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JCS Marketing would like to express our deepest sympathies to our readers, colleagues, friends and family who have been impacted by the recent fires in California.

For disaster assistance go to USDA Disaster Resource Center to find information about specific disasters and emergencies and connect with state and local help. You can even view, print, and download a quick reference guide to USDA Disaster Resources for Farmers, Ranchers, and Communities. Also go to https://www.farmers.gov/recover.
The opportunity to ask questions about nut varieties drew an early morning crowd of growers to the South Valley Nut Conference in Tulare.

Questions ranging from cankers to clonal rootstocks were answered by Cliff Beumel of Sierra Gold Nurseries, Kern County University of California Cooperative Extension (UCCE) advisor Craig Kallsen and Ben Goudie of Blue Diamond Almonds during the 30-minute session.

**Band Canker**

Determining the cause of the canker outbreak is the first step in addressing the issue Goudie said. Higher levels of Band Canker have been observed recently according to Beumel, though the issue is not new. The rapid growth of the young trees will lead to growth cracks in the bark and an easy entrance for Botryosphaeria infection and development of cankers. Irrigation systems that wet the trunks also contribute to the higher incidence of cankers, Beumel said. Some varieties appear to be more susceptible than others, including Wood Colony, though information is limited.

UCCE has initiated research on Band Canker, he added.

Goudie said phosphite or fungicide treatments to affected trees can be done, but without management of irrigation, the disease will continue to spread. Treatments can assist in controlling the spread of canker, but as long as the tree trunks continue to be wetted by irrigation, the problem will persist.

**Golden Hills Pistachio Variety**

Growth in popularity of Golden Hills pistachio variety is due to its similarity to Kerman and an earlier harvest. Spreading out the harvest lets growers and processors use their equipment and facilities longer and more efficiently. Kallsen reported the majority of new orchards planted in recent years have been Golden Hills—but total acreage of 50,000 is still far below Kerman, the main variety of pistachio in the San Joaquin Valley. Kallsen said there is no ‘perfect’ variety of pistachio for Califor-
nia growing conditions.

Kallsen's overview of the pistachio varieties included information on Kerman, Golden Hills, Lost Hills, Kalehghouchi, and Gumdrop. Gumdrop, released in 2016 is a very early variety. Golden Hills and Lost Hills are next in line. Kerman overlaps Lost Hills and Kalehghouchi is the latest maturing variety.

**Independence Variety**

Goudie explained pricing on the self fertile Independence variety of almond that is being widely planted. This relatively new variety was accepted under Nonpareil pricing early on, he said but as the volume has increased and more are marketed, the value has declined where it is now 15-20 cents off Nonpareil.

“It looks like it has found a place as a 'utility nut,' Goudie said. “It is a good variety for a lot of growers and an option that has a lot of positive attributes.”

He said there are challenges in getting the nuts off Independence trees in the early producing years. Nutrient management might be the answer to that issue, Goudie said. Nitrogen applications could be tapered off earlier to slow vigorous growth. The variety also sets a scaffold early making it harder to shake. Once the tree gets to the fifth or sixth leaf, Goudie said the nuts set more on the outer branches and shake off easy. He advised growers to work with Dave Wilson Nursery and follow their advice on tree maintenance. Removing mummy nuts at the second-fourth leaf stage is important, he said to get ahead of navel orangeworm infestations. Shaking is best done, Goudie added, when there is some moisture on the nuts making them heavier and more likely to come off the tree.

**Shasta Variety**

Another self-fertile variety, Shasta is gaining attention. Beumel said this Burchell Nursery variety is another option for growers. He likes the vigor of the tree and shaking results have been

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*Continued on Page 6*
good. They can be planted in standard spacing with Nonpareil. Unlike Independence, Burchell has licensed other nurseries to grow Shasta and therefore it is more widely available. Beumel said Sierra Gold has sold Shasta to growers for the past two seasons.

As for the best variety—or the most popular variety? Beumel said that is a question for nurseries as they are always working about two years ahead with propagation and they don’t bud what they don’t sell.

Butte-Padre are making a comeback, he said. Nut prices are lower than Nonpareil, but the consistent higher production can off set price. The advantages of these varieties is that they are later blooming trees, so they escape freezes, that carries on fewer spray applications and one shake at harvest.

“They are not selling a million of them, but the ones that are coming out, they are putting them back in,” Beumel said.

**Carmel Variety**

Carmel is another variety that produces a versatile kernel, Goudie said. If you ask handlers what is in demand, they will respond that this variety is good, even with the reputation of bud failure. There are also sources of Carmel from some nurseries that have a proven low incidence of bud failure. Beumel said Sierra Gold is one of those nurseries.

**Revenue Per Acre**

With variety choices, Goudie said, it is all about revenue per acre.

“You have to look at what is working for you,” Goudie said. Switching to other varieties can present new issues.

Revenue per acre, price per pound and bloom timing are drivers for almond planting choices, he said.

**Walnuts**

One of the more interesting questions of the day was posed by Kallsen: Why are no walnuts being grown in Kern County?

There are a few brave souls who have planted walnuts there, Beumel said, in 10-20 acre blocks. Chandler is a good choice for that region he said, as it is the most adaptable and dependable. There are also lots of good clonal rootstocks available that would suit particular soils or growing conditions.

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*Continued from Page 5*
Introducing HELMSTAR PLUS SC. A new champion for best in class disease control.

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Managing and Controlling Canker Diseases IN ALMONDS AND WALNUTS

By: Cecilia Parsons | Associate Editor

Options to control Botryosphaeria (BOT) diseases in tree nut crops include good sanitation and cultural practices to reduce the amount of inoculum in the orchard.

University of California plant pathologist Themis Michallides covered the range of BOT diseases that affect walnut, pistachio and almond trees and how growers can reduce infection at the South Valley Nut Conference in Tulare.

Panicle and Shoot Blight of Pistachio

Panicle and Shoot Blight of pistachio was discovered in 1984 in a commercial orchard in northern California and has become a disease of major importance. Buds infected by *B. dothidea* either will not emerge or will emerge, but the flower or shoot eventually dies. Symptoms of the infection are dark lesions at the base of shoots, rachises and mid ribs of leaves. Later in the growing season, brown, blighted shoots and leaves are easily seen among healthy foliage.

Buds are highly susceptible to infection from pre-bloom in mid-March until the end of May. Rainfall during this time can result in significant infection if spores are present and temperatures are above 50 degrees F.

Leaf stem and mid rib infections are very common and usually are the first symptoms to appear during an epidemic of panicle and shoot blight in an orchard. Infection on the pistachio nut hulls appear in mid-summer as pinhole size, round black spots. The lesions enlarge, turning the hulls of infected nuts black. Eventually, the hulls of infected nuts become light gray/yellowish to silvery with small black spots. Usually only one or two to several fruit per cluster are infected and these develop the characteristic light gray color, while the rest of the blighted nuts turn tan to brown as the cluster collapses.

Michallides said the disease could be spread in an orchard by water, insects, birds, pollen and pruning equipment. Studies have shown that the disease can spread to two to three cuts after a tool has cut infected wood.

The best control options if the orchard has a history of infection are selective pruning and removal of prunings, and timely fungicide spray applications. A list of products registered for pistachio can be found at ipm.ucanr.edu/PDF/PMG/fungicideefficacytiming.pdf.

Leaf Wetness Model

Fungicide application can be done by calendar or by use of a leaf wetness model, which can signal optimum time to prevent spread of infection. The four calendar sprays are: mid-April, mid-May, mid-June and mid-July. The leaf wetness model is weather dependent. Length of time leaves are wet and the temperature determine spray necessity.

Michallides noted that bloom and spring sprays are necessary and spraying either two to three days before rain is forecast or after provides the best control.

Continued on Page 10
Happy Holidays!
from the
Scott Family
Botryosphaeria or Phomopsis Cankers in Walnuts

Botryosphaeria or Phomopsis cankers in walnuts are first seen as wilting and flagging leaves on branches adjacent to a canker. Walnut leaves are not infected with BOT. Nuts are infected first with the pathogen entering the hulls at the site of an injury or insect feeding. Other contributing factors in infection are sunburn, hail damage, downy spot and leaf scars. Symptoms appear later in the summer as the hulls turn black, then brown. Infections can spread to adjacent nuts and invade the peduncles and spurs, resulting in black cankers and dead buds. The presence of walnut scale increases the likelihood of BOT infection. Michallides said 60-70 percent more shoots were infected when scales were present.

Pruning diseased limbs, cutting back to healthy wood can remove the pathogen. Chipping prunings can reduce inoculum level in the orchard and should be done in orchards where infection levels are below 50 percent. Over that number and removal won’t affect the inoculum level.

Huller debris is generally heavily infected and should be chipped.

Growers have three options for fungicide spray timing. Infection levels at 20-50 percent can be handled with one spray in late June. Higher levels warrant three standard sprays from mid-May to mid-July. The leaf wetness model can also be used to time fungicide applications.

Band Canker in Almonds

Band canker in almonds is a BOT canker disease. This canker typically shows as a line of cankers around the trunk. This disease can kill trees at a young age.

The infection enters the trees through growth cracks in the bark or pruning wounds. Most infections occur during wet weather in the spring.

Michallides said keeping tree trunks dry reduces the incidence of band canker and slows growth of existing cankers. Use of splitters on sprinkler heads is recommended.

Research into band canker infections on very young almond trees indicates the pathogen infected the tree before it was planted or soon after delivery to the field. The band canker pathogen can now be detected on symptomless tissues of young trees. The uniform pattern of band canker on very young trees indicates the trees may need to be protected at a very young age.

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Continued from Page 8

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CONSUMERS AROUND THE GLOBE ARE BUYING CALIFORNIA WALNUTS

Over 30 billion California walnuts have made their way into export markets for snacking, commercial and home baking, trail mixes, savory sauces, restaurant menus, ready-to-eat meals and more this past crop season.

Marketing programs are the key to building consumer demand to expand distribution and raise consumption.

Here are the numbers:

Walnuts were the 4th leading export commodity from California.¹

Every $1 spent in California walnut export promotion returned over $26 in export revenue to the industry.²

Each $1 in FAS-taxpayer support for California walnuts export promotion generated over $15 in tax revenue creation.²

Spending on export promotion in 2017 created 2,682 jobs.²

66% of the California walnut crop was exported in the 2017/18 crop year.

Top 10 Export Markets:

Germany  Japan  Turkey  Spain  Korea

Italy  Greater China  Canada  UAE  Netherlands

Currently, the California Walnut Commission (CWC) conducts targeted marketing programs in eight countries throughout Europe and Asia, including an EU regional industrial program, positioning California walnuts distinctive quality, taste, versatility and nutritional benefits. Industry growers, handlers, and the CWC have made great strides by working together and will continue building demand in an ever-expanding global market.

¹ California Agricultural Statistics Review 2016/2017 by CDFA
² Economic Evaluation of the California Walnut Commission’s Export Promotion Programs: An Analysis of the Direct and Indirect Impacts, January 2018, Harry M Kaiser, Cornell University
It's no secret that much former flood irrigated cotton ground is prone to water logging and salinity. This ground has been converted to pistachio orchards on drip irrigation. Blake Sanden, University of California Cooperative Extension (UCCE) irrigation-soils advisor emeritus from Kern County, who has spent his career digging up soil samples and evaluating orchards sites, has seen some spectacular results in pistachio production along with struggling trees that never reached their production potential.

High Salt Loads

Sanden’s presentation at the South Valley Nut Conference centered on the effects of high salt loads in soil and water on pistachio and almond orchards and sampling for new orchards.

High salt loads in the soil and irrigation water inhibit uptake of nutrients, and interfere with the process to produce high yielding nut crops. Salt increases osmotic potential. This costs the plant energy and limits critical processes like cell expansion for germination and shoot growth. Excessive sodium, chlorine and especially boron can burn and desiccate almonds. Sanden said he has observed many almond orchards stress and defoliate as early as July. High sodium levels can also adversely affect young pistachio trees, though they are more tolerant than almonds.

Enabling Plant Growth

The key processes that enable plant growth and yield are photosynthesis and carbon dioxide uptake. When a tree is exposed to high salts and water uptake is reduced, the size of the stomatal openings on the leaves is reduced and uptake of carbon dioxide is reduced.

Improving Crop Outcomes

Soil and water conditions at an orchard site can be limiting, but there are factors that growers can use to improve crop outcomes. Those include irrigation methods, distribution patterns, irrigation frequency and pressure regulation. Sanden’s strategy for soil and water challenges is to first understand normal salinity standards and toxicity. Soil test lab reports often use tables to show when thresholds for electri-
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Salinity Levels Vary

Salinity levels can differ across an orchard site. Sanden recommended using soil surveys, Google Earth images and backhoe pits to assess different soil textures and layers across a field. Another strategy for orchard sites is to monitor in-season soil water content, plant water status and collect and analyze soil, water and plant tissue samples. Aerial imagery can also identify irrigation stress and non-uniformity.

Sanden said irrigation uniformity has a big impact on the actual depth of water applied, leaching, final salt deposition and yield. He recommended measuring distribution uniformity and improving it.

Leaching

Poor uniformity of water penetration can lead to leaching at the head end of the rows, and mite infestations and early defoliation on the tail ends with surface irrigation. Pressurized systems do not guarantee uniformity. Sanden said that use of non-pressure compensating emitters in orchards with rolling topography can cause bad distribution uniformity.

Finally Sanden recommended searching out information on soil amendments and infiltration. Sites include:

http://cekern.ucanr.edu/Irrigation_Management/ANALYTICAL_CONVERSIONS_AND_LEACHING_CALCULATIONS/

http://cekern.ucanr.edu/Irrigation_Management/IMPROVING_WATER_PENETRATION/

http://cekern.ucanr.edu/Irrigation_Management/SITE_EVALUATION_AND_SOIL_PHYSICAL_MODIFICATIONS/

http://cekern.ucanr.edu/Irrigation_Management/MANAGING_SALINITY_SOIL_AND_WATER_AMENDMENTS/

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Bud Abscission Research on Pistachios SHOWS PROMISE

By: Kathy Coatney | Editor

Many fruit and nut crops commonly grown in California have the tendency for some alternate bearing, but it is most severely pronounced in pistachio.

“Pistachios will have one year of very heavy bearing, followed by one year of significantly lighter bearing,” according to Leigh Archer, Horticulture and Agronomy MS Candidate at the University of California (UC), Davis, working with Louise Ferguson, extension specialist, Department of Plant Sciences at UC Davis.

Causes of Alternate Bearing

Archer explained that, in order to understand alternate bearing, it is important to understand the bearing habit of the pistachio tree. The same shoot produces both the current year’s crop on one-year-old leafless wood and simultaneously is growing the new leafy shoot that bears buds for the following year’s crop.

“So any one shoot, any one individual branch on a pistachio tree has fruit both on the one-year-old wood with the current crop and buds for the next season’s crop on the current year’s shoot,” Archer said.

This concurrent growth and development exerts a high demand on the leafless one-year-old shoot’s available carbohydrates, particularly before the leaves of the current year’s shoot growth are mature enough to produce more carbohydrates to support nut kernel growth.

As kernel growth begins the basal inflorescence buds on the current year’s shoot growth begin to drop, Archer said.

Embryo

“The other thing to think about is, the clusters of nuts are fully sized or they look like they’re fully sized from about April through the rest of the season. But inside each shell the embryo doesn’t begin to grow until mid-July to August,” Archer said.

Researchers found that the embryo growth in June, July and August correlates with the most significant period of bud drop. There is some research to suggest that this bud drop is related to the carbohydrate status of the branch, and the carbohydrate status precipitates a hormonal signal that causes bud abscission, Archer said.

Research Trials

Archer conducted trials in 2016 and 2017: in 2016, Archer said they found
some data that supported the hypothesis that embryo growth is related to bud abscission.

“In 2017, we were trying to look at how bud abscission was a function of kernel growth and the carbohydrate status within an individual shoot,” Archer said.

There were basically two different focal topics for the experiment that were funded by Acadian Seaplants and the California Pistachio Research Board.

One focus was looking at whether a biostimulant, a compound made from seaweed extract supplied by Acadian, would reduce bud abscission. The other objective was to investigate carbohydrate dynamics within individual branches.

**Carbohydrate Trial**

With the carbohydrate trial, researchers selected branches and tagged them, then counted the buds at the beginning of the season on fully extended new wood. Next they counted the buds at the end of the season—counting the buds on shoots that had a crop and shoots that did not have a crop. “So nonbearing and bearing branches,” Archer said.

Branches were also selected for carbohydrate analysis using standard procedures for analyzing carbohydrates.
within individual wood fragments in wood pieces, Archer said.

“What we found was that abscission was higher in the bearing shoots which we’d seen before, and that branches, the bearing branches, will have a lower carbohydrate gain than nonbearing branches,” Archer said.

“The current year’s growth, with the buds for the next year’s crop, of the bearing branches, won’t store as much carbohydrates because the carbohydrates are consumed producing the nuts,” Archer said.

In the nonbearing shoots, researchers saw a gain in stored carbohydrates in the current year’s shoot growth with the buds for the following year’s crop because there were no nuts to consume the carbohydrates produced by the leaves.

The net result is, enough carbohydrates are stored to support the buds ability to bloom and produce crop the following year, Archer said.

Continued from Page 17

Acadian Research

The abscission mitigation trial used the biostimulant—a seaweed extract developed by the company. The purpose of this compound was to improve the photosynthetic capacity of branches to increase the chlorophyll content to increase carbohydrate availability, Archer said.

Results from the first year of the abscission trial indicated consistent and significant differences in bud abscission of bearing and nonbearing shoots from the trees, Archer said.

This suggests that bud abscission is not directly correlated with total tree cropping status, but that abscission is a linked to the crop load on the one-year-old growth, Archer said.

The current working hypothesis is that the developing nut kernels deplete the carbohydrates from the current year’s,
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Continued from Page 18

while the carbohydrate status of last year’s wood remains basically unchanged, Archer said.

**Results**

The bud abscission and carbohydrate trial has concluded, Archer said. The Researchers found that the second, more severe, phase of bud drop on fruiting branches is significantly related to embryo seed development.

Previous research found that the presence of fruit will not impact the uptake of carbohydrates by leaves, but fruit clusters will be impacted on the carbohydrate distribution between developing embryos and flower buds.

**Other Acadian Research**

“Acadian also has trials using the same seaweed extract in a number of other crops,” Archer said.

The Acadian product is more commonly used in vegetable and row crops because it has more consistently proven to act on annual crops effectively, Archer said. However, we are also seeing that it may have the potential for use in tree crops and that research is ongoing, she added.

There is a trial being conducted on citrus where the Acadian product helps increase trunk diameter. So there’s definitely some research where the Acadian product could also be useful in pistachios, and in tree crops, Archer said.

“It may not be the best way decrease bud abscission,” Archer said, but it may have other potential uses for tree crops.

**Other Research**

There will probably continue to be genetic and molecular research done to minimize alternate bearing, Archer said.

There are also some cultural practices that Ferguson and Bob Beede, UCCE farm advisor, emeritus, have been conducting that suggest a combination of rootstock selection and mechanical pruning can alter the ratio of fruiting branches to non-fruited branches.

“This can help to reduce some of the yearly fluctuations in yield,” Archer said.

Fruit thinning is another possibility. It would be done early in the season using a chemical thinning application (a plant hormone) to cause fruit drop, Archer said.

“There haven’t been any successful trials which show that fruit thinning can effectively reduce alternate bearing, but thinning trials continue to be explored to understand optimal crop loads,” Archer said.

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FSMA On Farm Readiness Reviews (OFRRs)—WHAT DO WE KNOW NOW?

By: Priscilla Rodriguez, Director of Food Safety | Western Agricultural Processors Association and Roger A. Isom, President/CEO | Western Agricultural Processors Association

As the season heads into the final stretch, growers and hullers, the initial compliance dates for actual enforcement of the Food Safety and Modernization Act’s Produce Safety Rule loom just around the corner in March of 2019. Growers and Hullers need to start planning now and should already be implementing measures called for under the Produce Safety Rule. As a reminder, you must comply with the following:

**Produce Safety Rule Requirements**

Please refer to the Produce Safety Rule for more details on these requirements.

- Worker Health & Hygiene
  - Employee Training*
- Personnel Qualifications & Training
  - At minimum one person trained on Produce Safety Rule through Food and Drug Administration (FDA) approved curriculum*
  - Supervisor Training*
- Agricultural Water (Proposed compliance extension to January 2022)
  - Agricultural water testing—Generic E. Coli*
  - Microbial Water Quality Profile—Testing samples quantity based on water sources (above ground vs below ground-water source)*
  - Inspection of water systems and surrounding area
  - Water corrections and treatment (if needed)*

Continued on Page 24

Viewing of the drying process at a pistachio huller. All photos courtesy of WAPA.
Pindar® GT herbicide provides long-lasting control – up to six months – of the toughest broadleaves, including fleabane, marestail, filaree and malva. Plus, Pindar GT provides post-emergence activity on many winter and summer annual broadleaves, including fleabane and marestail. Commercial use has shown consistent performance across geographies, soil types and rainfall levels. For the strongest foundation in your residual weed control program, use Pindar GT herbicide.
• Equipment, Tools, Buildings and Sanitation
  - Sanitation/cleaning logs—Equipment such as harvesting equipment, tools, buildings such as shops, etc.*
• Domesticated and Wild Animals
  - Inspection of orchard/huller prior to harvest
  - Corrective Actions for contaminated produce and disposal
• Growing, harvesting, packing, and holding activities
  - Follow Good Agricultural Practices during these activities
• Biological Soil Amendments
  - Use of treated Biological Soil Amendments only*  
  *Requires record keeping

**Education**

To help growers and hullers better prepare for the enforcement of this rule, the California Department of Food and Agriculture (CDFA)’s new Produce Safety Program is currently scheduling an On-Farm Readiness Reviews (OFRR) for readiness for the FDA’s Produce Safety Rule when it takes effect in 2019 as part of the Food Safety Modernization Act (FSMA). CFDA wants to educate farmers and hullers on how to comply with new regulations under the Food Safety Modernization Act before regulation begins, so a new unit

On Farm Review at an almond huller in Fresno County.
charged with conducting on-farm inspections on behalf of the U.S. Food and Drug Administration is offering California produce farmers and commodity groups the opportunity to learn what to expect during inspections. The OFRRs consist of a team of inspectors visiting farms walking through the process of what will happen during a real inspection. The Western Agricultural Processors Association (WAPA) has co-hosted four of these OFRRs and has learned quite a lot from these visits that have helped growers and hullers to connect the dots. Some of the key points we have learned from the OFRRs we have been involved with include:

- Ensure all bathrooms (including portable toilets) are cleaned and inspected on a regular basis and documented.
  - Ensure water used for hand washing is tested to ensure it is potable.
- Do not place portable toilets in or near the orchard.
  - Be prepared to discuss what happens in the event of a spill.
- Be prepared to discuss how you train all of your employees, including those that our

Continued on Page 26
outside contractor labor, and those that join “med-season”

- Be prepared to discuss how you clean and sanitize your equipment, especially harvest equipment.
- Be prepared to discuss cleaning and sanitation of tools (rakes, shovels, etc.).
- Ensure you have documentation of cleaning and sanitizing activities.
- Have measures or practices in place for a pre-harvest inspection of farm/orchard to look for possible contamination (animal tracks, feces, etc.).
- Have measures in place to deter wildlife from nesting or inhabiting the grounds or facility.
  - Do you document?
- What do you do when you find evidence of animal intrusion?
- Be prepared to discuss how contaminations are handled.
  - Do you create a buffer area around contamination?
- Ensure contaminated risks are minimized in or around water wells.
- Ensure water wells have back flow preventers.
- Be prepared to discuss how you handle sick employees (don’t allow them to work).

WAPA is still coordinating On Farm Readiness Reviews and will compile a more comprehensive list of key points.

**Schedule OFRRs**

OFRRs can be scheduled by contacting CDFAs Produce Safety Program by phone or email. Please note that the Produce Safety Alliance-approved Grower Training is required in order to schedule an OFRR and it’s preferable to schedule an OFRR during harvest periods. When you reach out to CDFA to schedule an OFRR, be prepared to provide the following information:

- Farm name and location.
- A contact person, phone numbers and email addresses.
- The produce items grown, harvested, packed or cooled.
- Harvest timing.

CDFA Produce Safety Program officials have conducted OFRRs so far for crops such as avocados, citrus, almonds, pistachios, walnuts and leafy greens. They can be scheduled for individual farms, but it is more efficient for a group of farmers to schedule one together. With official Produce Safety Rule inspections set to begin in the Spring of 2019, CDFA is encouraging California produce farmers to learn as much as they can about the Produce Safety Program before then. If you are interested in scheduling an OFRR, please visit the CDFA website at https://www.cdfa.ca.gov/producesafety/educate.html. We highly recommend scheduling an OFRR, or attending one of the regional OFRRs the Association will be hosting following the end of this season.

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ALMOND JOY: Almond Leadership Program Participants Bring Smiles to Young Patients

By: The Almond Board of California

Almonds aren’t just for eating, and if you don’t believe us, the young patients at Valley Children’s Hospital in Madera, California, will give you the truth.

On October 3, at the tail end of a busy harvest season, 16 participants and mentors from the Almond Leadership Program set aside their work obligations to visit hospitalized children recovering from a variety of conditions, from appendicitis to cancer.

Almond Leadership Program Continues to Create Impact

Making a difference in local communities goes to the heart of the leadership program, now in its tenth year. As Jenny Nicolau, manager, Industry Relations at the Almond Board of California (ABC), explains, “Being a leader means making an impact in the industry, the local community and within your own circle of family and friends.”

The leadership program’s mission is to prepare the next generation of industry leaders to carry California almonds into the future. Since the one-year leadership program was introduced in 2009, it has graduated more than 150 almond industry leaders. Even after a decade, the program continues to be an asset to the California agriculture.

“This program educates passionate, knowledgeable and service-oriented individuals who have a desire to step up, speak up and get involved. Being a leader in the California almond industry extends far beyond the orchard floor.”

In this instance, the leadership role

Continued on Page 30
Each year between February and early March, California almond orchards burst with beautiful flowers as almond buds begin to bloom. The longer the bloom, and if weather cooperates, the better your chances for each of those almond blooms to become pollinated, and the better your chances for a strong nut set and yield potential.

“Keeping the almond bloom viable longer is important for pollination — especially if wind, cloudy days or rain interfere with bees foraging,” said Tom Caruso, almond crop lead for Valent. “By keeping the flower alive longer, growers can help ensure the success of their investment.”

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extends all the way into the lives of young patients who are thrilled to spend a morning getting a small glimpse at that same orchard floor.

“The annual trip to the Valley Children’s Hospital is just one example of how this year’s leadership class has risen to the top—and continues to serve others,” Nicolau said. “The energy and passion the leadership participants displayed when interacting with the patients was a true testament to the heart of our industry, and its commitment to serve others.”

Community Service Paired with Fun for All

As young patients approached the tables filled with what would soon become almond art, the upbeat melodies of well-loved Disney songs filled the air and encouraged hospital volunteers, staff and the patients’ parents to join the children at the craft tables. Soon, 3-D artwork of almond trees, smiley faces and even basketballs filled the room as leadership participants spoke with the patients about almonds in their different forms.

Amy Russo, child life assistant at Valley Children’s Hospital, manages the Big Hearts for Little Hands program the leadership group participated in. Russo said the Almond Leadership Program’s visit to Valley Children’s Hospital brings an element of normality and nature’s beauty to the young patients.

“As the leadership participants’ visit, patients who have not left their rooms in three days suddenly forget about the fact that they’re in the hospital,” Russo said. “The day before they could have been in constant pain, but now they aren’t thinking about that because they’re having fun. This experience takes their mind to another place.”

The patients’ parents were also delighted to see their children engaged in creating almond art, even if only for a few hours.

“The leadership group’s visit also helps the parents, who are stressed no
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Continued from Page 30

matter what their child is hospitalized for,” Russo said. “Watching their kid be a kid again makes them feel better; it gives them peace.”

The fun wasn’t limited to art, either. The Almond Board gave each child an educational workbook, An Almond Story, which tells the tale of the almond industry, and donated ever-exciting temporary tattoos. Kids happily applied images of honey bees and shakers harvesting almonds to their hands and arms—leadership participants even took part in the fun!

Participants and mentors had a chance to answer staffers’ questions about ABC, the leadership program and, of course, the almond growing process.

“This experience gives young minds a different perspective on almond growing, and I’m sure as they’re driving by an orchard or in the store they’ll say, ‘I made this or that out of almonds that look like that!’ It creates dialogue and is a learning experience for them.”

“After the leadership group leaves, the hospital staff hear about your visit from patients days later, and they talk about how much fun they had,” Russo said. “Patients will come back a month or a year later and still remember how much fun they had with the leadership group. It makes an impact on them.”

In turn, the enthusiasm of one patient—James, an ardent airplane buff—left a big impression on Mark Sherfy, leadership program participant. “I’ve never actually volunteered to do anything like that before,” Sherfy said. “But after that experience, I feel like I could definitely do it again.”

In the end, it was hard to tell who had more fun: the young artists or their helpers. Parents joined their children around the tables full of almond art, smiles full of encouragement, regularly glancing at their children’s faces to see the joy and carefree nature reflected there.

“It was fun to see everyone out of their element, and really nice to see the smiles on the kids’ faces,” said leadership program participant Blaine Salisbury. “For me, these are the things that make lasting impressions—and make a difference.”

Do you know a good candidate for the Almond Leadership Program? Applications for the 2019 program can be submitted now. For questions or to submit your application, email Jenny Nicolau at jnicolau@almondboard.com.

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ARE YOU READY for a Pesticide Headquarter Inspection?

By: Amy Wolfe, MPPA, CFRE | President and CEO, AgSafe

Using pesticides is just one tool in a grower’s toolbox to help ensure a successful crop. However, the use of pesticides in California comes with several laws and regulations. First and foremost, the label is the law, any deviation from the label can result in a violation. Additionally, the Department of Pesticide Regulation (DPR) has authority under Title 3 California Code of Regulations (3CCR) to enforce and cite violations under these codes: https://www.cdpr.ca.gov/docs/legbills/calcode/chapter_.htm.

To help ensure compliance and more importantly, safety for pesticide handlers and fieldworkers, each year DPR releases its top 10 violations. Let’s explore the top 4 of those violations found during pesticide headquarter inspections: personal protective equipment (PPE), training, hazard communication and application specific information display (ASID). A headquarter inspection is different from the inspection that happens in the filed during pesticide application. Typically a headquarter inspection is the result of a violation found during an application inspection or is used as annual “check-in,” with growers.

1. Have you worn, or provided to your employees, all of the required personal protective equipment (PPE)?

Under 3CCR 6738-6739, all of the requirements for PPE are laid out in great detail. It is important to note that even growers have to wear PPE. The PPE required for a grower is listed on the pesticide label. However, in addition to the label-required-PPE, employees must also wear PPE as outlined in the regulation previously noted. During a headquarter inspection, the inspector will check to ensure that PPE is being provided by the employer and not being stored in the pesticide/chemical storage shed. All of the PPE regulations have language that says, “The employer shall ensure that,” it isn’t enough to only provide the PPE—you must ensure that employees are wearing the PPE and wearing it correctly.

2. Have you trained your employees who will be performing tasks such as pesticide application or mix/loading? And what about fieldworkers?

Employers are required to train their employees that will be handling or working around areas where pesticides have been used. All handlers need to be trained annually on pesticide safety topics outlined in 3CCR, on all pesticide product labels they will handle, and any time a new pesticide is added to the pest control program. A common violation is failure to train on a label of product that has been added to the pesticide program mid-year. Recently DPR adopted new training topics in response to EPA’s update to the Worker Protection Standard (WPS). Those updated requirements are:

- Personal protective equipment (PPE)
- Training
- Hazard communication
- Application specific information display (ASID)

Remember that fieldworkers and handlers need to be trained annually. Be sure and track that training on an updated training record form.

Continued on Page 36
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Training is a requirement for fieldworkers as well. A fieldworker is not handling pesticides directly, but rather working in an area where pesticides have recently been used. Prior to the update to WPS, this training could be done every 5 years, with the revision to WPS, we now need to train fieldworkers annually, just like handlers. The full fieldwork training regulations can be found under 3CCR 6724: https://www.cdpr.ca.gov/docs/legbills/calcode/030302.htm.

3. Have you provided proper hazard communication information for fieldworkers?

The employer (grower or Farm Labor Contractor [FLC]) is required to display a completed copy of the current Pesticide Safety Information Series (PSIS) A-9 leaflet:

- At the worksite,
- At all permanent decontamination facilities, and
- Decontamination facilities servicing 11 or more fieldworkers.
- The entire PSIS can be found at: https://www.cdpr.ca.gov/docs/whs/psisenglish.htm

Any changes to the medical information must be updated within 24 hours of the change. And, upon request, the employer must read the PSIS A-9 in a language the employee can understand.

In addition to the posting, the grower must maintain pesticide use records and safety data sheets for each pesticide at a central location accessible to grower or FLC employees.

- The grower must inform his/her employees or the FLC (who then must inform his/her employees) of the location of the records before the employees enter a treated field.
- If the record location changes, the employer (grower or FLC) must immediately inform employees of the change.

Common violations here include, not completing the required fields on the displayed PSIS A-9 leaflet and not having SDSs for the pesticides listed on pesticide use records.

4. Have you posted the application specific information display?

The grower must display application-specific information at a central location detailing:

- Crop/site treated and identification of the treated field;
- Start and end date(s) and time(s) of the application;
- Restricted entry interval (REI);
- Product name(s), U.S. Environmental Protection Agency (EPA) or California registration number(s), and active ingredient(s);
- Safety Data Sheets for the applied pesticide(s) or spray adjuvant(s).

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are allowed to enter the treated field.

- A specific description of the location of the application specific information must be included on or attached to the PSIS A-9 leaflet.
- The ASID must stay displayed until the field no longer meets the definition of a treated field.
- The ASID (including SDSs) must be retained for two years.

Don't forget to include the start and stop times, REI, or active ingredient in the displayed information.

If all of these regulations feel overwhelming, you can ask your local Agricultural Commissioner’s Office for a compliance inspection. In the case of a compliance inspection, the inspector will walk you through all of the codes that effect a headquarters inspection. However, if violations are found, instead of getting cited the inspector will give you time to fix the non-compliances and then come back at a later date to re-inspect. And as always, call AgSafe for help.

For more information about pesticide safety or any worker safety, human resources, labor relations, or food safety issues, please visit www.agsafe.org, call us at (209) 526-4400 or via email at safeinfo@agsafe.org. AgSafe is a 501c3 nonprofit providing training, education, outreach and tools in the areas of safety, labor relations, food safety and human resources for the food and farming industries. Since 1991, AgSafe has educated nearly 75,000 employers, supervisors, and workers about these critical issues.
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In this month’s article about the Food and Drug Administration’s (FDA) Food Safety Modernization Act, or FSMA, we discuss rules related to importation of food and ingredients. You may recall that FSMA is intended as a sweeping update to our country’s food safety regulations. The “Foreign Supplier Verification Programs” rule (FSVP), and the associated rule “Accredited Third-Party Certification” will drastically change the way food is brought into this country for the public’s consumption.

Summary of Requirements

The first obvious question with any new regulation is, who has to comply? The FDA has provided this table as a helpful tool to determine if compliance is required: https://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM472461.pdf Simply stated, the FSVP importer, whom FDA will hold responsible for compliance with this regulation, is the U.S. owner or consignee of products for import. It may be the importer of record, or it could be another party. The entity whose DUNS number is entered into the Customs & Border Patrol system is the one who will be held accountable by FDA.

We highly recommend that any food importers attend one of the official FSVP courses that are currently available, to help ensure they understand the requirements. One notable thing about this course is that, unlike the PCQI (Preventative Controls Qualified Individual) course and the Produce Safety course, this one is completely voluntary and not required for compliance with the regulation. That being said, there is a lot involved in this regulation that is difficult to implement without the proper food safety knowledge and understanding. We always tell customers that training is the first step to compliance.

One thing that stood out to us when we took the train-the-trainer course, is that there are a lot of importers who are currently on record with FDA as the FSV importer, and may not even be aware of it—or they may be aware, but not really understand the implications. According to FDA, nearly half of all importers visited by regulators have had significant gaps in compliance with the regulation.

The intent of the rule is to ensure that imported foods are produced under the same caliber of food safety controls that products made in the U.S. are produced under, in accordance with FSMA regulations, in order to help assure the safety of U.S. consumers. To meet that intent, importers are held responsible for verifying their foreign suppliers’ programs.
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to ensure they meet the FDA standards. In most cases your suppliers will need to comply with the Preventive Controls rule or the Produce Safety rule, and you will be required to verify their compliance in some way.

The following are some key activities required by the rule, each of which must be done by a “qualified individual”:

- Identifying and evaluating potential foodborne hazards, based on current scientific understanding;
- Conduct an assessment of suppliers;
- Identifying appropriate verification steps to ensure suppliers’ compliance, based on the two assessments noted above;
- Conduct these verification activities, or ensure they are conducted and review their results;
- Apply corrective actions as needed;
- Develop and maintain documented procedures for the above;
- Maintain required records.

There is an excellent summary of the rule from FDA posted here: https://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM472890.pdf

The Qualified Individual (“QI”)

A key concept within the FSMA rules written by FDA is the “Qualified Individual”, referred to by some as the “QI.” Anyone with a key responsibility that may impact food safety of products, should be specifically qualified for that role through a combination of job experience, knowledge, and training. In essence it comes down to employee competence, similar to any GFSI (Global Food Safety Initiative) audit or ISO (International Organization for Standardization)-based audit. It makes sense if you consider it; anyone who is involved in approving or verifying suppliers, assessing hazards, or reviewing critical documentation, should be qualified to do so. It’s also worth noting that you can use contractors or third-party service providers to conduct some of the functions required by the regulation, if you don’t have anyone on staff who is qualified.

On our web site you can find a guide that will allow you to identify and keep records of who is responsible in your organization for each key function required by the FSVP rule. It’s posted here: https://safefoodalliance.com/wp-content/uploads/fsvp-log.pdf

FSV Rule Versus Preventive Controls

For companies who not only import, but also process, there is an important
consideration regarding the FSVP rule. Companies who have programs in place to comply with the Preventive Controls rule, are considered in compliance with the FSVP rule, if they fully comply with the PC rule supply chain requirements. The requirements are basically equivalent, although not the same word for word. The one exception is that import documentation requirements still must be complied with, including obtaining a DUNS (Data Universal Numbering System) number.

What About Third-Party Accreditation?

FDA's plan for importers includes a method for foreign suppliers to be 'pre-qualified', so to speak, for import. By voluntarily taking part in an accredited third-party audit, and participating in the FDA's Voluntary Qualified Importer Program (VQIP), foreign suppliers should experience expedited entry into the U.S. Of course, there are fees involved.

At this time there is only one Certification Body listed on the FDA web site that offers these audits, but the framework is now in place for this program to grow and you can expect to see more of these audits being done in the future. You can find out more about VQIP at the FDA's web site: https://www.fda.gov/Food/GuidanceRegulation/ImportsExports/Importing/ucm490823.htm

Steps to Take Now

1. First, make sure you understand the requirements of the regulation as they pertain to you. If this involves training, be sure to get it.

2. Identify key roles required by the regulation, and who your organization will rely on to complete those roles. Again, you may find this document useful: https://safefoodalliance.com/wp-content/uploads/fsvp-log.pdf

3. Ensure that you have a good system for tracking documents and records. We strongly recommend a cloud-based system, whether something like Dropbox, Google Documents, or a paid provider. You need to have records readily available.

4. Consider attending Safe Food California this coming April, to get important updates on various aspects of your program and to attend the FSVP course.

5. Contact us any time with questions or requests for assistance at https://safefoodalliance.com/contact/

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A study on the best use of irrigation water in almond orchards is what University of California (UC), Davis, second-year graduate student, Kelley Drechsler, has undertaken as she continues to work on her both her Masters and PhD programs in Biological Systems and Engineering.

“I have been working on a five acre almond orchard at the Nickels Soil Lab in Arbuckle,” Drechsler said. Resourceful use of water in agriculture continues to be a big subject in California, and 24-year-old Drechsler says she is hoping to help develop a new tool that could make irrigating orchards become more efficient.

Almonds grow well in many parts of the state where the Mediterranean climate of warm summers and mild winters provide a hospitable environment, according to Franz Niederholzer, UC Davis pomologist who also conducts experiments at the Nickels Soil Lab.

**Research on Water Levels**

Working with Niederholzer and her UC
Davis professor, Isaya Kisekka, of the Department of Land, Air, and Water Resources, Drechsler is doing research to see how different water levels affect different varieties of almonds.

In her five acre plot, she is working with Nonpareil, Butte and Aldrich varieties.

“The reason for those three varieties is for the yield of the Nonpareil and the other two are there for better bee pollination more than their yield,” Drechsler said.

The multi-year study started in June and she was still implementing her unique irrigation treatments into November during post harvest.

“Usually growers irrigate their orchard according to the Nonpareil variety’s needs, but since the different varieties have different growth stages that aren’t exactly occurring at the same time, they might have different irrigation needs,” Drechsler said. “Since the grower usually has their irrigation system set up to irrigate the entire orchard the same, there is no control over individual varieties in water use.”

**Irrigating Specifically to Varieties**

In her research, Drechsler wants to discover whether irrigating to the specific water needs of each individual variety will not only help in the health of that variety, but also in yield, resourceful water use, and harvest conditions.

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“I interfaced the irrigation system in the orchard I am working with so I can control irrigation in individual rows independent of each other,” she added.

The experiment to date has consisted of four different irrigation treatments—four different amounts of irrigation.

“So basically, one treatment is 100 percent, or a full irrigation; and three deficit irrigation lines, these trees are getting a shortage of water. This is called a regulated deficit irrigation system,” Drechsler said. She explained, there have been four treatments during pre-harvest season, and four treatments during the post-harvest season.

“Typically, irrigation studies end at harvest, however, I’m continuing through November, or when the water supply is turned off,” Drechsler said.

**Stem Water Potential Data**

One of the key elements of the research consists of collecting a large amount of stem water potential data to monitor the physiological response of the tree varieties to the different water amounts.

“We conduct stem treatments about two times a week,” Drechsler said. “We take measurements in each variety and each variety has four different irrigation treatments, so we test one of each combination and five replications of that.”

Overall, that amounts to three varieties, plus four irrigation treatments, equaling 12 combinations which is repeated five times.
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Continued from Page 46

The research team conducted stem water treatments through November and plan on repeating the study at least a couple more times in the multi-year study.

“We are hoping to see if there is an interactive affect between irrigation levels and the variety to see if the variety should be independently irrigated,” Drechsler added. “That could possibly improve water productivity.”

Harvest Period

She explained her research also takes into consideration the complications that can occur during the harvest period.

“The problem at harvest arises when there is just one irrigation system for all three varieties and the grower doesn’t have control of the needs of the Butte and Aldrich during harvest of the Nonpareil when the nuts are on the ground drying for a week or more,” Drechsler explained. “On a single irrigation system, the grower usually can’t irrigate the other varieties during that period, and that might not be what is best for the health of the other varieties that might be in that same orchard.”

In addition, she added, during harvest period for almonds, August and September, is the time when the bud differentiation happens, which determines next years yield.

“And coincidentally, that period is when the grower has restrictions on the ability to irrigate because there are almonds sitting on the orchard floor trying to dry,” Drechsler said. “So this project will hopefully provide supporting data that indicates growers may need to invest in an irrigation system that allows them to independently irrigate individual rows.”

She added that it will be hard to see the true story of her research with the current data because whatever irrigation the team did this year will in fact actually effect next year’s yield.

“So we have to wait until next year to understand this year’s irrigation treatment outcome,” Drechsler explained.

She created and presented a poster for December’s Almond Board Conference in Sacramento which shows this year’s results—while Kisekka delivered an oral presentation during the conference.

“I hope to talk with growers during the Almond Board Conference to find out what they think of my research,” she said.

Other Research

The Almond Board of California is financing Drechsler’s current research project at the Nickels Soil Lab.

Other research Drechsler has worked in at UC, Davis, is the Development and Evaluation of a Leaf Monitoring System for
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The bags on this almond tree in a research orchard at the Nickels Soil Lab in Arbuckle, are used for equilibrating the leaf water potential and stem water potential to prepare for the stem water potential measurements to collect data for project being conducted by UC Davis graduate student Kelley Drechsler.

Continuous Measurement of Plant Water Status under Rajveer Dhillon, Francisco Rojo, Jedediah Roach, Robert Coates, Changjie Han, Shriti Upadhyaya, and Michael Delwiche, in the Department of Biological and Agricultural Engineering.

This research project was also conducted at the Nickels Soil Lab with the objective of plant water status detection in nut and fruit crops using leaf temperature measurement. Orchard crops used in the study were mainly almond, walnut and grape.

“I hope to continue working the area of water management in California,” Drechsler said. “It has become a passion for me and something I believe is critical for our future in agriculture. I am especially interested in developing feedback systems for irrigation scheduling of fruit and nut crops using integrated soil and plant water status sensing systems.”

Comments about this article? We want to hear from you. Feel free to email us at article@jcsmarketinginc.com
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² 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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<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>07:30 AM</td>
<td>Grower, Private Applicator, PCA, QAL, QAC, and Pilot: 3 Hours</td>
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<td>Other: 2.5</td>
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<td>Laws &amp; Regs: 0.5</td>
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<tr>
<td>08:00 AM</td>
<td>Registration For All Seminars Begins at 7:00 AM</td>
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<td>08:00 AM</td>
<td>Trade Show CE Credits: 15 minutes; Other</td>
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<td>08:30 AM</td>
<td>General Sessions</td>
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<td>08:30 AM</td>
<td>The Latest on Bot Control in Walnuts</td>
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<td></td>
<td>Janine Hasey, University of California Cooperative Extension Tree Crops and Environmental Horticulture Advisor in Sutter and Yuba Counties</td>
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<td>08:30 AM</td>
<td>Panel Discussion: Get the Latest on Walnut Varieties</td>
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<td>Cliff Beumel, Sierra Gold Nursery/Chuck Leslie, Walnut Specialist, UC Davis</td>
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<td>09:00 AM</td>
<td>CE SEMINARS</td>
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<td>09:00 AM</td>
<td>Herbicide and Insecticide Update</td>
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<td>Sean Nelson, Ag/Standards Biologist III, Sutter Department of Agriculture</td>
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<td>09:30 AM</td>
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<td>10:30 AM</td>
<td>Walnut Board</td>
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<td>Jennifer Williams, Claire Lee</td>
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<td>11:00 AM</td>
<td>NOW Update: What We Learned About Winter Sanitation, Spray Applications and Damage in 2018</td>
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<td>Emily Symmes, University of California Area Integrated Pest Management Advisor for the Sacramento Valley Region</td>
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<td>11:30 AM</td>
<td>Codling Moth—What you Need to Know</td>
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<td>Dr. Charles Burks, Research Entomologist at the USDA Agricultural Research Service, San Joaquin Valley Agricultural Sciences Center</td>
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<td>12:00 PM Lunch</td>
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<td>12:15 PM</td>
<td>Why Mating Disruption for NOW is Part of a Complete Management Program</td>
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<td>Brad Higbee, Field Research and Development Manager for Trécé Inc. CE Credits: 30 minutes; Other</td>
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NEW REGULATIONS on Wages and Overtime

By: Jenny Holtermann | Contributing Writer

It is almost the end of the year. November and December are usually filled with end of year reports, meetings with the accountant, holiday parties, and planning for the year ahead. It can be a crazy time of year where everyone seems to be running from point a to point b. We are trying to wrap things up and start fresh in the new year.

A new year comes with new postings, new rules, new regulations and new mandates. Going into the new year we are reminded of the past and how certain laws passed then are now impacting your business. Sometimes, we just need a little refresher course to update us and get us on track. If we start planning now, we will be able to start the new year in order and ready to run.

Do you know all the new regulations that are going into effect January 1st, that will impact your business? Thinking of them all might make your head spin. As an agriculture business owner, it can be a little intimidating at times thinking of all the regulations we have to follow and keeping up to date with the new ones may be overwhelming.

Changes to Wages and Overtime

Wages and overtime are the main changes we need to stay on top of. With new regulations such as wages going into effect January 1st, you really need to be prepared well before the first of the year. One thing to also keep in mind is the distinction between small and large employers. The separation of small and large employers is aimed to help out the small employer and give us more time to adapt to the changes, but that doesn’t quite work in the real world. If you want to be competitive and keep your hard-working employees, you just might have to consider the large employer wage bracket. If an employee can do the same job down the street at a large employer and you are offering $1 less, where do you think they will go? I am not standing around long enough for them to have to make that decision.

The Department of Industrial Relations defines a small employer as having 25 or fewer employees at all times during a pay period and a large employer is one having 26 or more employees.

Effective January 1st, 2019 California minimum wage for small employers will be $11 per hour and minimum wage for large employers will be $12 per hour.

Effective January 1st, 2020 California minimum wage for small employers will be $12 per hour and minimum wage for large employers will be $13 per hour.

Effective January 1st, 2021 California minimum wage for small employers will be $13 per hour and minimum wage for large employers will be $14 per hour.

Effective January 1st, 2022 California minimum wage for small employers will be $14 per hour and minimum wage for large employers will be $15 per hour.

Effective January 1st, 2023 California minimum wage for ALL employers will be $15 per hour.

Agriculture Overtime Regulations

We also have new agriculture overtime regulations that were

Continued on Page 56
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Continued from Page 54

put in place with the passage of AB 1066. This law has added a provision to our agriculture overtime wages paid after so many hours worked. It is a stair stepped law, similar to the minimum wage regulation.

This is a tough one for me, as I am sure it is to many of you. It wasn’t a fair law; many other industries have exceptions against overtime and allow for flexibility in work environment. Our California legislature and elected officials chose to ignore the seasonality and specialty industry that agriculture is. I applaud the certain few elected officials who stood their ground and helped the agriculture industry. The few that helped bring agriculture laborers to the capital and told the real story behind the agriculture workforce, they are ones who are real friends of agriculture.

How agriculture overtime is going to change will impact the number of hours employees will be allowed to work before overtime will be paid. The standard 10-hour harvest workday that currently exists, will be a thing of the past. Every year, our employees could find themselves working fewer hours during the busy season, because it doesn’t make economic sense when we can hire an extra person to pay standard wages. Employers should remind our employees of AB 1066 when these discussions start happening.

There is another provision in the overtime regulation for large employers to start paying overtime faster as well. The standard is one and a half times the regular rate for overtime.

Effective January 1st, 2019 California overtime paid for more than 9 and a half hours per workday and 55 hours per work week for large employers.

Effective January 1st, 2020 California overtime paid for more than 9 hours per workday and 50 hours per workweek for large employers.

Effective January 1st, 2021 California overtime paid for more than 8 and a half hours per workday and 45 hours per workweek for large employers.

Effective January 1st, 2022 California overtime paid for more than 8 hours per workday, 40 hours per work week and double time after 12 hours for large employers. California overtime paid for more than 9 and a half hours per work day and 55 hours per work week for small employers.

Effective January 1st, 2023 California overtime paid for more than 9 hours per work day and 50 hours per work week for small employers.

Effective January 1st, 2024 California overtime paid for more than 8 and a half hours per workday and 45 hour per week for small employers.

Effective January 1st, 2025 California overtime paid for more than 8 hours per work day and 40 hours per work week, as well as double time for more than 12 hours per work day for small employers.

Staying Competitive

As outlined from the Department of Industrial Relations, there seem to be a large number of differences and delay of timing for small employers when compared to large employers. This is aimed at helping the small employers and giving them more time to adjust to the new changes. I appreciate the thought and time consideration, as these wage changes could be impactful to a small family farm. A few dollars an hour more could mean the difference between making a profit and breaking even to some small farms. Unfortunately, if you wish to be competitive in the work place and keep valuable employees, you may not have the choice as an employer.

In today’s world, labor is one of the biggest expenses to an agriculture business. Employees are also one of the largest investments. Without employees, our businesses and farms would not be able to be productive and effective in operating. They are the back bone and heartbeat to our businesses. Wages are just another aspect of our business that we aren’t able to control to keep our farm moving into the new year.

Jenny Holtermann, writes an agriculture blog ‘Almond Girl Jenny’ and farms almonds with her family.
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By: The Walnut Board

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80 Years of Walnut Growing Experience

Photo courtesy of Frank Guerra.
In our last article, Grades & Standards Committee Chair Frank Guerra, a fifth generation walnut farmer and handler, talked about the important work the committee has done regarding food safety and related research. In this article we’ll look at the new directions the committee is moving towards.

For the past few years, Grades & Standards Committee was focused on basic food safety research and gathering data that we thought could tell the story about walnuts being among the safest tree nuts besides being rich in beneficial omega-3 fatty acids.

**Walnut Shelf Life**

Lately, the focus has gradually shifted to improving walnut shelf life and new product development. This will have two fold implications. One, this will allow us to pitch walnuts as viable ingredient to industrial customers who want more shelf stable ingredients for products such as cereals, granola bars, chocolates, trail mixes, and so on. Second, this will also allow us to market a product to consumers who will know that, if handled properly, the product will not spoil immediately and retain its flavor much longer.

To this effect, one of the projects we are supporting explores edible coating for walnut pieces. The principle behind this is an edible coating will prevent oxygen from reacting with oil inside the kernel thereby preventing or delaying onset of rancidity.

In addition, responding to changing consumer tastes, we are also focusing on developing new products that incorporate walnuts, such as meatless burgers, walnut milk, walnut butter, dark chocolate walnut truffle, walnut bars, just to name a few. This allows for a great combination of flavor and healthy omega-3s in one product!

**Food Safety**

Having said that, we are still committed to investing in food safety efforts. The California Walnut Board was the first commodity group to offer industrywide Food Safety Modernization Act (FSMA) training two years ago. We are continuing to offer more grower and huller/dehydrator training this season as well in partnership with the Safe Food Alliance. The first two trainings will be held on December 10 (Marysville) and December 13 (Yuba City). Walnut growers who have yet to fulfill the training requirement should take advantage of these training sessions.

The Grades & Standards Committee will continue to explore new technology to prolong walnut shelf life and help create healthy and nutritious consumer products.

*Comments about this article? We want to hear from you. Feel free to email us at article@jcsmarketinginc.com*

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Typical Micronutrient Application

Looking at a typical application of a micronutrient in a fertigation event, we don’t get a whole lot of pound for pound bang for our buck. Doing the math, a 2 quart Chelated zinc EDTA (Ethylenediaminetetraacetic acid) application at a nine percent rate gives us a half a pound of actual zinc per acre! The next time you pick up a small socket wrench in your shop, and realize that it weighs about a pound, think about grinding half of that down to tiny bits so you can spread it over an acre of soil. It would definitely fit in the palm of your hand. If we could stand on a ladder, in a stiff breeze and blow hard enough, we could save ourselves a bundle on application costs, but it would take 50 years to get into the trees!

Continued on Page 64
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Zinc

Let's go further with zinc. For nut crops, this is a big focal point for micronutrient sufficiency levels. The fact that chemical soil analysis tells us how much zinc our soils may contain at that moment is important. However, the roots of our trees don't have chemistry sets at their disposal. Zinc is often times tied up in phosphates, sulfates, oxides, clays, organic matter and rock. This doesn't give us a good depiction of how much of that zinc is available. But here's the good news, we do have little chemists working their magic. Soil biology is hard at work absorbing, eating, dissolving, and weathering a cocktail of nutrition and making it available to the plant roots. We aren't exactly making their lives easier if we blow ground up wrench dust over our fields, but we'd feel better that we put some on. What are our options? Using zinc as a carbonate, oxide, chloride, nitrate or sulfate changes the game a bit compared to an ore. Chelating or complexing it as an EDTA, carbohydrate, amino acid, or lig-nosulfonate makes an even bigger difference. Now we make it easier for conversion and assimilation. Our hard-earned dollars go a bit further buying better products.

Foliar Application

Going a step further, research shows that applying micronutrients directly to our leaves in a foliar application is very effective. However, there are steps we need to take to make them even more available. Many times when we spray, we follow the manufacturers advice on adding a buffering agent and or a sticker-spreader. But we don't test our water in our finished mixed spray rig. We may still be over 7.5 pH depending on the water started with. Too alkaline, or too acidic, and we either won't get the nutrient into the plant, or too much is absorbed and we go toxic (remember, it doesn't take much to move the needle foliarly). Mixing our own cocktails, especially with an unchelated phosphorus material, and we spray a nice sheen of nutrition that reconstitutes as rock on our leaves as it dries out.

Small Nutrient, Big Impact

Although they are called micronutrients, they play very important roles in making enzymes, facilitating reactions, anchoring molecules and moving nutrients. Insufficiency levels are akin to a spark plug. They are insignificant to the weight of the motor, but without them, the motor won't run. It is very tough to move the needle in the soil, even with the small ppm required of micronutrients. In season it is often much more beneficial to make quick adjustments with foliar sprays. Doing your due diligence to make sure your mixes are adjusted properly will go a long way to making sure a small nutrient has a big impact.
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Climatic conditions in California are unique, as is the agriculture. California faces wet winters and dry summers, with agricultural water demands greatest when precipitation is least available. Groundwater storage is critically important, but many water users do not completely understand how interconnected the water system is. Groundwater is affected by the surface water and the reverse is also true. There are 400+ commodities produced annually in California, all of which require water and many of which require pesticide applications. Some of these pesticides end up in our water system, causing profound impacts. By knowing more about the water system, and by implementing good application and irrigation practices, we can ensure our water supply remains clean and secure.

The extension branch of the University of California (UC), the Division of Agriculture and Natural Resources, has put together an educational and extension program for pest control advisers and pesticide applicators to teach them how to keep pesticides out of water. This project has been led by Lisa Blecker, Pesticide Safety Education Program Coordinator with the UC Statewide Integrated Pest Management Program and Dr. Samuel Sandoval Solis (Sam), Assistant Professor at UC Davis, and Cooperative Extension Specialist in Water Resources. Both Lisa and Sam deliver the content in English and Spanish. The project consists of three modules: the climate of California, the water cycle, and pesticide characteristics and applicator practices.

Continued on Page 68
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Climate and Topographic Features of California

First, the climate and topographic features of California are described, so advisers and applicators have a clear understanding of what the main climatic and landscape processes that can affect their professional practice are. They are introduced to concept of atmospheric rivers, which are the high intensity and low duration (two or three days) rainfall events that account for 65 percent of the annual precipitation in the state of California.

Headwaters

Second, they are introduced to water cycle and how water moves in the headwaters and the river valleys. In the headwaters, because there is a shallow soil layer on top of rock, precipitation can fall onto the land, infiltrate into the soil and be stored as soil moisture. Later it can be taken up by the plants through evapotranspiration or end up in rivers by traveling through the
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Continued from Page 68

soil and into the creeks as subsurface flow. If the soil is already saturated, then water may flow directly into the creeks as surface runoff because water was not able to infiltrate into the soil layer. Alternatively, precipitation can be stored on the soil surface if it falls as snow, which later will be melted and may follow either of the previous two paths. In contrast, in river valleys, the soil layer is usually on top of deeper alluvial soil layer (sands, gravels and fine material), thus water can move the same way as previous pathways described. It can also infiltrate further down into underlying soil layers and be stored in aquifers, which are large, underground deposits of water. This explanation of the water cycle is done using a physical aquifer model where advisers and applicators can see with their own eyes the different pathways and processes that water can take. This is a hands-on experience where all these concepts are not only explained but experienced. By the end of this section, they have a clear understanding of water movement in the landscape, so they can apply this knowledge to preventing pesticides (or any other contaminant) from reaching
and contaminating any water body (creeks, rivers, aquifers, or soil moisture). A series of videos that show this approach can be seen in the following webpage.

### Runoff

Third, the specific characteristics that increase the likelihood that a pesticide will contaminate water through leaching or runoff are explained. These pesticide characteristics are water solubility (measured in mg/L), soil adsorption (measured in Koc), and persistence (measured in half-life). If a pesticide is soluble, then it will move as water moves. For instance, if a water soluble pesticide is soil-applied ahead of a heavy rainfall event, the pesticide will move with soil water and end up in aquifers or rivers. A similar effect can happen with over-irrigation. Some pesticides can be less soluble, or not soluble at all, but adsorb, or bind, easily to the soil. In this case, when a rainfall (or over-irrigation) event occur, precipitation (or over-irrigation) can cause surface runoff. Surface runoff not only carries water but also sediment with pesticides bound to it, thus, contaminating rivers and creeks. Both leaching and runoff are more likely to happen with persistent pesticides—those with a long half life. Persistent pesticides are not easily degraded and remain in the soil for long periods of time. The longer a pesticide is in the environment, the more likely it is to become a pollutant. A practice recommended to advisers and applicators is to look at the weather forecast and to schedule pesticide applications so they do not occur before rainfall or irrigation events. In addition, they are recommended to not make any pesticide management within 100 feet of a well, because if a spill occurs, it can contaminate directly the aquifer.

This outreach and education program shows the main principles of the water cycle, how water moves into the natural and agricultural environment, and how to prevent pesticides from reaching any water bodies. The overall goal is not to teach them a recipe for every pesticide and agricultural landscape, but to teach them the main principles, so they can apply them according to the specific conditions that they are dealing with day to day. Because this program is taught in English and Spanish languages, it has a deep impact in the agricultural community because it has reached different audiences. For further information related with this program feel free to contact Lisa Blecker (lblecker@ucanr.edu) and/or Dr. Samuel Sandoval Solis (samsandoval@ucdavis.edu).

Comments about this article? We want to hear from you. Feel free to email us at article@jcsmarketinginc.com
RECENT ADVANCES in NOW Management

By: Cecilia Parsons | Associate Editor

Even though 2018 has turned out to be a relatively tame year in regards to navel orangeworm (NOW) damage in pistachios, no one is convinced that battle has been won.

According to Bob Klein of the California Pistachio Research Board (CPRB) and Kern County Cooperative Extension entomologist David Haviland, plenty of knowledge gaps with this pistachio pest remain.

“How far do they fly at night?” and “what do I do if my neighbor does no sanitation?” were just a few of the questions posed during a panel discussion on advances in NOW management at the South Valley Nut Conference in Tulare.

Cost for Controlling NOW

Klein outlined the pistachio industry costs attributed to NOW control and crop damage. Adding winter sanitation costs of $100 per acre, $18 million for insecticide sprays, monitoring costs and mating disruption at $50 an acre for 50,000 acres, growers are out almost $80 million. Add in the two percent NOW damage incurred in 2017, cost to processors of removing damaged nuts, aflatoxin test costs, and processors took a $40 million dollar hit, Klein said.

There are management options for NOW control, but there is no ‘silver bullet’ that will eradicate NOW from California pistachios, Klein said.

Klein stressed that the most recent
advance in NOW control, the experimental sterile insect release program, is not a replacement for other control methods. The sterile insect program, where NOW adults are mass-raised, irradiated to make sterile then released to out number fertile NOW is only in it's third year at a cost of $4 million. Klein said CPRB expects to spend $5 million on the program.

The board began funding to determine if NOW could be mass reared, if the adults could be sterilized and maintain vigor, if the sterile moths could be shipped and released via air craft, if they could be recaptured and finally—prove that sterile NOW releases reduce crop damage.

**Sterile Insect Release**

This year marked the first releases of sterile NOW. Releases began in April in the Lost Hills area of Kern County and will continue until mid-November. About 150 million NOW moths have been released this year, Klein said. The board was not looking for reduction in crop damage this year, but at the survivability of the moths. The releases, he said, were done over orchards where NOW control methods were used and sanitation done.

Klein said the timing of the sterile insect project also takes advantage of the existing Arizona facility that produced sterile pink bollworm for that the United States Department of Agriculture (USDA) eradication effort. The CPRB
decided to initiate the program before the facility was shut down.

Differences in NOW and pink bollworm biology means this project is aimed at suppression, not eradication. There are too many hosts for NOW and too many generations per year to expect eradication, Klein explained.

Control Methods

Orchard sanitation, monitoring pest levels, trapping and insecticide sprays are standard NOW control practices, and can be effective, Haviland said. Resistance to insecticides can be expected as more applications of the same materials
are made. There are no new chemistries being developed, he noted.

Mating disruption (MD) has been effective in lowering NOW populations in some situations. Mating disruption, the use of pheromones dispensed in orchards to keep male NOW from finding and mating females, works in larger, more square orchard blocks, Haviland said. Use of MD, however, makes monitoring for NOW with pheromone lures difficult in MD-treated blocks and neighboring blocks. Haviland said work by USDA researcher Chuck Burks found that a combination Phenyl propionate/pheromone (PPO) lure attracts similar numbers of NOW adults in the presence of MD. A field trial showed the Phenyl propionate dispensers last about six weeks.

There are four MD products registered for use in pistachio orchards. They all cause a reduction in NOW moths trapped and some growers report a 50 percent reduction in damage when the products are used throughout the growing season. Klein said they are typically placed in orchards by April 1 and last until harvest.

This control method can pay for itself in some situations, Haviland said, but even at the break-even point, there are rewards to be captured in marketing, noting the sustainability of the practice to customers.

**Damage Levels**

Conservative economic models show that at ten percent damage, using MD can reduce nut damage by half, paying back the investment. Damage levels in the half to quarter percent don’t warrant the investment, but Haviland noted—who can predict the level of NOW damage? While 2017 had very high levels, this year’s low level was a surprise.

Trials that showed significant reduction in NOW damage involved good sanitation at two mummies per tree, MD plus insecticide sprays. Mating disruption is always at the top of the program, Haviland said, with the goal of replacing sprays.

It is not true that MD becomes less effective if all growers were to use it in their orchards, Haviland said.

“The opposite will happen if you and all your neighbors use mating disruption in your pistachios. There will be a lot of wigged out moths.”

Comments about this article? We want to hear from you. Feel free to email us at article@jcsmarketinginc.com
Aged-out almond trees are providing health benefits for next generation orchards.

**Chips**

Instead of burning or grinding trees and hauling off chips, more growers are choosing to spread and incorporate at least a portion of the wood chips generated from tree removal and grinding into the ground, confirmed Zach Fowler of Fowler Brothers Farming in Waterford.

"Of the 2,600 acres we have worked on, 90 percent of the growers asked us to spread the wood chips on the ground," Fowler said.

Restrictions on burning orchard waste and limitations on biomass plant options are making the choice of incorporating wood chips into the ground easier for almond growers, but research is proving there are many soil and tree health benefits to this practice.

**Demonstration**

At a Denair whole orchard recycling demonstration hosted by Fowler Brothers Farming, University of California (UC) researchers shared what they have learned about the effects of whole orchard recycling on soil health and planting second-generation orchards.

For the past three years, studies have been conducted at four sites in the San Joaquin Valley to look at soil organic matter, carbon, nitrogen and water content of soils where almond wood chips had been incorporated into the soil.

Brent Holtz, University of California Cooperative Extension (UCCE) farm advisor in San Joaquin County has been leading research into whole almond orchard recycling and its effect on second generation tree growth, yields, light interception and soil fertility.

Ten years ago, as more and more almond orchards were nearing the end of their productive years, efforts began to help growers in their choices in orchard removal. Restrictions by air pollution control districts on open field burning and closure of co-generation facilities due to expired contracts led research into alternative uses for wood chips.

While uses have included erosion and dust control on-farm, addition of wood chips to orchard re-plant sites has shown the value of adding organic matter to the soil.

Holtz estimated that in the past three years nearly 19,760 acres of aged-out almond trees in California have been ground and wood
chips spread and incorporated into the soil. Average cost for this practice is $1,000 an acre. The operation uses several pieces of heavy equipment to push trees, grind and pile wood chips. Two years ago, a 50-ton rock-crushing machine was used to push, grind and incorporate trees into the soil in one pass.

Holtz said the trial showed that chips were not evenly distributed in the soil and there were too many large chunks of wood that took much longer to break down in the soil.

**Benefits of Whole Orchard Recycling**

Benefits of whole orchard recycling listed by Holtz include sequestration of carbon in the soil, enhancing soil health, increased water use efficiency and water holding capacity, reduced nitrogen loss due to leaching and increased soil diversity. There is no evidence that the practice is associated with re-plant disease.

Amalie Gaudin, agroecology professor at the UC Davis department of plant sciences, said incorporation of chipped trees into soils helps build soil carbon and improves carbon sequestration potential of the soil. Decomposition of the chips over time adds organic matter to the soil. Soil microbial activity makes nitrogen in the soil available to plants.

When a new orchard is planted, Gaudin said, research shows that the tree’s water status is improved due to better water holding capacity of the soil.

**Preliminary Results**

Preliminary results from two years after the soil incorporation:

At Tallerico Farms in Manteca—22 and 15 percent greater carbon and organic matter content in the wood chip plots, 12 percent lower bulk density in the woodchip, 33 percent less soil compaction in the woodchip treatment.

At Wonderful Orchards in Kern County—29 percent greater carbon content in the wood chip plots compared to control, 28 percent lower bulk density in the wood chip treatment.

At Kearney Agriculture and Research Center in Parlier—in micro plots 60 percent greater carbon content in the wood chip plots compared to control, 66 percent higher nitrogen content in the wood chip plots, 16 percent lower bulk density in the wood chip treatment.

At Agriland Farming in Chowchilla—57 percent greater carbon content in the wood chip plots compared to the control, 60 percent greater nitrogen content in the wood chip plots.

Holtz noted that there was a range of soil types at the test sites, except for clay soils. Soils were less compacted at most sites and at the Kern sites, it was difficult to find chips the third year after
Continued from Page 77

there was significantly greater increase in tree circumference in the grind treatment from 2014–2016 when compared to burn. Significantly greater photosynthetically active light interception was also measured in the site of the grind treatment compared to burn.

Yield comparisons in the Nonpareils 2014–2017 showed 1,120 kg/ha greater in the grind treatment than the burn.

Soil analysis showed more soil nutrients were found in the grind treatment and soil pH was significantly lower. Leaf petiole analysis showed higher nitrogen, phosphorus, potassium, manganese and iron and less sodium and magnesium levels. Holtz also noted that bud failure severity was lower in the Carmel variety in the grind treatment.

Nitrogen dynamics are a concern where wood chips have been incorporated into the soil, Greg Browne, United States Department of Agriculture (USDA)/Agricultural Research Service (ARS) plant pathologist, said. The first year after planting, trees may become stunted due to lack of nitrogen which hasn’t yet been released by the wood. Until decomposition begins after the first year, trees will need supplemental nitrogen applications.

Holtz said his research team would continue their characterization of soil health hydraulic properties after whole orchard recycling.

Fowler said that during the three-year period between the orchard removal and the first harvest of the next generation of almond trees, the plan is to provide optimum growing conditions and achieve smooth, chip-free orchard floors before the first harvest.

At the Denair demonstration, Fowler showed the entire recycling process starting with grinding the trees, spreading the chips, deep ripping the ground and then discing to fully incorporate the wood chips in the soil and smooth the surface prior to planting trees.

Chip Size Matters

Size of the chips matter, he said and smaller, two-inch pieces are best, but the grinding process is slower—and more expensive.

The machine can process trees from 10-15 acres per day. Ripping takes one to two hours per acre depending on the ground.

After the demonstration, Fowler pointed out an adjacent second-generation almond orchard planted last April. The potted, Independence variety trees were mechanically planted after wood chip incorporation. The ground was smooth with few visible wood chips on the surface. The trees were thriving.

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OUT WITH THE OLD
Thanks to $135 Million in FARMER Funding

By: Jodi Devaurs, Director of Regulatory Affairs | Western Agricultural Processors Association

FARMER

Nearly a dozen pieces of agricultural equipment, were crushed in Fresno, CA signifying the beginning of a historic state-wide funding program for the agricultural industry. The Funding Agricultural Replacement Measures for Emission Reductions (FARMER) program consists of $135 million in incentive funding. These dollars come from the California Climate Investments, a state-wide initiative tasked with putting money from Cap & Trade to work to reduce greenhouse gas emissions. While the FARMER program benefits air districts statewide that have agriculture, the San Joaquin Valley Air Pollution Control District (SJVAPCD) stands from the rest as it will inherit $108 million dollars alone. Why such a large portion? The San Joaquin Valley is now facing a mandatory tractor replacement rule, a regulation being rolled out by the California Air Resources Board (CARB) due to the exceedingly strict federal ambient air quality standards overseen by the Federal Environmental Protection Agency.
As members of the SJV APCD, EPA, United States Department of Agricultural Natural Resource Conversation Services (US-DA-NRCS), CARB, as well as state and local officials gathered for the FARMER roll out event, Roger Isom, President/CEO of Western Agricultural Processors Association (WAPA) addressed the crowd, “Today is a monumental day!” This step to secure millions of dollars to go directly to the agricultural industry was not only a great achievement by the multitude of agencies involved of handling these funds, but is a beacon of what can be accomplished through our state legislature when we can work across party lines. Among those in attendance were Assemblyman Heath Flora and Assemblywoman Autumn Burke. Assemblyman Flora represents the 12th Assembly District encompassing Turlock, Ripon, Manteca, Escalon and parts of Galt, an area that will significantly benefit from these incentives. Assemblywoman Burke on the other hand, represents the 62nd Assembly District. The assemblywoman was one of the biggest champions to secure these dollars despite having no agriculture in her district, which is made up of Venice, El Segundo, Inglewood and Hawthorne. This bipartisan effort will give the agricultural industry the significant jump start it needs to power through regulations and get newer technology in the field for tractors, UTVs and trucks.

Specifically, the San Joaquin Valley required significantly larger funding allocations due to the recently adopted CARB requirement that mandates that the Valley will need to replace nearly 12,000 tractors that operate with Tier 1 or Tier 2 engines by 2025. This equates to roughly 2,400 tractors a year, a number that, while astonishing, will need to be achieved and the FARMER funding will be a critical component to reaching compliance. Funding for replacing tractors is already available and covers other agricultural pieces of equipment including wheel loaders, combines, cotton pickers, graders and more.

**FARMER Funding**

FARMER funding is also available through the newly created Ag Utility Terrain Vehicle (UTV) replacement program in the San Joaquin Valley. While this program has been historically available for municipalities, the agricultural industry will be able to take full advantage of this new initiative. Structured as a voucher program, farmers can apply to turn in old, fuel-fired UTVs or ATVs (All Terrain Vehicles) to be

Continued on Page 82
crushed and then receive a voucher covering up to 75 percent of the cost of an electric replacement. Electric UTVs are widely available through manufacturers such as John Deere, Polaris, Cushman and others.

**Ag Trucks**

While not finalized, another program to benefit from FARMER incentive funds will be the replacement of ag trucks. The San Joaquin Valley will be funding up to 65 percent of the cost of replacing outdated trucks. Funds can be used to purchase used vehicles as long as they are less than 650,000 miles and are a 2012 model year or newer.

**The Future**

As we look into the future, the regulatory climate in California does not seem to be letting up on businesses or the agricultural industry. However, when programs such as the FARMER funding that are crafted with industry support, bipartisanship as well as local, state and federal agencies it shows what can be accomplished when industry and regulators work cooperatively. It is highly encouraged that farmers take advantage of these incentive funds as soon as possible. While only this first year of $135 million is secured, our Association as well as others are working behind the scenes to ensure another year of funding for the state.

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In-class Learning Leads to In-field Growth

This year, a team of four student interns headed-up ESRCD’s mobile irrigation lab service. Interestingly, though not coincidentally, they all had one connection in common—Steve Amador, professor in the Agriculture & Environmental Sciences department at Modesto Junior College (MJC).
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“I was asked to present at a Resource Conservation District board meeting a few years back. They had an open internship position and it fell together,” said Amador, who also serves as the faculty advisor for the Irrigation Technology program at MJC. “They’ve been hiring MJC students ever since, and we have three working there now, along with an MJC graduate.”

The partnership between MJC and ESRCCD seems like a perfect fit.

Amador oversees the first and only post-secondary program in California that offers an Associate of Science degree in Irrigation Technology. This means his students are trained in the fundamentals of irrigation system design and performance, field skills readily applicable for the services provided by ESRCCD’s mobile irrigation lab.

“Everything is done with students in mind,” said Amador. He notes that the internship program is a continuation of the hands-on learning students gain while earning their degree.

Industry Demand Inspires Collegiate Program

The groundwork for MJC’s Irrigation Technology program dates back approximately ten years. Amador recalls teaching his first irrigation class and working with agricultural irrigation professionals and farmers when he soon learned that demand was off-the-charts for graduates who specialized in irrigation. Specifically, there was demand for individuals with more advanced skills but not necessarily a bachelor’s degree in engineering.

“We realized there was nothing in between the engineer level and those with basic skills,” said Amador. “Our A.S. degree fills that gap, preparing students for success and providing industry with skilled talent.”

Almond Board Provides In-field Support, Program Funding

Spencer Cooper, senior manager of...
irrigation and water efficiency at the Almond Board, is a member of MJC’s Irrigation Technology advisory committee, which provides industry guidance and feedback on the program. He has also witnessed the value almond growers and students receive from the MJC-ESRCD partnership, and the guidance they receive while conducting irrigation testing in almond orchards.

“ABC has been a proponent of local conservation district programs that help growers improve efficiency, save costs and conserve resources, such as the mobile irrigation lab,” said Cooper. “When you add in the fact that the field testing and data collection is being done by students interested in irrigation, it’s a win-win. They are sharpening their skills and growers are getting valuable results about the performance of their irrigation systems.”

Cooper notes that Resource Conservation Districts across California offer similar free or low-cost technical assistance programs, and he encourages growers to contact their local districts this winter to learn more about these opportunities.

Growers interested in learning more about irrigation optimization can contact Cooper to learn about ABC’s Almond Irrigation Improvement Continuum, a comprehensive manual of irrigation management and scheduling practices that range from fundamental to advanced management levels. For more information, visit Almonds.com/Irrigation or contact Cooper at scooper@almondboard.com or (209) 604-3727.

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Webb and Chaney measure sprinkler emitter output to ensure uniformity across the irrigation system. Image courtesy of the Almond Board of California.
Drilling a water well can be an expensive endeavor with many uncertainties. When constructed properly, your well should be a reliable source of water now and into the future. But how does one ensure the well drilled today will operate consistently and efficiency into the future? Certain questions should be asked to your drilling contractor or consultant to clarify expectations before drilling commences. Some of these include comparing appropriate drilling methods, evaluating different material options to maximize well life, and understanding the pros and cons of different screens.

Water well drilling contractors that work in your particular area are typically knowledgeable and can provide reasonable expectations. However, too often well owners fail to ask pivotal questions to their drillers regarding the well design that could have resulted in a well that lasts longer, produces more water, and operates at a lower cost.

**How Will My Well Be Drilled?**

Water wells can be drilled by a number of different techniques. The depth and geology often dictate what drilling method is best, which should help you to hire a drilling contractor that is competent in that method. Four common drilling methods used today for irrigation wells are:

- Cable Tool
- Air Rotary
- Direct Mud Rotary
- Reverse Circulation

Cable Tool drilling is one of the oldest drilling practices. The borehole is drilled by the pulverizing action of a reciprocating steel bit suspended from the rig with a cable. The process can take several weeks, if not months, and for this the cable tool method is best suited for small diameter wells where the geology consists of consolidated formations. Air Rotary drilled wells are typically drilled in hard rock formations. They too are better suited for smaller diameters and typically yield lower amounts of water. If your farm is located above an alluvial
formation, most likely you would want a Direct Mud Rotary or Reverse Circulation drilled well. Direct Mud drilling is very versatile and used for medium depth wells (<1,000 feet). In California’s Central Valley, often times well depths exceed 1,000 feet which is where Reverse Circulation becomes the most efficient. Reverse drilled wells are the most common method for large diameter high capacity wells in alluvial formations. The process also involves shorter drilling and construction time, as well as providing good access for gravel pack installation to promote sand-free water production at high pumping capacities.

**Know Your Steel Options**

Well owners should understand that their drilling contractor is hired to drill the hole and install the casing, screen, and pump. Once their work is complete the contractor moves on to the next job and you as the owner are simply left with a hole in the ground (your well) that will hopefully yield you adequate amounts of water. The well is made up of two parts, the blank casing and the screen. Without being prompted, drillers may only offer one option, such as mild steel or PVC. However, you as the well owner have choices, and the material from which the casing and screen are constructed will have a direct impact on the longevity of your well.

Mild Steel, also referred to as Low Carbon Steel, is the most commonly used material for well casing and screen and is readily available in a variety of diameters and wall thicknesses. A common question an owner may ask their driller is how long will my well last before corrosion sets in? The answer to that question is subject to the quality of the ground water under your property. Mild steel has the lowest corrosion resistance, but is also the lowest cost. If you are looking for a steel option that offers higher corrosion resistance, there is Copper Bearing steel or High-Strength Low-Alloy (HSLA) steel. If your well is pumping water that is higher in salts, you may be forced to use Stainless Steel. Table 1 (below) presents a summary of the relative corrosion resistance levels of each steel based on an independent field study.

<table>
<thead>
<tr>
<th>Corrosion Resistance</th>
<th>Mild Steel</th>
<th>Copper Bearing</th>
<th>HSLA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Properties</td>
<td>iron &gt; 98%</td>
<td>minimum 0.2% Cu</td>
<td>Min. amounts of Cu, Ni, Cr</td>
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<tr>
<td>Yield Strength</td>
<td>35,000 lbs/in²</td>
<td>35,000 lbs/in²</td>
<td>50,000 lbs/in²</td>
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</table>

Table 1. Courtesy of Fountail Valley Corrosion Study, Geoscience Support Services Inc. (1990)

Many carbon steel wells that were constructed 50 or 60 years ago are still pumping today, which can cause some owners to assume a mild steel well drilled today will also last as long. The truth is, the carbon steel cased wells from 50 years ago are actually made from a higher grade steel that more closely resembles HSLA steel that is available today. Mild steel is composed primarily of iron, but adding small amounts of Chromium (Cr), Copper (Cu), and Nickel (Ni) substantially increases its strength and corrosion resistance. Table 2 (below) highlights the chemical composition of well casing used in the mid 1900’s compared with the composition of mild steel today.

Some drillers may suggest using a thicker walled casing in order to extend the life of the well. While more steel does increase well life, thicker steel can have the unintended consequence of...
Continued from Page 89

reducing well efficiency by having the screen clog, especially with smaller slot sizes. To avoid this potential problem, using a higher quality steel such as Copper Bearing or HSLA is recommended to ensure long operating life and limit the screen clogging. Simply put, you should use better steel, not more steel.

Some drillers may recommend the use of PVC for the casing and screen. PVC is a good option when the depth of the well is relatively shallow (<500 feet) and the diameter small (< 10 inches). While PVC offers substantial corrosion resistance, it lacks the strength to endure years of pumping.

What Type of Well Screen is Best for my Operation?

Water well screens can be manufactured in three different ways: Mill Slot, Wire Wrap, and Louvered. Vertical Mill Slot pipe is commonly used because it is typically the lowest cost option as it is mass produced. A rotating blade makes cuts (slots) to the pipe outside to inside, removing material as it penetrates. Because of the pipe’s curvature, a slot slightly tapered is produced (wider on the exterior and narrower on the interior) creating an outwardly opening slot. This slot shape results in sand particles building-up quickly, clogging the opening and rapidly reducing yield and efficiency. The cut angle produces a slot that has opposing surfaces, which increases the occurrence of clogging. As a result of the cutting process material is also being removed, resulting in slotted pipe being weaker than blank pipe.

Wire Wrap screen is fabricated by taking a V-shaped wire and wrapping and resistance welding it around an array of vertical rods. This process creates a screen that has large amounts of open area, which is beneficial if the water bearing formation is confined to a tight zone. However the wire and rod framework creates a screen with a weaker structure, compared to that of a screen constructed from blank pipe.

Louvered screen openings are perforated (or punched) in pipe from interior to exterior, forming an inwardly opening slot with non-opposing surfaces. Offset, non-parallel slot edges significantly reduce chances for clogging, regardless of slot size or wall thickness. Additionally, the downward facing orientation of the shutter shaped opening acts as a bridge to retain gravel pack. An added benefit is Louvered screen’s strength which
is greater than the blank pipe from which it was made, since no material is removed during fabrication and the corrugating effect of uniformly spaced shutter-shaped openings.

**What Accessories Do I Need?**

A water well's only components are not simply the blank casing and screen. Manufacturers also construct other components that can be added to your well to help it extend its life as well as monitor its performance. Commonly used accessories are listed below.

Camera Port—This is a 4 inch diameter tube that runs vertically adjacent to the casing and enters into the casing through an opening typically 84 inches in length. This allows the use of a camera to monitor the condition inside of your well, without having to bear the expense of pulling the pump.

Sounding Tube—This is similar to the camera port, but only smaller (typically 2 or 3 inches diameter). This opening into the casing is usually 24 inches in length and allows for small instruments to enter the well to perform readings.

Compression Section—This joint of casing acts similar to a shock absorber you would find on a car. The compression section is part of the well assembly, typically placed above the screen zones in a non water bearing formation. In many parts of California over pumping of ground water has resulted in subsidence, which causes the ground to sink. The compression section is set in the tension position, which allows the well to “compress” as the ground subsides, avoiding premature cracking or failure.

A water well represents a major investment for the owner, and has the task of providing a reliable source of water which is the lifeblood of one’s growing operation. While drillers are knowledgeable and competent, it should not be overlooked the importance of asking the proper questions to ensure your new well will last long into the future.

### Mill Slot vs Wire Wrap vs Louver

<table>
<thead>
<tr>
<th>Strength</th>
<th>Slot Configuration</th>
<th>Redevelopment</th>
<th>Best Attribute</th>
<th>Drawback</th>
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</thead>
<tbody>
<tr>
<td>Mill Slot</td>
<td>Low</td>
<td>Outward Opening</td>
<td>Inward Opening</td>
<td>Low Efficiency</td>
</tr>
<tr>
<td>Wire Wrap</td>
<td>Low</td>
<td>Inward Opening</td>
<td>Limited</td>
<td>Structural Integrity</td>
</tr>
<tr>
<td>Louver</td>
<td>High</td>
<td>Inward Opening</td>
<td>Excellent</td>
<td>Durability</td>
</tr>
</tbody>
</table>

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