



CAPCA ADVISER

JUNE 2020 | VOL. XXIII, NO. 3



California Association of
Pest Control Advisers

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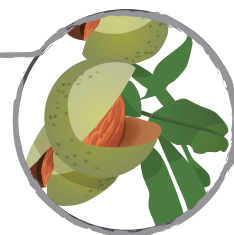
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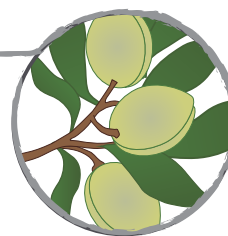
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CAPCA

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From the Editor

CAPCA 2020 Conference Update

The recent months have brought a lot of changes and challenges to how we all live and do business. We are mindful of the of ever-changing situation with COVID- 19 and are closely monitoring the recommendations from the CDC, WHO, federal, state and local officials.

Based on this, CAPCA would like to advise our readers that at this time we have no reason to believe that CAPCA Conference will not occur in Disneyland on October 11 – 13th. However, in these uncertain times, as Disneyland is currently closed indefinitely, we do not feel that we can start promoting the event and processing funds. We are pressing pause until June 1st. It is our hope that we will be able to begin active event coordination and open registration for the October event at that time.

Please note that since we have put all planning on pause you won't see any Conference acknowledgement pages in this issue, as we want to be respectful of those who might have submitted forms that are still in process.

We appreciate the continued support by you, our members, sustaining members and industry supporters and will continue to provide updates as things develop.

Ruthann Anderson, Editor
ruthann@capca.com



CAPCA EDITORIAL STAFF

Ruthann Anderson - Editor
Joyce Basan - Deputy Editor
Crystelle Turlo - Individual Membership & Chapter Projects
Sylvia Stark - Advertising Sales Manager
Rachel Taft - Executive Assistant
Adam Barsanti - Outreach Relations Manager

Graphic Design - Rosemary N. Southward
southwardr@comcast.net

MISSION & PURPOSE

California Association of Pest Control Advisers (CAPCA) is a non-profit voluntary mutual benefit association that represents 75% of the 4,000 California EPA licensed pest control advisers. *CAPCA's purpose is to serve as the leader in the evolution of the pest management industry through the communication of reliable information.*

CAPCA is dedicated to the professional development and enhancement of our members' education and stewardship which includes legislative, regulatory, continuing education and public outreach activities.

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Resiliency the new norm

Rick Harrison, CAPCA Chair

COVID-19. There it is once again, that word that no one wants to hear and that which has been uttered constantly throughout the globe for the last few months. As much as we don't want to hear it, it has impacted every level of our society. As a manager at Nutrien Ag Solutions in Oxnard, I have observed many aspects of this biological virus on our industry. One can't help but wonder what impact this unexpected reality is having on CAPCA and PCAs throughout California.

During this challenging time, CAPCA staff and the Executive Board are continuing to provide our members with options for obtaining their CE hours. Many of you were planning to attend our Spring Summit to fulfill those CE hours, but unfortunately, meeting in our traditional format isn't an option during the quarantines. Fortunately, CAPCA is launching an online program with the same professional education you have come to expect during these meetings, so it will be possible to get your hours online.

Coinciding with the publication of this June Adviser, CAPCA staff are scheduling an email explaining the new online CE program being introduced in May. As a CAPCA member, you can take advantage of this program for CDPR CE Hours. In the program we have included talks previously scheduled for our Spring Summit, as well as collaborated with staff from Kings County and Riverside County to provide relevant and approved online material. If you do not receive an email, please check our CAPCA website or call us with your questions.

Along with online CE hours, CAPCA staff and the Executive Board continue to engage in advocacy and the value of responsible pesticide use. COVID-19 has brought more U.S. EPA registered pesticides into our homes than ever before. Products like chlorine bleach and various sanitizers are now more commonly used and essential in keeping families safe. Now is a great opportunity to educate others about how these products go through years of health and safety evaluations as part of the registration process and before being offered to the consumer. It is important for them to read and follow the label properly.

As safety and cleanliness continue to be key issues for PCAs and their growers, not-so-common items like facemasks and gloves, frequent hand washing, and social distancing are the new norm in the workplace. Consumers, now more than ever, want to know their food is handled properly and is safe to eat. We have always maintained a high degree of safety in California agriculture, more than any other state, but this special circumstance requires more awareness and effort on our part. Based on feedback from PCAs and growers, extreme effort has been made to make safety a top priority, even with the scarcity of PPE items.

We are fortunate enough to be part of an industry that is vital under any circumstance. While others may be jobless, we continue to fulfill the essential workers' responsibility in our state. When you have 80% of the population of America living in big cities, and they are the hardest hit by COVID-19, the demand for readily available fresh produce is more important than ever. This is why our job is so important as we facilitate growers who are feeding America and the world. This new norm has been a testament to the resiliency and necessity of our industry. Staying the course in good times, bad times, and in between is essential because people have to eat and we are here to make that happen. ■

NEW FROM CAPCA

CAPCA Ed Online CE

In the midst of challenges facing licensees in obtaining Continuing Education (CE) for renewal in 2020, CAPCA has established a pathway to meet the needs of members through CAPCA Ed Online CE. Courses will feature both webinar-based learning and interactively formatted content to meet your CE needs with the professionalism you expect from CAPCA Ed.

CAPCA is piloting the platform for our Active and Associate members during the month of May for free. Be on the lookout for an email with more details or contact the CAPCA office to get started!

Our goal was to build a system that is compliant but flexible to changing requirements from CDPR and to be inclusive of all pesticide handlers. It is our intention to provide California Department of Pesticide Regulation approved content in English and Spanish for PCA, QAL, QAC, Aerial Applicators and PAC. So if your growers or an applicator in your crew are in the same spot that you are - looking for relevant CE hours - we will have additional content available to non-members starting June 1st.

The CAPCA CE platform will be full of collaborations across the industry, as researchers, ag commissioners, and others still need a space to perform required outreach to growers, applicators and PCAs this season while adhering to public gathering limitations and social distancing. We look forward to bringing CAPCA Ed Continuing Education to your keyboard! ■

CAPCA

Dedicated to Supporting PCAs

MISSION & PURPOSE

CAPCA's mission is to facilitate the success of the PCA and to represent our 3,000 members who provide pest management consultation for the production of food, fiber and ornamental industries of California.

CAPCA's purpose is to serve as the leader in the evolution of the pest management industry through the communication of reliable information.

CAPCA is dedicated to the professional development and enhancement of our members' education and stewardship, which includes legislative, regulatory, continuing education and public outreach.

Photo: Fred Rehman, Elysian Fields



CAPCA



Government relations in the time of COVID-19

George Soares, Kahn, Soares and Conway, LLC

Mid-March 2020 was the equivalent of free-falling off a cliff. Suddenly the unknown was upon our lives in ways that virtually no one in America had experienced in their lifetime. COVID, shelter in place, social distancing, essential services, curbside waves, masks and more instantly became part of our vocabulary and conduct, and remains so as we move into the summer months.

State Government was no different. COVID hit like a thunderbolt. The State Legislature mostly shut down until early May. Thousands of bills, then pending hearings and votes, were put on hold and most are done for the year. Tax dollars are now in short supply and a long list of ideas to spend the states rainy day fund evaporated.

The Governor began operating by Executive Order—seldom used but deemed essential during the pandemic—and shut the state down except for essential services. No surprise that the exception included all aspects of agriculture, and with it came a temporary re-awakening of what our industry provides us all every day.

While there has been little thought about food security in recent decades—no shortage in the stores will do that—priorities shifted and we were essential again. People standing in lines for food, over-buying the basics, and stockpiling out of fear of the unknown became headline news. While never a good thing, this back to basics mentality temporarily renewed interest in such agrarian issues as the production, processing and delivery of food, fiber, ornamentals,

flowers and a lot more that comprise this essential industry.

In the midst of all this, CAPCA has kept a watchful eye on the state regulatory process which historically has had a life of its own; each siloed agency grinding along often in defiance of good judgment and uncaring about the larger community in which we all exist. This message was recently delivered to the Governor in a pointed request by a coalition including CAPCA that all but essential (there is that word again) proposals be postponed to allow for more deliberation and opportunity for public input.

A letter along these same lines is being drafted by CAPCA and others as this article goes to print outlining numerous regulations and laws which will have negative economic impacts and greatly slow, if not stall, the industry's economic recovery. CAPCA intends to widely distribute the letter within the Newsom Administration and the Legislature, and will be looking to its members to spread the message far and wide.

The Department of Pesticide Regulation too often fits the description of government overreach by elevating its actions to the level of a crusade to reshape its defined purpose and eliminate essential crop protection tools and offer little in the form of suitable replacements. As a result, PCAs face mounting challenges in recommending effective pest control and essential farmers ponder their future. ■





NorCal and Sutter Buttes CAPCA Chapter members at the James Gallagher fundraiser on March 12, 2020 in Yuba City, CA. The two chapters each matched \$1,000 to the PAC to support Assemblyman James Gallagher's campaign.

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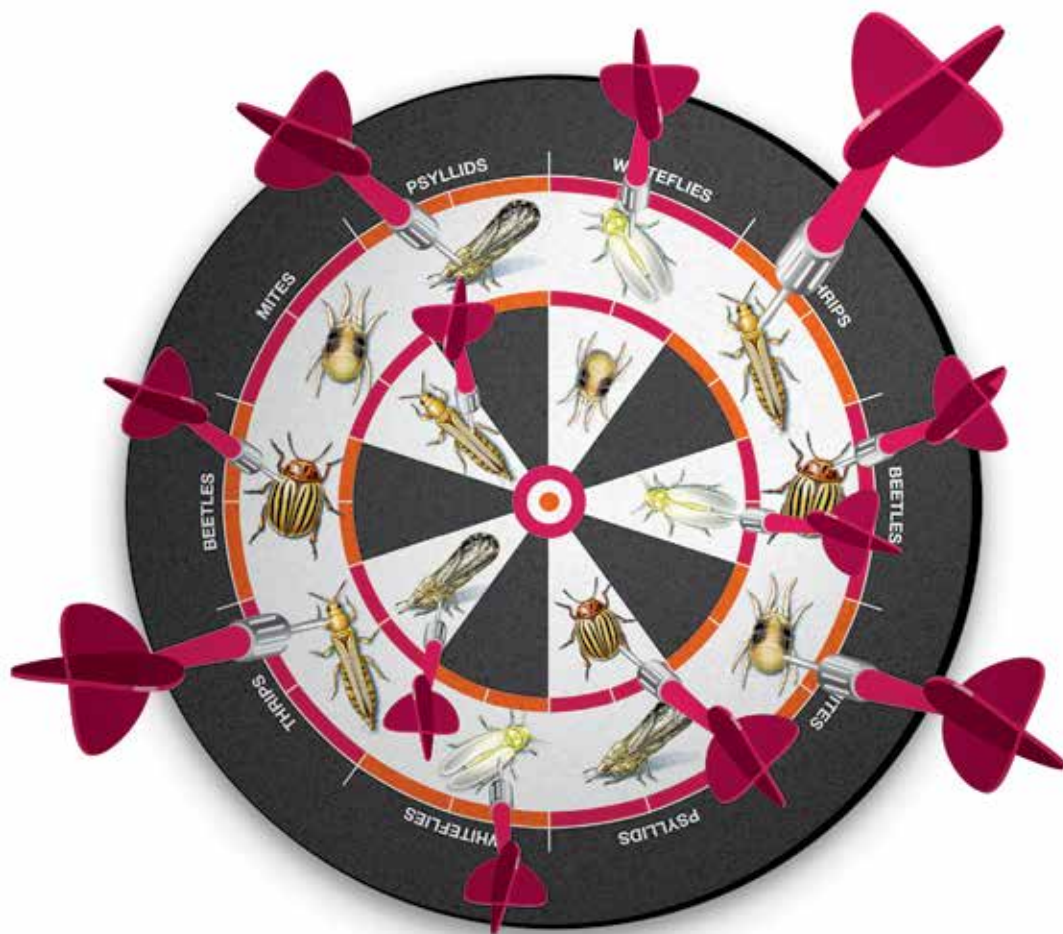
PCA Profile: Ventura Chapter's Patricia Dingus

By CAPCA Staff

Patricia Dingus graduated from Cal Poly, San Luis Obispo with a Bachelor of Science degree in Crop Science-Agronomy and a Plant Protection minor. In addition to her PCA license, which she obtained in 2009, Patricia is a Certified Crop Adviser and also holds a QAL. The major crops she consults in are strawberry, caneberry, vegetable, lettuce and leafy greens. Her areas of specialty are coastal crops (berry and vegetable).

She has worked for Ocean Breeze Ag Management as an in-house PCA in strawberry and caneberry, and for Coastal Growers Supply in caneberry, strawberry and row crops. Currently, Patricia works for Yara International as the regional sales manager for California's coastal region. "My main responsibilities are assuring consistent supply in season of our crop nutrients when needed by our customers," she says. "I work to understand what the grower standard fertility programs are and develop value proposals that are a reasonable return on investment, as well as support PCAs with agronomic analysis of crop nutritional needs based on soil and tissue reports." Her role also includes technical training for their full portfolio of products, developing field demos for improved crop quality and yield, and building a strong collaborative team of co-workers that supports their Coastal market. "I'm always increasing my agronomic knowledge and adding to my agri-business skills," Patricia explains. "The most important part is the close working relationships with advisers and their growers! That's my favorite part of my job."





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Patricia has two college-age children: Josiah is at Portland State University studying mechanical engineering and Olivia attends Cal Poly Pomona and studies chemical engineering. When not working in California agriculture, Patricia enjoys hiking, horseback riding, gardening and backyard barbecues with family and friends. “Sourdough breadmaking is a recent passion; the best part about sourdough is the sharing of loaves and eating them.”

Recalling her early career, she says one of the highlights was the first time a grower called up to tell her they were giving her more acres to take care of. “I felt happy and freaked out at the same time. Happy because it was a reminder that my professional work was valued. Freaked out because it meant my professional work was on the line. Even now I still remember that day.” Patricia says one her personal keys to success is the growing network of trusted friends and colleagues: “People who live out their values and lead by example - these individuals are brave, curious, always learning and growing. They inspire me to be my best and to do more than I believed I was capable of accomplishing.”

Asked when she knew she wanted to become a PCA, Patricia jokes, “When I first noticed their awesome trucks! But seriously, life sciences have always interested me. I love growing things - trees, flowers, onions, tomatoes - anything that grows. When I became aware of the PCA career, I knew it was the perfect fit for me. The added bonus was the trusted friendships that developed with my peer group, ranch managers, harvest managers and others. Really, it’s the awesome people I get to work with on a daily basis.”

To describe her job to someone outside the industry, Patricia explains it this way: “I am a doctor for crops. I observe and assess using visual and analytical tools, including tissue and soil reports, to develop a prescription or nutrient that will keep the plant healthy and flourishing.”

When talking about the value CAPCA membership has for her, Patricia says, “As a CAPCA member, I feel that my dues are defending and supporting my license and my livelihood.” She thinks CAPCA involvement has a lot to offer PCAs: opportunities to engage in government relations and advocacy locally as well as state level, offering quality CE meetings, student mentorship, and the opportunity to develop a professional network and interact with people working in different cropping’s. Asked about the value for

newer PCAs, she notes the benefits she has seen, “Beyond the basics of the membership, involvement means building and growing friendships, meeting individuals that are working outside my crop focus, as well as developing a professional network and leadership skills through volunteering at the local level.”

Patricia volunteers with her local Ventura Chapter, serving as a Director on the State Board. “I volunteered for this role as a way to observe the workings at the state level.” She’s also very proud of the work the local Ventura Chapter does: “Our local chapter has an annual golf tournament that is a scholarship fundraiser. Our local agriculture industry, as well as the agriculture suppliers are very supportive. Every year our local chapter awards scholarships to students from Ventura county who are either planning on becoming PCAs or studying an agriculture discipline. Every year when the recipients are announced and receive their scholarships, I feel very proud of being a part of an organization that is making long-term investments into the future of our industry.” ■





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CAPCA Membership benefit explained: The CAPCA website

Crystelle Turlo, Individual Membership & Chapter Projects Director

CAPCA continues to develop and provide exclusive benefits for our Active members. One of the benefits that we are proud to offer is a “members only” section of our website. This area has been created to ensure our members have access to important information when they want it and when it is convenient.

If you do not have an account, sign up today. It really is simple!

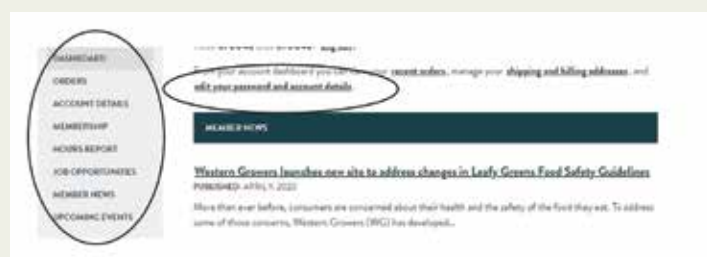
There are two ways you can sign up for an account. When paying dues for 2020, you can sign up for an account when completing the order:



When you are creating your “username”, keep in mind that this will be permanent. Using an email that may change is not recommended since you will need to create a new account if you want that username to be different in the future. A couple good choices for usernames are to use your PCA license number or perhaps your first and last name.

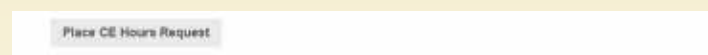
If you have already paid your dues, simply contact the CAPCA state office to have an account set up for you.

Once you have an account and have logged in you will have access to the member dashboard:



From the dashboard, you will have access to the “only Member” pages. Check your hours, see available job opportunities and read exclusive news from Agri-Pulse. You can edit your password and your account details from this page too.

You can also request an Official CE Certificate from the website. From the “hours” page, just complete the form and click on the button.



Paying your CAPCA dues is very simple as well. After logging into your account, scroll to the top and hover over the “Membership” button, and click “Renew Membership.”



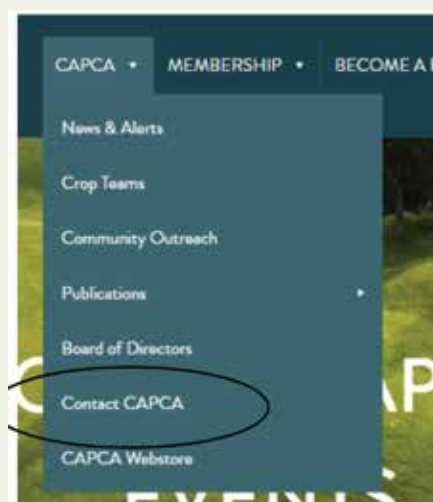
From there, just follow the prompts!

A few helpful hints:

- Paying your dues online will not force your hours to appear instantly. After completing your payment on the website, please allow 3-5 days for CAPCA to process your payment before expecting to see your hours on the website.
- Your username is permanent. Your password is not. Passwords can be updated through the website. Be aware that if you are using an outdated email, the new password prompt will not be able to be delivered. Remember to update your account when there is a change.
- Allow at least 30 days for your hours to appear from recently attended courses. This time will allow the sponsor to verify attendance/registration and for the data to be processed accurately by the data processing center. If you do not see hours from a recently attended course on your hours report, try contacting the sponsor first to find out if they have turned in the course. If the hours are in and it has been over 30 days, CAPCA can research the missing hours.

If you need assistance, please reach out to the CAPCA state office. Contact information can be found by scrolling to the top menu, hovering over the “CAPCA” button and clicking on “Contact CAPCA”.

We hope that with this information, navigating the CAPCA website is now easier and more convenient. ■



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Legislature focuses all efforts on budget, dropping many bills

Brad Hooker, Agri-Pulse Associate Editor

The Legislature has been closed for business during what would normally be the two busiest months of the year. With the Senate and Assembly now expected to return on May 4, lawmakers will have little time for debating any bills not related to the state budget and that go beyond the most critical issues, particularly the state's response to the COVID-19 pandemic and related economic fallout.

"When it comes down to it, there are only two issues that need to be addressed - the budget and an economic stimulus package," says Louie Brown, an attorney with Kahn, Soares & Conway.

More than 2,000 bills were introduced to the Legislature in February. Yet only a handful made it to committee before the capitol shuttered its doors on March 16.

One of those bills proposed to increase fines on pesticide spray drift incidents to ensure "repeat offenders and bad actors" are held accountable, according to the author, Bay Area Assemblymember Rebecca Bauer-Kahan. Ag interests raised eyebrows over a five-fold increase in those fines and about the Department of Pesticide Regulations assuming control over investigations that traditionally have been the territory of county ag commissioners. Republican members of the committee reviewing the proposal argued it usurped local control. Yet the measure passed along party lines.

In a normal year, the bill would go through several more committee and floor debates before the Legislature could pass it to the governor's desk. If the past is any indication, the bill already faced an uphill battle, since an identical measure failed in 2017.

The one slight leg up that might give the bill some slight chance of survival is that it currently is not tagged for the Appropriations Committee. With the status of the budget highly uncertain, any bills that could add a cost to the state and do not relate to COVID-19, wildfires, or homelessness are expected to be left behind. Legislative leaders this week asked their committee chairs to "put on pause" all other bills.

"The budget is where most, if not everything will happen this year," said Louie Brown. "Of course, the governor could always call a special session to deal specifically with COVID-19 and possibly, the economy."

One bill likely not to make it into the budget is a two-year bill that was reintroduced in January. Assembly Bill 1071 proposes a new grant program to help farmers adapt to the impacts of climate change. To do so, the measure would need \$2 million from the budget.

Irvine Republican Asm. Steven Choi was proposing another grant program that was aimed at helping schools transition to organic pesticides. It called for studying the financial impacts on school districts for banning chemical pesticides. While the bill does not spell out a specific request for funding, it would likely add a cost to the state for implementing the pilot program.

Gov. Gavin Newsom is expected to release the "May Revise" of his budget proposal just the week after the Legislature reconvenes. He has indicated in press conferences that this proposal will be a "workload budget," meaning the same budget as the current fiscal year with any new funding trimmed out. The governor was careful last year to limit any ongoing funding as much as possible for the current budget, allowing him to simply not renew funding for many programs in the event of a recession.

While the Legislature is expected to return in May, it may not see much action until later in the summer, after the governor's lockdown order has been lifted and it is safe for lawmakers to meet within the confined spaces of the capitol - or they have been able to amend constitutional rules to allow them to meet remotely.

The debate will center around an onslaught of trailer bills following the approval of a budget in June. Similar to the intense lobbying efforts taking place in Washington, D.C., over rescue packages, lawmakers will be balancing an avalanche of requests from interest groups.

With agriculture, many of those requests will focus on relieving regulatory burdens for farmers. The air, water and pesticide departments within the California Environmental Protection Agency are scheduled to decide on a number of regulations in 2020. This includes new regulations on Telone, neonicotinoids, water quality and groundwater sustainability.

"With trying to discern which ones would make potential sense for a blanket hold, as of right now, a lot of them have been put on delays for two weeks or 30 days so we can reassess the situation," CDFA Sec. Karen Ross told Agri-Pulse in an interview. "It's premature to say how that will be ultimately handled."

Editor's Note: Agri-Pulse is pleased to partner with CAPCA, providing members with information about regulatory and legislative issue in California. ■

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Benefits by the numbers

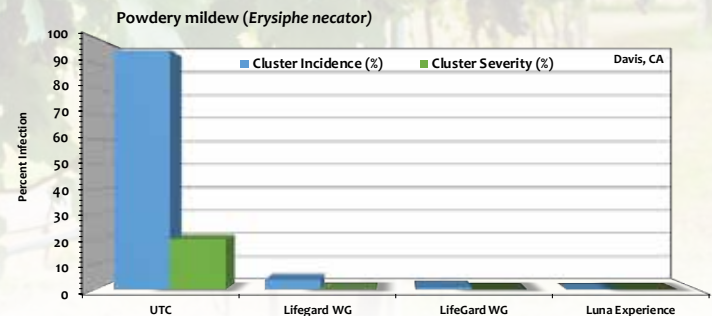


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Fire blight, Flyspeck/Sooty blotch, Powdery mildew
- **Cucurbits**
Powdery mildew
- **Almonds & Carrots**
Alternaria

LifeGuard on Grapes



- Variety: Chenin-blanc, 4 yrs. old
- Treatments: 7 applications from April 30th – July 20th on 14 day intervals
- University of California - Davis

1. APPLICATION

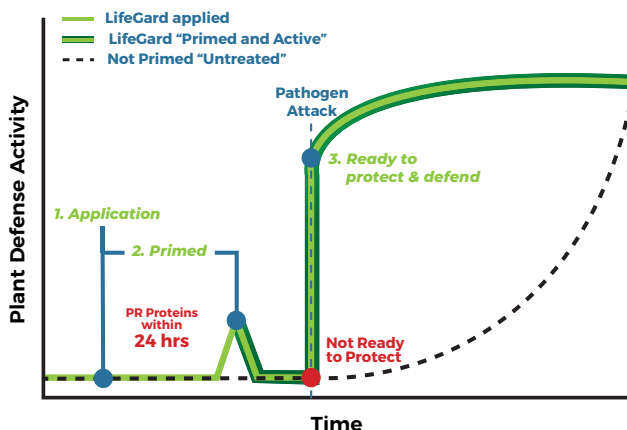
LifeGuard is applied early, ideally the first spray of your disease management program as a preventative application before disease occurs.

2. ACTIVATION

BmJ bacterium lands on the plants, induction or "activation" initiates. LifeGuard spores trigger the SAR process by directly activating the NPR1 proteins within 3 hrs. PR proteins spread throughout the plant within 24 hrs.

3. DEFENSE & ATTACK

The plant responds with a cascade of metabolites that resist infection and the development of disease. Once the plant's natural immune response activates, it remains primed and resistant to disease for up to 18 days.



Powdery mildew (*Erysiphe necator*)



Untreated Control



LifeGuard® WG
 4.5oz/100 gal
 (1-7)

- V Variety: Chardonnay, 31 yr. old
- Treatments: 1 = Jun 3rd; 2 = Jun 15th; 3 = Jun 27th; 4 = Jul 11th; 5 = Jul 26th; 6 = Aug 9th; 7 = Aug 22nd
- Induce surfactant 0.125% used with LifeGuard
- Geneva, NY - Cornell University



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CAPCA Annual Financial Report

for period ending
December 31, 2019

Organization:

CAPCA is a California non-profit 501(c)(6) mutual benefit corporation.

Base of Reporting:

2019 financial statements were prepared using an accrual basis of accounting. Property and equipment purchased were capitalized and depreciated over their useful lives.

Income Tax Status:

CAPCA and Regional Chapters, Stanley W. Strew Educational Fund, and the CAPCA Political Action Committee are exempt from income taxes under IRS code sections 501(c)(6), 501(c)(3) and 527 respectively.

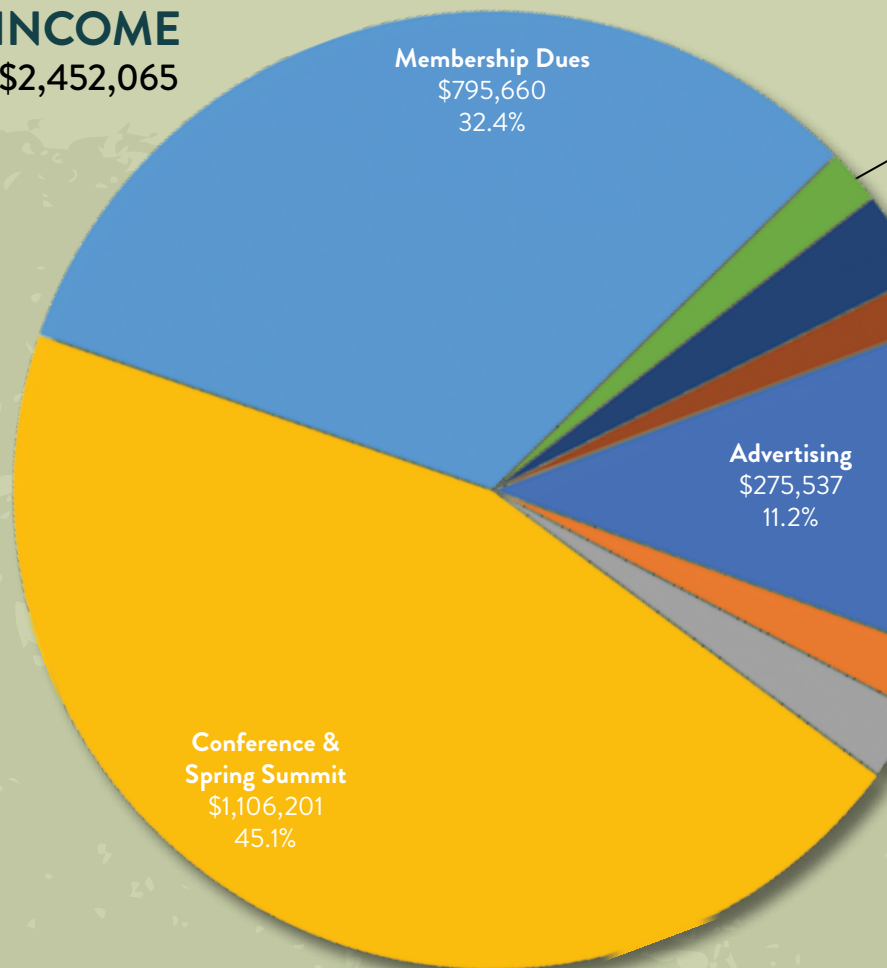
Functional Expense Allocation:

85% of expenses are directly related to CAPCA's purpose and mission. Only 15% is spent on general administration.

The CPA firm of Boden Klein & Sneesby performed a financial audit of CAPCA, Stanley W. Strew, Regional Chapters and the CAPCA PAC accounts. They found all financials to be in order. ■

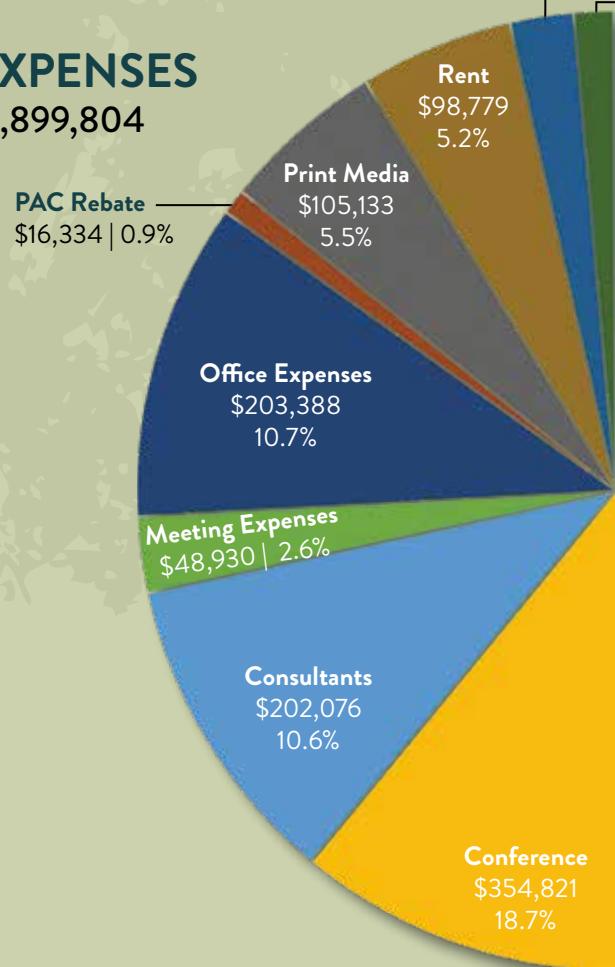
2019 INCOME

Total = \$2,452,065



2019 EXPENSES

Total = \$1,899,804



Rental Income/Misc/Donations

\$45,770 | 1.9%

Unrealized gain on Investments/
Gain on sale of assets

\$74,369 | 3.0%

Interest

\$41,447 | 1.70%

Contract/Grant Revenue/Reimb.

\$52,113 | 2.1%

Meeting Revenue

\$60,968 | 2.5%

Travel: \$40,645 | 2.1%

Website: \$25,497 | 1.3%

Personnel
\$749,444
39.4%

CECPM Tracking
\$34,900 | 1.8%

Chapter Resource Budget
\$19,857 | 1.0%

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TOO LATE.



TOO BAD.



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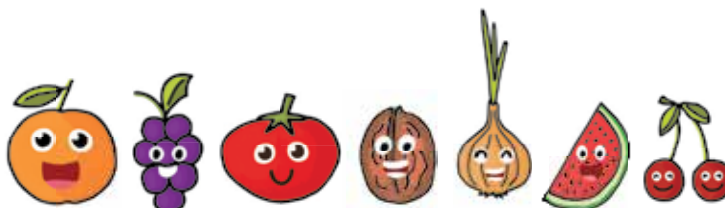
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Activating your plants' natural defense system to guard against diseases

From the Certis USA Field Development Team

During these challenging times, we extend our thanks to all of the agricultural professionals working to ensure the world has a steady supply of healthy food. We realize it is even harder now to balance all the demands that life places on you and your families, and want recognize all of you for putting forth the extra effort.

Here we will address a unique and reliable mode of action for fungal and bacterial disease control. These tools rely on the ability to trigger and amplify the natural defenses of plants in a reaction called Induced Resistance (IR). Induced Resistance to disease can be broken into two pathways, Systemic Acquired Resistance (SAR) and Induced Systemic Resistance (ISR). Although these pathways have many similarities, they do differ in their triggers, signaling molecules and final biochemical reactions. Since the vast majority of commercially available IR products utilize the SAR pathway that is the focus of this article.

Induced Resistance

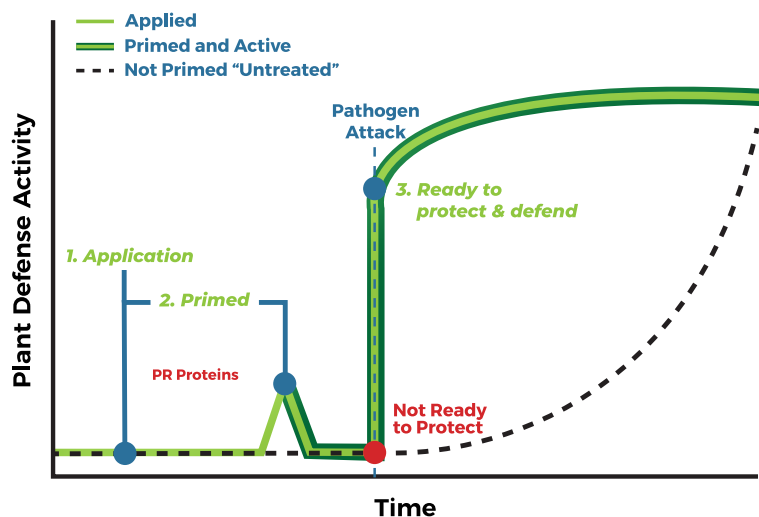
Plants have the ability to activate biochemical defenses in response to attacks from pathogens. These induced defenses are expressed systemically throughout the plant, not only in the infected tissues. Systemic acquired resistance (SAR) is a type of induced defense that is triggered after local infection by pathogens, resulting in broad-spectrum (i.e., nonspecific) resistance to pathogen infection in parts distant from the point of primary infection. SAR is regulated by a set of signal transduction pathways, with salicylic acid (SA) acting as a key signaling molecule. The onset of SAR is marked by an “oxidative burst” of reactive oxygen species (ROS). This is followed by an associated increase in internally produced

SA levels, leading to activation of defense-related genes that are coded to produce pathogenesis-related (PR) proteins having antimicrobial or other properties that limit disease development.

In response to the increased SA levels, oligomers of the regulatory protein NPR1 (NON-EXPRESSOR OF PATHOGENESIS RELATED GENES 1) in the cytoplasm are converted to active monomers small enough to be translocated through the nuclear membrane. Inside the nucleus, they stimulate transcription factors required for expression of *PR* genes coding for pathogenesis-related (PR) proteins. These are antimicrobial proteins such as chitinases, proteinases, peroxidases, and other compounds that disrupt infection processes or further transmit the defense signal to other parts of the plant. Functional analogs of SA such as the benzothiadiazole compound acibenzolar-S-methyl (ASM), and some microbes such as *Bacillus mycoides* isolate J (BmJ) can directly trigger monomerization of NPR1 and signal transduction in the absence of SA accumulation. Application of such “plant activators” results in elevated resistance to pathogen infection. Plants exposed to such stimuli often demonstrate a heightened state of alert, with more rapid and stronger response to secondary infection, a phenomenon known as “Priming.”

In addition to its role in SAR signal transduction, NPR1 has been determined to perform a similar function in defense pathways which use as signaling molecules the plant hormones jasmonic acid (JA) and ethylene. These include Induced Systemic Resistance (ISR) triggered by contact between plant roots and certain rhizobacteria, and induced defenses against herbivores such as insects.

Plant activators trigger immune responses in the plant even in the absence of a pathogen. This has been demonstrated using molecular and physiological techniques to monitor the signaling cascade and production of PR proteins following application. Priming of plants by such products prepares them to fend off disease when pathogens attack, as illustrated below:



Crops/Diseases Controlled and Available Products

Although there are a number of commercially available products that feature IR as either their primary or secondary mode of action, this table below focuses on the products that claim IR as their primary mode of action. These products have proven effective in controlling a number of diseases across a variety of crops. Examples include powdery and downy mildew in grapes, fire blight in pome fruits, *Alternaria* in almonds and carrots, and bacterial spot/speck in tomatoes.

Examples of different types of plant activator products for use in crop protection.

Type	Active Ingredient	FRAC Code
Synthetic	Acibenzolar-S-methyl	P01
	Phosphorous acid	P07
Botanical	Laminarin (kelp extract)	P04
	<i>Reynoutria sachalinensis</i> extract	P05
Microbial	<i>Bacillus mycoides</i>	P06
	Yeast cell wall extract	

Biocontrol strains of *Bacillus*, *Trichoderma*, and other microbes that directly attack plant pathogens through competition, parasitism, and/or antimicrobial metabolites may trigger plant immune response as an additional mode of action.

Best Practices

Successful use of IR products requires a different approach to disease control compared to active ingredients that directly kill or compete with pathogenic microbes. The following guidelines should be applied whether the product contains chemical or biological plant activators:

- Apply early, before infection occurs
 - Allow for Induction time
 - Many product labels call for application 3-5 days before expected disease
- Use in a program with other effective modes of action
- Can be used to supplement or replace other modes of action
 - As part of a resistance management plan
 - To boost overall control of hard to manage diseases

If used properly, IR compounds offer another effective tool to help growers successfully manage disease in many of their crops.

Conclusion

The world depends on growers and the agricultural professionals supporting them to supply healthy crops in the face of many challenges. The ag industry must work together to provide the tools, know-how, and resources needed to meet this demand – including the technology highlighted in this piece. We thank you for all that you do, each and every day, no matter what. ■



Improving integrated pest management of spider mite on almond

Kris Tollerup, Area IPM Advisor, San Joaquin Valley, University of California Statewide IPM Program and Cooperative Extension

In the San Joaquin Valley and Sacramento Valley region two mite species, twospotted spider mite, *Tetranychus urticae* (Koch) and Pacific mite, *Tetranychus pacificus* McGregor, infest almond orchards. These species tend to occur regionally with twospotted spider mite most commonly infesting orchards in the northern growing regions while Pacific mite occurs predominately in the middle and southern San Joaquin Valley.

Spider mites feed on plants by piercing cells at the epidermal layer of leaves then sucking out the cell contents. Visible feeding damage, termed stippling (Fig. 1), results from cells dying and appearing discolored from the surrounding healthy plant material. Injured leaves do not efficiently exchange carbon dioxide, resulting in a lower rate of carbohydrate production for vegetative and nut growth. An important period to protect almond against spider mite occurs throughout spring until approximately mid-June during the time of shoot growth and kernel development. Additionally, heavy infestations late in the season exacerbated from activities associated with harvest have a high potential for causing defoliation resulting in limb and trunk sun burn and inducing trees to re-flush.

Critical for making treatment decisions is understanding the degree of feeding injury almond trees can sustain prior to economic loss. One study conducted in the early 1980s by a group of

entomologists out of the University of California, Riverside found that a significant reduction of shoot growth and yield occurred in the following season after trees had sustained 424 mite-days, defined as 1 mite feeding for 1 day. This equates to 10 mites per leaf feeding for 42.4 days or 5 mites per leaf feeding for approximately 86 days. Their study showed that almond trees can sustain considerable mite feeding before injury occurs.

As with navel orangeworm and ants, spider mite management occurs, more often than not, as part of an annual pest management program. The University of California Statewide Integrated Pest Management (IPM) Program *Almond Pest Management Guidelines* suggest that monitoring begin in May and continues into August. The *Pest Management Guidelines* indicate that a miticide application is justified when approximately 32 and 53% of leaves are infested with mite eggs, immatures, or adults in the presence and absence of predators respectively.

However, contrary to the *Pest Management Guidelines*, the practice of applying a miticide in spring, commonly abamectin, as a preventative measure, has become common. The practice aims to insure against mite “blow-ups” and protect the trees through the critical spring growing period. No published data, however, exists on the effectiveness of the strategy, the practice

Figure 1. Feeding injury, termed stippling, from spider mites on an almond leaf. Credit: Kris Tollerup, UC IPM.





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Hull Split Applications

Foliar: Add **2-3 quarts/acre** of **BounceBack® Foliar** to mitigate heat stress and maintain cell wall integrity with **2-3 quarts/acre** of **MicroBlend Foliar™ Zn-Mn-B Foliar** to support fruitfulness of reproductive buds for next year's crop.

Soil: Include **Zicron® Soil** at **2 quarts/acre** to replenish zinc levels in the trees with **Transit Soil®** at **8 ounces/acre** for reduction in heat stress symptoms that can affect final yields.

Post-Harvest Applications

Foliar: If a foliar pass is accomplished when leaves are still in good condition, add **2-3 quarts/acre** of **MicroBlend Foliar™ Zn-Mn-Cu** to support orchard fertility levels necessary for vigorous spring growth.

Soil: Include **5-10 gallons/acre** of **Phosron Soil** with **2 quarts/acre** of **BoronBoost® Soil** and **2 quarts/acre** of **Zicron® Soil** to replenish nutrient reserves in the trees which will maintain orchard health during dormancy and prepare the trees for budbreak and successful pollination.

Have a question?

Matt Visser

Sales Director: NorCal
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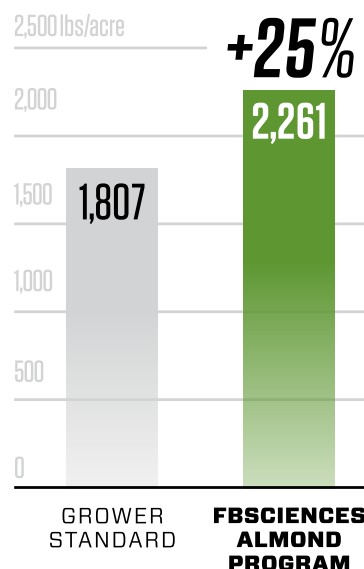
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has increased over the past decade. For instance, the California Department of Pesticide Regulation reported abamectin was applied in April and May to approximately 39% of bearing acres in 2005. Currently, abamectin is applied to roughly 65% of the bearing acres. Moreover, approximately 95% of bearing acres received a miticide application in 2017 during the months of April and May.

In 2016 and 2017, I partnered with an almond producer in Kern County on a project funded by the Almond Board of California to evaluate the effectiveness of abamectin applied in spring as a preventative mite treatment. We established 24 large field plots, each roughly 9 acres in size, and randomly assigned one of four treatments: 1) an untreated control, 2) abamectin at 16 oz/acre plus alcohol ethoxylate at 2 pts/100 gal, 3) cyflumetofen at 13.7 fl oz/acre, and 4) etoxazole at 3 oz/acre. The grower applied treatments using a commercial engine-driven air-blast sprayer traveling at 2 mph and 200 gallons of water per acre. We assessed spider mite populations bi-weekly or weekly from May to early October (2016) and mid-May to mid-September (2017). Also, in 2017, we monitored for the mite predator, sixspotted thrips, using yellow sticky cards. And finally, because of the heavy reliance on abamectin, we assessed Pacific mite for resistance to the miticide from 10 different orchards located in the middle and southern San Joaquin Valley.

Our results from both years of the study indicated that the preventative mite treatments did not provide a beneficial effect. First, spider mite populations remained near zero mites per leaf in all plots through the critical growth period of May and June. And densities did not increase considerably until hull split into late July (Fig. 2). And second, as mites increased, the number of sixspotted thrips also increased (Fig. 3) and precipitated a rapid decline of spider mites over five weeks, holding injury well below the damage threshold. This data parallels the findings of David Haviland and Jhalendra Rijal, that in most cases the beneficials sufficiently manage mites.

Figure 2. Density of spider mites plus eggs per leaf on almond in 2017. Data pooled from two sites located near Shafter and Wasco, Kern County.

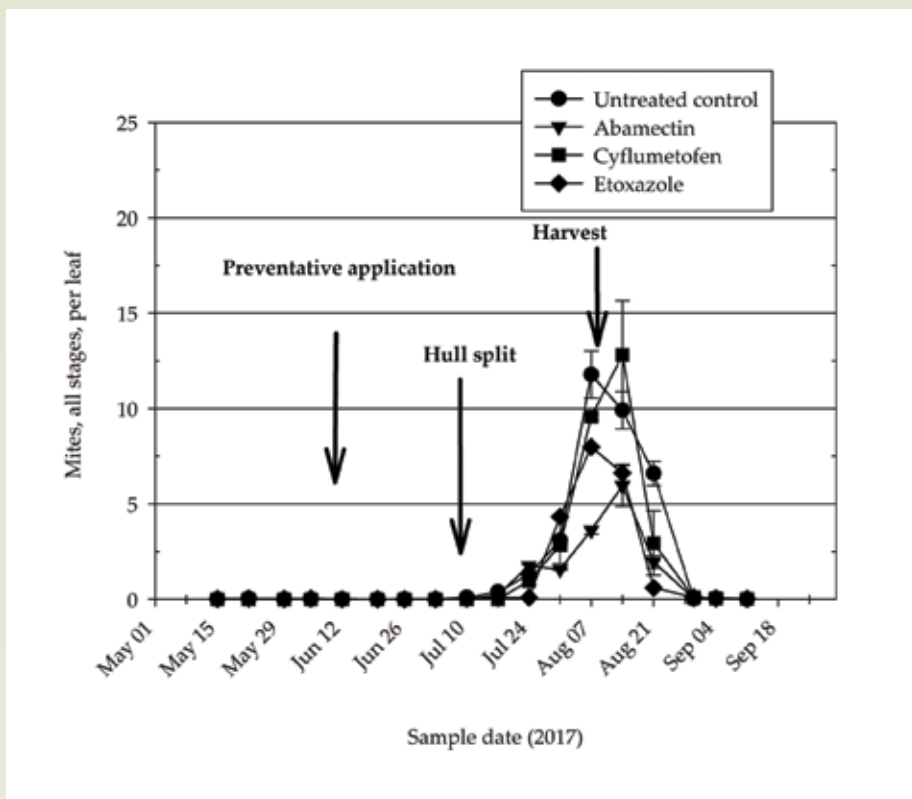
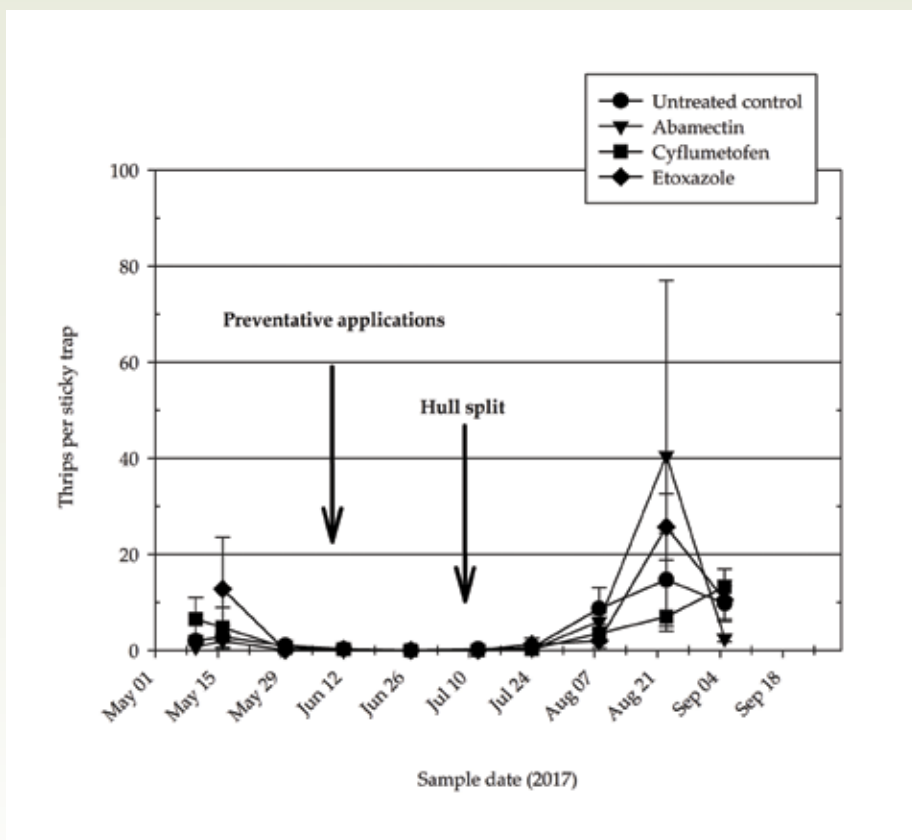


Figure 3. Density of sixspotted thrips per leaf on almond in 2017. Data pooled from two sites located near Shafter and Wasco, Kern County.



Moreover, we determined that a low to moderate level of resistance to abamectin has developed in some Pacific mite populations in the south and middle San Joaquin Valley. Abamectin is an important tool for managing spider mites. To maintain the miticide's effectiveness, the almond industry should avoid making spring applications strictly as a preventative measure. Rather, the industry must continue to develop good monitoring practices for mites and natural enemies such as sixspotted thrips to determine if a spring application is warranted. ■

For additional information on managing webspinning mites on almond, view the *Almond Pest Management Guidelines* (ipm.ucanr.edu/agriculture/almond/) or contact the nearest University of California Cooperative Extension Advisor.



The Almond Board of California's research program got started nearly 50 years ago to improve the management of navel orangeworm, building a culture of seeking IPM-focused pest management. The recent work by Tollerup, as well by UC Cooperative Extension Entomologist David Haviland and UC IPM Advisor Jhalendra Rijal, to revisit web-spinning mite management continues this tradition. They have demonstrated that beneficials can take care of webspinning mites in most situations if growers avoid preventative miticide sprays and sprays that interfere with the beneficials. It does require more monitoring. Working to continue to implement IPM, where the focus is on preventing a problem, monitoring, and only when levels warrant treating, ties in with the Almond Board director's goals of increasing the adoption of environmentally friendly pest management by 25% by 2025. Letting sixspotted thrips do the work fits in with this goal.

- Courtesy of Almond Board of California



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Pest management benefits of implementing soil health practices

Sarah Light, UCCE, Sutter, Yuba and Colusa Counties; Rachael Long, UCCE, Yolo, Solano and Sacramento Counties

Building soil health on farms involves multiple practices including maintaining soil cover, minimizing soil disturbance, keeping living roots in the soil as long as possible, and incorporating plant diversity, such as cover crops or crop rotation. These management practices keep soils alive by supporting beneficial soil microbial communities and physically protecting soils from erosion and structural damage. While we may typically think of these practices for their soil health benefits, there are also associated pest management benefits.

Below Ground:

Crop health can be impacted by both biotic and abiotic disorders. While the majority of this article will focus on biotic disorders caused by living organisms, building soil health can also reduce the risk of abiotic disorders, caused by factors such as soil compaction, by improving soil structure and reducing crop stress. Healthy plants are able to better resist insect pests, nematodes, and diseases, and compete better against weeds.

In general, healthy soils contain about 45% mineral matter, 1-5% organic matter, and 50% open pore space (about half filled with air and half with water). Practices that promote healthy soils, including compost, cover cropping, mulching, reducing or eliminating tillage, and controlled traffic farming, will increase soil organic matter and soil carbon, which are food sources for microbes. This can help break what is sometimes referred to as the “boom bust” cycle of soil carbon where microbes flourish during crop production, then crash after crops are harvested and the ground is bare, with no living roots. Living roots release carbon-based compounds called root exudates, that serve as an important food source for microbes. Optimizing carbon cycles ensures that food is available for microbes throughout the year, and that beneficial microbes can thrive.

Soil health incorporates the chemical, physical, and biological properties of soil. Practices that promote healthy soils and reduce the risk of soil compaction (like increasing soil organic matter and reducing soil disturbance) can improve crop emergence in direct seeded crops, and reduce the risk of restricted root growth in all crops. In addition, compacted soils have less pore space (physical) for air and water, which can lead to water logging and anaerobic soil conditions, or a low-oxygen environment (chemical). This reduces crop roots respiration (biological) and leads to plant stress. Standing water also increases denitrification, during which nitrogen is lost from the soil. In the long term, incorporating soil health practices can improve soil water dynamics, by increasing water infiltration and water storage; and can reduce soil salinity as well as the risk of soil erosion.

While some microbes in the soil are plant pathogens, the majority are not. Beneficial microbes include *Rhizobia* bacteria, that allow for nitrogen fixation in legume crops (including cover crops) and can reduce the need for nitrogen fertilizer application. Mycorrhizal fungi form a symbiotic relationships with most plants, which effectively increases the crop root area, and allows the crop to access phosphorus in the soil that would be inaccessible by the roots alone. Building soil structure (physical) with soil health management practices means there is more pore space for roots and fungal hyphae (biological) to grow and will increase crop access to soil phosphorous (chemical). Building soil organic matter means beneficial microbes may outcompete pathogenic microbes for resources. Soil disturbance disrupts microbial communities, breaks fungal hyphae, reduces earthworm populations, and in general can damage soil structure.

Diversifying crop rotations, including incorporating cover crops, help break belowground pest cycles. Many pathogens and nematodes are host specific, so they will not be able to reproduce or grow on a non-host crop. This will reduce the population of pathogens that cannot persist in the soil for long periods without susceptible hosts. Some plant pathogenic fungi and nematodes can produce resting structures that can persist in soil for years (even decades) without a susceptible host and these species will not be affected by incorporating plant diversity (e.g. crop rotations) into cropping systems. The best way to manage these long-lasting resting soil structures is with the use of resistant plant varieties, chemical control options, and healthy soils practices to ensure crops are healthy to better compete against nematodes and diseases.

Some cover crops have nematocidal properties, such as many in the mustard family (Brassicaceae) that release isothiocyanates when they break down. Isothiocyanates are similar to the active ingredient in the soil fumigant metam. Some studies have demonstrated efficacy of mustard cover crops for disease and nematode suppression. While it is unlikely that soil pathogens will be eliminated with mustard cover crops, they may offer the opportunity to reduce fumigant application (reduced rate or frequency), or to use a non-fumigant nematicide. Thus, mustard cover crops can serve as a preventative soil conditioner. It is challenging to quantify the same rate of isothiocyanate release with a cover crop as a pound of active ingredient per acre as with a chemical application, thus, the use of mustard cover crops, while beneficial, may be somewhat unpredictable as you are relying on the biomass and growth of the cover crop, the concentration of the compound that gets released into the soil upon cover crop incorporation, and the need for the compound to come in contact with the soil pest. The best defense against nematodes is the use of plant resistant varieties when available.



Photo, top: Adult syrphid fly (also known as hover flies) on a flower.
Bottom: Syrphid fly larvae feeding on aphids. Photos: UC IPM



In selecting cover crops, watch for plants that could be hosts for diseases. For example, previous UC Cooperative Extension research evaluating the impact of cover crop species on lettuce drop disease (causal agent *Sclerotinia minor*) found that susceptible cover crops (phacelia, lana woollypod vetch, and Austrian winter pea) increased disease pressure while non-susceptible cover crops (oilseed radish, barley, and fava bean) did not. Similarly, other research by Farm Advisor Margaret Lloyd found that care should be taken when selecting legume cover crops in fields known to have verticillium wilt (causal agent *Verticillium dahliae*). The best legumes to plant in known infected fields are hairy vetch and bell bean to avoid increasing soil inoculum. Common vetch should be avoided because it is a good host of *V. dahliae* and field pea, purple vetch, 'Windsor' broad bean, and Lana woollypod vetch are intermediate choices in known infected fields. Bell beans (fava beans) are a host for tomato spotted wilt virus (TSWV) a serious disease of tomatoes and peppers that is vectored by thrips; avoid planting this cover crop on your farm if you are growing tomatoes or peppers nearby.

Above Ground:

Cover crops and increasing crop rotation/crop diversity can break pest cycles. In addition, as cover crops are planted on otherwise fallow ground, they can outcompete weeds, reducing the amount



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Lady beetle feeding on aphids. Photo: UC IPM



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of weed seeds in the soil seed bank. Recent work by Farm Advisors Amber Vinchesi-Vahl and Sarah Light found that plots cover cropped with vetch had fewer weeds than fallow plots, presumably reducing the weed seed bank in the soil.

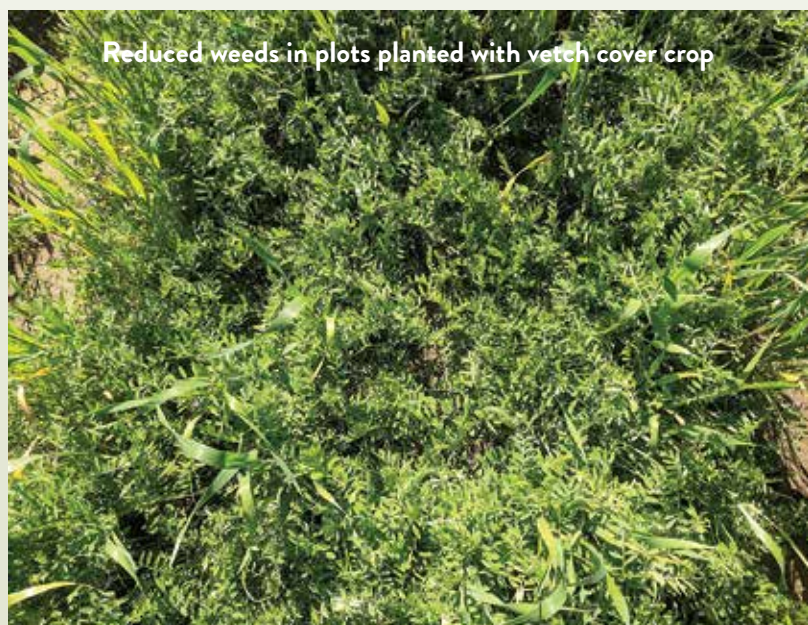
Increasing plant diversity in the landscape with cover crops as well as field edge habitat plantings, like hedgerows of flowering plants such as western redbud, attract natural enemies, leading to better biocontrol of crop pests on farms. Beneficial insects, including parasitoid wasps, lacewings, and syrphid flies need floral resources to survive and reproduce. The larval stages are predaceous, but adults are like honey bees, they need nectar and pollen to thrive. Even ladybugs feed on floral resources during times of prey scarcity. UCCE studies have shown that crops with adjacent flowering habitat increase biocontrol activity by natural enemies, leading to reduced pest pressure and less pesticide use on farms.

Plant selection for increasing farm biodiversity is important because, like some cover crop varieties, some plant types can harbor pests and diseases. For example, mustard and wild radish cover crops are good for bee pollinators, but they are also key hosts for lygus bugs, stink bugs, and cucumber beetles. Early in the season these insect pests build up on these plants and then move into adjacent crops when they dry down. The key is to control mustard and wild radish (as well as other weeds like malva that are significant stink bug hosts) in field margins where there is crop sensitivity to these pests. Better yet, replace weedy field edge vegetation with managed native California plants, such as coffeeberry, Toyon, Ceanothus and manzanita, to maximize natural enemy activity and biocontrol of crop pests and weed suppression. Many annual weeds, like sow thistle, prickly lettuce, and malva are key hosts of TSWV and can be managed on field edges by permanent hedgerow vegetation that shades out invasive weeds.

It may not be possible to incorporate all the principles of soil health into every operation and certainly all pests cannot be reduced, controlled, or avoided even with maximum soil health practices. However, modifying practices, when possible, to increase soil health, including incorporating plant diversity, can play a role in a strong integrated pest management program both by improving crop health and reducing pests. ■



Control plot with more weeds



Reduced weeds in plots planted with vetch cover crop

Two photos above: Amber Vinchesi-Vahl

CAPCA STAFF CONTACTS



RUTHANN ANDERSON
CAPCA President/CEO
Adviser Editor
ruthann@capca.com
(916) 928-1625 x7



JOYCE A. BASAN
Programs/Communications Dir.
Adviser Deputy Editor
joyce@capca.com
(916) 928-1625 x2



CRYSTELLE TURLO
Individual Membership &
Chapter Projects Director
crystelle@capca.com
(916) 928-1625 x1



SYLVIA STARK
Advertising Sales Manager
Advertising/Publications
sylvia@capca.com
(916) 607-0059
or (916) 928-1625 x9



ADAM BARSANTI
Outreach Relations Manager
adam@capca.com
(916) 928-1625 x6



RACHEL TAFT
Executive Assistant
rachel@capca.com
(916) 928-1625 x5



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Herbicide trial in Delta drill-seeded rice

Michelle Leinfelder-Miles, UCCE, San Joaquin County

Introduction:

Weeds are important pests of California rice systems, and weed management can account for roughly 17 percent of total operating costs (Espino et al., 2016). Integrated weed management uses cultural and chemical practices and considers the following:

- Prevention (e.g. using certified seed, equipment sanitation, maintaining roads and levees)
- Cultural practices (e.g. land leveling, crop rotation, tillage, winter flooding, drill-seeding)
- Fertilizer placement and management
- Water management
- Monitoring
- Herbicides

Herbicide are important tools. Certain conditions in California rice production systems, however, increase the likelihood of developing herbicide resistance, or the ability of certain weed biotypes to survive certain herbicide treatments when the weed species is usually killed by that herbicide (Al-Khatib et al., 2019). Such conditions include, but are not limited to, lack of crop rotation, the efficacy of certain herbicides on certain weeds causing them to get frequently used, and not having diverse chemistries available.

In 2019, a trial was conducted to evaluate the efficacy of a new herbicide product with active ingredient florpyrauxifen-benzyl (group 4 herbicide) in drill-seeded rice in the Sacramento-San Joaquin Delta region. The product is registered in rice growing states in the southern US but would be a new chemistry in California*. California registration is anticipated in 2020, with the product being available for use in 2021. Previous work by the manufacturer indicates that florpyrauxifen-benzyl provides good control of broadleaf weeds (e.g. duckweed, redstems), smallflower umbrella sedge, and ricefield bulrush. It has some activity on *Echinochloa* species (e.g. barnyardgrass, watergrass). The objective of the trial was to assess the efficacy and crop tolerance of this product for weed control in drill-seeded rice in California.

The trial took place in the Delta region on a Kingile muck soil. This soil classification is characterized as having upwards of 40 percent organic matter in the top foot of soil, and approximately 27,000 acres in the Delta are classified as the Kingile series. On high organic matter soils in the Delta, the typical practice is drill-seeding. Water-seeding, which is the typical practice in the Sacramento Valley, is not successful in the Delta because the soil particles can float and move too easily, causing seed to get buried too deeply and germinate poorly.

**California registration is expected in quarter three of 2020. Paperwork is currently with federal EPA and Cal DPR.*

Figure 1. Weeds present in the trial: watergrass and barnyardgrass (*Echinochloa* spp., left photo), sprangletop (*Leptochloa fusca*, center photo), and sedge (right photo). We believe the sedge to have been redroot flatsedge (*Cyperus erythrorhizos*), but they were identified by photograph only and could be some other type of sedge. Photos by M. Leinfelder-Miles (left, right) and UC IPM (center).



GROWING EFFICIENCY AND PROFITABILITY WITH IRRIGATION CHEMISTRY

Pests, diseases and limited access to irrigation water: Three challenges nearly every vineyard producer encounters. Over time, this trifecta can have a profound and expensive impact on an operation from reduced yield and grape quality to, in extreme cases, vineyard removal.

For Napa producer, Frank D'Ambrosio, this was the exact situation he faced. Season after season, D'Ambrosio Vineyards attempted to maintain a block of petit verdot limited by disease, phylloxera and nematodes, but to no avail. As part of a final effort to revive the underperforming section before removing it altogether, D'Ambrosio and Daniel Robledo, his viticulture consultant, initiated a trial on this block with an Irrigation Water Optimizer (IWO) from Precision Laboratories.

"The IWO is a water surfactant that helps the soil retain and expand water like a sphere around the root system. This also makes any nutrients applied through irrigation available to the plants much more easily," Robledo said.

Water and soil interactions depend on many different variables, such as soil type, particle size, porosity and organic matter. When those variables are insufficient, the availability of water is reduced and plant establishment, yield and crop quality can be hindered. This is where IWOs even the balance.



Daniel Robledo, PCA | Viticulturist

IWOs, a category of irrigation chemistry, help maximize plant health and the environment around the plant. Treating water with IWOs reduces surface tension, moving water into and throughout the root zone and decreasing runoff. By holding water in the root zone, IWOs not only optimize water usage, they also make soil-applied chemistries and nutrients more available to the plant. These efficiencies lead to better plant health, yield, crop quality and ROI.

ENHANCING THE VINEYARD AND THE BOTTOM LINE

Throughout the 2018 season, three applications of the IWO were made to the struggling petit verdot block. As the season progressed, D'Ambrosio and Robledo began to see significant improvement in the once unproductive block.

"When we started the trial, we had phylloxera and nematodes we were treating with a drip-applied insecticide," Robledo said. "The blocks that were treated with the IWO [in combination with the insecticide] now have zero phylloxera, and the nematode numbers dropped dramatically from 2018 to 2019. [It] is a powerful tool."

In addition to reduced pest populations, the trial yielded a 21% increase in wine grape weight, a 16% increase in production and a \$6,300 per acre increase in ROI. Worth noting is that these enhancements in the vineyard and on the balance sheet were achieved even though irrigation of the block was reduced to three hours, twice a week.

"Five years ago, that vineyard had all kinds of problems," D'Ambrosio said. "Now, it's looking good."

"We're proud to provide a lineup of IWOs that help growers like D'Ambrosio Vineyards create a more ideal environment for the root systems of their plants for healthier, more productive crops and a more fruitful bottom line," said Dr. Rob Osburn, technical and commercial product manager. "At Precision Laboratories, we're always looking for new ways to improve producer profitability. IWOs are a great example of that commitment in action."

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Methods:

The variety M.206 was drill-seeded on May 15, 2019. After planting but before rice emergence, glyphosate herbicide was applied to manage weeds, primarily grasses, that had already emerged. Treatments (Table 1) were applied on June 9th, when the rice was at approximately the 5 to 6 leaf stage. (Applications were slightly delayed due to windy conditions in the week prior to application). Applications were made using a CO2 backpack sprayer, using flat fan nozzles, with an output volume of 20 gallons per acre. At the time of planting, environmental conditions were approximately as follows: air temperature 63 degrees F, relative humidity 54 percent, and wind speed 3 mph. We considered the pre-emergence pendimethalin treatment as the “control”. Since this was a commercial field, and because weed pressure would have been severe, we did not have completely untreated plots. In the “grower substitute” program, we replaced propanil with

florpyrauxifen-benzyl to learn whether florpyrauxifen-benzyl could be a viable rotation product for propanil, since weed resistance to propanil has been observed in California rice systems (Espino, 2014). The permanent flood was applied within five days of herbicide application.

The experimental design was a randomized complete block design with four replicates. Plot size was 20 feet by 20 feet. We made crop injury observations on 7-day intervals from 7 to 42 days after treatment (DAT). We made weed density observations on 7-day intervals from 14 to 42 DAT. The most prevalent weeds in the field were the *Echinochloa* species (e.g. watergrass, barnyardgrass) and sprangletop (*Leptochloa fusca*) (Figure 1). We also observed a few sedges near the edge of the field, which we believed to be a flatsedge, like redroot flatsedge (*Cyperus erythrorhizos*). The trial was harvested on November 1st, measuring grain yield from a 10.8-ft² (1-m²) quadrat per plot.

Table 1. Herbicide treatments in the 2019 drill-seeded rice trial.

Materials	Rate (unit of product/acre)	Herbicide Program denoted as
Florpyrauxifen-benzyl, Pendimethalin, MSO	1.37 pints, 5.5 pints, 0.5 pints	Product-high rate + pre-emergence
Florpyrauxifen-benzyl, Pendimethalin, MSO	1.024 pints, 5.5 pints, 0.5 pints	Product-low rate + pre-emergence
Florpyrauxifen-benzyl, MSO	1.37 pints, 0.5 pints	Product-high rate
Bispyribac-sodium, Halosulfuron-methyl, Pendimethalin, Propanil, MSO, UAN-32	0.2 ounces, 0.8 ounces, 5.5 pints, 6 quarts, 16 fluid ounces, 2 gallons/100 gal	Grower standard
Pendimethalin	5.5 pints	Pre-emergence only
Bispyribac-sodium, Halosulfuron-methyl, Pendimethalin, Florpyrauxifen-benzyl, MSO, UAN-32	0.2 ounces, 0.8 ounces, 5.5 pints, 1.37 pints, 16 fluid ounces, 2 gallons/100 gal	Grower substitute

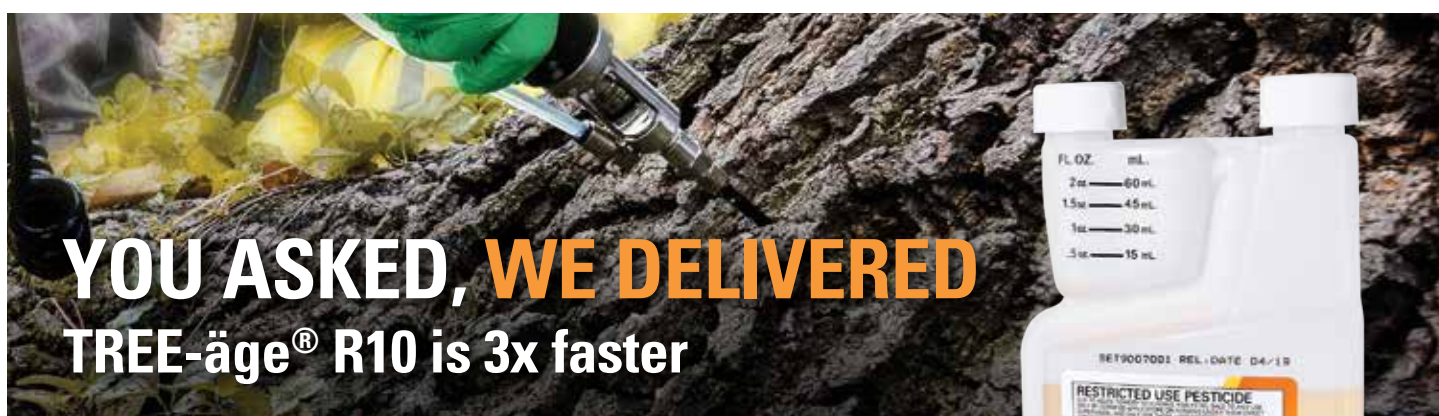
Table 2. Crop injury on 7-day intervals from 7 days after treatment (DAT) to 14 DAT. Injury symptoms had disappeared by 21 DAT.

Herbicide Program (Treatment)	Crop Chlorosis 7 DAT	Necrosis/Tip Burn 7 DAT	Crop Chlorosis 14 DAT	Leaf Curling 14 DAT
Product-high rate + pre-emergence	None	None	None	Noticeable Effect
Product-low rate + pre-emergence	None	None	None	Noticeable Effect
Product-high rate	None	None	None	Slight Effect
Grower standard	Noticeable Effect	Noticeable Effect	Slight Effect	None
Pre-emergence only	None	None	None	None
Grower substitute	Slight Effect	Slight Effect	None	Slight Effect

No Severe Effects Observed with any Program.

Table 3. Weed counts on 7-day intervals from 14 days after treatment (DAT) to 42 DAT. Data were transformed for analysis. Arithmetic means are presented. Data represent number of weeds in the entire 400-ft² plot. An untreated area of the field had approximately four weeds per square foot.

Herbicide Program (Treatment)	14 DAT	21 DAT	28 DAT	28 DAT (excluding sprangletop)	42 DAT	42 DAT (excluding sprangletop)
Product-high rate + pre-emergence	0 b	2 b	10 b	4	10 b	4
Product-low rate + pre-emergence	0 b	5 b	12 ab	2	11 b	2
Product-high rate	1 b	2 b	6 b	2	8 b	2
Grower standard	0 b	6 b	13 ab	1	16 ab	1
Pre-emergence only	13 a	21 a	29 a	10	36 a	15
Grower substitute	2 b	6 b	14 ab	2	18 ab	6
Average	3	7	14	4	17	5
Coefficient of Variation (%)	56	44	36	53	34	58
Significance of treatment effect (P value)	<0.0001	<0.0001	0.015	0.0584	0.0036	0.0787



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Table 4. Harvest results for the 2019 drill-seeded herbicide trial. Results are the average across four replicated blocks. Yield was adjusted to 14 percent moisture.

Herbicide Program (Treatment)	Seed Moisture (%)	Yield (lbs/ac)
Product-high rate + pre-emergence	13.8	9251
Product-low rate + pre-emergence	13.8	9122
Product-high rate	13.8	8632
Grower standard	14.0	8896
Pre-emergence only	13.8	8896
Grower substitute	13.1	8994
Average	13.7	8965
Coefficient of Variation (%)	5	3
Significance of treatment effect (<i>P</i> value)	0.0566	0.5748

Results:

Crop injury observations were characterized as crop chlorosis, tip burn, and leaf curling (Table 2). We observed noticeable crop chlorosis and tip burning in the grower standard treatment at seven days after treatment (DAT), and slight effects in the grower substitute treatment. We observed slight to noticeable leaf curling in the florypyrauxifen-benzyl treatments at 14 DAT. Crop injury effects had disappeared in all treatments by 21 DAT. We observed no stunting or stand reduction with any of these treatments, and we observed no differences in heading with any of these treatments. Heading occurred at approximately 87 days (Aug 15th, approximately 1855 growing degree days).

All treatments had similar weed control with the exception of the pendimethalin (“pre-emergence only”) treatment, which had statistically higher weed counts in many circumstances (Table 3). Florypyrauxifen-benzyl did not control sprangletop, so that was the weed most commonly observed. This is indicated by the columns of weed counts excluding sprangletop (i.e. 28 DAT and 42 DAT).

We found no differences in yield or seed moisture at harvest (Table 4). Yield averaged 8965 pounds per acre across treatments, and seed moisture averaged 13.7 percent. We observed no lodging at the time of harvest.

Conclusions:

The purpose of this trial was to learn the efficacy and crop tolerance of florypyrauxifen-benzyl for weed control in drill-seeded rice in California. We observed slight leaf rolling with those treatments a couple weeks after application, but those symptoms were gone by the third week after application. We observed florypyrauxifen-benzyl to have good activity on the *Echinochloa* species but not on sprangletop, which was expected based on previous manufacturer trials. We observed florypyrauxifen-benzyl treatments to have similarly low weed counts compared to the grower standard practice, and no significant differences in yield among the treatments. Tank mixes will be needed to manage sprangletop. The

results indicate that florypyrauxifen-benzyl could be used in drill-seeded rice herbicide programs, providing a different chemistry for herbicide resistance management.

We will continue the trial in 2020 to evaluate different combinations of products. For more information on Delta rice production, please see <https://ucanr.edu/sites/deltacrops/Rice/>. The aforementioned information on products and practices is for educational purposes only and does not constitute an endorsement or recommendation by the University of California. ■

References:

- Al-Khatib, K., J.W. Eckert, and A. Fischer. 2019 Integrated Weed Management. UC IPM Pest Management Guidelines: Rice. UC ANR Publication 3465. <https://www2.ipm.ucanr.edu/agriculture/rice/Integrated-Weed-Management/>.
- Espino, L. 2014. Management of propanil resistant sedges. UC Rice Blog. University of California Natural Resources. <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=14349>.
- Espino, L., R.G. Mutters, P. Buttner, K. Klonsky, D. Stewart, and K. Tumber. 2016. Sample Costs to Produce Rice – Sacramento Valley. University of California Agriculture and Natural Resources. <http://coststudies.ucdavis.edu>.

PCAs Fight Insecticide Resistance by Adding Flowable Mating Disruption to Spray Programs

Pheromone-based mating disruption is a well-proven pest control technique to reduce populations of damaging pests in major California crops. Based on years of trials, University of California researchers now consider mating disruption a vital part of Integrated Pest Management (IPM) programs.

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they can be incorporated into existing spray programs **without additional labor requirements or special sprays.**

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Suterra's CheckMate® flowable products are flexible additions to spray programs because they can be sprayed using different approaches depending on a grower's budget, pest pressure, labor availability, and existing operations. One option is to spray throughout the season. Another popular choice is to spray during periods of increased crop vulnerability to provide an additional mode of action for pest control. Adding flowable CheckMate® pheromones to end-of-season sprays also provides extended control when other options are no longer available because of the proximity to harvest.

Crops grown for export drive some of the increased adoption of CheckMate® flowable products because they offer damage protection without residues.

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Perhaps the most important reason for the industry to adopt flowable mating disruption is its ability to help fight insecticide resistance. With chemical options shrinking, every opportunity to reduce pest populations and fight insecticide resistance is necessary.

While nearly every grower wants to extend the useful lifespan of popular pesticides, few growers would invest in a crop input if they didn't see a direct financial return. Independent research shows that incorporating flowable mating disruption into a grower's IPM program will reduce damage from pests and pest-vectored viruses by 50 percent or more. Whether through increased quality or increased yield, this reduction in pest population more than pays for product and labor investment.

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The role of weeds as hosts and overwintering sites for *Impatiens necrotic spot virus*



Industrial and other areas where weeds are not controlled are habitat for many host plants. Photo by Richard Smith

Richard Smith, Vegetable Crops and Weed Science Farm Advisor, UCCE Monterey County
 Alejandro Del Pozo-Valdivia, Entomology Advisor, UCCE Monterey County
 Daniel Hasegawa, Research Entomologist, USDA ARS, Salinas

Since 2006, *Impatiens necrotic spot virus* (INSV) has been a serious disease of lettuce on the Central Coast – Monterey, Santa Cruz and San Benito Counties. It is a tospovirus that is spread by its insect vector, the western flower thrips (*Frankliniella occidentalis*). Tomato spotted wilt virus (TSWV) is another tospovirus that is transmitted by thrips, and is also present on the Central Coast, but is less of a problem in lettuce. INSV requires a mobile population of thrips to acquire the virus from infected host plants, followed by transmission to uninfected lettuce fields. During the middle of the production season, adjacent infected crop fields can be the source of INSV for a particular field. However, in the early spring at the beginning of the crop cycle, it is unclear how the virus overwinters and reestablishes the infection cycle into the subsequent cropping season. It appears that there must be susceptible host plants and possibly thrips that bridge the virus from the fall, over the winter, and to the spring, at which time INSV can be transmitted by thrips to production fields.

During the winter fallow period, vegetable production fields are kept weed-free mechanically by lillistoning peaked winter beds or by the application of herbicides registered for use on fallow beds such as carfentrazone, glyphosate, gramoxone, oxyfluorfen and pyraflufen. As a result, fallow winter beds are generally not a significant source of INSV infected host plants. However, in

surrounding non-crop areas or in surrounding areas cropped to other crops (e.g. strawberries and vineyards) weeds may be present that can serve as a reservoir of the virus during months when thrips are not as active on the Central Coast.

In 2019, there was a severe outbreak of INSV in the northern part of the Salinas Valley that began early in the summer. At the height of the outbreak, there was little opportunity to explore the role of overwintering host plants because many of them had senesced and it was evident that the main source of the virus was other infected crop fields. However, during the fall of 2019, we examined the role of weeds as bridges for INSV infections over the winter to the new 2020 production season.

Areas near INSV “hotspots” evaluated in fall 2019 included non-crop areas surrounding production fields such as ditches, roadsides, adjacent areas cropped with vineyards or strawberries, edges of surrounding hills, along the Salinas river and residential areas. In the late fall and early winter many of the annual weedy plants in these areas were senesced, but some persisted where sufficient water occurred such as in low spots and ditches, or in cropped areas. Many of the weed species were infected and tested positive for INSV. In particular, weed species in the same plant family as lettuce, the asteraceae, such as sow thistle, bristly oxtongue, flaxleaf fleabane,

marestalk and pineapple weed. However, INSV has a wide host range and plant species from other plant families were also infected such as members of the brassicaceae (shepherd's purse and short pod mustard), chenopodiaceae (nettleleaf goosefoot, lambsquarter and *Atriplex* sp.), urticaceae (burning nettle) and malvaceae (little mallow).

All the infected weeds listed above are annuals (except little mallow, see below) and would not be expected to overwinter as they complete their life cycle by late summer; these species begin their life cycle again with the onset of winter rains. However, there are exceptions to this rule and individual plants that germinate in late summer/early fall can be infected with INSV and persist over the winter. Annual plants that hunker down and survive the winter can serve as foci for INSV infection.

Around Thanksgiving, the first rains germinated the flush of winter vegetation in non-crop areas. This new generation of plants, it is assumed, start their life cycle free of infection of INSV. They become infected during their crop cycle by thrips transmission of the virus from older surviving plants. Little mallow can persist as a weak perennial in non-tilled locations and we observed old plants (>1 year) in an industrial area that were heavily infected with INSV; these plants serve as a classic example of a bridge capable of carrying the virus from one growing season to the next.

Little mallow and other hosts that can survive the winter such as nettleleaf goosefoot can also survive in vineyards as well as ditches and roadsides. There is much discussion about the foothills being a significant reservoir for INSV host plants, but we did not find that to be the case during 2019. None of the grasses in the foothills



Little mallow (*Malva parviflora*) is a weak perennial and commonly over-winters, serving as a key bridging plant for INSV. Photo by Richard Smith



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were hosts for INSV, and many of the broadleaf weeds such as turkey mullen, mustards (field and black) and cutleaf plantain were not good hosts of INSV.

Field bindweed is found in scattered untilled locations around fields in the Salinas Valley. We detected INSV in field bind weed in the fall and again in the spring following winter dormancy. The role that field bindweed plays in the spread of INSV is not clear, but a perennial plant could potentially be an important virus reservoir in areas where it occurs widely along with a sizeable thrips population.

Depending on the rain pattern and germination of winter vegetation, it is clear that key plant species in key habitats can serve as hosts of INSV, and may serve as sources where thrips can acquire the virus as the subsequent growing season gets underway. As already mentioned, levels of INSV infection were worse in the north part of the Salinas Valley in 2019. In our survey, we found little infection of INSV even in known hosts further south in the valley. It is not clear why this distribution pattern exists (north vs. south), but rainfall decreases further south in the valley which may affect the presence of overwintering host plants. Another factor could be wind speed. Higher wind gusts in the southern part of the Salinas Valley may reduce the possibility of thrips infesting lettuce, resulting in lower INSV infections.

The presence of susceptible host plants is one part of the INSV equation, but thrips are needed to move the virus from them to lettuce production fields, where disease symptoms appear and result in crop loss. Thrips feed on several plant species, including both agricultural crops and weeds. Western flower thrips, the primary insect vector for INSV, undergoes several life stages: 1) Eggs, which are laid inside the leaves of a plant, 2) Two larval stages, which are wingless and feed on the leaves of the plant, 3) Two pupae



Sow thistle (*Sonchus* sp.) is closely related to lettuce and is a good host for INSV. It has a relatively short life cycle but can germinate late in the season and, if infected with INSV, can serve as an over-wintering host plant. Photo by Richard Smith

INSV infected plant with severe stunting and necrotic tissue growing next to healthy romaine plant. The level of infection in fields varies depending on the population of thrips infected with INSV. Photo by Daniel Hasegawa



Severely infected romaine plant on right showing characteristic stunting of the plant with yellowing and necrosis on leaves. Photo by Daniel Hasegawa



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stages, which are non-feeding stages and resides in the soil, and 4) Adults, which have wings and feed on leaf tissue. Only the adults can transmit the virus to new plants, but to do so, the virus must be acquired from an infected host during the larval stage. Therefore, the most probable scenario to explain the thrips-INSV transmission cycle is as follows: Thrips adults lay their eggs in the leaves of an INSV-infected plant (weeds and/or lettuce). In the Salinas Valley, the wind is a strong influence on thrips dispersal, and therefore, likely contributes to the spread of INSV. Larvae will eclose and feed on the INSV-infected tissue – the critical point at which the virus is acquired. Larvae will then pupate in the soil and emerge as winged adults that are capable of transmitting INSV to a new host plant. The life cycle for thrips, which utilizes foliar and soil dwelling stages, presents additional challenges for managing the insect, and thus managing INSV.

Based on our current area-wide monitoring program in the Salinas Valley, thrips have been actively moving across the landscape, with lower numbers during the winter months. Both thrips and weed management are critical to mitigate the effect of yield loss due to INSV in lettuce. Repeated chemical applications to control thrips may not be sufficient to lower these vectors, since they are coming into lettuce fields from the surrounding areas. To reduce the incidence and severity of INSV in lettuce production fields, it is recommended to control weeds in surrounding cropped and non-cropped areas to reduce the reservoirs of INSV in the landscape. ■

For more information, see the UCCE Monterey website: <https://ucanr.edu/blogs/SalinasValleyAgriculture/>

Photo, right: Purslane is a good host for INSV. It only grows during the warm summer months and does not bridge INSV from one year to the next. Photo by Jack Kelly Clark.

Ditch remain wet and many host plant species grow in this environment if not controlled. Photo by Daniel Hasegawa



FORMATIONTM 828

Plant Health Begins with the Roots

by **Simplot**

Soil and root health are vital to the present and future of agriculture; the essential industry responsible for feeding the world. As crop production demands increase in California, the significance of long-term soil health has been intensified. California's severe drought (2014-2017) resulted in a fundamental change in crop production management. FormationTM 828 was created specifically to help growers with the multitude of problems facing soil health, like salt accumulation in soil and crop tissues, marginal irrigation water quality, and poor crop performance.

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- Enhance soil and root health to help crops in both stressful and non-stressful conditions
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During FormationTM 828's development, market research was conducted to understand the product's competitive environment and to formulate an effective pricing strategy for the relevant target crops. Emphasis was placed on creating a product that would benefit all crops and soil types.

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Focus on fruit quality

Marcus McClure, Regional Agronomy Manager for AgroLiquid

When fruit quality is the goal, the characteristics and composition of the soil and irrigation water are critical considerations in developing a crop nutrition management plan. Under adverse conditions it can be difficult to achieve desired quality, with stress leading to problems with size, color, flavor and shelf life.

Imbalance of the nutrients in the soil or irrigation water is a common situation and can contribute to those stress conditions. When cations in the soil, such as calcium, potassium, magnesium and sodium, are not in the right ratios, they can interfere with nutrient availability to the plant. Excesses of some nutrients can interfere with the utilization of good levels of other nutrients. With dry climates, as we have in much of California, high evaporation rates will keep cations at the surface. In addition, arid areas are often receiving irrigation water. Since the irrigation water generally carries other nutrients, the top of the soil starts acting like a coffee filter. This means the soil can take on properties of the water. The result can be soil with an imbalance of magnesium, which can block calcium and potassium (K) uptake, or high levels of sodium, which can also interfere with K available to the plant. These factors matter as we manage crop nutrition. We can manipulate levels some, but we always have to look at the economics to see if productivity will justify the expense.

Cation Exchange Capacity

The Cation Exchange Capacity (CEC) shows us the nutrient and water holding capacity of the soil. This is the first indicator of the productive capability of a soil. The higher the number, the more water and nutrients it can store. A low CEC number would be 1, requiring superb management, and a high number might go as high as 50 if a lot of organic matter exists. Typical soils range between 10 and 30. All types of CEC soils can be productive. Low numbers can be challenging because they need rain or irrigation more often as sandy soils don't store much water. When the CEC is low, there is also often low organic matter, which affects the availability of the nutrients to the plant in the form the plant can take them up. This makes the management of nitrogen more complicated and frequently the calcium, potassium, magnesium, sulfur and sodium

will be imbalanced. But crops root down well in a sandy soil. With sufficient water and careful nutrient management, they will reward you with outstanding yields.

Higher CEC soils hold more nutrients and water, providing a buffer between rain events – but can be subject to water logging during heavy rains. The management of potassium can be a challenge, and it is common to have problems with fungi and bacterial diseases in these soils, such as damping off and fusarium.

Water

We cannot expect to be able to get the best fruit quality if the water has high levels of sodium, carbonates, bi-carbonates, or any other elements that can interfere with crop nutrition. The best practice is having the pH of the water as close to the neutral range (pH of 7.0) as possible. If you use irrigation with high pH and the fertilizers have high levels of detrimental salt, we are moving away from the fruit quality we are looking for. It is common to find crops setting fruit under stress conditions due the high level of salts in the soil. This makes the decision of type and amount of fertilizer used more complicated, knowing that it can create a higher stress environment for the plants.

Problems with the calcium levels in the plant, and therefore in the fruit, are often caused by changes in the weather. In high temperature, low humidity conditions, for example, transpiration will increase dramatically, causing the plant to use more water. In irrigated crops, if watering has not been well scheduled, even soils with good levels of calcium can have problems in the fruit caused by calcium deficiency, such as blossom-end rot in tomatoes. This is the time when we need a fast calcium fertilizer that can be applied by foliar.

Electrical Conductivity

Increasing the electrical conductivity (EC) of the solution is a practice sometimes used to improve the quality of the fruit. The problem with this strategy is that increasing the salt content of the solution does not necessarily mean we are increasing the levels



of nutrients needed for increased fruit quality. When the EC of the solution increases and the roots detect a higher concentration of detrimental salts, the plant reacts by stopping the uptake of water to preserve its own water. Therefore, the flow of nutrients decreases. What we see is an increased firmness of the fruits. However, it is only water and some salts (nutrients and non-nutrients) that the plant has taken up. There is not enough calcium to build cell walls, or enough potassium working to increase the brix grade. What we have is an “emergency contingency reaction” in the plant, to be ready since the soil solution has high levels of detrimental salts.

Under this circumstance, when the fruit has been harvested, the attributes of quality that we were trying to get are lost: a bad shelf life, bad taste, loss of water when the fruit is cut, hollow fruit, slim walls of the fruit, and sometimes even the weight is not desirable.

The question is how to supply the crops with the right amount of nutrients, not just salts, at the right time, and the answer is always the right source. Applying high-efficiency fertilizer to help ensure the health and vitality of a crop is a tool that cannot be overlooked in any crop management plan. When selecting fertilizer products and application placement it is important to use the best agronomic practices for the product and crop. Always consider what crops, application methods, tank mix partners, and environmental conditions are present when making fertilizer decisions. Above all, find a trusted agronomist or crop nutrition expert to help identify your crop nutrition needs. ■



NOTE: Some of the following job opportunities are abbreviated postings. To view the complete posting, please log into your membership access on our website at <https://capca.com/my-account/>

Pest Control Adviser-Salesperson – Ventura County

Nutrien Ag Solutions Oxnard

Description: Scout fields - record weed, insect, disease and other observations; Learn agronomy and sales skills; Perform petiole, tissue, soil and water sampling; Inspect crops for nutritional deficiencies; Complete crop inspection reports for crop consultation; Learn computer recommendation and billing programs.

Duties, Qualifications & Requirements: Ag-focused degree; Valid PCA License or ability to obtain PCA License within 6 months of hire; Valid driver's license and clean driving record; Ability to work outdoors for extended periods of time under all weather conditions; Above average organizational skills, ability to understand new concepts and learn quickly, complete work targets with little or no supervision in a timely manner, self-motivated; Ability to pass drug and alcohol screening.

Apply: Please contact Rick Harrison at rick.harrison@nutrien.com

Agronomy and Weed Management Area Advisor – Merced County, California

UC ANR at <https://UCANR.edu>

Description: The Advisor will conduct a multi-county extension and applied research program that addresses grower and industry needs, including variety evaluation, soil, nutrient and irrigation management to optimize agronomic cropping systems and integrated weed management. Primary crops include forage and silage crops, alfalfa, small grains, grain corn, dry beans, and cotton.

Duties, qualifications and requirements: A master's degree in disciplines such as plant science, weed science, agronomy, pest management, crop production, or a closely related field is required at the time of appointment. The advisor must possess/obtain a Qualified Pesticide Applicator Certificate (QAC) within one year of hire. Other required skills: Technical competence and impact, Communication, Collaboration, teamwork and flexibility, Lifelong learning.

Apply: To submit your application materials, please visit UC Recruit at: <https://recruit.ucanr.edu/> and select "Applicants." For full consideration, application packets should be submitted in their entirety no later than May 31, 2020.

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