Extension Connection

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INTRODUCTION FROM OUR

County Director

Dear Readers,

We hope you all had a good holiday season and are looking forward to this new year! When I planned what to include in this quarter's County Director's message, the fires and devastation in the Los Angeles County area had not yet started. We have been fortunate in San Diego County to escape much of what is going on to the north of us, but because the two previous years were high in rainfall, the vegetation all around Southern California is very dense and creates a high fire risk we cannot ignore in our area. Please take precautions to protect yourselves and your property from the extreme risks that wildfires can pose as we go through this fire season.

We would like to mention some new developments in the office. We are hiring two new advisors—one who will be working in the area of Indigenous Food Systems in the San Diego area, and one who will be a Subtropical Horticulture Advisor. The Indigenous Food Systems Advisor position is new to San Diego and is part of a group of advisors around the state who focus on Indigenous Peoples' issues. The Subtropical Horticulture Advisor fills a similar position that was vacated a couple of years ago and will focus on avocado, citrus, and other subtropical crops. These positions are welcome and needed additions to the San Diego staff. The two new advisors will join a few long-term and several recently hired advisors as we work to fully staff our San Diego office.

Also, a quick update on our Master Gardener program. Just this week, we started the new 2025 Master Gardener class. Potential Master Gardeners apply to the program, and fifty new volunteers are selected every other year to participate in a 19-week, rigorous training that covers a large number of topics related to home gardening. Many speakers and instructors will provide information to the new volunteers, and once they graduate from the training, they will be part of the overall Master Gardener program at UCCE in San Diego County. Master Gardeners must complete volunteer hours each year and also continue to update their knowledge of gardening and associated topics through continuing education each year. Our current total number of Master Gardener volunteers is 354, and last year, this group provided 35,000 hours of volunteer time to the community of San Diego. This is a robust and engaged group with many volunteers who have participated in the program long term. We would like to thank Master Gardener Coordinator Leah Taylor, as well as those who assist in managing the program, for their efforts in organizing and maintaining this important group.

Thanks for your continued support of our program. Wishing you the best for 2025!

Val and Ramiro

Co-County Directors

Urban Agriculture Update

Written By: Eric Middleton

Can people grow high-value crops in urban lots and produce enough to sell for profit? For most of 2024, our urban agriculture project funded by a grant from USDA NIFA has been trying to answer this question when it comes to growing blueberries and turmeric/ginger in Southern California. We are testing different plant varieties, soil mixes, fertilizers, and growing conditions to see which are most conducive to produce on a small-scale in urban settings. Our trials are scaled to fit in vacant lots or even backyards with the end goal of creating a start-to-finish production guide for small-scale farmers who would like to grow in urban areas.

We finished setting up our experimental site at the Carlsbad Flower Fields in early 2024. The site consists of a total of 6 high tunnels and 6 corresponding outdoor growing areas with 3 high tunnels and 3 outdoor areas used for blueberries; the other half was used for turmeric and ginger **(Figure 1)**. We have been gathering yield data from the blueberries and measuring growth of the turmeric and ginger, as well as monitoring for pests on all crops.

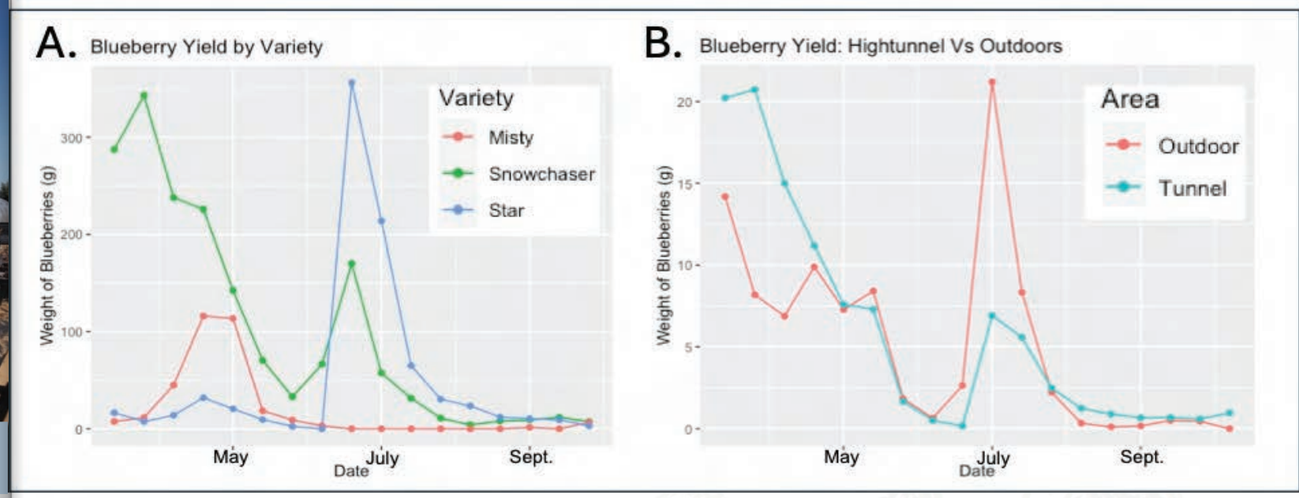
So far, the most interesting results are from the blueberry crop. We're growing 3 main varieties of blueberries: 'Snowchaser', 'Misty', and 'Star', which were expected to fruit in early, mid, and late season, respectively. We found that 'Snowchaser' indeed produced more in the early season and consistently yielded more fruit than 'Misty' **(Figure 2)**. 'Star' took a while to get going and had a sudden highly productive peak around July before going back to being mostly fruitless. There was little difference in yield between plants grown inside high tunnels and those grown outside, aside from 'Star' plants that seemed to be more productive outdoors than in the high tunnels. From this first year of data, it looks like 'Snowchaser' was a more reliable variety, while 'Misty' was not very productive, and 'Star' was hit or miss depending on timing and growing conditions. Additionally, high tunnels don't seem to affect yield much overall. However, future years should tell us more about the reliability and productivity of these varieties.

Fig. 1. The urban agriculture demonstration site, with open-field blueberry plots in the foreground and high tunnels housing blueberries and turmeric/ginger in the background.

While high tunnels didn't seem to strongly affect blueberry yield, they did have a noticeable impact on pest pressure **(Figure 3)**. The two main pests we encountered were aphids and light brown apple moth (LBAM) caterpillars. Aphids had a mostly negligible impact on plant health, while LBAM caterpillars damaged developing fruit and new leaves. LBAM caterpillars were noticeably more common inside high tunnels and caused more damage to high tunnel plants. Aphids followed this same trend, but to a lesser degree. Pest pressure also varied by blueberry variety: 'Snowchaser' had more LBAM caterpillars than either 'Misty' or 'Star', and 'Misty' had more aphids than the other two varieties. Taken together with our current yield data, high tunnels seem to increase pest pressure but not yields, making it unlikely that they are a worthwhile investment for growing blueberries.

In the coming years of this project, it will be interesting to see if the trends we saw continue and to see how much blueberry production increases. While our plants did produce fruit, yield was overall low and at most we harvested a clamshell or two of blueberries per week from all of the plants combined. As the plants continue to grow, our harvests should also increase.

Data on our turmeric and ginger is still very preliminary, as we haven't yet harvested this crop. Overall, though, they are growing poorly

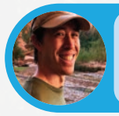


when compared to the blueberries. Neither the ginger or turmeric plants began growing many leaves until early summer and have remained small overall. However, plants inside the high tunnels did begin growing earlier and are now noticeably larger and healthier looking than the plants outside. Both turmeric and ginger like heat and humidity, and since we are growing close to the coast where temperatures stay cooler, it makes sense that insulation from the high tunnels allowed the plants to grow better than those outdoors. Pest pressure on both ginger and turmeric has been low, with only a few spider mites showing up. The ginger and turmeric were harvested in December, after this article was written and data analysis, still to be conducted, should tell us more about how well the plants fared ultimately.. For now, though, it appears that cool coastal conditions inhibit turmeric and ginger growth.

Finally, we have also been gathering data on how much everything cost, and how much time it took us to set it all up. This is very important data for anyone trying to grow these crops on their own and ultimately make a profit. While all the plants are now growing with very few inputs from us, the amount of cost and labor upfront setting up high tunnels and preparing for plants was impressive. Each of the high tunnels we built from commercially available kits ended up costing more than $2,000 each, and it took weeks to set them all up in the hard soil at our experimental site. We haven't done an economic analyses yet, but the cost and labor that additional infrastructure requires may make it prohibitive for both small-scale and urban growers.

As our project progresses, we'd also like to test other methods of growing high-value crops, like producing leafy greens in simple Kratky hydroponic setups. This will give us valuable information on another cheap and hopefully simple method for producing high-value crops. At the end of the day, growing on a small-scale in urban settings is difficult, and the more we can determine what works and what is and isn't worth the time and money, the more this work can benefit growers.

Stay tuned for future results and check out our website at https://ucanr.edu/sites/socalIPM/Small_Scale_Urban_Agriculture_Project_/ for more information on the project!



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How to size a polyethylene line for drip or spray stake irrigation

Written By: Gerry Spinelli and Natalie Levy

Deciding the diameter of polyethylene line for online drippers or spray stakes is a challenge. We see all sorts of creative solutions, mostly based on what the irrigation supplier has available in stock, on gut feeling, or on whatever grandpa used to do. In this article we will try to give some tips about the factors that should affect this choice. While we focus on ornamental production, these concepts apply to all forms of agriculture.

Why do I care?

What diameter should you buy? Half inch or three-quarter inch? How about one or two inches in diameter? Smaller is always cheaper and easier to transport and install, however, the main consideration is more about how much pressure loss occurs across the line. This is important because the volume of water produced in time by a drip emitter, or a spray stake is a function of the pressure in the line. In other words, if you have a small diameter dripline and too much pressure loss across it, the first plant of the line will receive a lot of water during your irrigation and the last one not enough. Your irrigator will be forced to irrigate longer, and you will create leaching, runoff, loss of fertilizer, and difficulty complying with water quality regulations.

How do I pick a diameter that gives a small pressure loss across the line?

Pressure loss across an irrigation mainline is a function of: the length of the line (the longer, the more pressure is lost across it); the flowrate (the higher flowrate, more pressure loss); the material (between PVC and polyethylene); and the diameter (smaller diameter, greater pressure loss). I know it is hard to accept this last point, and many of you think that a small diameter "squishes" the water and increases pressure, but that is not true. The opposite is true: a small diameter pipe causes a larger pressure loss than a large diameter pipe of the same length, material, and flowrate. Please contact Gerry for a personalized live demonstration of this phenomenon.

There is an equation called Hazen-Williams that allows you to calculate the expected pressure loss through a mainline based on length, diameter, flowrate, and material. You can download a spreadsheet with the equation by scanning this QR code or by clicking here. However, in a mainline the flowrate is the same at the beginning and at the end because we assume that the mainline doesn't have any outlets. In a dripline, at each plant, there is an emitter that takes some of the flowrate out of the line. Therefore, the first section of the dripline carries the flowrate needed by all the emitters in the line, while the last section carries only the flowrate needed by the last emitter.

How does a dripline differ from a mainline?

Since a dripline carries less flowrate than a similar mainline with the same length, diameter, and initial flowrate, it loses less pressure across it. This is good news for us because less pressure loss means greater pressure and greater irrigation volume applied to each plant. But how do you calculate the pressure loss across the dripline? You could spend two hours calculating a Hazen-Williams equation for each section between each emitter of the dripline, inputting for each section the corresponding ever-decreasing flowrate (and as I did, as a young irrigation student filled with hope). But luckily you don't have to, because there is a trick that you can use. If there are more than 10 emitters (there usually are), then the pressure loss is 40% of what it would be in a mainline of similar characteristics. If there are more than 40 emitters, the pressure loss is 37% of a mainline; and if there are more than 100 emitters, the pressure loss is 36%. However, I always use 40% to conservatively estimate the pressure loss, and in this article, we'll use 40% everywhere.

	Emitter Spacing	Line Length	Emitters per line	Nominal emitter flowrate		Initial Line flowrate	Polyethylene Roughness Coefficient	Line Inside Diameter	"Mainline" pressure loss	Drip line pressure loss (40% of mainline)
	feet	feet	#	gph	gpm	gpm	from table	inch	psi	psi
Emitters 1/2"	5	300	60	2	0.03	2	145	0.5	14.3	5.7
Emitters 3/4"	5	300	60	2	0.03	2	145	0.75	2.0	0.8
Emitters tight spacing 1/2"	1	300	300	2	0.03	10	145	0.5	281.7	112.7
Emitters tight spacing 1"	1	300	300	2	0.03	10	145	1	9.6	3.9
Spray Stakes 1/2"	5	300	60	15	0.25	15	145	0.5	597.0	238.8
Spray Stakes 1"	5	300	60	15	0.25	15	145	1	20.4	8.2

Table 1. *Calculations from Hazen-Williams equation*

Can you show some examples?

For example **(Table 1)**, if we have a 300-ft line with plants spaced 5 ft and one emitter per plant, like the outdoor protea producer in **Figure 1**, we'll have 60 emitters per line. If each emitter puts out 2 gph, then the beginning of the line has a flowrate of 120 gph or 2 gpm. With a ½" polyethylene line, we get a pressure loss of 14.3 psi, but since this is a dripline (with outlets) and not a mainline, then the pressure loss is only 40% of that, which is 5.7 psi. This is a borderline acceptable pressure loss: one could design the irrigation system so that the first emitter is exposed to 12.7 psi (a bit high) and the last one to 7 psi (a bit low) and the distribution uniformity will be even. If the grower uses pressure compensating emitters, this would be an acceptable solution. But look what happens if we install a ¾" line: the pressure loss is now 0.8 psi, meaning that even standard non-pressure compensating emitters would irrigate very uniformly, which are cheaper and clog less than the pressure compensating ones.

Fig. 1. *A half-inch dripline for outdoor field floriculture in San Diego County.*

Can you share more examples?

Here's another one. What if I'm in an outdoor container nursery and I'm growing 1-gal containers on driplines with one plant every foot like in **Figure 2**? With the same 2-gph emitters and a ½" line, I get a pressure loss of 113 psi!!! This is because the beginning of the line is now carrying 10 gpm, instead of 2 gpm like in the example before. In this situation I would need a 1-inch diameter line, to drop the pressure loss down to 4 psi **(Table 1)**.

Fig. 2. *Drip-irrigated 1-gal containers in an outdoor nursery in San Diego*

Finally, let's see what happens with spray stakes that produce larger flowrates than drippers. Going back to the 5 ft spacing, for example to irrigate the 48-inch boxes in **Figure 3** with the very popular black Spot Spitters, we will have 15 gpm at the beginning of the dripline and a pressure loss of 238 psi across it. Even with a 1-inch line the pressure loss is still 8.7, which is borderline acceptable. In this case, the recommendation here would be to split the line into two 150 ft sections or to install a 2-inch dripline.

Fig. 3. Spray stakes are popular for irrigating large containers

Remember, the larger the number of emitters and the emitter flowrate, the larger the pressure loss in the line. This is also why the intuitive solution of adding another spray stake when they don't get enough water out of the line is counterproductive: it will cause more flowrate through the line and increase the pressure loss even more. *Just get a larger diameter polyethylene line!*

Finally, one could choose a dripper or a spray stake with a smaller nominal flow rate. This, all things being equal, would cause a smaller pressure loss across the line, but it would require a longer irrigation duration to produce the same volume of water. Some operations are limited by available time to irrigate, particularly in summer during peak irrigation demand, and this is why this solution is not always feasible.

What if I have pressure compensating emitters?

If you have pressure compensating emitters, that's a good thing, since they will produce the same volume of water in time regardless of the pressure in the dripline. However, this is only true within a pressure range (for example, the popular Netafim WPCJ are recommended between 10 and 58 psi), and any emitter will produce zero water volume at zero pressure. So, if the pressure at the beginning of the line is 58 psi, and the pressure loss across the line is 113 psi like in example #2, pressure compensating emitters are not going to help you much.

The bottom line is a small diameter dripline may seem cheaper but often it means irrigating less uniformly. You need to consider the number of emitters, nominal flowrate of each emitter, and line length to adequately size the line diameter. Pressure compensating emitters always help if the pressure is too high, but not if the pressure is too low. Also, they clog easily (so you need a filter after each block valve), are relatively expensive, and may achieve the same result (or better) by instead installing a larger diameter line or smaller flowrate emitter.


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Holiday Food Safety Tips: Keep Your Festive Meals Safe!

Written By: Leah Taylor (Master Food Preservers)

As we gear up for the holiday season, it's time to enjoy delicious meals and gatherings. To ensure everyone stays safe, here are some essential holiday food safety tips: ***(Con'd Pg. 8)***

1. **Keep It Clean:** Wash hands, utensils, and surfaces frequently while preparing food. This reduces the risk of cross-contamination from raw meats or unwashed produce.

2. **Cook Thoroughly:** Use a food thermometer to make sure all meats are cooked to safe temperatures. Poultry should reach at least 165°F, while beef, pork, and lamb should be cooked to 145°F.

3. **Safe Storage:** Refrigerate leftovers within two hours of serving. Storing food promptly at 40°F or below slows bacterial growth and keeps leftovers safe for later enjoyment.

4. **Mind the Buffet:** If you're hosting a buffet-style meal, keep hot foods hot (140°F or above) and cold foods cold (40°F or below). Consider using warming trays and ice baths to maintain safe temperatures.

5. **Reheat Right:** When reheating leftovers, bring them up to 165°F. This extra step ensures any bacteria that may have formed during storage are eliminated.

Taking these simple precautions can help make your holiday celebrations joyful and safe. Enjoy a delicious, worry-free season!

Here is an easy dish and recipe to share at your holiday gathering: Chutneys are easy to dress up and make wonderful gifts!

Cranberry Chutney

Ingredients:

(Makes 6 half-pints)

- 3 cups fresh or frozen cranberries
- 1 ¼ cups finely chopped onion
- 1 ¼ cups chopped, candied pineapple
- 3 cloves garlic, minced*
- 2 tablespoons fresh gingerroot, minced
- 1 teaspoon grated orange zest
- ¼ cup freshly squeezed orange juice
- 1 cup red wine vinegar
- 1 ½ cups granulated sugar
- 1 cup golden raisins
- 1 cup water
- 1 teaspoon dry mustard
- 1 teaspoon ground cinnamon
- 1 teaspoon ground cloves
- ½ teaspoon cayenne pepper

In a large, stainless-steel saucepan, combine cranberries, onion, pineapple, garlic, gingerroot, orange zest, orange juice, and vinegar. Bring to a boil over med-high heat, stirring occasionally. Reduce heat to a gentle boil and cook till cranberries become soft and burst, about 15 minutes. Add sugar, raisins, water, mustard, cinnamon, cloves, and cayenne pepper. Boil gently, stirring frequently, for about 15 minutes. The mixture should be slightly runny and will thicken when cooling. Ladle hot chutney into hot jars, leaving 1/2 inch headspace. Remove air bubbles and adjust headspace, if necessary, by adding more hot chutney. Place lids and rings on jars, tightening rings only finger tight. Process for 10 minutes in a boiling water bath. Adjust for altitude, if necessary. Variation: replace garlic with 1 tablespoon prepared horseradish (idea from justtherightsize.blogspot.com)

Recipe source: "Ball Complete Book of Home Preserving"

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Left: Kim Holmes and Saoi Sope at a National 4-H Week event in San Diego

Right: San Diego County Administration Center lit in 4-H's iconic green color

San Diego Goes Green for 4-H Week

Written By: Rob Padilla

In August, California House Resolution 119, authored by Assembly Member Cecilia Aguiar-Curry, officially recognized October 6–12 as National 4-H Week. To celebrate this milestone, the San Diego County Board of Supervisors welcomed the San Diego 4-H Program to their meeting that week, honoring the program's impactful work in the community.

During the meeting, 4-H youth had the opportunity to practice their public speaking skills as they accepted a proclamation on behalf of their county clubs. Dressed in their signature 4-H whites, members of all ages shared heartfelt stories about what 4-H means to them. They spoke passionately about experiences like 4-H camp, archery, livestock projects, baking, and how the program fosters a sense of community and lifelong friendships.

San Diego County also marked National 4-H Week with a special lighting ceremony on October 8. At sunset, the County Administration Center was illuminated in 4-H's iconic green, symbolizing over a century of youth development in the region. A special thanks to Supervisor Joel Anderson and the board members for their support, and a shoutout to Anderson's staff for ensuring the Admin building was lit green in honor of the occasion. Kimberly Sinclair Holmes, the statewide director of California 4-H, attended the event to commemorate the occasion.

Several San Diego 4-H members expressed their gratitude by writing heartfelt thank-you notes to their elected officials for the recognition.

Below you'll find addtional information about the 4-H Proclamation event, held on October 8, in San Diego.

See 9:22-9:29 at https://sdcounty.granicus.com/player/event/2075?view_id=9&redirect=true

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Meet the Team

Get to know the people behind Cooperative Extension San Diego!
Each issue we like to highlight some members of our amazing team.

Meet our Advisor

Gerardo Spinelli, Phd.
Production Horticulture Advisor

Gerardo (Gerry) Spinelli is the Production Horticulture Advisor serving the Nursery and Floriculture industry in San Diego. He conducts research, extension, and education to enhance the industry's profitability while conserving natural resources and ensuring regulatory compliance. San Diego's Nursery and Floriculture industry ranks first in California for sales volume and second in the United States.

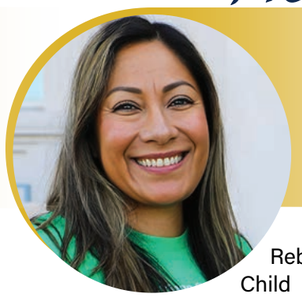
Gerry's main interests are irrigation management and water quality, critical issues for growers due to high water costs and regulatory pressures. Nitrogen management is another focus, given its close link to water use and its environmental impact.

Invasive pests are another pressing challenge for the industry. With large volumes of ornamentals moving between states, especially from Florida and Hawaii, San Diego faces significant exposure to these threats.

Gerry is also engaged in issues unique to San Diego, such as urban agriculture, horticulture in rural-urban interfaces, and addressing food deserts in low-income areas. Urban development encroaching on rural spaces raises costs for land and water, adding to growers' challenges.

Despite these pressures, San Diego's Nursery and Floriculture growers have demonstrated resilience, adapting practices to remain competitive. Gerry's focus is on developing research and extension programs to help the industry address current and future challenges effectively.

Meet our Staff



Rebeca Manzo
4-H Program Manager

Rebeca began her career as a Child Development Counselor at the San Diego Center for Children, focusing on ensuring the safety of children through crisis interventions, supporting treatment plans, and building therapeutic alliances with troubled youth. She then transitioned into the criminal justice field, joining GEO Reentry Services. Over 13 years, Rebeca advanced from an entry-level Client Services Specialist to Case Manager, Aftercare Coordinator, and finally Program Manager. As a contractor for the California Department of Rehabilitation, she managed operations as a Program Manager. At GEO, Rebeca oversaw internal operations, fostered customer relationships, reduced recidivism through evidence-based programs and curricula, managed sobering houses, and conducted monthly audits to ensure program fidelity.

Believing in the potential for change given the right opportunities and environment, Rebeca enjoyed her career in rehabilitation. She has now shifted her focus to youth development and is excited to serve as the new Community Education Specialist 2 for the 4-H Program. In this role, she aims to create a safe and positive learning environment, deliver high-quality programs, and promote the program to help establish more clubs.

Rebeca was the first in her family to graduate from college. She holds an associate degree in sociology from Southwestern Community College and a bachelor's degree in criminal justice from San Diego State University.

2024

Calendar

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

JANUARY

LAST WEDNESDAY GROWERS MEETING
- January 29th, 7:30AM to 8:30AM
- Hybrid, San Diego County Farm Bureau

AGRITOURISM GATHERING AND WORKSHOP: BUSINESS PLANNING BASICS
- January 27th, 9:00 AM to 12:30 PM
- San Diego County Farm Bureau/Ag Hub
  https://ucanr.edu/sdagritourismgathering

FEBRUARY

AGRITOURISM WEBINAR SERIES
- February 10th and 24th, 11:00 AM - Noon
- Online
  Details coming soon

MARCH

AGRITOURISM WEBINAR SERIES
- March 10th and 24th, 11:00 AM - Noon
- Online
  Details coming soon

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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