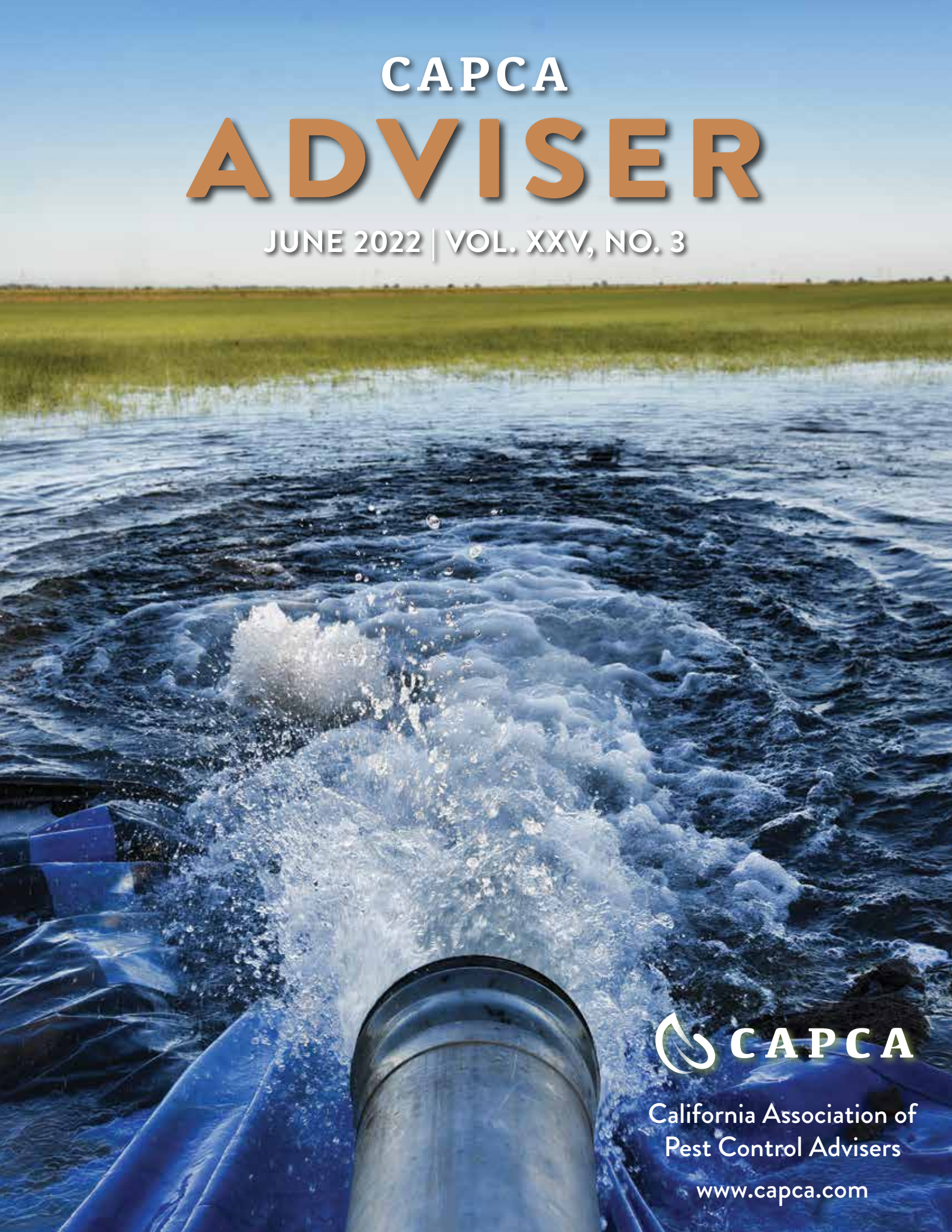
# CAPCA ADVISER

JUNE 2022 | VOL. XXV, NO. 3



CAPCA

California Association of Pest Control Advisers

www.capca.com

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# TABLE OF CONTENTS

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CAPCA
AT THE CENTER OF PLANT HEALTH

## Chapter Ranking: The Early Results Are In!

Chapters are competing this year for the coveted honor of the inaugural Chapter of the Year Award! In the December 2021 issue of the Adviser, Board Chairman Patrick Dosier wrote about the new Chapter Ranking program that would build a little friendly competition and reflect value for all the volunteer lead activities happening at your local chapter. CAPCA Chapters are doing a lot in their communities and for the profession, and we want that to shine as Chapters take the lead in 2022!

As of the date of publication, all points have been self-reported by Chapter Leadership. The top 5 positions on the leader board are as follows:

1. Fresno Madera
2. Ventura
3. Desert Valleys
4. Central Coast
5. San Diego

But it isn't over yet! The race to the finish line on October 11, 2022 in Anaheim includes so many additional opportunities for Chapters to take the lead in engaging their membership and telling their local chapter stories! Oh, and earning points for the win! Whether your chapter isn't on the leader board or you want to make sure it stays in a good position, there are opportunities from posting on social media to participating in Advocacy Training and significant volunteer opportunities for last minute points at the CAPCA Annual Meeting! If you have any questions about points for an activity, want to learn more about upcoming opportunities, or want to self-report your chapters activities, email chapter@capca.com.

May the best Chapter of 2022 win!

Ruthann Anderson, Editor
ruthann@capca.com

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**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.

**PUBLISHING INFORMATION**
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CAPCA
AT THE CENTER OF PLANT HEALTH




# What *Winning* Looks Like

By Patrick Dosier

ALLIANCE OF
California's Farmers & Ranchers

Last summer, the CAPCA Board set out three focused priorities for the organization. I have covered the first two in previous messages. The final priority is an audacious goal: **Agriculture Wins in 2024**. We're talking about supporting Ag-friendly political candidates as they seek election to the California Legislature.

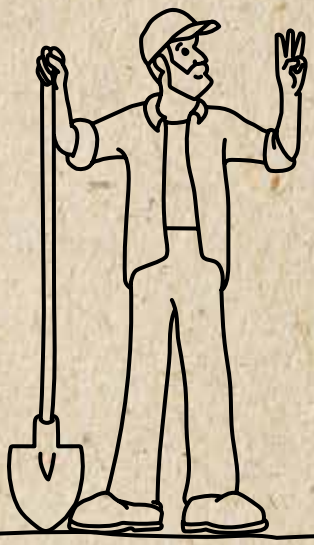
This is an immense task, and we will not succeed alone. CAPCA will seek guidance from our lobbyists, our Industry peers, and our Advocacy Committee. We will pool resources with the greater Ag community, primarily through the Alliance of California's Farmers and Ranchers. Members of this Alliance include California Dairies, California Fresh Fruit Association, California Citrus Mutual, American Pistachio Growers, California Rice, and CAPCA. Learn more at www.alliance.ag

Winning means that we will find ourselves, by 2024, with a legislature that is pro-Ag, Ag-friendly, or at the very least, Ag-aware, and willing to entertain our industry's opinion on sensitive issues. Pro-Ag candidates from rural communities need our support. Candidates from urban centers need to recognize that their blind support of environmental extremism has a negative impact on the health and food security of their most disadvantaged constituents. The Alliance's job is to identify pro-Ag, and potentially Ag-friendly candidates, to assess the cost/benefit of contributing to their campaigns, and to make a recommendation. It will then be up to CAPCA's Advocacy Committee Chairs to decide if we will contribute to an individual campaign, in consultation with the local chapter(s). The Alliance may also create independent expenditure committees where CAPCA can elect to participate.

Winning does not mean that a particular political party will gain seats in the legislature. Our pro-Ag, pro-Food, pro-Health agenda transcends partisan politics!

We will not succeed without your support and involvement. Yes, I mean you, the reader! CAPCA is a small organization. Even the Alliance's resources are eclipsed by the environmental extremists' resources. But we have members in every single electoral district, and we have food security as our salient message. We need you to participate in CAPCA's Advocacy Training (one is scheduled at our Annual Conference), to recruit members of your chapter, and to ask CAPCA membership (including me - patrick.dosier@gmail.com) how you can get involved. Over the past five years, CAPCA has built the resources and capacity to have a robust grassroots effort. CAPCA is a member of the Alliance, we have our own $1,000,000+ Advocacy Fund, and we have our own Political Action Committee (PAC). Combine these resources with an active member and… watch out!

Finally, I like this goal for two reasons: 1.) It is big, hairy and audacious. 2.) It is time-bound and measurable. We were purposeful in setting the 2024 goal. One strategic reason is that there are a lot of seats which will be openly contested in this election. Another reason is that it gives us time to build our grassroots momentum. And finally, it presents a finite point at which we can measure our success. ■

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# THIS IS IPM

## IPM: A Core Element of CAPCA

As stated in CAPCA's Code of Ethics, our Association recognizes the unique ethical and professional responsibility of the licensed pest control adviser (PCA) and that PCAs have the responsibility to support and promote the highest standards of conduct in the performance of their duties to the public, the environment, and their clients. That is why a core element for CAPCA has always been the support and achievement of IPM practices.

In ARTICLE I of CAPCA's Code of Ethics - Obligation of the PCA to the Public and Environment – the IPM focus is foremost and indisputably a key element. ARTICLE I includes the following responsibilities of PCAs:

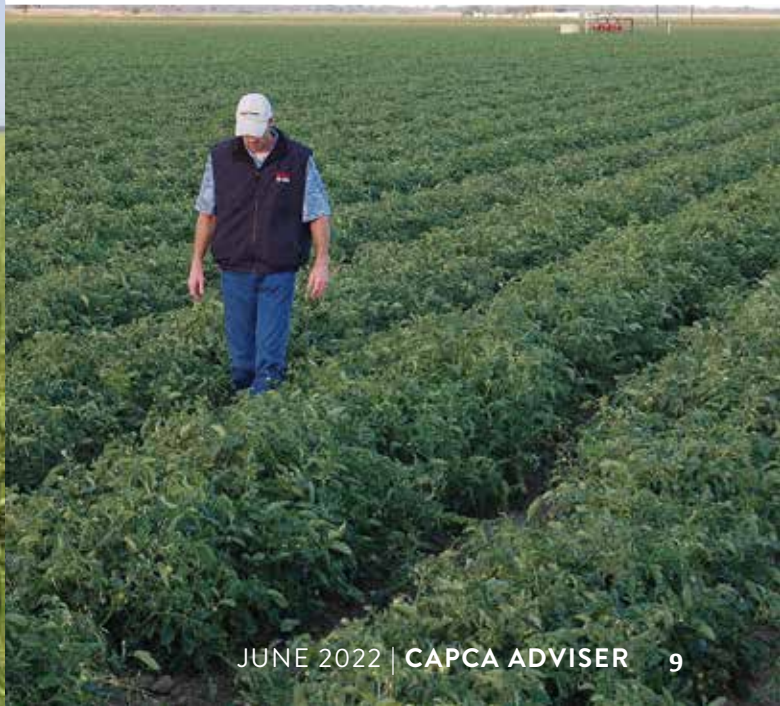
- Prescribe environmentally sound pest management methods which do not jeopardize the public health and welfare.
- Ensure that alternative measures for pest management situations have been reviewed, as provided by law.
- Maintain an awareness of public concerns and be willing to address those concerns in a sound, scientifically-based manner.
- Serve as a leading advocate of safe and effective pest management technologies.
- Participate in the advancement of pest management and professional knowledge.

The dedication of PCAs to IPM methods and implementation has been the essence of the successful contribution by PCAs to ensure efficient IPM practices throughout the Industry. ■


#ThisIsIPM

## THE FACES OF IPM








# Celebrating the 50th Anniversary of the PCA License

## *and fighting for the next 50 years*

CAPCA Advocacy Committee

Advocacy for CAPCA has always been complex. We have toggled over the years between a broad agricultural issue inclusive agenda and a narrow agenda laser pointed on the PCA license. As we observe 2022 as the 50th Anniversary of the PCA license, I was hopeful it would be a year full of celebration and reflection on how the license has evolved and flourished to serve the grower as a trusted Adviser. But in the wake of discussions around non-chemical alternatives, sustainable pest management and resetting licensing to fit new federal standards, we have spent much of the spring rethinking how the PCA license fits into the emerging structure of the Pesticide Handler Training guidance set federally and the overarching goals set by the State of California for Agriculture. We are at a crisis point. If we lean in to listen, to change, to rebrand and remake the license publicly what we all know it is in reality, in the field, then we find great opportunity - opportunity to showcase professionalism, qualified and licensed experts, and ultimately, IPM, which drives the whole system.

But in order to do that we need member voices. We need member engagement to fight for a vision of what the next 50 years of the PCA license should and can look like. As Chairman Patrick Dosier mentions in his article on page 6, you can be part of this big, wild, crazy idea to set a bar for Ag to develop new allies now and into a huge turn of the legislature in 2024. But the time is now for us to develop, harness and focus the political power of CAPCA's members to be a positive voice for PCAs and California agriculture generally. Here are some ways that you as a CAPCA member can get involved now:

1. **Lend your voice on behalf of the PCA License.** Sometime in the month of May, DPR will take their proposed licensing changes out for public comment. We will keep members looped in, but this is the time for honest discourse so that we can find a pathway forward to ensure a professionally and timely licensing program for PCAs.

2. **Tell your IPM story!** IPM month kicked off in February a year-round effort for CAPCA to persist in amplifying the role of the PCA by continuing to tell your own personal stories as you walk fields – highlighting IPM practices and decision making, show that your work expands far beyond a written recommendation and reflect your Chapters initiatives – the ways you give back within your community!

3. **Join the Advocacy Committee and help CAPCA find a unique voice within the noise of issues.** In Sacramento's political community, there is a longstanding practice, based on human tendency, to broadly categorize the many different and diverse actors of a business sector under one umbrella. It is exceedingly challenging in this environment for organizations to develop their own identity – and voice – outside of this umbrella. When CAPCA operates in and around the capitol community, for all the good and for all the bad, we are "Ag". Certainly, there is no reason to distance ourselves from the good. However, it is important to have an individual identity to avoid CAPCA being negatively impacted as collateral damage due to challenges others in agriculture may be facing at any given time.

4. **Engage as a Chapter Champion or Advocacy Representative for your Chapter.** Developing an individual voice and identity for CAPCA is possible by flipping the script and starting the building process at the local level. **This is because each member of the legislature inherently believes that their home district is unique, and that these traits should be recognized, accounted for, and even celebrated.** It is this power that the CAPCA Chapters and membership spread across every district of California will tap into. It takes time, persistence, and hard work, but we are used to all of that! CAPCA's regional Chapters are the foundation of a strong future for the PCA License. With 16 regional chapters located across California's diverse state, CAPCA has the foundation to be a statewide political force. This is because each chapter is uniquely local, with representatives who live and work in a given region. They understand the issues that impact that region, from an agriculture perspective as well as a community perspective. This is where they live, work and raise their families.

**Equip Yourself!** A simple way to help CAPCA and the PCA find a unique voice within the noise of issues is to equip yourself on how to tell your story as a license holder. CAPCA will be holding our next in-person Advocacy Training in October 2022 with plans to continue to build upon and grow those opportunities for both personal and professional development. But we need Chapter members to step up and participate, to get equipped so that they can answer the call by meeting with a local politician in their Chapter or attend a local meeting to provide public comments through the lens of personal experience and CAPCA's unique voice. We don't want to wait until the opportunities are already upon us in 2024 to mobilize! Visit https://capca.com/community-outreach/ to sign up and get involved! ■

PCA PROFILE

# Molly Yager
## NorCal CAPCA PCA


*Continued on page 14*

**NorCal CAPCA PCA Molly Yager** graduated from CSU Chico in 2014 with a BS in Crop Science and obtained her PCA license in 2015. She also holds CDFA County Ag Inspector licenses. The major crops she consults in are Tree and Vine crops.

Molly currently works for Apollo Ag Technologies as the Northern CA sales manager. "I cover Oakdale-north but reside in Roseville" she explains. Her job duties with current employer are varied but mainly focus on advising farmers and PCAs on water treatment. "I pull water samples, analyze them, and make water treatment recommendations. I primarily work with growers who have drip or micro sprinkler irrigation. I currently have one salesman working under my management. On top of advising and recommending, I also get to educate and train not only the growers and PCAs, but also my salesman." Her previous employment history included Wilbur-Ellis Co. Colusa branch, Sutter County Ag Dept, and Valagro USA.

When faced with the challenge of describing what she does to someone outside the industry or unfamiliar with PCAs, Molly says "I jokingly say I drop acid with farmers and then once the laughing or puzzled looks subside, I go onto explaining the nuts and bolts of what I do. When describing a PCA to someone who is unfamiliar with the industry I simply say we are plant doctors who specialize in fertility, insects, weeds, chemistry, math, and all things food and fiber."

Reflecting on when she knew she wanted to become a PCA and what made her think it would be a good career fit, she reflects "I have always had an interest in farming, and pesticides to be specific. However, when I initially went to college it was for heavy equipment operation, not agriculture. It wasn't until I was with a friend who is a PCA for Helena Agri Enterprises, and he was talking to a grower on the phone about rice herbicides. I remember sitting in the back seat of his truck googling what products he was talking about and what they did. I later picked his brain about what he did for a living, and he suggested I ride with a PCA for an afternoon to see what their day-to-day operations were. I was sold after that!"

Molly's personal experiences that helped her in her career come from every job that she has had in the agriculture industry and has been beneficial to where she is today in her career. "At the start of my career I was lucky enough to be taught by Paul Squires and Mike Pettigrew, if you know them you know I hit the jackpot with mentors" says Molly. "Paul specifically said to walk a field as if the grower is parked watching you, you need to be thorough. Mike taught me to document everything, the route you walked in the field, what you found or didn't find, and again be as thorough as possible. I utilize that advice daily."

Watching a crop go from seed or bloom to harvest is very rewarding for Molly and, along with being able to be a member of CAPCA, has provided her with some very satisfying highlights in being a PCA.

Reflecting on what she considers the "wins" in her job, she is proud to provide her clients with a professional service. "Having the ability and work ethic to meet my customers' needs and expectations are always a win in my opinion. I don't care if the grower is 10 acres or 1,000 acres if they are satisfied with what I am bringing to their table and willing to recommend me and Apollo Ag Technologies to their friends, family, and neighbors it is a win. Also, when I see a customer's harvested crop being sold in major grocery stores throughout the state, I always feel a sense of pride."

Although Molly became a CAPCA student member when she was in college in order to network, she only attended conference, never a local meeting. "When I obtained my PCA license I chose to continue my membership for the perk of CE hour accountability. It wasn't until 2018 that I attended my first chapter meeting. Aside from the networking aspect, CAPCA is great for newer and even veteran PCAs, or any PCA who wants to stay ahead when it comes to local and statewide regulations. It's a great way to have a relationship with your local ag department and local product reps."

The positive influence she experienced compelled her to become more involved and today is the President of the NorCal chapter, after previously serving as the Chapter's Vice President from 2019-2021. Molly reflects, "I started to attend the monthly meetings when I was a biologist at Sutter County Ag Department, to represent the department and answer any questions PCAs may have had regarding Sutter County ag. After I left the department, I kept attending because it was fun and informative!"

Molly believes CAPCA involvement offers PCAs many opportunities and she hopes to see additional participation in the NorCal Chapter. "CAPCA involvement is so beneficial in many ways, I cannot stress that enough. CAPCA is helping keep PCAs informed of regulations coming down the pipeline. The NorCal chapter meets the last Wednesday of every month; it is something I can always count on happening, and it is the first thing I add to my calendar every month. Every September we host a sporting clay event to raise money for college scholarships. It is a fun event and a great way to get involved with the community and future PCAs. I truly hope upcoming PCAs take part in CAPCA and make it a goal to sit on the board, even if it is for one term. The relationships, knowledge, fun, and dedication to the industry and the PCA career is unmatched!"

Outside of work, Molly enjoys golfing, duck hunting, wine tasting, and cooking. ■

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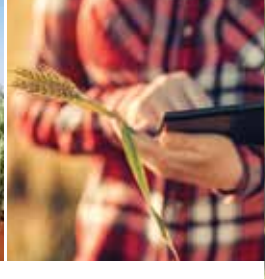

# Plan for Year-end Renewal Now

Crystelle Turlo, Chief Operations Director

As the days get longer and warmer, it is easy to put CAPCA business on the backburner. However, if you are renewing your PCA license in 2022, we urge you to take a few moments this summer to ensure you are ready for renewal prior to the fall months.

The first item up is to make sure you have both your 2021 and 2022 membership up to date. Remember, when you purchase your membership online, it does not update automatically and can take 3-5 days to process. When you are waiting to have access to your 2021/2022 Official CE report, the extra days can seem even longer. Although CAPCA staff works diligently to update member accounts as fast as we can, the closer we get to the end of the year, the more membership dues come in for the following year and may cause a backlog. The way to prevent getting stuck in this type of situation is to pay your 2022 dues right now, if you haven't already.

If you will be mailing in a check for your dues this summer, please note that CAPCA moved to a smaller and more efficient office in 2021, so make sure you have the correct office address prior to sending. For those members who have changed their personal addresses since their last renewal, this is also the best time to update DPR so that they have the correct information on file for you as well.

Now is also the time to know if you do not have as many hours as you expected for renewal, or are missing hours from courses that you took. Many members find themselves in the worst situation by not finding out this information until October, or later in the year. If you start early, you know where you stand and have a plan for taking the remaining hours or doing the legwork to find missing hours. And if you have plenty of hours, you can send in your DPR license renewal packet early and enjoy a stress-less fall/winter. Remember, the closer you get to the end of the year, the longer everything will take to do.

Finally, keep a lookout for the 2022 CAPCA Conference registration information coming in late May. We are excited to be back in Anaheim and are looking forward to hosting a wonderful program and seeing all our Members! ■

## CAPCA MEMBERS-ONLY BENEFITS

*Membership with CAPCA is the best way to take your involvement, education and skill set to the next level.*

**CAPCA provides three levels of membership for individuals:**

## MEMBERSHIP LEVELS

### ACTIVE MEMBER

Only California State licensed Pest Control Advisers are eligible for Active Membership in the Association.

### ASSOCIATE MEMBER

An Associate Member is any person not licensed as an agricultural Pest Control Adviser, but may hold other licenses issued by the State of California, and wants to promote the purpose of the Association.

### STUDENT MEMBER

A student member is a student regularly enrolled in a college or university, majoring in biological or agricultural sciences and preparing for a career in pest management. A student member may not hold a DPR license.

***To join, visit https://capca.com/membership/***

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# 2022 CAPCA CONFERENCE

## October 9-11, 2022 | Disneyland Resort | Anaheim CA


**REGISTRATION OPENS MAY 2022**

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## CONFERENCE SCHEDULE:

### SUNDAY, OCTOBER 9, 2022

Nitrogen Management Session
Crop Round Table Meeting: Wine and Table Grapes
Exhibitor Presentations

### MONDAY, OCTOBER 10, 2022

General Session
Exhibitor Presentations

### TUESDAY, OCTOBER 11, 2022

General Session
Exhibitor Presentations

**Discounts for CAPCA Members (Active & Associate)**

**CE Hours and Program Information:**
https://capca.com/conference/conferenceprogram/

**Anaheim Continuing Education Program**
October 9-11, 2022 | Disneyland Resort, Anaheim CA

DPR Hours Total TBA (Laws & Other)
Please note: No Label Update session will be held in Anaheim

**Pre-Recorded Label Update Program**
Pre-recorded Label Update will only be available online. Label Update sessions will be included with Pre-Registration purchase of Member or Non-Member registration through August 30, 2022. This pre-conference program will be available to pre-registered Members and Non-Members starting in September, and accessible through December 31st. Label Update Only will be available online for purchase in October 2022. The Label Update program will include four separate DPR-accredited sessions and one Nutrient Management session (CCA hours only).

# GroPro

# INNOVATIONS GROW HERE

## ABOUT US

GroPro is a USA headquartered producer and supplier of bio-pesticide protection products and bio-stimulants. We combine enthusiasm and knowledge with a deep comprehension of the real-world hurdles that growers and the agricultural industry face today.

GroPro has a proven track record of delivering natural materials while allowing growers to augment agrochemical products in the integrated pest management (IPM) approach. With multiple manufacturing locations, including Korea, the USA, Egypt, and the EU, we are positioned to support our customer's needs. GroPro has been performing in-depth field trials comparing GroPro materials against conventional and Bio-Based materials in the U.S. and internationally.

## OUR APPROACH

GroPro's approach includes a combination of unique natural ingredients and modern technologies to increase the bio-efficacy of products. Including our proprietary amplification, micronization, and anatomic extraction of active ingredients.

Sustainability is firmly rooted in our entire company's decision process, from early research to product development. This empowers our development team here and abroad to research and formulate effective materials that benefit our distributors, dealers, and growers.

## GROPRO HAS FOUR DIVISIONS

Agri-Line, T&O Line, Environmental Line, and Livestock/Pet Line. We have a global market sales reach with our brands trademarked in the U.S. and internationally.

GroPro's R&D scientists have worked with researchers at major agricultural universities to develop our suite of robust, cost-effective, and sustainable products that perform flawlessly. All our products are created and formulated by way of multiple patents for the extraction and processing of essential oils, microbials, bacteria, and control mechanisms.

Our unique in-vivo and in-vitro processes and the specific control mechanisms GroPro uses to produce nematicides, insecticides, and fungicides are also patented.

## TOP PRODUCTS


**ZAYIN®** is a patented dual-action bio-fungicide that is remarkably effective on Ascomycete fungi, Peronospora, Pseudoperonospora, Bremia, Plasmopara, and Basidiophora when applied to a wide application area covering all parts of the plant. By causing an imbalance in the K+ ions inside the mycelium, ZAYIN® destroys any active germ tube of the fungi. Spore germination and germ tube growth are inhibited, and pathogen cells are destroyed. ZAYIN® is equally effective on active mildew and when used as a preventative treatment.

Key product advantages of ZAYIN® are its efficacy against multiple organisms in multiple crops, 0 MRL, 0 PHI, and 0 REI, and the fact that it has both preventive and curative action. GroPro has a suite of formulated materials that work either stand-alone or tank-mixed with conventional or organic materials allowing for a genuine program.


**RECKONING®** is a patented curative and preventative sporicidal that is designed to be fully integrated into a pest management program. It is A.I. (active ingredient) Thymol (Thymus Vulgaris) and inhibits the spore tube germination, germ tube elongation, or the penetration of the peg formation of the pathogen. RECKONING® also dissolves the spore wall and works on active botrytis issues. Field results on grapes showed over 90% efficacy in control on active botrytis and have been trailed against conventional products to prove in field control under standard grower practices.

Critical advantages of RECKONING® are that it destroys the pathogen's cells, stops the proliferation of the mycelium, and has a PHI and REI of 0.


**WRATH®** is a patented bio-pesticide made from plant extracts that provide soft-bodied insect control. It has multiple modes of action leading to a wide range of control over mites, aphids, scale insects, worms, thrips, and more. WRATH® works by disrupting an insect's respiration process causing suffocation, causing neurological issues by disrupting the Gabba receptors, and has ovicidal activity. It allows for a complete life cycle control of the insect.

Critical advantages of WRATH® are its multiple modes of action, the efficacy of over 90% when properly applied, PHI and REI of 0, and the added benefit of having zero resistance issues.

**ZAYIN®, RECKONING®, and WRATH® can be used together due to the unique synergy of their formulations.**

***All product labels and SDS are available at agrian.com. Always follow all label directions and safety precautions when using these products.***

# 2022 CONFERENCE SPONSORS

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# Learning From Nature,

## LIVENTIAS's biostimulants for nutrient efficiency

Fertilizers **prices** were already soaring, now some markets are facing availability issues. American farmers are not alone, these are global issues. Fuel, labor, inputs, just about every aspect of crop production is being impacted, underscoring the importance of maximizing efficiency on all we do. Fortunately, we have existing, proven, and economical methods and **alternatives** to greatly **increase efficiency** of our cropping systems.

**Biostimulants** have always been a part of agriculture, but only for the last 20 years or so have they been recognized by farmers as a category of materials[1]. In agricultural context, that is a very young concept, and as such, we've only just begun to understand how and why we should consider biostimulants as part of our crop systems. This organic technology is emerging as a primary driver of sustainable crop production systems to adequately supply the world's population in the 21st century from farm to fork.

**LIVENTIA** is an old hand in the field of agriculture biotechnology with over 28 years of experience supporting biological solutions to agricultural issues, working with the living microorganisms of soil ecosystems to optimize results. Our biostimulants are carefully formulated with **naturally occurring**, hyper-vigorous mycorrhizal fungi and beneficial bacteria to enhance several important plant processes like nutrient uptake, nitrogen fixation, plant growth, and crop's genetic expression with proven results. They are non-GMO, non-pathogenic, and 100% organic consortia, resulting in strong, exclusive, and select microorganisms with the best genetic fitness for their natural performance.

Our line of microbial biostimulants is built over decades of **experience** in agriculture, allowing for great understanding of their role as a key component to enhance efficiency of nutrition. Through sustained research and development, our outstanding technical team has amassed a unique line of beneficial bacteria especially adapted to withstand and thrive in even the most hostile environments, and to produce the best possible return on your investment.

Under the challenging crop production conditions, farmers can engage the aid of LIVENTIA's microbial biostimulants as an alternative to enhance efficiency and crop success. Ask your trusted PCA or local supplier on how to **include** our natural solutions into your annual program.

### Our microbial biostimulants contribute to:

- Nitrogen fixation
- Phosphorus solubilization
- Promote plant growth
- Enhance root growth
- Induce stress tolerance


(1) X. Zhang, R.E. Schmidt. Hormone-containing products impact on antioxidant status of tall fescue and creeping bentgrass subjected to drought. Crop Sci., 40 (2000), pp. 1344-1349

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California Department of Pesticide Regulation

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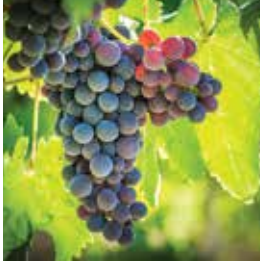

# Revised neonic regulations still raise concerns

Brad Hooker, Agri-Pulse

The Department of Pesticide Regulation has revised its proposed regulations for neonicotinoids to protect bee populations. After more than a decade of review, the agency plans to soon issue its final draft.

Yet a recent hearing on changes to the proposal showed how agricultural trade groups still have issues with some of the many provisions in the regulations, and environmental organizations are pushing for broadening the restrictions to more products and to address more pollinator situations.

"We believe the revised proposed regulations for neonics move in a very positive direction," said Eric Stein, who directs regulatory affairs at the Western Plant Health Association, before sharing the trade group's concerns over efficiency, application rates and consistency between state and federal regulatory processes and evaluations. "With increasing pests due to factors like climate change and human transport, it is vital that farmers are able to continue to access safe tools like neonics to protect their crops."

Stein pushed DPR to provide greater clarity on how the agency would implement the regulations and how they would affect best management practices. Since the regulations pose "a much greater complexity" in using and managing neonics, he urged DPR to provide a series of workshops for stakeholders on implementing the measures.

"Farmers, beekeepers, (pest control advisers) and agriculture commissioners need to have a better understanding," he said.

Michael Miiller, who directs government relations for the California Association of Winegrape Growers, shared far more dire concerns over the regulations, arguing they would hinder the ability of agencies to manage the spread of the glassy winged sharpshooter, which is a vector for Pierce's disease.

"The unintended consequence of this proposed regulation could be a statewide spike in invasive pests and the spread of diseases resulting in the devastating loss of vineyards in California," said Miiller. "What we're asking for is if DPR could consider an exemption for pests managed under the Pierce's Disease Control Program."

He explained that grapes self-pollinate, making vineyards less attractive for pollinator species to forage. Vineyards have

already been leading the state in voluntary efforts to protect pollinators, he added, with more than 2,400 participating in the Certified California Sustainable Winegrowing Program. As part of an integrated pest management regimen, the vineyard operators monitor for pests and explore low-risk alternatives before applying pesticides, such as establishing buffer zones to protect sensitive areas, according to Miiller.

While the Natural Resources Defense Council commended DPR for moving forward with the mitigation plan, the environmental group raised alarms that the control measures would not satisfy DPR's statutory obligations to protect pollinator health.

"This is the first such earnest effort by a state agency to comprehensively address neonic pollution," said Daniel Raichel, acting director for NRDC's pollinator initiative, before he outlined what he viewed as gaps in the mitigation measures and the analysis that informed them.

NRDC has been pressuring DPR to regulate neonic-treated seeds, both through a 2020 petition to the agency—which was later rejected—and through legislative measures at the Capitol. Raichel charged that these untracked seeds account for more use than all of the neonicotinoid use reports currently in the DPR database and the proposal would fail to protect pollinators from the products.

NRDC has been a co-sponsor on a bill advancing through the Legislature that would ban nearly all nonagricultural uses of several neonicotinoid pesticides. Farm groups have lined up in opposition to the measure, arguing it undermines the regulatory process and would enable invasive pests to proliferate. Raichel called the topic a big issue for threatened and endangered pollinators living within urban and suburban areas, and he said the proposed regulations offer no mitigation for ornamental uses of neonics, which drove the initial reevaluation of the pesticides in 2009.

Raichel also worried about the cumulative damage from exposure that can span a pollinator's lifetime and come from various sources. The regulations specifically consider exposures from target nectar for pollen bees. Wild pollinators, he argued, are exposed through soil and water as well. And those native insects often live outside of colonies, he added, calling it inappropriate for DPR to focus on colony harm as an endpoint.

The comment period for the regulations ended in April, but the department will reopen a 15-day window for feedback on any additional changes to the regulation. DPR expects to adopt the regulations in spring 2023. ■

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Photo: Fred Rehrman, Elysian Fields

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# An introduction to *Bacillus thuringiensis* bioinsecticides

Mike Dimock, Ph.D./ Vice President, Field Development/ Certis Biologicals

## Bt: The first commercial bioinsecticide

Discovered at the turn of the 20th century in Japan and formally named soon afterward in Germany, the bacterium *Bacillus thuringiensis* (Bt) has been used as a bioinsecticide since the 1930's. Bt was first introduced to the US market in 1958 as Thuricide®, which is still in commercial use and has been manufactured in California from the start. Since then, Bt products have become dependable tools for managing caterpillar pests in agriculture, forestry, floriculture, and home gardens, as well as in public health for control of mosquitoes and blackflies. The unique mode of action, natural origin, and robust safety profile of Bt provide growers flexibility in producing high quality crops while avoiding some of the challenges associated with synthetic chemical insecticides.

## How does Bt work?

Late in its life cycle, during spore formation, a Bt cell produces insecticidal proteins known as delta-endotoxins, or Cry toxins because they form crystals within the cells. Bt spray products contain spores, crystals, cell debris, and other components of the harvested fermentation biomass **(Fig. 1)**.

Upon ingestion of Bt spray deposits by a susceptible insect larva, the crystals dissolve in the alkaline environment of the midgut, releasing protoxin molecules which are converted to activated delta-endotoxins by the insect's own digestive enzymes. Activated toxins attach to highly specific receptor proteins on the surface of the cells lining the insect gut, then insert themselves into the cell membrane to open pores **(Fig. 2)**. The resulting "ulcers" cause gut paralysis and stop insect feeding in as little as 30 minutes. Death usually follows within 1-3 days from starvation, osmotic shock, or septicemia as gut contents, including spores, leak into the bloodstream (hemocoel) and affect other vital functions.

Laboratory bioassays with purified Cry toxins have found that caterpillars species differ in toxin susceptibility. Some species, such as cabbage looper, peach twig borer, and leafrollers, are quite susceptible to most Cry toxins, making them relatively easy to control with Bt sprays compared to others (most notably armyworms in the genus Spodoptera) that are less susceptible. Larval age and size also play a role in toxin susceptibility, with small larvae (1st and 2nd instars) requiring lower doses than mature larvae.

## What kinds of Bt products are available, and what are the target insects?

There are many subspecies and strains of Bt, from which hundreds of unique toxin proteins have been identified to date. Most commercial Bt spray products targeting caterpillar pests (Lepidoptera larvae) contain *B.t.* subspecies *kurstaki* (Btk) or *aizawai* (Bta) and their associated Cry1 and Cry2 toxins. Other Bt subspecies are found in products effective against larvae of Diptera (mosquitoes, blackflies, fungus gnats) and Coleoptera (some leaf beetles and grubs).

Btk and Bta strains differ in the types and amounts of Cry toxins they produce, and insects vary in susceptibility to individual Cry toxins. Cry toxins present in commercial Bt spray products and susceptibility of representative Lepidoptera species are indicated in Table 1. Products based on Btk are characterized by the presence of Cry1A and Cry2A toxins. In addition to Cry1A and Cry1D toxins, Bta is characterized by presence of Cry1C which is lacking from natural Btk. Cry1C is more toxic than others to *Spodoptera* species (armyworms), which are relatively insensitive to Cry1A toxins and therefore less susceptible to Btk.

**Figure 1.** Vegetative growth, sporulation, and toxin crystal formation in *Bacillus thuringiensis*.

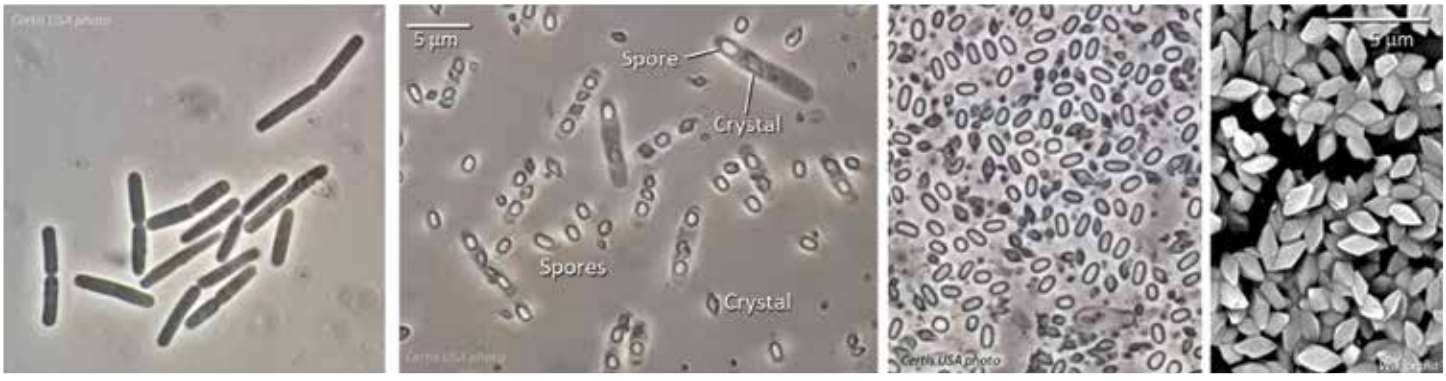
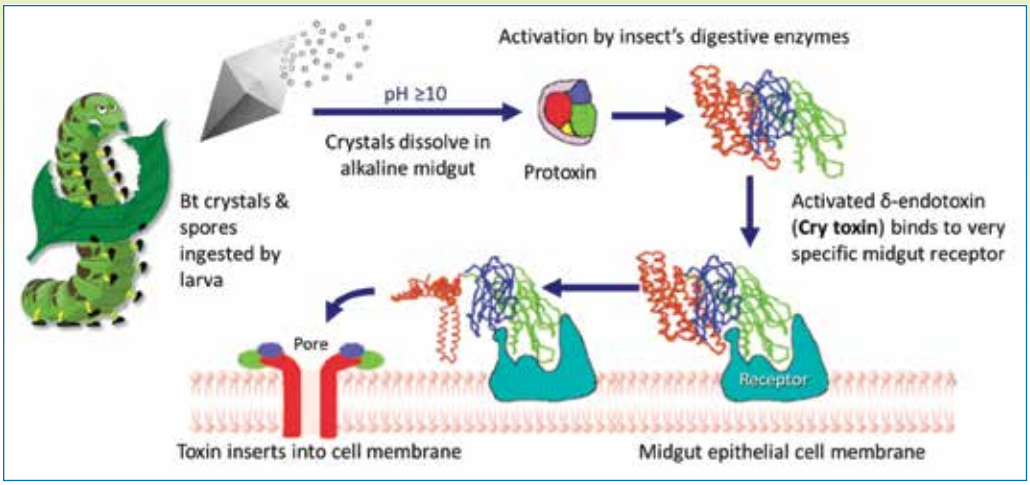


**Figure 2.** Mode of action of *Bacillus thuringiensis* against Lepidoptera larvae. Diagram modified from R. deMaagd et al. (2001), TRENDS in Genetics Vol.17 No.4.




### What are some features of Bt that make it valuable for IPM?

Bt has characteristics that make it a valuable tool for integrated pest management, and most Bt spray products are also approved for use in organic crop production. The highly specific mode of action of Btk and Bta is limited to Lepidoptera larvae, with no toxicity toward beneficial insects (including bees), humans, livestock, or wildlife. Of course, this also means that Bt spray products will not control non-susceptible pests such as aphids or spider mites. But Bt sprays also will not flare secondary outbreaks of those pests by harming their predators and parasitoids.
Most Bt products are exempt from US-EPA residue tolerance requirements, with no preharvest interval (PHI), or maximum residue limits (MRL) for exported commodities. Coupled with minimal re-entry interval (4-hour REI), Bt provides flexibility in crop and harvest management compared to pesticides requiring longer waiting periods before field re-entry and harvest.

Bt sprays tend to have short residual activity because of the effect of solar UV radiation on proteins. This contributes to the lack of residues, but may necessitate reapplication, especially in periods of rapid plant growth or sustained egg-laying by the target pest species. Residual activity can be extended by spraying late in the day (larvae continue to feed and ingest Bt at night) or tank mixing with a commercial sunscreen adjuvant. The proteinaceous nature of Bt gives it some natural rainfastness if spray deposits are allowed to dry on the plant for several hours. Most Bt spray products used in agriculture are dry formulations (water-dispersible granules or wettable powders) stable for 2-3 years at room temperature if kept dry in the original packaging, but some shelf-stable liquid formulations (mostly aqueous suspension concentrates) are also available. Refer to product labels for specific instructions on handling, storage and use.

### What is the role of Bt in insecticide resistance management?

The unique mode of action (IRAC Group 11) shows no cross-resistance with other insecticide chemistries, making Bt a good rotation or tank mix partner for insecticide resistance management. As with any insecticide, prolonged reliance on frequent Bt sprays (or repeated exposure to transgenic crops expressing Bt toxins) may result in development of resistance to one or more of the Cry toxins present in the product. However, research has shown that different Cry toxin families bind with different receptors in the insect midgut. Rotating Btk and Bta products can be a useful tactic for managing the risk of resistance, but as with all pesticides, overreliance on any single mode of action should be avoided.

### What is the future of Bt in agriculture?

Since the mid-1990's, genes coding for Bt toxins have been transferred into plants to develop transgenic crops resistant to rootworms, bollworms, borers, and other insect pests. New Bt strains are still being discovered, and new proteins are still being characterized from non-commercial Bt strains. Some of these have shown activity against insects not targeted by current Bt sprays, such as plant bugs, thrips, mites, ticks, and nematodes. Even human cancer cells have been found to be susceptible to certain Bt toxins. New types of Bt toxins like VIPs (vegetative insecticidal proteins) have been engineered into transgenic plants to prevent or delay resistance to the Cry toxins also expressed in these plants. And researchers continue to investigate in finer molecular and genetic detail the process of receptor binding and basis of toxin specificity.

Despite more than a century of research and commercial development, Bt has not yet given up all its secrets. Not bad for an active ingredient that has been in commercial use since before most of today's PCAs were born! ■

**Table 1.** Cry toxin profile of *Bacillus thuringiensis* spray products (upper table) and susceptibility of Lepidoptera species to those Cry toxins (lower table).

| Cry toxin family: | Cry1A | Cry1C | Cry1D | Cry2A |
|---|---|---|---|---|
| **Presence (+) or absence (-) in commercial Bt products based on different subspecies** | | | | |
| *B.t.* subspecies *kurstaki* (Btk) | + | - | - | + |
| *B.t.* subspecies *aizawai* (Bta) | + | + | + | - |
| **Relative susceptibility of representative target insects** | | | | |
| Cabbage looper (*Trichoplusia ni*) | + | + | - | + |
| Diamondback moth (*Plutella xylostella*) | + | + | + | - |
| Corn earworm* (*Helicoverpa zea*) | + | - | - | + |
| Beet armyworm (*Spodoptera exigua*) | +/- | + | + | + |

*Also known as tomato fruitworm and cotton bollworm.

# CAPCA Annual F

*for period ending*

## 2021 INCOME TOTAL = $2,481,330

| 2021 INCOME | AMOUNT | % of total |
|---|---|---|
| Advertising | $ 224,586 | 9.1% |
| Board Restricted Income | 7,000 | 0.3% |
| Conference & Spring Summit | 1,007,926 | 40.6% |
| Loan Forgiveness | 136,907 | 5.5% |
| Membership | 789,300 | 31.8% |
| Online CE | 75,934 | 3.1% |
| Rental Income/Misc/Donations | 35,257 | 1.4% |
| Interest | 23,406 | 0.9% |
| Unrealized Gain on Investments | 181,014 | 7.3% |
| **2021 TOTAL INCOME** | **$ 2,481,330** | **100%** |

### Organization:

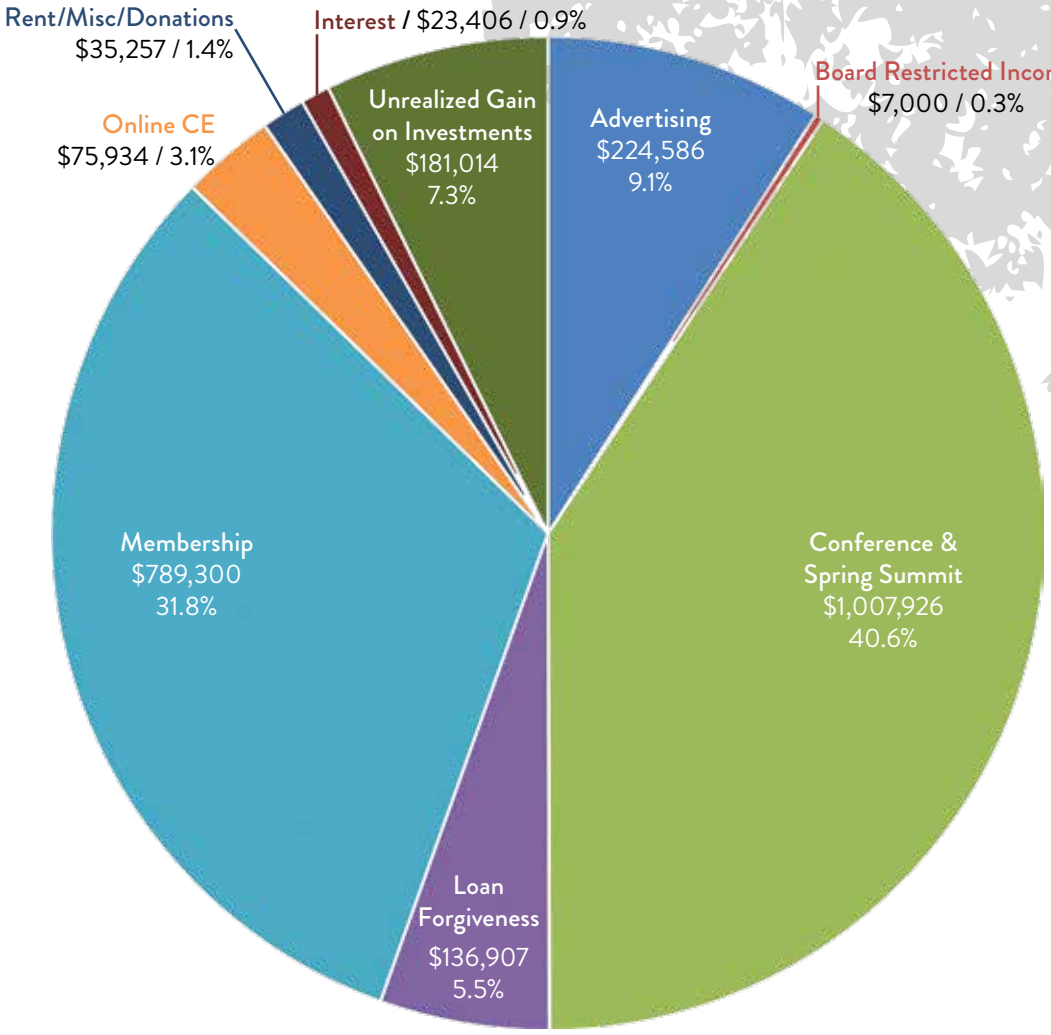
CAPCA is a California non-profit 501(c)(6) mutual benefit corporation.

### Base of Reporting:

2021 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.



# inancial Summary

*December 31, 2021*

## Functional Expense Allocation:

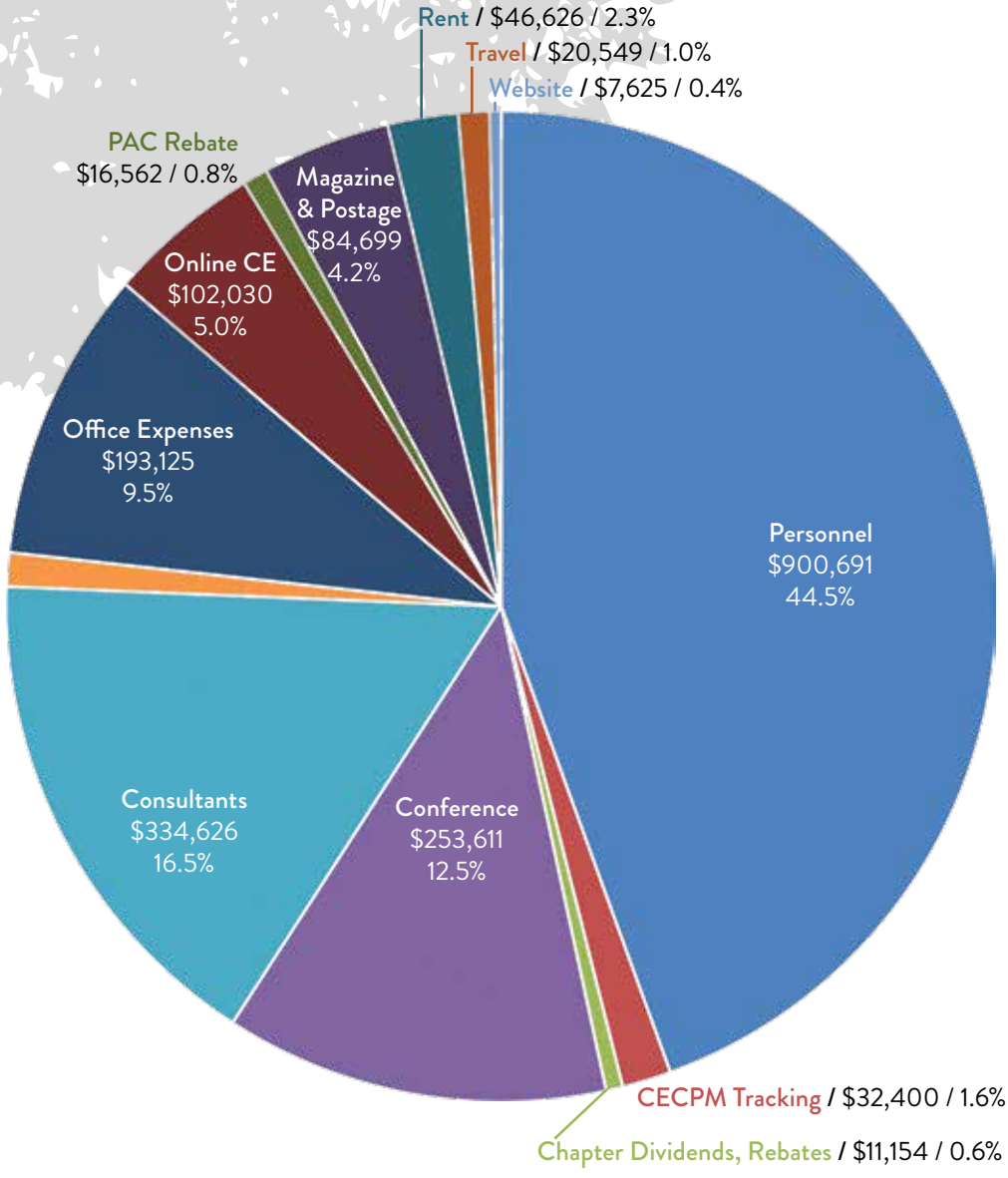
87.3% of expenses are directly related to CAPCA's purpose and mission. Only 12.7% is spent on general administration.

*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.*

CAPCA

## 2021 EXPENSES TOTAL = $2,026,069

| 2021 EXPENSES | AMOUNT | % of total |
|---|---|---|
| Personnel | $900,691 | 1.6% |
| CECPM Tracking | 32,400 | 1.6% |
| Chapter Dividends/Rebates | 11,154 | 0.6% |
| Conference | 253,611 | 12.5% |
| Consultants | 334,626 | 12.5% |
| Meetings & Meeting Supplies | 22,371 | 1.1% |
| Office Expenses | 193,125 | 9.5% |
| Online CE | 102,030 | 5.0% |
| PAC Rebate | 16,562 | 0.8% |
| Print Media & Postage (magazine) | 84,699 | 4.2% |
| Rent | 46,626 | 2.3% |
| Travel | 20,549 | 1.0% |
| Website | 7,625 | 0.4 |
| **2021 TOTAL EXPENSES** | **$ 2,026,069** | **100%** |

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| | $750 | $2,200 | $3,500 | $6,500 | $10,000 | $25,000 |
| Sustaining Member Acknowledgement on the CAPCA website and in each issue of the *Adviser* | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
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| Job Opportunities Posting in *Adviser* | | 1 | 2 | 3 | Unlimited | Unlimited |
| ½ Page *Adviser* Ad (October issue excluded) | | 1 | | 1 | | |
| One-Page Ad in *Adviser* | | | | | 1 | 3 |
| *Adviser* Advertorial* | | | 1 | 1** | 1** | 1** |
| Discount on *Adviser* Ad Placement | | | 10% | 15% | 15% | 15% |
| Complimentary Mailing Labels | | | 2 | 2 | 3 | 5 |
| Comp Conference Registration(s)*** | | | 1 | 2 | 2 | 3 |
| Conference Booth Discount*** | | | | $100 *discount per booth, limit 4* | $200 | $300 |
| Priority Placement for Conference Exhibit Booth*** | 6th | 5th | 4th | 3rd | 2nd | 1st |
| Comp. Mailing List for Exhibitors | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| CAPCA Online CE Host or Collaboration Discount | | | $250 | $500 | $500 | $750 |
| Spring Summit Complimentary Registration*** | 1 | 1 | 1 | 1 | 2 | 2 |
| Spring Summit Table-top Exhibitor Discount*** | $50 | $50 | $100 | $250 | $250 | $250 |

* October issue fills quickly, first come, first served

** October issue guaranteed if booked by March 31, 2022

*** Pending the availability of hosting in-person events in 2022. CAPCA reserves the right to limit benefits and/or adjust to online programming value due to unknown gathering and spacing restrictions.

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ADVERTORIAL

# PRIORITIZE SUSTAINABILITY AND PESTICIDE WASTE REDUCTION WITH CONCENTRATED FORMULATIONS

The managing, recycling, and disposal of pesticide containers continues to be a costly factor for growers across California due to the time and money lost, especially with larger acre producers. Since the Department of Toxic Substances Control (DTSC) and other agencies regulate the disposal of pesticide containers by requiring precautions such as triple rinsing to prevent hazardous waste, PCAs and pest control dealers should be mindful of how growers approach their processes – and the products available to reduce waste and foster more sustainable practices.

Current California regulations require users of agricultural and structural use products to triple-rinse containers and participate in a pesticide container recycling program to enhance efforts to divert containers from landfills, and industry professionals should be mindful of how they can further advance sustainability efforts. According to the California Department of Pesticide Regulation (DPR), the estimated recycling rate is only 54% based on a three-year rolling average from 2017-2019, which could be impacted by factors such as California products resold into other states, weather, container sizes, crop changes, and unused inventory.

Many counties across the state offer recycling programs for agricultural container recycling to support sustainability by taking the triple-rinsed containers and melting them into reusable pellets, which can be used in other projects, such as the creation of speed bumps, pallets, and more. Pest Control Advisors can be ideal catalysts for encouraging proper container management and sustainability practices for growers across California by recommending easy-to-use products with higher concentrations in larger pack sizes.

## NEW ABACUS® V6: SUPERCHARGED PERFORMANCE & LOW VOC FORMULATION FOR LESS WASTE

Since spider mite and other pest pressure is an ongoing challenge for specialty crop growers in California and other states, Rotam recently introduced an innovative EC Abamectin formulation that supports sustainable pest management practices that pack proven, dependable and powerful performance. Abacus® V6 is a low VOC liquid insecticide/miticide with 6% abamectin EC that is flexible and compatible for resistance management programs. It also provides a reduction in waste/container disposal thanks to the 3x higher concentration of abamectin in each container compared to old technology 2% formulations so growers can use less product and waste less, resulting in more dead mites per gallon.

**Abacus® V6 Features:**

- Flexible and compatible for resistance management programs
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Abamectin-based miticides work primarily through ingestion to break down the insect's central nervous system, which disrupts neural and neuromuscular transmissions, causing paralysis and death of mite populations. Specialty growers can benefit from enhanced potency without increased toxicity with higher concentrated formulations that provide power, performance, less waste, and minimal impact on beneficials.

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- And many more

### KEY PESTS CONTROLLED

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- Leafminers
- Pacific spider mite
- Strawberry spider mite
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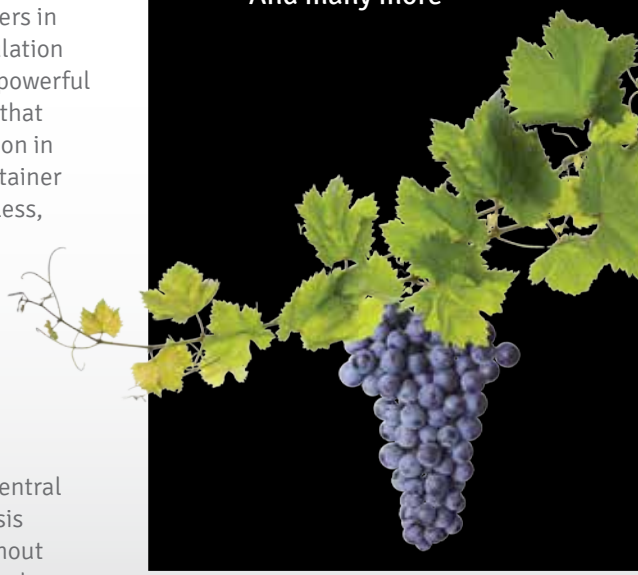

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# Beet leafhopper and its vectored beet curly top virus on processing tomato: vector phenology, disease severity, and yield impact

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## Study background

Beet leafhopper (BLH, *Circulifer tenellus*) is one of the most damaging pests in processing tomatoes because of its ability to vector beet curly top virus (BCTV). The virus significantly inhibits the plant growth and may kill the young tomato plants while economically impacting the tomato yield if the virus is spread over 10% of the crop area in general. Currently, there are no processing tomato varieties resistant to BCTV and no cure for the disease. In 2021, we observed an exceptionally high incidence of BCTV in processing tomatoes statewide. UC Cooperative Extension (UCCE) Farm Advisors' reports indicated that the first appearance of BCTV in processing tomatoes in their regions was much earlier than in prior years. Likewise, the California Department of Food and Agriculture (CDFA) Curly Top Control Program reported a higher population of beet leafhoppers (BLH) from the western foothills beginning in early spring of last year, and a similar trend has been reported this spring. This unusually early BLH activity and increased incidence of BCTV seem to be associated with dryer winter and drought, which likely has caused earlier senescence of the vegetations on the western foothills that led to the earlier migration of the BLHs to the valley. In the 2021 season, we initiated a study to monitor the BLH population and BCTV incidence in processing tomato fields in portions of the northern San Joaquin Valley.

## Seasonal monitoring of BLH and BCTV

For monitoring BLH seasonal activity, we set up yellow sticky traps on 4-ft tall metal posts at 10 different locations (three traps per location) covering 22 processing tomato fields along the highway-33 corridor in Stanislaus County in March 2021 (Figure 1). Each location represented a different number of tomato fields, surrounding vegetation patterns (Figure 2), and tomato varieties planted in varied timelines (Table 1). The yellow sticky traps were replaced biweekly and brought to the lab to inspect and count the number of BLHs. Additionally, we sampled surrounding vegetations using sweep nets (i.e., 40 sweep nets) at each location monthly and recorded the BLH counts in the lab. All BLHs collected from traps and sweep nets were shipped in batches to the CDFA-Integrated Pest Control Lab at Fresno to confirm the presence of BCTV (Figure 3).

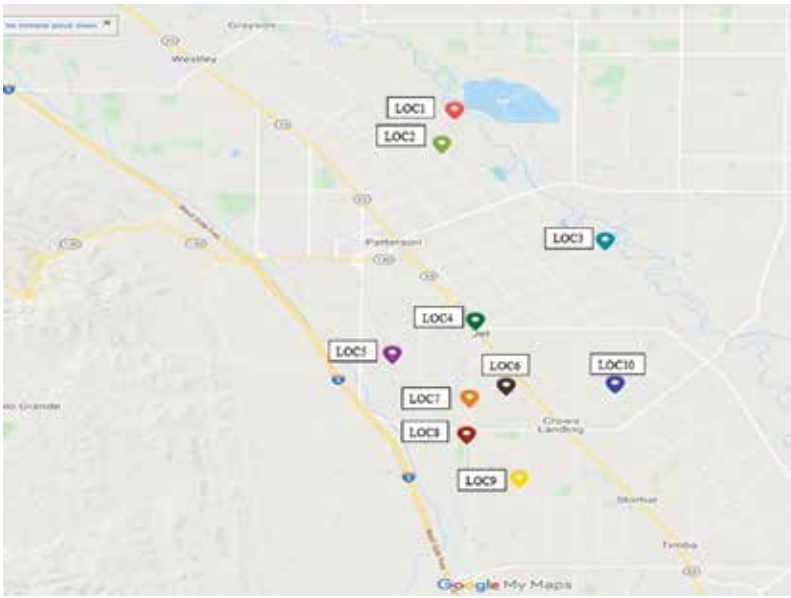


**Fig. 1.** Locations of the 10 monitoring sites where sticky traps were set (LOC = location).

For assessing BCTV severity, we randomly selected five rows (~200-300 feet per row) from individual fields and counted the number of infected plants in early July (Figure 4). The BCTV infection rate in each field was grouped into <5%, 5-10%, and over 10% and reported by location (LOC). Then, the percent infection was estimated by a combination of visual assessment and the number of infected plants in all the plants within the 1,000-1,500 row feet. At the end of the season, growers were interviewed to assess possible tomato yield reduction from each monitored field by comparing it to the 2021 statewide average yield of 49 tons/acre.

## Results

***BLH activity across the season.*** Figure 5 presents the total number of BLHs from 3 sticky traps during each 2-week collection period from all 10 locations. The seasonal BLH population at each location followed a similar trend with the peak activity in June through July (i.e., collection period 6-9). There were many more BLHs caught at locations 7, 8, and 9 compared to others. While it is still unknown if the BLHs caught on the sticky cards carry BCTV, we shipped

**Fig. 2.** Sticky traps were set up representing different locations with various vegetations near processing tomato fields in March 2021. Traps were set at ditches, weedy hills, edges of tomato fields next to the orchard, and roadside.

**Table 1. Planting information of each tomato field at the ten monitored locations.**

| Location code | No. of fields included | Total acreage | Varieties | Planting date (2021) |
|---|---|---|---|---|
| LOC1 | 2 | 68 | DRI 319 | April 5 |
| LOC2 | 3 | 106 | HM 4521 | April 20 |
| LOC3 | 1 | 93 | BOS 811, SVTM 9014 | April 10 |
| LOC4 | 2 | 340 | HM 4521, SVTM 9014, DRI 319, SVTM 9013 | April 22 |
| LOC5 | 2 | 127 | HM 58841 | May 16 |
| LOC6 | 2 | 190 | HM 4521, SVTM 9014, SVTM 9013, BOS 811, HM 9905 | May 20 |
| LOC7 | 4 | 570 | N6474, SVTM 1082, DRI 319, BP74 | May 4, 7, 9, 11 |
| LOC8 | 1 | 90 | SVTM 1082 | April 29 |
| LOC9 | 4 | 500 | DRI 319, HM 58801, N6420, HM 8163, HM 7885 | April 27, May 3, 12, 14 |
| LOC10 | 1 | 100 | HM 5522 | May 1 |


**Fig. 3.** BLHs were sorted from sweep net and sticky traps and saved in vials before shipping in batches to the CDFA lab for virus-positive confirmation.

**Fig. 4.** Diseased plants in rows (marked in yellow boxes) inside a processing tomato field. Note the western foothills in the background.

all of them to the CDFA diagnostic lab for virus-positive tests. This part of the data is still being processed, and we will report them once they are available. Table 2 presents the number of BLHs caught per 10 nets at each sampling date from all locations. Moreover, some net samples have been further inspected for the number of virus-positive BLHs. There were 11 and 13 virus-positive BLHs detected in sweep net samples collected on May 14 and June 11, respectively (Table 2), representing 27.7% and 29.7% of the total number of BLHs captured. The population trend was consistent with the number of BLHs captured on yellow sticky traps. Likewise, more virus-positive BLHs data are still being processed and will be reported later.

***BCTV incidence (severity) and yield loss at each location.*** The results indicated that of all the 10 monitoring locations (22 fields), there were three (LOC 1, 4, and 5) and five locations (LOC 3, 6, 7, 9, and 10) covering a total of 18 fields that had an average

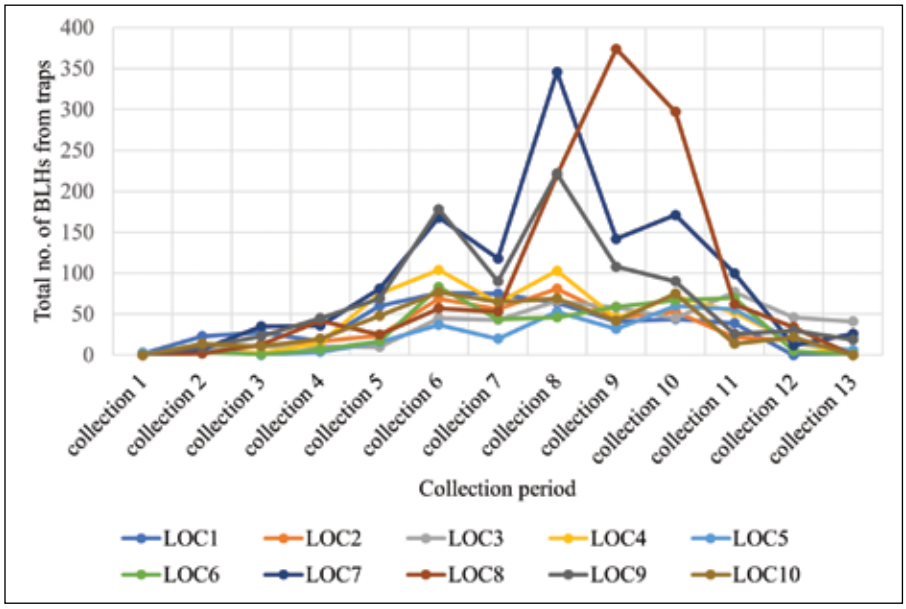


**Fig. 5.** Total number of BLHs during each two-week collection period from 3 sticky traps at all 10 locations in 2021.

Time frame of Collection 1 = 3/17 – 3/31;
Collection 2 = 3/31 – 4/15;
Collection 3 = 4/15 – 4/30;
Collection 4 = 4/30 – 5/14 ……
Collection 12 = 8/20 – 9/10;
Collection 13 = 9/10 – 9/24.

**Table 2. Number of BLHs per 10 nets at each sweep netting date.**

| Netting date | Total no. of BLHs* | Average no. of BLHs per 10 nets** | No. of virus positive BLHs*** |
|---|---|---|---|
| April 15 | 14 (LOC 3, 5, 7) | 4.7 | |
| May 14 | 37 (LOC 1, 3, 4, 5, 7, 10) | 6.2 | 11 (LOC 1, 4, 5, 10) |
| June 11 | 47 (LOC1, 3, 5, 6, 7, 10) | 7.8 | 13 (LOC 1, 3, 5, 6, 7) |
| July 9 | 27 (LOC 3, 4, 6, 7) | 6.8 | |
| August 10 | 9 (LOC 1, 3) | 4.5 | |
| September 10 | 5 (LOC 3, 4) | 2.5 | |
| Total | 139 | | 24 |

* Fields not planted or already harvested at sampling were not included. We swept 10 nets at each location.

**The average no. of BLHs per 10 nets is calculated by dividing total no. of BLHs with the no. of locations where BLHs were caught. For example, the average no. of BLHs per 10 nets on April 15, 2021, is calculated by dividing 14 with 3 locations.

*** Data of virus positive BLHs are still being processed and will be reported later.

**Figure 6.** The landscape and vegetation patterns of the three locations where tomato fields had BCTV incidence of over 10%. LOC 1 (left); LOC 4 (middle); LOC 5 (right).

incidence of BCTV >10% and 5-10%, respectively. For locations with over 10% BCTV infection rate, LOC 1 and 4 had complex weed species and other vegetation patterns, while LOC 5 was the closest to the western foothills and was surrounded by Brassicaceae weeds (Figure 6). According to growers' reports, tomato yield reduction was lower than expected, meaning a 10% incidence of BCTV in the mid-season did not necessarily translate into a 10% or greater yield reduction. This is mainly because 1) most single diseased plant in a row is usually compensated by their healthy "neighbors," and 2) late infested plants can survive and still produce marketable fruit.

## Summary

Although BLH is difficult to control mainly due to its indiscriminate feeding habit, some practices may help reduce the feeding activity and, thus, BCTV infections. Dense planting and delayed transplanting to escape the peak BLH migration could help minimize the feeding and virus transmission. Eliminating potential weed hosts near tomato fields can be helpful to minimize BLH establishment. Replanting to compensate for missing plants on time can help manage the insect vector and disease.


## Acknowledgments

We thank California Tomato Research Institute for the funding and CDFA Curly Top Control Program for the collaboration. We also thank technical staff, Chang Vue, Madison Cunha, and Madeline Morataya, for their help with trial setup and data collection. ■

# Herbicide susceptibility survey of watergrass (*Echinochloa* spp.) in California Rice

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## Introduction

In California rice, herbicide resistance has been documented in *Echinochloa* spp. since the early 2000's. Recent reports of uncontrolled grasses, as well as possible new species or biotypes have precipitated renewed research on this genus. Sixty four watergrass samples were collected from a survey conducted in 2020, with grower and PCA-submitted samples from across the Sacramento Valley, as well as samples collected from University of California and Rice Experiment Station fields. Those samples were representative of all the watergrass species/biotypes: late watergrass, junglerice, barnyardgrass, and the new biotype/species. This experiment was a follow-up to our 2018 screening of watergrass (CAPCA Adviser, June 2021).

The overall objective of this study was to determine the distribution and status of resistance to currently-registered herbicides in these species (cyhalofop, propanil, bispyribac-sodium, penoxsulam, benzobicyclon+halosulfuron, clomazone, and thiobencarb).

## Methods

In August and September of 2020, 64 watergrass samples were collected from rice fields across the rice-growing region of California (Fig. 1). The samples were representative of the *Echinochloa* spp. present in California rice, but were likely resistant, as they were self-reported by growers and PCAs: late watergrass (*Echinochloa phyllopogon*), junglerice (*E. colona*), barnyardgrass (*E. crus-galli*), and a currently unknown new biotype which is being characterized in a complementary study (Table 1). The overall objective was to determine the distribution and status of resistance to currently-registered herbicides in these species (cyhalofop, propanil, bispyribac-sodium, penoxsulam, benzobicyclon+halosulfuron, clomazone, and thiobencarb). Two known susceptible controls of late watergrass (*E. phyllopogon*) were added to the screenings as controls.

Screenings took place at the Rice Experiment Station greenhouse in Biggs, CA, in the summer and fall of 2021. All formulations were tested at the 1.5 leaf stage of watergrass. Dormancy was broken for the watergrass by wet-chilling in the fridge for approximately two weeks before planting.

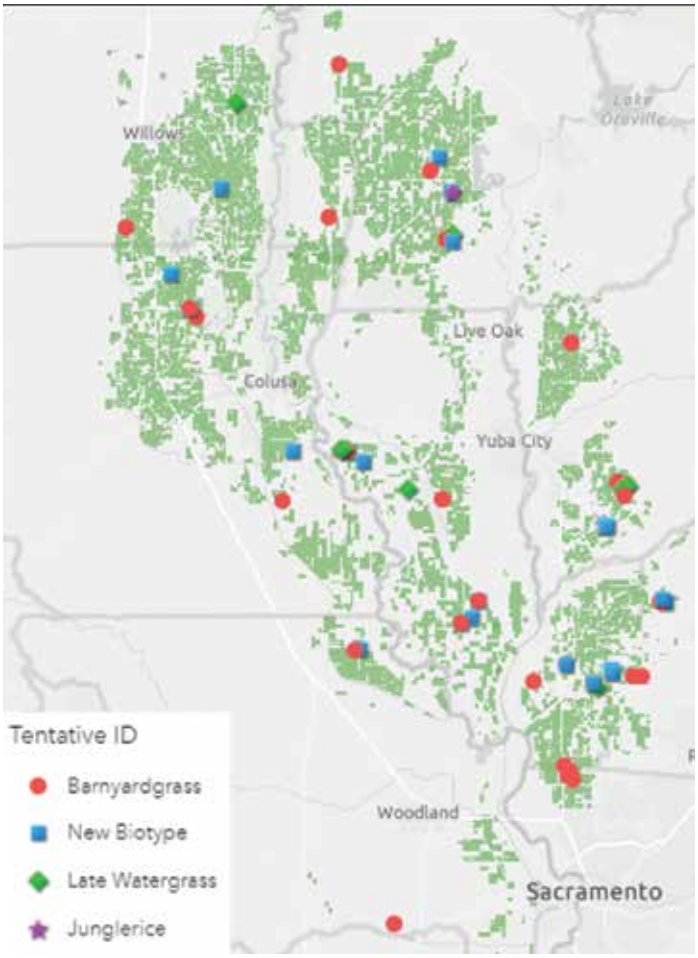


**Fig. 1.** Distribution of *Echinochloa* spp. samples collected in August and September 2020 from California rice fields. ID = identification

Seeds were pre-germinated in the incubator. Pots were seeded and then thinned down to 4 plants per pot.

All foliar-applied formulations (cyhalofop, propanil, and bispyribac-sodium) were applied with the label-recommended surfactants. Applications for into-the-water herbicides (granular formulations of penoxsulam, benzobicyclon+halosulfuron, clomazone, and thiobencarb) were made onto the water surface of bins that were flooded to 10 cm above the soil surface of the pots (where the

**Table 1.** Watergrass (*Echinochloa* spp.) samples were collected across the California rice-growing region in 2020. The samples were sorted by the seed description and preliminarily identified to species/biotype. No. = Number

| Description | Identification | No. of Samples | Percentage (%) |
|---|---|---|---|
| Small seeds, long awns | New biotype (*Echinochloa* spp.) | 22 | 34.4 |
| Extra small seeds, no awns | Junglerice (*E. colona*) | 2 | 3.1 |
| Small seeds, variable awns | Barnyardgrass (*E. crus-galli*) | 31 | 48.4 |
| Large seeds, no awns | Late watergrass (*E. phyllopogon*) | 9 | 14.1 |

watergrass was planted). All liquid herbicide treatments were applied with a cabinet track sprayer with an 8001-EVS nozzle delivering 40 gallons of spray solution per acre (at a pressure of approximately 20 psi). A flood was applied at 10 cm above the soil surface 48 hrs after the foliar applications. All herbicides were applied at standard field rates for California rice, though not at the maximum label rate for all herbicides (Table 2).

At 14 days after treatment, the number of living plants per pot was counted, and fresh biomass was measured (per pot) by cutting plants at the soil surface and taking the weight (per pot). Dry biomass was measured after drying the fresh weight samples down to a constant weight. Samples were classified as resistant to an herbicide if the average percent (%) dry weight control was less than that of the susceptible controls.

## Results

Out of the barnyardgrass samples (31), 23 were resistant to cyhalofop (CY), 3 were resistant to propanil (PR), and 26 were resistant to bispyribac-sodium (BS). Out of the late watergrass samples (9), there were 9 CY-resistant, 5 PR-resistant, and 9 BS-resistant. For the new unknown biotype samples (22), there were 17 CY-resistant, 3 PR-resistant, and 20 BS-resistant. For the granular formulations, barnyardgrass (31 samples) had 27 that were thiobencarb resistant (TH), 24 that were benzobicyclon+halosulfuron

resistant (BH), 17 that were clomazone resistant (CL), and 26 that were penoxsulam resistant (PE). Out of the late watergrass samples (9), 9 were TH-resistant, 9 were BH-resistant, 6 were CL-resistant, and 9 were PE-resistant. For the new unknown biotype samples (22), there were 20 TH-resistant, 18 BH-resistant, 11 CL-resistant, and 20 PE-resistant.

The majority of the samples of all species are resistant to all of the tested herbicides, with only propanil and clomazone showing control of approximately 50% (or more) of the samples (Tables 3 and 4). Late watergrass is widely resistant to all of the herbicides tested, with only propanil showing some degree of control in roughly 50% of the samples. Surprisingly, 100% of samples tested were resistant to thiobencarb, benzobicyclon+halosulfuron, cyhalofop, bispyribac-sodium, and penoxsulam.

The new biotype is best controlled with clomazone (50% of samples) or propanil (76% of samples), while a smaller proportion of samples were controlled by the other herbicides tested. Barnyardgrass is best controlled by propanil (90% of samples), and clomazone (45% of samples).

Although the new biotype shows widespread resistance, its impact on yields is likely explained by more than just herbicide resistance and is likely due to its competitive ability as well.

## Conclusions

The implications of this study reflect anecdotal evidence relayed by growers. *Echinochloa* spp. are becoming increasingly difficult to manage using our currently registered herbicides. For growers, this means it is increasingly difficult to plan an effective program that both controls grasses and prevents further selection for resistance. Aside from rotations with the above-utilized herbicides, some other alternative management strategies include: deep water, utilizing a stale seedbed, and rotating to a dry-seeded or drill-seeded system.

### Deep Water:

Maintaining a deep flood (of at least 4–6 inches) can suppress some grass emergence. Deeper water will provide more suppression. Deep water also improves herbicide efficacy for granular herbicide applications, and the deep water may also improve efficacy of pre-emergent herbicides. Keeping the water on the field as long as possible will improve control. Watergrass typically emerges in the first 30 days after water is put on the field, so longer flood duration is better.

**Table 2.** Herbicides and rates utilized for the 2021 watergrass screening. Rates are in grams of active ingredient (a.i.) per hectare and are standard field rates for California rice growers with susceptible *Echinochloa* spp. biotypes.

| Active Ingredient | Rate |
|---|---|
| clomazone | 673 g/ha-1 |
| thiobencarb | 3918 g/ha-1 |
| benzobicyclon+halosulfuron | 306 g/ha-1 |
| penoxsulam | 40 g/ha-1 |
| cyhalofop | 263 g/ha-1 |
| bispyribac-sodium | 32 g/ha-1 |
| propanil | 6726 g/ha-1 |

### Stale Seedbed:

A stale seedbed has been shown to provide good control of watergrass in heavily infested fields. To implement a stale seedbed, prepare the field as normal (in spring). The field can be tilled or untilled. If untilled, please keep in mind that watergrass seeds typically only emerge from the top 6 cm (3–4 inches) of soil.

Once the seedbed is prepared, flood the field until water is 3 to 4 inches deep, then turn off water and let it sink into the soil. This will increase watergrass germination. Roughly 1 to 2 weeks later, spray a nonselective herbicide (make sure the field is fully drained to ensure coverage). Tillage can also be utilized in place of an herbicide, but avoid deep tillage, as it will bring up additional grass seeds. Timing of the herbicide application or tillage will depend on temperature. Warmer temperatures cause faster emergence of grass. Two weeks should be more than enough time to bring up most of the grass population that will be germinable (able-to-germinate), regardless of temperature.

If not planting rice, this process (flushing/flooding, followed by tillage or herbicide application) can be repeated multiple times throughout the season. If planting rice, flood up the field after the application of the nonselective herbicide (follow label for instructions on flood timing).

### Rotation to Drill- or Dry-Seeded System:

Drill-seeding or dry-seeding rice allows for the use of pendimethalin, which is a different mode of action from all other currently-registered rice herbicides. Depending on the actual product used, pendimethalin may be best used in a drill-seeded system, due to the possible injury to emerging rice plants. Or it can be used in a dry-seeded system, where seed is flown on instead of drilled. For more information on application methodology, refer to the product herbicide label. ■

**Table 3.** Percent of samples resistant (R) to foliar-applied herbicides (cyhalofop, propanil, and bispyribac-sodium), by species or biotype, in comparison to two susceptible late watergrass (*Echinochloa phyllopogon*) populations.

| | Samples (%) | | |
|---|---|---|---|
| **Identification** | **cyhalofop (R)** | **propanil (R)** | **bispyribac-sodium (R)** |
| Barnyardgrass (*E. crus-galli*) | 74 | 10 | 84 |
| Junglerice (*E. colona*) | 0 | 50 | 50 |
| Late Watergrass (*E. phyllopogon*) | 100 | 56 | 100 |
| New Biotype (*Echinochloa* spp.) | 77 | 14 | 91 |
| **Total** | **77** | **19** | **88** |

**Table 4.** Percent of samples resistant (R) to granular formulated herbicides (thiobencarb, benzobicyclon+halosulfuron, clomazone, and penoxsulam), by species or biotype, in comparison to two susceptible late watergrass (*Echinochloa phyllopogon*) populations.

| | Samples (%) | | | |
|---|---|---|---|---|
| **Identification** | **thiobencarb (R)** | **benzobicyclon+ halosulfuron (R)** | **clomazone (R)** | **penoxsulam (R)** |
| Barnyardgrass (*E. crus-galli*) | 87 | 77 | 55 | 84 |
| Junglerice (*E. colona*) | 0 | 50 | 0 | 50 |
| Late Watergrass (*E. phyllopogon*) | 100 | 100 | 67 | 100 |
| New Biotype (*Echinochloa* spp.) | 91 | 82 | 50 | 91 |
| **Total** | **88** | **81** | **53** | **88** |

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# What do we know about *Heilipus lauri*, the large avocado seed weevil?

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Avocados are an iconic specialty crop grown in California that are worth approximately $350 million per year. The crop is grown by about 4,000 growers who farm around 50,000 bearing acres, and the 'Hass' variety accounts for >90% of fruit production in California. Avocados are native to parts of Mexico, and Central and South America, where associated insect biodiversity is high. In contrast, the biodiversity of the insect fauna associated with avocados in California is low, consisting primarily of native and invasive insects and mites that feed on leaves (Hoddle 2006).

Currently, California-grown avocados are free from specialist fruit-feeding pests such as seed feeding weevils (*Heilipus lauri*) and moths (*Stenoma catenifer*). Establishment of these fruit-feeding pests in California would cause significant disruption to biocontrol and IPM programs due to increased insecticide use and associated production cost increases could threaten the long term economic viability of this industry (Hoddle 2006). The avocado seed moth, *S. catenifer*, was the subject of a proactive IPM project sponsored by the California Avocado Commission. This multi-year project, run primarily in Guatemala and Peru, resulted in identification of this moth's sex pheromone, optimization of its field use (Hoddle et al. 2011), and development of natural enemy inventories and life table quantification of their impacts (Hoddle and Hoddle 2008; 2012). The pheromone is commercially-available, it is used in Mexico for pest detection in certified export orchards, and has been used in southern California (i.e., San Diego and Los Angeles) for incursion monitoring. Similar proactive work sponsored by the California Avocado Commission and the California Department of Food and Agriculture's Office of Pesticide Analysis and Consultation is now underway for the large avocado seed weevil, *Heilipus lauri* (Coleoptera: Curculionidae) (**Fig. 1**), a pest that is not in California but has high invasion potential.

*Heilipus* weevils are avocado specialists and are native to Mexico and Central and South America. They are considered to be a highly damaging pest complex associated

**Fig. 1.** *Heilipus lauri,* the large avocado seed weevil, is a potential invasive pest of California-grown avocados. Photo: Mike Lewis, UC Riverside

**Fig. 2.** Hass avocado leaf showing damage caused by feeding adult *H. lauri*. Photo: Mike Lewis, UC Riverside

with cultivated avocados (e.g., Hass and Fuerte) in the native range of this crop (Castañeda-Vildózola, et al. 2017). Approximately eight species of *Heilipus* (there are about 85 species of weevils in this genus) are associated with avocados in their native range. The *Heilipus* complex attacking avocados fall into two groups: (1) fruit-boring seed feeders (e.g., *H. lauri* [Mexico {native}, and Colombia {invasive and introduced accidentally in avocado seeds from Mexico that were used for root stocks}], *H. pittieri*, and *H. trifasciatus* [both in Central America]), and (2) species that bore into stems and branches (e.g., *H. albopictus* [Mexico], *H. elegans*, *H. rufipes, H. apiatus,* and *H. cartagraphus* [all in Central and South America]) (Castañeda-Vildózola, et al. 2013).

Adults of fruit-boring weevils, like *H. lauri*, feed on immature avocado leaves (**Fig. 2**), young stems and the skin of small and large fruit. Female seed-feeding weevils lay eggs inside holes they drill into fruit using their long beak-like snout or rostrum. Larvae that hatch from eggs bore through the fruit pulp to the seed. Upon reaching the seed, larvae burrow into the seed to feed (**Fig. 3**). Mature weevil larvae pupate within cavities excavated within the seed and once pupation is completed, adult weevils chew a circular exit hole and emerge (**Fig. 4**). Internal feeding activity damages fruit, making it unmarketable, and heavy damage causes fruit

**Fig. 3.** Hass avocado seed damaged by a *Heilipus lauri* larva. Photo: Mark Hoddle, UC Riverside

to drop prematurely. Chemical control is difficult because larvae are protected within fruit.

Consequently, *H. lauri* is listed by USDA-APHIS as an avocado pest of high concern for countries that export avocado fruit (i.e., Hass) to the USA from areas where avocados and *Heilipus* spp. are native (e.g., Mexico) and invasive (e.g., Colombia). This is especially important for California, as this state is the major consumer of these exported fruit and California has the largest avocado industry in the USA. Importantly for proactive control of *H. lauri,* this species belongs to a weevil subfamily that uses male-produced aggregation pheromones for attracting females and males to feeding and reproduction sites. Using *H. lauri* imported from Mexico under USDA-APHIS permit into the UC Riverside Insectary and Quarantine facility, we recently collected the aggregation pheromone of this pest (**Fig. 5**). The next step in this pheromone work will be to run field trials evaluating the attractiveness of the pheromone to *H. lauri*. Identification of best trap type and placement heights in avocado trees will then be needed to optimize field use. The pheromone, if demonstrated to be attractive to *H. lauri*, could be used to monitor for this pest in export orchards, it could potentially be used for trapping and control in and around areas that export fruit to the USA, and the pheromone could be used for incursion monitoring in California and other US avocado-producing states.

An additional piece of information that can be useful for managing invasive pests, especially insects, is having an understanding of their flight capabilities. In the quarantine facility, we conducted computerized flight mill (**Fig. 6**) trials to measure how far male and female weevils can fly. Flight mills are basically insect merry-go-rounds. Weevils are attached to a horizontal arm on the flight mill and when they fly they go in circles. The computer records distances flown, flight velocity, how often weevils fly, and when flight occurs (i.e., day or night). A group of male and female weevils of different ages were flown just once over a 24 hour period. Another group of males and females, all approximately the same age at time of first flight, were flown for 24 hours once a week for around 12 consecutive weeks. Our flight trials indicated that male and female weevils readily fly, most often during the day. On average, weevils can fly around 3-4 miles in a 24 hour period. Once weevils are older than about four months of age or they fly multiple times, average

**Fig. 4.** Hass avocado seed showing the exit hole made by an adult *Heilipus lauri*. Photo: Mike Lewis, UC Riverside

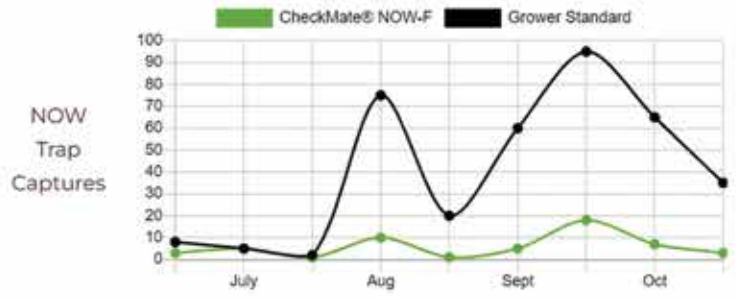
**Fig. 5.** *Heilipus lauri* males and females in a pheromone collection jar in the quarantine facility at UC Riverside. Adult weevils fed on the small avocado fruit. Photo: Mark Hoddle, UC Riverside

# STOP DAMAGE BEFORE IT BREEDS

## Suterra's Sprayable Pheromone Helps Control NOW Populations

The demand for a responsive, preventative navel orangeworm management was clear when growers treated over 100,000 acres with CheckMate® NOW-F when it was introduced in 2019. The number of treated acres more than tripled by 2021 because of clear evidence on the farm that it drove down pest populations, reduced damage and increased marketable yield.


Until recently, navel orangeworm management lacked a mating disruption option that could be applied reactively based on in-season conditions. CheckMate® NOW-F, the first and only sprayable pheromone specific to navel orangeworm, offers exactly that. Instead of requiring up-front investments before the season's pest pressure is known, sprayable pheromone provides PCAs and growers the flexibility to apply precisely when and where needed.




PCAs and growers know that prevention is the foundation of the "IPM Pyramid" for any pest. Applying Suterra's sprayable pheromone at any point during the season effectively prevents a significant portion of the next generation of pests from ever existing, stopping damage before it breeds. Reducing NOW population density with **mating disruption maximizes the impacts of other in-season inputs** like insecticides simply because there are fewer larvae to kill.

With an average material cost of around $30 per acre per application, CheckMate® NOW-F offers an affordable and flexible option to reduce NOW damage. It is uniquely designed to be tank mix compatible with many common agrochemicals and is an easy addition to spray programs.

Performance should be evaluated relative to other sprayable materials like insecticides, with these key differences in mind:

- Controlled-release microencapsulated pheromones are longer acting than most insecticides.
- Species-specific active ingredient is safe for all non-target species like bees.
- Mechanism of action does not require thorough foliar coverage, so it can be efficiently applied at lower volumes and higher speeds than insecticides.
- Minimal REI allows for easy integration into operational schedules.
- Exempt from MRLs with zero pre-harvest interval.
- Provides protection for all varieties and multiple shakes up until the day of harvest and beyond.

To learn more about this innovative IPM approach, ask any grower who uses CheckMate® NOW-F or visit **www.Suterra.com/CheckMateNOW**

Suterra®


**Fig. 6.** (A) *Heilipus lauri* attached to a flight mill arm which spins in circles when the weevil flies. (B) A close-up of the harness that is glued to the weevil's thorax. The harness is attached to the flight mill arm. Photos: Mark Hoddle, UC Riverside

flight distances decline significantly, averaging around 1 to 1.5 miles or less. How likely these flight distances are to occur under more natural situations is unknown. However, these types of flight data can help predict how fast an invasive weevil population could spread naturally. Flight data could also assist with development of eradication, containment, and monitoring plans should *H. lauri* populations be detected in California (Hoddle et al. 2022). As this proactive research program on *H. lauri* progresses, our findings will be shared with pest control advisers and other stakeholders who would benefit from this information. ■

## Background Reading

Castañeda-Vildózola, Á. Equihua-Martinez, and J. E. Peña. 2013. Avocado seed weevils of the genus *Heilipus*. In: Potential Invasive Pests of Agricultural Crops. Ed: J.E. Peña, pp. 35-47. CABI Invasive Species Series, Wallingford U.K.

Castañeda-Vildózola, Á. R.E. Palacio-Torres, J.R Sánchez-Pale, O. Franco-Mora, J. Valdez-Carrasco, and A. Equihua-Martínez. 2017. Sympatry of two species of *Heilipus* Germar, 1824 (Coleoptera: Curculionidae) infesting avocado (*Persea americana* Mill.) in Central Mexico. The Coleopterist's Bulletin 71: 361-363.

Hoddle, M.S. 2006. Lurkers on the threshold: Potential new fruit pests for California avocados. California Avocado Society Yearbook 89: 69-92.

Hoddle, M. S. and C. D. Hoddle. 2008. Bioecology of *Stenoma catenifer* (Lepidoptera: Elachistidae) and associated larval parasitoids reared from Hass avocados in Guatemala. Journal of Economic Entomology 101: 692-698.

Hoddle, M.S. and C.D Hoddle. 2012. Surveys for *Stenoma catenifer* (Lepidoptera: Elachistidae) and associated parasitoids infesting avocados in Perú. Journal of Economic Entomology 105: 402-409.

Hoddle, M.S., J.G. Millar, C.D. Hoddle, Y. Zou, J.S. McElfresh, and S.M. Lesch. 2011. Field optimization of the sex pheromone of *Stenoma catenifer* (Lepidoptera: Elachistidae): evaluation of lure types, trap height, male flight distances, and number of traps needed per avocado orchard for detection. Bulletin of Entomological Research 101: 145-152.

Hoddle, M.S., C. D. Hoddle, I. Milosavljević, E.G. Estrada-Venegas, and A. Equihua-Martínez. 2022. Assessment of age, gender, mating status, and size on the single and repeat flight capabilities of *Heilipus lauri* Boheman (Coleoptera: Curculionidae). Journal of Insect Science 22: 1-12.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# Building a Better Crop Nutrition Program

John Leif, AgroLiquid Agronomist

We know that what we harvest at the end of the season is dependent on the attention given to the beginning; and that starts with a crop fertility plan based on a complete soil analysis. However, upon first glance a complete soil sample report can be overwhelming and difficult to analyze. Having a good, solid understanding of a soil test, and what goes into reading one, will help you build a crop nutrition program for your operation.

## CEC

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 soil with a CEC below 8 is considered sandy, whereas a soil with a CEC between 8 and 14 is a medium textured, or loamy soil. When a soil has a CEC higher than 14 there is a fairly high clay content. Those values are not hard-and-fast rules, but generally the higher the CEC the more clay and organic matter the soil contains.

## Percent Base Saturation

Base saturation is the ratio, or proportion, of the amounts of potassium, magnesium, calcium, hydrogen, and sodium in the soil. Having the soil's calcium base saturation level between 65 – 75%, magnesium level between 10 – 18%, and potassium level between 3 – 5% provides the best opportunity for all nutrients in the soil to be available, plus a good soil structure, water holding capacity, and good microbial activity. When those nutrients are in their desired ranges, soil pH is usually in the upper 6s to 7s.

## pH

Soil pH has a direct effect on nutrient availability. Most nutrients are readily available when the soil pH is 6 – 7.5. Notable exceptions are aluminum, where availability drops substantially at pH levels greater than 5, and iron and manganese where availability drops starting at pH 6 and higher. It is also important to note that most bacteria and fungi are most active in soils with pH above 5.5.

## Phosphorus

Phosphorous plays a major role in crop production – from the earliest stages of growth through fruit production and maturity. When recommending phosphorus - or any nutrient - the yield goal is important. Phosphorus recommendations depend on yield goal and the readily-available phosphorus in the soil. That value is found in the Bray P1 column when soil pH is less than 7 and the Olsen Bicarbonate column when the soil pH is greater than 7. Some labs use the Mehlich 3 extraction process to determine available phosphorus, which is not dependent on soil pH.

$P_2O_5$ recommendations also take into account whether there is low, adequate, or high levels of phosphorus in the soil. Applying the amount of $P_2O_5$ needed to grow the crop and taking advantage of the nutrients already in the soil will provide for good crop production and reduced potential for environmental problems. The actual amount of $P_2O_5$ needed to grow the crop will vary by crop and yield goal but if the phosphate level is less than 30 ppm most crops will respond to supplemental $P_2O_5$ application.

## Potassium

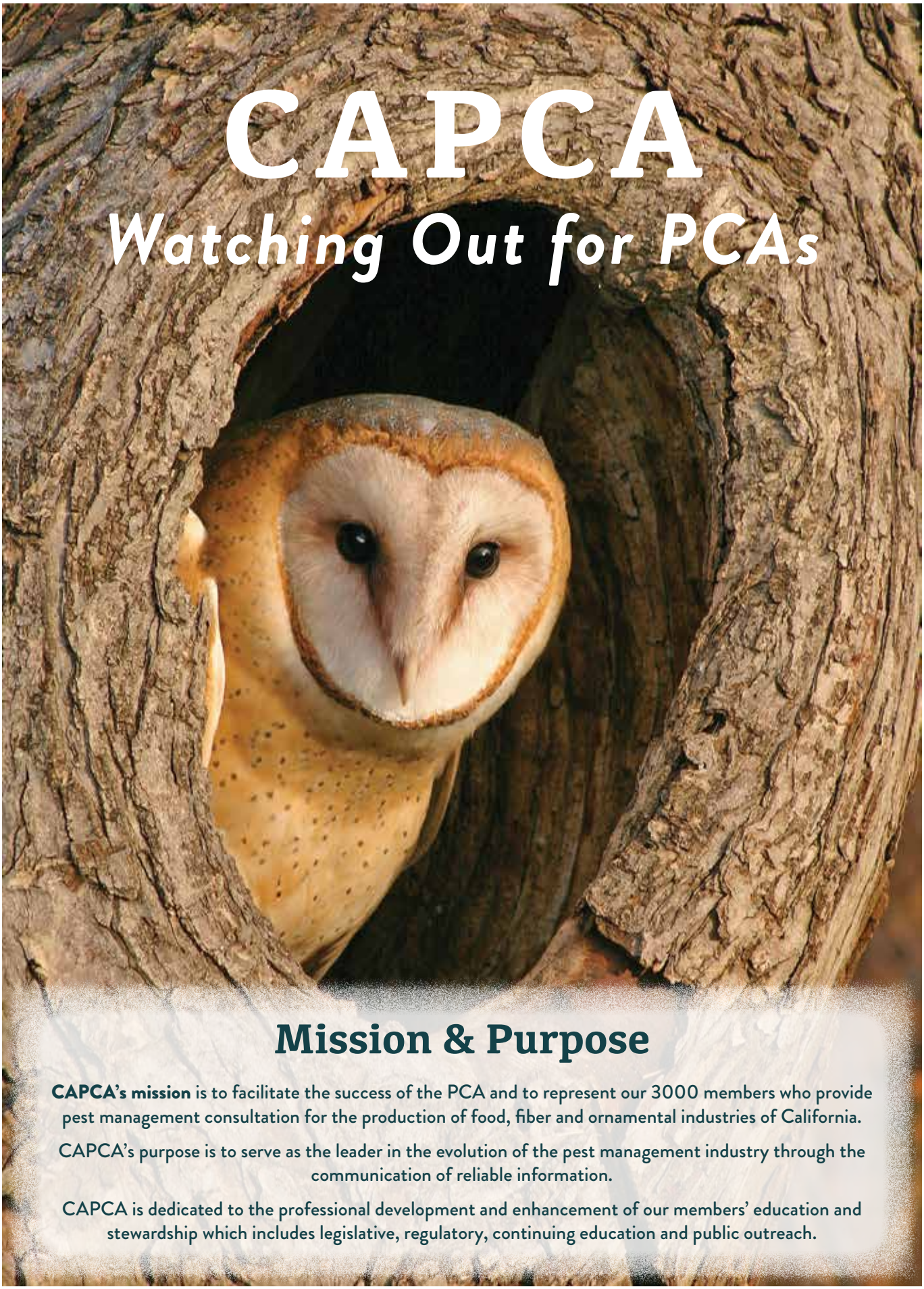
Many crops, especially legumes, fruits, and vegetables, have a high demand for potassium. It is necessary for fruit production and water relationships in the plant, among many other functions.

When recommending $K_2O$, the yield goal is the first piece of information to be collected. However, in addition to yield goal, the CEC of the soil also figures in to making recommendations for potassium. In sandy soils a potassium level of 150 - 175 ppm is considered adequate for most crops, and in higher CEC soils that value is upwards of 200 – 225 ppm. Those values are reasonable for row crops such as corn, soybeans, and wheat, but may not be adequate for crops that have a high demand for potassium.

### Sulfur

Sulfur is vital to high yielding, high quality crops. It is not required in as high of a rate as N, P, and K in most crops, but it is just as vital to plant health. Sulfur recommendations are based on several factors including CEC, organic matter, and pH. A rule of thumb to use for determining sulfur need is that most crops require 1 lb of sulfur for every 10 lbs of nitrogen the plant needs. Most crops will respond to sulfur applications when soil sulfur level is below 25 ppm.

Soil testing continues to be one of the most important tools a grower can use to help manage their crop fertility program. Although it is not simply just taking the soil test, but also understanding the results and knowing how to use them. Lean on a crop nutrition expert to help understand soil test reports and walk-through key areas where fertilizer dollars should be focused to balance yield and economics.



# CAPCA

## *Watching Out for PCAs*

## Mission & Purpose

**CAPCA's mission** is to facilitate the success of the PCA and to represent our 3000 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.

**NOTE:** The following job opportunities are abbreviated postings. To view the complete posting, please log into the **MEMBERS ONLY** section of our website https://capca.com/my-account/

## Sales Agronomist – California

**AgroLiquid**

**Description:** We're looking for a Sales Agronomist with 3-5 years of experience to join our West Region covering California and Nevada. Our ideal candidate will have a strong Agronomy and Sales background with experience working with permanent crops, tree fruits and vines.

**Duties, Qualifications & Requirements:** Provide crop and soil recommendations to growers and successfully incorporate cultural practices of the area; Build relationships with Retail Partners to sell and promote AgroLiquid products; Balance time between servicing existing accounts and attracting new ones; Effectively position our products; Contribute ideas for marketing and brand building. 3-5 years' industry experience in Ag chemicals, Fertilizer, Seed or similar sales role; Experience reading and interpreting soil reports/test; Bachelor's Degree in Agriculture or equivalent work experience; Willingness to commit to 50% travel.

**Apply:** Email resume to humanresources@agroliquid.com or apply online at https://www.agroliquid.com/about/careers/. ■

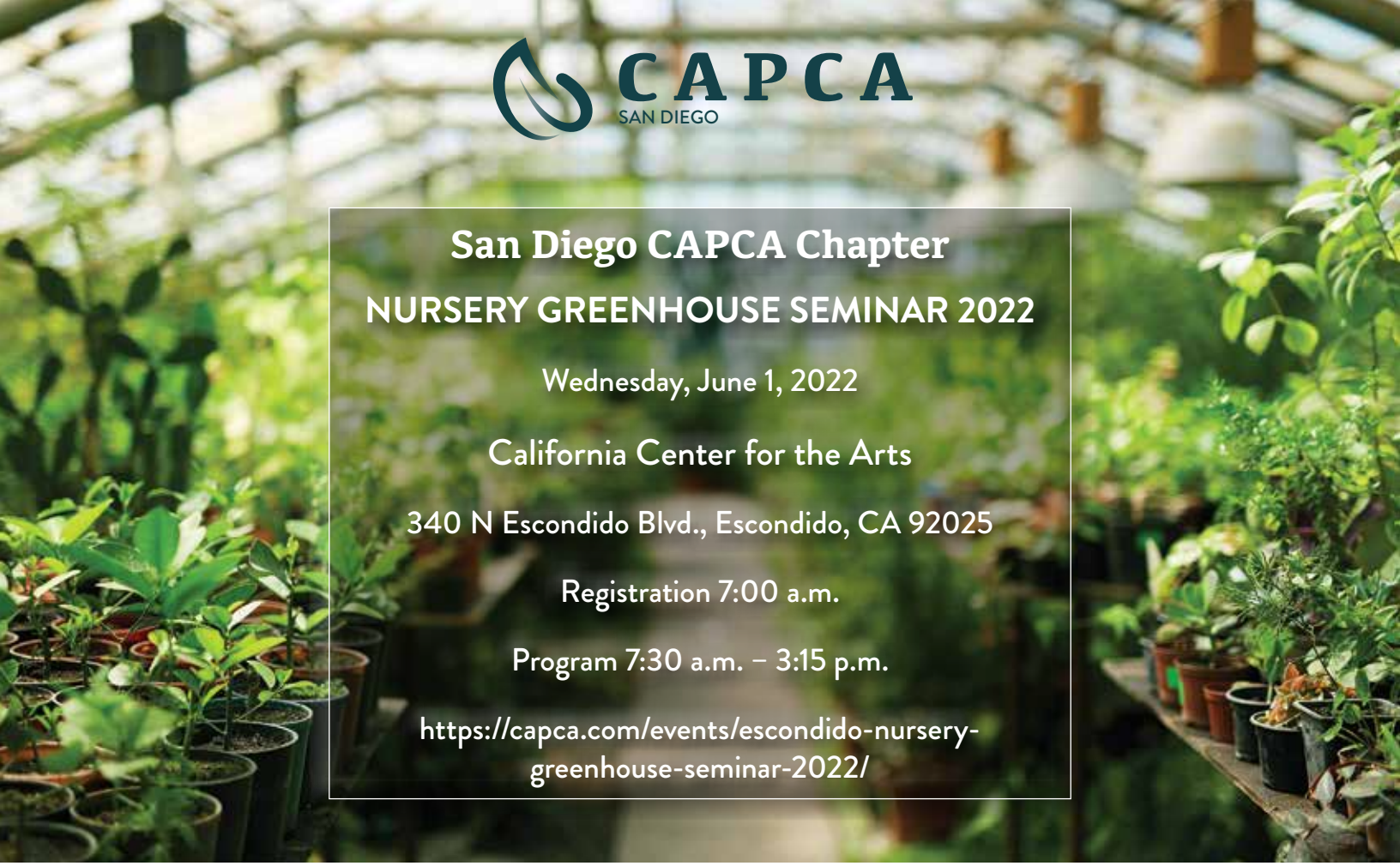



CAPCA
CENTRAL COAST

## Central Coast Chapter

Central Coast Chapter held their Spring CE Meeting in Atascadero (photo, right). They hosted several companies in an Expo area. Speakers gave 15-minute label updates and provided sponsorships. All profits are going toward paying for Cal Poly, Cuesta and Hancock College students to attend the CAPCA Student Network event and Conference in Anaheim this year. There were a total of 90 people in attendance at the CE Meeting and 7 hours of DPR-approved credit.

Central Coast Chapter held their local Board meeting on April 12th with representation from both San Luis Obispo and San Barbara Ag Commissioners Offices in attendance (photo, below).



CAPCA
SAN DIEGO

## San Diego CAPCA Chapter

## NURSERY GREENHOUSE SEMINAR 2022

Wednesday, June 1, 2022

California Center for the Arts

340 N Escondido Blvd., Escondido, CA 92025

Registration 7:00 a.m.

Program 7:30 a.m. – 3:15 p.m.

https://capca.com/events/escondido-nursery-greenhouse-seminar-2022/

CAPCA
DESERT VALLEYS

## Desert Valleys Chapter
## 2022 Continuing Education Meetings

**Tuesday, June 14, 2022**
12:00 p.m. - 4:30 p.m.
Palo Verde College, 1 College Dr, Blythe, CA
Luncheon & Meetings start at 12:00 p.m.

**Wednesday, August 10, 2022**
12:00 p.m. - 4:30 p.m.
Imperial Irrigation District Office,
81600 Avenue 58, La Quinta, CA
Luncheon & Meetings start at 12:00 p.m.

## Desert Valleys Chapter
## Annual Member Appreciation Lunch

**Thursday, November 3, 2022**
12:00 p.m. - 4:30 p.m.
Farm Credit West Conference Room,
485 Business Parkway, Imperial, CA

Luncheon & Meetings start at 12:00 p.m.

Luncheon provided at all meetings

*CAPCA Members/IDD Employees: no charge*
*All others: $25*

*(Meeting dates & times are subject to change)*
*Contact Desert Valleys Chapter for more information*
*https://capca.com/chapters/desert-valleys/*

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