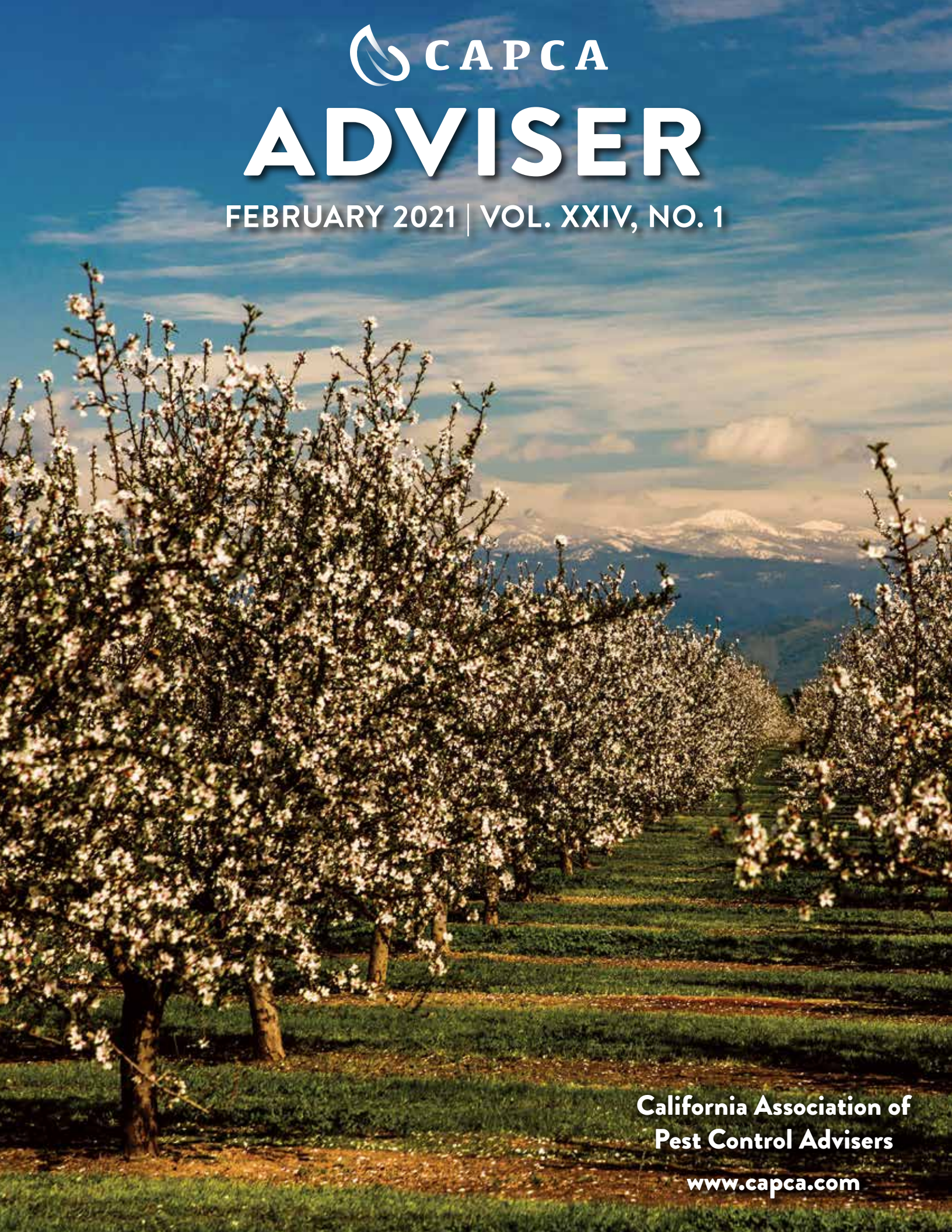
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ADVISER
FEBRUARY 2021 | VOL. XXIV, NO. 1
California Association of
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Spray Safe in 2021

While restrictions continue on gatherings and large educational meetings, Spray Safe and the annual message of preparation for the season remains – Collaborate, Connect and Commit. For 2021, the Spray Safe community has created a variety of unique ways for stakeholders to engage in this powerful message of communication.

CAPCA has worked alongside Farm Bureau, County Ag Commissioners and grower groups to develop digital accessibility for stakeholders statewide. We are grateful for the foundational work and leadership the Kern County Spray Safe Committee has had in the process as they produced and recorded example inspections, regulatory updates and demonstrations of how to spray safe. Developed in both Spanish and English to ensure the outreach continued to reach the same participants who regularly attend Spray Safe in person, there will be a variety of ways for individuals and stakeholders to participate.

Host a Mini-Spray Safe event for your employees or local community members. This option will allow you to proctor video content for a small number of attendees (ideally approximately 10, but final count will be based on current local county ordinances). Attendees will receive CDPR CE hours for their engaged participation. Programming is being finalized in both English and Spanish for 2.5 hours of education – see agenda on page 29. In the spirit of Spray Safe, events will be held for free. While we aren't paying the overhead of meeting spaces this year, there is still a cost to the technology being leveraged as well as opportunities to support the DPR application costs for hosts who need scholarships. If you are interested in sponsoring this unique opportunity for 2021 please visit https://spraysafeca.com/ and click on Sponsor.

Those unable to participate in or host a mini-spray safe event can Watch online. Non-CE short videos plus additional content will be available online starting early February 2021. Keep in mind the review of these videos on the Spray Safe website will not receive CDPR CE credit. But you will find in addition to the Spray Safe content, brief video updates from local County Ag Commissioners across the state providing relevant local as well as subject specific updates for pesticide stakeholders. We hope you will take a few minutes to view the update from the local county(ies) where you work.

This project has been unique with content contributions coming in from around the State. We encourage you to share this with your growers, coworkers and community stakeholders to help spread the Spray Safe message and opportunity for pre-season education in early 2021. To view content, sign up, or sponsor, visit https://spraysafeca.com/.

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.

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2020's Silver Linings

Patrick Dosier, CAPCA Chair

We can all breathe a sigh of relief. Though it sometimes seemed like it would never end, 2020 is over. It would be naïve to think that 2021 will be perfect bliss, but there is reason to believe it will be a solid recovery year.

As for CAPCA, the organization weathered 2020 with many bumps and bruises. Our established sources of revenue were upended. We had to make painful staffing decisions, for which there is no silver lining. The current staff had to work three times harder, under stressful and uncertain conditions, and in un-charted territory - to respond to wave after wave of new obstacles. We are all very grateful for the sacrifice and dedication of the CAPCA staff. Thank you.

We also need to recognize our two former Chairs – Rick Harrison and Rick Wescott. They were both steady, calm voices as we made hard decisions in an uncertain environment. The crisis that was 2020 disrupted the implementation of Mr. Harrison's vision for our organization. My plan, as incoming Chair, is to pick up right where we left off. Thank you both for your service to CAPCA.

Now let's look back at 2020. It was a year of sudden and drastic change. Most of this change was disruptive and painful, but there is some upside embedded in many of the challenges we faced.

Silver Lining #1 – the public became acutely aware that agriculture is essential, and that food security cannot be taken for granted. Empty grocery shelves were a wake-up call to the 21st century consumer. Just like pandemics, we thought food shortages were a thing of the past. They are not. I believe that public opinion will become more favorable towards "industrial" agriculture. I am not saying that the environmental extremists will stop their crusade, but the silent majority will see them for what they are – duplicitous. Consumers demand safe food to be on the shelf. We will provide that. They will not tolerate the absolute elimination of some obscure, unfounded risk at the cost of food security.

Silver Lining #2 – we will become more efficient in our commutes and our office time. Trust me, I understand that you hate Zoom and Teams. We all hate being forced into that environment. But, when we can freely meet in person again, remote meetings will become less of a drag and will be rather convenient. For routine meetings, we no longer need to commute. We will close them quickly and get on with our days. We will save our in-person time and space for those creative meetings where we generate new ideas and solve tough problems together. Meetings where body language and natural dialogue are essential. The consensus appears that most workers prefer a hybrid office setup: some days at home and some days in the office. While this will not change much for boots-on-the-ground PCAs, it will broadly engender a more flexible work culture which will ultimately lead to more time for our families and our outside interests.

Silver Lining #3 – PCA continuing education (CE) will be more accessible and flexible. The cancellation of our Chapters' CE events was a real gut-punch. These events are the main source of fundraising for our Chapters and underwrite much-needed scholarships. In-person CE will return for 2021. However, CAPCA's significant investment in online CE will provide Chapters the opportunity to scale the reach of the CE content which they create. Starting in 2021, Chapters will be able to put their CE content online. There they will be able to reach many more PCAs and to raise even more scholarship funds. This online CE will be available 24/7, for that inevitable end-of-the-year crunch.

Silver Lining #4 – The legislature and regulators are focused on other, somewhat more real, problems. It was a long time ago that agriculture became a low priority for our legislature. In 2021, our government will need to deal with pandemic response, severe budget deficit, economic disparity, wildfires and homelessness. Few lawmakers will choose to spend valuable political capital on an environmental justice pet-project. This is a double-edge sword. It could mean that lawmakers will rubberstamp anti-ag legislation or that they may choose not to scrutinize regulatory over-reach. CAPCA will remain vigilant and engaged in the fight to defend our profession against environmental extremism.

Thank you for remaining a CAPCA member during 2020. Thank you for attending our virtual conference and taking our online CE in unprecedented numbers. We, as an organization and as individuals, are now stronger than ever. ■


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Government Relations Committee Goals for 2021

Adam Tavares and Jeff Rasmussen, Co-Chairs, Government Relations Committee

As we all have adjusted to life in the COVID-19 era, the Government Relations Committee is working to keep members informed and to build relationships within our communities. Looking forward to the New Year, our three goals for 2021 are:

1. **Expand Outreach to Local Leaders**
2. **Increase Member Participation**
3. **Collaborate with Local Ag Commissioners**

In the last year, we have trained 23 Chapter Champion Volunteers to go out into the community and start building relationships with local leaders. Our first goal for this year will be to expand those relationships while offering our expertise on issues that arise, based on science and the effect it will have on local communities. We feel that City, County, and State leaders would benefit from knowing who we are and what we do. Knowing that there is a very large demographic that do not understand this, the challenge will be to change the narrative and reach out to those who do not have exposure to our world.

It is our hope that, by building these relationships, we will get a seat at the table when local issues are brought forward by groups whose intent it is to demonize Agriculture and the products we rely on to provide safe and affordable food to the world.

Our second goal for 2021 is to increase member involvement. We had a Call to Action that asked members to reply via email or text in defense of neonicotinoids, which California is trying to regulate out of use; fewer than 5% of members responded. This type of action is one of the best ways to notify elected officials where we stand on an issue and it only takes a few minutes to do. To ensure that you get timely information from our organization, I ask all members to verify that CAPCA has your current information and that your spam filter is allowing CAPCA emails through. If you did not receive the email or text message about our Call to Action, please let us know immediately so we can get this fixed.

We need volunteers. If getting involved in Government Relations is something you are interested in, please reach out. We meet a couple times per year. Post COVID-19, we will spend a day on the capital talking to legislators and, more importantly, introducing many political leaders to the value Pest Control Advisers bring and the damage that can be done by legislation brought forward by anti-Agriculture groups.

Lastly, we look to establish an even greater working relationship with our local Agricultural Commissioners and their staff. We not only want to get them involved in our chapter events, but also have an open line of communication to alert us to issues that may arise in the community.

We have high hopes that in 2021 we will continue building relationships with local government. But we cannot succeed without your help. Please get involved and respond to the Calls to Action. Our organization's ability to reach out to those in charge hinges on the actions of our members. ■

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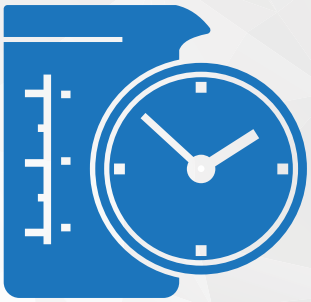

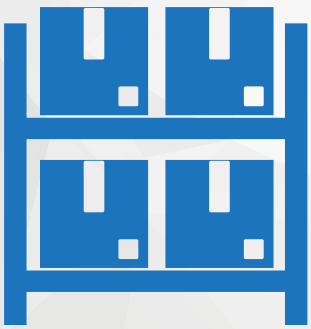

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Important Reminders for DPR License Renewal

CAPCA Staff

As you plan for your next renewal cycle, please keep in mind these reminders from DPR:

• DPR approved CE hours must be obtained during the valid period listed on your license card (where applicable). To determine the valid period, refer to the "Date of Issue" and "Valid Through" dates on your PCA License. Any CE hours obtained after your license or certificate expires will not be valid and if you are short CE hours you will be required to retest as a new applicant.

• You cannot renew your license/certificate if you do not meet the minimum Laws requirements for CE hours. This is true even if you have more hours than required in the "Other" CE category. However, if you exceed the required 4.0 hours Laws minimum during your valid renewal cycle, those hours can be used to meet the "Other" CE requirements.

• Verification of Attendance: In accordance with Title 3, CCR Section 6513, the CE sponsor is required to provide you with a certificate/verification or other proof of CE attendance/course completion. This includes online CE courses. DPR does accept these certificates/verifications of attendance for your license renewal.

• Registering with your local Agricultural Commissioner's office: If you are still waiting on your new PCA license to arrive so you can register with your County Agricultural Commissioner's office, watch the DPR website of Valid Licenses at https://www.cdpr.ca.gov/docs/license/currlic.htm. You can check if your license has been renewed using the lookup feature (by your last name) to confirm the status. If your name and license shows as renewed, you can print out the page from the DPR website and provide that to your county as documentation of the valid license.

Additional DPR FAQs for license renewals can be found at https://www.cdpr.ca.gov/docs/license/renewal_packets/renewal_faq.pdf ■

Photo: E. Kersh

CAPCA

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ACTIVE MEMBERSHIP
Licensed PCAs must join as Active Members

- ☐ 2022 = $160.00
- ☐ *2021 = $160.00
- ☐ 2020 = $210.00

ASSOCIATE MEMBERSHIP
Non-PCAs - printout not provided

- ☐ 2022 = $45.00
- ☐ 2021= $45.00

STUDENT MEMBERSHIP
Must provide proof of full-time student status. May not hold a DPR license.

- ☐ 2021 = (no fee)

* ***A late fee of $50.00 will be charged for any 2021 Active Membership paid after December 31, 2021.***

☐ I WOULD LIKE TO OPT OUT OF ALL EMAIL COMMUNICATIONS. I understand that by opting out of email, I will NOT receive any information from CAPCA regarding CAPCA business or any information outside of CAPCA, such as emails from CAPCA Sustaining Members or industry stakeholders. This includes updates and notices about continuing education, programs and benefit opportunities. (Please be aware that CAPCA primarily utilizes email to communicate with members.)

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You can now define which crop team, chapter and event notifications you want to receive.

Which of the following categories are important to your work as a PCA (check all that apply):

- ☐ Aquatics
- ☐ Berries
- ☐ Citrus & Subtropicals
- ☐ Cotton
- ☐ Deciduous Fruits
- ☐ Forage/Silage
- ☐ Golf/Sports Turf
- ☐ Grains
- ☐ Grapes
- ☐ Rice
- ☐ T/O, Landscape
- ☐ Tree Nuts
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- ☐ Vegetation Mgmt
- ☐ Organics
- ☐ Hemp

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If you qualify for an ordinary and necessary business expense tax deduction, you may deduct up to $143/$35 for dues of $160/$45 respectively. If you chose not to earmark $7.00 of your dues as a contribution to CAPCA PAC and you qualify for an ordinary and necessary business expense tax deduction, you may deduct up to $150/$42 for dues of $160/$45.

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CAPCA
KERN COUNTY

Kern County's MICHAEL HAUPT

By CAPCA Staff

Michael Haupt attended Butte College and graduated from C.S.U. Chico, earning a B.S. in Ag Science in 2017. He has been a licensed PCA since 2017, also holds a QAL and is a Certified Crop Adviser. He specializes in orchard management and the major crops he consults in are almonds and pistachios. For the last three and a half years he has worked for Wonderful Orchards in Kern County. Responsibilities in his current role include scouting for pests and disease, monitoring traps and mating disruption devices, as well as creating IPM programs for all ages of almond and pistachio orchards. He also manages fertilizer inputs and soil amendments, orchard development, pruning, and sanitation for both almond and pistachios, and manages almond harvest.

Sharing about his start in the industry, Mike said, "I knew I wanted to become a PCA after my first semester at Butte College in their Environmental Horticulture program." He credits his experiences in college with sparking the interest and providing opportunities to explore the career, "I enjoyed learning about IPM and plant health in my lab classes that were held in their vineyard and ornamental nursery. Much of the learning there was hands on, and I had a good experience working in the field. I strived to learn as much as I could from every course and was eager to share my knowledge with anyone who asked. I thought the role of providing information and advice to help growers as a PCA would be a good fit for me." While attending Chico State he worked at Sierra Gold Nurseries, and during the summers at home in Bakersfield as an intern for PCAs with Wonderful Orchards. "All my time spent as an intern was incredibly valuable. The opportunity to build relationships with industry professionals and learn from them while in school is a great advantage that every agriculture student must take. It not only is a benefit of networking with the ag community, but it helps you solidify the information learned in school when you can apply it simultaneously at work."

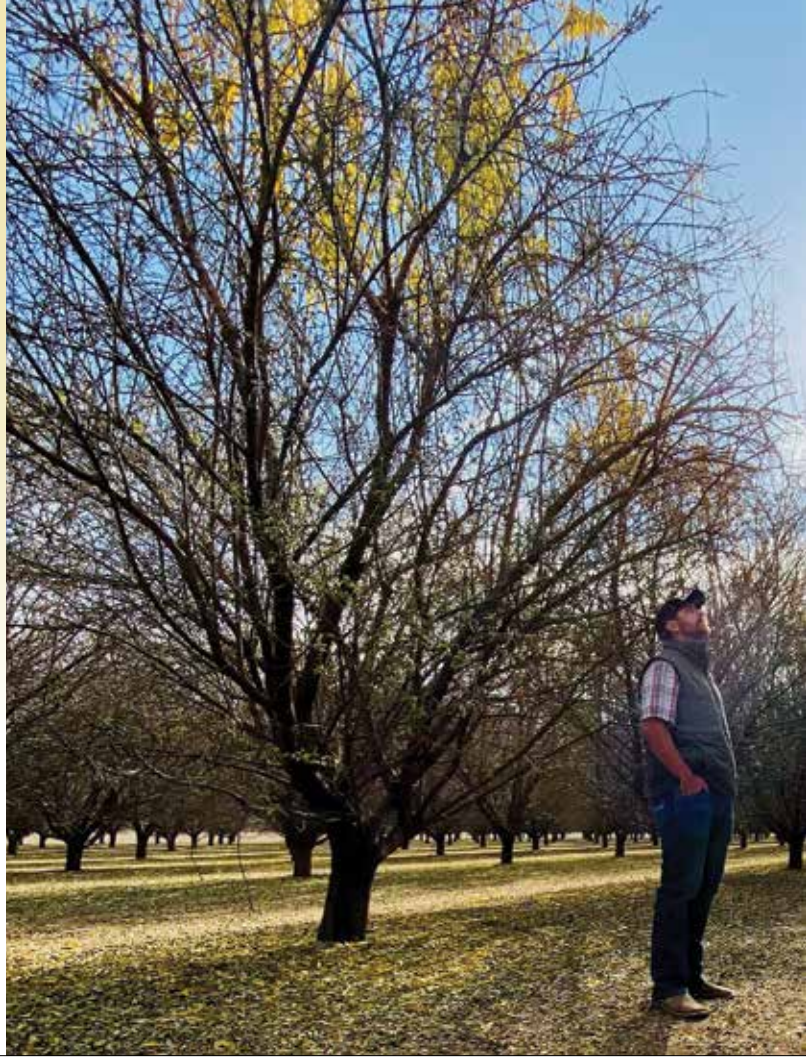
He's excited he gets to be a part of hiring summer interns and looks forward to working with them every year. "Each season is a win for me when I get to see them gain knowledge and experience that they will take with them the rest of their careers and open new opportunities for them, as it did for me." Talking about the highlights of being a PCA, in addition to working outside and the opportunity for continuous education, Mike says, "The most satisfying part of being a PCA is the completion of harvests every year. Each year is different and provides many challenges, but I think that's what keeps this industry exciting."

When asked how he describes his job and what a PCA does for someone outside the industry, Mike tells them, "PCAs are professional consultants of pest management and plant health for agricultural operations. PCAs are responsible for providing growers recommendations for crop protection materials while also acting as a steward of the environment and a proponent of public safety."

Mike has been a part of the Kern County CAPCA Chapter for several years, and currently servs as the Chapter's Director on the State Board. "This has been a good experience, despite only meeting everyone online, that has me even more excited to be a part of CAPCA. There are many dedicated people in CAPCA that give a lot of time and effort in support of this industry and I'm happy to be a part of that."

He originally joined CAPCA to stay up to date with continuing education and participate in local CAPCA events. "I think CAPCA has a lot more to offer for a newer PCA such as newsletters, networking opportunities, and online continuing education. In addition to all of that I think everyone should get behind CAPCA's support to preserve essential crop protection products, maintain a successful relationship with the public, and inform the ag industry on how they can help." When considering CAPCA's future, Mike is looking forward to continued growth and professional representation: "I hope to see all levels of CAPCA membership grow in the future and continue to provide a confident level of representation for PCAs."

Outside of work and his involvement with CAPCA, Mike says he enjoys spending time with his wife, Laura, and their two dogs. "I also enjoy hunting ducks and all upland game birds. I recently got a new German Shorthaired Pointer puppy and I spend most of my free time working on her training and obedience. I can't wait to bring her hunting for the first time. My wife and I love to cook, and I especially like to smoke meats and other great meals for my friends and family." ■



CAPCA

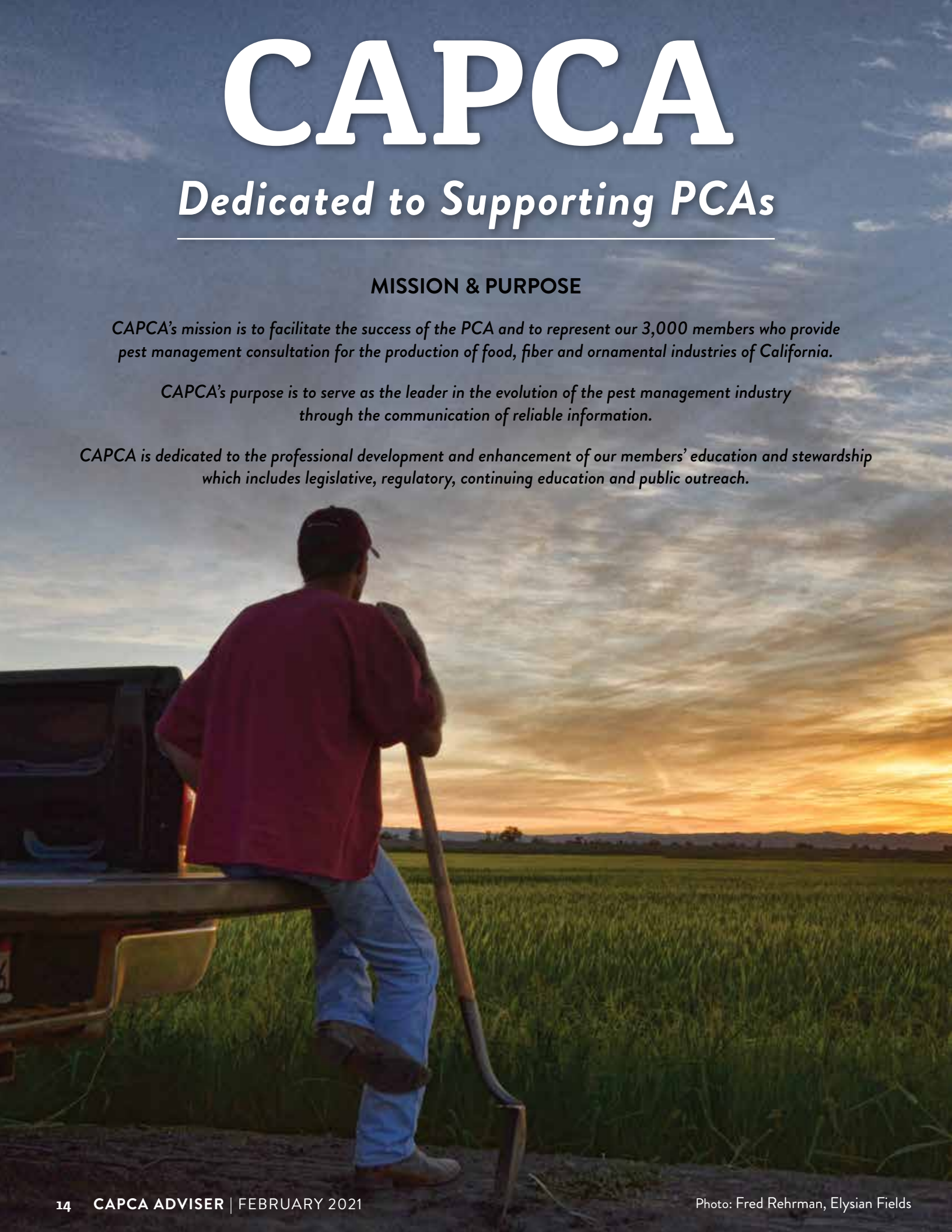
Dedicated to Supporting PCAs

MISSION & PURPOSE

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

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

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



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With increased regulatory pressure, evolving sustainability expectations, and efforts to reduce non-target and environmental impacts, mating disruption's unique mode of action has made it a fundamental pillar of many integrated pest management (IPM) programs.

In particular, aerosol-based Puffer® mating disruption systems are a proven IPM tactic, with scientific support from the University of California, USDA, and independent researchers dating back well over a decade. Each year hundreds of thousands of acres of specialty crops throughout California are treated with Puffer® mating disruption systems targeting serious pests such as Navel Orangeworm, Codling Moth, and Oriental Fruit Moth.

Suterra produced the industry's first aerosol mating disruption solution, the Puffer®, in 2009. Every year since its initial introduction, the company's chemists and engineers (with feedback from Suterra's California technical field team, growers, and PCAs throughout the state) have been continuously devoted to delivering the highest quality and most reliable aerosol pheromone release systems in the world.

The 2021 season ushers in the latest evolution in Puffer® development, available across the entire California product line, including: CheckMate® Puffer® NOW Ace™, CheckMate® Puffer® CM-O Pro, CheckMate® Puffer® OFM-O; CheckMate® Puffer® CM-OFM Pro.

The latest Puffer® boasts a number of features that ensure the durability, reliability, and ease-of-use that growers deserve to be confident in their mating disruption systems. The new design is based on a fully-sealed compartment coupled with an anti-corrosion coated steel can. A single button operation located on the external aspect of the device initiates the season-long pheromone release cycle, with no additional programming required. This means that it is no longer necessary to open cabinets during deployment, saving significant time and labor inputs.

"The latest Puffer® boasts a number of features that ensure the durability, reliability, and ease-of-use that growers deserve..."

Built with real-world crop conditions in mind, the rugged new design is simultaneously lighter and stronger than previous versions. This facilitates correct placement in the canopy, not only ensuring that the pheromone plume is being directed properly in the orchard environment, but also minimizing the potential for dropping during orchard operations. Its rounded edges maximize durability by significantly reducing potential breakage points.

The fully-sealed design eliminate dust, debris, and water, protecting all the functional components and the pheromone. The patent-pending design meets international standards for waterproof electronics like IP54 and NEMA 3S, and is so rugged, it even works underwater.

Because Suterra understands that a grower's crop is their livelihood, the new Puffer® is the only aerosol on the market that is rated to Life and Safety Standards for the electrical apparatus and enclosure.

Suterra remains committed to sustainability with the Clean Orchard Promise™ program. Growers will receive new Puffer® units each year. Suterra will handle the logistics and expense of responsibly recycling spent devices at the convenience of each grower, allowing increased flexibility for timing of removal at the end of the season when labor is available.

All of these features combine to make the new Puffer® easier and faster to deploy, with unrivaled durability and reliability to provide peace of mind to the grower that each and every treated acre is covered to the fullest extent.

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Lawmakers push farmers to tell their story before others do

Brad Hooker, Agri-Pulse

State lawmakers are concerned agriculture's voice in policymaking could dwindle as campaign spending for ballot measures hits record highs and the industry races to keep up with new regulations.

In reflecting on 2020, Assemblymembers Adam Gray, D-Merced, and Heath Flora, R-Ripon, urged the community to get more involved, as industry groups warned that far more campaign contributions will be needed in the future to stem a rising tide in policies that could be harmful to the industry.

"We've seen the demonizing of essential workforces, like agriculture," said Gray in a panel discussion for the Almond Conference in December. "While we've seen resources flow to our urban communities, as far as PPE and other supplies, we've seen blame head the way of Central Valley communities like my district, where we're continuing to do the work each and every day to make sure we can put food on the table for all Californians."

Gray recognized a high level of cynicism currently aimed at elected officials from constituents who feel their voices are not heard.

"Every single legislator – myself and others – has to get reelected, and they're out there working to make sure that their constituents are supporting them," he said in response, advising: "It's critical that you make your problems the legislators' problems."

Gray urged farmers, ranchers and others in the agriculture community to make sure policymakers are aware of the results of a law that affects businesses, livelihoods and daily life.

"Education just can't stop, even in times when we fail to stop a bad bill," he said. "Legislators up and down the state benefit from the agricultural economy, their constituents benefit from the ag economy. And we need to make them aware of that."

In the same panel discussion, Flora, who works in agriculture and hails from a farming family, said the imbalance is due to "simple math," with the majority of his colleagues coming from urban centers.

"It's our job out there to bring our Bay Area and Southern California colleagues to the Central Valley," he said.

The imbalance is an issue that crosses partisan lines, said Flora, noting how some of his Republican colleagues "have no clue what it means to be a Central Valley legislator or a farmer." When their buy-in is needed to pass legislation, he explained, a pesticide bill may seem like a great idea to them.

"Well, guess what, it's devastating to us," he said.

On a positive note, Flora said the almond industry has been leading the way in educating lawmakers on agricultural issues and hosting ag tours, while the cattle industry has been "doing a great job" as well. Flora said that when support from agriculture has stalled, he has struggled to persuade colleagues of the "huge issues" the legislation presents.

Labor groups, he added, are experts in pushing their agenda, with teams of advocates filling the hallways of the capitol every day during a normal year.

"Ag needs to do that as well," he said. "We have to get our voices heard. We as an ag community have nothing to be ashamed of. We have a lot to be proud of."

The last four years have shown significant progress in engagement from agriculture, he said, and while a bright future is ahead, more can be done.

"Politics needs to become an integral part of your business plan at this point," he said. "It really needs to become a line item in your business model to engage politically."

During the California Farm Bureau's annual meeting in December, Administrator Jim Houston said agriculture should expect to spend $4 million every cycle. The battle over the Proposition 15 split-roll tax measure last year "showed the amount of money we're up against in these elections is astronomical."

Almond Alliance President Elaine Trevino recognized how much industry engagement has paid off with Gray and Flora.

"You can't imagine how much work these gentlemen have done to prevent bad policies and laws from happening that you'll never know about because they handled it in their own worlds specific to the legislature," she said. "The thing that always boggles my mind is that we're all California and the economics of the Central Valley are sometimes ignored with blanket policies that just don't fit in this region." ■

CAPCA SPRING SUMMIT

VIRTUAL EVENT

APRIL 2021

Content to be available April 7 - April 30, 2021

CAPCA's Annual Spring Summit will be hosted virtually with:

On-Demand Online Continuing Education Content

Sponsorships (limited number available)

Label Update Session (spaces are limited)

Due to the nature of the event in 2021, no Exhibitor options will be offered.

Watch our Spring Summit webpage at https://capca.com/spring-summit/ for program and registration information.

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- $45 Pre-Registration (pre-registration ends March 31st)
- $65 Registration (April 1st - 30th) | • $30 Label Update Only

For sponsorship information visit https://capca.com/spring-summit/#sponsor

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WILBUR-ELLIS AGRIBUSINESS

New Partnership with Almond Board of California

CAPCA is excited to announce a new partnership with the Almond Board of California (ABC) to provide timely information, education and resources to PCAs. In 2021, you will see ABC providing the following to Nut Crop team members and CAPCA members:

- Technical articles on a variety of production topics
- Consistent, timely updates to Nut Crop Team members
- Continuing Education hosted by CAPCACE.com – "The Status of Herbicide Resistance in California and Finding Success with Soil Moisture Monitoring" coming early 2021
- Dedicated educational breakout on almonds at the CAPCA Conference

CAPCA has proven to be a leader in our industry through the communication of reliable information. In partnership with ABC, we are looking forward to bringing CAPCA and Nut Crop Team members even greater value in 2021!

Almond Orchard 2025 Goals

In 2018, the California almond industry launched four industry-wide goals – the Almond Orchard 2025 Goals – to help protect its right to farm, establish a journey towards continuous improvement and move towards the almond orchard of the future. One of those four goals is focused on increasing adoption of environmentally friendly pest management tools by 25%, using strategies beyond traditional methods to safely and effectively reduce pest levels.

Learn more at https://capca.com/cropteams/tree-nut/.

CAPCA

california almonds
Almond Board of California

ALMOND ORCHARD 2025 GOALS

Research drives product technology

Maximizing plant health and nutrient status in the spring.

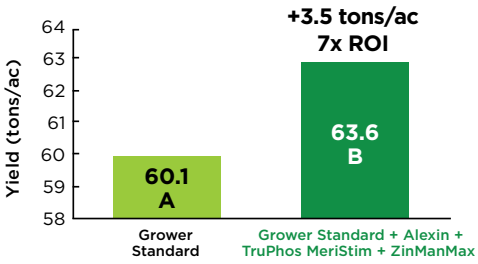
The spring season in California holds some unique challenges for many different crops. Taking steps to ensure a crop has optimal nutrition will promote both fruit/nut set in perennial crops, and vigorous vegetative growth of annual crops as they progress towards their reproductive phase. Springtime challenges include cooler soils that slow down root development and the diffusion of nutrients, which reduce nutrient uptake. In addition to the cooler temperatures, some soils in the Salinas valley have high levels of extractable P >50 mg/kg which can antagonize uptake of other nutrients including Fe, Cu, Zn, Ca, and K (Johnstone et al., 2005). An additional challenge is the frequently alkaline soils in the Central Valley that reduce the availability of micronutrients. Root growth of almonds is extremely limited during bloom and only picks up after leaf-out which presents another early-season challenge for nutrient uptake (Brown et al., 2014).

When presented with nutrient uptake challenges foliar fertilizers can supplement the crop to promote more balanced growth. Foliar nutrient applications rapidly provide the most limiting elements to developing tissues when they are needed the most (Saa et al., 2018). Several studies note that spring foliar nutrient applications can increase fruit set and yields (Sotomayor et al., 2002; Kamiab and Zamanibahramabadi, 2016). Foliar applications of phloem-mobile orthophosphate supplies sink tissues with the P needed to support cell division occurring in developing tissues (Kootnz and Biddulph, 1958). Tissue concentrations of zinc must be sufficient to maintain auxin levels required for the cell division and expansion that drive vegetative flushes and fruit development (Cakmak et al., 1989). Foliar calcium applications are an excellent tool for limiting the effects of crop stress and promoting quality in fruits and produce (Sakhonwasee and Wanalee Phingkasan, 2017). Finally, ensure that crops have adequate levels of magnesium to promote and maintain chlorophyll production and sugar movement in the crop (Cakmak et al. 1994).

Results from the field

Processing Tomatoes

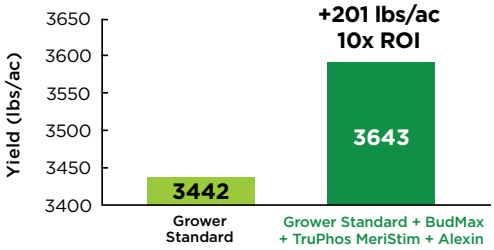
Crop: Processing tomatoes (var. 4885)
Year: 2017
Location: Fresno County, California
Trial Type: RCBD, 15 acres
Application: Grower standard vs. grower standard + 1 qt/ac Alexin, 1 qt/ac TruPhos MeriStim, 1 qt/ac ZinManMax applied at full bloom



*Trial performed by Simplot Grower Solutions.

Almonds

Crop: Almonds (c.v. non-pareil)
Year: 2018
Location: Mendota, California
Trial Type: Split field, 15 acres
Application: Grower standard vs. grower standard + 1 qt/ac BudMax applied at bloom and 1 qt/ac Alexin + 1 qt/ac TruPhos MeriStim applied at petal fall



NutriAg's technology.

Sci-Gronomics, the science of combining chemistry with agronomy, is our formula used to create our unique suite of proprietary technologies designed to activate nutrients and plant response. These technologies act by solubilizing various metals, allowing the plant to easily metabolize the nutrient, assist in alleviating abiotic stress tolerance and improve overall plant health.

ACE Active Cell Elicitor™

- Improves abiotic stress tolerance
- Improves growing conditions
- Optimizes crop metabolism

PAC PolyAldoCarbosate®

- Chelates nutrients with natural carbohydrates
- Enhance nutrient uptake
- Excellent tank-mix compatibility

MOD Matrix Ortho-Deprotonation™

- 100% orthophosphate
- Includes additional micronutrients
- True solutions

Alexin® activated by ACE and PAC
0-0-8, 2.4% Ca, 0.8% Mg

BudMax® activated by ACE and PAC
2-0-5, 2.0% Zn, 1.0% Mn, 0.5% B, 0.05% Mo, 0.05% Co

TruPhos MeriStim™ activated by MOD technology
0-23-3, 2.5% Ca, 1.0% Zn

ZinManMax™ activated by PAC
5.1% Zn, 2.7% Mn, 0.5% B, 0.25% Mo

NUTRIAG Innovators in the field

To learn more, visit nutriag.com or call:
Matt Lucas: (209) 761-0839 Chandler Wilson: (661) 556-1660

1 P.R. Johnstone, T.K. Hartz, M.D. Cahn, M.R. Johnstone, Hort. Sci. 40(5), 1499-1503 (2005). 2 P. Brown, Final Report FREP Grant No: 11-0461-SA (2014). California Department of Food and Agriculture. 3 S. Saa, C. Negron, P. Brown, Sci. Hort. 223, 233-237 (2018). 4 C. Sotomayor, H. Silva, J. Castro, Acta Hort. 591, 437-440 (2002). 5 F. Kamiab and E. Zamanibahramabadi, J. Nuts 7(1), 9-20 (2016). 6 H. Koontz and O. Biddulph, Plant Physiol. 32(5), 463-470 (1957). 7 I. Cakmak, H. Marschner, F. Bangerth, H. Exp. Bot. 40(212), 405-412 (1989). 8 S. Sakhonwasee and W. Phingkasan, Hortic. Environ. Biotechnol. 58(2), 119-126 (2017). 9 I. Cakmak, C. Hengeler, H. Marschner, J. Exp. Bot. 45(278) 1245-1250 (1994).

SPECIAL TO THE ADVISER

california almonds®
Almond Board of California

Application Considerations for Almonds During Bloom

By Dr. Josette Lewis, Chief Scientific Officer, Almond Board of California

By the start of bloom, PCAs and growers should have a detailed plan that states how potential disease and pest problems will be addressed and what issues must be treated during bloom.

If a grower must apply a pesticide during bloom, what guidelines should be followed?
UCCE IPM created the "Bee Precaution Pesticide Ratings" guide to help PCAs and growers make informed decisions in this area. The guide is founded on updated research of known pesticide impacts on adults and honey bee brood. The ratings for each compound are only for the active ingredient or common name of that compound, however, and do not include adjuvants.

It's imperative that before any spray takes place the grower or PCA visits BeeWhereCalifornia.com or contacts the county agricultural commissioner to locate hives within a 1-mile radius of the spray site. Pesticide applicators are required by law to provide 48 hours advance notification to the appropriate beekeeper/s of any upcoming spray.

From there, the application should only be made in the late afternoon or evening, when bees and pollen are not present in the orchard. The residue must also be completely dry before bees return to pollinating.

For more information on proper application, visit page 10 of the Almond Board of California's Honey Bee Best Management Practices.

If a fungicide application is needed, what is required in the tank to protect the crop?
Adjuvants – unless specified otherwise on the label – should not be combined with fungicides during bloom. Some fungicides are already formulated with adjuvants and, with few exceptions, added adjuvants do not statistically improve the efficacy of fungicides for managing disease. Further, adjuvants have been shown to harm bee health.

Avoid combining and/or tank mixing insecticides and fungicides. Insecticides, with the exception of *Bacillus thuringiensis* (Bt), an organic pesticide, should be avoided during bloom, and should not be needed in the first place. Research shows that mixing insecticides and fungicides can harm bee health, even if the individual chemistries will not do so.

When in doubt, always err on the side of bee safety and try to maintain a balance between protecting the grower's crop while also protecting pollinator health.

[i] https://www2.ipm.ucanr.edu/beeprecaution/
[ii] Almonds.com/Pollination

More information: Almonds.com/Pollination

2021 Stanley W. Strew Educational Fund, Inc.

SCHOLARSHIP

A scholarship opportunity is available for students interested in careers in the pest management industry. The scholarship is sponsored by the California Association of Pest Control Advisers (CAPCA) and is administered by the Stanley W. Strew Educational Fund, Inc.

The CAPCA Scholarship will provide $3,000 to a selected college student actively engaged in a PCA career pathway. The scholarship recipient will be selected by the SWS Board of Directors.

Applications are available for students who are currently attending college in an agricultural/horticultural related field or who are entering or returning to college in an agricultural/horticultural related field in the fall and will have a junior level status.

May 6, 2022

Nominees should submit a completed application form and copies of their transcripts. ***Applications must be postmarked no later than ~~May 7, 2021~~*** and submitted with required letters of recommendation so that the committee can make final selections. The student selected will be notified in July.

For application information please contact CAPCA at (916) 928-1625 or email rachel@capca.com

https://capca.com/scholarships-awards/

Photo: Fred Rehrman, Elysian Fields

ADVERTORIAL

QMIN® Pink Bud Almond Solution

Optimize the absorption of the most demanded nutrients before flowering and pollination

Pink bud signifies it's time for optimal application of essential nutrients like calcium, boron, zinc, molybdenum and copper. These nutrients are needed for pollen viability and floral development which help improve fruit set resulting in more abundant harvests.

The majority of nutrients taken up by almonds from the soil begins after flowering. Early fruit set and leaf development depend upon the nutrients stored in the buds and the tree the previous season. Soil factors such as temperature and high pH reduce uptake of most nutrients. Crop yield, tree management, irrigation and nutrition during the previous season impact the amount of nutrients stored in the buds. Nutrient deficiency early in the season can adversely impact pollination, leaf development, fruit set and yield. Soft tissue such as young leaves and flower buds absorb foliar applied nutrients easily. Nutrients applied during pink bud can rapidly enter the floral tissues and overcome deficiencies resulting in improve plant performance.

Ensuring Your Almond Trees Absorb Needed Nutrients

One way to ensure your plants get the nutrition they need is through the foliar application of nutrients. QualiTech's QMIN® is an ideal solution as it leverages polysaccharide technology to move nutrients into the tissues that need it most, like inside the developing flowers on an almond instead of on the calyx. How does QMIN® polysaccharide technology promote nutrient absorption?

- The nutrients are complexed with polysaccharides, to enhance translocation to almond flowers and developing fruit.
- It is tank-mix compatible with fungicides, which eliminates the need for additional applications, saving time and money.
- The polysaccharide complex is derived from natural plant sources which act as a source of energy for the developing flowers.
- Polysaccharides are natural humectants, which means that they readily absorb atmospheric moisture. This property allows QMIN® to frequently re-wet on the bud – thereby prolonging uptake activity.

Another benefit of QMIN® technology is that it is a safe solution derived from plants, which mitigates phototoxicity. QMIN® Boron, QMIN® Calcium and QMIN® HeptaBoost have been safely applied at almond bloom for over a decade.

The goal of our QMIN® products is to help your trees better utilize the nutrients you supply and deliver faster results. Since most plants store polysaccharides for energy, QMIN® complexes enter the plant through the cuticle and stomata. Once inside the plant, QMIN® technology improves translocation and metabolism.

Our products for pink bud application include QMIN® Boron, QMIN® Calcium and QMIN® HeptaBoost. Boron and calcium can be applied during early bloom, or pink-bud, to improve tree productivity. Post-bloom micronutrients can be applied twice a year or as needed based on tissue analysis and visual symptoms for maximum results.

How QMIN® Technology Works

The goal of our QMIN® products is to help your trees better utilize the nutrients you supply and deliver faster results. Since most plants store polysaccharides for energy, QMIN® complexes enter the plant through the cuticle and stomata. Once inside the plant, QMIN® technology improves translocation and metabolism.

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Combine Nutrient Enhancing Products with Superior Fertilizer Management Tools

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Nutrien Ag Solutions™

Qortex™, the Agronomy Decision Engine™, helps crop advisors make fertilizer programs which improve crop productivity and reduce costs. Use Qortex to speed up fertilizer decision-making by managing the fertilizer rate, source, location, timing and price all from one place.

Talk to a QualiTech agronomist to learn how crop advisors can save time, stay organized and increase ROI while improving the quality of their advice.

Contact Information.

For more information, contact your Nutrien Ag Solutions Representative.

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Multispectral imaging and its utility to an integrated pest management program

Christopher A. Greer, Area IPM Advisor, University of California Statewide IPM Program and Cooperative Extension
San Luis Obispo, Santa Barbara and Ventura Counties

There has been a great deal of discussion about the role and value of small unmanned aircraft systems (sUAS) and remote sensing in agriculture. I am currently utilizing sUAS to collect multispectral imagery in support of my integrated pest management research and extension efforts. Many people comment that it must be fun to pilot the unmanned aerial vehicle (UAV). In reality, it is not as exciting as people think because the UAV is flying autonomously following a programed flight plan. The pilot spends most of their time scanning the airspace for low flying aircraft and other obstacles to avoid. The real excitement for a scientist is the wealth of data collected by the instrumentation the UAV is carrying.

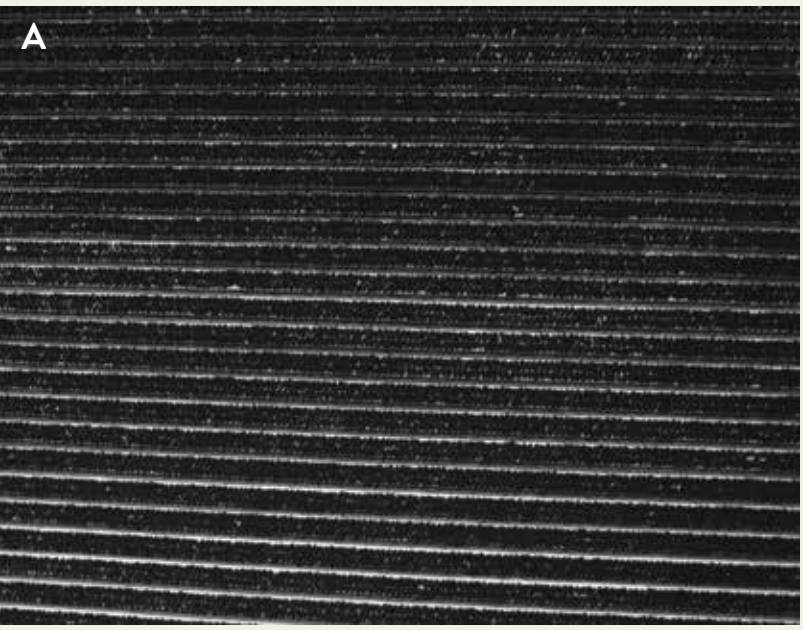
The sensors the UAV carries as payload are the critical components of the system, capturing raw data that is processed and analyzed to test experimental hypotheses or inform decision-making processes related to crop management. Multispectral, thermal, RGB (red, green, blue), and hyperspectral sensors collect different types of data that may be used in different applications. For example, plant water stress may be monitored using data from thermal imagery whereas plant stress may be estimated using data from multispectral imagery.

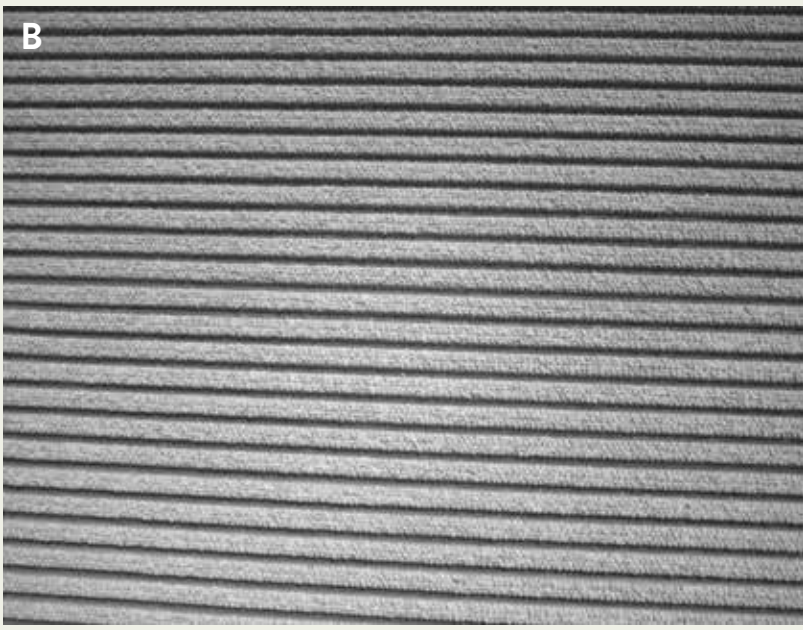
Multispectral imagery is a critical tool in my collaborative research efforts and I am exploring how we can simplify integration of the technology into an effective integrated pest management program. The multispectral sensor I use captures image data within five narrow spectral bands; blue, green, red, red edge, and near-infrared (NIR) during a single UAV flight. Five images are captured each time the sensor is triggered, one image for each spectral band.

The images for each spectral band appear as a grayscale image with the shade of each pixel determined by the value of the pixel (Fig. 1A, 1B). The value of each pixel is a measure of the surface reflectance of that corresponding spectral band of energy. Higher reflectance of a specific spectral band results in higher pixel values and stronger absorption results in lower pixel values.

Healthy vegetation absorbs blue and red light, reflects some green light, and reflects spectral energy in the red edge and near-infrared bands more strongly. In a field with healthy strawberry plants, healthy plants absorb most of the red band energy resulting in lower pixel values and a darker color (Fig. 1A) whereas healthy plants reflect a large amount of near-infrared band energy resulting in higher pixel values and a lighter color (Fig. 1B).

Figure 1. Multispectral images of a field of healthy strawberry plants taken at 200 feet altitude. Red band image demonstrating healthy plants absorbing most of the red band spectral energy resulting in lower pixel values and a darker color (**A**). Near-infrared band image demonstrating healthy plants reflecting a large amount of near-infrared band energy resulting in higher pixel values and a lighter color (**B**). Images: Christopher A. Greer, UC IPM.





EcoSwing®

BOTANICAL FUNGICIDE

FOR ORGANIC PRODUCTION OMRI LISTED

- *4 hour REI, 0 day PHI*
- *US EPA registered tolerance exemption*
- *Compatible with many other fungicides and insecticides*
- *Labeled across many crop groups including greenhouse and landscape uses*

For Additional Product Information
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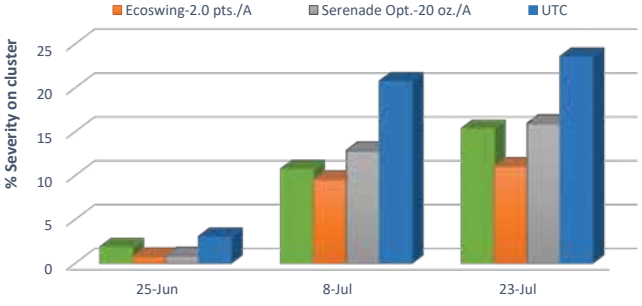
Gowan USA

EcoSwing® is a botanical fungicide created using proprietary plant extracts from the *Swinglea glutinosa* tree. EcoSwing has been a leader in fungicidal control of several key pathogens globally for many years. Incorporating EcoSwing as a preventative application in an integrated pest management program allows for the addition of an alternative mode of action for improved disease control and resistance management.

Wine Grape Powdery Mildew
(Erysiphe necator)

var	Carigna
GPA	100
Location	CA

Applications	
Total	12
7-Day Interval	

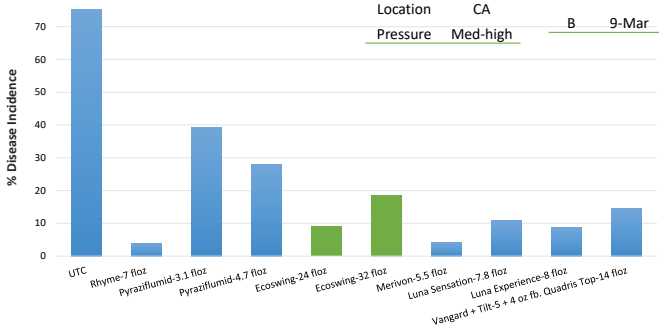


EcoSwing® primarily works as a contact desiccant and cell wall disruptor to the fungal hyphae. Preliminary research also suggests that **EcoSwing®** may aid in triggering innate plant responses to help boost plant's natural defense mechanisms against fungal pathogens.

Shothole - 2018
(Wilsonomyces carpophilus)

var	Drake
GPA	100
Location	CA
Pressure	Med-high

Applications	
A	13-Feb
B	9-Mar



EcoSwing®, in both research trials and field studies, has shown solid efficacy against several key pathogens of almonds, grapes, and stone fruit. **EcoSwing®** has thus far shown good efficacy on the brown rot complexes, powdery mildews, botrytis, and sclerotinia.

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Individual spectral band images are then “stitched” together through a rigorous process that uses common tie-points to align individual images using photogrammetry software. The result is the generation of a single geometrically corrected image for each spectral band (Fig. 2A). These images are georeferenced and highly accurate and can be used in geographic information systems (GIS) software for digital mapping.

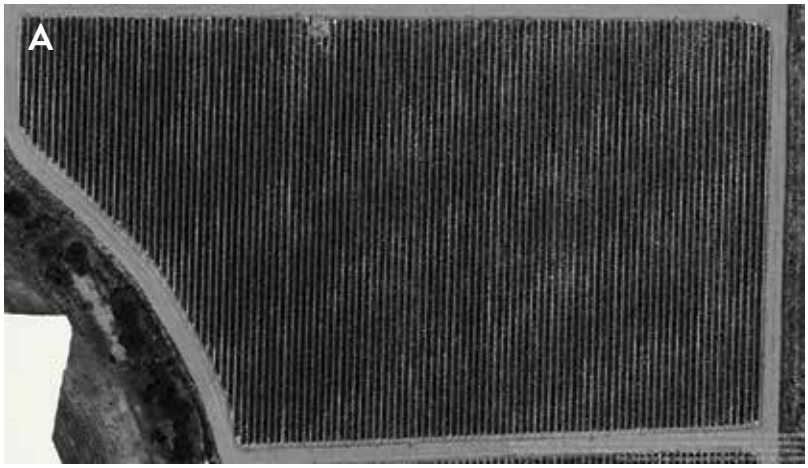
We generate other products that are useful in data analysis and decision-making from the values of the individual pixels of the spectral band images. Combining red, green, and blue band data creates an RGB image representing how we see things with the human eye (Fig. 2B). Calculating different vegetation indices reveals differences in plant health within a field. Vegetation indices are the mathematical result of the transformation and/or combination of two or more spectral bands in an effort to highlight or enhance some vegetative property and provide contrast. For example, we can calculate a simple vegetation index to enhance the difference between healthy plant tissue and soil based upon the different spectral reflectance properties of these objects.

Normalized difference vegetation index (NDVI) is a common vegetation index with which most people are familiar. NDVI utilizes the red and NIR spectral bands taking advantage of the fact that green plants absorb light energy in the red band and reflect light energy in the NIR band. NDVI is calculated using the measured spectral reflectance value for the red and NIR bands (ranging from 0.0 to 1.0). The equation is NDVI = (NIR - Red)/(NIR + Red) with a resulting NDVI value between -1.0 and +1.0.

Using the red and NIR band reflectance data with the equation above creates a geometrically corrected NDVI image with each individual pixel represented by a NDVI value. This image is grayscale as the previous ones but we assign colors to Individual pixel values for visualization of the NDVI image in GIS software (Fig. 2C). In general, higher NDVI values are color-coded green and represent healthy plant tissue. Lowest NDVI values are color-coded red and orange and represent dead plants and soil. Mid-range NDVI values are color-coded yellow and light green and represent unhealthy or stressed plants.

The value of NDVI is evident at the end of the season in a strawberry field severely affected by soilborne pathogens. A small section of the field is depicted by an RGB image (Fig. 3A) and an NDVI image (Fig.3B) to demonstrate a comparison between areas of high disease incidence and lower disease incidence. Disease incidence was much higher on the left half and bottom portion of the images as evidenced by more yellow- and orange-colored pixels versus in the top right quadrant. One important point to acknowledge is that if we only had these images with no scouting or field knowledge, we could only conclude that there were more stressed and dead plants in certain areas of the field. We did confirm disease presence in this field.

Figure 2. Individual multispectral images contribute to the generation of various mapping products. Individual images are "stitched" together in a single geometrically corrected image for each spectral band as demonstrated for the red band (**A**). Combining red, green, and blue spectral band reflectance data creates an RGB image representing how we see things with the human eye (**B**). Calculation of normalized difference vegetation index (NDVI) values using the red and near-infrared band reflectance data allows creation of a geometrically corrected NDVI image with colors assigned to Individual NDVI pixel values for visualization (**C**). Images: Christopher A. Greer, UC IPM.



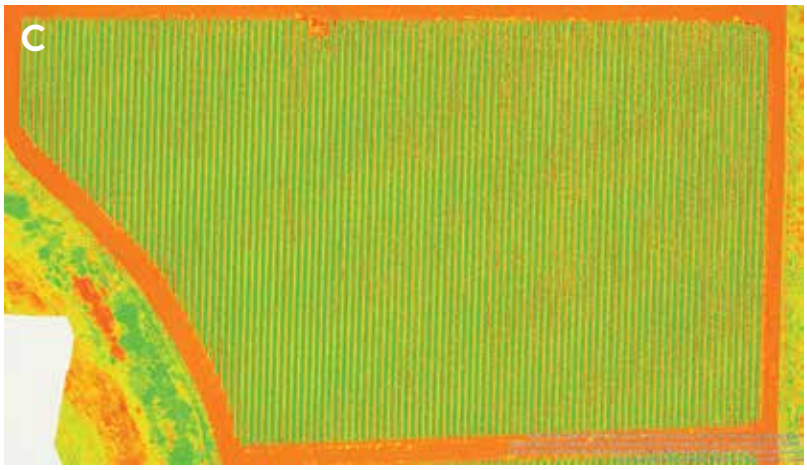
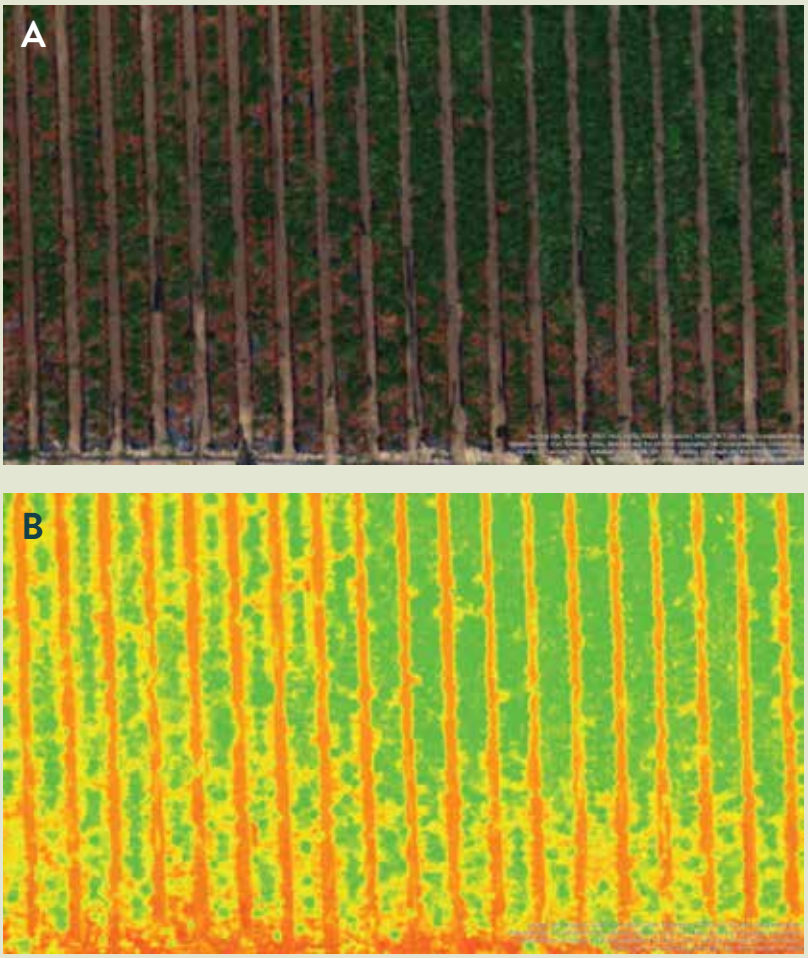


Figure 3. Red, green, and blue (RGB; **A**) and normalized difference vegetation index (NDVI; **B**) images at the end of the season in a strawberry field severely affected by soilborne pathogens. Disease incidence was much higher on the left half and bottom portion of the image as evidenced by more yellow- and orange-colored pixels in the NDVI image versus in the top right quadrant of the image. Images: Christopher A. Greer, UC IPM.



Remote sensing has great value as a research tool, as each individual pixel is a data point that allows us to analyze data over this field in any unit size we want. We can analyze data by individual plant, individual bed, individual experimental unit, or individual block. In addition, this type of data has temporal value as it allows us to document changes over time throughout a production season or from season to season for perennial crops. While utilizing remote sensing is a valuable research tool, I am also curious to explore ways of integrating this technology into the decision-making process of integrated pest management.

I do not believe remote sensing will ever be a replacement for on the ground scouting, historical knowledge, experience, etc. However, I view remote sensing as being complementary and having the potential to contribute to the knowledge base that informs the integrated pest management decision-making process. Providing this information to decision makers in a timely and useful form is critical to putting this data into action. While technological advances have brought these products closer to the field, we still have a long way to go. While this technology may not fit all crops and pest issues, the technology has great promise for contributing to the advancement of integrated pest management through increasing scouting efficiencies, early detection of pest issues, and documenting temporal and geospatial pest progress. ■

FEBRUARY, 2021

SPRAY SAFE

AGENDA TO INCLUDE:

Spray Safe 101 - Riverside County Agricultural Commissioner

County Laws & Regulations Update - Kern Co. Dept. of Agriculture, Weights & Measures

How to Decontaminate - California Safety Training Corp.

Chemigation & Fertigation - Ag Spray Equipment

How to Use Closed Systems - Ag Spray Equipment

How to Read a Recommendation - Sandridge Farms

Pesticide Use Monitoring Inspection Requirements - Kern Co. Dept. of Ag., Weights & Measures

Drift Incidents: Treat Smart - Department of Pesticide Regulation

(Continuing Education Hours - pending approval for Mini-Events)

Additional program information available at:

https://spraysafeca.com/

Impact of microbial, botanical, and organic acid-based biostimulants on strawberry health and yield

Surendra K. Dara, Entomology and Biologicals Advisor, University of California Cooperative Extension

Biostimulants are beneficial microorganisms, botanical extract, or other substances that stimulate plant growth, trigger immune responses to biotic and abiotic stressors, and improve plant health. Biostimulants induce plant resistance to stress factors through *systemic acquired resistance* or *induced systemic resistance.* When plants are exposed to virulent and avirulent pathogens, non-pathogenic microorganisms, and some chemicals, the systemic acquired resistance mechanism is activated through the salicylic acid pathway triggering the production of pathogenesis-related proteins. On the other hand, when plants are exposed to beneficial microbes, the induced systemic resistance mechanism is activated through the jasmonic acid and ethylene pathways. The jasmonic acid pathway also leads to pathogenesis-related protein production in plants. In other words, when plants are exposed to pathogens, non-pathogens, or other compounds, various defense genes are activated through two major immune responses, helping plants fight the real infection or prepare them for potential infection. Beneficial microbes and non-microbial biostimulants are like vaccines that prepare plants for potential health problems.

Earlier studies in tomato (Dara and Lewis, 2018; Dara, 2019a) and strawberry (Dara and Peck, 2018; Dara, 2019b; Dara, 2020) demonstrated varying levels of benefits to crop health and yield improvements from a variety of botanical, microbial, or mineral biostimulants and other supplements. Some of the evaluated products resulted in significant yield improvement in both tomatoes and strawberries compared to the grower standard practices. There are several biostimulant products in the market with a variety of active ingredients, and some also have major plant nutrients such as nitrogen, phosphorus, and potassium. Depending on the crop, growing conditions, potential risk of pests and diseases, and other factors, growers can use one or more of these products. A study was conducted to evaluate the impact of various biostimulants on the yield, quality, and shelf life of strawberries.

Methodology

Strawberry cultivar San Andreas was planted late November 2018 and treatments were administered at the time of planting or soon after, depending on the protocol. Each treatment had a 290' long

Hamza Khairi taking flower counts

strawberry bed where 10' of the bed at each end was left out as a buffer. Then, six 30' long plots, each representing a replication, were marked within each bed with an 18' buffer between the plots. Since the test products needed to be applied through the drip system, an entire bed was allocated for each treatment, except for the standard program that had one bed on either side of the experimental block, and plots were marked within each bed for data collection. The following treatment regimens were used in the study:

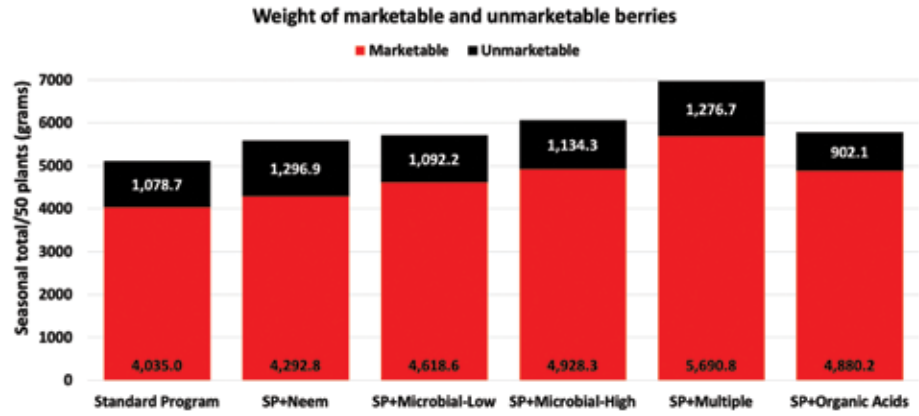
1. **Standard Program (SP):** Major nutrients were provided in the form of urea ammonium nitrate solution, ammonium polyphosphate solution, and potassium thiosulfate. Nitrogen, phosphorus, and potassium were applied before planting in November 2018 at 170, 60, and 130 lb/acre, respectively. From 15 January to 9 May 2019, a total of 26 lb of nitrogen, 13 lb of phosphorus, and 26 lb of potassium were applied through 13 periodic applications.

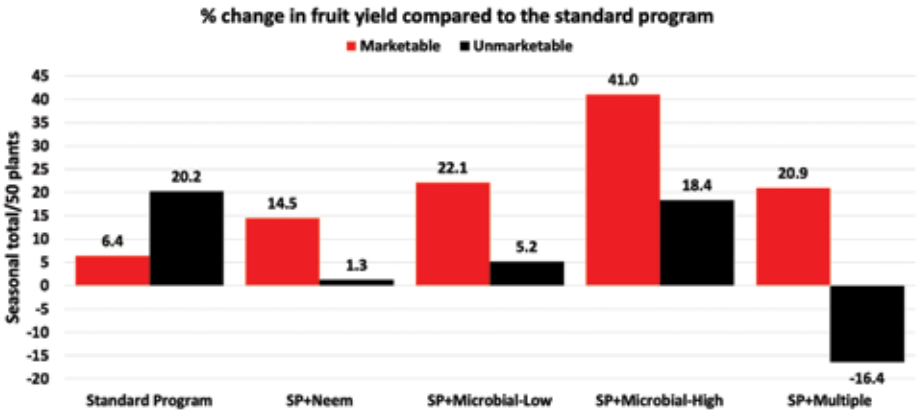
2. **SP + Neem:** Cold-pressed neem (70%) was applied at 1.2% vol/vol immediately after planting. Additional applications were made starting from 2 weeks after planting once every two weeks until the end of February (six times), followed by 13 weekly applications from the beginning of March 2019.

Study field 1

3. **SP + Microbial-Low Rate:** This program contained a soil amendment based on the fungus *Trichoderma harzianum* $1X10^8$ CFU/ml and the bacterium *Bacillus amyloliquefaciens* $1X10^9$ CFU/ml at 3 fl oz/acre, humic acid at 13.5 fl oz/acre, and kelp at 6.8 fl oz/acre. The first application was made within 15 days and at 30 days after planting followed by once in February, March, and April 2019.

Study field 2





Hamza Khairi taking yield data

4. **SP + Microbial-High Rate:** This program contained the soil amendment based on *T. harzianum* 1X108 CFU/ml and *B. amyloliquefaciens* 1X109 CFU/ml at 6 fl oz/acre, humic acid at 13.5 fl oz/acre, and kelp at 6.8 fl oz/acre. The first application was made within 15 days and at 30 days after planting followed by once in February, March, and April 2019.

5. **SP + Multiple biostimulants and nutrients:** Transplants were treated with a product containing the entomopathogenic fungus *Beauveria bassiana* 1.1%) by spraying 2 fl oz/acre (1.29 ml in 850 ml of water). About 7 weeks after planting, 30 gpa of a product containing botanical extracts, 2 gpa of a humic acid blend, 3 gpa of humic and carboxylic acid blend, and 5 gpa of a fertilizer (NPK 4-12-0 and 4.5% calcium and micronutrients) were applied. Starting from mid-February 2019, 15 gpa of Plant-X Rhizo-Pro, 1 gpa of CHB Premium 21, and 2 gpa of CHB Premium 6 were applied four times every 2 weeks until the end of March. Starting from 5 April 2019, 8 weekly applications of 10 gpa of botanical extract, 1 gpa of humic acid blend, 2 gpa of humic and carboxylic acid blend, and 4 gpa of NUE Flourish 4-12-0 were made until 26 May 2019.

6. **SP + Organic acids and macro nutrients:** A product containing NPK at 7-21-0 at 3 gpa and a product containing 22% organic acids and 4% potash at 1 gpa were first applied within 1 week of planting and then three more times every 2 weeks until the end of December 2018. Additional monthly applications were made from the end of January to the end of April 2019.

All the fertilizers and treatment materials were applied through the drip system using water powered injectors. The following parameters were measured during the experimental period from January to May 2019.

Canopy: The size of the plant canopy was determined on 21 January and again on 17 February 2019 by measuring the spread of the canopy across and along the length of the bed from 16 random plants within each plot, and calculating the area.

Initial flowering and fruiting: When flowering initiated, the number of flowers and developing fruits was counted from 16 random plants within each plot on 1 and 16 February 2019.

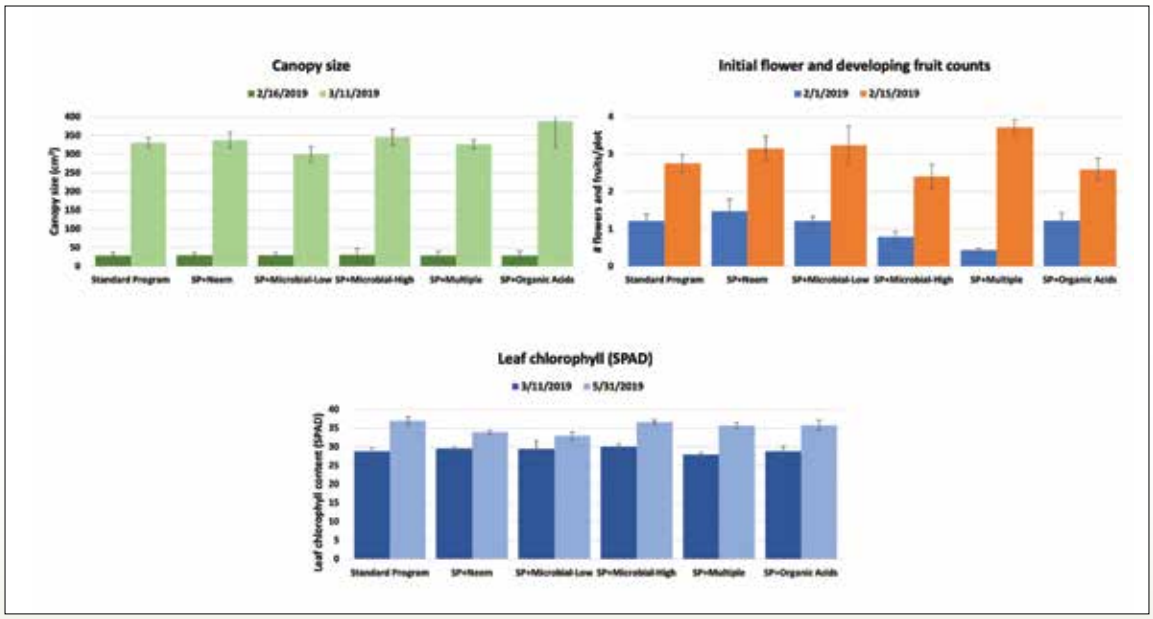
Fruit yield: Fruit was harvested weekly from every plant within each plot from 3 March to 26 May 2019 on 11 dates and the number and weight of the marketable and unmarketable fruit was determined. Due to a technical error, some of the yield data from an additional date (29 March) were lost and excluded from the analysis.

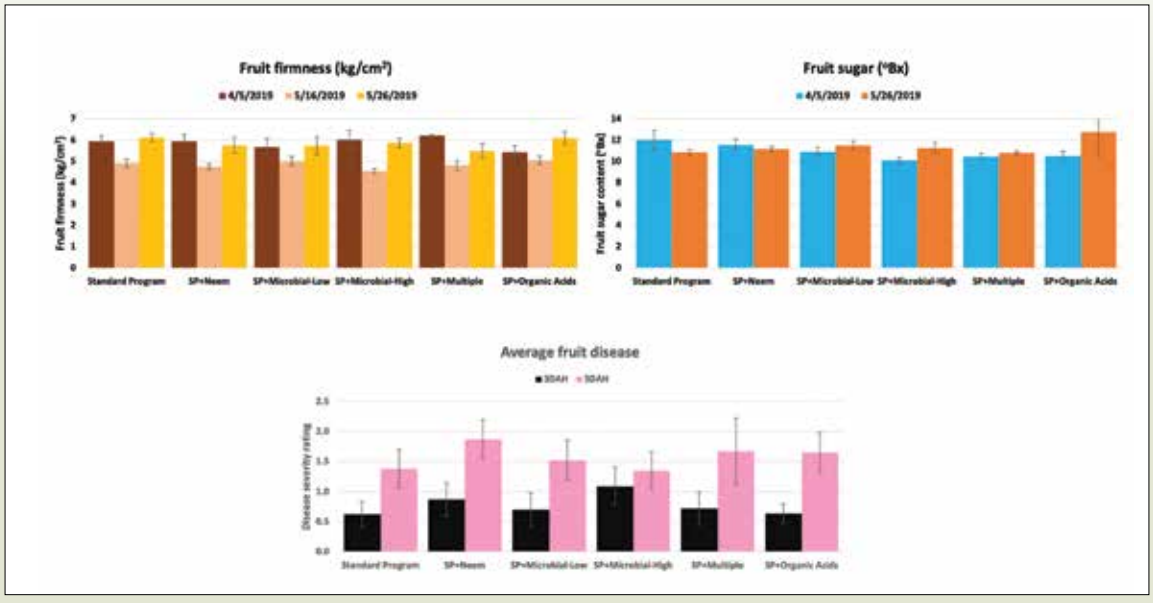
Fruit firmness: The firmness of two marketable fruit from each of five random plants per plot was measured using a penetrometer on 5 April, and 16 and 26 May 2019.

Fruit sugar content: The sugar content from one marketable fruit from each of 10 plants per plot was measured using a refractometer on 5 April and 26 May 2019.

Leaf chlorophyll content: On 11 March and 31 May 2019, the chlorophyll content of one mature leaf from each of five random plants per plot was measured using a chlorophyll meter.

Postharvest disease: Marketable fruit harvested on 21 and 28 April, and 5 and 26 May 2019 was kept at the room temperature in perforated plastic containers (clamshells) and the growth of gray mold (*Botrytis cinerea*) or Rhizopus fruit rot fungus (*Rhizopus* spp.) was measured on a scale of 0 to 4 (where 0=no fungus, 1=1-25%, 2=26-50%, 3=51-75%, and 4=76-100% fungal growth) 3 and 5 days after each harvest.





Data were analyzed using analysis of variance in Statistix software and significant means were separated using the Least Significant Difference means separation test.

Results and Discussion

Statistically significant differences among treatments were seen for the seasonal total number of unmarketable berries ($P = 0.0172$), the initial flower and fruit numbers on 1 February ($P < 0.0014$), the leaf chlorophyll content on 31 May ($P = 0.0144$), and the disease rating 3 days after the 28 April harvest ($P = 0.0065$).

Treatments did not differ ($P > 0.05$) in any other measured parameters of the plant, fruit quality, or yield. However, the total seasonal fruit yield was 13 to 31% higher and the total marketable fruit yield was 10 to 36% higher in various treatment programs compared to the standard program. The seasonal total of unmarketable fruit yield was also 4 to 25% higher in treatment programs than the standard program except that there were nearly 12% fewer unmarketable berries in the treatment that received organic acids and macro nutrients compared to the standard program.

While treatments did not statistically differ for many of the measured parameters, numerical differences in marketable fruit yield could be helpful for some understanding of the potential of these biostimulants. Additional studies with larger treatment plots would be useful for understanding the impact of various biostimulants on improving strawberry health and yields. ■

Acknowledgments

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Choosing a Potassium Fertilizer for the 2021 Crop

By Abe Isaak, AgroLiquid Agronomy Manager, West Region

Understanding how potassium fertilizers interact with other inputs and elements in the soil will help decide which inputs and application timings will best suit a particular operation. Potassium (K) is essential for the transport of sugars and the formation of starches and oils. Potassium helps regulate the opening and closing of leaf stoma which are important for the efficient use of water by a crop. It is also involved with enzyme activation within the plant, which affects protein, starch and adenosine triphosphate (ATP) production. The production of ATP can regulate the rate of photosynthesis. If potassium is deficient or not supplied in adequate amounts, it stunts plant growth and reduces yield.

Potassium promotes root growth and increases a plant's resistance to disease and cold temperatures. It improves the size and quality of fruits, nuts, grains and is essential for high quality forage. Crops that produce large amounts of carbohydrates (sugars) require large amounts of potassium (e.g., almonds, alfalfa, grapes, cherries, cotton, etc.).

While supplies of total potassium in soils is often quite large, relatively small amounts are available to the plant at any one time. That's because nearly all of this K is in the structural component of soil minerals and isn't available for plant growth. The amount of available potassium in the soil varies due in part to differences in soil parent materials and weathering. Therefore, like all crop nutrients, the need for potassium varies by crop and by region.

Plant-Available Potassium

Depending on soil type, approximately 90 to 98 percent of total soil K is unavailable to the plant. The minerals feldspars and micas contain most of the K. Over time, these minerals do break down, and K is released. As these minerals weather, some K becomes available, but typically not enough to supply the full K needs of the crop.

Some soil K is trapped between layers of clay minerals and is frequently referred to as being 'fixed'. Again, this type of potassium will vary by region and depends on the dominating type of clay in the soil. Fixed potassium is not measured by most soil tests, and plants cannot use much of it during the growing season.

Potassium that's readily available for plant growth is dissolved in soil water. This is the type of potassium measured on a routing soil test analysis.

Several factors affect potassium uptake by plants. As readily-available potassium is dissolved in soil water, higher soil moisture usually means greater K availability. However, as always, there can be too much of a good thing. If soil moisture content increases to saturation, root activity and K uptake decrease, because air is necessary for root respiration and K uptake by the plant. Oxygen levels are very low in saturated soils.

It is also important to mention that potassium and sodium have a unique relationship that is many times overlooked. The use of poor-quality, well water for irrigation has caused sodium levels to build up in many California soils. In these situations, the soil solution will contain more sodium ions than potassium ions. These two ions are "look alike" ions and the plant will not discriminate against which one it takes up. An excess of sodium in the soil solution will tend to induce a potassium deficiency in the plant. This is an important aspect to address in a farming operation. On a soil test, look at the base saturation, and if the sodium level is higher than the potassium, this is an indicator that there may have some serious problems during the heat of the growing season. This can appear as leaf burn on the edges of the plant, and in severe cases defoliation and crop loss.

Potassium in Almonds

Potassium, with nitrogen, boosts growth and enables better water utilization in the tree. It is particularly important and needed in large quantities for nut-fill and the highest yields. Calcium and potassium help improve nut fill and disease tolerance, reducing molds and storage rots.

According to the US Department of Agriculture, almond kernels contain 0.75% K, and potassium represents more than 2% of the dry weight of almond hulls (Calixto, 1982). We also know that of soil-derived nutrients, almond trees remove potassium and nitrogen in the greatest quantities. Removing almond hulls and kernels during harvest removes significant amounts of potassium from almond orchards. Depletion can be avoided by supplying potassium to the trees regularly throughout the season.

When first leafing out, trees displaying K deficiency symptoms appear pale in color and have small leaves with little new growth. Later, trees show rolled leaves with marginal leaf burning. This symptom is classic when it occurs in the tree top on leaves in the middle of new shoot growth. The Butte variety is a good indicator of this deficiency because it is likely to exhibit leaf scorching before other varieties show symptoms. K is deficient if July leaf analysis is below 1.0%.

There are many factors that influence K availability, sodium being just one of them. High pH, calcium and/or magnesium levels will tie up K in the soil. If some of these limiting factors are in play on your farm, you can get around this problem with foliar applications of potassium throughout the growing season.

Making Good Choices

Maintaining a proper balance of nutrients in the soil is critical to ensuring the plant has the nutrition available when it's needed during the growing season. Choosing a potassium fertilizer that is highly soluble and free of chlorides and other salts will ensure healthier plants to achieve 2021 yield goals.

As always, when selecting fertilizer products and application placement, it is important to use the best agronomic practices for the product and crop. Always consider what crops, application methods, tank mix partners, and environmental conditions are present when making fertilizer decisions. Above all, find a trusted agronomist or crop nutrition expert to help identify your crop nutrition needs. ■

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California Department of Pesticide Regulation

STANDARD OF CONDUCT

Adopted 1989

CAPCA members will conduct themselves in a professional manner according to their code of ethics by observing all laws and all regulations, broadening their abilities through continuing education, and respecting the needs of their clients, the environment and public safety at all times.

CODE OF ETHICS

Adopted 1992

INTRODUCTION

The California Association of Pest Control Advisers (CAPCA) recognizes the unique ethical and professional responsibility of the licensed pest control adviser (PCA). 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.

CAPCA members will observe and obey all laws and regulations pertaining to our industry, and will voluntarily assume the obligations of self-discipline, honor, and environmental respect set forth in the CAPCA 'Code of Ethics.'

ARTICLE I: Obligation of the PCA to the Public and Environment

- 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.

ARTICLE II: Obligation of the PCA to the Client

- PCAs have an affirmative ethical obligation not to conceal their source of compensation when asked.
- Help the client keep abreast of relevant regulatory and technological changes which could impact the client's business.
- Provide the client with pest management advice which meets the following criteria:

- environmentally, economically, and ethically sound
- legal uses that are objective and are research-based

ARTICLE III: Obligation of PCA to the Profession

- Refrain from making false or misleading statements about the work of other PCAs.
- Recognize the duty to report illegal practices to the proper authorities.
- Maintain state-of-the-art knowledge of pest management through conscientious pursuit of continuing education.
- Participate in industry affiliated organizations and activities which encourage the betterment of the profession.
- Foster and support research and education for the advancement of pest management.

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Description: We are seeking a tenacious PCA-licensed Territory Manager responsible for building and maintaining business relationships with growers, pest control advisers and channel partners, understanding their agronomic needs to drive new sales and maintain existing business with an unparalleled level of service. The territory regions covers southern half of California (includes Kern, Fresno) and Arizona.

Requirements: 10+ years of senior-level agriculture territory management with regional and/or national account experience; Bachelor of Science, preferably in Agriculture or a related field, required; Valid Pest Control Adviser (PCA) license in California is required; Proven experience with organic and conventional vegetable, strawberry and permanent tree & vine crop production in California and across the Southwest markets

Duties: Develop and implement creative initiatives in regional market development that yield high potential in demand and revenue generation; Advising PCAs/growers/farmers.

Apply: Submit your resume to kaymen.low@terramera.com or apply online: https://boards.greenhouse.io/terramera/jobs/2450208?gh_jid=2450208

Territory Sales Manager – Various Locations

Marrone Bio Innovations

Description: Position Type: Full Time - Education Level: 4 Years - 50% Travel. The Territory Sales Manager (TSM) conducts full cycle sales activities, with key growers and market influencer. Working closely with the Territory Account Manager, the person is responsible for developing and implementing an agreed upon Territory Business Plan which will meet business goals in the sales and marketing.

Duties, Qualifications, & Requirements: B.S. degree in Life Sciences or an agriculture-related field. A minimum of 3 years of sales experience with pesticide products or other relevant experience. Bio-pesticide experience is preferred but not required. PCA or CCA required or acquired within a year of hiring. Interpersonal skills required to communicate, advise, negotiate or influence others. Planning skills required to organize, prioritize, schedule and coordinate work activities for multiple projects. Good computer skills, including solid working knowledge of Microsoft Office Suite, and excellent written/verbal skills.

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Corporate Grower Account Manager – California

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Description: The Corporate Grower Account Manager (CGAM) conducts full cycle sales activities, with key corporate grower accounts and their influencers. Working closely with the Territory Account Managers, the person is responsible for developing and implementing an agreed upon Territory Business Plan which will meet business goals in the sales and marketing areas.

Duties, Qualifications & Requirements: Develop an annual territory business plan to drive business in key focus markets. Build and manage long-term relationships with a list of key growers to effectively create demand for the company's portfolio of products and increase. B.S. degree in Life Sciences or an agriculture-related field. A minimum of 10 years of sales experience with pesticide products or other relevant experience. Bio-pesticide experience is preferred, but not required. PCA or CCA required or acquired within a year of hiring. Must be in possession of a valid driver's license.

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For 2021, the annual allowable contribution amount has been increased. We encourage all Chapters that wish to participate to contact Ruthann Anderson or Joyce Basan.

Photo: S. Gupta

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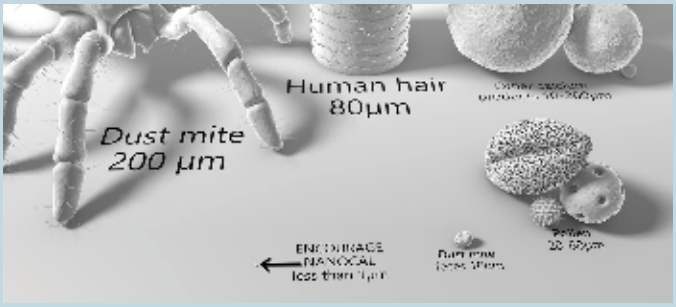

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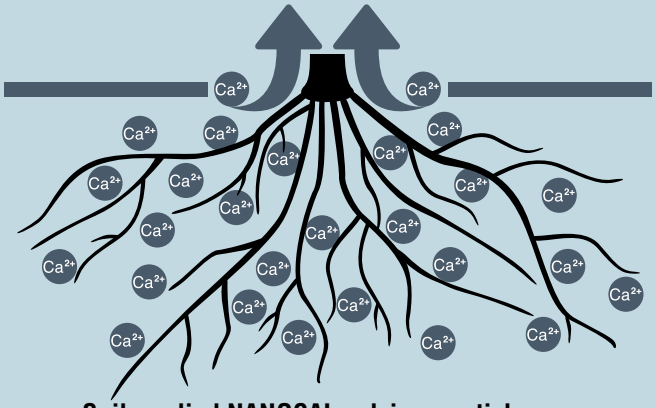

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