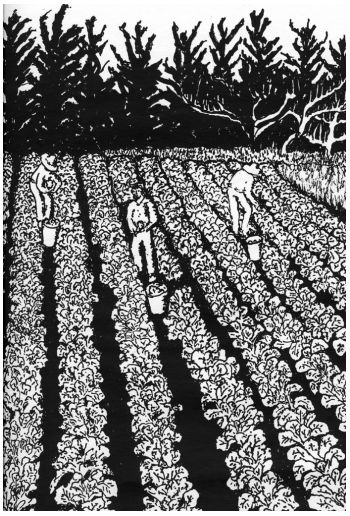

Forrest Cook

News & Notes of the UCSC Farm & Garden

Issue 167, Winter 2021

Armchair Garden Planning

—by Delise Weir

"A garden is half-made when it is well planned. The best gardener is the one who does the most gardening by the fire in winter..."
—Liberty Hyde Bailey

As with most endeavors, a little planning goes a long way towards success, and envisioning your future vegetable garden is no exception. Whether you're new to growing vegetables, in a new gardening space, or just looking to increase your efficiency and yield, it's helpful to review the basics of site selection, soil management, plant selection and timing. Only once you've determined the site, layout, and available hours of daylight in your growing space can you make informed choices about types and varieties of vegetables to plant.

Consider Your Goals

Most of us are spending unusual amounts of time at home these days and many of us need to economize. Consider your objectives for growing: Are you planting to reduce the family grocery bill? Are you planting for your own physical and mental health? Are you planting to improve your home patch of the planet? Your reason for starting a garden will influence what you plant.

Consider Your Growing Space

Sunlight and Site Selection

Whether you have a garden in production now or are starting from scratch, it makes sense to periodically re-visit the sun, soil and orientation of your planting space. For many small space gardeners, hours of direct sun is limited due to shade from nearby trees and buildings. Most vegetables require six to eight hours of direct sun a day to thrive, so it's important to plan accordingly.

The best time to start planning your garden is around the time of the winter solstice, when the sun is low on the horizon. Begin by mapping your garden area on graph paper, with one square on the graph paper translating to one square foot of space in your yard. Measure overall space including pathways and borders. Using a compass or an application on your phone, mark the north, south, east, and west coordinates on your map. Then, observe your yard and record how much sun each mapped section of your yard or community garden plot gets each hour.

You'll end up with a table like this:

Area	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
Back Yard	Shade	Shade	Partial shade	Sun	Sun	Sun	Sun	Sun	Sun	Sun	Sun
Front Yard	Sun	Sun	Dappled shade	Dappled shade	Partial shade	Partial shade	Shade	Shade	Shade	Shade	Shade

Since the sun is lowest in the sky on the winter solstice, this method will indicate your persistently sunny spots. If your sun is best on a deck or patio, consider container gardening. If you find your sun along the driveway or front yard, consider an edible landscape garden in whatever narrow slice of earth you have. Remember when you map your yard for sunshine that deciduous trees will grow leaves in summer that cast shade. Trees will also compete for water and nutrients, so avoid planting under them.

There are additional factors to consider when deciding on where to orient your growing space. In general, plants require soil with good drainage, so be sure that your growing area doesn't tend to accumulate stagnant water. Also, don't plant where weeds won't grow; if weeds can't survive in that particular spot, your vegetables probably won't either.

Soil Quality

Winter is the ideal time in the Monterey Bay area to plant a cold tolerant cover crop, which will do wonders for a patch of land that's never been worked before or improve one that has.

If you live in an area where it's too cold or wet to plant, the next best thing is to cover the soil with a very thick layer of mulch of straw or leaves six to eight inches deep. Your growing space will emerge in spring with improved soil structure that is enriched with organic matter.

Mulch materials include leaves, wood chips or straw. Hay is not recommended because it contains seeds that can germinate and take over your growing space.

Size, Layout, and Orientation

Wide beds are a more efficient use of gardening space than long rows; for example, 408 square feet of total area is required for 100 square feet of planting space when growing in rows, but only 235 square feet of space is needed to get 100 square feet of planting space when growing in beds.

Ideally, you should orient your beds north to south, with tall plants at the north end of the garden so they don't shade shorter plants. Beds should be no wider than four feet so that you will be able to reach into the center of them to plant and harvest.

Maximize your use of space by growing plants vertically up a trellis when possible; consider using hog-wire arches over your pathways between beds to maximize space.

If you're new to gardening, start small—100 square feet is a good starting size.

A Word About Frost Dates

You may have heard about climate zones. Use this online USDA zip code directory to find your hardiness zone: planthardiness.ars.usda.gov/PHZMWeb.

And this simple directory can be used to identify the start and end frost dates in your zip code: morningchores.com/frost-dates.

You'll note that first and last frost dates come with a probability confidence level, as they are never hard and fast, especially now with climate changes. The last frost date is important because many seed packets specify time to plant based on this date. Be on the safe side and try not to plant warm season plants too early as it will only slow their growth and make them vulnerable to pests and diseases.

Select Your Plants

Once you know how much land you have and what sort of light and soil conditions you will have available, it's time to choose plants. There's nothing quite as rewarding as poring over seed catalogs and websites on a cold winter day.

As you plan your garden you'll want to factor in:

Expected yield and space required – different vegetables require different amounts of room between plants. Sprawling vines, like those of pumpkins, take up much more room than a stand of beets. Here's a helpful plant spacing guide: gardeninminutes.com/plant-spacing-chart-raised-bed-gardening.

Food value – If you're growing to enhance nutritional health, nutritionally exceptional plants include spinach, carrots, broccoli, cabbage, kale, swiss chard, sweet potatoes, and collards.

Cost offset – If you're growing to reduce your grocery bill, consider growing lettuce, peppers, garlic, winter squash, tomatoes and broccoli.

Personal preference – Naturally, it makes sense to grow the things you like to eat.

Timing: Cool vs. Warm Season Crops

Crops fall into two categories: cool season, grown in spring and fall, and warm season, grown in summer. The primary factors that define the seasonal boundaries are soil temperature and nighttime ambient temperature. Both should be 50-60 °F for warm season plants to thrive.

Cool Season		*Warm Season*	
Beet	Broccoli	Basil	Bean
Cabbage	Carrot	Corn	Cucumber
Collard	Green	Eggplant	Pepper
Lettuce	Onion	Squash	Tomato
Radish	Turnip		

One of the primary factors for success as a home vegetable gardener is planting at the right time of year. Pushing the boundaries and planting too early or too late creates an environment that is challenging for plants to overcome. For example, if you plant out tomatoes too early, the cold and wet weather may start slowly making them vulnerable to fungal diseases and pest problems. Plant sweet peas too late in the spring and they may crisp up and die within a day or two of the first hot spell.

Most seed packets will give you a good idea of when to plant. Here's a good reference chart for the Santa Cruz area: cesantacruz.ucanr.edu/files/130451.pdf. You can also use this handy seed planting calculator, courtesy of Johnny's Seed company: johnnyseeds.com/growers-library/seed-planting-schedule-calculator.html.

continued on page 6

Upcoming Virtual Events

Organic Seedling Production for Small and Medium Scale Growers

February 8-10, 9:30am — 12:30pm
Online

In this interactive, virtual three-day course, participants will deepen their knowledge of seed and seedling biology, the management of environmental conditions to optimize seedling development, and effective regulation of pests and diseases in the greenhouse. This course is designed for those growing seedlings in a production setting. This will be a highly interactive space to draw from your experience, questions, challenges and learn from the wisdom of the group. For more information, visit bit.ly/seedlingshortcourse.

Cultivate & Nourish: 2021 CCOF Annual Meeting and Conference

Thursday, February 18, 11:00am — 1:00pm
Online

CCOF invites you to share a meal and conversation at Cultivate & Nourish—virtually! Don't miss this discussion about how the organic family can work together to rebuild our food system for an equitable and healthy future. Join CASFS alumnus and Friends of the UCSC Farm & Garden Board member David Robles in the kitchen and listen to his story while he creates an organic meal to nourish the body and soul. Guests will receive the recipe to prepare in advance, giving all the opportunity to connect over a meal. Register for this free event at ccof.org/cultivate-nourish-2021-ccof-annual-meeting-and-conference.

Beginning Seed Starting

Monday, February 22, 5:00pm — 6:30pm
Online

A seed is a powerful resource. In this workshop led by Kellee Matsushita-Tseng of the UCSC Farm, participants will learn best practices for sowing, cultivating seedlings and transplanting. The workshop will also explore strategies for planning and timing a successful warm-season garden in this region. Whether this is your first time sowing seeds or you have been stewarding your garden for years, this will be a great way to spring into the growing season. Find more information and registration instructions for this free event at casfs.ucsc.edu/news-events/events.

Critical and Equity-Oriented Pedagogical Innovations in Agroecology and Sustainable Food Systems Education

Wednesday, March 3, 12:00pm — 1:30pm
Online

This second session of the CASFS Quarterly Lecture Series will feature a panel discussion on Sustainable Food Systems Education (SFSE) pedagogical innovations that encourage systems thinking, inter- and trans-disciplinary collaboration, community-based learning, and collective action projects that foster more critical and equity-oriented SFSE initiatives and a more just food system. For more information and to register for this free event, visit casfs.ucsc.edu/news-events/events/quarterly-lecture-series.html.

Growing Asian Vegetables

Thursday, March 4, 5:00pm — 6:30pm
Online

Instructor Scott Chang-Fleeman of Shao Shan Farm in Bolinas, CA will cover the basics of cultivating different varieties of Asian vegetables in the cool summers of the Bay Area's coastline. Participants will explore concepts like succession planting for year round greens, climate control techniques for growing hot season vegetables, pest management challenges, and dry farming techniques. Find more information and registration instructions for this free event at casfs.ucsc.edu/news-events/events.

Introduction to Irrigation

Tuesday, April 20, 5:00pm — 6:30pm
Online

Water is the base for all life and critically important during these years of erratic rainfall. In this workshop, instructor Avry Miller will discuss the role of water in agricultural and home scale irrigation: how to evaluate soil moisture and structure, understand the impact of environmental conditions on irrigation and determine the irrigation needs of specific vegetable and tree crops. Students will look at a variety of garden-scale irrigation systems through a water conservation lens. Find more information and registration instructions for this free event at casfs.ucsc.edu/news-events/events.

Video Project to Bring CASFS Farm & Garden Teaching Online

In 2021 CASFS has a unique opportunity to greatly increase the reach and impact of our educational programming by expanding remote and online instruction through video production. With the CASFS Farm and Chadwick Garden closed due to COVID-19 restrictions, we plan to film the core farming and gardening instruction that typically would be presented to in-person audiences and make the footage available online.

Videographers are working with the instructors to document techniques for specific skills like planting and pruning fruit trees, sowing seeds and transplanting seedlings, irrigation set up, tillage equipment use, and much more. As the year progresses, new demonstrations will be filmed along with seasonal footage to show progress of plants or fields. Some videos will be short how-to videos and others will follow a specific crop through the season from seed to harvest.

Watch a video with more information on the project at vimeo.com/491830824.

The videos will be used as they are produced, for online courses, workshops, and internships. Additionally, some of the videos will be available on the CASFS YouTube channel, making farming and gardening knowledge and skills accessible to the public and reaching new audiences for CASFS. We plan to provide closed captioning for the videos and to translate videos into Spanish to further expand accessibility.

The resulting video library will provide a lasting teaching toolkit for online and in-person instruction through undergraduate classes and internships, the Apprenticeship, workshops, short courses, and visitor education at the Cowell Ranch Hay Barn and during site tours. Our long-term objective is to create an online learning center with videos linked to corresponding content in other existing instructional materials, such as the units in our training manual, *Teaching Organic Farming & Gardening*.

Help support the Farm & Garden Video Project!

We are seeking funding for the video producer and videographer, CASFS instructors and other presenters, Spanish translation, and the creation of the online video library. To donate to this project please visit casfs.ucsc.edu/support.

CASFS Programming Update

After a year spent on program review and strategic planning, the UCSC Center for Agroecology & Sustainable Food Systems (CASFS) staff is excited for what's in store in 2021 and beyond.

Among the new developments at CASFS are a revised 10-week residential apprenticeship program, to be offered twice a year, that will teach seasoned beginners practical skills in gardening and small-scale farming using an agroecological framework, and stand-alone "intensives," short courses that will provide intermediate and experienced gardeners and farmers with hands-on learning opportunities focused on specialized topics.

CASFS will also be focusing on programs for undergraduate students, with a new agroecology major, developed in part by CASFS staff, that will utilize the CASFS Farm & Garden as outdoor classrooms, and a new remote internship to keep students connected to CASFS and its sites during a time when students can't visit in person due to UC Santa Cruz COVID-19 restrictions.

Other plans for the upcoming year and beyond include integrating equity into all aspects of CASFS programming, ramping up virtual workshops and Q&A sessions, exploring how to update Center-managed facilities to better serve program participants, and continuing to provide UCSC students with access to free and low cost food and conducting important agroecological research.

CASFS staff and leadership presented these plans and updates in a virtual open house last October. This session was the first in a planned series of open houses to eventually be held in person at the Cowell Ranch Hay Barn with tours of the Farm & Garden and Center facilities. To view the recording, visit youtu.be/EJsYQ8qJ8G8.

Photo credit - Carolyn Lagattuta

Gratitude for Grants, Gifts, and Friends Membership Renewals

This December we received a new grant of $25,000 from the M&T Fantastic Family Foundation for general support of the Center for Agroecology & Sustainable Food Systems (CASFS). This is the fourth year in a row that this foundation has awarded a general support grant to CASFS. We have been very fortunate to have several foundations that respond favorably and consistently to our requests for much-needed operating support, as well as gifts from donors to support the overall work of our center.

For Giving Tuesday in December, a long-time Friends of the UCSC Farm & Garden member made a generous pledge of $10,000 for CASFS and offered to have this be part of our Giving Tuesday pitch to donors. We had a very successful run of donations which more than matched this gift, bringing in a total with the match of over $21,300 for CASFS.

Fundraising for our new video project is underway, with two former apprentices helping to provide seed gifts to initiate this project. We are busy sending out proposals and donor requests to raise the needed funding for a full year of filming. Please see page 4 for the article about this project, entitled "Video Project to Bring CASFS Farm & Garden Teaching Online."

We are grateful for all the Friends members who renewed their membership and for new members joining us this month! We also want to thank those who provided an additional gift this year for the Friends, CASFS Farm & Garden, and the video project.

For information about making donations and renewing your membership, please see casfs.ucsc.edu/support.

Friends Board Update

Members re-elected Delise Weir for Board president, Sarah Thorne as vice president, and Sandra Morishige as secretary for another term. Patti Barnett was elected to the position of treasurer, replacing Dan Dion, who retired from the Board after serving three years as treasurer. Thank you, Dan, for your service! And thanks to all members for your support over the years, your vote this year, and for renewing your membership.

Center Spotlight: David Robles

CASFS alumnus and Friends of the UCSC Farm & Garden Board member David Antonio Robles (he/him) is a Mexican-American farmer, cook, activist, and artist who finds himself at the intersection of culture and community through food systems work. David focuses most of his work on youth empowerment as the farm and culinary manager for Food What?!, a Santa Cruz-based nonprofit that utilizes farming, cooking, and personal development as tools to help youth understand their relationships to the food system and develop the agency to cultivate healthy lifestyles.

David's understanding of our current food system is framed by his experience at the University of California, Santa Cruz and the Center for Agroecology and Sustainable Food Systems (CASFS), where he earned a bachelor's degree in history and a certificate in ecological horticulture. His roots in agriculture run deep, and he draws much of his inspiration from his grandparents who worked for over a decade as migrant farmworkers from Michoacán, Mexico.

Join David in the kitchen for CCOF's Cultivate & Nourish virtual event on February 18. He will share his dedication to nourishing our communities through growing, cooking, and eating food together. His vision of the future centers on a family of farmers and food system workers to cultivate a new food system that is economically sound, ecologically responsible, and socially just. Find more information about the event on page 3.

Armchair Garden Planning (from page 2)

You can get a head start on planting your crops by starting them indoors in a container to protect them from the elements before weather conditions are optimal. Note that certain plants resist transplanting; root crops, corn, beans, and squash prefer to be planted from seed directly in the ground at the right time of year. Tropical perennials that take longer to mature, such as tomatoes, peppers, and eggplants, need seeds started indoors early to transplant in late spring.

Get a head start on planting by starting seeds indoors in containers. Photo - Carolyn Lagattuta

The Fourth Dimension: Time

Once you've planned your spring garden, taking into account sunlight, space, soil, and the type of plants you want to grow organized by length, width, and height, consider adding the dimension of time. In coastal California, we can plant different crops in the same location in succession.

When calculating plantings in succession, it helps to know which plants require a lot of nitrogen and which are susceptible to the same diseases. Planting multiple nitrogen-loving plants in succession should be avoided in order to not deplete the soil's nitrogen levels, while planting crops susceptible to the same diseases in succession increases the chance of those diseases becoming present or worsened and should also be avoided.

Here is a succession planting example for a single 5'x20' 100-square foot bed:

November-February

Plant half a pound of winter soil builder cover crop mix, which will yield a thick crop of legumes and grasses. This adds organic material to the soil and legumes add nitrogen.

March-May

Plant a mix of cool season crops. In a 100 square foot plot you can grow ~ 25 heads lettuce, 28 bok chois, 36 beets and 18 broccolis. All heavy feeders, these plants will scavenge the nutrients left by your cover crop and may need a little more to thrive.

June-August

Plant a mix of warm season crops. In a 100 square foot plot you can replace the spring crops with ~ four tomato plants, 42 basil plants, six cucumbers, and 16 bell peppers. Or, if you choose sprawling vines you can grow six pumpkins and fertilize the soil and transplant these heat-loving crops. Or, grow beans to replenish the nitrogen a bit.

August-October

Plant out brassicas, peas, root crops or leafy greens, or start a short-lived summer cover crop to let the soil rest for a season.

November

The cycle begins again with cover crop planting.

Get some help organizing your succession planting with Johnny's Seeds Succession-Planting Calculator: johnnyseeds.com/growers-library/successionplantingspreadsheet.html.

More Time - Crop Rotation

It pays to record what you plant since it's not recommended to plant the same crops in the same bed year after year. Ideally, you should rotate plants in a seven year cycle, especially tomatoes and basil, which are both susceptible to soil-borne pathogens. It may be difficult to rotate crops in a small suburban yard with limited space and sun but at the very least you can try to alternate plants every two to three years using containers that take advantage of sunny spots.

Share the Yield

As a rule of thumb, you'll want to plan 100 square feet of garden space per person in the household you want to feed. No matter how carefully you plan your expected yield, be prepared to share your bounty with herbivorous pests above and below ground, as well as diseases, unexpected weather, and other unpredictable environmental conditions. Expect a 10-30% rate of loss.

Let the Computer Help

There are a variety of free and low-cost online tools that can help with garden planning and are fun to try if that's your cup of tea. For the home gardener, GrowVeg (growveg.com) is the recommended option. Other options include Smart Gardener (smartgardener.com), Plangarden (plangarden. com), and for farm-scale growers, Tend (Tend.ag).

continued on page 8

UC Explores Alternatives to Fumigants for Strawberries

Strawberries, which generated $2.2 billion for California growers mainly on the coast in 2019, are sensitive to soilborne diseases. Strawberry plant roots infected by fungi are unable to take in nutrients and water, causing the leaves and stems to wilt. The diseases reduce fruit yields and eventually kill infected plants.

Photo by Joji Muramoto

To protect the delicate plants from pathogens, strawberry growers fumigate the soil with pesticides such as chloropicrin and 1,3-dichloropropene before planting transplants. Due to the potential negative effects on the environment and human health, however, use of fumigants are highly regulated and developing non-fumigant alternatives has been a priority of the strawberry industry.

For a biological alternative to manage soilborne diseases in strawberries, Joji Muramoto, UC Cooperative Extension organic production specialist based at UC Santa Cruz, has received a $411,395 grant from USDA National Institute of Food and Agriculture to study the ability of other crops to suppress strawberry pathogens in the soil.

Verticillium wilt, caused by *Verticillium dahliae*, is a common soilborne disease that can be controlled with anaerobic soil disinfestation (ASD), a fermentation-based biological treatment using carbon sources such as rice bran under plastic mulch in moist soils for 3 to 5 weeks in autumn. About 2,000 acres of berry fields, mostly organic, were treated with ASD in California and Baja California, Mexico, in 2019.

In 2008-09, the diseases fusarium wilt, caused by *Fusarium oxysporum f. sp. fragariae*, and charcoal rot, caused by *Macrophomina phaseolina*, emerged in Southern California and now threaten strawberry plants throughout the state.

ASD isn't as effective against *F. oxysporum* and *M. phaseolina* unless it is applied in summer on the coast. As saprophytes, they feed not only on living plants, but also can colonize crop residues and rice bran especially at lower coastal temperatures in autumn. Treating fields on California's coast with ASD during summer is difficult because it competes with the vegetable production period.

Based on promising studies in Asia and other areas, Muramoto plans to test alliums – such as onion, bunch onion and leek – and a certain variety of wheat (Summit 515) to see if they will suppress *F. oxysporum* and *M. phaseolina*. His team will conduct a series of greenhouse and field trials and test these crops with and without ASD to compare the effects on soilborne pathogens.

"Studies have shown the potential of using allium crops to control Fusarium wilt, and Summit 515 wheat for charcoal rot," Muramoto said. "Our goal is to examine the effectiveness of suppressive crops, optimize them for California strawberry production systems, and evaluate their economic feasibility for commercial use."

"No single tactic is likely to replace fumigants," he said. "Integration of multiple biological approaches such as crop rotation, ASD, and use of resistant strawberry varieties is a key to develop a successful non-fumigant-based soilborne disease management strategy for strawberries. This project is a part of such broader efforts."

At the end of the three-year study, he plans to share the results at workshops, field days and webinars.

Charcoal rot symptoms can resemble other soilborne diseases so it is essential to identify the pathogen using molecular approaches. Photo by Joji Muramoto

Rachael Goodhue, UC Davis professor of agricultural economics; Carol Shennan, UC Santa Cruz professor of environmental studies; and Peter Henry, USDA Agricultural Research Service plant pathologist, are co-principal investigators on the study with Muramoto.

Also collaborating on the project are Christopher Greer, UC Cooperative Extension integrated pest management area advisor in San Luis Obispo County; Oleg Daugovish, UCCE vegetable and strawberry advisor in Ventura County; Mark Bolda, UCCE director strawberry and cane berry advisor in Santa Cruz County; Jan Perez, food systems specialist, and Darryl Wong, farm research manager, at UC Santa Cruz Center for Agroecology and Sustainable Food Systems; Miguel Ramos of Ramos Farm; Agriculture and Land-Based Association (ALBA); Driscoll's; Naturipe; and The Oppenheimer Group.

—Pamela Kan-Rice, UC ANR

#119
University of California Santa Cruz
Center for Agroecology & Sustainable Food Systems
1156 High St.
Santa Cruz, CA 95064

Nonprofit Org.
U.S. POSTAGE
PAID
Santa Cruz, CA
Permit No. 109

Armchair Garden Planning (from page 6)

References

Square Foot Calculator
squarefootagearea.com/calculator/square-footage-calculator/

Vegetable Spacing Chart
home.howstuffworks.com/vegetable-spacing-guide.htm

Plant Spacing Calculator
www-users.math.umn.edu/~white004/personal/plantcalc.html

Seed Starting Date Calculator
johnnyseeds.com/growers-library/seed-planting-schedule-calculator.html

Days to Maturity Chart (In Iowa)
hortnews.extension.iastate.edu/2004/7-23-2004/vegguide.html

CA Statewide Planting Guide
ucanr.edu/sites/gardenweb/files/29040.pdf

Santa Cruz Planting Guide
cesantacruz.ucanr.edu/files/130451.pdf

Johnny's Succession Planting Calculator
johnnyseeds.com/growers-library/successionplantingspreadsheet.html

Johnny's Planning Tools & Calculators
johnnyseeds.com/growers-library/online-tools-calculators.html

About the Author

Delise Weir is a UC Santa Cruz alumna who is passionate about growing organic food and flowers. She is a UC Master Gardener who also wore another hat for 20 years working as a human-computer interaction designer and project manager. Delise currently serves as the president of the Friends of the UCSC Farm & Garden Board of Directors.

Friends Membership Renewals

Need to renew your Friends of the UCSC Farm & Garden membership? You can find renewal information and a secure donation link online at connect.ucsc.edu/joinffg. Contact us at casfs@ucsc.edu with any questions. Thank you for your support!

CSA UPDATE

After a year off from their popular Community Supported Agriculture (CSA) program, CASFS is excited to offer this service to the community again beginning in June 2021! Stay tuned for details and signup instructions. To keep up with the latest CASFS and the Friends of the UCSC Farm & Garden updates, sign up for our e-newsletter online at bit.ly/casfsupdates.