



UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources



COOPERATIVE EXTENSION/
HANSEN AGRICULTURAL RESEARCH AND EXTENSION CENTER
VENTURA COUNTY | ANNUAL REPORT 2019-2020



Dr. Annemiek Schilder
(photo by Bob Carey)

September 1, 2020

Honorable Board of Supervisors and Members of the Community of Ventura County,

I am very pleased to share with you the accomplishments of the University of California Cooperative Extension (UCCE) in Ventura County and the Hansen Agricultural Research and Extension Center (HAREC) for the 2019-2020 fiscal year. My second year as director has been eventful to say the least but has also been rewarding in many ways.

Last year, I mentioned that people in the US generally take the abundance of safe and nutritious food for granted. Then the unimaginable happened in 2020: the COVID-19 crisis turned our lives upside down and starkly exposed the shortcomings of our globalized food system. As supply chains became disrupted,

people experienced shortages of foods and other items, many for the first time in their lives; closures of schools deprived children of their school lunches while reduced demand for fresh dairy and produce led to food wastage and reduced farm income. The case for local food and short food supply chains is stronger than ever!

Our gratitude goes out especially to farmers and farm workers and other essential personnel who continued to provide us with our basic need, food. Looming food insecurity fueled a revival of interest in home gardening and World War I and II Victory Gardens. Our own Dr. Rose Hayden-Smith, emeritus advisor and expert on Victory Gardens, gave many presentations on this topic. We were able to continue our field research for the most part with alterations while our educational programming was successfully shifted to mostly virtual offerings, allowing increased participation.

This annual report highlights the research and outreach conducted by advisors, staff and volunteers to fulfill our mission of providing science-based solutions to make our world a better place, especially in light of climate change, invasive pests and diseases, water issues as well as wildfires and other disasters. Statewide programs such as 4-H, Master Gardeners and California Naturalists continue to provide valuable social and learning opportunities and life skills for youth and adults alike.

We extend our gratitude to Ventura County, the UC Division of Agriculture and Natural Resources, the Thelma Hansen Fund and other funding agencies and donors for their financial and logistical support of our programs. We also thank our collaborators listed in the back of this annual report, growers and other stakeholders, and all the volunteers who generously dedicated their time and resources to furthering our mission. We look forward to another successful year of serving Ventura County in 2020-2021!

Sincerely,

Annemiek Schilder, PhD

Director, University of California Cooperative Extension in Ventura County and the Hansen Agricultural Research and Extension Center

In March 2020, the UCCE team began working from home in response to the COVID-19 pandemic. Staff essential to HAREC operations remained on site to maintain vital research projects. Our advisors and education team quickly pivoted, reorganizing research work and creating virtual offerings to serve our clientele. We strove to maintain research and outreach activities to the extent possible. However, in-person meetings and trials requiring significant labor were postponed or canceled. Despite the setbacks, we provided a high level of service to farmers and other stakeholders, offered relevant youth programming, and delivered information that was timely and helpful to community audiences during this challenging time.

Our Spring 2020 farm field trip and student farm programs at HAREC were canceled. Instead, over three tons of fruit and vegetables grown at HAREC for these and other programs were donated to our community-based partners – Food Forward and the Ventura Unified School District (VUSD) – who facilitated delivery to children and families. The Master Gardener program provided more than 1,400 vegetable plants for distribution to youth and community groups.

"We are saddened that spring field trip season is canceled and miss the sound of children delighting in harvesting, sometimes for the very first time. But it warms my heart that our field trip garden can help feed so many families in need."
– Susana Bruzzone-Miller, UCCE's Education Program Manager –

VIRTUAL RESOURCES DEVELOPED IN RESPONSE TO COVID-19

- Virtual workshops, webinars, and field days for growers and other stakeholders
- Distance learning webpage linked to our YouTube channel curating age-appropriate lessons and story time on agriculture, gardening, nutrition, and cooking for grades K-5th
- Virtual Sustainable You! Summer Camp, co-organized with the City of Ventura
- Video contests replacing in-person 4-H competitive events
- Content for science-based, virtual youth programs on livestock and tree ecology





Dr. Schilder's celery research project at HAREC

While serving as Director of both the UCCE Ventura office and the Hansen Agricultural Research and Extension Center (HAREC), Dr. Schilder also maintains a rigorous research program that focuses on studying diseases in fruit and vegetable crops. Her program emphasizes the diagnosis and sustainable management of plant diseases and complements other UCCE Ventura research programs on fruits and vegetables. Plant diseases can be caused by plant pathogens, such as fungi, bacteria and viruses, or by nutrient deficiencies and environmental or chemical injuries. Sick plants may grow poorly, resulting in lower yields and quality of harvested plant parts. In severe cases, plants may die. It takes a trained eye as well as laboratory analysis to accurately diagnose why a plant is ailing and make appropriate management recommendations.

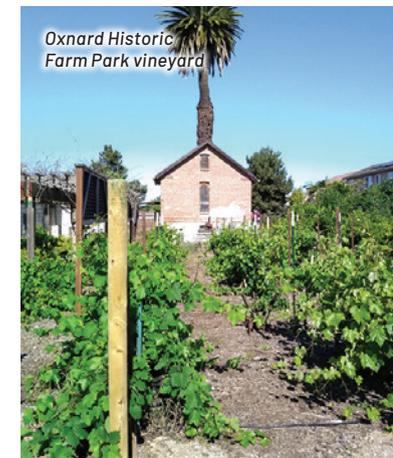
DISEASE CONTROL IN ORGANIC VEGETABLE PRODUCTION

Organic production is increasing in Ventura County and represents an important part of our overall agricultural economy. However, plant diseases pose formidable challenges that our research aims to address. Plant diseases can be managed by growing resistant or tolerant plant varieties, rotating crops to break pathogen life cycles, and sanitation, i.e. removing infected plant material. Fungicides may also be applied to protect plants from infection. However, in organic crop production, only approved fungicides of natural origin are allowed, such as plant extracts, oil, sulfur, copper, and beneficial microbes. However, efficacy data are often lacking or insufficient to allow growers to use these products with confidence.

A common fungal plant disease in warm, dry climates is powdery mildew, which is characterized by white powdery patches on a range of plants including pumpkins, beans, strawberries, grapes and roses. In 2019, we evaluated biological control agents, such as Botector (a beneficial yeast: *Aureobasidium pullulans*) and compost teas (fermented watery extracts of compost) against powdery mildew of pumpkin; some of these considerably reduced disease severity. In spring 2020, we studied the effect of plant density in two different celery varieties for control of Septoria leaf spot, a fungal disease that can render the crop unharvestable. While lower plant density reduced the spread and severity of Septoria leaf spot, it also reduced the number of bunches harvested. However, these bunches had better overall quality.

GRAPE PRUNING WORKSHOP

The Oxnard Historic Farm Park features two small vineyards of Zinfandel grapes that are offshoots from vintage vines planted in the 1880's on Santa Cruz Island. In February 2020, Dr. Schilder led a hands-on grape growing and pruning workshop attended by over 25 Master Gardeners and members of the public. As part of the experience, participants pruned the overgrown vines and then helped construct a new trellis to properly train the vines. The intent is to use these vineyards for future grape pruning, disease management, and wine-making workshops.



Oxnard Historic Farm Park vineyard

Annemiek Schilder, PhD – Director and Plant Pathology Advisor



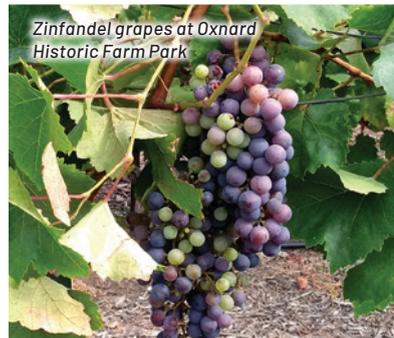
Annemiek Schilder inspecting grape leaves



Pumpkin powdery mildew untreated



Harvesting celery trial



Zinfandel grapes at Oxnard Historic Farm Park



Piedra Blanca, Los Padres National Forest

RESILIENT ECOSYSTEMS

Resilience means having the capacity to recover from disturbance. For ecosystems in the wildland-rural-urban interfaces of Ventura County, disturbance can be caused by natural events such as fire and flooding. This risk is increased by extreme heat, drought, and storms resulting from our changing climate, or human activities such as habitat destruction and the introduction of exotic pest species.

Natural Resources Advisor Sabrina Drill spent the past year at the University of Oklahoma learning how communities can become more resilient after a disturbance, such as a natural disaster. She is interested in understanding how nature can increase community resilience in urban areas, and ways in which communities can support urban biodiversity. Advisor Drill works with the Urban Biodiversity Hub, which uses global data to help cities around the world develop, implement, and evaluate biodiversity strategies. She is also working with the Southern California Association of Governments and the Nature Conservancy to create a Greenprint, a conservation plan that recognizes the economic and social benefits of parks, open space, and working landscapes within the region.

In partnership with the California Invasive Plant Council, she developed a series of webinars on best practices to prevent spread of invasive plants or pests through recreational activities and other topics. The recordings can be viewed at https://ucanr.edu/sites/invasivelunch/2020_Invasive_Lunch/.

CURRENT PROJECTS

- Surveying responses of California citizens on outreach needs related to public safety power shutoffs as part of “Disasters Happen” project team
- Developing a research agenda, funded by the National Science Foundation, for simultaneous responses to extreme weather and geohazards during a pandemic and social justice protests
- Studying how participatory science projects are affected by the COVID-19 pandemic for the National Extension Climate Initiative

EMERGING TREE PESTS

UCCE has focused on addressing emerging tree pests, particularly the Invasive Shot Hole Borer (ISHB), an exotic beetle that is a threat to many common native and landscape trees. The beetle tunnels into host trees and spreads the fungus *Fusarium euwallaceae*. While the fungus serves as a food source for beetle larvae, its growth disrupts the transport of water and nutrients in the tree, leading to branch dieback and overall decline.

We partnered with the Agricultural Commissioner focusing on proper green waste management to reduce the risk of ISHB spread. Four training workshops were held for growers, agency personnel, land managers, conservation groups and citizen scientists.

Other pests of concern include the Asian citrus psyllid (which vectors Huanglongbing, a disease that kills citrus), and the Glassy-winged sharpshooter (which harbors Pierce’s disease, impacting grapevines and other plants). Another emerging threat is the Gold Spotted Oak Borer, which attacks oak trees.

ONGOING ACTIVITIES

- Working with the Ventura County Agricultural Commissioner to draft the *Emerging Tree Pests Early Detection/Rapid Response Plan for Ventura County*
- Continuing to identify, report, and manage tree pest infestations and educate stakeholders on detection and best management practices
- Strengthening collaboration with local, regional, and statewide partners working on emerging tree pests

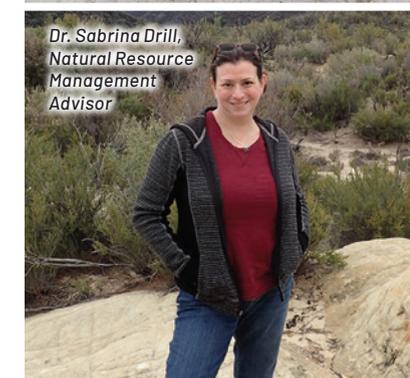
Sabrina Drill, PhD – Natural Resources Advisor
Julie Clark De Blasio, MUP – Community Education Specialist



Julie Clark De Blasio collects sample from ISHB-infested sycamore tree



Invasive shot hole borer
 Photo by Curtis Ewing, Cal Fire



Dr. Sabrina Drill, Natural Resource Management Advisor



Dr. Drill collects wood sample from tree in Ojai



Climate-ready tree trial at HAREC

Environmental Horticulture and Plant Pathology is concerned with plants in the landscape, such as trees, turf grass, shrubs and flowering ornamentals in urban and natural areas. The benefits of landscapes are shade, reduced energy costs of buildings, and open and recreational spaces all of which improve the quality of life and health of Ventura County citizens. Program clientele include city, state, federal parks and facilities grounds staff; arborists; pest control advisors, landscape architects, consultants, farmers, educators and gardeners, essentially anyone interested in landscape and other plants. The program is managed by Dr. A. James Downer who has worked for UC ANR for 35 years!

“Blood pressure, stress, heart disease and psychological disorders are all lessened in the presence of shade trees. It is becoming apparent that trees are necessary to sustain human health.”
- Dr. A James Downer, UCCE Advisor Ventura County -

Research and extension topics are water management and conservation, pest and disease diagnosis and management, urban forestry and arboriculture, soil issues, the use of mulches, and green waste management. Management of landscape insect pests and diseases is focused primarily on exotic pests but also deals with native insect and disease issues. Advisor Downer also provides oversight, guidance and education to the Ventura County Master Gardener Program.

SABBATICAL IN THE CHIRICAHUA MOUNTAINS OF ARIZONA

Advisor Downer spent a year on sabbatical leave at the Southwestern Research Station (SWRS) in Portal, Arizona, a field station of the American Museum of Natural History supporting study of the unique biodiversity of the Chiricahua Mountains. Advisor Downer investigated the biology and horticultural characteristics of local trees to assess their potential for use in California’s urban areas. He was particularly interested in drought- and monsoon-adapted trees.

Advisor Downer organized two meetings on the ecology of trees in the Chiricahua Mountains, attended by participants from all over the world. He also completed a number of publications such as “Wood Diseases in the Landscape” and started writing a book on the biology of shade trees. His travels and findings about “climate-ready” trees are summarized on: http://ceventura.ucanr.edu/Environmental_Horticulture/Landscape/.

Dr. Downer’s research is massively applicable to my practice in commercial arboriculture. As a result of attending symposiums where he has lectured, I’ve understood more about various pathogens and their strategies as well as understanding efficacy of various treatments and how to talk to my customers about them in a more well-informed manner.

- Participant UCCE Landscape Symposium -

THE CLIMATE-READY TREE PROJECT

Global climate change is leading to hotter and drier conditions, especially in the western US and California, stressing trees traditionally used in urban landscapes. Advisor Downer is working with researchers Greg McPherson (USDA Forest Service) and Alison Berry (UC Davis) on a 20-year Climate-Ready Tree study to evaluate trees for hotter and drier climates. He is studying the pruning requirements at research sites in Davis, Irvine, Riverside, and Santa Paula, California. Trees were selected from dry regions around the world with some native to the U.S. desert southwest. Little is known about their drought adaptation or horticultural characteristics. The Climate-Ready Tree project at HAREC is now 5 years underway and the trees are generally growing well, while a few trees have died.

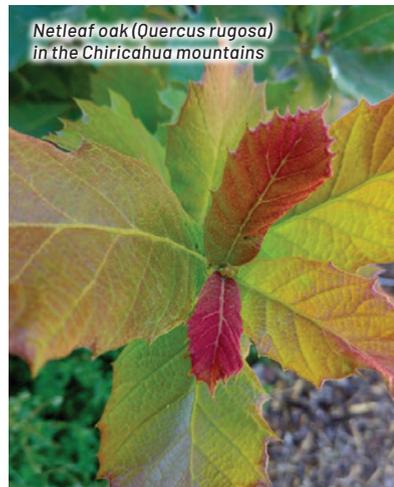
CURRENT PROJECTS

- **ISHB-infested Green Waste Processing Study:** A project with the Agricultural Commissioner to see if chipping Invasive Shot Hole Borer-infested trees into mulch eliminates the insect and accompanying fungal pathogen
- **Effects of urban environmental factors on tree development:** A study to understand carbon capture by urban trees in various stressful environments
- **Fertility requirements of landscape roses:** This study examines the fertilizer (nitrogen and magnesium sulfate) needs of different rose cultivars
- **Tree-turfgrass interactions:** A study to investigate the effect of turfgrass competition on tree establishment
- **Effect of compost and yard waste on control of root rots:** A long-term study of compost-induced disease suppression in soils

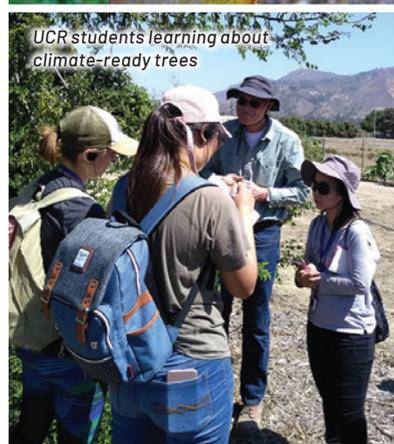
A. James Downer, PhD – Environmental Horticulture and Plant Pathology Advisor



Advisor James Downer teaching Master Gardeners



Netleaf oak (Quercus rugosa) in the Chiricahua mountains



UCR students learning about climate-ready trees



Sunset on forage production plots near City of Ventura, November 2019

Rangelands in Ventura County support a host of ecosystem services, including water storage and filtration, wildlife habitat, carbon storage, and scenic views. They also provide the primary forage base for the county's livestock industry. For generations, local ranchers have worked to sustainably manage these rangeland ecosystems while providing a safe, high-quality agricultural product. Increasingly, however, the county's livestock industry faces new sets of ecological, economic, and regulatory challenges that complicate this work. The goal of the UCCE Livestock and Range program, led by Advisor Matthew Shapero, is to assist producers and rangeland managers in successfully navigating these challenges.

"The Thomas Fire demonstrated that even if you live in a city or suburb, the way natural resources are managed impacts you. Livestock production is not an agricultural sector that generates a lot of gross revenue but it has great spatial impact. How it is managed impacts water quality, wildlife habitat, and the view those living on the peri-urban interface enjoy. There is important public and economic value in the way rangelands are managed."

- Matthew Shapero, UCCE Livestock and Range Advisor -

LIVESTOCK HEALTH AND WELFARE PROJECTS

- **Trace mineral status of beef cattle.** Trace minerals are an important indication of cattle health. This project on local ranches piloted a new mineral supplement program. A product designed specifically to alleviate mineral deficiencies in Ventura County beef cattle should be arriving in August 2020
- **Low-stress livestock herding and stockmanship.** This research explores practices that improve animal welfare and increase forage harvest efficiency and utilization on ranches

FORAGE PRODUCTION PROJECTS

Forage production on rangelands can fluctuate greatly from year to year depending on weather and grazing intensity. In collaboration with the Agricultural Commissioner, Advisor Shapero has established five sites on local rangelands to monitor forage biomass production, floral species composition, invasive plants, drought impacts, and shifts in species composition due to a changing climate. Another seven sites will be established in the fall of 2020 and 2021.

Data collected from these monitoring sites are used annually by the US Farm Service Agency to make an official determination of drought severity for crop insurance payouts to producers. The project will help ranchers understand how forage yield and composition are related to fluctuations in climate and grazing patterns. Ongoing projects:

- **Healthy Soils.** This CDFA-funded project investigates whether application of compost on Central Coast rangelands can increase carbon sequestration and thereby remove greenhouse gases from the atmosphere
- **Ranching, Rangelands, and Resilience.** This USDA-funded multi-state project will use 17-years' of forage production data San Luis Obispo, Santa Barbara and Ventura counties to predict future forage production under different climate scenarios

OTHER ECOLOGY AND WILDFIRE PROJECTS

- **Post-wildfire grazing.** Data collection was completed for this research project monitoring rangelands after the Thomas Fire. It will determine impacts, if any, to rangeland recovery in the presence of grazing
- **Ag Pass program.** We partnered with the Central Ventura County Fire Safe Council to improve this program, which allows access for agriculturalists to areas otherwise excluded to the general public in the event of disaster
- **Targeted grazing with small ruminants for vegetation management for fire resilience.**
- **Water Quality in the Ventura River watershed.** We are working with the Los Angeles Regional Water Quality Control Board, CoLAB, and the Ventura County Cattleman's Association to develop a Geographic Information Systems (GIS) spatial analysis of potential impacts from cattle on the watershed

Matthew Shapero, MS - Livestock and Range Advisor

Setting up forage production plot with Ag Commissioner staff



Rancher Mike Williams counts cow dung for stockmanship and herding project



Matthew Shapero, Livestock & Range Advisor



Nitrogen uptake trial in raspberry field

The continued trends of decreasing water availability and increasing environmental regulations to address surface and groundwater quality are posing unprecedented challenges to Ventura County growers. Irrigating and fertilizing more efficiently is essential not only to maximize yields and returns, but also to prevent surface and groundwater contamination.

The goal of this program, led by Advisor Andre Biscaro, is to optimize irrigation water and fertilizer use efficiency in the production of vegetable and berry crops in order to enhance the economic and environmental sustainability of Ventura County agriculture. Creating new information and integrating technology to support management decisions is the main approach taken by Advisor Biscaro.

ASSISTING GROWERS WITH NITROGEN MANAGEMENT WHILE ADDRESSING ENVIRONMENTAL REGULATIONS

Many groundwater wells in California have been found to have increased levels of nitrate, which has led the State Water Resources Control Board to implement new regulations, demanding that growers and consultants fill out nitrogen management plans for every crop. To develop these plans, it is important to understand how much fertilizer the crop needs, when it needs it, and to integrate this information into management decisions in order to avoid nitrogen contamination of surface and groundwater. In partnership with State and local agencies, Advisor Biscaro provided technical guidance for the development and teaching of Nitrogen Management Plan Self-Certification Workshops. These workshops assist growers in completing the Nitrogen Management Plans for their farms.

ASSESSING NITROGEN AND WATER NEEDS IN BERRY AND VEGETABLE CROPS

The amount of nitrogen and water that plants need varies by crop, variety, growth stage, and climate. Advisor Biscaro has been studying nitrogen and water utilization by strawberries, raspberries and vegetable crops over multiple growing seasons. These research efforts involve intensive data collection from multiple fields and crop growth stages. In addition to making this information available to growers and consultants, equations and coefficients that can predict water and nitrogen use are created and incorporated into CropManage (<https://cropmanage.ucanr.edu/>), a web-based application developed by UC ANR. The app provides optimal recommendations for both water and nitrogen fertilizer applications in berry and vegetable crops. Advisor Biscaro has organized several workshops to train growers, consultants and farm managers in use of the program.

The economic and environmental sustainability of Ventura County's agriculture is intrinsically dependent on efficient irrigation and nutrient management practices, and UC Cooperative Extension is committed to working with growers, the private sector, local and State agencies and the public to support a thriving agricultural sector.

- Andre Biscaro, UCCE Irrigation and Water Resources Advisor -

ONGOING PROJECTS

- Assessing nitrogen fertilizer needs for optimal production and environmental sustainability of summer-planted strawberries, raspberries, and celery
- Improving fertilizer management and addressing environmental regulations by estimating how much nitrogen is removed from fields via harvested portions of fruit and vegetable crops
- Comparing the accuracy and precision of chemical analyses performed by commercial soil testing laboratories in the Western United States
- Improving irrigation management and water use in celery by updating crop coefficients
- Studying the role of water stress in the development and management of Macrophomina charcoal rot, a serious soilborne disease of strawberry
- Development of site-specific management of soilborne diseases of strawberries using molecular quantification, remote sensing and field scouting

PROGRAM OUTCOMES

- Development of a free and accurate app for creating nitrogen fertilizer and irrigation recommendations
- Improved knowledge about the accuracy of commercial soil testing laboratories, aiding grower decision making
- Improved water and nitrogen fertilizer use efficiency, profitability and environmental sustainability of celery production
- Optimized fertilization programs for fall- and summer-planted strawberries so growers can maximize yields while meeting environmental regulations
- Improved salinity management of strawberry cultivars, increasing the competitiveness of the California strawberry industry

Andre Biscaro, MS - Irrigation and Water Resources Advisor



Advisor Biscaro deploys sensors for improving accuracy of irrigation recommendations



UC ANR staff collects plant growth data for modeling crop water and nutrient use



Equipment used to measure evapotranspiration in celery field



Determining nitrogen uptake in raspberries



Organic strawberries growing well after anaerobic soil disinfestation

Ventura County is a leader in year-round berry production with about 13,500 acres of strawberries, raspberries, blackberries, and blueberries grown with a market value of over \$730 million. In addition, a huge variety of vegetables, including celery, lettuce, spinach, greens, kale, cabbage, herbs, carrots, radishes, tomatoes, peppers, pumpkins, and onions are grown on almost 38,000 acres with a production value of \$572 million. Insect and mite pests, as well as soilborne diseases, literally take a bite out of production and can be devastating in certain crops and seasons. The goal of this program is to enhance sustainable pest management and reduce environmental impacts of berry and vegetable crop production in Ventura County.

The goal of the berry and vegetable crop program, led by Advisor Oleg Daugovish, is to enhance sustainable pest management and reduce the environmental impacts of berry and vegetable crop production in Ventura County.

SOLUTIONS FOR SOILBORNE SUPERVILLAINS

One of the most acute threats to strawberries and vegetables is Fusarium wilt, caused by the soilborne fungus *Fusarium oxysporum* f. sp. *fragariae*. This disease can significantly reduce crop yield and kill plants altogether. In the past, growers relied on chemical soil fumigants to address this issue, which increased the cost of production due to the expense of fumigants and additional labor. With the growing concern about the environmental impacts of fumigants as well as increased regulations surrounding their use, alternative means for control are urgently needed.

The research being conducted by Advisor Daugovish and other researchers gauges the level of resistance of strawberry varieties to Fusarium wilt. Since varieties have different characteristics, what are the tradeoffs? Pre-plant soil sampling using molecular tools is also being investigated. Ultimately, researchers want to develop a predictive tool that growers can use to estimate performance of their strawberry varieties based on the pathogen level in the soil before planting.

Advisor Daugovish’s research projects, conducted in collaboration with UC Davis faculty, are part of a multi-state project funded by the US Department of Agriculture. This ongoing research not only benefits strawberry production in California but across the globe, including in Spain, Japan, and Europe, which also have Fusarium in strawberry.

“Technology has progressed. Now we have molecular tools to determine how much Fusarium we have in soil samples.”

– Oleg Daugovish, UCCE Berry and Vegetable Crop Advisor –

COST-EFFECTIVE ALTERNATIVES FOR SOIL DISINFESTATION IN STRAWBERRIES

Anaerobic Soil Disinfestation (ASD) is a natural alternative to chemical fumigation of soil. It is used to kill soilborne pathogens prior to planting. ASD relies on the addition of easily degradable organic matter, such as rice bran, which is broken down by soil microbes and creates anaerobic (without oxygen) conditions. Because rice bran is expensive and not locally sourced, we recently we tested alternative carbon sources such as cover crops and midds, a by-product of flour produced in Southern California. These provided yields similar to ASD with rice bran (standard) but at a reduced cost. A majority of organic strawberry growers have adopted ASD and are interested in alternative carbon sources that are more economical.

DISEASE RESISTANCE IN STRAWBERRY CULTIVARS

Recently developed strawberry cultivars Victor and Warrior showed superior resistance to Fusarium wilt compared to the older variety Petaluma, even with high pathogen levels in the soil. They also yielded more fruit when the pathogen was absent. Advisor Daugovish is working with UC Davis plant pathologists and breeders to test these cultivars in multiple production regions.

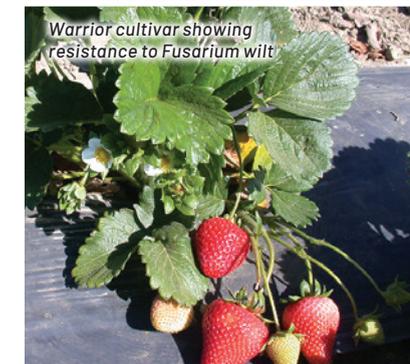
OTHER PROJECTS

- Minimizing pollutants in storm water runoff from plastic hoop houses
- Weed control in vegetable crops and strawberry

Oleg Daugovish , PhD – Berry and Vegetable Crops Advisor



Petaluma cultivar dying from Fusarium wilt



Warrior cultivar showing resistance to Fusarium wilt



Drip-applied Pronamide herbicide safely controlled weeds in transplanted romaine lettuce.



Advisor Oleg Daugovish



Citrus orchard in Ventura County

Thanks to a favorable climate, Ventura County is a major producer of avocados and citrus fruit, covering approximately 16,500 and 19,000 acres, respectively, in 2019. Minor subtropical crops such as banana, cherimoya, passion fruit, feijoa (pineapple guava), macadamia nut, and pitahaya (dragon fruit) are also grown here. The primary goal of this program is to optimize agricultural practices for growing subtropical crops in an environmentally sound manner. Advisor Ben Faber, who has been at UCCE for 31 years, leads the program. He also provides leadership for the Climate Smart Agriculture Program in Ventura County.

There are many production challenges related to pests, diseases, temperature extremes, and water and fertilizer use. Soil and microclimate variability complicate irrigation management, as too little water during a sudden heat wave can set trees back for years, while too much water may increase deadly Phytophthora root rot. Climate change is causing weather patterns to shift and requiring growers to change their production patterns. For crops that are new to Ventura County, such as coffee and tea, horticultural practices and variety performance need to be studied to ensure grower success.

“Growers like to do experiments with us because they want to learn more too. I spend my days talking to people, learning what they want to know and figuring out how to share that information.”
- Ben Faber, UCCE Subtropical Crops, Water, Soils Advisor -

Over the years, Faber has helped introduce a number of new crops to the area, including blueberries, not a traditional crop for Southern California. In 1995, there were no blueberries grown commercially in Ventura County. Now there are approximately 570 acres grown commercially in Ventura with a value of \$17.7 million according to the 2019 Ventura County Crop Report.

ONGOING PROJECTS

- Avocados are pollinated by a range of insects (native bees, syrphid flies, beetles and even moths). We are studying night-time pollinators of avocado flowers and ways to improve fruit set
- Most avocado and lemon trees are propagated by grafting a cultivar (scion) onto a rootstock. Our research helps determine the best rootstock and scion combinations for current and future production systems in Ventura County

- Mapping evapotranspiration for avocado irrigation management will help us determine how variability in water use by avocados can be better quantified to optimize application of this scarce resource
- In conjunction with the Agricultural Commissioner, we are overseeing a project to remove Invasive Shot Hole Borer (ISHB)/Fusarium-infested trees by cutting them down and chipping them into mulch for orchards. This will remove beetle infestations that can threaten wildland trees and provide mulch, which is in demand by growers to reduce water use and control weeds
- In partnership with UC Riverside, we have just initiated a new series of trials to evaluate control of avocado root rot, a fungal disease
- A large mulch study was started in 2019 to evaluate carbon sequestration (removal of CO², a greenhouse gas, from the atmosphere) in new citrus orchards
- A new study supported by the Thelma Hansen Fund will determine the profitability of high-density ‘GEM’ avocado plantings, which may accelerate grower returns. Since Gem is a newer variety, it needs to be studied to see what the long-term implications are for pruning, harvesting and economic viability
- To test alternatives to glyphosate (Roundup), two herbicide trials are in progress on both citrus and avocado. This research may provide growers with more treatment options, which is especially important in light of the lawsuits surrounding glyphosate
- Pomegranates are a crop that can potentially use runoff water from other crops or well water not suitable for other crops. Pomegranate nitrogen management research is helping to determine optimal fertilization practices for this crop
- We are investigating the effects of wildfires on soil structure, its chemical composition, and how it impacts suitability for crop production

Ben Faber, PhD – Subtropical Crops, Water, Soils Advisor

Advisor Ben Faber educating on cover crop field day



ISHB-infested poplar tree being removed



Infested poplar tree reduced to wood chips





Barns at UC Hansen Agricultural Research & Extension Center



4-H is a nationwide program designed to develop life skills, leadership, and responsibility through experiential learning activities and a positive youth development approach. It has served Ventura County youth since 1914. UCCE and the HAREC program staff oversee the local 4-H program, which includes community club activities and an agricultural literacy school enrichment program. This collective effort provides a robust, relevant and inclusive 4-H Youth Development Program able to effectively serve the county's diverse population.

"My 10 years in Las Posas 4-H has played a vital role in my decision to study Agriculture and Plant Science. While mastering skills to efficiently raise livestock, I also learned about the importance of abiding by consumer health and ethical farming standards. As an elected board member for three years, I was consistently challenged to speak in public, take on leadership roles, and refine my organizational and teamwork skills."

- Evan Tamayo, student, Cal Poly San Luis Obispo -

PROGRAM HIGHLIGHTS

- Fourteen 4-H Community Clubs and two Military Clubs with 515 members ages 5-18 provide a variety of hands-on projects under the guidance of adult volunteer leaders. Projects focus on STEAM (science, technology, engineering, art, math) education, healthy living, large and small animal science, leadership, and civic engagement activities
- HAREC: Year-round, county-wide 4-H agricultural literacy programs for grades K-12 include farm field trips, classroom outreach, an after-school Student Farm, and a Sustainable You! Summer Camp. Engaging, hands-on STEAM activities educate youth about Ventura County agriculture, nutrition, cooking, and sustainability, providing them with an opportunity to learn where their food comes from
- 137 community volunteers support our 4-H programming
- Partnerships with the City of Ventura and Ventura Unified School District enable us to stretch resources and extend program opportunities to youth by providing educators for student farm, summer camp, and field trips as well as transportation for youth from Title I schools to visit HAREC for Student Farm and field trips

COVID-19 IMPACTS

Cancellation of our Spring HAREC agricultural literacy programming affected in-person outreach to over 4,200 youth. However, it also created an opportunity to:

- Develop a HAREC Distance Learning webpage featuring agriculture, garden, and nutrition lessons, recorded story time and cooking demonstrations linked to HAREC YouTube channel
- Reinforce collaborations with the City of Ventura, leading to a virtual format for our 4-H Sustainable You! Summer Camp, which is offered free of charge as a community service to Ventura County families
- Partner with a network of statewide 4-H Youth Development Program educators to offer two weeks of virtual science-based summer camps, which were delivered to 4-H'ers throughout California

Likewise, 4-H community clubs rose to the challenge of the global pandemic by making quick adjustments to keep members engaged while sheltering at home:

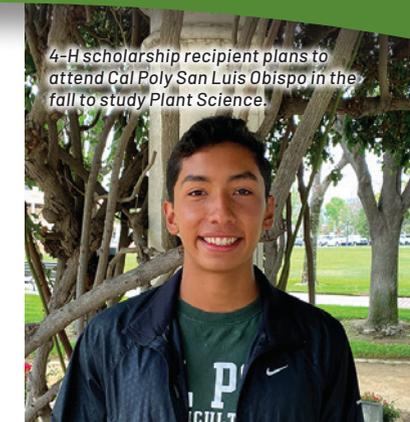
- Youth in 4-H sewing projects used their skills to sew and donate masks to local hospitals
- 4-H Food Faire, an annual event - planned to take place at a school on March 28 - became a recipe "how-to" video contest. The video submissions were posted on a newly created Ventura County 4-H YouTube channel
- 4-H Presentation Day - one of our largest annual events - became a video contest
- One 4-H member, who spent hours planning an outdoor event for younger children to earn her Emerald Star Award, quickly mastered the technology required to host the event virtually over Zoom
- Members of the Loma Vista 4-H Podcasting project interviewed each other, created and compiled audio recordings aired on KPPQ 104.1, the CAPS Radio station. The topic: How has COVID-19 affected their lives?

Valerie Zeko, MEd - 4-H Program Representative

Annabel Faris - 4-H Youth, Families & Communities Program Coordinator

Gwyn Vanoni - Education Specialist II

Susana Bruzzone-Miller, RDN - Youth, Families and Communities Program Manager



4-H scholarship recipient plans to attend Cal Poly San Luis Obispo in the fall to study Plant Science.



4-H events go virtual - Food Faire Video Contest participants



4-H Achievement Night recipients



Produce harvested by youth during farm field trips is sent home to share with families



Demonstration garden (HAREC)



Master Gardeners are highly trained volunteers who deliver UC science-based gardening information to Ventura County residents. They play a vital role in educating youth and adult audiences and assist with agricultural research projects at HAREC. There are currently 195 certified Master Gardener volunteers.

PROGRAM HIGHLIGHTS

- 36 new Master Gardener trainees graduated in May 2020
- Provided 11,226 hours of volunteer service, valued at \$336,219*
- Maintained nine demonstration gardens throughout Ventura County
- Delivered six hands-on drip irrigation workshops in English and Spanish that encouraged water-wise home gardens and landscapes
- Offered 19 gardening-related talks, attended by over 500 members of the public
- Conducted 14 community outreach events, resulting in 6,887 community contacts
- Provided home gardening support to 407 Ventura County residents through the Master Gardener Helpline, which provides free phone and email support to County residents
- Donated over 2,000 pounds of vegetables harvested from Master Gardener sites to local hunger relief agencies and over 1,400 vegetable plants to local schools and community groups.
- Constructed a new greenhouse at the ARC Enrichment Center in Ojai thanks to a generous donation from a Master Gardener
- Started a new partnership with Lowe’s Home Improvement stores to provide monthly outreach in their nursery

*Source: Independent Sector at \$29.95/hour

Master Gardener home gardening workshops inspired:

- ◆ 73% of participants to select low water-use plants
- ◆ 88% to improve practices growing edible plants
- ◆ 60% to spend more time gardening

Master Gardener hands-on drip-irrigation workshops inspired:

- ◆ 36% of participants to install drip irrigation
- ◆ 57% to start using mulch and other water conservation practices

MASTER GARDENER TRAINING CLASS MAKES BIG IMPACTS

Master Gardener trainees completed 70 hours of classroom instruction and 20 hours of hands-on training in our demonstration gardens across the County. Due to COVID-19, the last classes were completed virtually. Some of their contributions include:

- Camarillo Ranch House – designed and installed a California native plant garden demonstrating low water-use and pollinator-friendly plants in residential landscapes
- HAREC, Santa Paula – plant propagation, tree pruning and maintenance, design and installation of a native plant garden
- Agricultural Museum, Santa Paula – established vegetable gardens
- ARC Enrichment Center, Ojai – deciduous and non-deciduous fruit tree care and plant propagation
- California Veterans Home, Ventura – tree care and harvest from over 30 established fruit trees to supplement the diet of the facility’s residents
- Oxnard Historic Farm Park – planted historic Ventura County crops, including corn, sugar beets, lima beans, and barley, and thematic raised bed gardens

“I can’t remember the last time I enjoyed a program so much. I loved every part of it and look forward to continuing my education and volunteering wherever and whenever I am needed.”
- Rebecca M. -

INVASIVE PEST OUTREACH GROUP EDUCATES PUBLIC ON DEADLY CITRUS DISEASE

The Master Gardener Invasive Pest Outreach Group continued their work with the Farm Bureau and California Department of Food and Agriculture to raise awareness of and provide science-based information to the public on Huanglongbing disease of citrus and its insect vector, the Asian citrus psyllid (ACP). The ACP has been present in Ventura County for several years, but recently, the presence of the disease was indicated by special “sniffing dogs” trained in Florida to detect the causal bacteria.

Alexa Hendricks – Community Education Specialist



Advisor James Downer teaches tree pruning at HAREC



Laura Powell with fresh produce grown at the Arc Enrichment Center



Kei Zehr, Nicole Vanole, and Ruth Lee discuss health benefits of gardening at the Conejo Valley Wellness Festival



Peg O'Connor-Tressel and Alison Watase at the California True Colors Garden



Growers attend cover crop field day at HAREC



Pollinator mix in cover crop demonstration at HAREC



Alli Fish, Community Education Specialist



Barley cover crop at HAREC

Climate-Smart Agriculture addresses how to manage agricultural systems to meet the nutritional needs of a growing population while building resiliency to climate change and using agriculture as a solution to our climate crisis. To be effective, climate-smart agriculture must meet three main objectives: increase agricultural productivity and incomes; adapt to and build resiliency to climate change; and reduce greenhouse gas emissions.

UC ANR established a team of 10 education specialists throughout California that includes Alli Fish (formerly Rowe) in Ventura County. Fish educated and assisted farmers and ranchers in applying for California Department of Food and Agriculture (CDFA) funds to promote the adoption of climate-smart practices. Projects include:

- **The State Water Efficiency and Enhancement Program (SWEET)**, which encourages farmers to install more efficient irrigation systems that decrease water consumption as well as greenhouse gas emissions (up to \$100,000 is available per project)
- **The Alternative Manure Management Program (AMMP)**, which awards up to \$750,000 to livestock producers who decrease their methane emissions by changing the way that they manage manure
- **The Healthy Soils Program**, which encourages the implementation of conservation agriculture techniques that decrease erosion and greenhouse gas emissions, such as cover cropping, compost application, crop rotation, and mulching (up to \$75,000 per project). There is also the option to coordinate with a local resource conservation district or university on a healthy soils research and demonstration project of new practices (up to \$250,000 per project)

In 2019, Alli Fish, in partnership with other colleagues, established a large demonstration trial with numerous different cover crops, ranging from pollination mixes to low-growing ground covers, biomass producers, and leguminous soil builders. In December 2019 two well-attended field meetings were held for growers and other stakeholders, where participants could observe the cover crops and learn about soil health improvements, including compost and compost tea applications.

In 2020, she assisted growers in applying for the above CDFA programs, bringing \$450,000 in grants to Ventura County in support of climate-smart agriculture. She also wrote blogs on relevant topics such as cover crop selection, irrigation management and profiles of local growers who apply sustainable cropping practices. In addition, she assisted with the 4-H "Sustainable You" Youth Summer Camp. In March 2020, Alli Fish left UC Cooperative Extension Ventura in search of greener pastures on the East Coast. We extend our deepest gratitude to her for her excellent work and collegiality.

Alli Fish, MEM – Community Education Specialist

The Hansen Agricultural Research and Extension Center in Santa Paula provides field space and facilities to support research, extension and education activities and is part UC Cooperative Extension (UCCE) in Ventura County.

In December 2019, John Antongiovanni joined HAREC as the new Farm Supervisor. As a previous grower and farm manager in Kern County, he has extensive experience growing a variety of fruits and vegetables using conventional as well as organic practices. John Antongiovanni is responsible for the day-to-day operation and management of HAREC and provides field and logistical support for research and educational activities.

SPECIAL EVENTS

- In recognition of excellence in agricultural youth education, HAREC educators (staff and volunteers) received the **Educator of the Year Award** during the Fourth Annual Ventura County Ag Week in March 2020
- In the spring, we hosted plant pathology graduate students from UC Riverside, who learned about plant diseases in various research settings. Undergraduate students from California State University Channel Islands and Ventura College also made educational visits
- Elayne Harbert, an avid Master Gardener who passed away in 2019, was memorialized with the establishment of a rose arbor at HAREC and the **Elayne Harbert Endowment Fund** to support the VC Master Gardener program in perpetuity
- Volunteers and VC Master Gardeners participated in the **United Way of Ventura County Day of Caring** in September 2019 by helping to spread mulch in the Master Gardener demonstration garden
- In November 2019, HAREC participated in **Ventura County Farm Day**, an annual county-wide event organized by Students for Eco-Education and Agriculture (SEEAG) that is open to the public. About 100 visitors toured HAREC on hour-long wagon rides



Farm Manager John Antongiovanni



UCR Plant Pathology class visiting HAREC



Volunteers spreading mulch on United Way Day of Caring



Dragonfruit flower at HAREC

True to the mission of the land grant universities, UC Agriculture and Natural Resources connects the power of UC research in agriculture, natural resources, nutrition and youth development with local communities to improve the lives of all Californians.

LEVERAGING THE POWER OF UC ANR

County-based advisors and community education specialists work closely with colleagues and specialists throughout the state, bringing expertise and research and extension funding to Ventura County.



UC ANR Public Value Statements

Promoting economic prosperity in California

Developing a qualified workforce in California

Safeguarding abundant and healthy food for all Californians

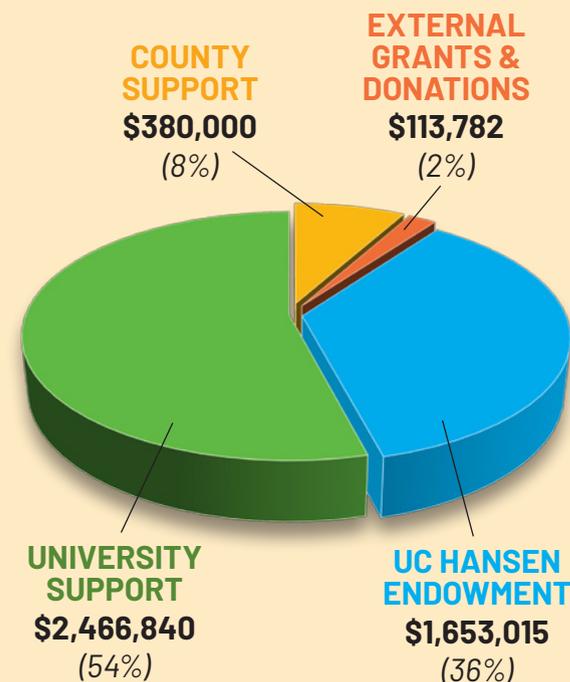
Protecting California's natural resources

Building climate-resilient communities and ecosystems

Promoting healthy people and communities

Developing an inclusive and equitable society

UC Agriculture and Natural Resources VENTURA COUNTY



TO DONATE: <https://donate.ucanr.edu/>



THELMA HANSEN FUND

Thelma Hansen was a farmer's daughter from Saticoy who studied mathematics at UC Berkeley in the early 1900's and later returned to the area to continue farming. Her generous bequest in 1993 created the Thelma Hansen Fund, a UC endowment that supports and maintains University research and extension activities for the sustainability and benefit of agriculture and natural resources in Ventura County.



THELMA HANSEN RESEARCH SYMPOSIUM AND POST-FIRE FOOD SAFETY WORKSHOP

On February 27, 2020, approximately 150 people attended the Thelma Hansen Research Symposium held at the Crowne Plaza Hotel in Ventura. This annual symposium highlights research funded by the Thelma Hansen Fund (THF) and convenes scientists that address topical issues relevant to Ventura County agriculture and natural resources. This year's theme was "Sustainability through Soil Health". Invited speakers were Dr. John Idowu, a Soil Science professor from New Mexico State University; Dr. Jeffrey Mitchell, a UC Cropping Systems Specialist; and Dr. Lynn Epstein, a Plant Pathology professor from UC Davis. The event was free and open to the public.

In the afternoon, a Workshop on Post-fire Food Safety of produce and eggs was held by Julia Van Soelen Kim, UC Food Systems Advisor in Marin, Mendocino, Napa, and Sonoma Counties; and Dr. Todd Kelman, a veterinarian at the UC Davis.



UCCE and HAREC Staff
 Back row: Andre Biscaro, Alexa Hendricks, Anthony Luna, Matthew Shapero, Stephanie Gomez, Brandy Allee, Valerie Zeko,
 Front row: Patti Verdugo Johnson, Gina Ferrari, Leon Preciado, Julie Clark De Blasio, Susana Bruzzone-Miller, Annabel Faris, Annemiek Schilder

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 Ben Faber
 Matthew Shapero

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Gina Ferrari
 Anthony Luna
 DeAnna Vega

COMMUNITY EDUCATION SPECIALISTS

Julie Clark De Blasio
 Alexa Hendricks
 Alli Fish
 Gwyn Vanoni
 Valerie Zeko

Hansen Agricultural Research & Extension Staff

EDUCATION & OUTREACH

Susana Bruzzone-Miller
 Annabel Faris

FIELD & FACILITY

John Antongiovanni
 Jose Hernandez
 Leon Preciado
 Santos Ramirez

UCCE/HAREC Support Staff

Brandy Allee
 Stephanie Gomez
 Patricia Rodriguez
 Patti Verdugo Johnson

We wish to thank our volunteers as well as the many community partners and collaborators for their dedicated service and support that helps enrich the lives of Ventura County residents.

VOLUNTEERS

4-H
 Hansen Advisory Board
 Master Gardener
 Research Advisory Committee

COMMUNITY PARTNERS & COLLABORATORS

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 ARC Enrichment Center
 Baron Brothers Nursery
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 California Association of Pest Control Advisers
 California Avocado Commission
 California Avocado Society
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 Metropolitan Water District
 Moorpark Library
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 Ojai Valley Land Conservancy
 Orange County Parks
 Oxnard Historical Farm Park
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 Resource Conservation District of Ventura County
 Rio Farms
 Riparian Invasion Research Laboratory - UCSB
 Santa Clara River Conservancy
 Society of Municipal Foresters
 South Coast Habitat Restoration

Southwest Wetlands Interpretive Association
 Sundance Berry Farms
 The Britton Fund, Inc.
 The Growers of Ventura County
 The Huntington Library, Art Museum, and Botanical Gardens
 Thousand Oaks Goebel Center
 Thousand Oaks Library
 TreePeople
 Tri-Tech
 UC ANR Opportunity Grants Program
 UC Santa Barbara
 UCLA Institute of the Environment
 University of OK Biological Survey
 U.S. Fish & Wildlife Service
 U.S. Forest Service - Forest Health Protection Program
 U.S. Forest Service - Los Padre National Forest
 U.S. Forest Service - State and Private Forestry
 USDA Natural Resources Conservation Service
 Ventura County Agricultural Commissioner
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 Ventura County Board of Supervisors
 Ventura County Cattlemen's Association
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 Ventura County Planning Department
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 Ventura County Resource Conservation District
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 Ventura Unified School District
 Veterans Home of Ventura
 West Coast Arborists
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 Yara International



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669 County Square Dr., Suite 100 • Ventura, CA 93003
(805)645-1451 • ceventura.ucanr.edu/



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287 So. Briggs Rd. • Santa Paula, CA 93060
(805)525-9293 • harec.ucanr.edu/

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Ventura County 4-H

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CloverLines

http://ceventura.ucanr.edu/Families_-_Communities/Newsletter/

Landscape Notes

http://ceventura.ucanr.edu/Environmental_Horticulture/Landscape/

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