quality regulations, and considering weed management strategies.

In December, Sierra Reiss and Chris McDonald held a virtual conversation alongside American Farmland Trust focusing on advancing equitable land access in Southern California. This episode of the Climate Action and Land Equity project allowed attendees to learn about new community plans, helpful resources, and ways to connect farmers, ranchers, and land stewards with opportunities. Whether you're a grower, landholder, land seeker, or simply care about building a more inclusive food system, this is your chance to shape the future of land access.

Together, let's prepare for a productive and balanced year ahead. Many thanks for your continued support of our programs and warm wishes for a joyful holiday season. Happy holidays!

Chandra Richards

UC Cooperative Extension

San Diego and Imperial Counties

Meet our Incoming County Director: A Q&A with Chandra Richards

Interview conducted by Robert Padilla, featuring Dr. Chandra Richards, UCCE County Director, San Diego and Imperial Counties,

As **Chandra Richards** steps into her new role as **Area County Director for San Diego and Imperial Counties**, we asked her to share more about her background, leadership approach, and what's ahead for our programs! Here's what she had to say.

What first sparked your interest in land, science, and the environment?

I've always been inspired by natural and environmental sciences – especially from an early age. I follow in the footsteps of my parents, two dedicated scientists who used their education and lived experiences to shape impactful academic careers. They nurtured my curiosity by gifting me science kits, enrolled me in educational camps, and encouraged time outdoors, all of which fostered self-exploration and discovery. Our frequent travels across the U.S. and abroad exposed me to unique landscapes and diverse cultures, deepening my connection to the natural world. These early immersive experiences laid the foundation for my passion and ongoing desire to learn more about environmental sciences.

You've studied chemistry, mathematics, and soil biogeochemistry. What drew you to studying soil systems?

I spent much of my childhood outdoors, fortunate to have large backyards in Charlottesville, Virginia during my early years, and later in State College, Pennsylvania, where I lived through high school and completed my undergraduate studies at Penn State. Alongside my family, these garden spaces became my first opportunity to cultivate native plants and grow food, sparking a lifelong connection to the land. I also played soccer and lacrosse throughout grade school and into graduate school, which gave me regular, meaningful experiences in nature. At Penn State, I took several environmental chemistry courses, and later, during my doctoral studies at the University of California, Berkeley, I completed my first soils course. There, I developed a comprehensive understanding of the biological, physical, and geochemical interactions between soil and water at the Pescadero Estuary, an ecosystem plagued by decades of fish mortality events. This research brought together my interdisciplinary interests and systems thinking approach and ultimately launched my career as a soil scientist and conservation leader.

Before UC ANR, you worked on projects from riparian restoration to carbon farming. How did these experiences shape your path to Cooperative Extension?

As Conservation Program Director at the Greater San Diego Resource Conservation District, I led projects supporting farmers, ranchers, Tribal Nations, and conservation partners.

County Director Chandra Richards speaking at the San Diego Farm Bureau for the 2025 Advances in Vineyard Management Workshop

This work highlighted the need for equity-centered solutions and accessible outreach. I recognized the tremendous importance of equity-centric topics and policy recommendations crucial to the resilience of our local clientele and the substantial need to translate research into outreach especially for underserved communities. This realization ultimately led me to Cooperative Extension, where I continue to advance inclusive, science-based solutions to regional resilience.

Has your perspective on community-based research changed since joining UC ANR?

I started working at UC ANR in 2021, right in the middle of the pandemic, which meant that most of my engagement with team members and partners started virtually. This required me to develop new adaptive strategies to cultivate and sustain authentic relationships with my clientele, especially with those who had limited capacity, access to technology, or were part of underserved communities. I quickly recognized the need to shift our practices: creating more space for communication, embracing flexibility, and finding innovative ways to co-create and collaborate. I continue to be inspired by the creativity and dedication I see across UCCE within fundraising, research, and extension work.

You've managed large interdisciplinary efforts like the CALE Project. How do you stay grounded?

I am consistently motivated by the drive to help others and find sustainable solutions that allow us to work efficiently and effectively toward our shared mission and strategic goals. Communication and organization are two pillars that keep me grounded especially when navigating eclectic projects, multidisciplinary expertise, and diverse visions. I'm particularly passionate about strengthening capacity first, as it often serves as the glue that holds teams and partnerships together. When we build that internal capacity and culture collaboratively, we create the foundation to grow programs that meaningfully address equity and elevate support for community-led initiatives. I also strive to stay calm and present, especially in dynamic or high-pressure environments, so I can remain grounded with clarity and intention.

Continued Pg. 4

Who has shaped your sense of responsibility to land and community?

Throughout my education, I was fortunate to be mentored by four remarkable women who served as role models in my scientific and professional life. These include my mother, who passed in 2016; my high school chemistry teacher; my college organic chemistry professor; and my graduate school soil science advisor. Each of these women inspired me to stay resilient, find daily inspiration, work with purpose, and never give up. I'm also deeply grateful for the connections I have built with Tribal leaders across California. Their vision and leadership have profoundly influenced my commitment to supporting land stewardship, improving safety, access, and preparedness, and uplifting community empowerment through collaborative, equity-centric work.

UC ANR panelists from the Advances in Vineyard Management Workshop with UCCE San Diego's incoming County Director Chandra Richards

What brings you joy outside of work?

I love the ability to spend time outdoors and continue discovering new spots with my husband, daughter, and dog. Together, we explore California's endless trails, enjoy the local beaches and playgrounds, and spend time visiting farms, natural spaces, and the San Diego Zoo. At home, my vegetable and citrus garden keeps me grounded and inspires me to cook and bake creatively. I still play lacrosse with the San Diego women's post-collegiate club team and continue to grow as a downhill skier.

What do you hope people in San Diego and Imperial Counties come to know about you?

Over the last four years, I've been building a regional presence in Southern California, and I'm excited to step into my new role as Area County Director to deepen meaningful relationships in San Diego and Imperial Counties, especially with our county partners. I look forward to elevating the visibility of our diverse team of academics and staff, highlighting their impactful work, and strengthening the status of Cooperative Extension and ANR. Most importantly, I strive to lead with my values, fostering a workplace culture rooted in hard work, high impact, positivity, and respect. My door is always open: for honest conversations, moments of connection, and opportunities to grow through challenges together.

UC Organic Agriculture Institute forges partnerships at first regional conference

Written By: Caroline Champlin,
Science Communication Specialist*, San Diego County*

Free farm tours and local expertise helps ground organic farmers in the San Diego region

This fall, grower Rufus Jimenez was preparing to lead a tour of Golden Eagle Farm, a certified organic farm owned by the Mesa Grand Band of Mission Indians, when he had an idea. His watermelon fields were loaded with ripe fruit, and he was running out of storage.

His solution? Let everyone enjoy a hands-on farming experience. After dispensing tips for choosing the best melons, he released the tour group to pick as many as they wanted.

"That was a spur-of-the-moment kind of decision," Jimenez said. "I was excited to see everybody's faces at the watermelon patch. It was a great day."

That tour of Golden Eagle was one of several farm visits that kicked off the first day of the 2025 San Diego Region Organic Agriculture Conference. Held Sept. 25-26, the gathering was organized by the University of California Organic Agriculture Institute, a part of UC Agriculture and Natural Resources.

Over 100 attendees, including more than 50 organic farmers, turned out for tours, panel discussions and one-on-one consultations – adding up to the biggest event in the institute's five-year history. This gathering demonstrated the breadth of experience represented in the organic agriculture industry and the individualized support available for growers to achieve their goals. After this first successful conference at this scale, more regional events are expected in the future.

Lexie Wilson, extension and outreach coordinator with the institute, organized the San Diego conference, along with several colleagues and local partners. According to Wilson, the planning team incorporated Golden Eagle Farm into the agenda with the intention of highlighting "the Indigenous knowledge that has stewarded this particular region for tens of thousands of years."

Continued Pg. 5

Hosting the conference in San Diego was an easy choice – the county currently has the highest number of certified organic farms in California.

In attendance were dozens of experts who support local farms with the latest science in organic cultivation and resource efficiency. Speakers included people from the University of California Cooperative Extension, Resource Conservation District of Greater San Diego County, Community Alliance with Family Farmers, U.S. Department of Agriculture Natural Resources Conservation Service, the County of San Diego and California Department of Food and Agriculture Farm to School Program.

Representatives from other UC ANR entities, the **Climate Smart Agriculture program** and **Small Farms Network**, also introduced themselves to growers.

Keeping all of those agricultural advisors straight can be confusing, even for the farmers they serve, Wilson admits. To address that, the planning team hosted Q&As with members of each organization on stage at the same time. That helped the audience differentiate between nonprofits, government advisors, regulators and university scientists. Following introductions, there were opportunities for more casual networking and valuable face time.

“We were able to gather these experts together in one room, and that might not happen as often as we would like,” Wilson said. “A farmer could speak to all of those representatives together and understand the full suite of support that is possible.”

In addition to those panels, farmers could meet individually with experts during “Organic Office Hours,” an opportunity to learn about the organic certification process and discuss specific complexities of growing food without synthetic fertilizers and pesticides.

Funding for the event was provided by the California Department of Food and Agriculture Office of Agricultural Resilience and Sustainability, as well as the State Organic Program, which manages organic enforcement, state registration of organic farms, and education and outreach related to organic agriculture.

“Having so much knowledge, experience and support gathered in one place was incredibly inspiring and reinforced the sense of community within organic agriculture,” said Mayze Fowler-Riggs, CDFA State Organic Program special investigator.

Kevi Mace, senior environmental scientist from the CDFA Office of Agricultural Resilience & Sustainability, also commented on the engagement facilitated by the conference.

“The attendees were having lively and earnest discussions with each other and the presenters,” Mace said.

“The presenters clearly take their roles seriously and provide an amazing array of technical assistance. Getting everyone in the same place at the same time generated many conversations.”

Reaping the benefits of farmer-to-farmer mentorship

Farms all across San Diego County opened their gates for conference, including J.R. Organics in Escondido, Nopalito Farm in Valley Center and Golden Farm in Ramona.

What made Golden Eagle a noteworthy stop, besides the impromptu watermelon u-pick, was hearing about the tribe’s success in securing resources and identifying mentors to grow their operation. Showcasing opportunities available to farmers was a focus of the conference.

Lexie Wilson (left) planned the 2025 San Diego Region Organic Agriculture Conference along with Michael Jaquez (center), Darlene Ruiz (right)

In Golden Eagle’s case, farm supervisor Jimenez has been mentored by longtime grower Scott Murray for nearly five years. That partnership is officially recognized and funded by the **USDA Transition to Organic Partnership Program (TOPP) Mentorship Program** for early-career growers, thanks to an introduction to the program by Wilson of the UC Organic Agriculture Institute.

The partnership between Murray and Jimenez has been productive. Together, the pair have turned a run-down former horse ranch into several successful harvests of corn, cucumber, chiles, tomatoes and collard greens. Witnessing conference attendees pick watermelons was a payoff for both mentor and mentee.

“Turning a group of people loose in a watermelon field has got to be the funniest thing to watch in the world,” Murray said. He hopes the tour participants will remember that experience and share the word about the Native-operated farm and the resources available to new growers.

“Being a success in the agriculture business is getting known for what you do,” Murray said.

Since the pair were first connected, Murray is proud to have watched Jimenez transform from humble backyard gardener to professional grower. The farm is now providing economic value to the Mesa Grande tribe, a major win as they fight for greater Native food sovereignty.

Marisela Chávez, Indigenous food systems and food sovereignty advisor with UC ANR, explained the concept of Native food sovereignty during a panel discussion at the conference.

“The heart of it is about building just food systems centered on self-determination and the ecologically sound production of culturally-relevant foods,” Chávez said. “It can range from working on nutrition, community wellness initiatives, youth programming, land stewardship, native plant restoration or cultural revitalization of Native foodways.”

Continued Pg. 6

Marisela Chávez provides research-based information to local tribes as a UCCE Indigenous food systems and food sovereignty advisor for San Diego and Riverside.

For Jimenez of the Mesa Grande tribe, food sovereignty is about being self-reliant.

“So if anything happens, the community has their own security, food and materials and medicine,” Jimenez said.

Jimenez left the conference grateful for the opportunity to rub elbows with prominent organic farmers. Those new contacts even got a homegrown gift to remember him by.

“We’re out here trying to make a name,” Jimenez said.

Turning dead vines into organic wine

To complement attendees’ first-hand tours of farm operations, the indoor programming facilitated discussions on the details of running a successful and sustainable organic business. At the end of each panel, there was a good chance of spotting vineyard owner Jorge Reyes’s raised hand in the audience.

“I ask a lot of questions. Some of the questions may not be that smart,” Reyes said. “But I figure, if I have a question, maybe other people might have a question too.”

Like other people in attendance, Reyes is just starting his farming career. In 2020, he retired from the Navy and bought a cabin nestled on a three-acre vineyard, fulfilling a childhood dream. One problem: the place needed work.

“The cabin was a big-time fixer-upper. It had holes in the roof. It was leaking. The vineyard was just overrun by bushes, and most of the vines were dead,” Reyes said.

Since buying the property, Reyes has sought the guidance of agricultural experts, like UC Cooperative Extension advisors, to help turn the dilapidated vineyard into an organic winery. He has even benefited from their feedback during in-person visits to his site.

“When you start out, you don’t even know how to do a soil test,” Reyes said. “You never know what you’re going to learn just talking to different people.”

Like Jimenez, Reyes is also a mentee through the USDA mentorship program and has received additional funding through the nonprofit California Certified Organic Farmers Foundation for **organic transition**.

By regularly participating in UC-sponsored events, Reyes has become familiar with all the entities that provide free support to organic farmers like him. At the same time, he’s built a network of industry colleagues who share his passion for organic practices and support his endeavors.

Jorge Reyes (right) owns a San Diego County vineyard and is producing organic wine with support from UC Cooperative Extension advisors and experts like Jennifer Nunez (left) of California Certified Organic Farmers.

Reyes was especially impressed by the conference tour offered by a major grower, J.R. Organics, and considers that operation a role model. As a fellow organic farmer working with a sloped landscape, he found it helpful to have a point of comparison, and left the event re-energized by the mission of organic farming.

“Even just seeing it encourages you, like ‘Hey, you know what, it can be done.’ If you believe in something, you should just do it,’ Reyes said.

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Figure 1. The garden's 4 ft x 8 ft raised beds (left) are irrigated with four drip tapes served by a polyethylene lateral (right).

Randy's Conundrum: a case study in irrigation system design for urban agriculture

Written By: Gerry Spinelli, UCCE Production Horticulture Advisor, and Derrick Robinson, Urban Ag, Food Systems, and Environmental Issue Advisor

Last month we visited a community garden in Southeast San Diego. The shared garden is accessible by any community member interested in renting a 4 ft x 8 ft raised bed to grow vegetables and ornamentals. The garden is currently being reborn from its ashes after a Covid 19-imposed hiatus.

Randy is the volunteer that installed the current irrigation system. He is very engaged, and he's interested in improving his irrigation design and his management. "Are you an irrigation specialist?" he asks me hopeful. "I'll do my best", I answer with a smile.

Randy's beds are roughly 4 ft by 8 ft (Figure 1). This seems to be a common size for community garden-style raised beds. Someone recommended Randy to buy drip tape, but he doesn't know the specs. They also told him to install a ½" polyethylene hose mainline to serve the eight raised beds from a municipal water utility hose bib controlled by a garden-style two-line controller. Randy installed a screen filter and a 25 psi pressure regulator on each line right after the controller (Figure 2). One line irrigates fruit trees; the other irrigates Randy's eight vegetable beds.

I asked Randy to show me the drip tape, and in the shed we found the coil with a label in Figure 3. The label has seen better days, and we can barely read the specs. The drip tape is 5/8 inch in diameter, 15 mil of wall thickness with emitters spaced 8 inch and a flowrate of 0.65 gpm per 100 ft of linear length at 10 psi, while at 8 psi the flowrate is 0.52 gpm per 100 ft.

Figure 2. The controller, filters and pressure regulators (left) and detail of one pressure regulator (right)

I found the specs of Jain Irrigation Chapin Drip Tape on the manufacturer's website and I highlighted the specs of Randy's model in the table in Figure 3. Note that the flowrate in the table is expressed both gpm per 100 ft of tape and in gph per emitter. It's common for driptape to express the flowrate per 100 ft of tape. Since the emitters are spaced 8 inch, in 100 ft of tape (or 1200 inch) there are 1200/8= 150 emitters. Each of them has a flowrate of 0.26 gph at 10 psi so the cumulative flowrate for 100 ft of tape is 150*0.26 = 39 gph, that are the same as 0.65 gpm.

Spacing and Flow Rates

Spacing and Flow Rates

Spacing		Outlets/ 100 ft	Flow Rates at 10 psi				Flow Rates at 8 psi				CV	K	X
inch	cm		gpm/100ft	lph/100m	gph/outlet	lph/outlet	gpm/100ft	lph/100m	gph/outlet	lph/outlet			
2	5	600	2.00	1,488	0.20	0.76	1.60	1,190	0.16	0.60	1.79	0.073	0.42
4	10	300	1.00	744	0.20	0.76	0.80	595	0.16	0.60	2.40	0.070	0.53
4	10	300	1.33	989	0.27	1.01	1.06	792	0.21	0.80	1.30	0.083	0.47
4	10	300	1.80	1,339	0.36	1.36	1.44	1,071	0.29	1.09	2.50	0.001	0.54
6	15	200	0.25	186	0.08	0.28	0.20	149	0.06	0.23	4.60	0.023	0.60
6	15	200	0.30	223	0.09	0.34	0.24	179	0.07	0.27	3.50	0.032	0.53
6	15	200	0.40	298	0.12	0.45	0.32	238	0.10	0.36	2.04	0.030	0.61
6	15	200	0.50	372	0.15	0.57	0.40	298	0.12	0.45	3.40	0.052	0.47
6	15	200	0.65	484	0.20	0.74	0.52	387	0.16	0.59	3.00	0.071	0.47
6	15	200	0.85	632	0.26	0.96	0.68	506	0.20	0.77	1.72	0.090	0.42
6	15	200	1.00	744	0.30	1.13	0.80	995	0.24	0.91	4.40	0.017	0.49
6	15	200	1.33	989	0.40	1.51	1.06	792	0.32	1.21	2.00	0.117	0.50
8	20	150	0.40	298	0.16	0.60	0.32	238	0.13	0.48	3.70	0.111	0.45
8	20	150	0.50	372	0.20	0.76	0.40	298	0.16	0.60	1.60	0.064	0.49
8	20	150	0.65	484	0.26	0.98	0.52	387	0.21	0.79	2.10	0.081	0.51

Figure 3. The barely readable label (top) and specifications of Randy's drip tape (bottom).

"You see", I tell Randy, "if the first bed is operated at 12 psi, it will produce even more flowrate than 0.65 gpm/100 ft, and if the last one gets 8 psi, it produces only 0.52 gpm/100 ft, so you end up having to overirrigate plants in the first bed to get enough water to those in the last one." It all depends on how much pressure is lost through the ½ inch mainline that in this case, is also a lateral. When designing an irrigation system, it's very important that pipes and hoses lose little pressure because pressure uniformity results in distribution uniformity.

Typically, when I see ½ inch hoses in nurseries and greenhouses I cringe. It's almost always too small of a diameter, causing large pressure losses across the line and resulting in poor distribution uniformity. Contrary to popular belief, a small diameter line causes a larger pressure loss in an equal amount of length than a large diameter one. Another parameter strongly affecting the pressure loss is flowrate, with a larger flowrate causing more pressure loss.

I tell Randy that when the irrigation area covered is small, there are few emitters and thus the total flowrate travelling through the hoses is small. With a small flowrate, there are small pressure losses, even if the diameter of the lateral is small. "I'd like to measure the pressure" I tell Randy, "But I think you're doing a good job". Randy smiles, I can tell that he's proud of his creation.

Continued Pg. 8

"How could I improve it?" he asks. I hesitate for a minute. "Well, I haven't run the numbers to calculate the pressure loss, nor measured the pressure, but your design is kind of unusual. With this horseshoe shape (Figure 4), you have a mainline that is also a lateral... You're also forced to run all the beds at once; you don't have the flexibility to run some beds and not others. Additionally, your hose always carries the maximum flowrate; this causes larger pressure losses than if you split into two or four irrigation blocks, each with its irrigation lateral. In practice, I think that you're still in good shape, I don't want to confuse you with too many considerations."

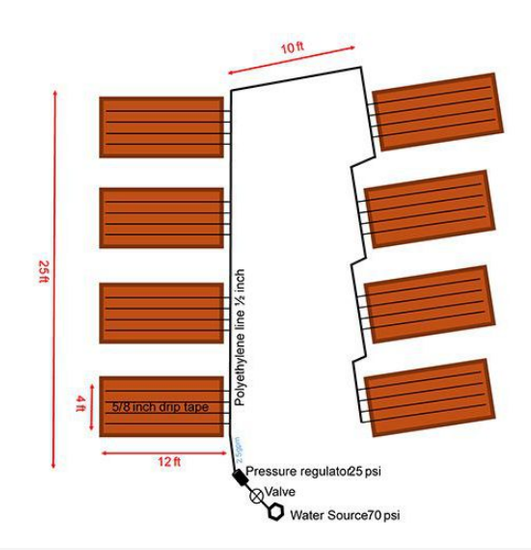

Figure 4. Randy's current "Horseshoe" layout

But Randy doesn't buy my dismissive way to find a way out of the hole I've dug myself into. "What do you mean by mainline and lateral?" he insists. I walk to the hose bib, and I trace lines on the ground with my boot. "Well, this could be your mainline, from the water source to this tee, then you put one valve on each side, and you have two laterals one per side, serving 4 beds each (Figure 5). This way each lateral carries half the flowrate than before, and you have the flexibility to run four beds independently from the other four, instead of all eight beds at once. The downside is that you need two separate controllers if you want automatic irrigation. They only cost about 30 dollars each, so it's not too bad. There is also a third option (Figure 6), and this is how we design large irrigation systems, but it's probably not worth it."

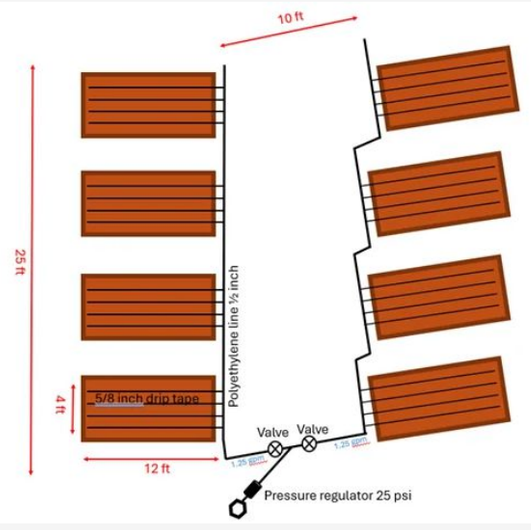

Figure 5. Proposed layout with four laterals

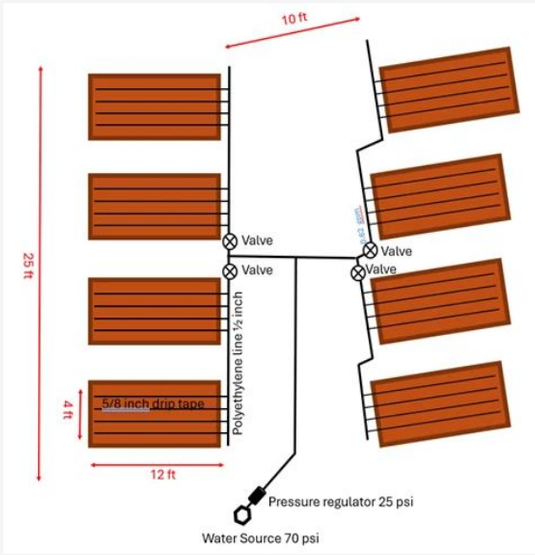

Figure 6. Proposed layout with two laterals

Another consideration has to do with the absolute value of pressure, not only the pressure differences. "You have really good tape, 15 mil refers to the thickness of the drip tape walls. The thickness of your dripline walls is 15 thousand of an inch. This is about as thick as you can buy for drip tape, generally the thicker the walls, the more durable the tape. Also, a 15 mil tape should withstand high pressures while a 5-mil tape may burst at 20 psi. Still, you may be running it at too high of a pressure, since the first bed is only three feet away from the 25 psi pressure regulator. You may need to swap it with a 12 psi regulator. Remember, the name of the game is that all your emitters should be exposed to a pressure of about 10 psi."

I drove home feeling uneasy. Did I unnecessarily confuse poor Randy with my inconclusive irrigation system design knowledge that he didn't even need? I ran to my computer and I frantically punched numbers into the excel spreadsheet with Hazen-Williams equation. That's the only thing that can save me from my demons now. I pasted the table on page 9 (Figure 7).

I calculated four scenarios per each irrigation system layout. The last column on the right calculates the total pressure loss through the lateral. Remember, we can only afford a maximum pressure loss of 4 psi, from the 12 psi of the proposed pressure regulator after each valve, to 8 psi in the last bed.

The first row for each scenario (in bold characters) represents Randy's current configuration, with four driplines per bed and a dripline with a flowrate of 0.65 gpm/100 ft. The next rows for each scenario calculate the pressure loss through the lateral if Randy had eight driplines per bed to get better coverage. Now he has four lines spaced 16 inches in a 48-inch bed. If he doubled the lines, the spacing would become about 8 inches, the same as the spacing of emitters on the line. I suggest this solution because raised bed substrate is often coarse and it's hard to get it uniformly wet. It has little wicking power and water just runs through.

The third and fourth row for each layout calculates the flowrate and pressure loss if Randy had bought the 1.50 gpm/100 ft tape instead of the 0.65 gpm/100 ft. The first one produces a larger flowrate and hence a larger pressure loss in the lateral. I didn't recommend this solution but I included it to illustrate the phenomenon of pressure loss.

Continued Pg. 9

	Nominal tape flowrate	Number of lines per bed	Bed length	Number of beds served by lateral	Flowrate in lateral	Lateral Length	Inside diameter	Total pressure loss through lateral
	gpm/100ft	#	feet	#	GPM	feet	inch	psi
	0.65	**4**	**12**	**8**	**2.50**	**60**	**0.5**	**1.8**
Figure 4, Horseshoe layout	0.65	8	12	8	4.99	60	0.5	6.6
	1.5	4	12	8	5.76	60	0.5	8.7
	1.5	8	12	8	11.52	60	0.5	31.3
Figure 5, Two laterals layout	**0.65**	**4**	**12**	**4**	**1.25**	**30**	**0.5**	**0.3**
	0.65	8	12	4	2.50	30	0.5	1.1
	1.5	4	12	4	2.88	30	0.5	1.4
	1.5	8	12	4	5.76	30	0.5	5.1
Figure 6, Four laterals layout	**0.65**	**4**	**12**	**2**	**0.62**	**13**	**0.5**	**0.0**
	0.65	8	12	2	1.25	13	0.5	0.2
	1.5	4	12	2	1.44	13	0.5	0.2
	1.5	8	12	2	2.88	13	0.5	0.8

Figure 7. Calculation of total pressure loss through the irrigation lateral for each of the irrigation system layouts described above.

The verdict is: Randy is fine, even with the current "Horseshoe" configuration. The current total pressure loss trough the 60 ft of horseshoe mainline/lateral is less than 2 psi. Randy only needs to swap the current 25 psi pressure regulator with a 12 psi one.

Just for instructional purposes, look at what happens with eight lines per bed, a tape with twice the flowrate, or both. In the "Horseshoe" layout, all these three options cause too much pressure loss (6.6 psi, 8.7 psi and 31.3). In the "Two laterals" layout, either eight lines per bed or the larger flowrate tape are possible, since each of them cause a pressure loss of a little more than 1 psi, but not both, that would cause a pressure loss of 5.1 psi. Finally, the "Four laterals" layout is the most forgiving and would allow even for eight lines with the large flowrate tape.

In conclusion, Randy is doing just fine. He got lucky, or maybe whoever recommended his design ran the numbers when designing it. In either case, before driving to the irrigation supply store and ordering hoses and drip tapes, please talk to us. We can help to design your irrigation system and sizing its components for you to save you time, water and money.

ABOUT THE AUTHORS

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What does Food Sovereignty mean and what does it currently look like in San Diego County?

Written By: Marisela Chávez, Indigenous Food Systems and Food Sovereignty Advisor

Food sovereignty asserts people's right to healthy, culturally relevant, and sustainably produced food—and their power to shape their own food and agriculture systems. First defined in 1996 by La Via Campesina, an international alliance of small-scale farmers and peasants, the concept gained global momentum at the 2007 Forum on Food Sovereignty. Rooted in movements led by communities historically pushed to the margins and harmed by neoliberal, market-driven food systems, food sovereignty responds to these impacts by promoting self-determination, protecting land, seeds, natural resources, and cultural heritage, and safeguarding the well-being of future generations. In practice, it strengthens community ownership, builds multi-level strategies for long-term systemic change, revitalizes ancestral and sustainable food practices, enhances ecological resilience, and improves community health and well-being.

Continued Pg. 10

On the ground, food sovereignty initiatives increase community ownership, build multi-level approaches for long-term change, strengthen ecological and climate resilience, and improve health and well-being:

- **Community ownership:** Communities lead and expand culturally relevant initiatives such as community gardens, urban farms, food cooperatives, farmers markets, food banks, and food pantries. They build local food system alliances and invest in circular economies, increasing economic empowerment and reducing dependence on external food systems and markets.

- **Multi-level approaches:** Communities and partners expand food production and access while addressing systemic barriers through policy. They coordinate with regional, national, and international coalitions to build collaborations and leverage resources for sustainable, long-term change.

- **Building ecological and climate resilience:** Stakeholders promote environmental sustainability by expanding agroecological and regenerative agricultural practices. They center land and resource stewardship—such as water conservation, drought-tolerant crop selection, and agroforestry—and leverage resources and technical assistance from natural resource management agencies, agricultural agencies, research institutions, and regional organizations.

- **Health and well-being:** Communities enhance nutrition and public health by increasing the availability of locally produced nutrient-dense foods. They develop and use community kitchens, food hubs, and build spaces to support community-led nutrition and wellness programs.

In San Diego County, these principles are reflected in community-led initiatives such as the Mesa Grande Tribe's Golden Eagle Farm, the New Roots Community Farm in City Heights where refugee and immigrant growers cultivate culturally preferred crops, and programs offered by People, Plants, and Community, an Oceanside-based nonprofit that nourishes plant-people-ecology relationships through ethnobotanical experiences. Local food cooperatives like Ocean Beach People's Food Co-op and the Foodshed promote local purchasing and circular economies. Multi-level collaboration appears in efforts like the San Diego Food System Alliance, which brings together nonprofits, policymakers, and producers to advance equitable food policies. Ecological resilience is strengthened through regenerative agriculture training at Escondido-based Garden 31 and Coastal Roots Farm in Encinitas. Health and wellness outcomes are supported by community kitchens and food hubs such as those within Kitchens for Good partnerships, Project New Village, and by distribution networks like the San Diego Food Bank and Feeding San Diego providing fresh, locally sourced produce to neighborhoods with limited access.

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FOOD SOVEREIGNTY INITIATIVES IN SAN DIEGO COUNTY

COMMUNITY OWNERSHIP

Community-led gardens like New Roots Community Farm, Golden Eagle Farm, and Plants, People, and Community

MULTI-LEVEL APPROACHES

Efforts like the San Diego Food System Alliance

BUILDING ECOLOGICAL AND CLIMATE RESILIENCE

Regenerative agricultural training at Garden 31 and Coastal Roots Farm

HEALTH AND WELL-BEING

Community kitchens and food hubs, including Project New Village and Kitchens for Good

Integrated Weed Management in Floriculture, Nursery, and Greenhouse Production

Written By: Matthew Fatino, UCCE Subtropical Crops Advisor in San Diego and Riverside Counties and Gerry Spinelli , Production Horticulture Advisor

Introduction

Managing weeds in ornamental plant production, whether in field soil, greenhouses, or container nurseries, can be challenging but is essential for successful, high-quality production. Weeds compete with crops for water, nutrients, and sunlight, and they can harbor pests and diseases that threaten ornamental and nursery plant health. In the ornamental industry, they can also reduce aesthetic value and marketability. Moreover, the presence of certain noxious weeds can prevent plants from being sold due to quarantine regulations.

Because of the high value of ornamental crops and the limited number of herbicides labeled for use, many growers rely heavily on hand weeding, which is labor-intensive and costly. However, utilizing a variety of integrated strategies—many adapted from vegetable and tree crop systems—can improve weed management while reducing labor costs and pesticide dependence.

The principles of Integrated Weed Management (IWM) in ornamental production emphasize combining preventive, cultural, mechanical, and chemical methods to suppress weeds effectively and sustainably. Preventing seed introduction, promoting crop competitiveness, and maintaining sanitation are central to successful programs. The following sections outline strategies for managing weeds across common production systems: field and container nurseries, including container-grown trees such as avocados and citrus, and inside greenhouses.

Figure 1. Weeds in potted ornamental agave for sale at a big box store

Integrated weed management for field-grown ornamentals

Prevention

Preventing weeds from establishing is the cornerstone of any effective program. Weed seeds may be introduced through infested stock plants, contaminated soil or organic matter, irrigation water, or windborne seed. Regularly treating nursery perimeters with herbicides or cultivation reduces external seed sources. Screens on water inflow systems can prevent aquatic weed seed contamination, though fine mesh screens require maintenance to prevent clogging. Weed seeds can also enter a production system through soil media, plant stock, or soil brought in on vehicles, equipment, or personnel. Utilizing a sanitation protocol, buying media and stock from reputable sources, and regularly cleaning equipment and personnel can help mitigate the introduction of new weeds into your production system.

Cultural and Mechanical Control

Cultivation is a foundational practice for field-grown ornamentals. Preplant irrigation to induce weed germination followed by shallow cultivation, or the use of nonselective postemergence herbicides, reduces the soil seed bank before planting. After planting, mechanical cultivation between rows or the use of preemergence herbicides can maintain weed-free conditions, and additional cultivation postharvest prevents seed production.

Mowing prevents seed production and limits the spread of windborne seeds but must be carefully timed. Repeated mowing without additional control measures can favor low-growing perennial grasses.

Flaming offers nonchemical control between rows but is limited by safety concerns, fuel costs, and potential crop injury.

Hand removal remains an integral practice, particularly for species escaping herbicides or mechanical cultivation, but it's cost prohibitive in many cases due to high labor costs.

Mulches and Soil Solarization

Synthetic mulches, including geotextiles and black plastics, are effective and widely used in field grown ornamental operations. They can be costly to purchase and install, but for high value ornamental crops and the potential long-term weed control, they can be quite efficacious in field-grown operations.

Organic mulches (bark, composted yard waste) suppress weed germination by excluding light. Fine mulches (2–3 inches deep) can be worked into soil postharvest to improve structure, while coarser mulches may require 3–6 inches for full suppression.

Soil solarization, the process of heating moist soil under clear plastic during hot months, can control many annual weeds by killing seeds near the surface. It is most effective in California's interior valleys during the warmest parts of the year, when soil temperatures can exceed lethal levels for weed seeds and soilborne pathogens.

Continued Pg. 12

Figure 2. Nurseries surrounded by open space suffer from heavy weed pressure. Hairy fleabane is a common late summer weed in our area.

Herbicides

Chemical tools remain an important component of weed management in ornamentals. Herbicides are generally classified as **preplant**, **preemergence**, or **postemergence** depending on timing relative to crop and weed growth. In general, it is easier to control a plant that is just germinating or starting to establish than an established, mature plant. A successful herbicide program often relies on the combination of preemergence and postemergence products, as a part of a larger integrated weed management program.

- **Fumigants or preplant herbicides** such as metam sodium (commercially known as "Vapam") or dazomet (commercially known as "Basamid"), are applied before planting and may be used to sanitize infested soil. Some special exemptions exist for the use of methyl bromide as a soil fumigant.
- **Preemergence herbicides** including oxyfluorfen, oryzalin, pendimethalin, and others prevent weed seed germination and are widely used in field and container nurseries (Table 1).
- **Postemergence herbicides**, such as clethodim or glyphosate, control emerged weeds but must be directed to avoid crop injury (pg. 15, Table 1).

Integrated Weed Management for Container Nurseries

Container nurseries, including those producing subtropical trees such as avocados and citrus, face unique challenges. Weeds can quickly reduce growth and vigor through competition with the crop plant and can be particularly problematic for slow-growing species that do not canopy quickly.

Sanitation and Site Preparation

An effective weed management program begins with sanitation. Weed-free growing areas, properly drained container pads, and the use of geotextiles, gravel, or concrete under containers prevent weed growth between pots and limit spread. Perennial weeds should be eradicated before nursery establishment, as they are nearly impossible to remove afterward.

Many producers find that the propagation area can be a major source for weed seeds to enter containers, making it a good place to utilize a sanitation protocol. Keeping the propagation area weed free can minimize potential contamination of downstream products.

Containers should be spaced tightly to minimize open ground, and perimeter vegetation should be controlled to prevent seed introduction. Common sources of contamination include liners, equipment, irrigation water, and stored potting media.

Figures 3. Examples of portulaca growing at the edge of the weed mat and also through it in areas where it was damaged by vehicle traffic (left) and a screenhouse with heavy weed pressure due to a thinning gravel groundcover.

Soil Mix and Fumigation

Although potting mixes are typically sterile at planting, they can become contaminated if stored uncovered. If weed contamination is suspected, fumigation, steaming, or solarization can be used. These practices have the additional advantage of controlling some pests and diseases.

Continued Pg. 13

Although potting mixes are typically sterile at planting, they can become contaminated if stored uncovered. If weed contamination is suspected, fumigation, steaming, or solarization can be used. These practices have the additional advantage of controlling some pests and diseases.

Steam treatment involves heating mix to at least 140°F for 30 minutes.
Chemical fumigants, such as dazomet or metam sodium, are effective but require specialized equipment and permits.
Solarization is a lower-cost alternative for smaller volumes or when fumigation is not feasible.

Some nurseries experience the challenge of wind borne weed seeds constantly being reintroduced into the nursery beds, particularly if they are surrounded by open space. One strategy is to topdress containers with a mulch layer of rice hulls that creates a barrier against establishment of wind-borne weeds. The rice hulls are also rich in silica, a nutrient associated with resistance to pests and diseases.

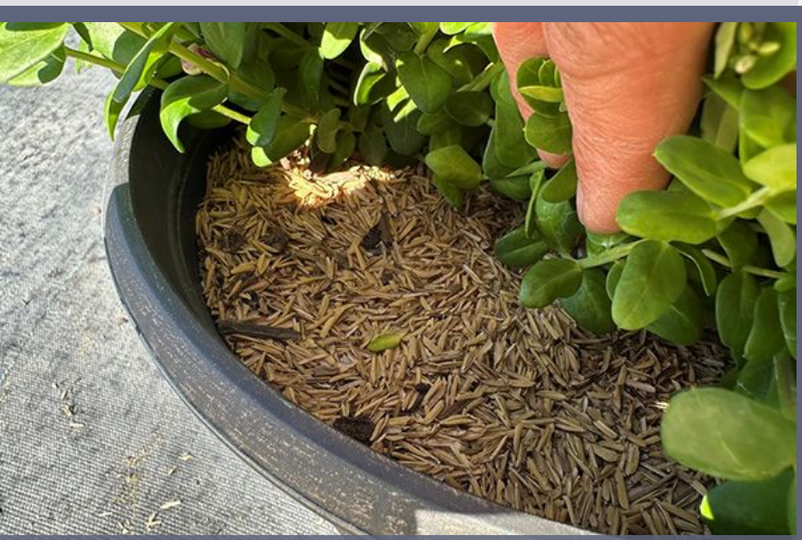

Figure 4. A nursery container topdressed with rice hulls

Herbicide Use in Containers

Preemergence herbicides are used to prevent weed establishment in containers and can greatly reduce hand weeding time and labor costs as a result. Preemergence herbicides are active between weed seed germination and emergence from the soil, so good placement in the substrate or media at the correct time are crucial for efficacy. Applications are typically made one or more times per year, incorporated/activated by rain or irrigation, and then supplemented with hand weeding. Herbicide safety and efficacy depend on several factors: plant age and establishment, herbicide formulation, soil composition, and environmental conditions. Runoff management is critical to prevent off-site contamination. Spot treatments, reduced water volumes, and careful calibration, all help minimize loss and injury risk to the crop plant. It is recommended to apply broadcasted applications of preemergence products on a conveyor belt or trailer where excess prills can be collected. Applications should be made at the soil line.

Figure 6. Out-of-control weed problem in a succulent nursery that relies only on hand weeding.

Monitoring and Hand-Weeding

Regular monitoring is vital since many nursery weeds—such as bittercress, liverwort, creeping wood sorrel, and pearlwort—can flower within weeks. Monthly inspections and immediate hand-removal of escapes prevent reseeding and the development of a weed seedbank.

Figure 5. Hand application of sodium bicarbonate to control liverwort

Integrated Weed Management Inside Greenhouses

Weed management inside greenhouses requires a distinct approach due to enclosed conditions and sensitive crops. Only one preemergent herbicide, indaziflam, trade name Marengo, is registered for use, and only beneath benches or on floors. Post-emergent herbicides include diquat, glufosinate, glyphosate, and pelargonic acid (pg. 15, Table 2).

Common Greenhouse Weeds

Common greenhouse weed species in Southern California include annual bluegrass, common chickweed, creeping wood sorrel (Oxalis), bittercress, liverwort, moss, nettles and pearlwort. These species thrive under high moisture and nutrient conditions typical of greenhouse environments and can act as reservoirs for insect pests and pathogens.

Continued Pg. 14

Figure 7. A nettle weed introduced into a greenhouse by propagative materials

Figure 8. Examples of weeds harboring other pests. Spurge (Euphorbia) can harbor powdery mildew (left) and Sonchus can harbor aphids (right).

Cultural Control and Sanitation

Sanitation remains the most economic and effective strategy. Weed seeds may enter via infested potting mixes, plant material, or contaminated tools, pots, or personnel. To prevent establishment:

- Hand-weed frequently - weekly or even daily - to prevent seed set.
- Sweep or wash concrete floors regularly.
- Between crop cycles, thoroughly clean benches, walls, and irrigation tubing to remove residual seeds.

Moisture management is also critical: Ensure adequate drainage under benches and reduce standing water, as excessive moisture favors moss and liverwort growth. Increasing air movement near the floor helps reduce humidity and suppress weed development.

Herbicide Use in Greenhouses

Indaziflam can be applied beneath benches and on floors for long-term preemergence control, but not in pots. For postemergence control, directed applications of diquat, glufosinate, glyphosate, or pelargonic acid may be used under benches or along walkways. These should be applied carefully at low pressure and large droplet size to minimize drift, with fans turned off during application.

Conclusions and Take-Home Messages

An integrated approach to weed management in ornamental plant production combines prevention, sanitation, cultural practices, and targeted herbicide use. By emphasizing sanitation and site design, growers can prevent many weed problems before they start. Regular monitoring, timely cultivation, and mulch applications reduce the weed seed bank and improve overall crop health.

In container and greenhouse systems, maintaining clean growing media, preventing moisture accumulation, and implementing hand-weeding schedules are essential. When herbicides are used, label adherence and calibration are critical for both efficacy and safety. Always read and follow the herbicide label.

For more detailed information, consult the **UC IPM Floriculture and Ornamental Nurseries** Weed Management pages and the **UC ANR Pest Notes**.

***Table below continued on pg. 15**

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TABLE 1. HERBICIDES REGISTERED FOR USE IN CONTAINER AND FIELD-GROWN TREES AND SHRUBS

COMMON NAME	EXAMPLE TRADE NAME	RE-ENTRY INTERVAL (HRS.)	PRE-HARVEST INTERVAL (DAYS)	COMMENTS
Dichlobenil	Casoron 4G	12	NA	Dormant-season use; controls many perennials such as mugwort. Not for container-grown ornamentals.
Dimethenamid-P	Tower	12	NA	Mix with isoxaben or pendimethalin for broader control. Safe on well-rooted plants.
Flumioxazin	Broadstar, Sureguard	12	NA	Provides moderate liverwort control; avoid contact with young foliage.
Indaziflam	Marengo G	12	NA	Long residual; safe on many ornamentals; irrigate immediately.
Isoxaben	Gallery SC	12	NA	Excellent on broadleaf weeds; often mixed with oryzalin or trifluralin.

TABLE 1. HERBICIDES REGISTERED FOR USE IN CONTAINER AND FIELD-GROWN TREES AND SHRUBS				
COMMON NAME	**EXAMPLE TRADE NAME**	**RE-ENTRY INTERVAL (HRS.)**	**PRE-HARVEST INTERVAL (DAYS)**	**COMMENTS**
Napropamide	Devrinol DF-XT	24	NA	Good grass control; requires incorporation by irrigation or rainfall.
Oryzalin	Surflan AS	See Label	NA	Broad-spectrum grass and broadleaf control; safe for many ornamentals.
Oxadiazon	Ronstar G	12	NA	Long residual; not for conifer nurseries; effective in fall or spring.
Oxyfluorfen/ Pendimethalin	OH2	24	NA	Broad-spectrum preemergence control; water-in immediately.
Prodiamine/ Oxyfluorfen	Biathlon	See label	NA	Good broad-spectrum combination with moderate persistence.
Clethodim	Envoy Plus	24	NA	Selective grass control, including annual bluegrass.
Glyphosate	Roundup Pro	4	NA	Nonselective systemic herbicide; use as directed spray only.
Glufosinate	Finale	12	NA	Nonselective contact herbicide; limited systemic activity.

Always read the label and consult with your local pest control pest control advisor or supplier

TABLE 2. HERBICIDES REGISTERED FOR USE INSIDE GREENHOUSES				
COMMON NAME	**EXAMPLE TRADE NAME**	**RE-ENTRY INTERVAL (HRS.)**	**PRE-HARVEST INTERVAL (DAYS)**	**COMMENTS**
Indaziflam	Marengo	12	NA	Only preemergence herbicide registered for greenhouses; use under benches and on floors.
Diquat	Reward	24	NA	Contact herbicide; apply at low pressure and avoid drifting to crops.
Glufosinate	Finale	12	NA	Directed spray for under benches or greenhouse floors; avoid green tissue contact.
Glyphosate	Roundup Pro	4	NA	Spot treatment under benches and walkways; use low pressure, large droplets.
Pelargonic Acid	Scythe	12	NA	Contact herbicide for young weeds under benches or along edges.

Always read the label and consult with your local pest control pest control advisor or supplier

Climate Action and Land Equity (CALE) Update

Equitable Land Access in Action: Partner Plans & Resources Virtual Event

Took place December 12th, 2025, Hosted by UCCE San Diego in partnership with American Farmland Trust

This virtual event brought together partners to share upcoming outreach efforts, community-based plans, and new resources aimed at advancing equitable land access in Southern California. Participants learned from CALE subawardees, explored new tools, and shared insights to help shape future outreach supporting diverse farmers, ranchers, and land stewards across California.

Did you miss the meeting? Use the QR Code and watch the video here!

Visit the CALE website: **https://bit.ly/3MGl4wD**

Calendar

Stay up-to-date with seminars, webinars, trainings, events, and more!

DECEMBER

PRINCIPLES OF IRRIGATION WORKSHOP W/ GERRY SPINELLI

December 22, 9:00 AM to 11:00 AM

Farm Bureau Conference Room, Virtual

https://ucanr.zoom.us/j/94488484535?pwd=Dhy39vZR3jkhhTLvZrPl17axxbH2c5.1

JANUARY

LAST WEDNESDAY MEETING

January 28, 2026 7:30 AM to 8:30 AM

Farm Bureau Conference Room, Virtual

FEBRUARY

SMALL-SCALE URBAN AGRICULTURE PRODUCTION

February 11, 2026 Time: TBA

Carlsbad Flower Fields

APRIL

2026 LANDSCAPE PROFESSIONALS IPM WORKSHOP

April 02, 2026 Time: TBA

JULEP Venue

Extension Connection

We hope you have enjoyed this issue of the Extension Connection!

We will continue bringing you the latest news from UC Cooperative Extension San Diego, and we would also like to hear from you.

What Do You Think?

TAKE OUR SURVEY

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