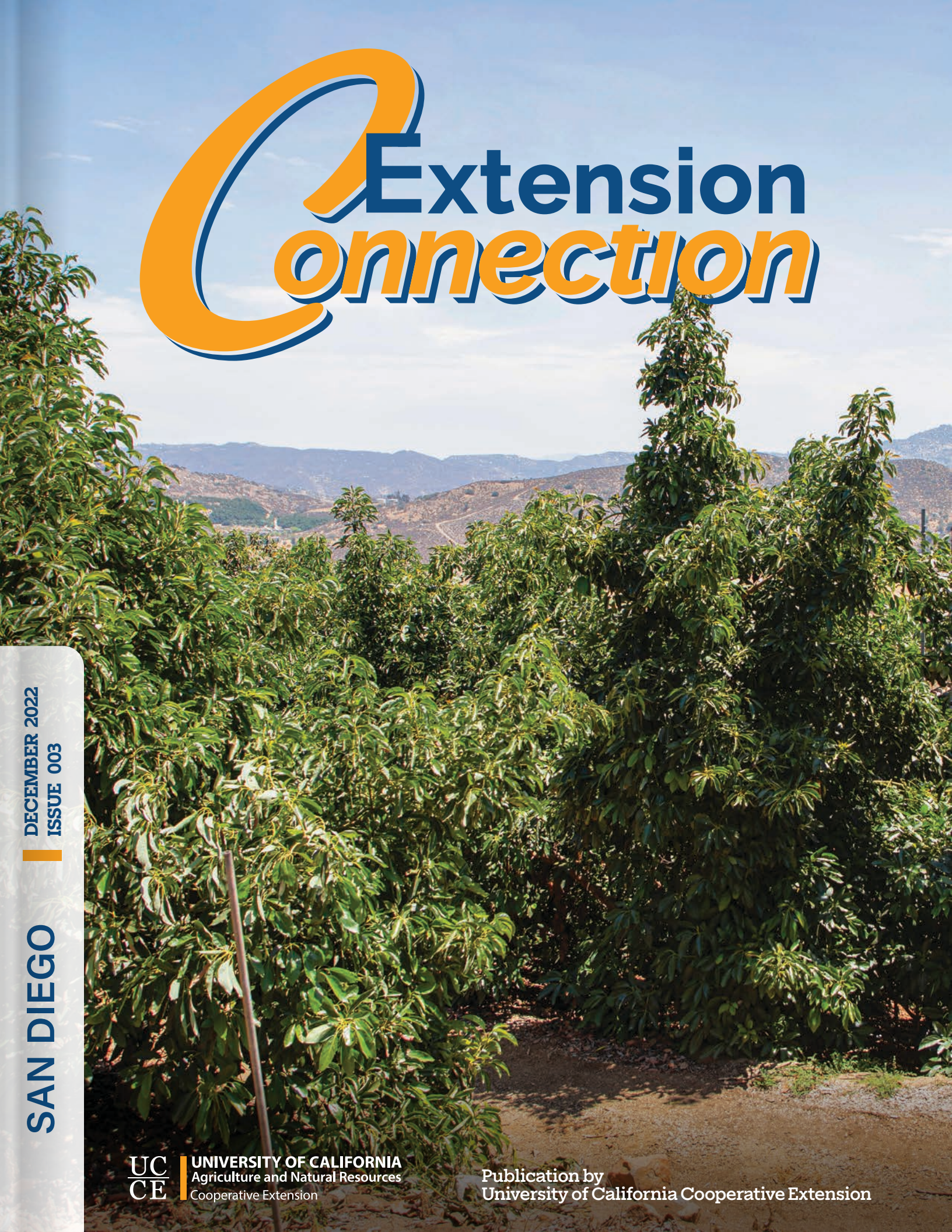

Extension Connection

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INTRODUCTION FROM OUR

County Director

Dear Readers,

Among the notable happenings during this quarter, UCCE San Diego took part in the AgTech hackathon. Our participation originated from the City of Escondido's initiative to establish an AgTech incubator that unites agricultural institutions, agricultural technologists, venture financial groups, governments, stakeholders, growers and more.

Provided that funding is available, I believe that the center can be utilized by UCCE San Diego and other collaborators to implement educational events and demonstrations addressing topics like vertical growing, hydroponics, and pest diagnosis. I envision a community kitchen benefiting programs like the Master Food Preservers and extend their impact within the San Diego community.

I had the pleasure of working with officials of the City of Escondido, particularly with the Deputy Director of Economic Development and Ag technologists & innovators. This endeavor is being considered by higher officials of UC ANR. "UC ANR can confirm that it has a significant interest in exploring the use of a potential Ag Tech Incubator to house University research projects pursuant to the UC ANR mission and the research conducted by the local UC Cooperative Extension office for San Diego County," said Vice President Glenda Humiston.

Our advisors organized various extension events that will take place starting this December, including workshops on organic farming and crop pest management. I hope our growers, stakeholders, PCAs, and more will take advantage of these upcoming educational workshops.

Another highlight this quarter is the designation of two UC campuses, UC Merced, and UC Santa Cruz by our UC President, as an Agricultural Experiment Station (AES). The two campuses will join UC Berkeley, UC Davis, and UC Riverside as AES campuses.

Last but not least, we welcome two new cross-county advisors who have recently come onboard, Luca Carmignani as an Assistant Fire Advisor and Stephanie Mar an Organic Materials Management Advisor. Rhiannon Willingham joined UCCE San Diego as community Education Specialist II. Carmignani and Mar are headquartered at the South Coast Research and Extension Center (SC REC) with a cross-county assignment to San Diego and Los Angeles counties. As wildfire, drought, and organic waste are challenges to our county, these two programs are expected to play valuable roles in developing solutions across our county.

As we come closer to the holiday season and the end of 2022, I would like to wish everyone happy holidays and a Happy New Year in 2023!

Oli Bachie, PhD
UC Cooperative Extension San Diego County Director

Agricultural Land Protection, Preservation, and Planning

Improving stakeholder assistance for agricultural land planning regionally.

One of the newest programs supported by UCCE San Diego is the Sustainable Agricultural Lands Conservation (SALC) program. Agriculture in the San Diego region is a unique piece toward food security: it leads in avocado and nursey crop production, and is host to more small, part-time, and certified organic farms than any other county in the nation. San Diego is also the second most populous county in California, with the majority of inhabitants living along the 70 miles of coastline and adjacent to low density rural agricultural communities. However, resource, land, climatic, and development pressures are transforming San Diego and its local food systems, community health, and economic state. SALC is one statewide program aiming to improve agricultural land use plans and developments in line with urbanization while advancing equity and opportunity in California.

A potential easement site in Southern California.

The Sustainable Agricultural Lands Conservation Program protects agricultural lands at the urban-rural fringe from sprawl development by safeguarding existing parcels, supporting coordinated land use planning, and contributing to a healthy agricultural economy. The SALC Program is a component of the California Strategic Council's Affordable Housing and Sustainable Communities Program (AHSC) and administered by the California Department of Conservation. SALC is a component of California Climate Investments, a statewide program that allocates billions of Cap-and-Trade dollars toward reducing greenhouse gas emissions, strengthening the economy, improving public health and the environment – particularly in disadvantaged communities. The program was initiated in 2014 and has offered funding for three types of projects – planning, acquisition, and capacity and project development grants.

Planning grants offer funding to develop and implement plans for the protection of agricultural lands at risk of conversion to non-agricultural uses. Generally, planning projects allow local governments, Tribes, and policy makers to collaborate with stakeholders to develop community visions and strategic plans. These plans allow for regional growth, while addressing landscape-level, water, climate, and economic changes. SALC has funded 27 planning grants throughout the state: four of these projects have been awarded to Southern California, including a Round 6 grant to the San Diego Local Area Formation Commission that is currently underway.

Photo By: White Buffalo Land Trust

Acquisition grants offer funding to protect agricultural lands under threat of conversion to non-agricultural uses. The idea is to place voluntary easements on properties at the urban-rural fringe to protect them from development and preserve them as agricultural parcels. For reference, an easement is an agreement established between a landowner and land trust or conservation buyer to protect their land as agricultural working lands. Through Round 7, total awards made through the SALC program is approximately $300 million dollars, supporting 142 easement projects, 2 fee-title acquisitions, and 27 planning grants. Projects span across 42 counties and cover 142,000 acres to be conserved. In Southern California, there have been six successful acquisition projects, albeit all outside of the San Diego region. To address regional and programmatic barriers, both UC ANR research and the local SALC planning grant are exploring challenges to participation in both the planning and acquisition grants. The County of San Diego offers a similar program, known as the Purchase of Agricultural Conservation Easement (PACE), which has successfully conserved over 1,500 acres in the region.

Lastly, capacity and project development grants ("capacity grants") offer funding to expand organizational capacity toward the development of agricultural conservation acquisition projects. For the first time this year, this project type became available to local governments, Tribes, land trusts, and non-profit organizations. Capacity grants were incredibly popular this year: up to $3 million dollars is available for funding capacity grants for Round 8. An additional $3 million dollars are to be made available for the same purpose in each of the two subsequent solicitations for a total of three solicitations.

Stehly Farms (Valley Center)

In 2020, UC ANR and the Department of Conservation entered a partnership to fund two regional Academic Coordinators, based out of Southern California and San Joaquin Valley. Our roles are to actively increase SALC Program engagement with partners and stakeholders, provide technical assistance, and enhance the capacity of underserved communities. Both regions have exhibited lower rates of participation and subsequently fewer

funded SALC projects than in other regions in California, likely due to technical assistance, capacity, and knowledge barriers. This partnership will encourage eligible applicants to develop SALC projects and apply for SALC Program funds.

Much of our focus on research, education, and outreach aligns with the mission of UC ANR – to serve Californians in agriculture, natural resources, and health. In the first year of activities, we conducted a needs assessment and outreach plan to outline regional barriers and gaps and identify solutions through outreach. Several themes emerged and were provided as recommendations for the SALC Round 8 Guidelines that were released this past spring. We have also held multiple conversations at regional workshops and at statewide conferences throughout the year to continue discussing barriers and opportunities to SALC program participation.

From the outset, we expanded education and outreach efforts significantly to connect our stakeholders to UC ANR services and resources, begin meaningful conversations on land use issues and strategies, and encouraged the use of climate-smart opportunities. To date, we have presented at over 50 workshops for both new and engaged entities to improve familiarity with SALC. We also directly have connected with many new California Native American Tribes for their input and interest in SALC. To boost interest in the program, we created a clear and simplified blueprint to the guidelines and regionally-specific examples and visuals.

Recently, we conducted a regional survey assessment to interview multiple Round 8 Planning grant eligible and partner entities. One key finding was that SALC remains an excellent way to strategize planning for accelerated land use change and protection while providing momentum to increase working lands for specialty

Coffee berries at the Flower Fields (Carlsbad)

crops; and that this work complements other necessary tasks and plan updates. However, capacity is a limiting factor: staff resources and time are often already allocated or invested elsewhere, and planning is difficult without collaborative efforts. Based on projections of future interest and capacity, we determined that outreach activities and technical assistance are an integral method to support capacity regionally by offering grant writing assistance and providing examples specific to Tribes, water districts, groundwater sustainability agencies, and generally other eligible grantees in need of assistance.

As the SALC program moves towards Round 9 of funding, we will continue to increase regional education and outreach on SALC Programs and related land conservation programs. We are actively working with other UC ANR Academic Coordinators, Advisors, and Specialists to strengthen sustainable agriculture in the UC ANR Statewide Climate Smart Agriculture program; and the UCCE Climate-Resilient Agriculture program, a new program that disseminates current and relevant research, information, and resources to promote climate resiliency in the region. We are also partnering with other SALC technical assistance providers, both the Cultivate team and Helianth team, to offer widescale services across the state for a diversity of eligible entities and communities.

To learn more about UCCE's research, education, and outreach activities supporting the mission of the Sustainable Agricultural Land Conservation program, we invite you to contact program Academic Coordinators directly, check out the Department of Conservation and Strategic Growth Council websites, and subscribe to the Department of Conservation SALC page.

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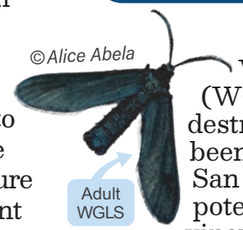
FlightSensor Monitoring for Western-Grapeleaf Skeletonizer

Flightsensor technology to monitor western-grapeleaf skeletonizer in southern california vineyards.



In the past few years, the Western grapeleaf skeletonizer (WGLS) *Harrisina brillians*, a destructive pest on grapevines has been detected in Temecula and San Diego vineyards and the potential of expanding to more vineyards is a concern. The Western grapeleaf skeletonizer is a moth first discovered in California in the 1940's and over the years it has spread throughout the state, however it does not occur in all grape production areas.

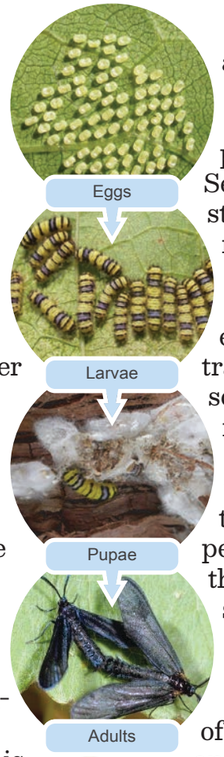
Normally, the grape skeletonizer population is kept under control by the natural presence of a granulosis virus that infects the larvae, or by the action of insect parasites. If the virus is not present in the vineyard, the insect population will grow, and the amount of leaf damage will increase with each generation. To look for this pest in the vineyard, inspect the border vines at bloom and search for the larvae on the underside of the leaves. The larvae are voracious foliage eaters that leave the main veins behind after they feed on the leaves producing a distinctive lacy-skeletal pattern easy to recognize. If unchecked,

A group of Harrisina metallica larvae skeletonizing a leaf. (Credit: Zindor)

the grape skeletonizer can cause partial or complete defoliation in a matter of weeks affecting food reserves of vines and exposing the fruit to sunburn. The larvae is also a nuisance to the field workers when they get in contact with them due to the presence of poisonous hairs at the end of the body.

Currently the grapeleaf skeletonizer is monitored with a pheromone lure in a sticky trap. Pheromones are chemicals that trigger a response to individuals of the same species, in this case the lure mimics the 'smell' of a female and males attracted to the lure get caught in the sticky trap. Traditionally, the role of insect trapping has been used to monitor the presence of pests that pose a threat to crops, however, data recording from conventional sticky traps is labor intensive and inaccurate since is recorded 7-14 days after insects have been caught. It is important to highlight that the purpose of insect traps and lures is to monitor pest populations to time effective management techniques to control the pest.

As a response to the grower's concern, in the spring of 2022 a collaboration of the University of California Cooperative Extension with FarmSense Inc, and Temecula and San Diego wine growers, a pilot project was initiated to monitor the skeletonizer in using a new patented FlightSensor trap developed at the University of California, Riverside. These traps use artificial intelligence, are wireless and have a unique sensor with a learning algorithm that" train the trap" to recognize the pest, once detected, delivers alerts as text to a smart phone app or web dashboard. FlightSensor is a promising alternative to sticky traps using pheromones, but more research is needed.



The first step is to validate the efficacy of the trap by comparing traditional sticky trap and FlighSensor data, both with lures, then using real-time monitoring data construct a pest population model to predict the population cycle. By targeting the most vulnerable stages of the pest at the right time will maximize the efficacy of the control method and subsequently will reduce grower's costs.

Currently there is no assessment of the status of the pest in the region and if funding is granted, the goal of the project will be to develop a research-based area-wide management program with treatment options. The information produced will be communicated to the growers to advise them the timing to start monitoring, and what treatment options are effective to control this pest.

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Agave Mites: A Tiny Menace

An invisible enemy that threatens many agaves in San Diego County.

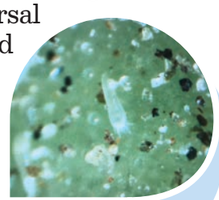
Agave are a common sight in Southern California and are frequently used in landscaping for homes, businesses, and in public spaces. You've almost certainly seen agave growing in your neighborhood and may even have some growing yourself. Many varieties of agave are grown in San Diego nurseries to keep pace with the demand for these plants across the state and country. As the climate continues to warm and California becomes increasingly dry, hardy and water-conscious plants like agave will more frequently be used in xeriscaping and as ornamentals.

Greasy spots and lesions caused by agave mite feeding.

However, there is an almost invisible enemy that threatens many of these agave. Greasy streaks and smudges appear on leaves, followed by lesions and plant decline. Sometimes, the entire core of the agave collapses. The plants look sickly and unattractive, dismaying homeowners and nursery growers alike. What is causing this damage?

IDENTIFICATION

The answer are tiny agave mites, invisible to the naked eye. Agave mites, also known as grease mites, are a type of Eriophyoid mite. Like other Eriophyoid mites, agave mites are elongated and have a wormlike appearance, with 4 small legs positioned around their head. Adults are a translucent pale whitish color and lay oval translucent eggs. Depending on the temperature, agave mites can complete a lifecycle and develop from eggs into adults in just a few weeks. Agave mites are very small: Adults are around 1/3 mm long and 50 microns wide while eggs are around 20 microns wide. You will not see them at all unless using a microscope or powerful hand lens. While the exact species is currently unknown, agave mites are believed to be in the genus *Oziella*. Their method of dispersal is also unknown, but it is assumed they catch air currents and drift on the wind to find new hosts like other Eriophyoid mites do. If conditions are correct, mites like these can travel hundreds of miles on the wind.

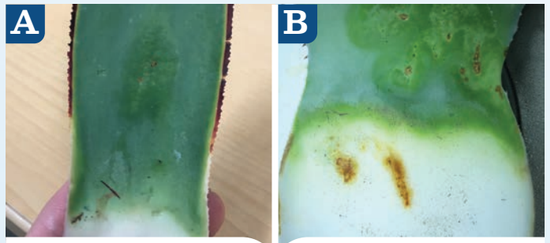


Agave mite with eggs around it.

DAMAGE

Agave mites feed on the surface of agave leaves, living hidden at the very base of leaves or inside the core of the agave. If they are present, they are almost always on the whitish, unexposed leaf tissue and are unlikely to be found on visible sections of leaves. Feeding and damage takes place out of sight, and symptoms only appear once the damaged leaves have grown out. By the time damage is observed, the agave

plant is already well infested with mites. To find the mites themselves, the agave must be cut open and leaves peeled away.



A *Blue glow agave w/ greasy section (mite damage).*

B *Parry's agave w/ active mite damage (yellowish lesions).*

Agave mites live and feed on the white sections at the base of leaves.

Agave mite damage is often easily recognizable but can also be subtle. Agave mites are colloquially called grease mites and with good reason: the most characteristic sign of agave mite feeding is a greasy smudge or streak appearing on agave leaves. It will often look like someone dipped their thumb in grease and left a fingerprint on the leaf surface. These greasy spots can be small or hidden in the event of minor infestations. Areas around greasy spots frequently appear yellowish and will lack the powdery blue-white surface color that many agaves have. When infestations are more severe, greasy spots can be seen all over the plant, and lesions or dying plant tissue are present in the greasy areas. Mites concentrated at the core of the plant can severely damage the new leaves and cause the core to collapse from their feeding.

HOST PLANTS

Multiple species and varieties of agave are susceptible to agave mites. While most agave appear to be suitable hosts, there is still uncertainty about which varieties experience the most damage. Blue glow agave (*Agave attenuata x Agave ocahui*) and Parry's agave (*Agave parryi*) are two commonly grown ornamental agave that can be heavily damaged by agave mite, but other susceptible species include *Agave americana, A. celsii Nova, A. franzosinii, A. guadalajarana, A. isthmensis, A. macroacantha, A. palmeri, A. parryi var. truncata, A. potatorum, A. parrasana, A. shawii, A. titanota, A. weberi, and A. xylonocantha*

A *Blue glow agave*

B *Parry's agave*

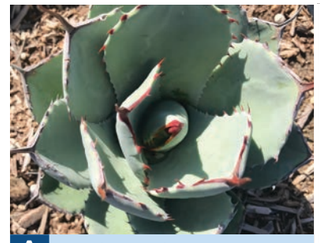
MANAGEMENT

Management of agave mite is both difficult and not well understood. Their small size and hidden feeding locations make agave mites extremely hard to detect, and by the time damage is found it is too late to prevent the agave from being infested with mites. Vigilance, persistence, and a willingness to make difficult choices is required to effectively manage agave mites.

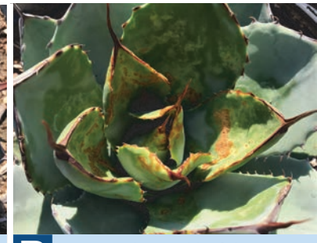
Prevention is key to agave mite management. For both home gardeners and commercial growers, make sure you can recognize the symptoms of an infected agave, and don't bring in other agave that show signs of a mite infestation. Proactively monitor your agave for symptoms so you catch any mite outbreaks as early as possible. If you do find symptoms, you have a difficult choice to make: Get rid of the infested plant and hope the mites haven't already spread, or keep it and hope the symptoms do not become progressively worse or that the mites spread to other uninfected agave. Commercial growers should err on the side of caution and proactively remove agave showing signs of infestation, especially if the symptoms are advanced. For home gardeners, the choice is harder. If you don't mind some cosmetic damage, agaves can frequently tolerate mite damage without dying. However, this is a risk, and you may end up with some very sad-looking and damaged agave if you choose this route and don't dispose of infested plants. If you do dispose of infested plants, make sure they are kept in a sealed container to prevent mites from spreading on air currents, and preferably keep it downwind of any other agave you have. If you handle an infested plant, make sure you sanitize or wash your hands and any tools used before moving on to other agave plants.

Saving already infested plants is difficult. One extreme option involves coring an infested plant and waiting for new pups to emerge. To do this, remove most of the inner leaves with scissors or a knife, and then destroy the agave core with a drill fitted with a shovel bit. Be sure to collect and promptly dispose of the macerated tissue and remove all the leaves on one side of the plant to ensure water does not pool in the now damaged and removed center of the agave. Removing the core and some of the inner leaves should in theory remove most of the mites, which tend to live at the base of inner leaves. If this is successful, the agave should still survive, and will produce pups even though it will no longer be able to grow itself. This technique is best used in combination with chemical control to increase the chance that mites are eliminated. For commercial growers, it is unlikely to be feasible due to the time it takes to implement. Again, this is an extreme option that is not guaranteed to work, and will result in serious damage to your plant, so only use it as a last resort.

While some predators like predatory thrips and Phytoseiid mites do feed on

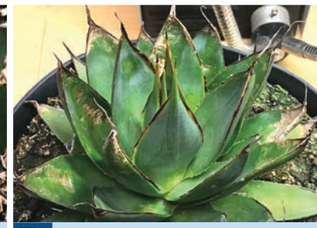


A *Undamaged agave*



B *Severe internal leaf damage*

C *Extensive mite damage*



D *Extensive mite damage*

B, C and D are heavily infested with agave mites with severe damage. Agave with similar symptoms should be removed and to prevent spreading.

Gerry Spinelli examining young agave used in current research trials.

Eriophyoid mites, it appears unlikely they can access most agave mites living deep inside agave plants. While predators may provide some measure of control and could potentially prevent new agave mite infestations from starting, they will probably not eliminate already-present agave mites.

Miticides labeled for use against Eriophyoid mites may be effective against agave mites. The biggest challenge is finding a miticide that can affect agave mites protected in the core and at the base of leaves. For this reason, systemic insecticides like Savate (Spiromesifen) and Kontos (Spirotetramat) appear promising, although contact insecticides like Akari (Fenpyroximate) could also work if very thorough coverage is achieved. Similar products have been effective against other Eriophyoid mites but have not been directly tested against agave mites. Anecdotally, agave plants can grow out of the damage caused by agave mites if treatments eliminate infestations. However, this takes time, and effective treatments have not yet been established for agave mite.

In short, there are currently few options to treat infested agave plants. While some miticide treatments exist, little is known about their efficacy against agave mite. There are many unknowns and preventing agave mite infestations from occurring in the first place seems to be the best option for home gardeners and commercial growers alike.

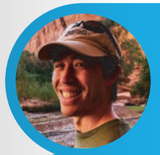
CURRENT RESEARCH

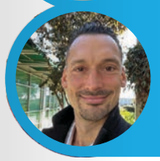
To help determine how best to manage agave mites, UC Cooperative Extension advisors Eric Middleton and Gerry Spinelli are currently conducting research on various agave mite treatments. Working in collaboration with the Center for Applied Horticultural Research, we began a series of trials in October 2022 to better understand agave mite biology and management.

Our research will consist of 3 main experiments. First, we will test how long it takes for clean agave plants to become infested with mites when already infested plants are placed nearby, and how far mites can travel from these infested plants. Second, we will determine which commercially available miticides are effective at cleaning up agave mite infestations. Two different species of predatory mites, *Amblyseius swirskii* and *Neoseiulus californicus* will also be tested to see if they can eliminate agave mite infestations. Finally, using the miticides and predators that worked in the previous experiment, we will conduct a long-term experiment over the course of a year to evaluate if these control options can prevent agave plants from becoming damaged and infested by agave mites.

CONCLUSIONS

Agave mites are a difficult pest to manage and can be a serious problem on multiple types of agave. Being proactive and removing infected plants is currently the best way to protect your agave from mite infestations. Recognizing agave mite symptoms and being ruthless with eliminating plants is key to preventing damage. Research on management options is just beginning and there are still many unknowns, so please contact us if you are having issues with agave mites at your nursery, if you have questions, or if you think there is something we should know about. Stayed tuned for future results and hopefully some better news on how to manage this tiny menace!





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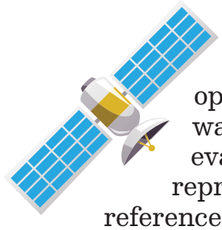
Satellite-Based Irrigation Tools

User-friendly satellite-based irrigation tools to manage irrigation water more efficiently.



The water requirement of a crop must be satisfied to achieve optimum potential yields. The crop water requirement is called crop evapotranspiration and is usually represented as ETc. By combining reference evapotranspiration (ETo) and the proper crop coefficient (Kc), crop water use (ETc) can be determined as ETc = ETo × Kc. ETo is an estimation of evapotranspiration for short grass canopy under a well-managed, non-stressed condition. ETo is the main driver to estimate or forecast crop water needs. There are user-friendly satellite-based irrigation tools available that may assist growers to schedule irrigation more effectively. These tools provide ETo forecast for up to six days in the future or/and actual ET at the scale of individual fields. This article introduces three satellite-based irrigation tools including FRET, IrriSAT, and OpenET. A comparison of the estimated daily crop water needs utilizing OpenET tool and actual ET measured for a period of 150-day is also presented for an avocado grove in the San Pasqual Valley, Escondido.

FRET (FORECAST REFERENCE EVAPOTRANSPIRATION)

A new alternative to weather station ET is forecast reference ET or FRET (**Fig. 1**). The National Weather Service offers FRET data on the Graphical Forecasts page of their website. FRET is one option in the digital forecast database display, and you can zoom in to find ETo

data for your field up to six days in the future. In other words, FRET will help growers to have forecast ETo up to the next six days and more effectively schedule irrigation. FRET is currently available at digital.weather.gov/. This tool is particularly very useful to forecast crop water requirements and schedule running hours of irrigation system ahead of heat waves.

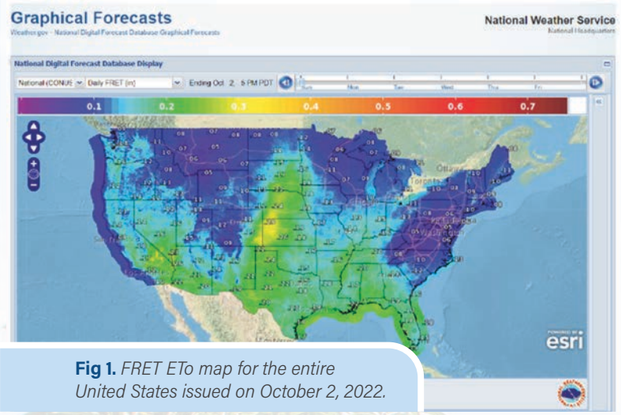


Fig 1. *FRET ETo map for the entire United States issued on October 2, 2022.*

IrriSAT

IrriSAT is a weather-based irrigation management and benchmarking technology that uses remote sensing to provide site specific crop water management information across large spatial scales (**Fig. 2**). IrriSAT uses satellite imagery to estimate crop coefficients (Kc) at a 30 m resolution. It calculates Kc from a linear relationship with satellite derived Normalized Difference Vegetation Index (NDVI). Daily crop water use is determined by simply multiplying Kc and daily reference evapotranspiration (ETo) observations from a nearby weather station. A beta version of

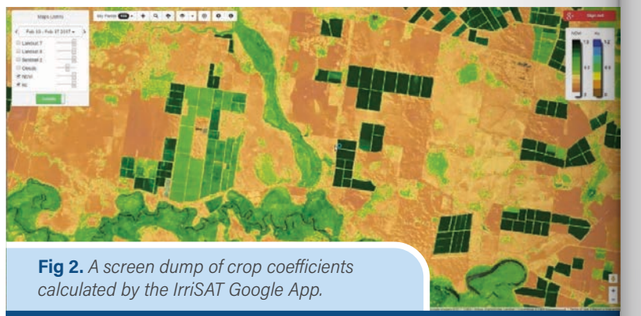


Fig 2. *A screen dump of crop coefficients calculated by the IrriSAT Google App.*

By combining reference evapotranspiration and the Landsat derived crop coefficient, crop water use can be determined on a 30m x 30m basis such that: ETc = ETo × Kc.

the app is currently available at irrisat-cloud.appspot.com/, developed using Google App Engine.

OpenET

OpenET is a new online platform that uses satellites for mapping evapotranspiration (actual ET) at the scale of individual fields, and currently can be used in 17 western states (**Fig. 3**). OpenET is produced at a spatial resolution of 30m x 30m (0.22 acres). Daily, monthly, and cumulative ET data are now available on the OpenET Data Explorer. OpenET is currently available at openetdata.org/.

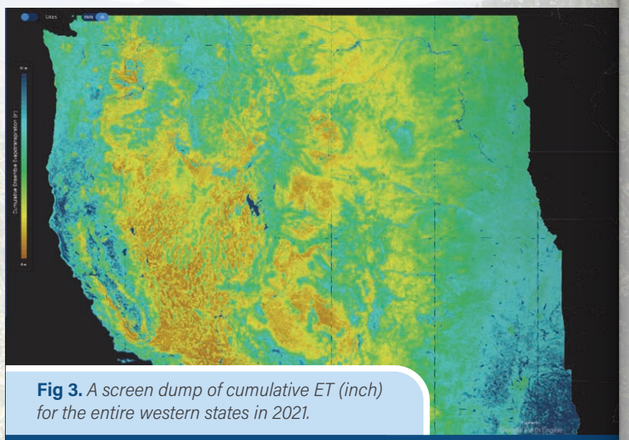


Fig 3. *A screen dump of cumulative ET (inch) for the entire western states in 2021.*

You may zoom on the OpenET map to find your orchard for a specific time (daily, monthly, yearly) and explore the data.

OpenET currently includes seven models that are developed based on full or simplified implementations of the surface energy balance (SEB) approach or relies on surface reflectance data and crop type information to compute ET as a function of canopy density using a crop coefficient approach for agricultural lands. The model acronyms are eeMETRIC, geeSEBAL, DisALEXI, SSEBop, PT-JPL, and SIMS. In addition, OpenET provides the OpenET ensemble values calculated from an ensemble of the above six models.

OpenET to estimate crop water requirements of avocado groves. A case study was conducted to estimate daily ET values in an avocado grove in the San Pasqual Valley, Escondido over a 150-day period (May 1st, 2022, through September 27th, 2022). The experiment was carried out in nearly 3-acre (south facing row orientation) of this 8-acre avocado grove. The ET estimated from the OpenET models, and the OpenET Ensemble were evaluated versus the actual ET measured using the residual of energy balance approach (**Fig. 4**) with a combination of surface renewal and eddy covariance equipment.

The actual ET (measured) varied widely throughout the study period.

Fig 4. *Ground view of surface renewal and eddy covariance ET station at the avocado site in Escondido.*

The ET ranged between 0.03-inch d−1 (May 20th and September 9th) and 0.23-inch d−1 (May 13-14) (**Fig. 5** - **Pg. 15**). The cumulative ET, average daily ET, and maximum daily ET were 26.78, 0.18, and 0.23-inch, respectively (**Table 1**).

Comparing the cumulative ET and daily ET values estimated from the OpenET models and measured from the surface renewal equipment indicated that both geeSEBAL and SIMS models provide an accurate estimation of ET for the experimental site (an average of 2% cumulative ET difference). All other OpenET models and the OpenET Ensemble overestimated

Table 1

	Ensemble	eeMetric	SSEBop	SIMS	PT-JPL	DisALEXI	geeSEBAL	Measured
Cumulative ET	23.84	30.10	18.36	27.16	22.70	17.70	27.47	**26.78**
Maximum Daily ET	0.23	0.33	0.17	0.26	0.23	0.18	0.29	**0.23**
Minimum ET	0.06	0.11	0.05	0.09	0.05	0.05	0.06	0.03
Average Daily ET	0.16	0.20	0.12	0.18	0.15	0.12	0.18	**0.18**

Table 1. *Cumulative ET, maximum daily ET and average daily ET estimated by the seven OpenET models and measured using surface renewal equipment in an avocado orchard the San Pasqual Valley, Escondido. The comparison was conducted for a 150-day period (May 1st, 2022, through September 27th, 2022). The ET values are reported in inch.*

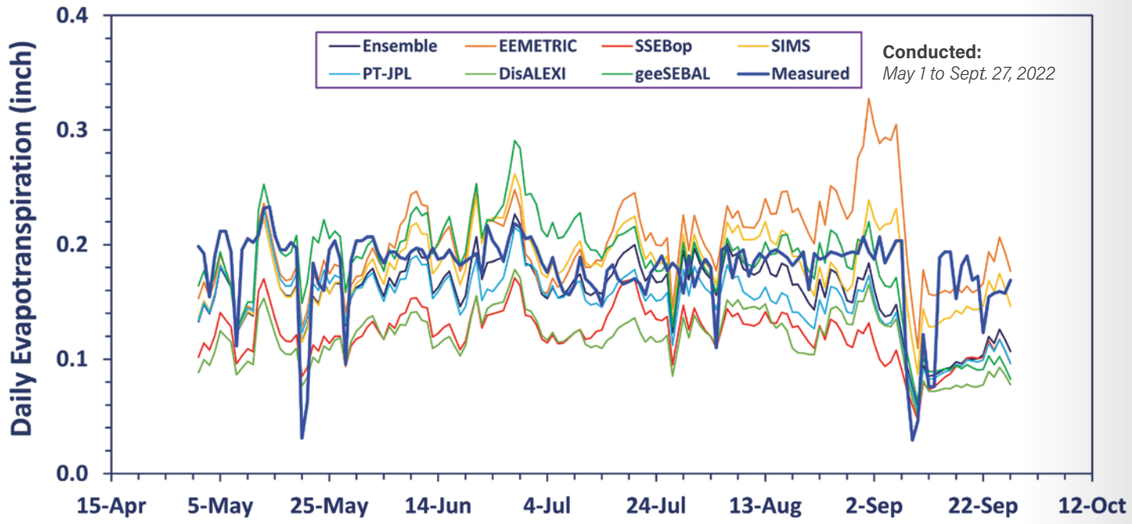


Fig 5. *Daily evapotranspiration (ET) estimated by the seven OpenET models and measured over 150-day period using surface renewal equipment in an avocado orchard the San Pasqual Valley, Escondido.*

the ET of the avocado site from 11-12% (Ensemble and eeMETRIC models) to 51% (DisALEXI model).

RECOMMENDATIONS

While more comprehensive efforts will be conducted to evaluate the accuracy of OpenET under different canopy features, row orientations and environmental conditions for avocado orchards, this case study demonstrates a good agreement between the results of OpenET (geeSEBAL and SIMS models) and field measurements for an avocado site. As a user-friendly satellite-based irrigation tool, it is recommended growers consider using OpenET to manage water and fertilizer more efficiently.

Excess irrigation can be considered beneficial water use for salinity management in avocado groves. In other words, 2.2 ac-ft/ac actual ET reported for the experimental avocado site over the 150-day study period is only avocado crop water use over the period. The amount of additional irrigation water to effectively drain salt from the crop root zone depends on the soil conditions and effective rainfall. The irrigation water that needs to be applied in an individual orchard depends on crop water requirements, irrigation system efficiency, salt leaching requirements, and excess water to mitigate heat stress during potential heat waves.

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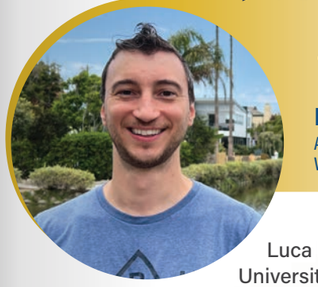
Meet the Team

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

Meet our Advisors



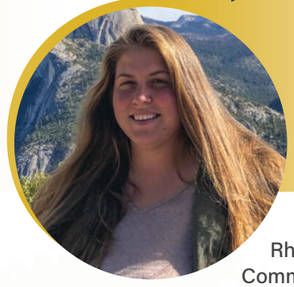
Luca Carmignani, Ph.D.
Assistant Fire Advisor
Wildland-Urban Interface

Luca has recently joined the University of California Agriculture and Natural Resources as an Assistant Fire Advisor to promote fire resilience in Southern California. He is based at the South Coast Research and Extension Center in Irvine.

Previously, he was a postdoctoral researcher at the Berkeley Fire Research lab at the University of California, Berkeley. Luca's research is focused on fire and combustion applications, from wildland fires to material flammability.

He graduated from the Joint Doctoral Program between the University of California, San Diego, and San Diego State University in Engineering Sciences, after obtaining his bachelor's and master's degrees in Aerospace Engineering from the University of Pisa (Italy). Luca's research interests include image analysis, computer programming, and scientific outreach.

Meet our Staff



Rhiannon Willingham
Community Education Specialist II

Rhiannon Willingham is the new Community Education Specialist II for the San Diego County 4-H program. Though she is new to her role she has never been a stranger to the 4-H program. She has over 20 years involvement.

She was able to attend the National 4-H Conference and meet with her local representatives to advocate for the program. She attended conferences across the U.S and in Canada. She was selected to be a 2009-2010 California 4-H State Ambassador. She is currently a California 4-H State Ambassador Advisor.

She found passion in people and food. She worked in the hospitality and restaurant industries for over a decade, managing businesses like Bowlero Bowling Centers and the Legoland California Hotel restaurants. She had the opportunity to travel and help open several businesses all over California and even in South Korea. Her work has come full circle back to her true passion of 4-H and youth development.

In her spare time Rhiannon loves to travel whenever possible. She enjoys baking and cooking. She loves to host dinner parties with friends.

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Calendar

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

DECEMBER

SOUTHERN CALIFORNIA INVASIVE WILDLAND AND URBAN TREE PESTS WEBINAR

- December 7th
- Virtual Workshop - Zoom
- Event Registration and Information

ORGANIC AGRICULTURE WORKSHOP

- December 8th
- San Diego Farm Bureau Office
- Event Registration and Information

JANUARY

4-H SOUTHERN YOUTH SUMMIT

- January 13th–15th, 2023
- Pathfinder Ranch, Riverside County
- Event Registration and Information

MASTER GARDENER: FREE GARDEN TOOL SHARPENING AND ROSE PRESENTATION

- January 14th - 9am to 11:30am
- Coronado Public Library
- Call MG Hotline for more information: (858) 822-6910

MONTHLY OUTREACH EVENTS - WITH OUR FLORICULTURE AND IPM ADVISORS

- Last Wednesday of Each Month - Starting January 25th, 2023 at 1pm
- San Diego Farm Bureau Office
- Topics TBD. Watch for updates on our Website Calendar or Social Media.

Extension Connection

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AND A

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