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MAY 2021 ISSUE

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BUMPER CROPS PUSH  
WALNUT MARKET**

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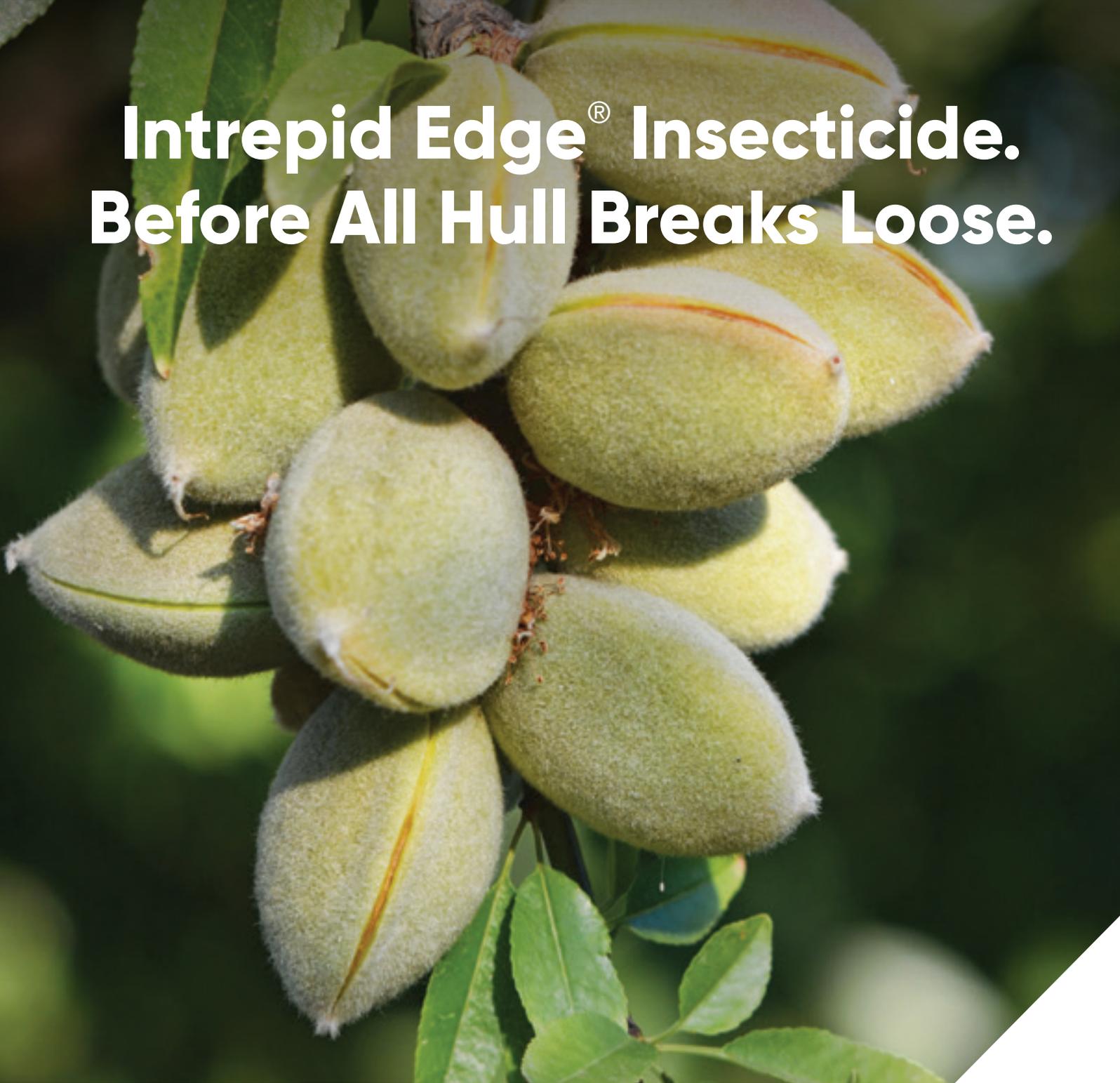
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# WEST COAST NUT

By the Industry, For the Industry

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**SPOTLIGHT ARTICLE: Bumper Crops Push Walnut Market**

Quality, marketing and innovation will be needed to counter record walnut production and increased competition.

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# IS NAVAL ORANGEWORM A CANDIDATE FOR AREA-WIDE INTEGRATED PEST MANAGEMENT IN CALIFORNIA?

By **HOUSTON WILSON** | Asst. Cooperative Extension Specialist, Dept. of Entomology, UC Riverside,  
**SETH HANSEN** | Independent PCA, Reliant Crop Services, LLC,  
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**U**NDER INTEGRATED PEST MANAGEMENT (IPM), crop fields are considered interconnected agroecosystems where long-term pest/damage prevention is best achieved through a combination of biological, mechanical, cultural and chemical controls (Stern et al. 1959). Area-wide control refers to a systematic approach to quarantine and eradicate pests, where total pest management over an entire geographic area is critical, since small fractions of an insect population left uncontrolled can promptly reverse the benefits of greatly suppressing the main pest population in a large area (Knipling 1960).

The challenge to IPM practitioners is that while independent operators focus on individual fields or orchards, many agricultural pests are highly mobile. For example, many people have at some point likely had to deal with the problem of a “bad neighbor” whose pest management efforts are inadequate and lead to spillover of pests/disease issues into their adjacent fields. Furthermore, certain management strategies are most effective when implemented over a large contiguous area, such as mating



Given that NOW attacks multiple crops, some form of cross-commodity organization will likely be needed for the success of an area-wide IPM program (photo courtesy Peggy Greb, USDA-ARS.)

disruption. While the goal of IPM is not pest eradication, the successful suppression of highly mobile pests with technologies that work best at scale requires an area-wide approach. As such, the concept of area-wide integrated pest management (AW-IPM) has emerged over time as various groups began to effectively bring together the ideas of IPM and area-wide control (e.g. Kogan 1998, Brewer and Goodell 2012).

### Approaches to Implementation

While IPM is generally implemented at the field/plot/block scale by individual growers and/or pest control advisors (PCAs) operating independently, participation in an area-wide quarantine and eradication campaign is typically mandatory, with pest management activities enforced by, or even conducted by, government entities like CDFA and/or USDA Animal and Plant Health Inspection Service - Plant Protection and Quarantine (APHIS-PPQ).

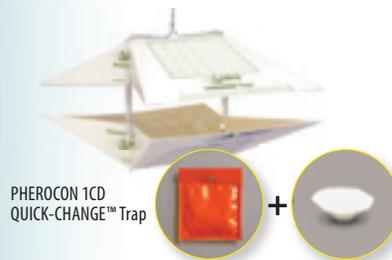
In California, some recent examples of pest eradication efforts include the light-brown apple moth (Tortricidae: *Epiphyas postvittana*), European grapevine berry borer (Tortricidae: *Lobesia botrana*) and pink bollworm (Gelechiidae: *Pectinophora gossypiella*). In this way, independent implementation of field-scale IPM practices across multiple operations lies in sharp contrast to

*Continued on Page 6*

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The larvae of NOW directly feed on the nut kernels, leading to reduced crop yield and quality (photo courtesy Emily Symmes, Suterra.)

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state-led mandatory area-wide eradication efforts. AW-IPM falls somewhere in the middle of this continuum, and as such requires a unique approach to facilitate the coordination of multiple independent growers/PCAs in order to optimize pest suppression at a regional scale.

AW-IPM programs have been operating successfully for several decades in many parts of the world, with interest in and the number of programs reaching operational level growing steadily since the 1990s (Vreysen et al. 2007). However, program success depends on the continuous and positive interactions between growers, PCAs, scientists, cooperative extension and state/county personnel, with many technical and managerial difficulties to negotiate. AW-IPM programs have worked well when they are able to leverage the existing social and economic connections between growers, usually in a specific geographic region growing a specific crop.

### Navel Orangeworm

Navel orangeworm (*Pyralidae: Amyelois transitella*) (NOW) is the primary insect pest of California tree nuts (almonds, pistachios, walnuts) which are grown on close to 2 million acres and valued at over \$8 billion annually (CDEA 2020). The larvae of NOW directly feed on the nut kernels, leading to reduced crop yield and quality, and NOW infestation is associated with aflatoxins, which are known human carcinogens heavily regulated in key markets.

Management of NOW includes crop sanitation, mating disruption, well-timed insecticide applications and timely harvest. These IPM strategies are typically implemented independently on a field-by-field or farm-by-farm basis with little coordination or communication between individual growers. The problem with this approach is that NOW is a highly mobile insect capable of flying an average of seven miles per night (Sappington and Burks 2014), and the use of mating disruption on small

*Continued on Page 10*

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## 2021 Almond Day Agenda

7:30 Trade Show

8:00 **Managing Stink Bugs in Almonds** (CEUs: CCA 30 minutes; DPR 30 minutes, other)\*  
*Jhalendra Rijal, UCCE Area IPM Advisor*

8:30 **Developing a Monitoring System for Leaf-footed Bug**  
*Houston Wilson, UCCE Assistant Specialist* (CEUs: CCA 30 minutes; DPR 30 minutes, other)\*

9:00 **Best Management Practices for Nitrogen in Almonds** (CEUs: CCA 30 minutes; FREP 30 minutes INMP)\*  
*Doug Amaral, UCCE Farm Advisor, Kings and Tulare Counties*

9:30 Break/Trade Show

10:30 **The Latest on Ganoderma Butt Rot** (CEUs: CCA 30 minutes; DPR 30 minutes, other)\*  
*Phoebe Gordon, UCCE Orchard Crops Advisor, Madera and Merced Counties*

11:00 **Improved Management for Spider Mites** (CEUs: CCA 30 minutes; DPR 30 minutes, other)\*  
*David Haviland, UCCE Entomology Advisor, Kern County*

11:30 **Planting New Orchards After WOR** (CEUs: CCA: 30 minutes)\*  
*Mae Culumber UCCE Farm Advisor, Fresno County*

12:00 Trade Show

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**'Taken together, these elements provide a strong justification for development of an AW-IPM program for NOW. At this stage, the key is determining the best organizational form, scale and incentives to catalyze an effort like this.'**

*Continued from Page 6*

acreage (<40 acres) can be ineffective due to the colonization of orchards by mated female NOW. Furthermore, the benefits of thorough crop sanitation can be reduced or negated by poor

sanitation in neighboring orchards, which subsequently become sources of NOW that migrate into well-sanitized blocks. For example, Higbee and Siegel (2009) demonstrated that one of the key predictors of NOW damage in almonds was proximity to pistachios, where crop sanitation is the most difficult due to the small size and durability of mummy pistachios.

While laboratory assays have demonstrated the strong flight potential of NOW, the actual timing, frequency and extent of NOW movement between orchard blocks remains unclear, although research efforts are currently underway to better characterize this (Burks et al. 2020). Regardless, NOW do indeed move between orchards (Bayes et al. 2014) and therefore some form of coordinated AW-IPM could likely improve suppression.

### **AW-IPM for NOW: Challenges and Opportunities**

Development of an AW-IPM program for NOW presents a significant

challenge, given that the California tree nut industry consists of approximately 2 million acres of orchards managed by thousands of operators spread across all 20,000 square miles of the Central Valley. Given the wide extent of this acreage, it may be more feasible to start at the county level through the creation of area-wide pest management groups or districts comprised of all growers with crops susceptible to NOW. Such organization can take a variety of forms, including self-organized associations, industry/commodity technical workgroups or even legislatively defined programs that include grower assessments (e.g. Beet Curly Top Virus Control Program, Pierce's Disease Control Program etc.) While each approach has different challenges and benefits, such organizational efforts lay the foundation for an AW-IPM program by providing a platform for coordination. Historically, area-wide programs like this have been initiated through the combined effort of growers/PCAs, processors, UC Cooperative Extension (UCCE) and other stakeholders. Given that NOW attacks multiple crops, some form of cross-commodity organization will likely be needed.

Regional monitoring is a critical element of AW-IPM that requires the aggregation of pest trapping data across multiple farms. Depending on the program, these data can be self-supplied by growers or collected by UCCE and/or county/state personnel. There are different costs and logistics associated with each of these approaches, but recent advances in remote automated trapping may provide a low-cost alternative. For instance, a network of automated traps across multiple orchards could self-report to a database, thereby lowering program administrative costs while providing high-resolution regional data to monitor progress, or even identify "hot spots" for more targeted intervention.

The real substance of an AW-IPM program involves the selection and coordinated implementation of pest management activities across a region. To be successful, there must be some way to ensure that practices are implemented in a timely and effective manner. This "enforcement" element

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is typically associated with state-led quarantine and eradication programs, which usually include some form of fiscal assessment to support monitoring and enforcement costs. While not always desirable to all growers, this state-led mandatory model has the benefit of reducing free riders in the program.

In the absence of a state-led effort, some AW-IPM programs have relied on economic incentives (e.g., payments from buyers) or simply social contracts (e.g., groups of growers mutually agree on a strategy). For area-wide management of NOW, incentives from processors (i.e., bonus payments) may be a key tool to encourage participation, especially since reduced NOW infestation is of mutual benefit to them. At the same time, this approach doesn't always guarantee full participation and is subject to market fluctuations. Finally, in some cases, self-organized groups of growers have simply partnered with UCCE or other technical providers to develop and implement programs that primarily rely on self-enforcement. For these programs, the USDA Environmental Quality Incentives Program (EQIP) may provide some mechanism for financial assistance for certain IPM practices, such as mating disruption, through practice code 595 Pest Management Conservation Systems.

NOW is a highly mobile pest that attacks multiple high-value commodities, and mating disruption is a key non-chemical strategy for NOW control that works best over large contiguous acreages. Taken together, these elements provide a strong justification for development of an AW-IPM program for NOW. At this stage, the key is determining the best organizational form, scale and incentives to catalyze an effort like this. There are many ways to structure an AW-IPM program, and the best approach can likely be achieved by forming partnerships between industry, UCCE and county/state entities to develop, implement and measure the success of a program.

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# BUMPER CROPS PUSH WALNUT MARKET

QUALITY, MARKETING AND INNOVATION WILL BE NEEDED TO COUNTER RECORD WALNUT PRODUCTION AND INCREASED COMPETITION.

By **DAVID MAGAÑA** | Vice President and Senior Analyst, RaboResearch Food & Agribusiness, Rabobank

**G**LOBAL WALNUT PRODUCTION AND EXPORTS WILL SET records during 2020-21, impacting the export-reliant U.S. market. U.S. production is at record levels, but will likely remain in check due to a lack of price incentives. U.S. exports will likely continue to grow in the next five marketing seasons, but the challenge of boosting domestic demand will continue. Hence, it will be necessary to maintain high-quality product, research, innovation and marketing to enable the U.S. walnut industry to continue surmounting both international competition in the walnut market and increased competition in the tree nut space overall.

## Market Trends in a Nutshell

Global walnut production is estimated to set a new record of almost 2.3 million metric tons (inshell basis) during the 2020-21 marketing year. This production level represents a 7% increase year over year and roughly 5%

*Continued on Page 14*

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It will be necessary to maintain high-quality product, research, innovation and marketing for the U.S. walnut industry to surmount both international competition in the walnut market and increased competition in the tree nut space overall (photo courtesy Sacha Heath, UC Davis.)



The average U.S. walnut production estimate for the period 2021-22 to 2025-26 is around 1.45 billion pounds, roughly 11% higher than the observed production level during the 2019-20 marketing year (photo by Cecilia Parsons.)

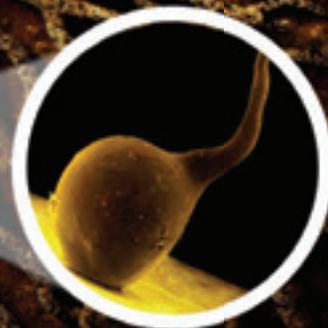


Healthy snacking trends for walnuts are expected to continue driving consumption (photo courtesy Diamond of California.)

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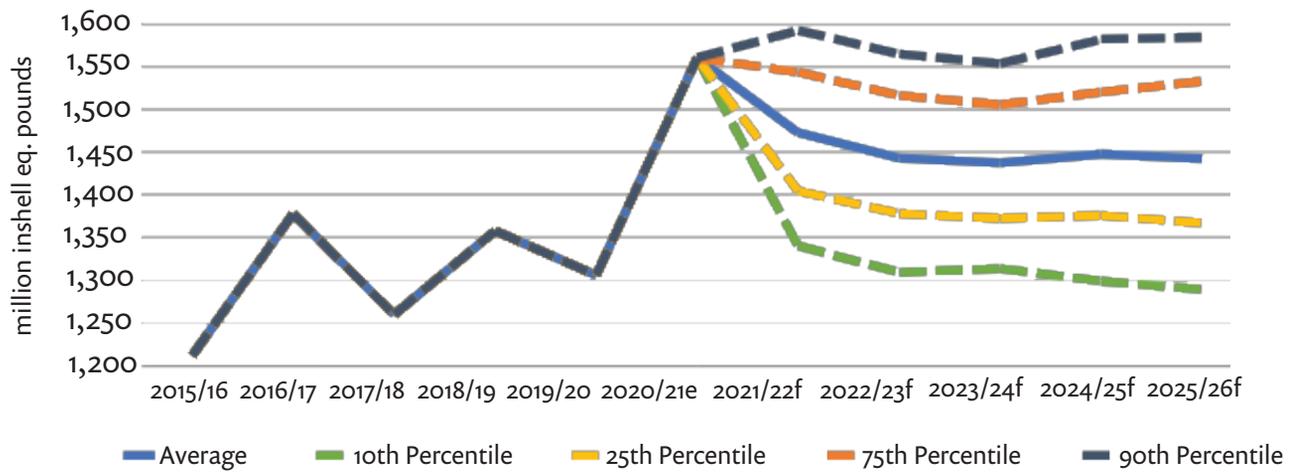
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<sup>1</sup> Profit increase based on 2017 almond price/lb. and average yield/bearing acres with 8.3% increase in yield versus untreated over three-year trial, per trial data of five locations with a single application of Velum One at 6.5 or 6.85 fl. oz./A.

<sup>2</sup> Velum One applied at 6.5 oz./A, spring 2017, via drip irrigation. Trees planted in January 2017. Increase in green canopy pixels based on an average of two rows of untreated trees compared to an average of two rows of Velum One-treated trees.

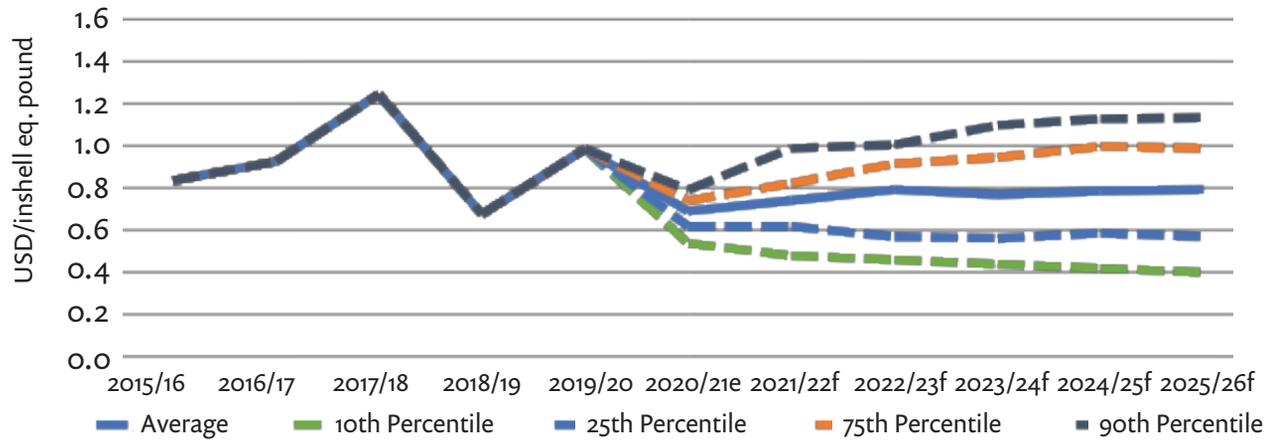
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Source: USDA, California Walnut Board and Commission, Rabobank estimates 2021

**Figure 1.** U.S. walnut production and production estimates, 2015-16 to 2025-26f



Source: USDA, California Walnut Board and Commission, Rabobank estimates 2021

**Figure 2.** Average U.S. walnut prices and price estimates, 2015/16 to 2025/26f

*Continued from Page 12*

growth compared to the previous production record in 2016-17. More than 80% of 2020-21 global walnut production will come from three countries: China, the U.S. and Chile, with shares of 45%, 31% and 7%, respectively. Production out of the U.S. and Chile is estimated to be up about 20% year over year, setting new records, while production in

China has recovered after a 15% drop in 2018-19.

Higher global production will build increased international competition in the export market. Global walnut exports are projected to grow about 14% year over year during 2020-21, with exports out of the U.S. expected to grow about 18% year over year and exports from Chile growing roughly 25% year over year. The U.S. and Chile were the largest walnut exporters during the last few years. However, the fast growth of exports from China, which is rapidly capturing market share, has been disruptive to the market and has surprised many industry participants. China is now competing for second place as a walnut-exporting country. International trade is critical for the U.S. walnut industry, as around 70% of U.S.

production has been exported in recent years. Imports have not played a relevant role in the U.S. market over the last few marketing seasons.

### Are More Bumper Crops Looming?

At Rabobank, we have developed a proprietary analytical tool to estimate U.S. production, U.S. shipments and U.S. average grower prices, taking into consideration relevant underlying variables. On the production side, our estimates are a function of bearing acreage and yields, which are functions of planted acreage and age of trees. Yield variability (weather risk) is captured by the probabilistic nature of the model.

Estimated bearing acreage in 2020-21 increased by 4.1%, the lowest growth rate in the last five seasons. According to official figures, since 2016-17, newly

planted acreage has been considerably lower compared to the levels observed during the decade before that. We expect that, on average, bearing acreage may grow at modest rates during the next five crop years. It is also likely that current low prices create enough incentive to even reduce bearing acreage, particularly of lower-value varieties, in some areas in years to come.

The 2020-21 U.S. walnut crop was, per the USDA objective measurement report, estimated at 1.56 billion pounds (780,000 short tons), a record crop up 19% year over year. The final crop number was slightly higher than that. Yields in 2020-21 were exceptionally high. For our production prospects, we use a yield probability distribution based on historical values. Our expected production levels show more average yields going forward. However, having average yields in every year is highly unlikely. Higher percentiles included in our production estimates show the likely ranges should higher yields be achieved. Hence, it is possible that we

will observe a new record crop in the next few years.

A range of walnut production estimates are provided for the period spanning from 2021-22 to 2025-26 marketing years (**Figure 1, see page 14**). Overall, estimates show that annual U.S. walnut production is likely to remain at higher levels than the 2019-20 crop size during the aforementioned period. On the other hand, the estimated probability of obtaining annual production higher than the current record crop during any specific year is about 10% (90th percentile).

Our average production estimate for 2021-22 is 1.47 billion pounds, roughly a 6% drop with respect to the record-setting crop in 2020-21. We calculate a 50% probability that production in 2021-22 will be between 1.4 billion pounds and 1.54 billion pounds. Our estimates show about a 90% probability that production will be roughly 1.34 billion pounds or higher (10th percentile) this coming season. The average U.S. walnut production estimate for the

period 2021-22 to 2025-26 is around 1.45 billion pounds, roughly 11% higher than the observed production level during the 2019-20 marketing year. Percentiles show likely walnut production outputs depending on yield and acreage dynamics.

### Downside Price Risk May Linger

While U.S. walnut shipments are keeping pace in the current season and we are projecting a growth in shipments in the longer run, the relevant question remains: at what price?

In our estimates, the E.U. remains the top destination for U.S. walnut exports over the next several years. Keep in mind that global demand growth is expected to continue, but lower prices are partially fueling this trend of growing shipments.

The expected average blended price to the grower for the 2021-22 to 2025-26 period is around USD 0.78 per inshell pound (**Figure 2, see page 14**).

*Continued on Page 16*



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Continued from Page 15

As an example of how to interpret these price estimates, for the 2022-23 marketing year, there is a probability of 50% that the average (blended) price will be between USD 0.57 and USD 0.91 per pound (25th and 75th percentiles). Also, the estimated probability of observing prices north of USD 1.00 is about 25% for the 2024-25 marketing year and forward. Given a combination of higher demand and/or lower production (i.e., yield shocks), prices would sit at the higher range of estimated percentiles. These are average annual price estimates, so prices for specific varieties, handlers and regions would differ.

### Is Walnut Demand Growing Fast Enough?

On a global level, walnuts have been the most widely consumed tree nut. However, during the last decade, the consumption growth of almonds and pistachios has outpaced that of walnuts, both globally and in the U.S.

The growing popularity of tree nuts is a positive factor for the category as a whole, but it has not necessarily resulted in increased walnut consumption in the same proportion as in competing tree nuts, as consumers seem willing to spend only so many dollars in the category. Particularly in the U.S. market, the per capita consumption for the main tree nuts shows differentiated trends over the last two decades. While per capita consumption of walnuts in the U.S. has grown about 30% in the last 20 years, the consumption of almonds has grown almost 200% and pistachios more than 150%.

### Research and Marketing Are Key

On the supply side, growers will continue to face increasing environmental and water regulations, which contribute to increasing production costs. Continued production of high-quality walnuts under more efficient production systems will remain imperative, and the industry has shown that it is possible to achieve that. Never-

theless, boosting demand in domestic and export markets for the growing U.S. output amid increased international competition is yet another formidable challenge.

Walnuts have a high protein content as well as an elevated level of healthy fatty acids. Although a versatile tree nut that can be used as for cooking, baking or snacking; many consumers consider walnuts to be primarily an ingredient. Industry reports show that the perception of walnuts in terms of convenience and value has improved over the last few years. According to a

**'Creating global and domestic strategic partnerships with manufacturers to include more walnuts in different foods and snacks will be increasingly relevant to ensure U.S. walnut marketers find a home for their product.'**

USDA report, consumers in some markets, "are increasingly purchasing walnuts all year round due to their perceived nutritional benefits. These healthy snacking trends are expected to continue driving consumption. The ongoing release of scientific studies and research highlighting cardiovascular benefits has made walnuts very popular among health-conscious consumers." Continuing research on health and identifying new and innovative ways to use walnuts seems imperative. Also, finding ways to increase consumer demand for walnuts as a healthy snack is an ongoing challenge for the industry.

Since the start of the COVID-19 pandemic, higher demand for walnuts at retail due to increased baking and cooking at home may have partially compensated for the loss in the food-service channel. A couple of trends may positively impact walnut demand going forward: 1.) continued remote working and home baking; and 2.) an increase in plant-based diets, which is likely a more permanent demand shift.

Creating global and domestic strategic partnerships with manufacturers to include more walnuts in different foods and snacks will be increasingly relevant to ensure U.S. walnut marketers find a home for their product. Consumer food companies and product manufacturers can take advantage of plant-based diet trends by promoting the healthfulness of walnuts and including (more) walnuts in their products. In the upstream value chain, the fact that walnut prices may remain close to the breakeven level for some growers could drive increased consolidation and vertical integration.

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# CALIFORNIA ALMONDS SET TO ENTER CARBON MARKET

New program aims to reward almond growers for new practices that reduce greenhouse gas emissions.

By MITCH LIES | Contributing Writer

**F**ROM ALL INDICATIONS, BY NEXT YEAR, some California almond growers will be getting paid for using cover crops, adding composts or conducting whole orchard recycling.

The development is part of an expansion of private carbon markets into almond production that is being advanced by Ecosystems Services Market Consortium (ESMC) and the Almond Board of California (ABC).

Debbie Reed, executive director of ESMC, said major U.S. food companies that use almonds in their food production have embraced the opportunity to reduce their carbon footprint through purchasing carbon credits from almond growers.

“In terms of interest as a specialty crop, this is probably the highest interest that we have seen to date,” Reed said.

“A lot of companies have figured out that climate change is a real risk to their business, and given that American politics has not been taking care of climate change very much, they are stepping in,” said Gabriele Ludwig, director of sustainability and environmental affairs for ABC. “Many have set voluntary goals, such as to reduce greenhouse gas emissions or water use for their company. And a lot of it is around showing their customers that they are trying, as more and more consumers want the products that they buy to not only be good for them, but also good for the planet and for society.”

To date, the food companies seeking to purchase carbon credits are operating under voluntary programs, Reed said. They are turning to agriculture in part because without doing so, it is difficult to meet internal goals for lowering their carbon footprint, given that a high percentage of the carbon footprint in food production comes from farming. This is where private ecosystem services markets

have a role to play.

ESMC currently has a dozen or so pilot projects in the U.S., the biggest of which in terms of acreage are concentrated in the commodity cropping systems in the Midwest. It has been working on developing the almond carbon market since last fall and is set to announce the start of an almond pilot project this spring.

“We are now at the point where we are ready to announce the pilot and start enrolling producers, many of whom will be brought in through the Almond Board,” Reed said. Major food companies that purchase almonds also are expected to contract directly with growers for using cover crops, composting or conducting whole orchard recycling.

Reed advised producers who wish to participate in the carbon market to work through the ABC.

“During the pilot phase, that is how we will operate. Once we get past that, and we are launching our full program in 2022, it will be more of an open process for growers in all of the production systems and regions that we are operating in,” Reed said.

“This is one of those true opportunities that agriculture as a sector can bring to the table. Through markets, we can pay farmers and ranchers for what society is demanding, and thus achieve it at scale,” Reed said.

## Market Standards

ESMC started its process to devise a carbon market for large scale food companies and producers who supply them in 2017.

“We started just assessing whether or not we could design a market for agriculture on scale,” Reed said. “Then we started designing our protocols in 2018 and formed as an organization formally in 2019.”

The nonprofit consortium works in



Whole orchard recycling, one potential practice advocated by the carbon market consortium, can help store additional carbon in the soil and improve tree growth through incorporating wood chips into the soil (photo courtesy Brent Holtz, UCCE.)

both agricultural cropping systems and grazing land systems with livestock.

“Our role is developing the protocols and quantification and verification systems and working with third-party certifiers to ensure that our protocols and our standards and credits meet market standards,” Reed said.

“We have been investing in both tools and technology and better ways to quantify and verify credits across all the systems,” she added. “We also are looking at how we can drop the cost of soil carbon sampling. That is an important part of why markets have not scaled in the past. Currently, and in the past, 75% of the cost in generating credits has gone to verification, largely because of the requirement that somebody go out to the field and confirm that a practice took place. Can we use time- and date-stamped photos? Can we use satellite imagery? Can we use other tools and sensors to track what is happening and imbed that into our tools so that verifiers can have access to it and not necessarily go out to the farm?”

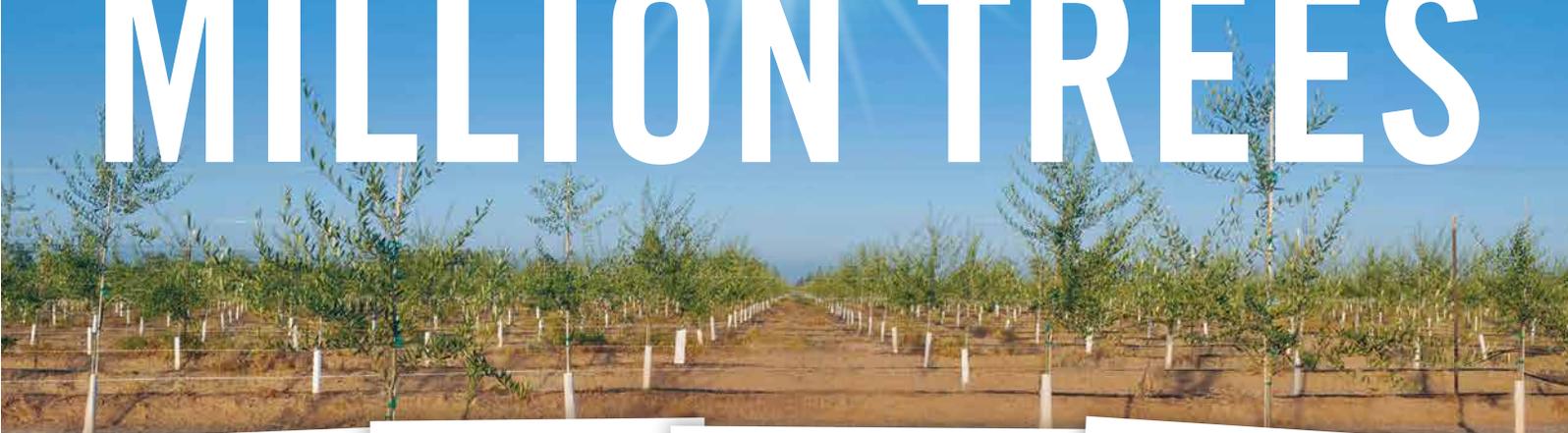
When thinking of carbon markets, many California growers think of the Air Resources Board’s (ARB) carbon offset markets that operate under the state’s Cap and Trade program. “They keep asking when they will get an opportunity to benefit from that program,” Ludwig said. “Unfortunately, as implemented, ARB’s carbon offset program does not work for agriculture because of unworkable provisions.”

According to the Global Warming Solutions Act of 2006, which set in motion California’s cap and trade program, carbon offsets need to meet five criteria: they need to be permanent, quantifiable,

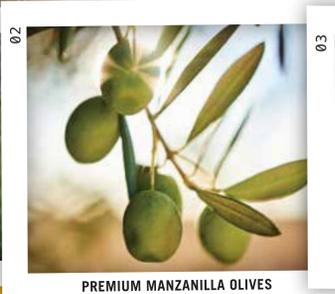
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# MILLION TREES



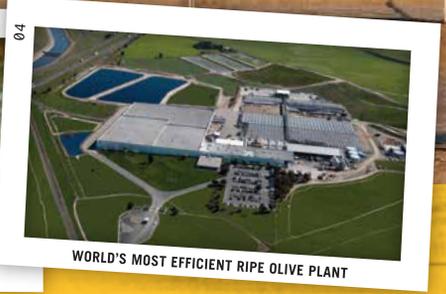
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By next year, California almond growers could be generating income for composting through participation in a private carbon market being advanced by Ecosystems Services Market Consortium and the Almond Board of California (photo by Vicky Boyd.)

*Continued from Page 18*

additional, enforceable and verifiable.

“ARB defines permanent as 100 years,” Ludwig said, “and there is nothing we do in ag on the sequestration side that is 100 years.”

Ludwig said the industry is considering approaching the ARB to consider additional time frames, taking into account newer science that has emerged since the definitions were put in place. “Anything we do right now to reduce greenhouse gas emissions is actually more valuable than what we do 50 or 100 years from now,” Ludwig said, “because it is right now that we need to lower the greenhouse gases. Even shorter-term reductions help to reduce the rate of climate change, and currently, the (California cap-and-trade) system does not allow that to be valued.”

In the meantime, privately run carbon markets, which are focused on voluntary rather than mandatory reductions, can operate under more reasonable standards of mitigating climate change, Ludwig said, and companies are embracing the opportunity to participate.



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## Desired Outcomes

While many incentive programs are based on paying for certain practices, companies would like to ensure that they are paying for a desired outcome, such as more carbon stored in the soil, Reed said. To that end, ESMC’s research arm has investigated new ways to measure the carbon sequestration benefits of certain farming practices. Companies like General Mills are using those new tools and measurements to determine how much growers change their carbon footprint when adopting practices such as using cover crops and composting or conducting whole orchard recycling. Prices, which are typically made on a per-ton basis, currently are running between \$3/ton and \$20/ton, with \$20/ton being the industry standard, Reed said.

Whether on a strictly economic basis it is worth \$20/ton for an almond grower to adopt whole orchard recycling or use cover crops or composting is a question Reed said she couldn’t answer. But any equation should also include the agronomic benefits gained from the practices, she said.

“I think there is so much to learn in these systems that the better the data we collect and the better we are able to track what is happening over time, we will have a much better handle on the economics of all of this so that we can truly value the credits,” she said.

To date, practices that will be eligible for compensation include only practices that are “additional” to existing practices. In other words, if a grower already employs cover crops in his or her system, and has done so for more than three years, he or she won’t be eligible for the credits. Reed noted the ESMC is hoping to alter that policy to some degree.

“One of the things we are advocating for is if cover crops are not a business-as-usual practice in a given geography, then it should count as ‘additional’ because you don’t want to penalize the early adopters that we all learned from,” Reed said. “We are working with the standard-setting bodies and the certifiers to say if there is only a 1% or 3% penetration rate of a certain practice in a given region, don’t we want to try to encourage 50% or 75% adoption, and don’t we want to use the markets to do that?”

Ludwig said she has been asked for years about almond growers getting credits for growing trees, which sequester carbon while growing. Here, she said, the stumbling block is the need for the practices to be “additional,” something above what the grower would normally be doing.

“It comes back to, ‘Well, you are growing trees anyway for your own benefit, so why should society or a company pay you for that?’” Ludwig said.

In the meantime, almond growers will soon have what could be characterized as their first real opportunity to participate in a carbon market. It is an opportunity Reed hopes almond growers embrace.

“All the world’s scientists agree that every sector has to do something to mitigate climate change,” Reed said. “The agriculture sector has great opportunities to actually draw down atmospheric carbon and increase soil carbon. This is one of those true opportunities that agriculture as a sector can bring to the table.”

*Comments about this article? We want to hear from you. Feel free to email us at [article@jcsmarketinginc.com](mailto:article@jcsmarketinginc.com)*

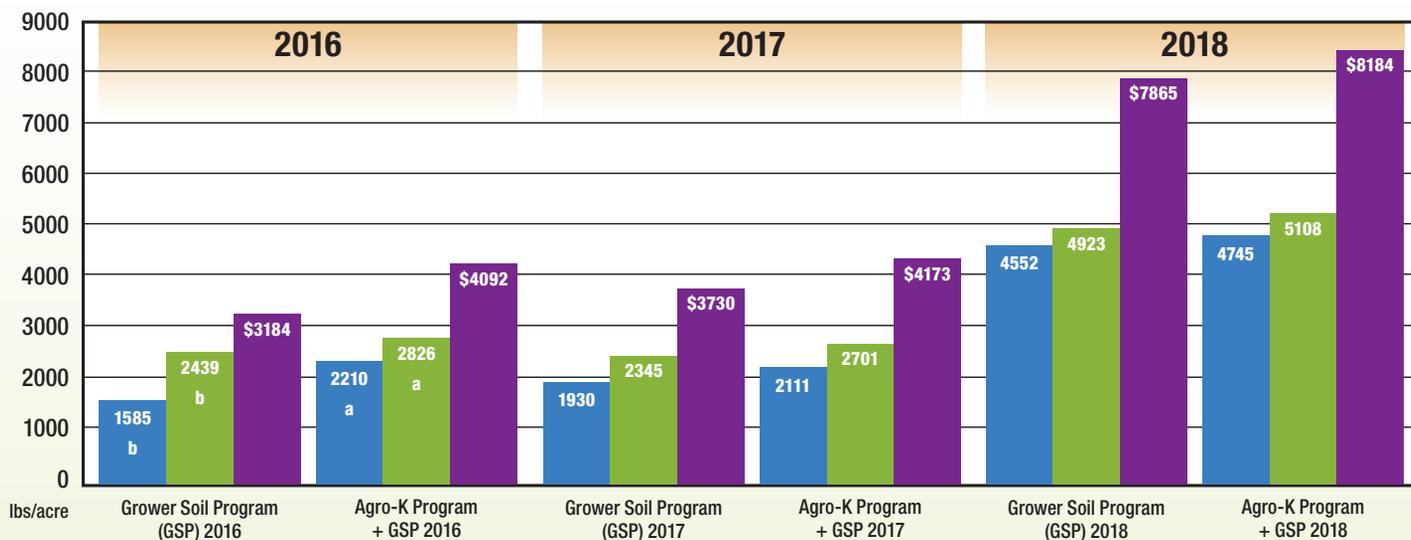


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# Passing the Baton to Golden Hills

Benefits Become Apparent as Variety Now Accounts for Nearly All New Pistachio Plantings

By **CECILIA PARSONS** | Associate Editor

Growers are finding Golden Hills pistachio crops mature 10 days to two weeks before Kerman (photos by C. Parsons.)

**W**HEN THE UC PISTACHIO BREEDING PROGRAM RELEASED the new Golden Hills variety in 2005, it was thought by industry leaders that adoption of this new variety would be slow. The Kerman variety was well established and had been the dominant pistachio variety grown in California since the 1970s.

Today, Golden Hills and Lost Hills, a sister variety of Golden Hills, comprise almost a quarter of the state's 409,000 acres of pistachio orchards. Since 2012, nearly all new pistachio orchards have been planted with Golden Hills or Lost Hills. An early male pollinator, Randy, also released in 2005, is reported to provide adequate pollination for Golden Hills. Randy flowers 10 to 15 days before Peters, which is a

main pollinator variety for Kerman.

Why the shift to Golden Hills and how, as more orchards are in full production, are the trees meeting grower horticultural and production expectations?

## Grower Expectations

Yes, the trees are meeting grower expectations, said Zack Raven, who has planted Golden Hills and manages pistachio orchards for Kettleman City-based Keenan Farms, one of the state's largest grower/processors of pistachio. The shift to this variety has come primarily to widen the pistachio harvest window, but growers are finding there are additional reasons to plant Golden Hills.



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Raven said the physical attributes of Golden Hills trees include less need for training and pruning.

“It’s more shakable,” Raven said of Golden Hills’ tree shape.

The trees grow in a more upright manner, he said, and need less training to achieve the proper shape. Maintenance pruning is not needed by Golden Hills trees as much as for Kerman trees, which saves on labor costs. Depending on the rootstock used, the trees adapt well to a range of growing conditions.

The trees also come into production earlier than Kerman, Raven said. Kerman has decent production in year seven to eight, but Golden Hills trees will reach that level in year five to six.

“Unless your neighbor has all Kerman and you want to harvest at the same time, then stick with that variety. But if you are developing a large block, go with Golden Hills, you will get more for your money,” Raven said.

### Test Plot Performance

Golden Hills and Lost Hills pistachio varieties were chosen for release based on performance characteristics in a test plot budded in 1997 on the west side of the San Joaquin Valley in Kern County. A second test plot budded in 1999 in Madera County showed acceptable performance as did two additional Kern County plots budded in 2002.

In 2007, after six years of yield and nut quality evaluation on rootstock, the UC pistachio breeding program proclaimed that the Golden Hills variety appears to have excellent commercial potential, including less of a tendency to alternate bear.

The UC pistachio breeding program notes that Kerman, with its 60-year track record in California, does have strong points. Growers and processors have experience with Kerman and recognize its strong points, including good hull strength and clean, unstained shells.

Jeff Gibbons, general manager at Setton Farms in Terra Bella, said the big advantage on the hulling and processing side is Golden Hills’ early harvest. As more orchards mature and enter full production, the variety is reliably ready for harvest two weeks

before Kerman.

Extending the season makes for a more economical harvest, Gibbons said, as harvest equipment, trucks and processing plants will be in use for a longer period.

Harvest readiness is also easier to predict for Golden Hills since it matures in the heat of August. Since most of the nuts split relatively early in the season, maturity progresses quickly and evenly.

Add in a low percentage of closed nuts and blanks in the harvested crop compared to Kerman and Golden Hills is an attractive choice for growers. Harvest data shows a 7% closed nut average compared to 15% for Kerman.

The earlier harvest timing does commence during hot summer temperatures, and that can have an effect

*Continued on Page 24*

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Golden Hills pistachio orchard in Tulare County. This variety has a more upright growth pattern than Kerman, improving harvest efficiency.

**IF YOU ARE DEVELOPING A LARGE BLOCK, GO WITH GOLDEN HILLS, YOU WILL GET MORE FOR YOUR MONEY.**

— ZACK RAVEN, KEENAN FARMS

*Continued from Page 23*

on crop quality if the tree cannot be shaken when ready. Hot weather when Golden Hills matures will break down the hull faster, Gibbons said. The hull breakdown can cause shell stain which lowers the value. Gibbons said shell staining could also occur if the nuts sit too long in the trailer. That can be prevented, Gibbons stressed, with a coordinated harvest. Kerman harvest timing is less critical as it matures when temperatures are relatively cooler.

### NOW Damage

An earlier pistachio harvest can also help avoid navel orangeworm damage to the nuts. Populations of this pest can build in an orchard over the growing season and the longer the nuts are on the tree, the more vulnerable they are to NOW feeding. When Golden Hills was released, the UC breeding program reported that the early maturity may help the crop escape the third NOW flight entirely, meaning less damage or need for an additional spray application.

Bob Klein, executive director of the California Pistachio Research Board, pointed out another Golden Hills trait that has economic importance given climate change models.

Klein said complete data is not yet available, but Golden Hills does appear to have lower chill requirements than Kerman. UCCE farm advisors in research presentations have cited models that predict warmer and dryer winters in the future. Kerman, during winters with low chill, has exhibited longer and more erratic bloom periods after breaking dormancy. Longer and uneven bloom periods result in uneven nut maturity at harvest. Given the long life span of pistachio trees, there may be an economic incentive to plant trees that can produce a profitable yield in warmer conditions.

Raven said the advantages of Golden Hills pistachio trees are being realized by growers.

“No one is sorry they planted them and they plan to plant more of them,” he said.

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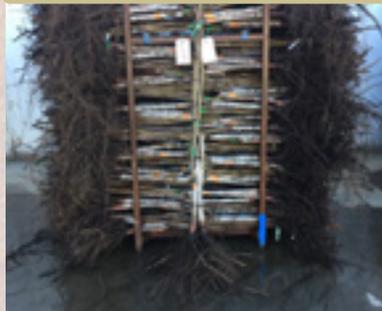
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# Getting Off the Ground

Dust reduction research continues on almond shake-and-catch harvesting coupled with different drying systems.

By VICKY BOYD | Contributing Writer

**A**LMOND BOARD OF CALIFORNIA (ABC) AND COLLABORATING researchers are taking a two-pronged approach to dust reduction that involves harvesting and complementary crop drying methods. As part of the effort, they're taking a closer look at eliminating blowing and sweeping and possible alternatives for in-orchard drying and nut pick-up. Altogether, these steps account for about 90% of harvest dust, according to the San Joaquin Valley Air Pollution Control District.

Just by following best management practices, California almond growers over the past several years have reduced the amount of harvest-related PM10 dust particles to 31 pounds per acre from about 40 pounds per acre, according to Texas A&M University research. PM10 particulates—10 micrometers or smaller in size—are about one-seventh the diameter of a human hair and are easily inhaled. PM10 particles are regulated as an air pollutant by the US EPA.

ABC wants to further decrease dust emissions and has set a lofty goal, announced in 2018, of reducing harvest-related dust by 50% by 2025.

The first part of the equation involves substituting a shake-and-catch harvester for the traditional sweeper. The second portion focuses on evaluating different drying techniques.

## Getting Off the Ground

While two-piece side-by-side off-ground harvesters used by the prune and pistachio industries may come to mind, other companies have one-piece over-the-row types similar

to those used in high-density olives or blueberries. Even as far back as the 1970s, one company had a wrap-around shake-and-catch harvester.

The designs may be divergently different, but the goals are the same – eliminate blowing and sweeping nuts into windrows on the orchard floor and, in some cases, get rid of nut pick-up altogether.

Erick Nielsen Enterprises Inc. of Orland, California, has been designing and building orchard equipment for nearly 50 years. Among their products are side-by-side shake-and-catch harvesters for prunes and pistachios. In addition, the Niensens farm almonds and use their shake-and-catch harvesters in their orchards, said Hilary Porter, a company owner.

About eight years ago, the family-owned company began offering custom off-ground harvesting. Customers, for example, may have rocky or uneven middles where nuts could be lost or they may have a dense tree canopy that would shade the orchard floor and slow drying.

“Sometimes the growers just want to save passes, but we're still windrowing in the field on the ground,” Porter said. “We've also done them where we've completely taken the nuts out of the field and windrowed them at a different site.”

Franz Niederholzer, a UCCE orchard systems farm advisor in Colusa, Sutter and Yuba counties, has had the Niensens custom harvest an experimental block of organic almonds at the Nickels Soil Lab near Arbuckle since 2016.

He had installed a new buried drip irrigation system along the edges of the middles, creating an uneven surface. Niederholzer also shanks in nutrients, further disturbing the surface.

“The floor's not that pristine,” he said. “The catch-frame system might be a great way to move your operation away from the need to have the orchard floor so smooth for harvest.”

At Nickels, the Niensens use a modified bin-style prune harvester that catches the almonds as they are shaken and lays them in neat windrows down the middles. To make sure drying is as fast as possible, the Nickels crew conditions the windrow soon after shaking so all leaves are removed and the windrow is clean and wide to facilitate drying. Then the windrows dry as they would during conventional harvesting.

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University of California researchers, along with colleagues in Australia, are examining optimum ways to dry nuts in a stockpile (photo by I.R. Donis-González.)



A catch-frame machine harvests almonds from a mature orchard (photo by F. Niederholzer.)



A two-piece shake-and-catch machine harvests almonds, conveying them into a bin (photo by ENE Inc.)

With the nuts immediately windrowed, the orchard is irrigated within two to three days of shaking.

For at least one other customer, Porter said they shake and catch the almonds, then transport the crop to a nearby cement yard where it is windrowed. Because of the orchard's dense canopy, the nuts would be slow to dry if left on the ground.

At Nickels, the catch-frame harvesters did occasionally knock low-lying branches as they moved from tree to tree, and a small number of nuts on long branches were not caught and ended up as windfalls, Niederholzer said. Neither was a significant issue.

If the experimental block were developed again with shake-and-catch harvesters in mind, Niederholzer said the trees would be trained to be slightly more upright or select varieties with those characteristics.

Porter agreed, saying a higher tree crotch and higher scaffolding would allow the catch-frame harvesters to move more safely down the rows.

In addition, research by Ted De Jong, UC Davis pomologist emeritus, found a strong need for studies into size-controlling rootstocks. Along those lines, Porter pointed out how the pistachio industry has successfully developed cultural practices and canopy management, such as mechanical hedging and skirting, to produce trees adapted to off-ground harvesting.

### Different Drying Options

As part of multi-disciplinary efforts, Irwin R. Donis-González, a Cooperative Extension specialist in post-harvest engineering at UC Davis, is working on stockpile drying techniques with counterparts in Australia. As a result, they're able to obtain two sets of harvest data per year.

Zongli Pan, a UC Davis professor of biological and agricultural engineering, is conducting complementary research into alternative drying techniques in fixed structures, such as stadium and trailer dryers. As part of his work, he is examining temperature, drying rates, moisture at harvest, varietal differences and costs.

They recently presented research updates virtually.

The first harvest scenario involves harvesting almonds using a shake-and-catch harvester and simply depositing the nuts in a windrow to dry on the orchard floor.

The second scenario uses a shake-and-catch harvester, then ferries the nuts to a nearby drying yard. An initial trial involved creating a stockpile of nuts over an A-frame with air channels to take advantage of prevailing air flow. But the researchers found the system didn't offer enough natural air circulation.

They also looked at different sets of stockpile drying systems to determine optimum air flow rates, air temperature and drying time.

During a 2020 trial in Australia with 20 tons of nuts, they

*Continued on Page 28*

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found that a three-horsepower fan did not provide enough air movement to dry nuts harvested at 14% moisture.

“Ambient air, especially with wet fruit at 14% moisture, wasn’t able to efficiently and effectively remove the moisture from the stockpiles, and we observed problems with mold,” said Irwin R. Donis-González.

Another experiment used a two-horsepower fan coupled with a propane heater that raised air temperatures to 122 degrees F. An air distributor inside the stockpile A-frame had 12 air outlets from which the forced air moved.

Using this system, 5.2 tons of Non-pareil harvested at 12% moisture took six days and five hours to dry. A 2.8-ton stockpile of Winters at 12% moisture took six days, and 7.6 tons of Monterey at 21% moisture took seven days.

“We used the air distributor to force a combination of ambient and heated air to remove the nut moisture, and we reduced drying by about 50% compared to not using an air distributor,” Donis-González said. “But we still are averaging a five- to seven-day window regardless of stockpile size. The next step is to consider expanding the size of the fans so we can force enough volume of air through the stockpiles.”

The researchers will also be switching to covered stockpiles with central exits to try to manage uncontrolled drying fronts.

The third scenario involved the same off-ground harvesting method but instead transported the nuts to a commercial dryer.



The Niensens use a shake-and-catch harvester on a three-leaf almond orchard (photo by ENE Inc.)

### Earlier Harvest

The latter two harvest methods allow growers to shake trees two to three weeks earlier than traditional timing. This could potentially reduce late-season pest issues, including navel orange-worm damage and associated insecticide treatments, said Patrick Brown, a UC Davis plant sciences professor.

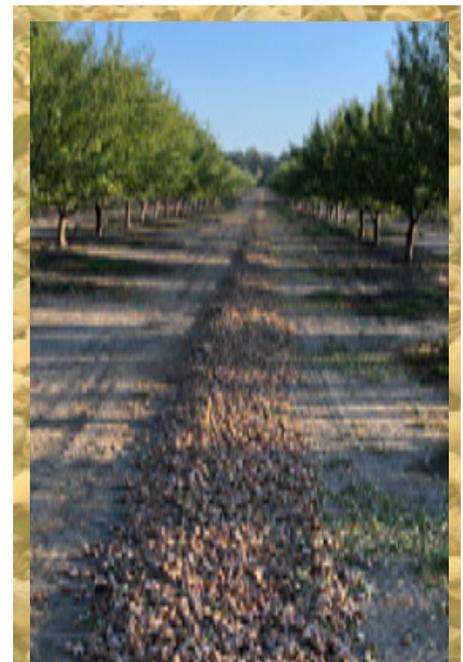
Yet trials conducted by Brown found that shaking two to four weeks earlier than conventional harvest timing did not compromise kernel quality or size.

“You can shake three weeks prior, and you’re not losing any statistically significant yield,” he said. “This isn’t surprising. You can go back 45 years to 1986, and they showed once you reach that B3 stage, you’ve reached the full kernel size.”

That said, kernel moisture tends to be 10% to 15% higher with a two-week earlier shake.

One of the biggest benefits Brown sees is the latter two harvest scenarios create opportunities for alternative orchard floor management, such as with cover crops or recycling almond hulls and shells.

Regardless of the harvest and drying scenario,



A modified shake-and-catch harvester lays down a neat windrow without the need for a blower and sweeper (photo by ENE Inc.)

a transition to any new system won’t happen overnight, but Porter said she remains optimistic that the industry will answer the challenge.

“There are just a lot of things being done. I think farmers are creative by nature,” she said.

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# OREGON HAZELNUT VARIETIES IN A NUTSHELL

## NEARLY A DOZEN NEW VARIETIES HAVE BEEN MADE AVAILABLE IN THE LAST DECADE



By **HAZELNUT MARKETING BOARD** | *Contributing Writer*

**T**O THE UNTRAINED EYE, A HAZELNUT tree is a hazelnut tree; one orchard may look like thousands of its neighbors with the only difference being age. However, with nearly a dozen new varieties released in the last decade, hazelnut growers have an unprecedented number of viable options to consider as they expand or replant orchards.

The genesis of these new cultivars in Oregon traces back to the obscure pollinizer cultivar Gasaway, which was discovered to possess resistance to the fungal disease eastern filbert blight (EFB) back in the late 1960s. It has been used in controlled crosses since then in the hazelnut breeding program at Oregon State University. Since 2002, 15 new cultivars with resistance to EFB from Gasaway have been released, including seven main crop varieties and eight pollinizer selections.

### EFB Resistant Varieties

#### *Jefferson*

The catalyst for the current boom in Oregon hazelnut plantings, Jefferson was the first variety widely released to growers in the Willamette Valley. Jefferson trees remain the most popular new variety and are lauded for their ease of maintenance. The trees tend to grow in the desired “champagne glass” style with branches growing skyward rather than spreading out.

Jefferson trees tend to be a later-harvesting variety with high yields. Jefferson trees produce some of the largest nuts and kernels, and they are a

popular inshell variety.

#### *Yamhill*

Yamhill trees are some of the smallest statured yet highest yielding of the new varieties. They produce a small nut that is well-suited to industrial kernel uses, such as hazelnut paste. Yamhill trees are hearty and adaptable to nearly every growing condition. They are notorious for their shorter stature and tendency for branches to spread out and stay low to the ground rather than grow upward, meaning Yamhill trees require more pruning than Jefferson.

Yamhill trees are commonly processed as a kernel variety. Growers willing to put in the effort on maintenance can be handsomely rewarded with heavy harvests.

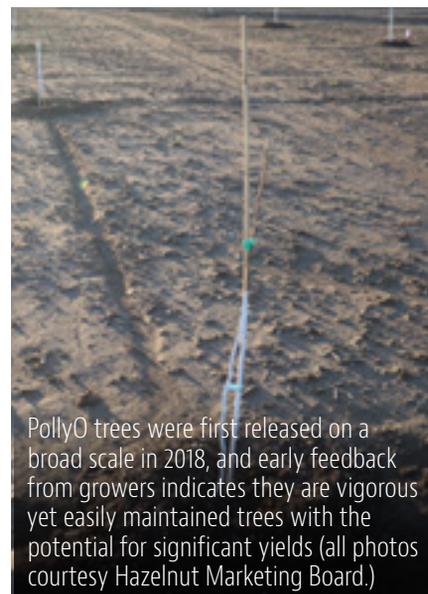
#### *Wepster*

Wepster trees are named for the Wepster family, longtime growers who have been very dedicated to helping the Oregon hazelnut community. Wepster trees are at the top of the list for vigor, kernel fiber and kernel percentage. These traits make them desirable in the expanding kernel marketplace; Wepster kernels are coveted for candy and confections.

Wepster trees are some of the first to harvest and relatively easy to manage with upright growth habits.

#### *Dorris*

Not yet as popular as some of their peers, Dorris trees exhibit some of the



PollyO trees were first released on a broad scale in 2018, and early feedback from growers indicates they are vigorous yet easily maintained trees with the potential for significant yields (all photos courtesy Hazelnut Marketing Board.)



McDonald is a recently released hazelnut variety with a higher kernel percentage.

Pollinizer	Compatible Varieties
<b>Eta</b>	Jefferson
<b>Felix</b>	Dorris, McDonald, PollyO, Wepster, Yamhill
<b>Gamma</b>	Dorris, Barcelona, McDonald, PollyO, Wepster, Yamhill
<b>Theta</b>	Jefferson
<b>York</b>	Dorris, McDonald, PollyO, Wepster

\*McDonald, PollyO, Wepster and Yamhill are all compatible with each other and can be planted together in an orchard with York as the third pollinizer



Barcelona is the industry standard hazelnut variety.



Casina, one of many older varieties susceptible to EFB, is still grown in small quantities.

best features of all varieties. Where Dorris shines most is in the blanching of kernels; Dorris kernels blanch better, on average, than any other Oregon variety. Blanching, or the removal of the hazelnut skin during roasting, is a highly desirable trait in foodservice, confectionery and consumer markets.

This variety is named for the Dorris family and Dorris Ranch, the first commercial hazelnut farm in Oregon.

*McDonald*

One of the most recent releases to Oregon growers, McDonald trees are another variety named after a dedicated hazelnut family. They have already been planted in large numbers and are fast becoming a favorite of farmers.

Another kernel variety, McDonald produces very well and has the highest kernel percentage of the Oregon cultivars. McDonald trees are relatively easy to manage and prune. They are also very early to drop and harvest.

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*Continued on Page 32*

## Oregon Hazelnut Varieties

Variety	Vigor (%)	Harvest Date <sup>2</sup>	Nut Weight <sup>3</sup> (Grams)	Kernel % <sup>3</sup>	Blanching <sup>4</sup>	Gasaway
Barcelona <sup>1</sup>	100	October 10-21	3.3-3.8	39-43	4-5	No
Clark	60-70	0 to +3	3.1-4.6	43-46	6-7	No
Ennis	70	-7 to -10	2.5-2.8	48-51	2.6-3.5	No
Lewis	75	-5 to -7	2.7-2.9	46-48	4-5	No
Sacajawea	85	-7 to -10	2.8	48-50	2.5-3.5	No
Dorris	60	-3 to +3	3.4	43	2.4-2.9	Yes
Jefferson	70	-3 to +3	3.7	45	4-5	Yes
McDonald	70-80	-10 to -14	2.5	51	3.5	Yes
PollyO	90	-10 to -14	2.8	47	3.6	Yes
Wepster	80-110	-7 to -10	2.4	46	3	Yes
Yamhill	60-70	-7 to -10	2.3	49	4.5-5	Yes

1. Barcelona is used as the standard for comparison of all other varieties
2. Harvest Date is expressed in days before or after average Barcelona harvest time. For example, Yamhill trees would expect harvest a week to ten days before Barcelona.
3. Nut weight refers to the whole nut; kernel percent refers to the percentage of the whole nut that is shelled kernel
4. Blanching is recorded on a 1-7 scale. 1 means very good blanching, 7 is poor blanching



*Continued from Page 31*

### PollyO

The newest variety made available in the Willamette Valley, PollyO trees are named in honor of Polly Owen, the former director of the Hazelnut Industry Office who retired in 2021 after 25 years of service to the Oregon hazelnut industry. PollyO trees were first released on a broad scale in 2018, and harvest data is minimal at this stage. However, early feedback from growers indicates they are vigorous yet easily maintained trees with the potential for significant yields.

They were bred specifically to be a kernel variety that is popular with confectionaries, candy makers and food manufacturers seeking value-added products.

### Pollinizer Varieties

Hazelnuts are not self-pollinating, which means orchards need several varieties of trees to produce nuts each year. While the following trees do produce a small amount of nuts, they are planted specifically as pollinizers.

#### Eta

Eta sheds pollen very late in the season and is a recommended pollinizer for Jefferson.

#### Felix

Felix is a general purpose late mid-season pollinizer that is compatible with most other cultivars.

### Gamma

Gamma was released as a pollinizer for Barcelona but is a suitable early mid-season pollinizer for other cultivars, too.

### Theta

Theta sheds pollen very late in the flowering season and is specifically well-suited for Jefferson, which has a very late female flower bloom period.

### York

York is a mid-season pollinizer recommended for Dorris, McDonald, Wepster and PollyO. It is compatible with Jefferson and Yamhill, too, but is not ideal for either of those because of the time of pollen shed.

At least three different pollinizer varieties should be planted in each orchard.

### Non-Resistant Varieties

#### Barcelona

The standard for the industry that all other varieties are measured against, Barcelona trees once dominated the U.S. hazelnut landscape. However, like every other variety that predates the discovery of the Gasaway gene, Barcelona trees are susceptible to EFB, and their prominence has waned in years as blighted trees have been removed.

Even so, Barcelona trees are still estimated to be the most common hazelnut variety in Oregon. They harvest in early-to-mid October and feature an upright growth habit. They produce some of the largest nuts, making them the benchmark for the inshell market.

### Ennis

Second in popularity to Barcelona amongst classic varieties, Ennis is one of the few varieties that can match, if not exceed, Barcelona in size. The trees are robust and high-yielding, and they produce a distinct, oblong-shaped nut.

Perhaps more than any other popular variety, Ennis trees were obliterated by EFB and their acreage has plummeted in recent years; nonetheless, growers with remaining healthy trees report strong yields.

### Lewis, Clark and Sacajawea

These three varieties were bred at Oregon State University. All three varieties are somewhat resistant to EFB, with Sacajawea showing the most success in fending off the disease.

All three tend to produce smaller nuts yet are high yielding with tremendous quality. All three are harvested relatively early in the season.

### Past Varieties

Many other hazelnuts varieties have come and gone from the Willamette Valley; most faded away due to their inability to handle EFB. Casina is still grown in small quantities, while others like Butler, Daviana, DuChilly, Gem, Hall's Giant, J-5, Negret, Tonda di Giffoni, Tonda Romana and TGDL may only have a handful of trees still standing in the entire country.

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# IN SEARCH OF ALTERNATIVES TO AG BURNING IN THE CENTRAL VALLEY

## COMPANIES INVEST IN NON-BURNING ALTERNATIVES FOR NUT ORCHARD WASTE AS PHASE-OUT BEGINS

By **CECILIA PARSONS** | *Associate Editor*

New investment is underway in plants to convert shells into renewable fuels.

**C**ALIFORNIA AGRICULTURE PRODUCES MILLIONS OF TONS OF woody waste each year, most notably from orchard removals or pruning operations. With the recent decision by the California Air Resources Board to phase out open-field burning in the San Joaquin Valley, growers need to know if there will be economical options for woody waste disposal in the future.

Roger Isom, president of Western Agriculture Processors Association, said flexibility and viable alternatives to agricultural burning are critical, particularly for smaller growers. The co-generation option for wood waste disposal has all but disappeared. While whole orchard recycling is a promising alternative, it may be cost-prohibitive for most small growers. The 2019 Almond Conference included presentations on using woody biomass, a feedstock for renewable fuel and biochemical production, but those projects have yet to come online.

### Gradual Phase-Out

The San Joaquin Valley Air Pollution Control District will be working on specific agricultural burning regulations and limits. Almond Board of California's Jesse Roman, principal analyst in environmental and regulatory affairs, said there would be a period of negotiation with CARB and the District to line out a clear path for growers.

Currently, growers with 3,500 acres of trees or less may still apply for a permit to burn prunings. Almond Board said that the number of growers who will receive a permit will be gradually reduced until 2023 when only operations of less than 50 acres will be allowed to burn orchard removals. The number of permits and acres will continue to be reduced even beyond that.

Elaine Trevino, president of Almond Alliance, said in an Almond Board report that while the almond industry has made significant progress in whole orchard recycling programs, that is not a solution for all growers. The current exemptions protect the economic viability of small growers.

Roseman said the valley air district remains under a CARB mandate to reduce agricultural burning between now and 2025. Inaction by the almond industry is not an option, he added. The valley air district must show progress in



Under the new CARB phase-out, growers with 3,500 acres of trees or less may still apply for a permit to burn prunings and brush piles. The Almond Board said that the number of growers who will receive a permit will be gradually reduced until 2023 (photo courtesy Almond Board of California.)

annual reports or growers could face an immediate ban on burning, Roseman said.

According to the Almond Board, CARB has pledged action over the next six months to support the valley air district's efforts in phasing out burning.

The board plans to hold a summit on non-burning alternatives and develop outreach materials and programs with UCCE to identify alternatives to orchard and vineyard removals. The summit would address how to get the biomass facilities permitted and built, and how to overcome regulatory hurdles. Energy market policies and incentives and infrastructure would also be discussed. The summit would also pursue a Clean Biomass/Bioenergy Collaborative across state agencies along with incentive funding for growers from state and federal sources and encourage the use of woody biomass in low carbon uses.

The SJVAPCD has launched Alternative to Agricultural Open Burning Incentive Pilot Program and is accepting applications. The program provides incentives to chip or shred orchard removals for use in soil application.

## Current Efforts

The challenge of disposing woody biomass, given the growth of the tree nut industry in recent years, makes viable alternatives a life or death matter, said renewable energy consultant Jim Stewart. Stewart is assisting West Coast Waste in its renewable energy projects and is a former chairman of the Bioenergy Producers Association.

There are a number of gasification or pyrolysis-related projects in active development or construction in the Central Valley that could consume 1.2 million tons annually of agricultural residues as feedstock for the production of low carbon biofuels or renewable power. Gasification or “high temperature non combustion technology” will be the primary use of ag waste feedstock. These technologies, Stewart said, offer the single most available solution for growers while contributing to improved air quality throughout the Central Valley.

Aemetis in Stanislaus County is nearing construction readiness for a

‘Carbon Zero’ renewable jet fuel and diesel plant. The plant has a planned capacity of 23 million gallons a year from 287,500 tons of ag waste. This plant is receiving funding from the California Energy Commission, the USDA, US Forest Service, CDFA and the PG&E Energy Efficiency Program.

Enerkem and West Coast Waste in Madera County would convert 220,000 tons of almond orchard removal materials to 45 million gallons of low carbon intensity cellulosic ethanol. This project is in the CEQA process pending completion of engineering and closing of financing for a similar project in Canada. The Enerkem project will have two gasification production lines. The cost of this project is \$500 million.

San Joaquin Renewables LLC is a company majority owned by Frontline Bioenergy. This plant is in the advanced planning stages for construction of a facility in McFarland in Kern County. This plant would convert 231,000 tons of orchard wood, almond and pistachio shells into renewable natural gas

annually. This facility will use a proprietary gasification process that uses steam generated from process heat and oxygen produced in an air separation unit to convert biomass feedstock into renewable natural gas, biochar and ash. The EPA has determined that the facility will achieve a 96% lifecycle greenhouse gas reduction when compared to the 2005 diesel baseline emissions and will qualify for California’s Low Carbon Fuel Standard.

Chevron Corporation, Schlumberger New Energy, Microsoft and Clean Energy Systems have announced plans to develop a bioenergy with carbon captures and sequestrations project designed to produce carbon negative power in Mendota in Fresno County.

The plant will convert approximately 200,000 tons of orchard removals, primarily almond trees, into a renewable synthesis gas that will be mixed with oxygen in a combustor to generate

*Continued on Page 36*

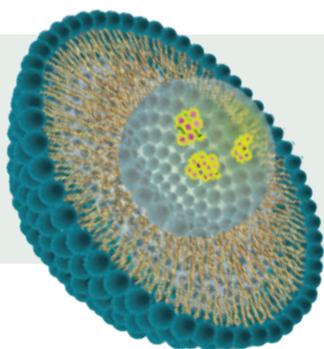
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electricity. More than 99% of the carbon from the process is expected to be captured for permanent storage by injecting carbon dioxide underground into nearby deep geologic formations.

West Coast Waste in Fresno County was originally established to provide orchard removal services and transport to waste combustion power plants. With the closing of those plants, WCW began development of both anaerobic digestion and gasification facilities at their Fresno headquarters site. These projects are in advanced stages of permitting and construction is expected to begin this year. The biomass plant will convert 79,200 tons of orchard waste annually into renewable electricity via a process that creates steam to run a turbine generator. The anaerobic digestion facility will principally process green waste from Fresno.

Aries Clean Technologies will provide the downdraft gasifiers to convert agricultural waste into energy and biochar at a facility to be built in Lost Hills in Kern County. The downdraft units will be capable of processing 165 tons of biomass daily to generate 86 megawatts of electricity, 72 megawatts of which will be sold into the grid. The system will also produce 5,000 tons of biochar annually for use as a soil amendment.

Yosemite Clean Energy in Kings County is developing three projects to convert wood waste into a synthetic gas



from which power, renewable hydrogen or renewable natural gas can be produced. The Kettleman City Yosemite Hydrogen plant is expected to use agricultural waste to produce hydrogen for Interstate 5 trucking and passenger vehicles. This plant has a cooperative business model as suppliers of the waste will be owners of the plant.

Phoenix Energy, now commissioning in North Fork and Mariposa Biomass, are planning two facilities that will use forest-based fuel as feedstocks for gasification.

Stewart said these projects are capital intensive and face complex and time consuming permitting challenges that many developers find to be frustrating. It is not unusual, he said, for it to take four years or more to advance a project from inception to commission. Expediting permitting and development phases is necessary to have these projects on-line by 2025.

The demise of the co-generation plants plus the huge growth in nut production in California has made development of renewable product technologies a must, Stewart said. Sustainable products from agriculture feedstocks are more than just biofuels.

Other products, including renewable chemicals, can be made from the same waste streams.

A stakeholder committee with representatives from California Citrus Mutual, California Fresh Fruit Association, WAPA, California Association of Wine Growers, American Pistachio Growers and Nisei Farmers League has sent a letter to Governor Gavin Newsom proposing new concepts for dealing with the challenges of agricultural waste disposal.

The proposal includes expanding the Alternative to Open Burning program and incentivizing purchase of chipping and shredding equipment and support of a platform to assist with connecting small growers and their jobs with custom operators.



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# Demonstrating Biologically Integrated Orchard Systems in Walnuts

## New Multi-Year IPM Project Underway in Sacramento and San Joaquin Valleys

By **SARA TIFFANY** | *Director of Ecological Farming, Community Alliance with Family Farmers*



The project will test efficacy of mating disruption for NOW in walnuts. NOW is becoming a more prevalent pest in walnut crops (all photos courtesy S. Tiffany)

**T**HE COMMUNITY ALLIANCE WITH FAMILY FARMERS (CAFF) is working closely with UCCE and participating growers and PCAs to implement demonstration and research trials in walnuts as part of a new three-year IPM project titled “Promoting Biologically

Integrated Orchard Systems (BIOS) in Walnuts in Sacramento and San Joaquin Valleys.” The BIOS project focuses on walnut production systems targeting three important pests: codling moth, navel orangeworm (NOW) and web-spinning spider mites.

The project has partnered with six farms (three in the Sacramento Valley, three in the San Joaquin Valley) to set up BIOS demonstration sites where alternative pest management practices, including mating disruption for codling moth and NOW and biological practices for spider mites, are being implemented along with robust monitoring programs, UC IPM models and action-based thresholds.

CAFF’s BIOS for Walnut project is funded by CDFA through their new Biologically Integrated Farming Systems (BIFS) program, which seeks to explore alternative approaches to pest management in California cropping systems. The name of CDFA’s new BIFS program is a nod to the original Biologically Integrated Orchard Systems program led by CAFF in the 1990s and 2000s, which built a broad coalition of UCCE, PCAs, growers, researchers and others to implement BIOS projects in walnuts and almonds in counties including San Joaquin (led by Joe Grant), Merced, Yolo, Solano and Stanislaus.

The success of CAFF’s previous work in this area has provided a strong foundation for the new BIOS in Walnuts project, which is supported by a collaborative team including CAFF (Project lead: Hanna Kahl), UC IPM Advisor Jhalendra Rijal, UCCE Orchard Systems Advisors for the Sacramento and San Joaquin Valleys, experienced growers and PCAs, and the California Walnut Board.

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# LESS DAMAGE MORE ROI

The CDFA funding for this project was made available after the state of California banned chlorpyrifos, an important pest management tool for many cropping systems, including walnuts. Many believe that this ban is part of a gradual trend of increased restriction and regulation around pesticide products available to California growers. In the context of this challenge, CAFF developed the new BIOS in Walnuts project to demonstrate and research the practice of mating disruption for codling moth and NOW as well as biological control strategies for web-spinning spider mites.

The goals of the BIOS in Walnuts program are threefold: to evaluate the pest management efficacy of mating disruption and biological control compared to the grower standards; to evaluate the economic cost of these alternative pest management practices compared to more conventional products used in the grower standards; and to provide field scale demonstrations of the practices and opportunities for growers to get together and discuss their experiences around pest management.

## Mating Disruption Trials

While data collection has just started, the project team anticipates that mating disruption will effectively manage codling moth and NOW at its six demonstration sites with little to no use of broad-spectrum pesticides. Mating disruption has proven to be an effective tool for managing NOW in almonds and pistachios, with over 148,000 acres of nut crops under mating disruption as of 2017. Considering that NOW is becoming a more important pest in walnuts, particularly in the San Joaquin Valley, this project will test efficacy of this practice for NOW in walnuts at a critical time.

Mating disruption has also been proven to be an effective practice for managing codling moth in walnuts. Furthermore, studies indicate that mating disruption may allow for the preservation of natural enemies that could help manage many pests in the system, potentially increasing yields. Initially,

*Continued on Page 40*



— **Kevin Davies,**  
*Tehama Angus Ranch*

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CAFF's BIOS for Walnut project is funded by CDFA through their new Biologically Integrated Farming Systems (BIFS) program, which seeks to explore alternative approaches to pest management in California cropping systems.

*Continued from Page 39*

the high cost associated with the practice served as a significant barrier to growers. In recent years, improvements in mating disruption dispensers have brought down the price, making it a more affordable option for growers. However, despite the increasing affordability of mating disruption, the low price of walnuts in recent years is a major barrier for trying out any new practice that, on paper, costs more than conventional products that may already be dialed in to a grower's pest management program.

### Demonstration Orchards

Among the six partnering farms, the project is implementing a total of five mating disruption trials for NOW and six trials for codling moth (some of which are on the same acreage) as well as three replicated research trials that are looking at the effect of natural enemy release and cover crops on populations of spider mites. Each mating disruption trial is set up as side-by-side comparisons of the BIOS plot, which includes 40 acres of mating disruption and a 30- to 40-acre control plot, which is each grower's standard for managing NOW and/or codling moth.

The project team is using a variety of mating disruption products that are currently commercially available to growers. While mating disruption is the primary tactic used for codling moth and NOW, extensive pest monitoring, degree-day models and eco-

nomie thresholds will help determine if and when to apply narrow spectrum pesticides, such as *Cydia pomonella* granulovirus, methoxyfenozide, chlorantraniliprole and acequinocyl. The mating disruption trials will run for two seasons, 2021 and 2022, during which extensive monitoring as well as damage evaluation of mummy nuts and harvest samples will provide concrete data on how effective the mating disruption has been in each trial. The BIOS mating disruption trials are located at farms in Gridley, Woodland, Yolo, Ripon, Linden and Waterloo.

### Biological Control Trials

In addition to mating disruption for codling moth and NOW, the BIOS project also has three research and demonstration sites that focus on managing web-spinning spider mites using the release of predatory mites and increasing habitat for beneficial insects through the planting of cover crops.

Each biological control trial includes replicated research of natural enemy release and cover crops in various combinations, including predatory mites + cover crops; predatory mites + grower standard; cover crops; and the grower standard. These combinations of "treatments" for spider mites occur on a total of 120 acres at each site, and similar to the mating disruption trials, will run for the 2021 and 2022 seasons. While data collection for biological control did not start until spring 2021, outreach to growers began in 2020 in order to plant winter cover crops at the

participating farms. Monitoring of spider mites, economic thresholds and UC IPM guidelines will determine if and when to apply miticides. Pest and predator monitoring data throughout the two-year trials will determine the effectiveness of biological control practices. The BIOS biological control trials are located at farms in Woodland, Yolo and Waterloo.

### Field Days and Project Updates

Throughout the three-year BIOS project (2021 to 2023), there will be a wide range of field days and trainings to demonstrate the practices, share the findings and hear from participating and experienced growers. These events will also dig into the region-specific benefits and tradeoffs of mating disruption and biological control practice implementation.

While the majority of in-person field days will take place in the Sacramento Valley and the Northern San Joaquin Valley, the project will also host multiple outreach events in Tulare County and present at commodity and extension meetings and conferences. The BIOS project will also develop a wide range of extension resources, project updates and results (biological, pest and economic analysis); technical information highlighting up-to-date research and IPM recommendations; pest management decision making tools and perceived risks and strategies for mating disruption and biological control; and grower perspectives of benefits and tradeoffs of BIOS approach.

This content will be featured in a variety of online and printed fact sheets, technical reports, resource and decision-making guides, case studies, podcasts, instructional videos and a new BIOS webpage. While the dates and locations are still TBD, the first BIOS field days are planned for May/June 2021. To receive details about extension events and receive project updates, please sign up at <https://forms.gle/s7AJU4EarqH6K7RG6> or email [intern@caff.org](mailto:intern@caff.org) noting your interest in the BIOS project.

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# Up? Down? Trends in California Tree-Nut Property Values

Two experts share what's driving land values for almonds, pistachios and walnuts.

By CATHERINE MERLO | Contributing Writer

Insurance companies are among the investors who are buying California's tree-nut properties (photo by C. Merlo.)

**JANIE GATZMAN AND MIKE MING** know better than most about the value of California farmland. Gatzman is not only a fourth-generation farmer who grows and processes

almonds in the northern San Joaquin Valley, near Oakdale; she's also owner of Gatzman Appraisal and a long-time accredited rural appraiser who specializes in valuing larger nut crop hold-



Janie Gatzman has been an accredited rural appraiser for 18 years. She also grows and processes almonds in Stanislaus County (photo by Allison Gatzman.)



Mike Ming, Alliance Ag Services in Bakersfield, has more than 30 years of agricultural brokerage and appraisal experience in Kern County (photo courtesy M. Ming.)

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Prices for pistachio orchards have soared, reaching \$55,000 an acre in the southern San Joaquin Valley (photo by C. Merlo.)

ings as well as leaseholds all over the Central Valley.

Further, Gatzman is a member of the California Chapter of the American Society of Farm Managers and Rural Appraisers (ASFMRA). For the past

eight years, she's co-edited the group's "Trends in Agricultural Land and Lease Values<sup>®</sup>" for California and Nevada, a respected report published annually. The 2021 edition was released in late March.

Ming, owner of Alliance Ag Services in Bakersfield, has more than 30 years of agricultural brokerage and appraisal experience in Kern County, one of California's top almond and pistachio

*Continued on Page 44*



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In Kern County, demand is above average for almond acreage with good water access (photo by C. Merlo.)

*Continued from Page 43*

producers. He's an accredited rural appraiser and a professional real estate broker. He's also a member of ASFMRA and contributed to its 2021 Trends publication.

From their vantage points, Gatzman and Ming are seeing a substantial amount of buying, selling and even leasing interest in California's tree nut land. Here's what they're reporting:

***Investors are buying California's larger tree nut properties.***

Institutional groups like insurance companies (think Hancock and Prudential), real estate investment trusts, private equity firms and out-of-state teachers' unions are making farmland purchases to diversify their portfolios. Their agricultural investments underscore their confidence in California's long-term land market and their belief that farming can offer higher, more stable returns than the stock market. "We're also seeing buying interest from large family operations looking to expand," Ming said.

***Property sellers tend to be larger farmers who are getting out of the business.***

"Maybe they're in partnerships that are falling apart or the next generation isn't interested in continuing to farm," Gatzman said. "Or they're trying to consolidate their operations into better water areas or want to get rid of property that needs redevelopment, such as old orchards."

***Water is key.***

"The water issue is huge," said Ming, who has developed expertise in the Sustainable Groundwater Management Act (SGMA). The 2014 legislation provides a framework for long-term sustainable groundwater management across California. Many expect SGMA to result in hundreds of thousands

“

**“We have buyers writing offers at \$55,000+ an acre depending on water access and orchard age.”**

– Mike Ming, Alliance Ag Services

”

of acres of farmland being fallowed due to groundwater pumping restrictions.

As a result, access to water supplies has become a major component of the state's farmland values. Buyers are increasingly drawn to property with secure water rights. The highest valued land has "two-source water," that is, viable groundwater and surface water supplies. Yet, Ming said, "in many areas, especially in the southern SJV, farmland with two-source water that's available for sale is nonexistent."

Some areas have plummeted in value because of SGMA-related groundwater restrictions. In some "white land" areas – land with no surface water supplies – per-acre values have dropped to less than \$9,000, Gatzman said.

In Kern County, "demand for almond acreage is above average in well-watered districts," Ming noted. Those orchards were valued at about \$30,000 per acre during the first quarter

*Continued on Page 46*



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of 2021. But almond property with poor water access is worth much less at about \$15,000 per acre.

**Pistachio orchards are outpacing other tree nuts in buyer interest, especially in the southern SJV.**

While almond and walnut orchard values have remained stable, prices for pistachio tree property have soared. Commodity prices for the crop remained well above the cost of production in 2020, making pistachios a “rare bright spot” among Western tree nuts, Gatzman noted.

Also bolstering pistachio land values? Because pistachio trees require less water than almonds or walnuts and can withstand lower-quality water and soils, “buyers have found these orchards are a good long-term bet in areas where both surface and groundwater supplies are decreasing due to regulation,” said Gatzman.

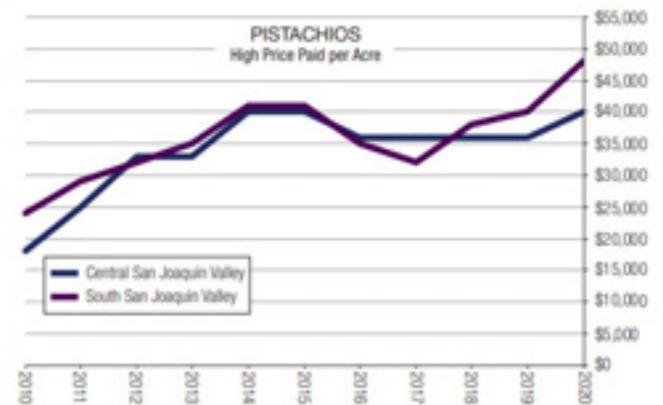
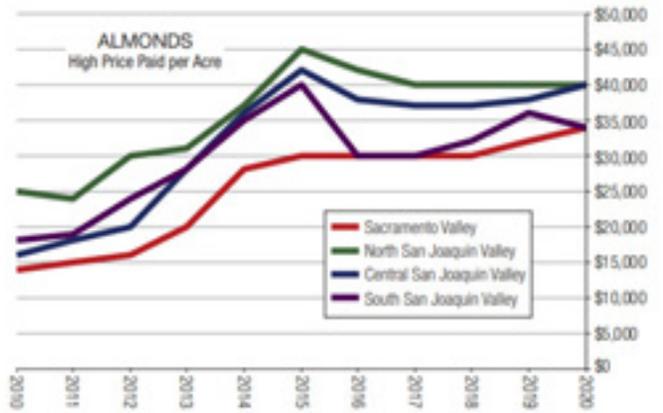
But that demand has sharply tightened the supply of pistachio orchards for sale in Kern County. Rising land values reflect that lack of pistachio availability.

“We have buyers writing offers at \$55,000+ an acre depending on water access and orchard age,” said Ming. **Sales activity for walnut property has remained stable.**

2020’s drop in walnut prices also put downward pressure on the crop’s land values. According to the 2021 Trends report, sales of Tulare County walnut properties were very limited, ranging from \$24,000 to \$30,000 per acre last year. In the Sacramento Valley, demand for good-quality walnut orchards remains strong, with significant demand coming from outside individual and group investors as well as large private equity groups. A limited number of walnut orchard transactions took place in 2020, with several high-quality orchards selling between \$30,000 and \$35,000 per acre. Older or lower-quality orchards are generally valued at \$20,000 to \$27,000 an acre.

**Leasing tree-nut property is an option.**

Although leasing tree-nut property is rare in the central and southern San Joaquin Valley, it’s common in the valley’s northern production areas, Gatzman said. In fact, she and her husband, Nick Gatzman, have long-term almond development leases totaling 180 acres on various properties in



**These charts reflect the high end of prices paid for almond and pistachio acreage in the Central Valley over the past 10 years (courtesy California Chapter, American Society of Farm Managers and Rural Appraisers, 2021 Trends® report.)**

Stanislaus County.

“Farmland and orchards in our area can be prohibitively expensive for younger farmers like us to purchase outright,” said Gatzman, who began her career with Farm Credit. “I know many local farmers who lease tree nut properties, especially 20- to 40-acre parcels with high land values. There’s a lot of competition for new orchard development leases. A landowner interested in leasing his or her property typically can solicit multiple lease offers in our area.”

Whether land values rise or fall, California farmland remains an enduring asset. “Investors know that food production is always in demand, and California grows many commodities that can’t be produced anywhere else,” Gatzman said. “For family farmers, land represents opportunity they want to see continued for their children and grandchildren.

“For me, farmland value is also about history,” she added. “My great-grandfather farmed some of the property I’m farming today, and that means something.”

The complete 2021 Trends in Agricultural Land and Lease Values report is available for purchase at [www.calasfmra.com](http://www.calasfmra.com).



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# If You Do Decide to Sell By CATHERINE MERLO | Contributing Writer

**A S A CERTIFIED PUBLIC ACCOUNTANT** and principal with Grimbleby Coleman CPAs in Modesto, Calif., Jeff Bowman has worked closely with tree nut clients for 20 years.

These days, he's seeing long-time farming families looking to retire or transition out of the ag business. Like others, Bowman is also seeing growing interest in farmland from investment and non-farming groups. He even has some new clients who are first-generation farmers with resources from another industry looking to diversify into walnut and almond properties.

"If you own tree nut property and are thinking about selling, you might want to consider other options besides simply selling outright and taking the cash," Bowman said.

A straight cash sale, for example, would likely require you to pay capital gains taxes, since your property will probably have risen in value since you acquired it. One option to minimize your tax obligation is carrying the note and taking the purchase payments in installments over a period of time.

"You would be spreading the taxable income over multiple years, which may help avoid a higher tax bracket," said Bowman. "You might also incur other losses or deductions over that period to offset that income."

Another option if you're selling property is to take advantage of the Section 1031 tax-deferred exchange. In that case, you could invest the cash from the sale of your orchard into investment or commercial property, such as an office building. Your newly purchased exchange property can even be located out of state. The 1031 transaction doesn't mean the sale of your orchard is tax-free. Instead, the tax you would have paid on the land sale is simply delayed until you sell the 1031 investment property.

"That can be a benefit, and it allows you to diversify your assets," Bowman said.

Investing in "opportunity zones" to defer capital gains is another consideration. This federal economic development tool allows people to invest

in distressed areas of the nation. By substantially improving or developing property in an opportunity zone, you can reduce or defer your capital gains if the investment is structured correctly and held long-term.

"We have clients who found land in an opportunity zone that could be farmed," said Bowman. "They took undeveloped land and developed it into an orchard that was then attractive to other investors."

If you decide to sell your land, work with someone from the appraisal or ag real-estate sector to make sure you're getting a fair offer, Bowman said. In fact, it would be wise to include a team of experts, he added. For example, a realtor or broker with ag expertise can help market your property. A good business attorney can help structure a lease or installment sale.

"And definitely use a CPA, unless you enjoy tax surprises," Bowman said.



**If you're thinking about selling your tree-nut property, CPA Jeff Bowman says there are other options besides simply selling outright and taking the cash (photo courtesy J. Bowman.)**

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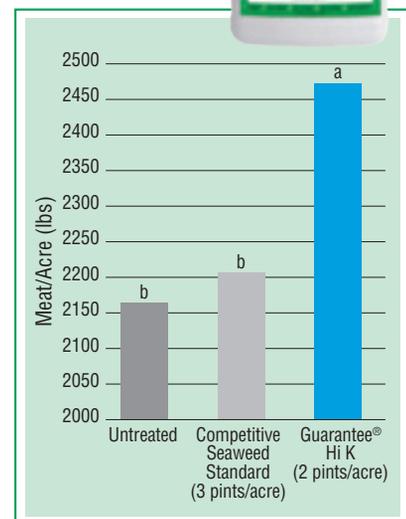
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As wildfire season approaches, and threatened regions expand, growers may consider some preventative steps to mitigate fire and smoke damage.

# Smoke, Not Heat, Biggest Wildfire Threat to Nut Crops

By MITCH LIES | Contributing Writer

**W**HEN THE LNU LIGHTNING COM-plex wildfire scorched the outside rows of some walnut orchards around Pleasants Valley Road last August, it marked the rare occurrence when a California nut crop suffered direct loss from a wildfire.

Unlike in avocado orchards, where wildfire damage is common, California nut orchards generally escape direct damage from wildfires. It is the smoke, not the flames, that is the biggest issue in California nut crops.

“The biggest impact of these wildfires is the smoke pollution and the

impact that has on sunlight getting through to the crop,” said Katherine Jarvis-Shean, orchard systems advisor for Sacramento, Solano and Yolo counties.

Wildfire smoke can inflict long-term physical damage on trees, can alter irrigation needs by changing evapotranspiration in orchards and, perhaps most worrisome, can delay dry down of almonds during harvest.

“My understanding is that last year, there were incidences where there were almonds on the orchard floor that were relying on sunlight to dry out that were not drying out,” Jarvis-Shean said. “People kept waiting to pick them up and send them to a processor, and some even resorted to picking them up anyway even though they weren’t at ideal humidity, which involved some other drying steps along the way.”

In some cases, producers spread out almonds in the hopes of speeding dry down; in others, producers turned piles

over as a conditioning tactic to bring wetter almonds to the top of piles, two tactics available to try and reach ideal humidity.

“There are a few little tools that we can use to help improve things,” Jarvis-Shean said. “But you can’t get smoke out of the air, so a lot of the impacts you are just stuck with.”

## Tree Loss Minimal

Actual tree loss to wildfires over the years has been minimal, according to Ben Faber, Ventura County advisor for UCCE, primarily because nut crops are grown on large expanses typically far from the rangelands and forests that provide fuel for California wildfires. “You might see marginal burns that burn down a dry creek bed, but nothing like in avocados,” he said.

“Avocado orchards burn every year, and they have done so historically, because of their location. The same is true for several of the citrus orchards. It is

something growers have learned to live with,” Faber said.

Applying mulch to orchards and keeping trees adequately watered are important fire-prevention steps regularly employed in avocados, Faber said. “Most plants, if they are adequately watered, are not very fire susceptible, and so that is one of the things they do. And avocado orchards are thick with mulch, a foot deep sometimes. It gets moist in there, and when you get embers falling into it, it burns really slowly. The orchardists can just take a shovel and whack it out.”

In nut crops, however, where orchard floors generally are kept clean and crops are dried down at harvest, the mitigating steps taken in avocado orchards often aren't feasible. Where fire is a concern, steps like creating defensible spaces devoid of vegetation can be key to minimizing risks, Jarvis-Shean said. But, here again, in many cases, that is not possible, particularly with

orchards often planted right up to property lines.

“I certainly saw some instances (last year) where folks were turning over soils that had dead grass on them many yards out from where their trees were situated so the fire wouldn't have a fuel source near their orchard line,” she said. “But that isn't something that everyone has available to them. In many cases it is someone else's property or it is government land adjacent to an orchard.”

“But when possible, you want a defensible space, just like you would for a house in a fire-prone area,” she said.

### Wait-and-See Approach

In cases where trees are singed by wildfire, Jarvis-Shean advised growers to take a wait-and-see approach before replacing them. Many of the walnut trees singed by the LNU Lightning Complex fire, for example, are expected to recover.

“Trees are more resilient than you might think,” Jarvis-Shean said.

“Generally, you want to approach it the same way that you would freeze damage,” she said. “You want to slice into the tree a little bit to see if there is dead tissue underneath to see if it is burned all the way through, not just the water pipes or sugar pipes of the current year, but the cambium, which is sort of the stems cells that are going to make sugar and water pipes in the future. If those are scorched and destroyed for more than a third of the circumference of the tree, then that tree is probably not going to be worth much more of your time.”

“But often buds will emerge the following year later than they would in a normal year, and you might still have more budbreak than you expect. As far as the singeing on the edges, we recommend a wait-and-see approach before doing anything really dramatic,” she said.

*Continued on Page 50*

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The heat damage to this walnut tree from a fire burning adjacent to the orchard killed leaf tissue, but much of the wood was expected to be viable the following year (photo by K. Jarvis-Shean.)

*Continued from Page 49*

The effect of smoke pollution on trees is still largely unknown, Jarvis-Shean said, but researchers believe the potential exists for long-term negative impacts.

“We don’t have a great understanding of what that impact is,” Jarvis-Shean said. “But, when you get all sorts of junk in the air, and the trees are taking that junk into their stomata and trying to make sugars with it through photosynthesis, there is good reason to think that it might not be great for our orchards.

“We know that when you have a similar cocktail in urban settings, through smog and pollution, that can be detrimental to urban trees,” she said.

In regard to the effect of smoke on evapotranspiration, Jarvis-Shean said growers should keep an eye on whatever metrics they use to determine water needs to prevent over-watering.

“Sometimes, having that much smoke in the air, because of that light-filtering effect, decreases the evapotranspiration in the orchard, and that can catch people off guard,” Jarvis-Shean said. “That is one thing that people lose track of a little bit sometimes, the need to dial that irrigation back, because the tree is using less water. So, keeping that in mind, when skies are smokier, it can be important to watch whatever metrics you have for water use, like sensors in the soil or plant-water stress sensors, rather than just going through the motions.”

One other step to keep in mind in regard to wildfires, Jarvis-Shean said, is to document damage.

“Depending on the fire and how the government adapts to it, there are a number of assistance programs that may or may not kick in,” she said. “So, you should really do a good job of documenting the damage on a month time basis and certainly right after it happens so that you have documentation for insurance claims and for any federal assistance that may be available.”

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# PRESSURE RISES ON POPULAR SOIL FUMIGANT

## REGULATORY PRESSURE HEATS UP ON TELONE

By **ROGER A. ISOM** | *President/CEO, Western Agricultural Processors Association*



**1,3-D and other soil fumigants will take the biggest hit from the proposed mill taxes, potentially seeing the tax on that class of pesticides doubled (photo by Kristi Sanchez, TriCal Diagnostics.)**

**I**T HAS BECOME A THEME IN CALIFORNIA, where pesticides are under an unprecedented attack from every possible side. From Proposition 65 requirements; to possible new notification requirements and buffer zones; to an increase in the tax on all pesticides, this administration has made it abundantly clear they intend to change the landscape in California. And if they have it their way, the future will not include pesticides. Governor Newsom has even been quoted as describing the situation as a “harmful

overuse of pesticides in this state”.

Well, no chemical is feeling this pressure more than 1,3-Dichloropropene (1,3-D), more commonly known as Telone. Currently, the California Department of Pesticide Regulation (CDPR) is looking at mitigation controls and new notification requirements, plus an increased mill tax on 1,3-D while the California Office of Environmental Health Hazard Assessment (OEHHA) is looking at new requirements under Prop 65. If all were to go through as

proposed, it would make the use of this already heavily restricted use fumigant very difficult.

### Mitigation Requirements and Buffer Zones

For a couple of years now, CDPR has been looking to “mitigate” risk to bystanders and residents from the use of 1,3-D. These measures would include buffer zone requirements, application rate limits and tarping. On mitigation, specific measures being looked at include the use of totally impermeable film (TIF) tarps, pre-application moisture content of 70% field capacity by irrigation and looking at

an injection depth of 24 inches compared to the standard 18 inches, and/or various combinations of these measures. The Western Agricultural Processors Association (WAPA) is involved in this effort to actually measure how effective these measures will be and has secured a grower in Stanislaus County where the site will be tested for the difference in emissions. If 1,3-D is to survive, it is imperative some type of mitigation measure rise to the top of being effective, but remain reasonable from a cost perspective.

### Potential Notification Requirements

Another relatively new issue is notification of the application of 1,3-D. This issue came to a head as part of the AB 617 process for the City of Shafter and its Community Emission Reduction Plan (CERP). However, there has been mounting pressure by pesticide activists to know about all pesticide applications, whether the person receiving the notification is impacted or not. In an example of how far reaching the activists are, and how this is not about local impacts, Monterey County had instituted a notification system by email. It was later determined that 56% of those that signed up did not even live in California. Now, the activist community in Kern County have brought this to the forefront as they have applied continuous public pressure on State DPR Director Val Dolcini and Kern County Ag Commissioner Glenn Fankhauser, even going



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so far as writing letters to the Kern County Supervisors demanding that Fankhauser be fired for not adopting a more robust and far-reaching notification system. To date, Fankhauser has remained resolute in his stance, stating he is willing to look at an enhanced notification system, but not one proposed by the radical activists.

### Proposed Mill Tax Assessment Increase

In the Governor's recent Budget Change Proposal, DPR requests \$16.75 million (\$8.25 million General Fund and \$8.5 million DPR Fund) and 44.0 positions in 2021-22, and CDFA requests \$11.75 million General Fund in 2021-22, as part of a comprehensive proposal to support the "state's transition to safer, sustainable pest management." Additionally, DPR proposes to replace the current flat-fee mill assessment on pesticide sales with a risk-based tiered mill assessment, where higher-toxicity pesticides are assessed a higher fee. Once fully phased in by 2024-25, the tiered mill assessment is anticipated to generate approximately \$45 million in additional revenue annually to the DPR Fund. The additional revenue will fund various DPR and CDFA programs and will increase support to the county agricultural commissioners for local pesticide use enforcement activities to accelerate the state's transition away from harmful pesticides.

It is that risk-based tier system that is a problem—a big problem. The risk-based system uses the "signal word as determined by U.S. EPA" for the different categories, and naturally fumigants are classified by "danger" and fall into the highest category. Their mill assessment will go from 21 mills to 45 mills: more than doubling the tax on that class of pesticides. Again, 1,3-D takes the hit. There are no effective alternatives to 1,3-D, so no way to avoid this tax.

### 1,3-D and Prop 65

OEHHA is the lead agency for the implementation of the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). This past month, OEHHA granted a Petition for

Rulemaking submitted by Californians for Pesticide Reform (CPR). The goal is to develop a Prop. 65 No Significant Risk Level (NSRL) for 1,3-D. This chemical was added to the list of chemicals known to the State of California to cause cancer for purposes of Prop. 65 in January 1989. A copy of the Petition and Response letter is available on the OEHHA website at [oehha.ca.gov/Proposition-65](http://oehha.ca.gov/Proposition-65). An NSRL is a "safe harbor" level at which an exposure poses no significant risk. Businesses do not have to provide warnings for exposures below an NSRL. When an exposure is above an NSRL, a business may have liability under Prop. 65 but may demonstrate by other means that the exposure poses "no significant risk" of cancer.

OEHHA intends to develop an NSRL for 1,3-D and is requesting scientific information that may be relevant to the development of an NSRL for this chemical. Written comments on this request must be received by OEHHA by April 27, 2021 to be considered during the development of this NSRL. Opportunity for public comment on the proposed NSRL will be provided when OEHHA initiates a formal rulemaking process to adopt an NSRL for 1,3-D. Because of limited in-office staffing during the COVID-19 emergency, OEHHA strongly recommends that submissions be made electronically through their website at [oehha.ca.gov/comments](http://oehha.ca.gov/comments). This is the latest in a string of challenges against 1,3-D and we should be prepared to expect more in the future if the industry is to preserve this critical tool.

It is the combination of these measures that mandates we take action. Now is not the time to sit idly by and hope for the best. Support your commodity organization or local farm bureau. Do not think that this won't impact every single grower in this state. It may be 1,3-D now, but it will be glyphosate or another chemical right around the corner. Now is the time to push back. Agriculture in this state is the safest in the world. Make sure everyone knows it!

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# GROWER INSIGHTS:

## JOCELYN ANDERSON MAKES TRANSITION FROM TEACHER TO LEADER AND LEARNER

By **SABRINA HALVORSON** | Contributing Writer



**J**OCELYN ANDERSON HAS SECURED A spot for herself among the state's young ag leaders. She is the first vice chair for the California Young Farmers and Ranchers, a director for the Glenn County Farm Bureau, a past participant

in the Leadership Farm Bureau program and the 2021 American Farm Bureau Young farmers and Ranchers vice chair. She hopes to inspire other young farmers and ranchers to become leaders as well, a passion that started forming

several years ago.

"I thought I wanted to be a teacher. I started teaching swim lessons when I was about 13," she said. "I was a competitive swimmer my whole life and that went right along with what I was



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Jocelyn Anderson is the first vice chair for the California Young Farmers and Ranchers, a director for the Glenn County Farm Bureau, a past participant in the Leadership Farm Bureau program and the 2021 American Farm Bureau Young farmers and Ranchers vice chair (all photos courtesy J. Anderson.)

already doing daily. So, I had kind of been involved in teaching from a young age, and I have family members who are teachers or in the education field. So, I thought that's definitely what I wanted to do for the rest of my life."

She earned her Bachelor of Arts Degree and teaching credential simultaneously at Cal Poly State University, San Luis Obispo, and started teaching kindergarten and first grade.

"I really enjoyed it at the time. Just after being in it for several years, I knew that it wasn't what I wanted to do for the rest of my life. I started to learn more and more about my family farm and grew closer with my dad as well. I knew I wanted to eventually come out to the family farm one day," she said.

Anderson did go back to the family farm in Willows, Calif. She now joins her father in growing primarily walnuts and almonds. Part of the farming experience she enjoys is the opportunity for continual learning.

"I literally learn something new every day from my dad. He's been doing this since he was a kid and on our specific farm now for over 30 years. So, I just feel like I learned something new every single day."

Anderson said she set out to learn all the ins and outs of farming. "I wanted to learn everything, even down to how to work on equipment and change oil on tractors. I wanted to be able to start building an understanding of how everything works from the bottom up."

She started by working closely with the other farm employees and asking a lot of questions. She said she continues to ask a lot of questions.

"I'm learning everything I can from my dad. I'm trying to ask him questions so I can eventually hold all the knowledge that he does from being in the field and specifically with almonds and walnuts for so long. Our walnut huller as well, because that's obviously a big operation once we get to harvest and there's a lot of moving parts that go along with it," Anderson explained. "There's a lot. There's a lot of stuff to learn, but I love it."

As she continued learning about growing tree nuts, Anderson worked on growing her sphere of influence. She was selected to participate in the 2019 class of the Leadership Farm Bureau program from the California Farm Bureau and is a director for the Glenn County Farm Bureau. She also holds

*Continued on Page 56*



Anderson recently made the transition from teaching kindergarten to farming almonds and walnuts with her father.

*Continued from Page 55*

positions with the statewide California Farm Bureau Young Farmers and Ranchers and the national American Farm Bureau Young Farmers and Ranchers.

“There are a couple more programs I want to apply for and complete eventually, and just to be involved as much as possible. I think it’s so important to have family farmers who are on the ground, working on their family farm every day, to also be able to represent in a boardroom or with leadership responsibilities and positions,” she said. “Right now, I’m the first vice chair with the California Young Farmers and Ranchers. Hopefully, next year I can move up into the chair position. My two-year term with the American Farm Bureau will end next year and you can only do that once, but it’s a great pro-

**I always say it’s great to have representation from the field to the boardroom so that you cover all your bases.”**  
 – Jocelyn Anderson

gram and I hope to pursue some more leadership opportunities with American Farm Bureau in the future.”

She also wants to apply for the California Ag Leadership program and said when she hits the cutoff age of 35 for the Young Farmers and Ranchers group, she plans to continue being involved with the Farm Bureau in other ways.

Where does she get passion for the Farm Bureau? It is something she learned from her father.

“My dad. He’s been part of our local county farm bureau pretty much since I can remember,” Anderson said. “Since I was little, he’s been a director on our Glenn County Farm Bureau board.”

However, she said the drive for leadership is more personal.

“I think my drive for leadership comes from within. I know that I have been successful in it in the past and I can be a real advocate for farming. So, I don’t want that to go to waste,” she said. “I always say it’s great to have representation from the field to the boardroom so that you cover all your bases.”

*Sabrina Halvorson is the host of the MyAgLife Daily News Report. Hear the full interview with Jocelyn Anderson on the MyAgLife Daily News Report at [myaglife.com](http://myaglife.com) or on the MyAgLife app.*

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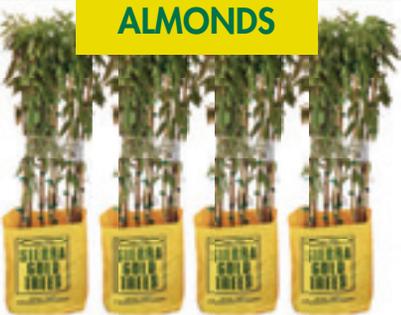
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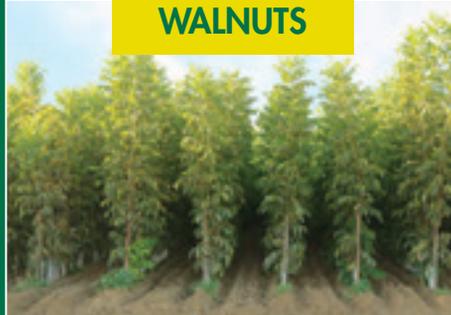
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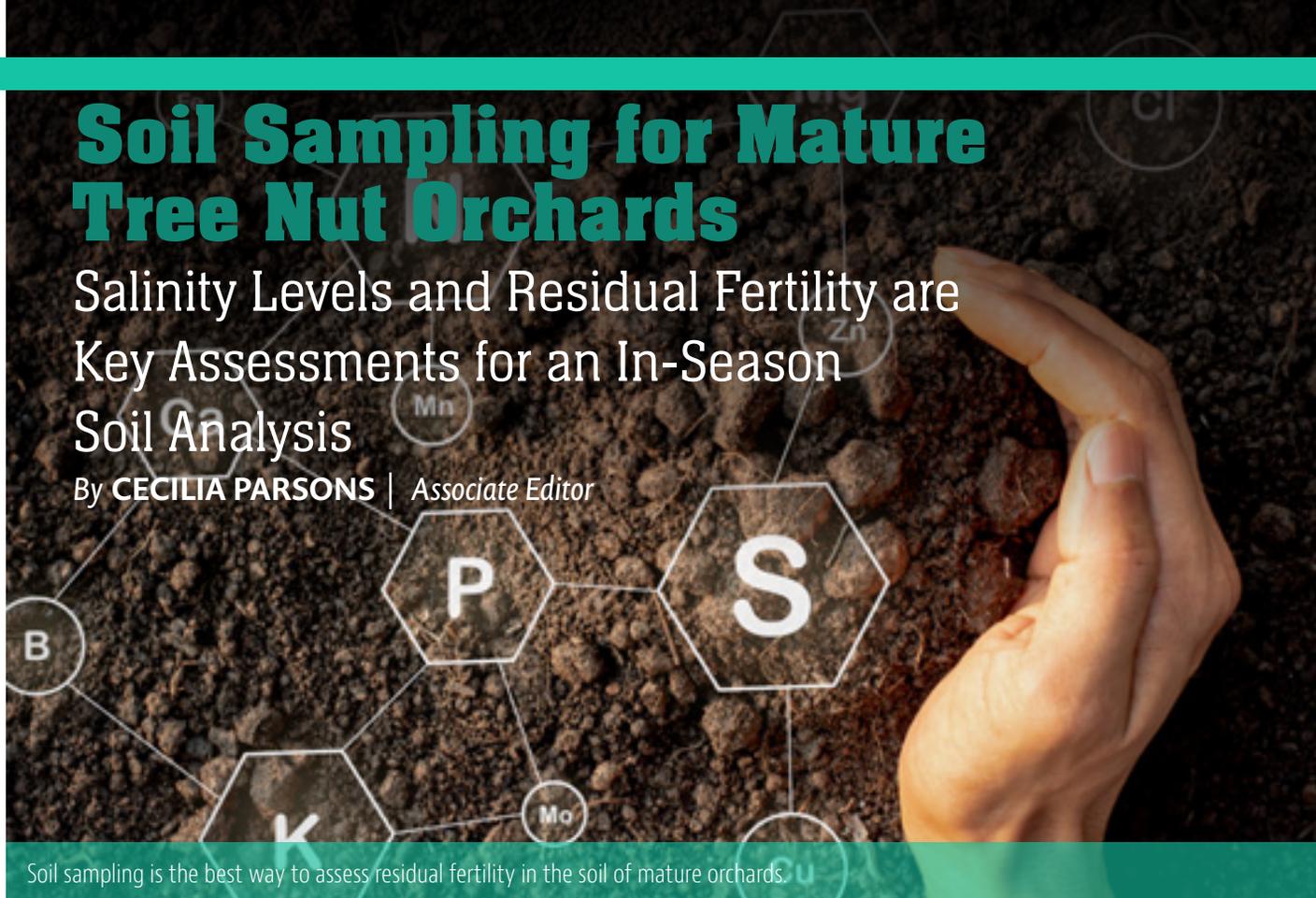
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# Soil Sampling for Mature Tree Nut Orchards

Salinity Levels and Residual Fertility are Key Assessments for an In-Season Soil Analysis

By **CECILIA PARSONS** | Associate Editor



Soil sampling is the best way to assess residual fertility in the soil of mature orchards.



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**C**HECKING SALINITY LEVELS IN OR-  
chard soils or residual fertility at  
the end of the growing season are  
two of the main reasons for conduct-  
ing soil analysis in a mature tree nut  
orchard.

Tree nut orchards are ideally planted  
in deep, uniform loam soils that pro-  
vide an optimal combination of perme-  
ability, water retention and root zone  
aeration. Expansion of tree nut produc-  
tion into areas with marginal soil qual-  
ity makes soil sampling an important  
tool for assessing soil properties.

## Sample Timing

In tree nut orchards, soil sampling  
for salinity should be conducted after  
the final irrigation of the season. This  
sample can determine any potential  
issues with sodium, chloride or boron.  
These salts can build up in the soil from  
fertilizers or low-quality irrigation  
water.

Ben Wardell of Fruit Growers  
Lab said salinity management is the  
primary reason for soil sampling in  
tree nut orchards. The optimal time  
for determining the salinity levels of

orchard soil is postharvest, especially after rainfall as that can indicate a need for additional leaching to push accumulated salts below the root zone. In orchards with marginal water quality or sub-optimal drainage, more frequent soil sampling may be necessary to monitor for salinity increases.

Sampling soils for nutrient levels can be done at any time during the year, but is generally done prior to leaf-out and can guide decisions on fertility management.

For soil nitrate analyses, samples should be taken in spring before the high nitrogen uptake by the trees. Samples also should be taken prior to fertilizer applications.

The timing for making that decision, Wardell added, is usually related to why sampling is indicated.

Besides salinity levels, soil sampling can provide soil pH, texture, and nutrient concentrations. Another diagnostic tool for tree nut orchards, tissue sampling, is used to detect deficiencies in tree nutrient status.

“Typically, in sampling soil in an almond orchard postharvest, we can learn if the potassium levels are low or if the salinity levels are creeping up,” Wardell said. “This allows the grower to band some potassium or put some gypsum down before it rains. Soil analysis is one tool that can be used to determine the appropriate rates of application. A follow up sample can be done to ensure that any salinity issue is resolved.”

Depth of the soil sample is one of the most important steps in the process. Wardell said the most common depth is a sample pulled to a depth of 18 to 24 inches, which is the effective root zone. The sample should also be pulled from an area that is wetted by the irrigation system. When managing salinity, a second sample should be collected from a depth of 18 to 39 inches.

### Sampling Protocol

Protocol for soil sampling in a mature orchard in the Central Valley is to divide the orchard into blocks based on soil type. Unless soil maps show wide

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**“SOIL ANALYSIS IS ONE TOOL THAT CAN BE USED TO DETERMINE THE APPROPRIATE RATES OF APPLICATION. A FOLLOW-UP SAMPLE CAN BE DONE TO ENSURE THAT ANY SALINITY ISSUE IS RESOLVED.”**

– BEN WARDELL, FRUIT GROWERS LAB

*Continued from Page 59*

variability in the soil types across the orchard block, 20 acres is the average sample size, Wardell said.

CDEA's Fertilizer Research and Education Program (FREP) notes that even when a field or orchard appears to have a uniform soil type, it is worth dividing the orchard into several blocks which are sampled and analyzed separately. They can be divided according to soil survey data, slope, crop history, variety, rootstock, age or irrigation method.

The person taking the samples walks a random pattern and takes multiple core samples. The 20 to 25 cores taken are mixed in a bucket and a 'sub sample' is pulled from the mixture for lab analysis. FREP recommends putting a quart of soil in a clean bag and labeling according to laboratory instructions. To receive accurate fertilizer recommendations, the sample information sheet needs to be completed and returned to the lab with the sample.

Soil sampling is always recommended prior to planting trees. Wardell said that if any major changes are necessary, they are easier to make on bare ground. A more comprehensive soil survey can be done with a backhoe to obtain a good look at the soil profile.

When soil survey data suggests possible physical limitations for plant growth at the site, a series of backhoe pits can be dug to identify textural changes in the soil and layers that would restrict root growth. Information and visual inspection can determine the best method of soil modification and if the site is suitable for orchards.



Orchards can be divided into 20-acre blocks based on soil survey data, slope, crop history, variety or other variables (photo courtesy Neal Kinsey.)

Anything that will inhibit drainage as well as soil chemical levels, pH, salinity and fertility can also be analyzed. Wardell said that as an alternative to backhoe pits, soil cores, may be taken with a soil auger, but this method is not as comprehensive. Samples taken at various depths can be used to determine soil characteristics.

It is less common to do soil sampling for salts or nutrients in young orchards unless a problem is detected in the trees.

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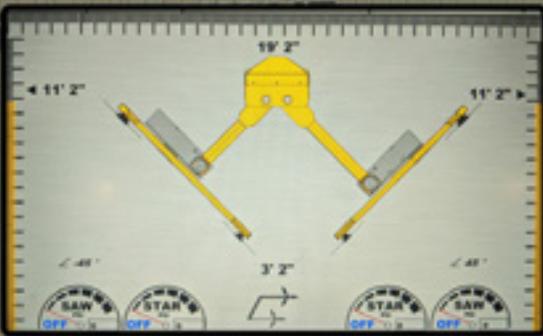
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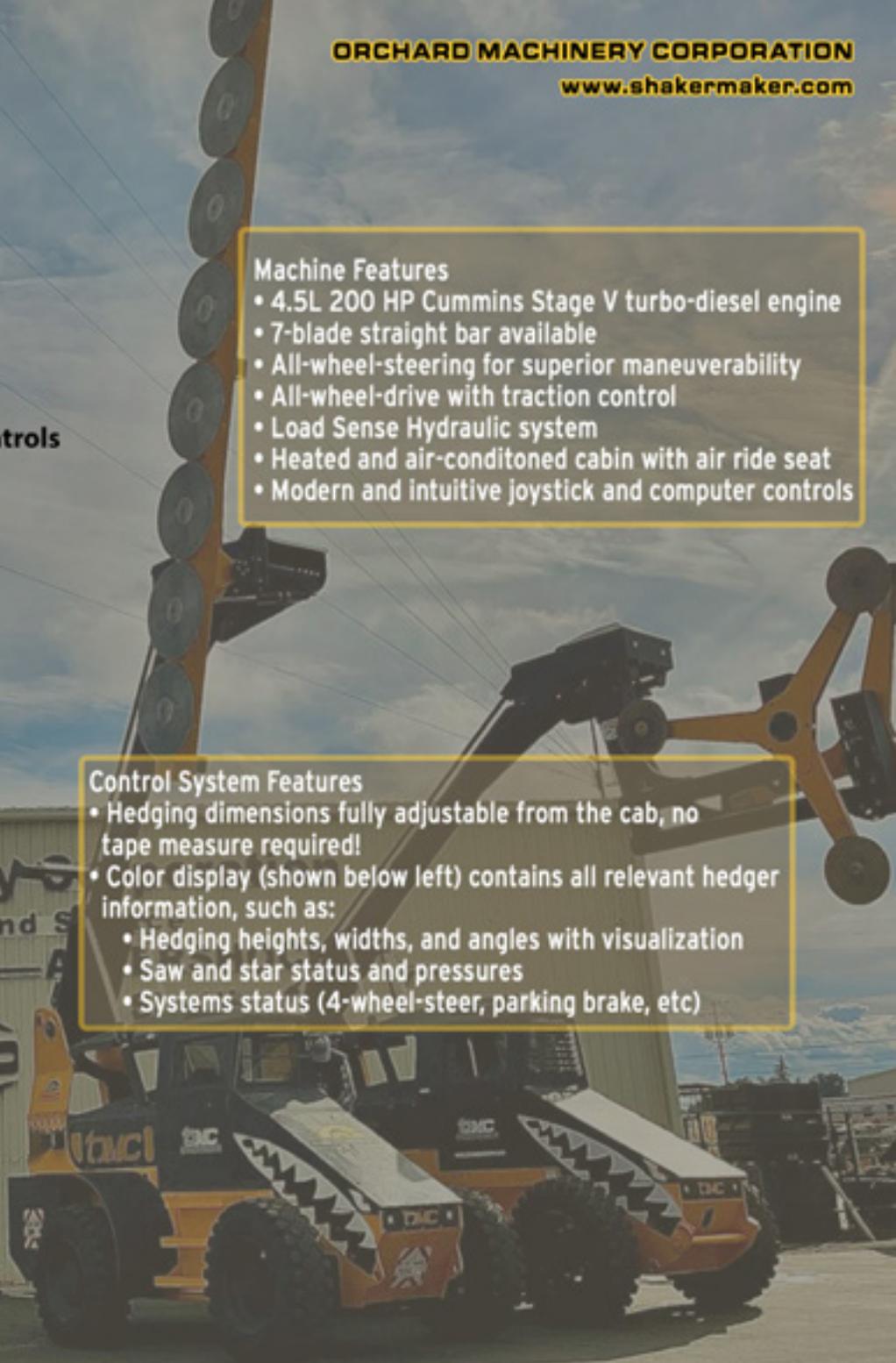


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# Take Soil Analysis to a Deeper Level

## Get Soils Closer to Ideal to Make Easier, “On-the-Fly” Adjustments

Sampling soils frequently to start the season close to ideal helps facilitate adjustments throughout the season.

By **RICH KREPS** | CCA, SSp, Contributing Writer

**T**HE DAY AFTER MY 40<sup>TH</sup> BIRTHDAY, I REALIZED MY ARMS weren't long enough to allow me to focus my eyesight for what I was reading. Unfortunately, readers are now an everyday part of my life even if I want to see the darn cell phone. As much as we as CCAs push the narrative created by a good soil test, it's imperative that your advisor gives you the full picture. Put on your glasses and look closely. It's easy to get fooled into thinking everything is okay with balanced numbers on the base saturation percentages (i.e., 68% calcium, 12% magnesium, 7% potassium, 2% sodium, etc.)

When we rinse the soil with acetate, we get a snapshot of the nutrient load that is on the edge of the colloid or the weathered rocks in the soil. It's not a total number of the nutrient load in our soils, but what is “etched” of the soil at that moment. There are layers of rock and clay that have trapped nutrients to be weathered in time. The “hanging chad” nutrient clingers on the surface give us an idea of what may become available shortly. However, that number is still deceiving. It may show up when rinsed with acetate, but is not soluble at all with bad water. If you want to take this a step further, run a soil test with the actual water you'll be using to irrigate. That'll shock you.

### Soil pH

Take a look at soil pH. While not an end-all to solving soil issues, it may be a better representation of how we can actually manipulate soil into making it more ideal. The logarithmic calculation of hydrogen gives us an idea of how much of the exchange capacity we can replace with earth metals like calcium, magnesium and potassium. The lower the pH, the more hydrogen. Higher pH means much less hydrogen is attached to the soil.

Neal Kinsey talks and writes often about the trap of thinking we can manipulate potassium numbers postharvest with slugs of dry mixes when pH is over 6.5. Unfortunately, at higher pH readings, we have less hydrogen bonded to the soil. When the water we use is high in calcium or magnesium (drought years in particular), or we have made heavy applications of amendments like gypsum, calcium overpowers the ability of potassium to stick. It has a double charge and stronger bond. We try to build these numbers in the fall, but may be just wasting our money at a time when any rain we get will just push the small amount of soluble potassium we actually receive right through the root zone. With high sulfate numbers in our soils, dry-down allows that anion to reconstitute with earth metals like calcium, magnesium and potassium. More lockup. Now what?

### Organic Matter

More binding sites come from increasing organic matter. In California, using cover crops comes with the concern

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of using more water than we can handle to grow the non-economic crop. With the water prices we'll be charged this year, if we can get them, we need to make every drop count just to deliver some nutrients and maintain our trees. However, think of the increase over winter that five to ten tons per acre of green manure can add to our soils. Using tubers like radishes can add even more stable organic matter while legumes can soak up atmospheric nitrogen and stabilize it in our soil. That organic matter will allow soil to hold more water in the spring and summer. With more binding sites, we can add acids to lower pH and then add cations to replace negative ions we want to leach like sodium. That's a better picture.

### Solubility

To take it a step further, look closely at the milliequivalent per liter readings coming out of the solubility section of a soil test. This is a better measure of what your roots are actually being given to drink. You can multiply the meq/l of those cations by the atomic weight of that element then divide that number by the number of electrons that specific element has. Calcium has two as well as magnesium. Sodium and potassium have only one. Now divide that number by the ppm in the base saturation. This will tell you how much of the soil constitution is actually being released in the soil solution. We can then make better decisions as to what needs to be added to our soils to feed our trees.

I am a big proponent of hitting my soils with an acid shock, following it with organic acids and then adjusting key cation ratios. I have found significant levels of success coordinating tactical applications with my growers when budgets are tight like our current markets have subjected us to.

The closer we can get our soils to ideal, the easier it will be to make "on-the-fly" adjustments to offset deficient tissues at critical agronomic stages. Getting your calcium right during cell division, potassium for heat stress, magnesium during peak chlorophyll production, etc. will greatly enhance the health of your orchard and in turn



**‘Strategically applying soluble and plant ready nutrients in-season will make those bigger yields a reality, and that is something all of us want to see.’**

Soil pH can dictate how well amendments like potassium are utilized.

increase yields. Take your analysis to deeper levels and you will find you can do more with less. Strategically applying soluble and plant ready nutrients in season will make those bigger yields a

reality, and that is something all of us want to see.

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## TRADE OFFICIALS, ABC WORK CLOSELY TO MAINTAIN, EXPAND MARKETS

By ALMOND BOARD OF CALIFORNIA | Contributing Writer

Almonds encounter many hurdles and barriers during their travel to destinations in more than 100 countries around the world (all photos courtesy Almond Board of California.)

**A**FTER HARVEST, ALMONDS TRAVEL A LONG AND TWISTED route before they meet their end consumer, who may be enjoying a candy bar in Switzerland, or baklava served at an Algerian wedding, or tea-flavored almond milk in Japan.

Almonds travel to destinations in more than 100 countries around the world, and along their winding route, they encounter many hurdles and barriers: difficult inspection procedures, varied food safety regulations, excessive tariffs and bureaucratic red tape.

“While most shipments make it to their customers overseas with no disruptions, some consignments get held up in foreign ports for a myriad of reasons,” said Geoffrey Bogart, principal specialist for Global Technical and Regulatory Affairs at the Almond Board.

Fortunately for the California almond industry, skilled U.S. trade officials team up daily with Almond Board of California (ABC) staff, such as Bogart, and others to ensure almonds make it to their destination as seamlessly as possible.

“Key to ABC’s ability to address global regulatory issues in real time is the support provided by the U.S. Department of Agriculture’s Foreign Agricultural Service (FAS) officers and local staff,” said Bogart.

During The Almond Conference 2020 last December, four FAS officials from around the world joined a panel to discuss their work to address trade barriers and grow foreign markets for almonds and almond products.

### Navigating Complexities in the E.U.

One of the most complex, important markets discussed was the European Union (E.U.), where exports of California almonds were worth roughly \$1.25 billion in 2019.

Agricultural Minister-Counselor with FAS’s U.S. Mission office in Brussels, Belgium, Bruce Zanin, described E.U. food safety rules as “extremely strict” and enforced through a complex system where the central E.U. authority sets the rules, but those rules are sometimes enforced differently depending on the interpretation of many different national governments.

*Continued on Page 66*

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Geoffrey Bogart, principal specialist for Global Technical and Regulatory Affairs at the Almond Board said that the support provided by the U.S. Department of Agriculture's Foreign Agricultural Service (FAS) officers and local staff is key to ABC's ability to address global regulatory issues in real time.

*Continued from Page 64*

The situation was particularly challenging in 2017 and 2018, when unusual weather conditions in California led to higher aflatoxin levels in almonds. This triggered increased inspections and costs. When this occurred, Zanin said FAS and ABC engaged closely to preserve the industry's Pre-Export Check (PEC) program.

"We were able to stave off the member states so that when weather conditions improved, and aflatoxin [levels] went down, inspections went down," Zanin said.

"I hope it is clear to you all that export success in the E.U. regulatory realm, which is minimizing disruption of shipments and keeping down your transaction costs, comes from a close partnership between FAS Brussels, the other FAS offices in Europe and ABC," Zanin said. "Because of the hard work of the California almond industry and ABC, the excellent quality of California almonds is unassailable. In fact, the trade issues faced by California almonds are much less than other U.S. agricultural products.

"You're doing great, despite the E.U.'s complicated system."

### Addressing Challenges in India

With India's huge market for California almonds come significant technical barriers to trade, according to Jeanne Bailey, who was formerly FAS minister counselor in New Delhi. Today, she is deputy administrator for FAS Trade Policy and Geographic Affairs in Washington, D.C.

For example, India continues to consider a high number of chip-and-scratch to be a food safety issue rather than a grading issue, despite significant evidence to the contrary. To address this, FAS and ABC have been working with India's Food Safety Standards Authority and providing education and data. While the issue is not yet resolved, Bailey said the constant engagement has helped keep the matter from worsening.

She pointed to a successful example of engagement in 2020 when FAS and ABC teamed up to address an issue with port officials assessing the value of almond shipments based on outdated data. By intervening quickly and providing reliable data on more current values, FAS was able to persuade port officials to adjust the valuations downward.

"While these issues pop up suddenly, unfortunately it often takes months and sometimes even years to address them," Bailey said. "But one of the things I so admire about ABC is that they are there for the long run. Through their superlative trade servicing efforts and building of relationships, combined with working with the FAS Offices of Agricultural Affairs around the globe, they are able to have those conversations and help foreign officials better understand our grading system, the top quality of our producers and the top quality of our food safety."

### Opportunity for Growth in Japan

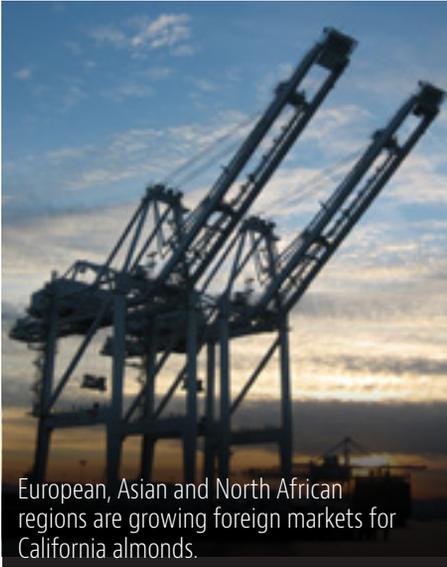
Japan, among the top markets for almonds, usually purchases between 75 million to 100 million pounds of almonds annually, worth between \$225 and \$325 million. Despite a slightly shrinking population, consumption in this country has increased over the past two decades.

"For almonds, there are prospects for continued growth, due in large part to increasing diversification of how people consume almonds," said Morgan Perkins, agricultural minister-counselor with the FAS Tokyo office.

"In particular, almond milk [consumption] has been growing very quickly in recent years, and there's strong potential for continued growth due to messaging on the health and

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European, Asian and North African regions are growing foreign markets for California almonds.

of testing 100% of shipments, increases costs and risk for exporters.

But there have also been recent successes. Under the U.S. Japan Trade Agreement, which went into effect on January 1, 2020, tariffs were eliminated for kernel, inshell and roasted almond exports to Japan. Previously, there was a 4% tariff on kernel/inshell almonds and 5% on roasted almonds.

The agreement will also gradually eliminate tariffs on almond flour and almond milk over the next three to eight years.

### Algeria: Market Again Open

In July 2020, the Algerian market was officially closed to almond imports. Prior to market closure, Algeria had been a small but growing market for California almonds. Handlers reported shipments of almost 10 million pounds in CY 19-20, which was an increase of 29% from the previous year.

With the unexpected announcement, ABC worked with the Embassy in Algiers to assist several handlers with consignments “on the seas” or in the port that had been impacted by the

closure. ABC provided almond export data to the Embassy to support the call for market re-opening. USDA and the U.S. Trade Representative also reached out to Algerian authorities to call for reopening.

These efforts eventually led to the government’s reconsideration of the almond ban and the recent announcement of re-opening, but with restrictions: California almond imports will be restricted during almond harvest time in Algeria (June 1 to August 31).

With the Algerian market back on line, Morocco close to breaching 30 million pounds, and the Egyptian market on an 8% growth spurt, North Africa as a region holds great promise as an emerging market for California almond shipments.

Industry members are invited to watch the entire panel discussion among FAS staff at [Almonds.com/Conference](https://www.almonds.com/conference).

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beauty benefits of consuming almonds,” said Perkins.

Though the U.S. enjoys a 97% share of the Japanese market, it is not without challenges. Japan has incredibly low tolerances for aflatoxin, so any detection above the tolerance level of 10 parts per billion leads to an outright rejection of shipments, with no in-market remediation. This, combined with Japan’s policy

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Aluminum sheet fencing substantially slowed down movement of voles in research trials (photo by Denise Stetson, Kearney Ag Center.)



Vole girdling damage in trees can be reduced by applying anthraquinone to trunks (photo by R. Baldwin.)

# Managing Burrowing Rodents in Walnut Research Updates Provide Insights into New Management Strategies and Tools

By TAYLOR CHALSTROM | Assistant Editor

**R**ESearch updates for burrowing rodents provide walnut growers with a more effective set of strategies and tools for damage prevention.

Burrowing rodents typically found in California walnut orchards include California ground squirrels, pocket gophers, voles, roof rats and deer mice. These rodents are found uniformly throughout the state, with most walnut orchards experiencing infestations of at least one species.

## Exclusion

Exclusion strategies in rodent management are ways that growers can prevent rodent pests from physically entering a protected area through the use of fencing and other methods.

Research conducted by Roger Baldwin, a UCCE wildlife specialist in the Department of Wildlife, Fish and Conservation Biology at UC Davis, found that fencing works for some rodent pests and not others.

“We dug trenches about two and a half feet

deep and put gopher wire down the length of that and allowed it to extend above ground to see if we could slow down gopher incursion into those areas,” Baldwin said during a presentation for the 2021 UCCE Virtual Walnut Series. “We suspected it probably wasn’t going to work and it didn’t; the gophers found their way around the fencing.”

Fencing for voles provided more effective means of slowing movement. Baldwin and other researchers used aluminum flashing sheets and buried it six inches below ground, allowing the flashing to extend 8 to 12 inches above ground.

“This did substantially slow down movement of voles,” Baldwin said. “It doesn’t completely stop it, of course, but it does slow it down. If you have adjacent habitats where you constantly have vole movement from and into an orchard, then I think something like this might be a good strategy.

“You’re probably not going to be able to fence off an entire field. That’s not practical,” he added. “You need to be able to move equipment in and out of the field, things along those lines.”

Baldwin also noted that any and all vegetation within one to two feet of the fence base should be removed as it may allow voles, which are dependent on crop cover to avoid predation, to linger and eventually figure out ways around the fence.

Walnut growers also can use tree protectors on the bases of newly planted trees to protect from vole girdling damage. This damage mitigation strategy, however, is labor-intensive and costly.

## Repellents

In general, according to Baldwin, repellants have not worked well for controlling rodents in field or orchard settings. However, lab results have indicated that anthraquinone, a



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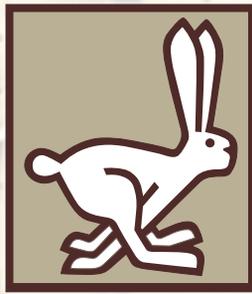
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*Continued on Page 70*



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Research shows the PERC carbon monoxide machine provides 56% to 68% efficacy for gophers and 66% to 100% efficacy for voles in various soil conditions (photo by R. Baldwin.)

“We found that it actually was a pretty effective repellent against voles,” Baldwin said. “With voles in our lab trials, we had 84% repellency using the highest concentration of anthraquinone.”

“We thought, ‘Well, this is pretty good, is this something we could utilize in a field setting?’” he continued. “We thought that tree crops might be the best scenario for which this might work. Voles, unlike other species, don’t climb well, so we thought that if we coated the bottom 10 to 12 inches of a tree where voles girdle, then that might be a way to reduce some of that girdling damage.”

Baldwin and researchers set up a

trial to analyze vole girdling during spring and summer seasons. They found that, depending on the season, girdling damage was reduced 10- to 20-fold when anthraquinone was present.

Baldwin noted that, in general, repellents require periodic reapplication in order to maintain efficacy, which can be costly and laborious. However, anthraquinone, he said, showed extensive longevity.

“We looked up to five weeks in summer and six weeks in springtime and did not see an increase in girdling damage,” Baldwin said. “We think there’s probably an extended period of efficacy associated with this [anthraquinone].”

*Continued from Page 68*

post-ingestive repellent, works well against some rodents, particularly voles.

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Keep in mind that with new growth in trees, there will have to be some reapplication periodically, but my guess is that once every year or two might be all that you need to do.”

While Baldwin believes that anthraquinone can be a good option for growers who experience extensive vole girdling damage, he said that the product is not currently registered for use, but is in the process of becoming registered, hopefully in one to two years.

Another possible application for rodent control using repellents is reducing damage to surface drip irrigation (SDI) from pocket gophers. SDI has become a popular irrigation option throughout the state, but Baldwin said that gopher damage is one of the biggest hurdles for greater implementation.

“The depth of the drip tape is usually at the perfect level for gophers, so they come through and chew quite extensively on this drip tape,” he said. “This creates situations like substantial flooding which leads to all kinds of issues.”

Baldwin said that he and researchers have begun to look at the potential of running a repellent through the water during an irrigation event to move gophers out of a particular area.

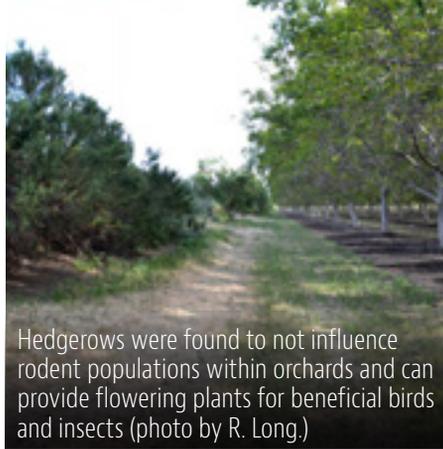
“There’s a product called Protec-T (active ingredient is methyl mercaptan) that just became registered for use in California in January of this year,” he said. “We’ve just begun to look at the efficacy of this. What we’ve seen so far is a 41% reduction in gopher numbers. It’s not getting rid of gophers, but it is reducing the number in the field.”

Baldwin said that they haven’t studied this method enough to determine whether damage is reduced on SDI, but he believes that the possibility of damage reduction is promising.

“We haven’t had a chance to do it yet, but we need to measure the number of strikes on drip tape. That’s the most important thing that we need to measure right now,” he said.

## Carbon Monoxide Machines

In the last few years, California has legalized carbon monoxide machines, sometimes referred to as pressurized exhaust machines, according to Baldwin, for burrowing rodent control. The devices inject carbon monoxide through



Hedgerows were found to not influence rodent populations within orchards and can provide flowering plants for beneficial birds and insects (photo by R. Long.)

hoses into burrowing systems and kill rodents.

Research conducted by Baldwin and others revealed that between 56% and 68% efficacy could be achieved for gophers across various soil conditions and 66% to 100% efficacy could be achieved for ground squirrels, all using a PERC carbon monoxide machine.

“The efficacy we observed with the PERC machine in dry soil conditions is much better than we would expect with more traditional burrow fumigants like gas cartridges or aluminum phosphide, and they seem to work as well or better than these same fumigants in ideal moist soil conditions,” Baldwin said. “So, I do think that these kinds of pressurized exhaust machines are probably very effective for ground squirrels and relatively effective for gophers.”

## Trapping

Baldwin also mentioned a new trap type for roof rats known as the A-24 repeating trap. The trap has an automatic lure pump and can be placed up into trees. Once the rat smells the bait and hits the trigger, a CO<sub>2</sub>-fired bolt will kill it, automatically resetting afterwards, according to Baldwin.

“The trap will reset up to 24 times and the lure will last for several months out there,” Baldwin said.

He noted that the traps can provide additional benefits such as reduced labor costs since they last for long periods, but are also expensive. “They are \$150 to \$200 a piece, and we’re still not sure how efficacious they really are,” Baldwin said.

Research is underway to address the efficacy of these traps.

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# Hedgerows and Rodents

**P**REVIOUSLY, IT WAS THOUGHT THAT hedgerows adjacent to orchards and fields might contribute to increased rodent incursion in fields and orchards. However, a recent study led by UCCE Wildlife Specialist Roger Baldwin and UCCE Farm Advisor Rachael Long did not find this to be the case. Instead, they found that hedgerows do not influence rodent populations within orchards.

“You do get some rodents that are in those hedgerows, but they [hedgerows] are too small on a large landscape scale to build up rodent populations,” Long said.

There were also concerns about whether or not foodborne pathogens were impacted by field-edge habitats like hedgerows, but the study found that hedgerows did not appear to increase food safety risk either.

What hedgerows excel at, according to Long, is providing flowering plants for beneficial birds and insects that control insect pest populations in adjacent fields and orchards as well as increasing biodiversity in general.

“Insectivorous birds like flickers and woodpeckers feed on codling moth pests,” she said. “You also have natural enemies like *Trichogramma* wasps that prey on codling moth as well.”

Additionally, the study found that hedgerows can reduce pest control costs and increase farm revenue. Long provided data from hedgerows in tomato fields that showed that 1000 feet of hedgerow surrounding a 40-acre crop pays for itself in 15 years for pest control services alone and in seven years with pollination added in. Only one out of the eight fields evaluated had to be treated with insecticides if a hedgerow was present whereas four out of eight fields had to be treated for those without hedgerows.

“12% of fields had to be treated with insecticides for aphid control if a hedgerow was present,” Long said. “If not (no hedgerows), fields were treated 50% of the time per year. So, that was a pesticide savings of several hundred dollars per year.”

# Gaining Insights: Investigating Cal/OSHA Citation Data

By **THERESA KIEHN** | *President/CEO, AgSafe*

**A**S YOU BEGIN TO PREPARE FOR THE upcoming season, be sure to spend some time ensuring your safety programs are meeting regulatory standards. An excellent way to tackle this best practice is to investigate agricultural citation trends from Cal/OSHA.

Each year, Cal/OSHA releases enforcement trends for all industries, including agriculture. Pay special attention to their top 10 citations. This data provides an insight into the agency's priorities and can help to focus your efforts.

The data released from October 2019 to September 2020 revealed fewer citations and penalties for the agricultural industry than previous years. However, do not be misled by those statistics, as this year included Cal/OSHA having to divert inspection resources to COVID-19 efforts. Concerning this most recent year of data available, the industry's 10 most common violations resulted in 320 citations totaling \$860,545 in fines. On average, agricultural employers paid \$2,689 per citation to Cal/OSHA alone, which does not include the added expense of appeal and subsequent increased employment costs, like workers' compensation insurance. Note that the order is based on the total number of citations issued, not the monetary impact of those citations.

## #1: Heat Illness Prevention

California Code of Regulations (CCR), Title 8, Section 3395  
Violations: 68  
Total fines: \$48,190

Since its inception, the heat illness prevention standard has historically been one of the ten most frequently violated standards by the agricultural industry. While we have made meaningful strides in improving our day-to-day operations, we continue to be challenged by the paperwork requirements of the regulation. As noted by Cal/OSHA, one

of the industry's remaining challenges is failing to have a copy of the company's heat illness prevention plan available in the field. It is critical that this document be available and easily accessible to all employees, not to mention Cal/OSHA enforcement staff, when requested.

As a reminder, the core tenant of the standard includes developing a company-specific heat illness prevention plan, in writing, with a copy available to employees in the location where they are working and available for inspection.

## The plan needs to include and/or address the following:

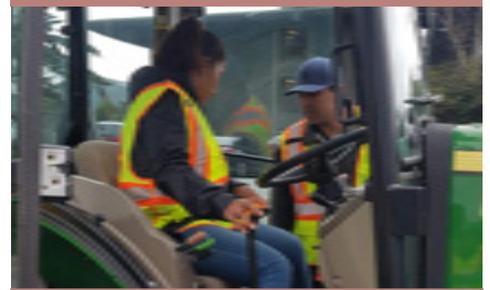
- Provision of Water
- Access to Shade
- High Heat Procedures
- Rest Periods
- Worker Training
- Supervisor Training
- Observation and Response Requirement
- Emergency Medical Services
- Provision for First Aid Training
- Acclimatization

Growers and processors who are still unclear about how to address compliance with the heat illness prevention standard are encouraged to reach out to AgSafe or their commodity trade association for assistance on how to implement this regulation.

## #2: Injury and Illness Prevention

California Code of Regulations (CCR), Title 8, Section 3203  
Violations: 60  
Total fines: \$128,260

When implemented in 1991, the Injury and Illness Prevention Program (IIPP) standard was the first of its kind in the nation. Even today, 30 years later, it stands out as the preeminent regulation specific to creating the foundation of an organization's occupational safety and health program.



Training employees in the safe operation of agricultural equipment not only protects your workforce and product, but it also ensures you are compliant with Cal/OSHA regulations (photo courtesy AgSafe.)

## The IIPP includes eight required elements:

- Identify responsible person(s) for program administration.
- Ensure employee compliance with safe and healthy work practices.
- System for communication with employees relative to workplace hazards.
- Procedures to identify and evaluate workplace hazards.
- Investigate injuries and illnesses.
- Procedures for correcting unsafe/unhealthy conditions, work practices and procedures.
- Provide employee safety training.
- Ensure thorough recordkeeping and document retention relative to the implementation of the safety program.

The team at Cal/OSHA works from the premise that all employers have an IIPP as the basis for their company workplace safety program. All other programs, such as heat illness prevention, hazard communications and lock out/tag out, to name a few, build upon the core tenants in the IIPP. As such, it is essential that agricultural employers remedy deficiencies that may exist in complying with this standard as they work to improve overall occupational safety and health.

## #3: Field Sanitation

California Code of Regulations (CCR), Title 8, Section 3457  
Violations: 32  
Total fines: \$19,245

The third most frequently cited regulation is specific to the provision of clean, usable field restrooms, handwashing facilities and drinking water. The

standard overall is relatively straightforward, and as an industry, our compliance challenges stem primarily from cleanliness. The bottom line is that employers need to invest time and resources to ensure field restrooms are kept clean, well-stocked and with ample potable drinking water.

**As a refresher, the standard requires the following:**

Provide potable drinking water, toilets and hand washing facilities to hand-laborers in the field.

Ensure there is one toilet and hand washing facility for every 20 employees of each gender, located within a quarter mile walk.

Facilities must be maintained properly, clean and in good working order.

**#4: Operation of Agricultural Equipment**

California Code of Regulations (CCR), Title 8, Section 3441

Violations: 12

Total fines: \$146,250

Fourth on the list of violations for the agricultural industry has to do with the operation of equipment. This standard is incredibly broad in nature, relative to the types of machines that fall within its scope. In addition, it is an area of our businesses that many employers take for granted. We often take employees at their word that they have been properly trained in the safe use of equipment. It is also common practice to not provide the requisite on-going training or insist that workers follow the company protocol relative to safe equipment operation.

Unlike the preceding standard, this is one that is directly correlated to our day-to-day activities and is exacerbated by complacency, production pressures and labor shortages. Unlike the previous standard, failure to comply with this regulation leads to serious injuries and fatalities, and as a result should never be taken lightly.

**In simplest terms, the regulation states the following:**

An employee shall be instructed in the safe operation and servicing of all equipment before that employee is assigned to operate the equipment.

Training shall continue annually.

Examples of this type of equipment include tractors, forklifts, ATVs, UTVs and other custom and specialty equipment.

A compliant program will include:

What personal protective equipment (PPE) is required to operate the equipment

Pre-Inspection Checklist

Use of seat belts

Lock Out/Tag Out/Block Out Procedures

Documentation protocol

**The remainder of the Top 10 list is as follows:**

#5: Reporting a Work-Connected Fatality and Serious Injury (CCR, Title 8, Section 342) – Violations: 13, Total fines: \$60,000

#6: Machinery and Equipment (CCR, Title 8, Section 3328) – Violations: 7, Total fines: \$39,565

#7: Lock Out/Tag Out/Block Out (CCR, Title 8, Section 3314) – Violations: 10, Total fines: \$60,245

#8: Industrial Trucks (CCR, Title 8, Section 3650) – Violations: 5, Total fines: \$25075

#9: Conveyors (CCR, Title 8, Section 3999) – Violations: 4, Total fines: \$40,800

#10: First Aid (CCR, Title 8, Section 3439) – Violations: 4, Total fines: \$1,500

Given our current reality with most of our emphasis on COVID-19 prevention, it is also important to maintain perspective and not to overlook the areas listed here. Use this information to evaluate your own operation, prioritize how to make improvements and consider where your greatest gaps exist.

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# Keeping Rodents and Bird Numbers in Check in Hazelnut Orchards

By **DANITA CAHILL** | *Contributing Writer*

**S**INCE MAN FIRST BEGAN GROWING HIS OWN FOOD, ANIMALS have made it a habit to help themselves to his crops. Controlling rodent and bird pests in hazelnut orchards is a constant battle. Unfortunately, there is no quick and easy fix. Instead, it's a long-term issue that requires constant vigilance to keep chewing, gnawing, nut-eating animal pest numbers in check.

## Mice and Field Voles

Rodents are one of the most destructive mammal pests to hazelnut trees. Small but mightily damaging, mice and field voles (sometimes called field mice) tunnel around the base of trees and gnaw at the bark of trunks and roots. They damage or even girdle small trees. Mice and voles are especially drawn to young, vulnerable, newly planted trees with tender bark.

So what's a grower to do?

Jeff Newton, farm manager of Crimson West/Christensen Farm in McMinnville, Ore., has tried all of the well-known methods to eradicate rodents.

"We bait 'em, bird pole 'em, keep the grass from around the trunks, keep the rows clean," Newton said.

When mice or voles do girdle and kill young trees, Newton cuts out the main trunk and lets the suckers grow.

"Use suckers from the roots. Not side shoots from the trunk," he said, noting that side shoots grow a weak tree.

Newton chooses three or four of the most promising suckers and prunes out all the rest. After the vigorous new suckers have grown for a while, he chooses the sturdiest one and trains it as a new, young tree. He removes the rest of the saved suckers.

## Squirrels

For such a small animal, squirrels can pack away an amazing number of nuts. In orchards near a wooded border, Newton has seen the adjacent floor of orchard rows picked clean. In short order, too.

"I came back the next day and all the nuts were just gone," he said.

Newton has spotted squirrels in the springtime sitting in the crotch of hazelnut trees stripping the bark and eating it. On closer inspection, he noticed those squirrels were all female and either pregnant or nursing young. Newton assumes they get essential minerals from the bark.

To keep the squirrel population in check, Newton uses traps. "Any kind of trap that will catch a squirrel," he said. "I set the trap with a hazelnut. I know they like hazelnuts," he



A cover crop that has been sprayed out in a nursery row of Polly Os. Sometimes removing a cover crop drives mice and voles to the trees (all photos by D. Cahill.)



A crow flies through an orchard. Crows are one of several bird species that eat hazelnuts.

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*Continued on Page 76*

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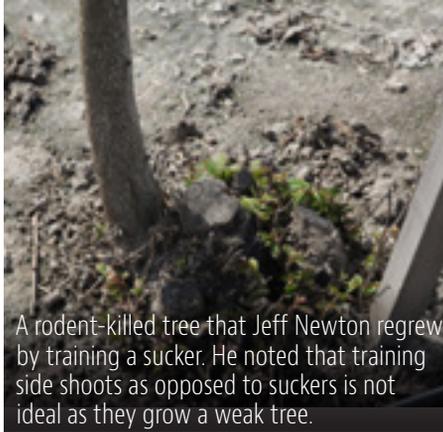
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Jeff Newton, farm manager of Crimson West/Christensen Farms.



A rodent-killed tree that Jeff Newton regrew by training a sucker. He noted that training side shoots as opposed to suckers is not ideal as they grow a weak tree.

Continued from Page 74

added with a grin.

### Red-Tailed Hawks as Day Hunters

Besides trapping, baiting and shooting varmints, growers can attract and utilize the hunting skills and appetites of birds of prey.

Red-tailed hawks, also known as chicken hawks in some parts of the country, are a beneficial addition to orchards. The biggest of the hawks, red tails weigh 2 to 4 pounds on average. Their plumage varies widely in color from one bird to the next, but most have a red-brown tail, which the sun

beams through during flight. They have eight times better eyesight than humans. Like humans, they see in color. In addition, hawks see colors in the ultraviolet spectrum. Mouse and vole urine is phosphoresced and visible under an ultraviolet light. So, for hawks, rodent runs appear as lighted highway maps from above.

Hawks hunt in open spaces, often from a perch. The red-tailed hawk is one species that has benefitted from clear-cutting for agriculture, road building and power line maintenance.

The hawk's diet is made up of 85% to 90% small rodents such as mice, voles, squirrels and gophers. But they also

prey on other birds, including crows, jays and starlings, all of which gobble hazelnuts. Attracting red-tailed hawks to orchards could save growers hundreds of dollars a year in salvaged nuts and trees.

Newton has seen hawks using Christensen Farm's bird poles, so the birds of prey are helping with rodent problems, even if they aren't eating all of the pests.

Red-tailed hawks are the most common raptors to use high perches, which can be either tall trees along orchard edges or man-made bird poles. There are other birds of prey that will intermittently use poles, too, such as the red-shouldered hawk, Cooper's hawk, merlin (pigeon hawk), American kestrel, white-tailed kite and great horned owl.

In the wild, red-tailed hawks have an average life span of 20 years, so if you can attract them, the parent birds and their offspring could stick around hunting pests in your orchard for decades.

### Attracting Owls as Night Hunters

Besides erecting raptor poles for

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2. Sand the perch (cross piece) to round and smooth the edges where the birds will sit.
3. Choose an open spot to erect the pole.
4. Face the T-perch in an east-west position.
5. Sink the pole 2 to 3 feet into the ground and anchor it with cement.

rodent control, Oregon State University also suggests installing owl nesting boxes to attract the night-hunting barn owl. It is a common owl species west of the Cascade mountain range.

Barn owls have a heart-shaped face, light, tawny feathers and a raucous cry. Like other birds of prey, they have sharp talons and excellent eyesight. Barn owls also have exceptional hearing. They swoop down silently on their prey and swallow it whole. Later the owls regurgitate a pellet made up of the hair and bones of their meal. The tell-tale pellets let you know owls are present in your orchard. Break open the pellets and see by the skulls inside what the owls are eating, most often rodents and starlings.

Barn owls readily nest in boxes if they are made to spec. Whether purchasing an owl box or making your own, keep the following in mind:

Size – Barn owls hatch many young at a time, seven is common. More is not uncommon. Offer a big enough box to accommodate many owls since they will reach full size while inside the nest box.

The box should be at least 24 inches deep, 18 inches high and 18 inches wide.

The entrance hole should be 5 to 5.5 inches. Owls want to be able to barely squeeze through. That way they are assured that larger predators, such as great-horned owls, cannot get in and attack their hatchlings.

Position entrance hole at least 6 inches off the floor of the box. This will prevent baby owls from tumbling out.

Paint outside of the box with white paint to reflect the sun and not overheat the owls inside.

Use 0.5-inch plywood for construction. Thicker plywood will last longer but will make a heavier, more unwieldy box to install.

Attach box to a pole, post or building 8 to 12 feet off the ground.

Face the entryway towards an open area.

### Rodent Issues and Cover Crops

Cover crops have both positive and negative effects on hazelnuts.

“They’re good, they’re great. They

have a lot of benefits,” Newton said. But, he adds, they can also cause problems.

Cover crops, especially grass, seem to attract mice and voles. When grass or weeds are left growing around the base of trees, the mice move in, set up house and start gnawing on the bark.

Taking out existing cover crops may also create problems.

“We took out the grass and the mice went ‘whoosh,’ right into the trees,” Newton said.

Irrigation can also draw mice.

“Mice moved in with nice, irrigated orchards,” Newton said. “I guess they like having a shower in their living room,” he joked.

Newton still plants some cover crops. For example, he drilled creeping red fescue seed in December. He uses cover crops primarily to prevent winter erosion.

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# Looking for Some Free Mowing? Grazing Agreements Come With Benefits, Caveats for Walnut Growers

By **CECILIA PARSONS** | Associate Editor

Growers need to find hullers and processors that are comfortable with grazing, and irrigation and management need to be done properly to ensure that manure is broken down (all photos by C. Parsons.)

**S**IGHT OF A LUSH GREEN COVER CROP GROWING BETWEEN rows of walnut trees was a draw for Visalia area sheep producer Cole Bakke. Not spending money on mowing and spraying was the goal of Jon Dolieslager, a walnut grower and operator of Tulare County Stockyard in Dinuba.

“We struck a deal that is a win-win for both of us. We eat his grass and Jon sells our sheep at his auction,” Bakke said in mid-March as he watched about 200 head of ewes and lambs graze a volunteer cover crop in the row middles.

This mutual agreement between a walnut grower and commercial sheep producer has a green light from a soil health perspective, but raises caution from the food safety standpoint. Krista Marshall, a researcher in the Gaudin Lab at UC Davis, said there are practical soil health benefits to grazing if it is managed well. Eric Heidman, vice president of

grower services at walnut processor and marketer Diamond Foods, LLC, said the company does not encourage livestock grazing in their grower’s orchards due to food safety concerns.

In Dolieslager’s view, saving on mowing and weed abatement costs in the orchard when walnut prices are low is a benefit to him. The 60-acre orchard of mature Serr walnuts is transitioning to organic production and is flood-irrigated. The nearby huller that takes in organic walnuts is fine with the sheep grazing, he said.

Grazing walnut orchards is a new opportunity for Bakke. His bands of ewes normally graze dormant alfalfa fields or are fed crop residues. Both of those feed sources are becoming difficult to find, he said. The ewes and lambs in the orchard are well fed on the filaree and other native plants growing in the orchard middles in the winter months.

Dolieslager and Bakke have a plan for grazing the orchard middles. Portable electric fencing keeps the sheep in one smaller area rather than allowing them access to the entire orchard. This removes the vegetation quickly and the sheep are moved to another area. It adds to time and labor on Bakke’s end, but this type of targeted grazing is becoming more common for sheep producers. The practice is called ‘mob grazing’ and moves sheep to fresh feed and cuts down on soil compaction.

“The sheep are taking that plant matter and making nutrients. It is incorporated into the soil and available to the trees,” Bakke said.

*Continued on Page 80*

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The collaboration between grower and shepherd needs to benefit both parties. Cost considerations for shepherds include transporting the animals, setting up electric fencing, providing water and moving the animals to avoid overgrazing.

*Continued from Page 78*

### Grazing Benefits

Ecological benefits to soil by using sheep to control winter weeds was the focus of a 2018 study at the UC Davis Gaudin Laboratory. The trial was conducted in a north coast vineyard and concluded that sheep integration increased soil microbial biomass and diversity in the top 15 centimeters of the soil and also enhanced the amount of soil fungi recycling plant residues into soil organic matter. The study also found that the added organic matter

improved the soil water holding capacity.

But, there are caveats. Marshall said that it is important to understand how you are using the animals in the orchard. Goals are different depending on if the animals are brought in to manage the vegetation or terminate it. Integrating animals to manage vegetation can benefit soil health. Research has shown positive shifts in nutrient cycling, carbon sequestration and microbial communities, Marshall said. The advantages are similar in terminal grazing operations, but they have to be

managed to prevent soil compaction.

There is increasing interest in incorporating livestock in managed crops, Marshall said, but it depends on the crop. Some, including nut crops that are shaken to the ground, are a challenge due to food safety issues.

The Food Safety Modernization Act rules state that animals must be out of the orchard or field 120 days prior to harvest. For organic production, the rule is 90 days. Heidman said that length of time does not take into account specific factors in each orchard. Manure may not break down evenly across the orchard. How an orchard is irrigated can make a difference in decomposition of the raw manure, he said.

“Dehydrators can turn you away due to manure in the load,” Heidman said.

Community Alliance with Family Farmers, a statewide agriculture policy advocacy non-profit, reports that typically sheep are brought into an orchard once cover crops are about 12 inches in height. Stocking density depends on cover crop conditions. In a dry winter, 200 sheep can be expected to clear one acre per day. Overgrazing is avoided by moving the flock once the cover crop is munched down to six inches. If rainfall is sufficient and soil conditions allow, the sheep are allowed to graze a larger area. Sheep are generally grazed until July 1, and the cover crop is terminated to prepare for harvest.

### Grazing Is Not a New Practice

Jeremy Shepherd of Winters, Calif. grazes his sheep in walnut orchards. Growers must have hullers and processors who are comfortable with the practice, he said. Irrigation and management done properly can break down any manure left behind. Stocking rates and the amount of feed available have

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to be considered.

Grazing livestock on crop ground or in orchards is not a new practice, but it is new to the current generation of growers.

Shepherd said Sierra Orchards, an organic walnut orchard operated by Craig and Sean McNamara, have been flexible and open to grazing sheep in winter months.

“They were open to figuring out the process to make it work. Instead of just saying no, they were willing to try and make it work,” Shepherd said.

Finding a sheep producer who is willing to bring animals in for grazing could prove to be difficult. The situation has to have value for both the orchard owner and the shepherd. Moving the animals to the orchard, setting up portable electric fencing, providing water and moving the sheep frequently to avoid overgrazing are all costs to the shepherd. There is also the risk of losing animals to predators. The trade-off is free feed.

Food safety and soil compaction

from the sheep are not concerns for Dolislager.

The sheep are only in his orchard for a few months, removed well before the required 90-day time period prior to harvest. The sheep are also moved frequently, and in the case of wet weather, are allowed to spread across a larger area to avoid compacting the soil. Plus, he has approval from the huller.

When the sheep are moved out at the end of March, Dolieslager said he plans to a compost application and start irrigation.

Conventional walnut growers may be a little leery of allowing sheep in their orchards due to a number of issues, Dolieslager said, but he believes they fit into his organic production. After his purchase of the walnut orchard a few years ago, he was approached by a neighbor who produces walnuts in an organic program and operates a huller for organic walnuts. Considering the higher premium offered for organically grown walnuts, Dolieslager began the transition. The older block of Serrs were



Tulare County walnut grower Jon Dolislager saves on mowing and weed abatement costs in his orchard by incorporating grazing sheep.

not going to turn a profit otherwise, he said.

“We really have to farm these as reasonably as possible,” he said. “Mowing and weed abatement are added costs that we can’t always recoup.”

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# CALIFORNIA POLLINATOR COALITION AIMS TO SCALE UP POLLINATOR FRIENDLY PRACTICES

## BROAD COALITION OF AGRICULTURE AND CONSERVATION GROUPS TO SUPPORT ADOPTION ON THE STATE'S WORKING LANDS

By **MARNI KATZ** | Editor

**A** CONSORTIUM OF AGRICULTURE, conservation and industry groups have formed the California Pollinator Coalition aimed at bringing to scale research and cultural practices to preserve and protect honeybees and native pollinators.

During a conference call announcing the launch of the coalition in early April, Laurie Davies Adams, president and CEO of Pollinator Partnership, said the goal of the new California Pollinator Coalition (CPC) is to bring current collaborations between agricul-

ture, research and industry to scale in a way that encourages large-scale adoption of pollinator-friendly practices that increase biodiversity, integrated pest management and carbon sequestration in the soil. The Pollinator Partnership is a 20-year-old non-profit dedicated to pollinator health.

Two of the most commonly adopted pollinator-friendly practices in almond orchards are planting of orchard perimeter hedgerows and in-orchard cover crops to create habitat and provide additional food sources for pollinators. The coalition will aim to fund research into these and other practices, demonstrate their effectiveness and challenges on working lands in California, and encourage their widespread voluntary adoption.

“This is designed to be a large and comprehensive coalition,” Adams said. More than 20 participants have signed onto the coalition, including conservation groups, research and outreach groups including UC ANR, and industry groups including trade groups for almonds, citrus and other specialty crops, livestock groups, pollinator groups and crop consultants. The Almond Board, Pollinator Partnership and CDFA are taking a lead role in the coalition.

Josette Lewis, chief scientific officer for the Almond Board of California (ABC), noted that “almonds and bees are a partnership designed by nature.”

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Cover crops are among the most widely adopted pollinator-friendly practices currently underway in almonds. The coalition hopes to scale up these practices through research and education (photo by Jessa Kay-Cruz/Xerces Society)

In joining the coalition, ABC is extending its support for pollinators beyond the millions of honeybees brought in each year to pollinate the almond crop to include native pollinators, such as birds, bats and butterflies.

“Working lands can and should be part of the solution,” Lewis noted.

Populations of native pollinators, such as the Western Monarch butterfly, are imperiled, according to Xerces Society for Invertebrate Conservation, Native pollinators. In the 1980s, there were an estimated 4.5 million monarchs that overwintered along the Pacific Coast. In 2019, the number had dropped to approximately 29,000, and in 2020, the Western Monarch Thanksgiving Count tallied only 1,914 monarchs. Loss of overwintering habitat is cited as a major contributor to this decline.

CDFAs Secretary Karen Ross pledged

the support of CDFAs and sister state agencies to fund activities and goals of the coalition as well as incentive grants for growers through existing programs such as the Climate Smart Initiative and Healthy Soils Program and noted there are also opportunities to draw down federal dollars from agencies such as the USDA NRCS. The goals of the partnership fall in line with the governor’s biodiversity climate change priorities and are also an important component of food security in California.

Ross noted the importance of encouraging “pragmatic” solutions for land operators.

“The bottom line is we want to establish habitat and provide guidance so if people are reluctant they have what they need to get started. It really is a partnership that can produce on-the-ground results,” Ross said. “Bringing

this group together gives us a new model for showing what we can do together.”

The Almond Board hopes to develop new and existing partners for managing habitat for native pollinators, including irrigation districts and other agencies that can help growers

offset costs for pollinator-friendly practices. Lewis cited data in the California Ag Sustainability Program that shows 30% of almond acreage has hedgerows maintained with flowering shrubs for pollinator habitat. A recent study that estimated costs of developing hedgerows at about \$1,700 an acre noted that only about 10% of the farmers currently practicing hedgerows realize a financial benefit beyond their costs. Grants through the Healthy Soils and NRCS

*Continued on Page 84*

“THE BOTTOM LINE IS WE WANT TO ESTABLISH HABITAT AND PROVIDE GUIDANCE SO IF PEOPLE ARE RELUCTANT THEY HAVE WHAT THEY NEED TO GET STARTED.”

-KAREN ROSS, CDFAs



Almonds and bees are a “partnership by nature,” and the coalition aims to broaden the use of mutually beneficial practices.



Adult monarch on narrow-leaf milkweed, *A. fascicularis*. In 2020, the Western Monarch Thanksgiving Count tallied only 1,914 monarchs (photo courtesy Stephanie McKnight/Xerces Society.)

*Continued from Page 83*

program can help offset some of those costs for growers.

Ross noted the balance growers maintain on choosing which practices to implement in their orchards. One change in practices can have implications on many other practices. How do cover crops, for instance, impact irrigation, nutrient and pest management?

The goal of the coalition will be to demonstrate those tradeoffs and provide technical assistance to help growers manage them.

“It takes money to do these projects,” Adams noted.

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# Developing a Long-Term Plan for Your Orchard: Take it Five Years at a Time

By MALLVINDER KAHAL | Atlas Almonds

When making a long term plan, it's best to break it down into five-year increments (photo courtesy USDA NRCS.)

**A FARMER IS MAKING A DECADES-LONG DECISION WHEN** developing an almond orchard. If fortunate, that decision will span a quarter century. Unfortunately, digesting a 25-year timeline is a tall task for even the most methodical minds. The only sane option is to break this life cycle into phases that allow for adaptable planning. In our case, let's break it into nice and neat five-year spans. These are the five phases: Development, Recovery, Momentum, Equity and Endgame.

While making these five-year plans, it's important to remember that as time passes, so too will your orchard and your life. If you plan for your trees in manageable increments, then you should know what these five years will look like.

It's easy for the traffic of our lives to sweep our minds from having the chance to really sit down and plan, but it's critical because the next five years of your life will be the most important.

Your outset on planning will be unique to your situation and where you are in life. That being said, a five-year plan at its core is just a series of questions that can be asked at any stage of your career.

## Consider Time and Risk

Let's start with the most important one: Is farming something you want to keep doing? If yes, you must decide how involved you want to be. Does your operation require your full-time effort, or are you balancing another career that would require some outside management? Then you should ask how much you would like to grow your operation.

Growth requires risks. These risks could mean taking on loans or making purchases that aren't guaranteed bets. Aside from financial risk, you also should consider how much of your own time you truly want to put in. Growth will require more of your time, which will leave less time for your family and personal interests. Some farmers are okay with stepping outside their comfort zones while others prefer the security of maintaining the current size of their operation. Neither paths are wrong, but it's important to consider both options.

Regardless of your goals, the next question is: Does this make financial sense? Does keeping the farm provide the margins needed to maintain the standard of living you want for your family? This question is heavily dependent on where you are in the five phases of your orchard. If you're in the development phase, then know that you'll be investing money for years and won't start seeing a single dime until the recovery phase. Ask yourself where the money will come in during this phase. There's a very slim chance that a farmer will have savings to survive on, and many farmers are too busy with their own orchard to pick up a second job. A farmer has to be ready to have the mindset that the money for everyday personal expenses during some years of the orchard may have to come from a loan. And there is nothing wrong with that as long as it makes sense in your financial planning.

Farmers must decide how much money they need for their personal expenses. We value this as a standard of living. It goes without saying that we should live within our means, and that's the value we need to first determine. A simple way

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Mallvinder Kahal is a second-generation almond farmer and 2016 graduate of the Almond Board's Almond Leadership Program (photo courtesy M. Kahal.)

of putting it is how much money is left over after all farm expenses (cultural costs plus loan payments) plus any income that comes outside the operations. Next, you must determine whether you want to utilize that full value in your personal expenses or are looking to use less in hopes of applying it to further growth or saving for a rainy day. If you want to grow your operation, you'll likely have to live way under your means. But if you're comfortable with your current setup, then there's no harm in fully using that value for more comfort in your life. It's also important to remember that, as farmers, we have the added benefit of creating "savings" by paying off farms, which provide a base of equity.

Finally, a farmer must consider that the market and crop pricing can easily change year to year. Your financial planning should incorporate three models: poor, good and average crop prices based on historical market trends. This gives you a worst-case and best-case scenario and may help inform how much you can truly afford to spend. Hope for the best, but plan for the worst.

Identifying your financial/growth/career goals is the first step. Step two is determining what standard of living you'd like to maintain during the five-year stretch. Afterward, adjust your number based on income/expenses and adjust them in the case of poor market conditions.

I want to make sure that we do not fail to recognize a critical component in creating a five-year plan. That compo-

nent is identifying the emotional part of what we do. I truly believe that being the best farmer you can will be driven by an emotional engine. We're all fighting to put food on the table, we're all hoping to make somebody proud, and some of us are dead-set on leaving our mark on this world. Regardless of the why, pursuing this life will start to wear on you, and there will be many days where it will take more than you have to give. So give your best shot. Plan for what's to come.

But, when developing these grand plans, don't forget that you're just one person and you need to cut yourself a break here and there. After you're done doing that, remind yourself that you are a farmer, and there is nothing on God's good green Earth that you can't handle.

*Comments about this article? We want to hear from you. Feel free to email us at [article@jcsmarketinginc.com](mailto:article@jcsmarketinginc.com)*



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# Pecan Industry Federal Marketing Order Targets Strategic Plan Goals

By **AMERICAN PECAN COUNCIL** | *Contributing Writer*

**T**HE AMERICAN PECAN COUNCIL (APC) IS the Federal Marketing Order (FMO) for the U.S. pecan industry representing all pecan stakeholders across 15 growing states from North Carolina to California with the oversight of USDA. Industry came together to create the FMO to address the want and need to engage in widespread marketing activities to grow consumer demand for American Pecans.

The five critical areas an FMO focuses on are domestic and international promotion and marketing, research, grades and standards, compliance and data and statistics. APC cannot lobby, buy or sell product, set price or set tariffs.

During the 2018-19 fiscal year, the

Council voted unanimously to move forward with developing a strategic plan. The concept of the plan was to have a non-biased, outside consulting firm analyze the industry and look at the areas that the Council should focus on with its limited resources. The result was a finalized plan that focuses on five areas. These include: Winning its fair share of tree nuts; Leading among global suppliers; Strengthening our infrastructure; Modernizing the industry; and Uniting the pecan stakeholders. The results of these activities have been exceptional.

## Winning a Fair Share

Data showed that prior to the FMO, the U.S. Pecan industry remained

stagnant regarding overall growth, domestic and international demand, and consumption. Regarding top-of-mind awareness, pistachios, walnuts, cashews and peanuts all rose high above pecans prior to the industry's consumer brand launch. What these programs have under their belt is time and resources, with the youngest organization out of those listed, pistachios, being established in 2004. Walnuts have been established for over 50 years. Luckily, pecans are a part of a multi-billion dollar nut industry. Nut consumption in the U.S. has been steadily increasing.

Health research findings for nuts and the increased interest in a healthy diet have contributed to this increase. There

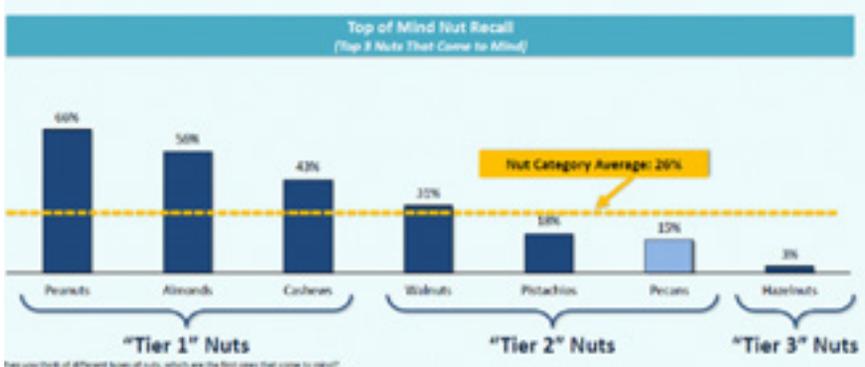
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Top of mind recall for pecans is low compared to other nuts (all photos courtesy APC.)

## Marketing Strategy Recap for 20/21

Over 75¢ of each Industry \$1 is Invested in marketing.

### REFOCUS:



- Public and Media Focus only
- Amplified Campaigns
- Healthy Snacking
- Reinvested Resources Elsewhere

### REPURPOSE:



- Move Activities
- Inhouse
- Advertise Regionally
- Nutritional Alignment
- Regional Approach

### REVIEW:



- Manage marketing through measurement
- Inhouse tools to check the checker
- Focus on TOMA, Impressions (digital views) and Lift

APC implemented a very robust campaign on refocusing, repurposing dollars and utilizing metrics to make sure everything is working effectively and efficiently.

was untapped potential for major growth in pecans. The FMO was created for this very reason: to pull industry resources together that spread across three regions and many states to create a single, unified national voice for American Pecans. Under the FMO, pecans can finally shine a light on our industry that has come together to share the story of the American Pecan.

Prior to the FMO, pecans had not experienced the same growth in consumption compared to other nuts who all benefited from Federal Marketing Orders for decades. The creation of the FMO was the first step in enabling pecans to win their fair share in the multi-billion-dollar nut industry. Although the pecan FMO is still a young organization (a little more than four years old), it has proven the strength of a unified and strategized marketing voice.

### National Voice for American Pecans

The consumer research that was conducted prior to the official brand launch of American Pecans showed a very low top of mind recall for pecans when compared to other nuts such as peanuts,

almonds, cashews and walnuts.

With a little over four years into the establishment of the Federal Marketing Order, Pecan's share of voice came in at 29% during the 2020 holiday season, trailing the leading nut by 1%.

APC implemented a very robust campaign on refocusing, repurposing dollars and utilizing metrics to make sure everything is working effectively and efficiently. The diversified marketing efforts reach the target audience across key touch points including initiatives with social media influencers and health and wellness professionals. Marketing is a huge focus for APC as over 75 cents of each industry dollar is invested into consumer marketing.

### Influx in Supply

Nuts have experienced a strong demand growth worldwide over the last couple of decades. The research conducted by the strategic plan showed that pecans severely lagged other tree nuts in many key dimensions for growth.

*Continued on Page 90*

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Domestically, consumer demand was stagnant, with consumer awareness behind other similar nuts as mentioned above. The same trend was seen in the global market, and global supply is forecasted to grow over the next ten years. The current projections show that supply is growing much faster than demand at 33%. If there were to be no unified marketing push, the pecan market would hit a surplus and face potential price depression.

A very important reason the FMO was created was because we knew an influx of pecans were coming and going to flood the market if nothing was done. Industry’s studies reiterated this fact. Global supply was shown to be at 680 million pounds in 2017. With the projected supply growth from China and South Africa, pecans are looking at a global supply of 1.2 billion pounds by 2027. The supply excelling in growth compared to demand could lead to the gradual oversupply. Based on the research and data presented, we need to make sure that we continue to expand markets, expand consumption and stimulate demand to capture new supply and diversify global demand to grow a sustainable market for pecans.

How do we prepare for the influx of pecans? How do we make sure American pecans and local markets are protected? For every pecan displaced or moved, the industry wins. We want to make sure we educate and keep consumers aware and buying pecans so we do not impact the already established markets. Thus, the FMO was created to combat all those pecans projected to pile up in our neck of the woods, which will eventually lead to less demand and lower prices.

### Industry Data

What we have seen since the FMO’s formation are great results for it being such a young organization. Let us look at the movement of pecans since the FMO. Pecan shipments, when compared to this time last year, pre-COVID-19 and even during the COVID-19 crisis, are still higher than they were last year.

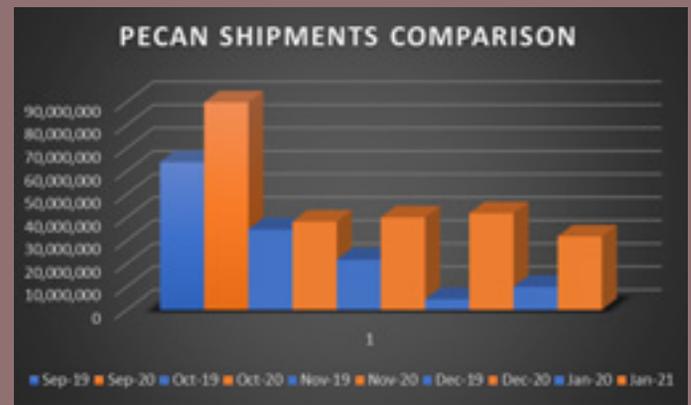
Our share of voice, amount of people listening and consumer recognition is substantially up. When we started, pecans were at 12%; now, we are at 32% to 33%. Our consumption is going up. Pecans purchased outside the U.S. is a lot lower, which means people are buying more locally.

It is vital to continue that. Internationally, our exports compared to a year ago are up, including those of China.

We need to keep those markets going because we do not want those pecans to stay here and start leaking into established markets.

Just like with a pecan tree, it’s important to remember the fruit of all labor is not instantaneous. The pecan industry is still laying the groundwork and building a strong foundation that will set the future of pecans up for success in the years and decades to come. FMOs are one critical tool in the toolbox. Without the FMO, standards, marketing and promotion, research and data would go away. These activities that are now being conducted and are establishing for the first time an opportunity for the industry to have transparency and, ultimately, have data to analyze and make critical marketing decisions.

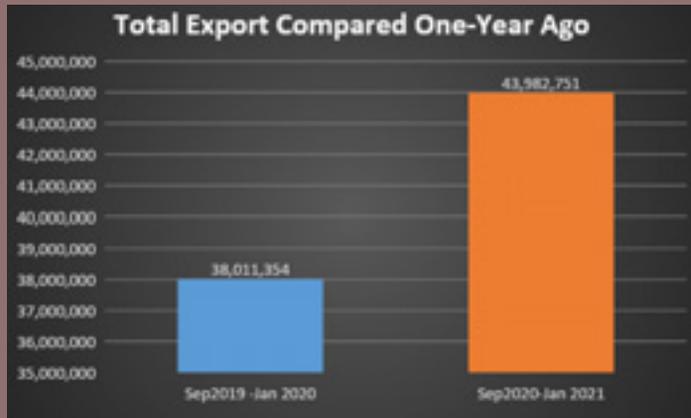
The FMO provides an opportunity for everyone to play by one fair set of rules for standards. Furthermore, the FMO



Shipments of pecans were up significantly in 2020-21 compared to 2019-20.



Less pecans were purchased outside of the U.S. by U.S. handlers in 2020-21 than 2019-20, signaling a shift to more local purchasing.



Exports in 2020-21 are up from 2019-20, including in China.

provides an opportunity to unite the industry under one organization and one message, paving the way for everyone to work together toward a common goal: Increasing awareness and demand for pecans. We are doing everything we can to help promote American Pecans and protect as many markets as possible while also expanding markets and being prepared for the gigantic load of pecans on its way. The goal of the Federal Marketing Order for pecans has and always will remain the same, to increase demand for American Pecans and provide industry with a path to sustainably grow profitability across the value chain.

*Comments about this article? We want to hear from you. Feel free to email us at [article@jcsmarketinginc.com](mailto:article@jcsmarketinginc.com)*



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