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WEST COAST NUT

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WEST COAST NUT

By the Industry, For the Industry

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Walnut Prices up, Tonnage Down Public Safety Power Shutoffs Plague Growers, Processors

While last year was pretty devastating for walnut growers in the state, this year hasn't been much better. With the worry over tariffs, public safety power shutoffs, pest and disease pressure, and production numbers down, about the only thing growers had to cheer about this year was a nearly 50 percent increase in walnut prices.

See full article on page 4



WALNUT PRICES UP, TONNAGE DOWN

PUBLIC SAFETY POWER SHUTOFFS PLAGUE GROWERS, PROCESSORS

By JULIE R. JOHNSON | Contributing Writer



This year's walnut harvest tonnage across the state was down at least 6.8 percent from last year. All photos courtesy of Julie R. Johnson.

WHILE LAST YEAR WAS pretty devastating for walnut growers in the state, this year hasn't been much better.

With the worry over tariffs, public safety power shutoffs, pest and disease pressure, and production numbers down, about the only thing growers had to cheer about this year was a nearly 50 percent increase in walnut prices.

Bruce Lindauer, owner and operator of Lindauer Ranch in Dairyville, said walnut prices went from last year's 60-70 cents a pound to an estimated \$1-1.20 a pound in 2019.

The California Walnut Objective Measurement Report forecasted production of 630,000 tons, down 6.8 percent from last year's 676,000 tons, according to the National Agricultural Statistics Service (NASS).

As reported, the average nut set per tree was 983 on a state-wide basis which is down 16 percent from last year and 23 percent from the five year average of 1,273.

Weather is to blame for the lighter crop, as record amounts of winter and spring rainfall delayed the bloom for seven to 10 days, according to the report.

Lindauer, a third-generation walnut grower, said he expects the report to be on the generous side.

"In the end, I think the tonnage will be leaner than anticipated," he added. "My overall production is down, my yields are down. My Chandler variety is going to come in pretty close to normal, Howard variety slightly less than normal, but my biggest hit is in my Hartley crop, I only have about two-thirds normal on my Hartley crop. It's just the year, I had a heavy, heavy crop last year and I think the trees are just taking a bit of a rest this year."

The report stated there are an estimated 365,000 bearing walnut acres this year in California, up 4.3 percent, exceeding last year's record of 350,000. Trees per bearing acre also set a new



Bruce Lindauer, right, with employee, Jimmy Joe Latimer, at the Lindauer Ranch in Dairyville, California, stands next to bins of walnuts in the drying shed during this year's harvest.

record of 76.9, up from 75.5 last year.

A possible reason for the increase in trees per bearing acre is due to density planting or hedgerow planting that is now common, Lindauer explained.

"We have stepped away from the past traditional tree spacing and moved to a much denser pattern that provides a heavier crop early on," he said. "The

Continued on Page 6


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Walnuts are swept up during harvest at Lindauer Ranch in Tehama County just hours before a Pacific Gas and Electric public safety power shutoff in October that shut down harvest for at least four days. This was the second power shutoff during harvest in two weeks.

Continued from Page 4

density is lessened as trees are removed over the years to allow for air movement and light infiltration.”

Nut Quality

NASS's survey indicated an average nut set per tree of 983, down 16.4 percent from 2018's average of 1,176. However, nearly all of the sizing measurements came in above last year's levels.

In-shell weight (gm) was estimated at 22.7 this year, up slightly from last year. In-shell width and in-shell cross width were in line with last year. In-shell length (mm) is estimated at 38.8, up from last year's measurement of 38.1. The kernel grade—percent sound came in at a new record of 98.9.



Walnut quality was rated good for 2019 by NASS, but public safety power shutoffs affected harvest.

The late spring rains may have provided cooler conditions which increased kernel size and helped walnut quality for some growers in California, but localized weather conditions have resulted in variable crop development around the state, said NASS.

Lindauer said of his three varieties, Chandler, Hartley and Howard—the edible yields in his Chandlers and Howards were down, while his Hartley size was very good.

Brian Crane, who grows 300 acres of Chandlers in Tehama County, said, “My nut quality this year has been decent, equal to if not better than last year. But the overall crop is down about 11 percent from last year and I think the weather may have had something to do with that.”

Public Safety Power Shutoffs

Harvest began on time, but the North State was plagued by Pacific Gas and Electric (PG&E) public safety power shutoffs right in the middle of harvest.

For growers, dryers and shellers, the timing couldn't have been worse.

While some growers were delayed slightly in starting harvest due to the shutoffs, such as Crane, others were right in the middle when the power shutoffs began.

“It wasn't a big problem for me and I was able to have my harvest in before the next shutoff occurred,” Crane said.

Lindauer, who harvests and dries

his own crop, suffered through several power shutoffs that lasted for days.

“I lost more than 10 days out of this harvest season due to shutoffs,” he said. “Thank goodness it is a dry fall, I would have lost half my crop if it was a wet fall. Something has to happen with these shutoffs and PG&E because this is going to come back and bite all of us in the end—especially us growers at harvest time because we basically have three weeks to get our commodity in and have a paycheck, and if they shut us down one week or ten days out of that window it can really hurt us.”

Management Practices

Like many variables for growers this year, the report of pest and disease pressure appeared to be different from one grower to the next.

Crane reported having disease pressure from blight this year.

“We have been applying more sprays for bot (*Botryosphaeria*), and that is a practice we will continue as it is proving to be more and more successful as we get a handle on that problem,” he said. “Bot is definitely my number one issue. As for pest control I have been receiving a lot of help from extension advisors.”

For Lindauer, his biggest issue for pests was the husk fly. “I had a real problem with husk fly this year. Our walnuts are clean, but it seemed like I was out there all the time spraying and catching husk flies,” he said.



While walnut prices were up this year for growers, tonnage was down, according to Bruce Lindauer, owner and manager of Lindauer Ranch in Dairyville, California.

Lindauer says he is in close contact with Bob Van Steenwyk, an entomologist at University of California, Berkeley who is going to help him this year on the problem.

“He looked at my data and records and he could see there is something going on that we need to figure out and also decide on how to manage,” Lindauer said.

As for disease pressure, Lindauer said he hasn't had much of a problem this year. “I've been diligent on blight spray and that really helped to keep that in check. I don't really have a bot problem because I am really careful with my irrigation system and how I manage my orchards with air flow,” he added.

One of the biggest problems Lindauer said he faced this year was sunburn. “We had a lot of sunburn this year in all the varieties. I don't know if it was because the crop was lighter that we see it more prevalent or what.”

Of all of his management practices, Lindauer said his water management is the most successful and proved to be so again this year.

He said he is a great advocate of Allan Fulton, University of California Cooperative Extension (UCCE) Irrigation and Water Resources advisor in Tehama County, and the tools he provides to growers.

“If people would follow Allan's advice and listen to what he says, it is like gold, you can't buy the kind of information he puts out,” Lindauer said. “You need

to learn about and use the instruments, information and instruction he provides. For me it has saved on electrical costs, how much water I use, and my trees have just jumped out of the ground and are happy little campers. To me, water management dictates

everything else, it tells my how efficient I can be with nitrogen uptake and so much more.”

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The Latest on *Disease Resistant Rootstocks*

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By CECILIA PARSONS | Associate Editor



Larger trees with orange band painted on shows test rootstock in a replant orchard infested with nematodes and replant disorder. Two Chandlers on test rootstock are on either side of a Chandler on VX211 and clear performance superiority of test rootstock is painfully obvious. All trees are same age in that row of three. All photos courtesy of Cliff Beumel.

SIGNIFICANT PROGRESS IS being made in the development of walnut rootstocks that possess resistance to the major yield limiting diseases and soil-borne pathogens.

“We are now working on putative disease resistant walnut genotypes which are being propagating to test in large scale field trials to determine how they perform compared to the greenhouse evaluations,” said Dan Kluepfel, United States Department of Agriculture (USDA)/Agricultural Research Service (ARS) research scientist and principal investigator of the walnut rootstock development program.

“This is not just an academic pursuit.

We have something in hand and in collaboration with nurseries are moving forward to place these rootstocks in field trials.”

Disease-Resistant Rootstocks

Disease-resistant rootstocks for commercial walnuts are a huge deal for growers, said Cliff Beumel, a long time walnut grower and nurseryman and President of the fruit, nut and olive tree nursery Agromillora located north of Sacramento near Gridley.

“All growers eventually bump up against one of these pressures,” Beumel said of crown gall, Phytophthora and lesion nematodes. “This is a real issue

right now in existing orchards.”

Most California walnut growers know they need to choose rootstocks based on their ability to resist or tolerate various soil-borne diseases and nematodes, even if pressure is low at the time of planting. After the trees are planted, there are few options for growers, who find these pathogens, to control their impact on tree health.

Significant walnut acres are planted with seedling or clonal ‘Paradox’ rootstocks which are susceptible to the soil-borne diseases, crown gall, root lesion and root knot nematode and

Continued on Page 10



First 5 trees on left show the replant tolerant rootstock and the trees on right are standard Chandler on VX211.



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Continued from Page 8

Showing enhanced performance of the new rootstock being trialed.

Phytophthora root and crown rots. Kluepfel said the most promising solution for long term tree health and major yield limitations is genetic resistance/tolerance in rootstocks.

Playing Catch-U p

Beumel said the walnut industry is 30 years behind the almond industry in mass rootstock propagation by cloning, a way to ensure uniformity in traits. That is due to the biological differences between the species. The technology to clone walnut rootstocks is a more recent achievement. Finding genes that are known to give certain attributes can make the process of rootstock development move faster, he said.

The use of genomic mapping will further accelerate the development of disease-resistant walnut rootstocks. The USDA ARS-University of California (UC), Davis walnut rootstock team has completed analysis of the genomic sequence data that resulted in the complete high quality reference genomes for *J. regia* and *J. microcarpa*, i.e. the English walnut and its wild North American relative respectively, that are parents to the promising disease resistant hybrid rootstocks. The genome data will accelerate the process of identifying genetic markers for disease and nematode resistance.

“We now have the best assembled and annotated genome for *J. microcarpa* and *J. regia*,” Kluepfel said. The complete analysis of the genomic sequence data shows high quality reference genomes for those two walnut species.

Kluepfel said the research team is looking at behavior of the walnut breeding populations originating the crossing of these two key species to see if the disease resistance is present. They are in the process of fine mapping and Kluepfel said his hope is to single out and identify a handful of the genes responsible for resistance. In most cases, there is resistance to one pathogen, but in a handful of cases resistance to both crown gall and Phytophthora have been found in some of these new and novel hybrids.

“We chose to cross the widely used English walnut specifically with the wild Texas black walnut because of its native resistance to several soil-borne diseases and root nematodes, which are serious pests of walnut in California,” Kluepfel said.

The assembled genome sequences of the two walnut species also will now help researchers identify genetic markers that breeders can use to develop new varieties with improved pathogen and pest resistance.

Objectives for the Research

Objectives of this continuing walnut rootstock research are:

Traditional and clonal propagation of a genetically diverse walnut species including a fine mapping of the *J. microcarpa* (Texas walnut) and *J. regia* (English walnut) genomes and their disease resistant hybrids.

Identification of resistance/tolerance to the diseases and nematode species considered most damaging to walnut production.

Genetic, physical and functional mapping of disease resistance genes and use of molecular marker for rapid screening of resistant genotypes.

Outreach to growers, field trials and examining performance of chosen rootstocks germplasm.

Moving Forward

About 1,530 unique walnut genotypes are being maintained by the research team as micro propagated cultures. With this material 60,000 fully rooted plants were produced and many were entered in the disease resistance phenotyping pipelines.

The research team reported completion of genotyping of the germplasm collection of *J. microcarpa* seeds and will soon complete the associated analysis. This will be used to

define the genetic diversity in an effort to select the most genetically diverse representatives for the planned field planting.

The team is also, under field conditions, continuing to monitor nematode populations on multiple *Juglans* genotypes identified as possessing resistance or tolerance to root lesion nematode and or root knot nematode.

In the latest report, Kluepfel said a high level of resistance to crown gall and *Phytophthora* have been identified. The pathogens remain the highest research priority level for the walnut industry.

A significant portion of the research team's propagation effort has been centered on production of clonal plants from each of 600 interspecific hybrids from the genetic mapping populations. When all of the disease resistance phenotyping of all genetic mapping populations is complete for crown gall, *Phytophthora* and nematode it will enable fine mapping of the genetic markers for disease resistance.

Kluepfel reports that four new elite



The younger trees shows Chandler on an experimental replant tolerant rootstock on the right hand side vs. Chandler on VX211 on the left side. Clear superior growth of test rootstock vs. VX211.

rootstock genotypes developed through this project are being studied in five replicated field trials across the state. They are being compared to industry standard clones VX2II RXI and Vlach at all sites. At one of the sites, trees were inoculated with the pathogen that causes crown gall and development was evaluated. This initial evaluation identified two of the experimental rootstocks with elevated levels of crown gall resistance compared to RXI, VX2II

or VLACH, with VX2II being the most susceptible. By the end of this year, the research team anticipates having several additional disease resistant genotypes in the field where they will be challenged by both crown gall and *Phytophthora* along with nematodes.

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Navel orangeworm. Photo courtesy of David Haviland.

“Hit them where it hurts,” is the game plan for controlling insect pests in specialty crops.

By CECILIA PARSONS | Associate Editor

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annual Crop Consultant Conference addressed insect pests that are the most economically damaging in specialty crops including tree nut crops. Control of these insect pests, said Kern County University of California Cooperative Extension (UCCE) farm advisor David Haviland, requires a game plan.

Navel Orangeworm

The number one insect pest in nut crops, navel orangeworm (NOW), is vulnerable over winter surviving inside mummy nuts left behind after harvest. Winter sanitation of orchards, by shaking mummies, blowing them to the row middles and shredding them is considered the most important part part of the NOW control strategy. The integrated pest management (IPM) plan for control from spring through harvest, Haviland said, is to confuse winter survivors with mating disruption, protect the crop from damage with insecticide sprays in June and try for early harvest

Continued on Page 14

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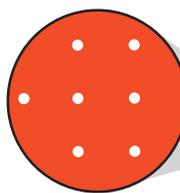
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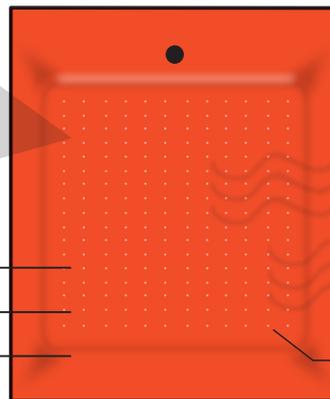
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Continued from Page 12

to minimize crop damage. A second shake of pollinator varieties should be done by early September to prevent a fourth flight of NOW and reduce overwintering numbers.

Haviland said a case study showed that reducing mummy nuts to an average of two per tree paves the way for greater efficacy of mating disruption and insecticide sprays. Those two efforts can reduce crop damage by about 50 percent. Sanitation reduces the odds that survivors will mate and find suitable places to lay eggs.

"The farther separated they start, the easier to keep them apart," Haviland said.

The case study showed that when Nonpareils are harvested by early August, worms are removed from the orchard and the third flight of this insect is negligible, providing protection of later harvested pollinator varieties. When Nonpareils are harvested

later in August, the worms become the third flight of adults, re-infesting the Nonpareils and infesting the pollinator varieties.

Results of a University of California (UC) West Side Research and Education Center IPM study showed that one timed application of an insecticide reduced NOW damage by 50 percent where mating disruption was used. Data also showed consistent reduction in moths captured and crop damage where mating disruption was used.

Reduction in the number of insecticide applications is important because of resistance issues. The two most widely used insecticide products are Intrepid and Altacor, and Haviland noted that there are no new chemistries for control being developed. Pyrethroid use is no better with resistance and also can lead to mite flare-ups.

Continued on Page 16

"Results of a University of California (UC) West Side Research and Education Center IPM study showed that one timed application of an insecticide reduced NOW damage by 50 percent where mating disruption was used."



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On the economic side, Haviland said that with no NOW prevention in almonds, the cost of inaction can be high. A damage calculator case study showed that at 2,500 pounds per acre, a 1.5 percent huller reject level with a base price of \$2.54, loss can be \$248 per acre. At the three percent huller reject level, the loss can be \$681 per acre.

Vine Mealybug

Control of vine mealybug (VMB), a major pest in vineyards, will become difficult with the loss of key insecticide chemistries. Haviland said that Lorsban (chlorpyrifos), an effective tool in controlling vine mealybug is on the regulatory chopping block. Loss of that insecticide leaves other products with their own challenges. There are Maximum Residue Limit (MRL) concerns in the European Union (EU) with Applaud, another effective chemistry and the neonicotinoids are also under fire by regulators. The ten year forecast



Vine mealybug is a serious pest in vineyards, feeding on vines and producing large amounts of honeydew resulting in sooty mold damage. Infestations of this pest can lead to decreased vigor and defoliation according to the Center for Invasive Species Research at UC Riverside.

without Lorsban, Haviland said, is scary.

Depending on the region, vine mealybug can be present in a vineyard year-round. With warmer temperatures in the spring, populations increase and

they become more visible as they move from the roots or trunk to the cordons and canopy. Ants may transport vine mealybug from the roots to above ground plant parts where they continue to tend vine mealybugs throughout the



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"Depending on the region, vine mealybug can be present in a vineyard year-round. With warmer temperatures in the spring, populations increase and they become more visible as they move from the roots or trunk to the cordons and canopy."

remainder of the growing season.

Haviland said CheckMate, a dispenser-based mating disruption (MD) product is registered for use for ten plus years. The dispensers are placed at a rate of 250 per acre and last throughout the growing season at a cost of about \$115 per acre. A microencapsulated version of the product, VMB-F is a liquid formulation of the pheromone at a lower cost of \$20 per acre but it is not approved for organic production.

Both formulations reduce mating success by VMB. In Kern County field trials last year, CheckMate VMB-F held vine mealybug male trapping levels at a lower rate than other MD products.

Haviland said one application disrupts VMB mating for about 30 days and efficacy is expected to increase with multiple years of use.

Spotted Wing Drosophila

Spotted Wing Drosophila (SWD) is an invasive fruit fly species that was first found in California in 2008 and infests ripening cherries and berry crops. Kent Daane, UCCE Specialist at UC Berkeley advised growers to first control with a broad-spectrum products, then determine efficacy of other control tools.

Daane said there are pupal and larval parasitoids that will suppress SWD numbers coming into orchards, but they are not found inside orchards. Since spotted wing drosophila is native to Asia, Daane said researchers have traveled to its historical range to search for parasitoids with the potential for controlling SWD.

Explorations in SWD native habitat found a number of larval-pupal parasitoids associated with SWD. In China and Japan parasitism levels were high and a Japanese strain was found to be specific in attacking SWD larvae in fresh fruits.

Daane said three larval-pupal parasitoids from Asia were chosen for study. *G. brasiliensis*, *L. j. japonica*, and *A. japonica*, were and imported into quarantine labs for evaluation as classical biological control agents.

Daane said that when multiple parasitoid species co-exist they likely work synergistically to suppress spotted wing

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Spotted wing drosophila is an invasive fruit fly species that has become established in California and causes economic damage to ripening cherry and berry crops. Damage is caused by maggots feeding on fruit pulp.

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drosophila. Ideal parasitoids are host-specific, so their introduction will not impact other non-target species that could be important to an ecosystem. When these parasitoids were screened with other *Drosophila* species, *A. japonica* was considered a generalist, and *L. j. japonica* and certain strains of *G. brasiliensis* were specialized for SWD.

Brown Marmorated Stink Bug

Brown marmorated stink bug (BMSB) is one of the newest invasive insect species to threaten California specialty crops. Jhalendra Rijal, UCCE IPM advisor for northern San Joaquin Valley, said this large bug pest is a voracious eater and has infested agricultural crops in San Joaquin, Stanislaus and Merced counties since 2016. The first reported BMSB damage to almond crops was in 2017. Signs of BMSB feeding on almonds include external gumming, brownish speckles or yellow coloration of the hull. Black spots on kernels are another sign of BMSB feeding. BMSB has a wide range of hosts and feeds on fruit and vegetable crops as they mature in the summer and spring.

BMSB is identified by light and dark bands on legs and antennae and along margins of the abdomen. Adults overwinter in sheltered areas of buildings, woodpiles and in old



Brown marmorated stink bug is an invasive species known for its wide host plant range. It has been found in almond and peach orchards in the Central Valley. Like other stink bugs, it uses piercing sucking mouthparts to feed on leaves and fruit.

dead trees. Infestations of BMSB are more likely if there are overwintering sites or preferred host plants nearby. Rijal said field trials in almond orchards known to be infested with BMSB showed significant nut drop in Nonpareil from end of March to mid April.

Rijal recommends monitoring for BMSB if infestations are known. A minimum of three sticky traps with a BMSB lure should be placed on border rows beginning in March. Sticky panels should be changed as needed and lure replaced every 12 weeks. Visual sampling in the orchards is as equally important as traps, Rijal said.

Possibility of BMSB control in agriculture crops comes with the introduction of a parasitoid *Trissolcus japonicus* or Samurai wasp. This parasitoid is also native to the area of Asia where BMSB originated and parasitizes a significant number of BMSB eggs. Since its introduction in U.S., Samurai wasps have been recovered in the field, most notably this year in southern California.

There is also a website dedicated to information about life cycle, management and biological control of BMSB: STOPBMSB.org.

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POSTHARVEST PREP FOR WALNUTS: WEEDS, NUTRIENTS, AND BOT

By CRYSTAL NAY | Contributing Writer

HARVEST TAKES A TOLL ON orchards, and as the hustle and bustle of walnut harvest comes to a close, trees need time to rest, recover, and refuel. Growing operations may be headed into a slower time of year, but postharvest actions taken to prepare the tree for—or nourish the tree during winter—help ensure its health and productivity come spring.

Less active months are good times

to check equipment and revisit the effectiveness of the previous season's protocols, while also considering the winter management of weeds, nutrients, and diseases or infections.

Weed Control

Luckily for walnut growers who have mature trees, many weed populations can't emerge simply because the canopy shades out the sunlight. But, weeds still

make an appearance in the winter.

As the end of harvest approaches, growers do a postharvest irrigation, which causes flushes of weeds to sprout up. By the end of November, most growers have begun their residual programs, or are considering another burndown, to try to eliminate the weeds that have come up due to the application of irrigation water. In drier fields, growers wait for the rain.



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If you're using the postharvest time frame to scout for weeds, you might come up a little empty-handed. Ideally this season's winter weeds were identified during the 18-19 winter season. Since the flora doesn't generally change too much, last winter's weed survey of your orchard will prepare you for what to expect this season. Sure, new seeds can blow in or make their way on the backs of critters, but anything new will be recorded in this year's weed survey, which will be helpful for the following year. (The same is true for recording summer weeds.)

There are two broad categories for weeds: grasses and broadleaf, with each requiring their own type of herbicide. Preemergent herbicides are typically tank-mixed and put down based on a weed survey or specific knowledge

about the field.

There are a few particular herbicide mixes commonly used by walnut growers that give broad spectrum weed control, such as Chateau and Prowl H₂O, which is a pretty common treatment for a berm spray or strip spray, or Alion and Matrix.

Ultimately, herbicide decisions are based on the species present. If you have never taken a survey and put the data in writing or are new to the walnut growing game, the collection and recording of your orchard data is important for knowing which treatments are ideal for your field.

There's also the consideration of resistance. Growers have been experiencing herbicide resistance in weeds, which has increased the use of spot sprays. Where common practice was once a blanket

application of glyphosate, media attention and weed resistance have required a different approach. If growers identify an escape or resistant species, spot sprays are more effective and financially sensible, instead of waiting for the weeds to become denser, a much larger problem, and spraying an entire field.

Good soil-herbicide contact is important for application effectiveness. So, be sure your orchard floors and berms are clean, with leaves and trash blown away first.

Nutrient Applications

Potassium is often the subject of nutrient discussions around this time of year. It's typically applied in a narrow band because it easily sticks to the soil and remains accessible to the tree. Potassium is available in two

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IT'S ALSO IMPORTANT TO AVOID PRUNING WHEN THERE'S RAIN IN THE FORECAST, AS THE LONG SUSCEPTIBILITY PERIOD ALLOWS RAINFALL TO THREATEN THE WOUNDS.

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forms—KCl and K₂SO₄. KCl, or potassium chloride, runs the risk of not being leached from the soil, which means there's a high possibility that growers are putting salt on a tree that doesn't need nor want it. This is also why this form is less expensive, and why many growers prefer the other form.

If you intend to regularly apply potassium with the goal of replacing what was lost, it's important to know what the levels were in your July leaf samples. Unfortunately, growers can definitely experience a decline in yield if their walnuts are potassium deficient. So knowing whether a potassium application is simply maintenance or a catch-up decision with the use of a larger slug will determine your options. For information on potassium fertilizer rates, please see apps.cdffa.ca.gov/frep/docs/Walnut.html.

Canker Monitoring

Fungicides are most effective in the warmer spring and summer months, when cankers grow more rapidly. In the fall, however, there will be a lot of dead wood. And while there are still leaves on the trees, it's a good time to go through your trees to look for any kind of canker. Sometimes growers will come across *Botryosphaeria* or *phomopsis* (BOT) infections, and it's best to cut out these infections in late summer. These fungal invaders kill large branches, small fruit wood, and nuts, are spread through splashed water or by air blown spores, both requiring water for infection.

A proactive step against BOT is limiting pruning wound susceptibility,

and using the seasons to your advantage can help. Pruning is a common consideration at this time of year, and while pruning is on some growers' agendas, autumn pruning is a better option than winter pruning because of the lower infection rates. Pruning wounds remain susceptible for a long time—about four months. It's also important to avoid pruning when there's rain in the forecast, as the long susceptibility period allows rainfall to threaten the wounds. But, pruning wounds made in fall are less susceptible since they're made ahead of the colder winter temperatures. This also means winter pruning that precedes the warmer months creates highly susceptible wounds as well.

University of California (UC), Davis plant pathologist Themis Michailides, Ph.D, based at the Kearney Agricultural and Research and Extension Center, tested February pruning and found that infections favor warmer months for growth.

By their very nature, these perennial cankers will continue to grow, so it's really about prevention. If you are hedging, it's possible that some of the infection will be cut away. Ideally, cankers are handled preventatively, but that's not an activity for winter months.

Prepare well for the upcoming spring by taking care of your walnut trees postharvest. The perceived winter slowdown can be misleading—there are still many things to do as the trees rest and the cycle prepares for its next run.

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PISTACHIOS—A Growing Trend

By JULIE R. JOHNSON | Contributing Writer



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OVER THE PAST FEW YEARS a trend towards planting pistachios seems to be growing in the Sacramento Valley. This upswing, coupled by the crop in California seeing its third-largest numbers, totaling more than 800 million pounds, is good news to many in the industry, including Richard Matoian, executive director for American Pistachio Growers, an organization representing pistachio growers, processors and suppliers.

Pistachio Acreage on the Rise

This year's spike in productive pistachio acreage goes back to 2013 when new plantings started to increase. Those young trees planted back then are now making significant contributions to the total pistachio nut harvest.

"Last year, 2018, there were 30,000 acres planted in pistachios in the state," Matoian said. "This was the largest planting on record."

There are now approximately 350,000 acres of pistachios planted in California, and of that number 284,000 are bearing acres, with more acreage coming into production in the coming years.



Matoian went on to explain, as growers look at a number of factors, such as commodity pricing, labor availability, water, mechanization, etcetera, a number of crops to plant begin to emerge; almonds, walnuts, pistachios, wine-grapes, and more.

“Then, growers will look at commodity pricing, certain commodities rise in their economic conclusions and others decline.” Matoian said. “In pistachios, we have seen annual plantings rise since 2003 to the present. Throughout those years, we have seen plantings as low as

7,500 acres in a given year, and other years around 15,000 acres. We have been averaging about 11,000 acres per year over the last 15 years.”

Continued on Page 26

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Continued from Page 25

This compares with an average of 35,500 acres of almonds being planted per year for the last 14 years.

“Of course, almonds are routinely pulled from the ground after they have exceeded their production expectancy, usually after 20-25 years, while pistachios remain in the ground for a long time,” he added. “Some of our earliest plantings are still producing today at good levels—some of these trees are over 40 years old.”

Northern Sacramento Valley

While the growth in pistachio acreage in the northern Sacramento Valley isn't staggering, it is still moving in a positive direction. For instance, in Tehama County there were 319 bearing acres in pistachios in 2017 with an increase to 368 in 2018, according to the county's 2018 Crop Report.



Pistachio “mummies” still on a tree following harvest that will be shaken in the winter and crushed to prevent disease and pests pressure. Photo courtesy of Julie R. Johnson.

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There was also an increase in Glenn County, going from 1,949 in 2017 to 2,047 in 2018.

San Joaquin Valley

Even Kern County in the San Joaquin Valley, well known for its pistachio numbers, reported to have 122,400 bearing acres in 2017, with an increase up to 128,400 acres in 2018.

Record Crops

Pistachio growers, processors and marketers in the state say they expect the 2020 crop to reach the billion pound mark for the first time ever.

Matoian said the industry expects record crops for the next several years as more orchards are planted and more production comes into bearing.

Michael A. Carr, president of 5 Farm Management, Inc., who manages 400 hundred acres of pistachios in Tehama County, agrees with Matoian that one of the reasons for the increase in pistachio acreage is the popularity of pistachios on the market and among consumers.

“There is a growing demand for pistachios and the market is just getting

Continued on Page 28

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A well-established pistachio orchard sits next to a young pistachio orchard in Tehama County off Gyle Road. Photo courtesy of Julie R. Johnson.



A bearing postharvest pistachio orchard in Tehama County where there is an increase in pistachio acreage, as is the case in several northern Sacramento Valley counties. Photo courtesy of Julie R. Johnson.

Continued from Page 26

bigger and bigger,” he added.

Carr said he has found success in growing pistachios in the north valley as the soil is conducive to productivity and there is an adequate water supply.

“The trees seem to like this area, they do really well, this is just a great area for them,” he said.

Market Saturation

With a forecasted continuance in pistachio plantings, there remains the question—Is there a concern that the market become saturated as has occurred with other nut crops in the past.

“Yes,” Matoian said, “we should always focus on the anticipated production in a given year and also look at future years production. Our mantra has been to build consumer demand ahead of the anticipated production. That has been our goal, particularly in export markets, where 65-70 percent of our production is directed. With this in mind, we want to insure that consumer demand is already in place when production has arrived.”

The demand for pistachios seems to be keeping in line with production. In the last completed Crop Year, September 1, 2018 to August 31, 2019, 578 million pounds of the state's pistachio crop, 72 percent, were exported and 226 million

pounds, 28 percent, were shipped domestically.

China

“These are both records,” Matoian added. “The domestic market has been steady and there has been growth in the last three years, but the real story has been in the export market, and this last Crop Year, every market was up in shipments, including China and Hong Kong, where we have been facing tariff issues over the last year.”

He said continuing strong consumer demand in China, coupled with low production from other exporting nations, have allowed the state's pistachio industry to experience record

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shipments in the last crop year to China.

Pricing

Regarding pricing, demand continues to grow around the world, and worldwide production is at a lower level compared to last year, so with world demand being what it is, Matoian said the industry would expect pricing to be firm and rising.

Infrastructure

A concern with growing pistachio numbers across the board is the ability for the industry's infrastructure to stay ahead of the demand.

"Every facility is focused on increasing capacity, anticipating the larger crops to come," Matoian said. "With pistachios taking seven years to come into production, each processor can well anticipate in advance what increase in capacity is needed. I am confident this will continue into the future."

As for this year's pistachio crop, Matoian says individual nut sizes have been larger, which is good, and insect damage has been very low.

Disease and Pest Control

"Growers have been very focused on navel orangeworm (NOW) control, which includes a lot of differing control techniques, including orchard sanitation during the dormant season, properly timed sprays during the growing season, mating disruption, pheromone puffers and other techniques, and earlier harvest if possible," he added. "All these techniques together help to reduce pest

populations to low levels."

According to Carr, in the north valley, disease and pest pressure might be a lighter than in the Central Valley because there aren't as many pistachios orchards around to be a threat and spread pests and disease.

However, there are several crops in the region that can threaten pistachio orchards when they are planted in proximity and growers need to be

vigilant in their management practices, Carr added.

Pistachios are an alternate-bearing tree, and 2019 was considered an "off" year, but with new acres coming into production, even "off" years are seeing good numbers for the industry.

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ALMONDS AND WALNUTS MAY BE

California's heavy hitters in the tree nut market, but pistachios also hold a valuable place, even if this crop experiences less of the spotlight, and has less research that finely tunes the growing processes.

"There's no step-by-step guide because everyone does different things," says Craig Kallsen, University of California Cooperative Extension (UCCE) farm advisor specializing in citrus and pistachios.

Even though there aren't any hard and fast rules about pistachio orchard best practices, there are a few things growers can do to ensure their orchard remains healthy during the winter months.

Slowing Growth

A significant step in the preparation for winter for pistachios begins in August when the water gets turned off. This is especially important for young trees under six years, and in areas where there is not a significant transition from summer to winter, as these trees suffer from juvenile winter dieback.

"We're trying to slow the tree's growth and get rid of some of that vigor as we head into winter time," says Kallsen. Otherwise, the quick freeze that can occur at the end of October and into November and early December can kill the trees or damage the way they come out in the spring.

While the finer details in the differences of young rootstocks haven't been completely uncovered yet, the intensity of this growth varies among them, with some experiencing a

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more vigorous growth and not slowing down as easily as their counterparts. This is a bigger problem in growing regions that are in low-lying areas, such as old lake beds, where the cold air likes to pond.

These complications target juvenile trees, or those that are just coming into bearing. For mature trees, there doesn't

seem to be much of a problem, as they appear to be far better equipped to handle the abrupt changes in temperature. Why that is, no one is quite sure just yet, but speculation leans towards the ideas of thicker bark, the bearing of the tree, or maybe just a cyclical slowdown after harvest.

As part of the slowdown, nitrogen applications may be reduced during the summer months, and drought conditions encouraged.

"It also has to do with how much salt is in the soil," adds Kallsen.

Salt Leaching

Researchers are just starting to get a handle on the rather complex phenomenon that is a soil's salt content.

Leaching salt from a pistachio orchard's soil is a very important wintertime activity, and while experts might disagree about the utilization of fertilizers after harvest, it's generally not a good idea to add it if you're going to leach.

If fertilizers are added before salt leaching, "[Grower's] are just going to wash a lot of these nutrients right through the profile, and they won't be available for the tree's roots," says Kallsen. "I tend to be more of a fan of adding nutrients at the end of March, beginning of April."

For nutrient applications, like nitrogen, there aren't necessarily best practices rather than suggestions from advisors out in the field. The same holds true for other customs that seem to work well for pistachio trees, even if there isn't hard data for them. "We just don't have the database like they have for almonds," says Kallsen.

Along with irrigation shutoff and salt leaching, another fall and winter activity is tree training and pruning. Based on observations in the field, trees seemed to perform better. For those pruned in-season, and especially for those around three years old, they just stop growing.

In-season training of trees in their first full season of growth encourages faster production of secondary scaffold branches. After those first two years, however, in-season training can cause shoot growth to come to a standstill. Not only that, but with bearing trees, in-season pruning may remove a lot of the bearing nut surface and can decrease yield.

Preventing Pests

Another thing that can decrease pistachio crop yield are pests, such as navel orangeworm and Gill's mealybug. Gill's mealybug likes to feed within the pistachio cluster, and hinders nut development by taking for itself the carbohydrates and other nutrients that

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are intended for the plant. Shell staining and reduced kernel size decrease the market viability for these nuts. For those that become entirely damaged from infestation, they can become sites for navel orangeworm.

The fall, after harvest, is a good time to look for mealybug and mark infestation locations, which will then be monitored in the spring, and followed with appropriate necessary actions. Mealybug populations are the highest during late fall and winter, so it would be easier to identify the signature sooty mold or white aggregations.

Winter is not the time to apply pesticides for mealybug since this pest already has a high wintertime mortality rate. The crop does not experience damage at this time, and this is when the pest's predators—the brown lacewing and ladybug—are the most active.

As for navel orangeworm, this pest can greatly damage the pistachio nut. While early signs include the

Continued on Page 34

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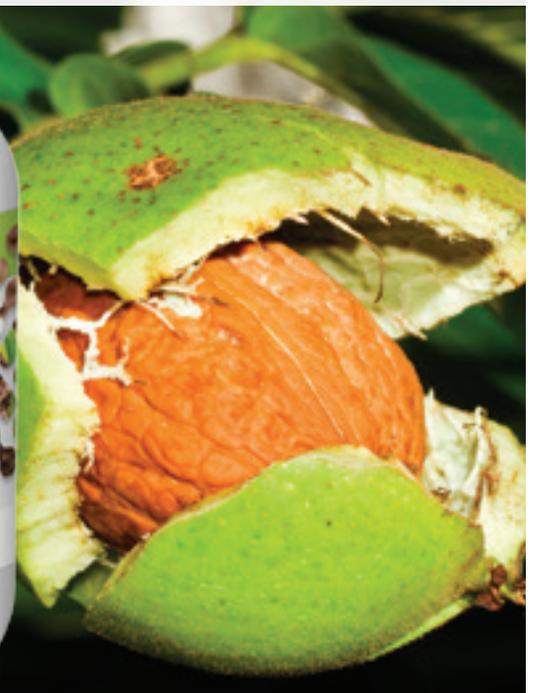
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pinhole-sized entrance into the nut, the worm eventually grows to feed on the entire nut, leaving behind a significant amount of webbing and frass. It can also leave the nut vulnerable to toxic molds.

As with all tree nut types, an aggressive winter sanitation program is of the utmost importance. Knocking mummies and then destroying all unharvested nuts is the most effective way to prevent navel orangeworm from finding sites to overwinter.

Winter Weeds

Preemergent herbicides can be helpful in controlling weeds, and in reducing the need for post-emergent herbicides later in the season. How effective preemergents are is fairly dependent on the amount of rainfall a particular region experiences, as the water helps activate the chemicals by

getting them into the soil where weeds seeds germinate. Patient growers in drier regions can wait for a rain event, but they also know that they can't depend on the weather.

In a very general sense, preemergent applications begin in November and December in an attempt to catch some help from the rain. Using the right herbicides—and in the correct ways—is key to the effects of the chemicals on the weeds, which is why keeping a weed survey can be so helpful. If growers know what to expect, they can prepare for it. And, even more effectively, they can spot spray, which helps to reduce herbicide resistance.

Postemergent herbicides are also an available option. Some are designed to be selective and target specific plant species, and others are not, just as there is also the option of either contact

herbicides that directly damage the weeds, or translocated herbicides that move within the plant to kill it.

There aren't many growers who use the reduced-herbicide option of cover crops, but for those who do, cover crop growth is seen about every other row.

Farm, crop, pest control advisors, and other personnel can help with these actionable steps, as well as with recommendations as to what works best for any particular orchard in a specific growing region.

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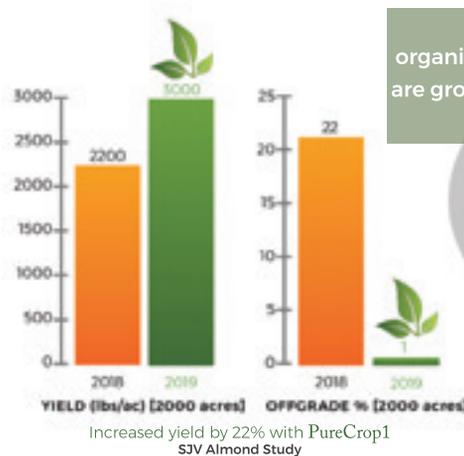
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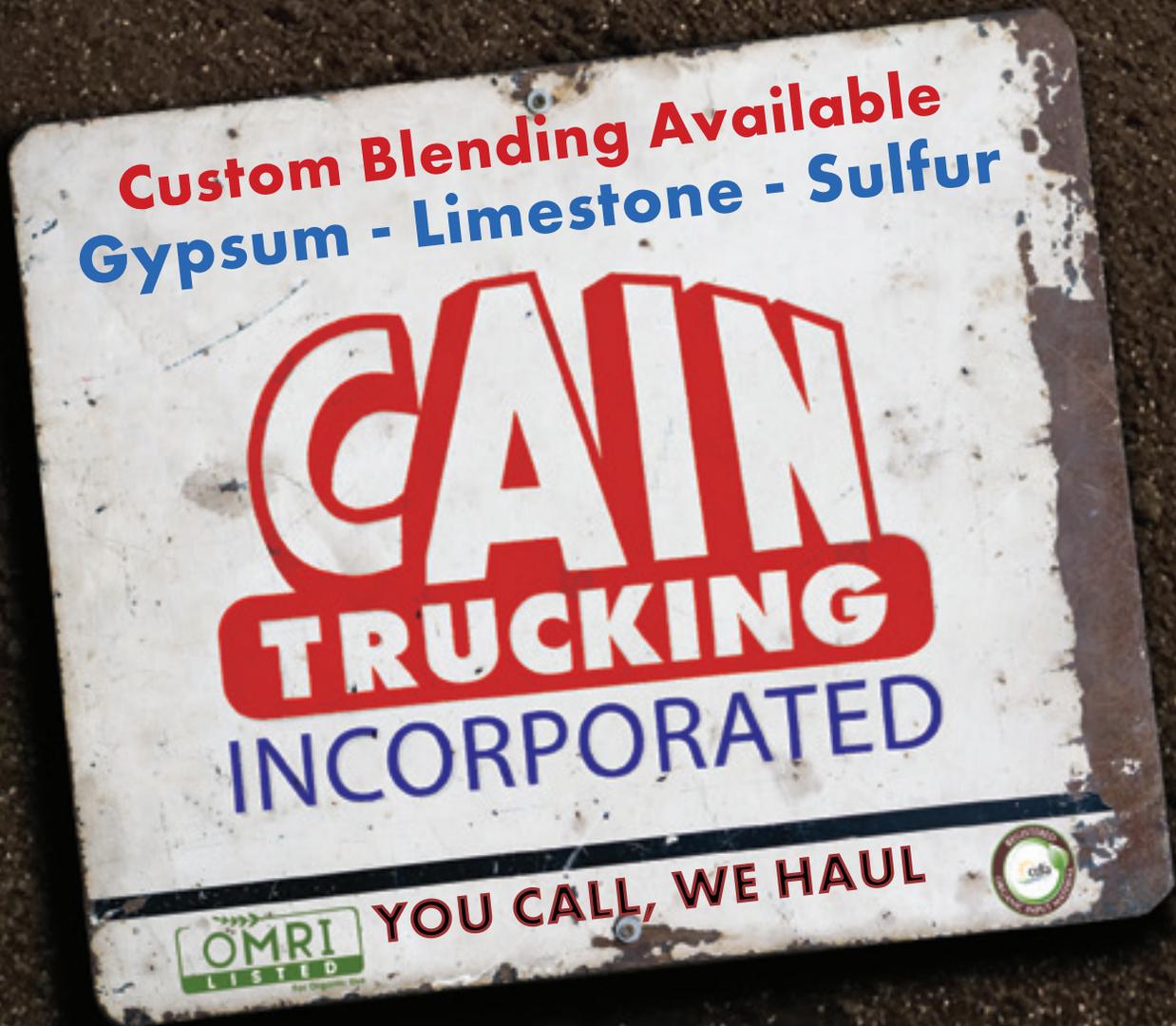
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THE FIRST TIME

By RICH KREPS | CCA

THE FARMING WORLD IS AMAZINGLY DIVERSE. Even saying you're a "nut" farmer, and I mean that in the nicest possible way, doesn't have the same connotation to the average Joe as it does to those of us in Ag. Most have no idea that there are multiple species of almonds, walnuts, pistachios, pecans, hazelnuts, etc. planted to multiple species of rootstocks. And most also think you just sit on your tractor, covered in dust and diesel, water your trees, throw out some fertilizer, harvest and things magically appear at the store. Of course, my background focuses on the nutrition side of things. However, one of the key components of getting the nutrition right in your orchard is its delivery system. And that



Flush out valve. All photos courtesy of Rich Kreps.

system will have a tremendous impact on how well your crop produces.

Irrigation System

An irrigation system is considered a big expense on a balance sheet. In all honesty, your irrigation system is a very important investment. Getting the proper water to your field and being able to deliver nutrients efficiently to the root zone is critical to making sure your inputs get into your trees. You are already spending the money on nutrition, but unless it gets into your trees, you won't see it in return on your crop.

Irrigation Design

I had the pleasure of meeting Cory Broad with Jain Irrigation the other night. Cory is the Key Grower Development Manager at Jain and a CID and CAIS certified irrigation designer. A little side note, the Madera County Farm Bureau voted him the Agriculturist of the year! You don't get that award for being a salesman, you receive that recognition for doing the right thing for farmers. So, I asked Cory to give me his interpretation of the five most important things to consider when designing your irrigation system. Here are his top five to maximize production and save a lot of money in the long run:

- 1** ▶ What are the future plans for the farm? If you plan on expanding your operation, "a simple conversion today can save you thousands of dollars and also increase efficiency of your system for years to come."
- 2** ▶ "System pressure requirement/operation pressure: This is often overlooked and the PSI (pounds per square inch) requirement on an irrigation design or bid often falls to the wayside when the bottom line is reviewed. Energy cost is a huge part of the overall irrigation budget for the season. The rough cost is \$1 per PSI per acre per year. Looking at a 30 PSI system against a 40 PSI system might make the larger mainline or tubing size worth the extra initial cost."
- 3** ▶ "Emission device Cv (coefficient of variability): Choosing a quality emission device is important. Many growers know and understand the necessity for durable and plug resistant irrigation emission devices, but that emission

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device Cv can have an impact of distribution uniformity. If the emitter is less than perfect your DU (distribution uniformity) is automatically lowered from the start. Consider choosing a product with the lowest possible Cv as there is no remedy for this once installed.”

4 The extras: “Many growers consider chemigation check valves, flow meters, and pressure sustaining valves as ‘extra’ or ‘unnecessary’ equipment for an irrigation system. While it may be true that they are not 100 percent necessary to make a system work, each of them do have benefits. Chemigation valves help protect the irrigation well/water source from accidental contamination of fertilizers and pesticides. Flow meters are the heart rate monitor for your irrigation system. If you know the flow, you know a lot about your irrigation system’s performance and potential remedies without much diagnosis. Both of these parts are also extremely valuable as SGMA (Sustainable Groundwater Management Act) and other legislative actions take a bigger hold on the state of California. Pressure sustaining valves help filtration systems maintain necessary pressure during backflush which improves the overall effectiveness of the flush. It can also help delay the time required between flushing events, and overall number of flushes in an irrigation set. This will save time, money and water.”

5 In field system flushing parts and their accessibility: “I often see many irrigation designs that don’t take into account how the system needs to be flushed or how the grower is likely to flush. It is important to design the system so that it is easy to flush, which will increase the likelihood that growers and

operators will flush their systems. It is also key to make sure the system is sized appropriately for flushing. It takes a certain pressure to flush an irrigation system, and this pressure is required when certain parts of the system are not closed off, thus flow is much higher in these areas. If mainlines, manifolds and laterals are not sized appropriately they will accumulate debris that can’t be flushed out. Make sure your PVC ball valves are sized correctly. Far too often, I see a manifold that starts with 8 inch pipe that eventually reduces to 4 inch pipe and has a 2 inch PVC flushout, which is more than likely way too small for proper flushing.

A clean system with proper pressure will help ensure your distribution uniformity is maximized. Knowing your flow, keeping your inputs in your field and not back in your well, will save you money and water. I harp a lot on knowing how quickly your water is moving through your root zone. Keeping nutrition in the root zone longer and maximizing uptake will increase your production, period. Designing an irrigation system that is properly suited to your operation can go a long way towards reducing the overall stress a farmer lives with everyday. Do it right the first time, and the bottom of those trees will help increase your bottom line.

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POSTHARVEST ALMONDS: GETTING READY FOR COLDER WEATHER

By CRYSTAL NAY | Contributing Writer

THE RUSH OF THE ALMOND HARVEST SEASON IS behind us, and now growers are heading into preparations and maintenance for next season. But, while the trees may slow down for the winter, a grower's work doesn't stop.

There are a few things that you must remember or consider while the colder months approach. Water, nutrients, and other maintenance are vital to a successful crop next year.

Postharvest Criticals

Water

One of the most important things you can do postharvest is water the trees.

As much as possible, the trees need to have adequate moisture, which helps keep the leaves on the tree, barring possible diseases that might cause otherwise. For as much as an orchard needs to have water, it's also extremely important to be cautious about overwatering. Moving from September and October and into winter weather may mean that trees are using less water, and therefore growers are applying less, but it's still very important to keep up with irrigation.

The goal: to match evapotranspiration (ET) rates.

Nutrients

There is a variety of nutrients available on the market in either foliar or ground applications. The key to knowing which would be beneficial to your particular orchard is to take samples— from

water to soil to tree tissue—and apply only what is absolutely necessary to promote ideal tree health. Too often, time and money is spent on unnecessary nutrient applications. Also keep in mind that there is still the question of bee health with nutrient sprays.

Gypsum

There are a few nutrient applications from which the trees will really benefit at this time of year. Gypsum is popular, in conjunction with postharvest irrigation, and is used with the intention—and hope—of maximizing the utility of applied water.

Boron and Zinc

Boron and zinc are other important nutrients to consider, as fall is the best opportunity for their application. If tissue samples show that your orchard is deficient, “The most critical time for boron and zinc is at budbreak,” says Franz Niederholzer, Ph.D, farm advisor with the University of California Cooperative Extension (UCCE). Unfortunately, many growers miss this vital window by applying these nutrients at bloom.

Since boron helps the blossoms to set, it is best to apply the nutrient as a foliar spray and not as a ground application. When boron is applied to the soil, it doesn't reach the buds quickly enough. Boron is also an inexpensive nutrient that can really boost yield.

If there is a lot of rust on the leaves, a strong zinc application can help knock off the infected leaves.

Nitrogen

General recommendations about nitrogen applications can span the gamut. While some may say that it should be a regular part of postharvest maintenance, others are not fans of the idea of applying nitrogen without really seeing if your orchard is deficient.

“If growers see a big deficiency, then they should really consider it. Otherwise, there's no extension growth,” explains Niederholzer.

Nitrogen loads up in the storage cells of the woody tissue of the plant, and fall isn't the ideal time to do this. In well-managed blocks where the trees are healthy and summer



Continued on Page 40

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leaves return, there isn't much need for additional nitrogen. In research done over a three-year period in California's Sacramento Valley—the northernmost part of California's prime central growing region—there was no yield benefit from fall nitrogen applications.

There are many things to do postharvest in preparation for next year's crop. Taking tissue samples and knowing whether or not your orchard truly needs

additional nitrogen can save both time and money, which are also two very valuable resources.

Surveys

Pest

Taking nut samples can be a helpful tool in identifying and measuring infestations. Some growers take samples and freeze them, killing the potential pests inside, and crack them out in winter. This can be done at night with a good light, and with a pest control advisor (PCA)

or certified crop consultant (CCA) on hand to plan for next year based on the information gathered.

It's also important to take a survey of what is left in the trees, taking note of mummy levels.

Weeds

Documented annual weed surveys not only keep a running log of weeds that are found in any particular orchard and when, but also help prepare a grower for what to expect for the following season. It's also a great way to reevaluate the previous year's protocol to measure its effectiveness. How did 2019's weed control program look?

Postharvest Don'ts

Just as there are important actions to take post almond harvest, there are some things that should not be done during this same time.

Pruning

Trees in their first and second leaf are experiencing bursts of growth, but pruning them at the wrong time can be detrimental to their health. Pruning ahead of a rain is a poor choice because of the time it takes for those wounds to heal and the increase in disease or infection susceptibility. While healing periods are still being researched, current research suggests that the healing process takes a minimum of two weeks, but can last up to four weeks, leaving a significant window of vulnerability for these young trees.

If, for some reason, pruning must occur at this time, you can spray fungicide on the wounds to help protect cuts from forming infection. If rain appears in the forecast, spray between the cutting and the rain. But, if it can be helped at all, don't prune in front of a rain.

Knowing and documenting the characteristics of any particular orchard is an incredible benefit when it comes to caring for the trees after harvest. Working closely with a PCA or CCA who also knows your orchard well can help ensure that your methods and implementation are ideal for your orchard in order to have the most favorable outcomes.

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The Ins and Outs of CROP PROTECTION INSURANCE

By JENNY HOLTERMANN | Contributing Writer



FARMING TODAY IS FULL OF challenges, many of which are out of our control. When it comes to weather and mother nature, we are at their mercy as to whether or not a crop is harvested. Farmers are taking a risk every time they put a seed in the ground, plant a tree or invest in the future of their farm. Todd Snider, owner of Western Ag Crop Insurance Services has an optimistic approach to help: “the American farmer can control their risk with crop insurance.”

History of Crop Insurance

Crop Insurance first began in the 1930's after the United States Congress authorized agriculture relief from the effects of the Great Depression and Dust Bowl, according to the United States Department of Agriculture. Mostly used for the Midwest for damage from rain or hail in their main crops, such as corn and soybeans. What was initially set up on a trial base, lasted until 1980 when the Federal Crop Insurance Act passed.

With the passage of the 1980 Act, crop insurance was expanded to more crops and regions across the country.

The United States Department of Agriculture Risk Management Agency (USDA RMA) explains, when the Farm Bills of the 1960's and 70's started to offer free disaster coverage, they were competing with the crop insurance coverage. Over the next several years Congress continued to pass more bills to add further relief to farmers. If a county or state's crops were wiped out, the federal government would back up the risk and make large Ad Hoc disaster payments. Crop insurance became multi-peril, adding relief for wind, rain, heat, freeze, fire, and other such wide spread disasters.

According to the USDA RMA, the 1994 Federal Crop Insurance Reform Act made participation in the crop insurance program mandatory for farmers to be eligible for deficiency payments under price support programs, certain loans, and other benefits. Catastrophic (CAT) coverage was created to provide farmers who were experiencing more than 50 percent losses a price at 60 percent of the average for that year. All for a rate of \$50 per crop per county not dependent

on acreage, the farmer covered the administration fee and the federal government covered the premiums.

Privatized Crop Insurance

Over this time frame, crop insurance also became privatized and independent Crop Insurance companies and agencies were formed. The independent agents were able to develop trust and build relationships with farmers. The federal government “I am here to help” motto wasn't as easily accepted. In 1996, USDA created the Risk Management Agency (RMA) to administer Federal Crop Insurance programs as well as research and development. Today, this agency is the percentage and number setter who manages the prices for the independent agents to charge.

Safety Net

In a period of agriculture where we can't control markets or weather, crop insurance provides farmers a sense of control. Snider, understands the concerns of farmers today, “Nowadays,

Continued on Page 46

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Why using KNO_3

PREVENTS AND ALLEVIATES SOIL SALINIZATION

Content provided by SQM North America

Salinization is recognized as the main threat to environmental resources and human health in many countries, and is a serious environmental factor limiting the productivity of crops around the world. Even though soluble salts are inherent in all soils (salinity), build-up of salts in a given soil layer above a certain level (salinization) adversely affects crop production.

Some agronomic practices such as fertilizer and pesticide application are among the leading causes of soil salinization.

The World Bank states that soil salinization caused by inappropriate irrigation practices affects about 60 million ha, or 24% of all irrigated land worldwide. In Africa, salinization accounts for 50% of irrigated land.

How can you prevent or mitigate soil salinization?

Fertilize with potassium nitrate (KNO_3). The K^+ and NO_3^- are fully absorbed by the plant following crop demand, no nutrients are left behind.

With a dominant presence of N as nitrate (NO_3^-) in the soil it stimulates K uptake and in turn K stimulates NO_3^- uptake. This is a very synergistic effect that can also benefit the uptake of other nutrients. Other sources of N, such as ammonium can have the opposite effect.

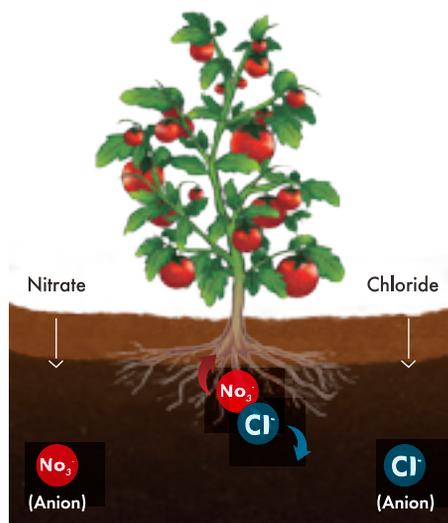
Since salts move with the wetting front, they accumulate in specific profiles according to the irrigation regimen and the type of irrigation used. For instance, when irrigating using sprinklers, water and salts move deeper, according to the soil's infiltration capacity and the water quantity, until they stop at a certain depth. When using drip irrigation, there is also a lateral movement of water and salts. Using potassium nitrate prevents these buildups and can help reduce the need for over watering to flush accumulated salts out of the soil.

Fertigation can reduce soil salinization and mitigate the effects of salt stress effects because it improves the efficiency of fertilizer use and increases nutrient availability. In arid regions, nitric acid and sulfuric acid fertigation represent rapid ways to reduce or minimize salinity and sodicity. Nitric acid applied with fertigation reduces soil pH and increases Ca^{2+}

dissolution in clay soils, thereby minimizing salinity injury due to Ca^{2+}/Na^+ competition. It may also reduce chloride salinity in the root zone, because the nitrate can counterbalance the excess of chloride.

Nitrate helps to prevent excess chloride-induced salinity stress

ANTAGONISM



When choosing a K source, proper nutrient balance should be considered. Sulfur is a critical nutrient, however, if 100% of the K is supplied by potassium sulfate, the level of sulfur applied far exceeds plant demand and most is left behind in the rooting zone. Potassium sulfate should be applied, for example, to reach the required sulfur demand of the crop. That's it. The balance of the K requirement should come from a source such as Potassium Nitrate that will also supply a portion of the crops required nitrogen demand.

By replacing some of the potassium sulfate (K_2SO_4) and potassium chloride (KCl) we can avoid excess sulfate and chloride accumulation in the soil, thereby, reducing soil salinity. In the case of potassium thiosulfate, using potassium nitrate as a K source can avoid potential toxicity by using too much thiosulfate.

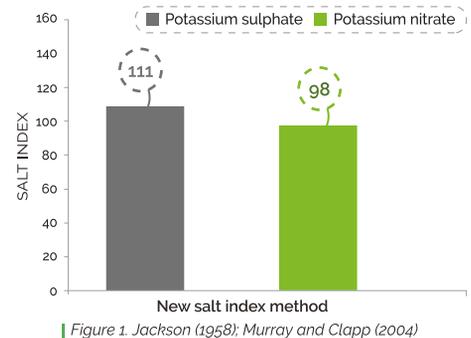
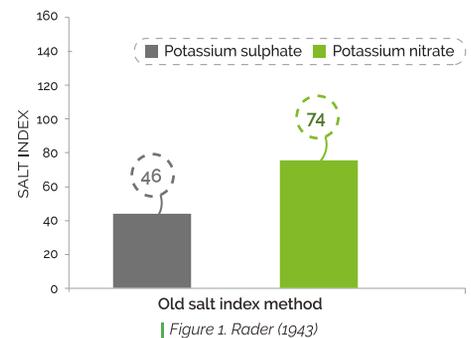
We must also understand the salt index (SI) of a fertilizer, to see additional benefits of using potassium nitrate as a main source of nitrate N and potassium. There are two common

methods to determine the SI. The old method was based on tables developed from soil solution osmotic pressure (Rader et al 1943). These can be misleading and do not reflect the correct measurement of the salt index of a fertilizer. The second and more widely accepted method comes from electrical conductance - Jackson (1958); Murray & Clapp (2004) or the EC of a fertilizer.

When other K-fertilizers are compared with the Electrical Conductivity method, then potassium nitrate has the lowest salt index, partial salt index and EC-level.

As seen below, potassium nitrate appeared to have a higher salt index using the old method. Using the new Jackson & Murray method shows more accurate readings.

Salt index comparison



Listed are the references for both methods.

Jackson M.L. (1958) Soil Chemical Analysis, Prentice Hall, Englewood Cliffs, NJ.

Murray, T.P. and Clapp, J.G. (2004) Current fertilizer salt index tables are misleading. Communications in Soil Science and Plant Analysis, 35 (19-20): 2867 - 2873

Rader L.F. Jr, White, L.M., and Whittaker, C.W. (1943) The salt index: a measure of the effect of fertilizers on the concentration of the soil solution, Soil Sci., 55 201-218



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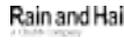
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PLAN	LEVEL	OPTION	PRICE	ACRE GUARANTEE	ACRE COVERAGE	ACRE PREMIUM	TOTAL GUARANTEE	TOTAL COVERAGE	TOTAL PREMIUM	PRODUCER PREMIUM
APH _{BU}	CAT	YA	1.16	1,350	1,566.00	0.00	13,500	15,660	53	0
APH _{OU}	50	YA	2.10	1,350	2,835.00	7.08	13,500	28,350	214	71
APH _{OU}	55	YA	2.10	1,485	3,118.50	11.05	14,850	31,185	307	111
APH _{OU}	60	YA	2.10	1,620	3,402.00	15.60	16,200	34,020	433	156
APH _{OU}	65	YA	2.10	1,755	3,685.50	24.58	17,550	36,855	599	246
APH _{OU}	70	YA	2.10	1,890	3,969.00	35.05	18,900	39,690	855	351
APH _{OU}	75	YA	2.10	2,025	4,252.50	53.52	20,250	42,525	1,189	535

60% plug not applied (YA)
T Yield = 1638.0
YA Option Yield = 2,700

CAT Approved Yield: 2,700
Rate Yield: 2,700

This is an estimate and does not constitute a binding offer of insurance. Actual crop insurance premiums may differ based on final variables which include, but are not limited to; high risk acres, written agreements, supplemental rates, actual production history, options, acres planted, units, and Practice/Type/Variety.

If the Farm Service Agency determines that the policyholder, or a substantial beneficial interest holder in the policyholder, is ineligible for premium subsidy as a result of any violation of 7 CFR Part 12 (Conservation Compliance), including, but not limited to, failing to file any required AD-1026 Form by the premium billing date, the policyholder may be required to pay the Total Premium rather than the Producer Premium.

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Continued from Page 42

every dollar on the farm is already accounted for. It's not like in the past, where if you had a great year you could put some money away. If you had a bad year you would be alright. Nowadays, the family farm is strapped from day one and every dollar is needed, and Crop Insurance is their primary safety net."

Crop Insurance has become a means to help farmers with reliability and consistency. Snider goes on to add "You have x amount of expenses and x amount of income in a perfect situation. If you don't have a perfect situation, you need to make sure you are at least covering your expenses; harvesting, labor, water, etc. Crop insurance is the only way you can do that. There is nothing else you can buy from a fertilizer company, or a spraying company or rent the perfect bee for pollination that can ensure you get 2,000 pounds per acre for your almonds. But with crop insurance you can guarantee 2,000 pounds per acre if mother nature impacted your growing season and caused a decrease in yield."

Catastrophic Coverage

Today, there are many more options that the initial catastrophic coverage that was the foundation of crop insurance for so many years. Catastrophic coverage will cover 50 percent of your losses at 55 percent of the price for \$655 per crop, per county. This price was \$300 until 2020, the administration fee is a federally set price regardless of acreage or crop that recently was increased for crop year 2020.

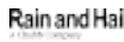
"Buy Up"

There are also private policies available that growers can implement to cover the loss with a higher per pound price option (POP). Say you have a premium product or just want to add .25 or .50 cents to the price per pound you would receive at loss time. "Buy up" options allow you to increase your coverage level in five



Coverage Analyzer 2020 Crop Year Illustration

AGRI GENERAL INSURANCE COMPANY
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California Division, 499 West Shaw Avenue, Suite 101 Fresno, CA 93704-2516



WESTERN AG CROP INSURANCE SERVICES LLC
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OFFICE@WESTERNAGCROP.COM
(661)695-1700 CA 7010-00
CA LICENSE NUMBER: 0M64468

STATE COUNTY ID # UNIT/FARM	CALIFORNIA KERN 2.0	CROP PRACTICE TYPE	0028 - ALMONDS 0020 - Irrigated 9970 - No Type Specified	YIELD ACRES SHARE	2700 10.0 1,000
-----------------------------	---------------------	--------------------	--	-------------------	-----------------------

PLAN	LEVEL	OPTION	PRICE	ACRE GUARANTEE	ACRE COVERAGE	ACRE PREMIUM	TOTAL GUARANTEE	TOTAL COVERAGE	TOTAL PREMIUM	PRODUCER PREMIUM
APH _{BU}	CAT	YA	1.16	1,350	1,566.00	0.00	13,500	15,660	138	0
APH _{OU}	50	YA	2.10	1,350	2,835.00	18.31	13,500	28,350	555	183
APH _{OU}	55	YA	2.10	1,485	3,118.50	25.57	14,850	31,185	710	256
APH _{OU}	60	YA	2.10	1,620	3,402.00	33.35	16,200	34,020	927	334
APH _{OU}	65	YA	2.10	1,755	3,685.50	49.88	17,550	36,855	1,217	499
APH _{OU}	70	YA	2.10	1,890	3,969.00	68.80	18,900	39,690	1,678	688
APH _{OU}	75	YA	2.10	2,025	4,252.50	102.80	20,250	42,525	2,284	1,028

60% plug not applied (YA)
T Yield = 2391.0
YA Option Yield = 2,700

CAT Approved Yield: 2,700
Rate Yield: 2,700

This is an estimate and does not constitute a binding offer of insurance. Actual crop insurance premiums may differ based on final variables which include, but are not limited to; high risk acres, written agreements, supplemental rates, actual production history, options, acres planted, units, and Practice/Type/Variety.

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Coverage Analyzer 2020 Crop Year Illustration

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BAKERSFIELD, CA 93301-0000
OFFICE@WESTERNAGCROP.COM
(661)695-1700 CA 7010-00
CA LICENSE NUMBER: 0M64468

STATE COUNTY ID # UNIT/FARM	CALIFORNIA TULARE 3.0	CROP PRACTICE TYPE	0028 - ALMONDS 0020 - Irrigated 9970 - No Type Specified	YIELD ACRES SHARE	2700 10.0 1,000
-----------------------------	-----------------------	--------------------	--	-------------------	-----------------------

PLAN	LEVEL	OPTION	PRICE	ACRE GUARANTEE	ACRE COVERAGE	ACRE PREMIUM	TOTAL GUARANTEE	TOTAL COVERAGE	TOTAL PREMIUM	PRODUCER PREMIUM
APH _{BU}	CAT	YA	1.16	1,350	1,566.00	0.00	13,500	15,660	81	0
APH _{OU}	50	YA	2.10	1,350	2,835.00	10.75	13,500	28,350	326	108
APH _{OU}	55	YA	2.10	1,485	3,118.50	16.05	14,850	31,185	446	161
APH _{OU}	60	YA	2.10	1,620	3,402.00	22.05	16,200	34,020	612	220
APH _{OU}	65	YA	2.10	1,755	3,685.50	34.13	17,550	36,855	832	341
APH _{OU}	70	YA	2.10	1,890	3,969.00	48.16	18,900	39,690	1,175	482
APH _{OU}	75	YA	2.10	2,025	4,252.50	73.06	20,250	42,525	1,624	731

60% plug not applied (YA)
T Yield = 2154.0
YA Option Yield = 2,700

CAT Approved Yield: 2,700
Rate Yield: 2,700

This is an estimate and does not constitute a binding offer of insurance. Actual crop insurance premiums may differ based on final variables which include, but are not limited to; high risk acres, written agreements, supplemental rates, actual production history, options, acres planted, units, and Practice/Type/Variety.

If the Farm Service Agency determines that the policyholder, or a substantial beneficial interest holder in the policyholder, is ineligible for premium subsidy as a result of any violation of 7 CFR Part 12 (Conservation Compliance), including, but not limited to, failing to file any required AD-1026 Form by the premium billing date, the policyholder may be required to pay the Total Premium rather than the Producer Premium.

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Coverage Analyzer October 28, 2019 03:55:40 PM_53941727

percent increments at 100 percent of the price. Risk Management Agency sets all pricing that is paid out and administration fees, so that across the country, state or county there are set payments per crop. The prices they set are slightly lower than market price because they are set for the year and do not change throughout the year as market prices fluctuate. First level “buy up” would be 50 percent yield and 100 percent of the established price. Highest level “buy up” being 75 percent of the yield for almonds at 100 percent of the price.

Western Ag Crop Insurance Services provided an example of the almond coverage with “buy up” options for three different counties across California; Butte, Tulare and Kern. These examples can show the price options (Acre Premium) for purchasing coverage and “buy ups” dependent on county. Rates

vary dependent on county and risk associated with that area. The premium for “buy up” levels fluctuate by county and risk dependent on yield, weather, soil conditions.

You can see as the percentage of yield to be covered or the “level” of coverage increases, the price per acre or the “acre premium” increases and the “price” would be the price per pound that you would be eligible for. The example is for 10 acres of almonds in three different counties and will show the varying different premiums for coverage. (see page 44)

Yield History

Each grower’s yield guarantee is set based on their four to ten-year history. In the example we used 2,700 pounds. Growers provide their yield history to the crop insurance agent to determine

their actual production average. If you do not have at least a four-year history, there are county averages that you may be able to use as a plug. Your highest level of coverage for almonds is set to 75 percent of the historical yield.

If there is a weather event that is impacting your yield, it is always best to be proactive and notify your crop insurance agent. Within 72 hours you have to notify your agent if you think your yield will be affected. There is no harm in opening a claim if you feel your yield is going to change. It is always best to open a claim, then not notify the agent and your yield ends up being impacted.

All insurance agents have universal pricing. No crop insurance agents will have higher or cheaper rates than another. Pricing and deadlines are

Continued on Page 48



Continued from Page 47

both set federally so it is important to remember these key dates moving into the new year to purchase crop insurance for the 2020 crop year.

Almonds

- Sales Closing and Cancellation due by December 31, 2019
- Production & Acreage Reporting due by March 15, 2020
- Premium billing due by August 15, 2020

Pistachios

- Sales Closing or Cancellation due by December 31, 2019
- Production reporting due by February

14, 2020.

- Acreage reporting due by March 15, 2020
- Premium Billing due by August 15, 2020

Walnuts

- Sales Closing or Cancellations due by January 31, 2020
- Production & Acreage Reporting due by March 15, 2020
- Premium Billing due by August 15, 2020

Almonds can be insured for the sixth leaf season. However, if you had a crop at fourth leaf you can request fifth leaf coverage. Pistachios can be

insured if trees have reached their tenth leaf. Walnuts can be insured once 90 percent of the orchard is at least seventh leaf. Every grower and scenario is unique, and you may have options to revise, exclude, or request to increase the average yield to ensure they have the best coverage based in their historical data. It is best to discuss with a crop insurance agent to discover your options.

Information Needed for Crop Insurance

To be covered you will need to provide key information to the crop insurance agent. An applicant will need their entity type; S Corp, LLC, Sole Proprietor, or different business structure as well as the appropriate EIN or social security number. An applicant needs to be able to provide production history from their processor, or they can ask RMA for increased yields of similar county average yield information. If this history is not available you will be forced to use county historical data which may not be the best representative for your production history. A map of your acreage as recorded needs to be provided. A grower can use their Farm Service Agency map or even your spray permit map you may have for the county agriculture commissioner. You will also need to be able to provide the year the orchard was planted, spacing information, variety and rootstock information.

Your crop insurance agent will be able to walk you through the list of necessities. If you currently do not have crop insurance and are interested to learn more, you can go to www.rma.usda.gov/en/Information-Tools/Agent-Locator-Page to find a Crop Insurance Agent near you.

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



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IRRIGATION SEASON WINDS DOWN AND WE NEED YOUR HELP

By ALLAN FULTON | University of California Cooperative Extension (UCCE) Irrigation and Water Resources advisor in Tehama County

UC University of California
CE Agriculture and Natural Resources Cooperative Extension

IT'S LATE OCTOBER, MANY CROP HARVESTS HAVE been completed while others are underway or still waiting to begin. It is the time of year, when irrigation needs can take second seat to harvest activities not to mention days are shorter and temperatures are cooler so irrigation seems less critical. However, after the crop is harvested in perennial tree fruit and nut crops, the remainder of the season represents a time for the trees to photosynthesize and store carbohydrates reserves for next year's bloom and early push of vegetation. Adequately re-hydrated orchards following harvest are also



less risk to cold injury and winter kill in the late fall and winter. So, there remains good reason to finish the irrigation season well until sufficient rainfall has occurred to justify suspending irrigation.

Table 1 on the next page is an example of a recent weekly Crop ET report that is provided for the northern Sacramento Valley area. This weekly report provides estimates of crop water use or ET (evapotranspiration) for the primary perennial orchard crops grown in our local area. These ET levels should be supplied by irrigation unless rainfall occurs at sufficient levels to supply the need. If you have been receiving or following these weekly reports on a weekly basis you will notice that these reports are sensitive to changes in crop stage, weather, and seasons. For more in depth information on how to access and use these reports please refer to <http://www.sacvalleyorchards.com/et-reports/>. This website also provides simple calculators to help relate these crop water estimates to the designed output of specific drip, microsprinkler, and solid set sprinkler irrigation systems.

We Need Your Help

University of California Agriculture and Natural Resources (UC ANR) and the Department of Water

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Resources (DWR) need your help to understand how our Weekly Crop ET Reports (a.k.a. “Soil Moisture Loss Reports” or “Crop Water Use Reports”) are helping California’s irrigators, and how we can improve these reports and other irrigation-related extension efforts to better serve you.

Please give us your feedback by completing the following survey: https://ucanr.co1.qualtrics.com/jfe/form/SV_50GEq3JrdyVOt3n

Your responses are anonymous and will not be tied to your name. This survey should take about 8-10 minutes. Participants will be eligible to win a \$20 Home Depot gift card—after you submit the survey, click on the link to provide your information for the gift card drawing. For questions on the survey, contact kjarvis@ucanr.edu.

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

Crops (Leafout Date)	WEEKLY ET REPORT (Estimated Crop Evapotranspiration or ETc) 10/11/19 through 10/17/19											
	Tehama County - Gerber South			Butte County - Biggs			Butte County - Durham			Colusa County - Williams		
	Foot Water of Week	Accum. of Water	Soil Water's Estimated	Foot Water of Week	Accum. of Water	Soil Water's Estimated	Foot Water of Week	Accum. of Water	Soil Water's Estimated	Foot Water of Week	Accum. of Water	Soil Water's Estimated
Pasture [ETc]	0.86	46.65	0.70	0.84	43.10	0.74	0.81	41.14	0.68	0.87	46.07	0.72
Olives Table*	0.65	35.20	0.54	0.64	32.60	0.57	0.61	31.15	0.53	0.66	34.88	0.55
Olives High Density*	0.51	27.97	0.42	0.50	25.83	0.45	0.48	24.68	0.40	0.51	27.61	0.43
Citrus*	0.56	30.47	0.47	0.55	28.06	0.50	0.54	26.79	0.46	0.57	30.05	0.48
Almonds (3/10)*	0.86	46.01	0.65	0.84	42.36	0.69	0.81	40.50	0.63	0.87	45.22	0.67
Cling Peaches (3/20)*	0.86	38.54	0.65	0.84	35.32	0.69	0.81	33.88	0.63	0.87	37.48	0.67
Pistachios (4/19)*	0.86	41.06	0.65	0.84	37.31	0.69	0.81	35.86	0.63	0.87	39.75	0.67
Prunes (4/5)*	0.63	40.02	0.47	0.61	36.67	0.50	0.60	35.00	0.46	0.64	39.12	0.48
Walnuts (4/14)*	0.57	39.24	0.42	0.56	36.00	0.45	0.53	34.46	0.40	0.58	38.18	0.43
Urban Turf Grass	0.65	39.08	0.54	0.64	36.24	0.57	0.61	34.64	0.53	0.66	38.67	0.55
Past 7 days precipitation (inches)	(0.02)			(0.00)			(0.00)			(0.00)		
Accumulated precipitation (inches)	(5.64)			(4.93)			(8.30)			(2.88)		

Accumulations started on March 10, 2019 or on the approximate leafout date for a specific orchard crop as indicated in parentheses. Criteria for beginning this report are normally based on the season’s last significant rainfall event where the soil moisture profile is estimated to be near its highest level for the new season. However, we had significant rains in April this year.

*Estimates are for orchard floor conditions where vegetation is managed by some combination of strip applications of herbicides, frequent mowing or tillage, and by mid and late season shading and water stress. Weekly estimates of soil moisture loss can be as much as 25 percent higher in orchards where cover crops are planted and managed more intensively for maximum growth.

Crops	PAST WEEKLY APPLIED WATER IN INCHES, ADJUSTED FOR EFFICIENCY 1											
	Tehama County - Gerber South			Butte County - Biggs			Butte County - Durham			Colusa County - Williams		
System Efficiency>>	70%	80%	90%	70%	80%	90%	70%	80%	90%	70%	80%	90%
Olives Table	0.9	0.8	0.7	0.9	0.8	0.7	0.9	0.8	0.7	0.9	0.8	0.7
Olives High Density	0.7	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.5	0.7	0.6	0.6
Citrus	0.8	0.7	0.6	0.8	0.7	0.6	0.8	0.7	0.6	0.8	0.7	0.6
Almonds (3/10)	1.2	1.1	1.0	1.2	1.1	0.9	1.2	1.0	0.9	1.2	1.1	1.0
Cling Peaches (3/20)	1.2	1.1	1.0	1.2	1.1	0.9	1.2	1.0	0.9	1.2	1.1	1.0
Pistachios (4/19)	1.2	1.1	1.0	1.2	1.1	0.9	1.2	1.0	0.9	1.2	1.1	1.0
Prunes (4/5)	0.9	0.8	0.7	0.9	0.8	0.7	0.9	0.8	0.7	0.9	0.8	0.7
Walnuts (4/14)	0.8	0.7	0.6	0.8	0.7	0.6	0.8	0.7	0.6	0.8	0.7	0.6

1 The amount of water required by a specific irrigation system to satisfy evapotranspiration. Typical ranges in irrigation system efficiency are: Drip, 80%-95%; Micro-sprinkler, 80%-90%; Sprinkler, 70%-85%; and Border-furrow, 50%-75%.

For further information concerning all countries receiving this report, contact Tehama Co. Farm Advisor's office at (530) 527-3101 or the Glenn Co. Farm Advisor's office at (530) 865-1153.

This same information and source is now available in the ET Reports section of the sacvalleyorchards.com website. Same information, just in a different format.



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CCA: 4.0 HOURS

7:00 AM	Registration	
7:30 AM	Trade Show CE Credits: 15 Minutes; Other	
8:00 AM	State of the Industry: Where We Are and Where We Are Going Michelle Connelly, Executive Director of the California Walnut Board & CEO of the California Walnut Commission	
	SEMINARS	WORKSHOPS
8:30 AM	Managing Orchard Weeds Without Glyphosate Dr. Brad Hanson CE Credits: 30 minutes; Other	"Growth Opportunities in US: Industrial and Retail" Jennifer Williams, Marketing Director Domestic Advertising Jennifer Olmstead, Marketing Director Domestic PR Keith Siez, Industrial Consultant & Don Ladhoff, Retail Consultant
9:00 AM	Walnut IPM and Disease Controls with Organic Chemicals Matt Boeger, Senior Vice President, Commercial Ag, Pure Crop 1 CE Credits: 30 minutes; Other	Driving Global Industrial Demand for Walnuts Hisao Fukuda (Market Makers – Japan), Jack Jacob (Promedia – Turkey), Peter Meadows (The Garden - UK)
9:30 AM	Break	
10:00 AM	Trade Show CE Credits: 15 Minutes; Other	
	QUICK RESEARCH UPDATES	
10:30 AM	Walnut Husk Fly Trapping Study Dr. Elizabeth "Betsy" Boyd, Professor of Plant Science, CSU Chico CE Credits: 15 minutes; Other	Walnut Health Research: Scientific Contributions and Why They Matter Carol Berg Sloan, Health Research Director, California Walnut Commission
	10:45 AM Flatheaded Borer: A New Walnut Pest? Jhalendra Rijal, UCCE Area IPM Advisor, Northern San Joaquin Valley CE Credits: 15 minutes; Other	
11:00 AM	Untangling Walnut Mold From Botryosphaeria and Phomopsis Blights Dr. Themis Michailides, Professor and Plant Pathologist, UC Davis CE Credits: 15 minutes; Other	Waiting for the Tree to Tell You When to Start Irrigating Dr. Ken Shackel, Professor, UC Davis
	11:15 AM Building a Better Walnut: From the Genes Up Dr. Pat Brown, UC Davis	
11:30 AM	What's New in Navel Orangeworm Management and Research? Dr. Emily Symmes, UCCE Area IPM Advisor, Sacramento Valley CE Credits: 30 minutes; Other	Applications of Unmanned Systems Technology for Precision Agriculture and Walnut Production Dr. Gregory Kriehn, Fresno State University
12:00 PM	Lunch	
1:00 PM	Testing Remedies for Pre- and Post-Plant Nematode Suppression Dr. Andreas Westphal, Associate CE Specialist and Nematologist, UC Davis, Kearney Agriculture Research and Education Center CE Credits: 30 minutes; Other	SGMA – What it Means for Walnut Growers David Guy, President, Northern California Water Association
1:30 PM	Next Generation Rootstocks: Where Do We Stand? Dr. Ali McClean, Crops Pathology and Genetics Research, Biological Service Technician, USDA	The Digital Orchard: Agriculture Technology Trends Gabriel Youtsey, Chief Innovation Officer, UC ANR
2:00 PM	Pesticide Regulations Update and Review Lisa Herbert, Sutter County Agriculture Commissioner CE Credits: 30 minutes; L & R	Plant Nutrition Update: Lessons Learned From Other Tree Crops and Opportunities to Improve Management Efficiency in Walnuts Dr. Patrick Brown, UC Davis
2:30 PM	Adjourn	

TEMPERATURE-CONTROLLED BEE STORAGE

By CECILIA PARSONS | Associate Editor

AVOIDING LOSSES DUE TO varroa mites, lack of adequate fall forage and high overwintering feeding/labor costs are all reasons California beekeepers have for considering storing their colonies indoors during the winter.

Temperature-Controlled Storage

In temperature-controlled storage, bees are less active and go into a hibernation mode. This extends the life of the bees and causes a break in reproduction as the queen does not lay eggs. Bees normally live 40-50 days, but

inside, their life span can be extended to 150 days, as they are not burning themselves out feeding their young. The break in reproduction can also break the life cycle of the parasitic varroa mite, one of the leading causes of hive mortality.

Continued on Page 56



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Last year in Kern County, one of the first large scale storage facilities housed about 40,000 bee colonies over the winter. The controlled atmosphere building was an alternative to field storage and supplemental feeding over the winter. Inside storage isn't new for beekeepers in cold winter climate states like Idaho, Montana and the Dakotas, but it is rare in California.

The aim with indoor or controlled atmosphere storage is to bring out strong, healthy hives for successful almond pollination. With more than one million acres of almond trees planted in California, adequate numbers of strong, healthy bees are crucial for pollination and nut set. While the almond industry has stepped up and planted 28,000 acres of bee forage since 2011 to provide nutrition before and after almond bloom, growers depend on strong hives arriving at their orchards to do the job.

Poor overwintering has a strong impact on beekeepers and almond growers because almond bloom is also when colonies are at their lowest populations and are just beginning to rebuild numbers. Weak colonies will not be able to rear enough brood to fulfill hive strength requirements needed for pollination. Lost colonies cannot be replaced in



Inspectors check for hive strength prior to placing hives in almonds for pollination. Most contracts call for a minimum of 6-8 frames to ensure enough bees will work in the orchard. Photo courtesy of Cecilia Parsons.



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February. Colonies that have survived are the ones available for pollination.

Just the Beginning

Overwinter indoor bee storage in California is in its infancy compared to Idaho, but there is beekeeper interest—as well as a learning curve. Visalia area beekeeper Steve Godlin said a lot of beekeepers are exploring their overwintering options. Godlin said he is working on his own small facility to see what works best for his bees.

Costs to keep temperatures at a consistent level, air flow and humidity are all important factors in indoor bee storage, he said. It is not that the traditional yard storage does not work, but there are tricks to being successful.

Mild Winter Temps

Tulare County beekeeper Roger Everett said Central California's mild winter temperatures would require bee

storage facilities to be cooled. Carbon dioxide levels would need to be monitored and a back up system in place for power.

“In the Central Valley, you can’t just open the doors to exchange air and regulate temperatures like they do elsewhere. The temperature has to be at 40 degrees F consistently.”

Everett said beekeepers also need to think about the health of the hives they are placing in storage.

“You get out what you put in,” he said.

Advantages to Indoor Storage

There is an advantage to indoor storage if it reduces feeding and labor costs and bees come out strong, Everett said. Beekeepers considering indoor storage need to have a strategy for choosing which of their hives will be stored indoors.

One strategy suggested by a United States Department of Agriculture (USDA)/Agricultural Research Service (ARS) research team at the Carl Hayden Bee Research Center in Tucson, Arizona, is to select colonies to overwinter in indoor storage based on their size and varroa populations in September. A decision tool developed by the team for beekeepers showed that selecting the colonies based on their guidelines could reduce costs in preparing, transporting and overwintering hives that are unlikely to reach the size needed for pollination.

Preventing Bee Theft

Los Banos beekeeper Gene Brandi said the serious problem of robbing would not be an issue in cold storage. Weak hives in outside yards can be robbed of honey by stronger hives. Bees would not expend energy to forage for food and are also less likely to spread mites to other hives. Mites can also enter hives when foragers rob weak colonies.

Research

According to Dr. Elina L. Nino, Cooperative Extension bee specialist at University of California (UC)

Davis more California beekeepers are interested in learning more about indoor storage options, but might be reluctant until there are more positive experiences.

Nino said more work needs to be done to determine the challenges with potential pest and pathogen spread between stored colonies, as well as what is the optimal environment for the stored hives and the potential effects on queens.

Nino said the research team study found that while the cost of overwintering bees was lower in cold storage, that option did not reduce overwintering losses. From their analysis, indoor storage costs less per colony than apiaries, but best management practices need to be developed to improve overwinter survival. Those include, besides colony selection:

- Optimal time for placing colonies in storage, and the amount of resources required for overwintering.

- Establishing and enhancing pollinator habitat in the summer and fall are also part of the solution.

With better forage opportunities, the study said, fat body mass and vitellogenin (female-specific egg yolk protein) levels critical for successful overwintering are enhanced when bees have access to fall pollens.

Due to California’s late spring rains this year, Brandi said fall blooms of blue curl and tarweed were especially helpful for bee health and honey production.

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A NEW APPROACH TO IPM

By CECILIA PARSONS | Associate Editor

THERE IS A NEW APPROACH to integrated pest management (IPM) said Dr. Surendra K. Dara, University of California Cooperative Extension (UCCE) entomology and biological advisor and speaker at the inaugural Crop Consultant Conference. The Journal of Integrated Pest Management published Dara's work on The New IPM Paradigm for the Modern Age earlier this year.

In his paper, Dara writes that the concept of IPM is not new and has historically been based on ecological and economic aspects of pest management. The new model, Dara said, is expanded to include management, business, and sustainability while emphasizing the importance of research and public outreach. The new IPM model is economically viable, environmentally sustainable and socially acceptable.

Balanced Ecology with Economics

Dara said that traditionally, IPM has balanced ecology with economics. The shift places more emphasis on ecology. Pest management decisions have to make economic sense, he said, but now there are more factors involved in pest management strategies. New technology, better communication tools, changing consumer trends, public awareness of food production systems and globalization of trade and travel are all drivers of the change.

The four major components in the new IPM model address various pest management options, the knowledge, and resources the grower has to address the pest issue, planning and organization of information to take appropriate management actions, maintaining

good communication and disseminating that information about pests and management.

New IPM Model

The new IPM model acknowledges that management rather than control of pests presents a more balanced approach. Preventing economic loss is preferable to eradication or elimination of a pest—with the exception of new invasive species. Knowledge of management options for pests is important as some are preventive and others are curative.

Dara notes that common control options that can be used in different stages of crop production to prevent or reduce or treat pest infestation are host plant resistance, cultural control, biological control, behavior control, physical or mechanical control, microbial control and chemical control. These options are not feasible in all crops, but can be effective in a specific crop.

Host plant resistance is a strategy that involves use of plant cultivars that

are bred to be resistant or tolerant to pests or diseases. The cultivars can have physical, morphological or biochemical characteristics that reduce their attractiveness to pests. This option is the first line of defense in IPM, Dara said.

Cultural control is the use of best practices to ensure plant health. Practices include irrigation management, optimizing plant nutrition, strategic planting or harvest dates to help avoid or reduce pest infestations. Crop rotation is one example where planning non-host or tolerant crops will break the pest cycle and avoid build up of numbers. Inter cropping or non-host plants or trap plants can also help reduce pest damage.

Biological control uses natural enemies of pests and can cause significant reduction in pest populations. Avoiding practices that reduce numbers of pest enemies is also part of biological control. Release of irradiated sterile

Continued on Page 60

"The new IPM model acknowledges that management rather than control of pests presents a more balanced approach. Preventing economic loss is preferable to eradication or elimination of a pest—with the exception of new invasive species."

The Alion logo, featuring the word "Alion" in a bold, brown font with a registered trademark symbol, is set within a white rectangular box with a black border. This box is placed on an orange background that has a green border and a stylized yellow and black arrow graphic pointing towards the top right.

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insects to inhibit reproduction of the target pest is another example of biological control.

Behavior control takes advantage of a pest insects' attraction to certain colors, lights, odors of attractants or pheromones. Mating disruption uses pheromone lures to confuse adult insect pests and reduce mating potential and eventually reduce overall pest numbers.

The physical or mechanical approach to pest management involves netting to protect crops, hand removal or vacuuming of target pests from crops, steam or solarization of ground to suppress soil pests and devices that deter pest birds from damaging crops.

Microbial control makes use of bacteria, fungi, nematodes or viruses to control arthropod pests, parasitic nematodes and plant pathogens.

Chemical control includes use of

both synthetic chemical pesticides and chemicals of botanical origin. Dara noted that both types possess many human and environmental safety risks and all need careful consideration and application to avoid potential health risks. Pests can also develop resistance to pesticides if they are over used.

Dara said that knowledge of pest control options, pest biology and damage potential enables growers to make decisions that will work for them. He stressed that successful IPM implementation is limited by growers' lack of sufficient information about control options and knowledge of appropriate control options. It is also critical that growers can identify the pest, understand its biology and vulnerability of each life stage among other things to identify an effective control strategy.

With more regulations on pesticide use and a reduction in the number of active ingredients in some crops, Dara said that there is more emphasis on better understanding of available pest control options.

The planning and organization component of the new IPM model deals with data collection, organization and actual actions against pest infestations.

Regular monitoring of a crop, Dara said, is a basic step in crop protection as early detection can save control costs. Monitoring or scouting can be labor intensive, but Dara noted that drone-assisted aerial imagery can improve efficiency and precision in managing pests.

Good communication, the final component, calls for use of modern communication tools used to spread information about agricultural pests, emerging threats and new control strategies. Dara said that growers and pest control advisors should stay informed about existing and emerging pests and management options. Communication should not only be among growers, but also with the public. This sector is influenced by marketing and lacks knowledge of food production systems.

Communication with the public will help with their understanding of and preference for different food production systems and it will also influence policy and regulatory decisions. Dara wrote that if growers implement good IPM strategies to produce safe food and consumers are aware of this practice then sellers would be able to market what informed consumers demand. He said Extension has traditionally focused on grower education, but public education about the importance of IPM can have a significant influence on the way food is produced.

Dara said the new IPM model provides a template for focusing on different areas of the IPM paradigm and encourages collaboration. The new model is expected to guide IPM strategies worldwide to develop and implement sustainable agricultural practices to ensure profitability for the growers, affordability for the consumers and food security to the growing world population.

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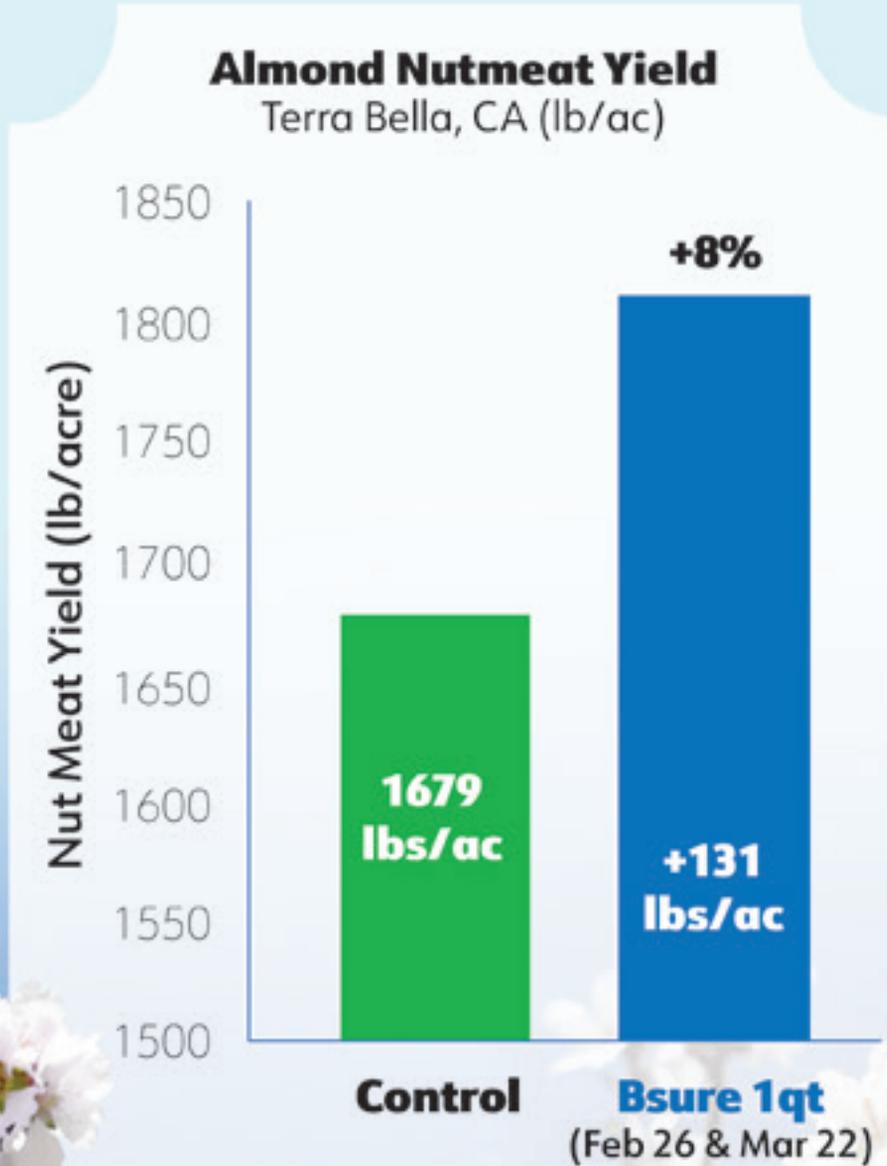


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ADVANCED HARVEST FOR ALMONDS

Will California's almond industry embark on a journey that could entail a major change in harvest practices?

By CECILIA PARSONS | Associate Editor

JOSETTE LEWIS, THE ALMOND BOARD OF California's (ABC) new Director of Agricultural Affairs predicted exploring alternative harvesting options will be a journey for almond growers as they make decisions and evaluate the advantages and disadvantages of what would be a major change for the industry. The topic of advanced harvest is so intriguing that it is one of the opening topics at The Almond Conference 2019 in December.

While other almond-producing countries have adopted some alternative harvest practices, including over the top harvest, in recent years, nearly all of the California crop, that makes up 80 percent of the world's almond production, is

harvested by first mechanically shaking, then windrowing the nuts and finally scooping them up with a pickup machine. New technology in harvest equipment and new harvest strategies have been successful in reducing the amount of dust generated during harvest operations, but dust remains an issue for the industry and is one of the drivers for alternative harvest.

Lewis said ABC funded research will help growers understand their harvest options. She noted that some growers are already trying new approaches to harvest and equipment manufacturers are also exploring changes in harvest machine design.

Grower Driven Changes

Changes will be grower driven, Lewis predicted, as growers strategize to improve their harvest efficiency, reduce dust and improve orchard health.

Advancing harvest dates, using a catch frame to keep nuts off the ground and mechanical drying are all aspects of almond harvest that are being studied.

Lewis said that adoption of these practices have the potential to also change orchard design, pest management and cultural practices. There will certainly be trade-offs. Mechanical drying would use energy, but early and off the ground harvest would also reduce aflatoxin and crop damage due to pests or disease.

Research

The level of interest in advanced harvest among almond growers is high, confirmed Patrick Brown of the University of California (UC) Davis Plant Sciences Department.

Growers see the harvest alternative as one way of meeting the California almond industry's 2025 Goal of harvest dust reduction.

Brown sees plenty of challenges in adoption of advanced harvest by the almond industry, but the environmental benefits may outweigh the challenges in the future. There could be increased flexibility in irrigation scheduling, meaning less tree stress at the critical time of bud development. Cover crops could replace bare orchard floors, providing extra soil health and pollinator habitat. There is also the chance of reduced need for pesticide applications if nuts are harvested earlier.

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Advanced Harvest Entails

Advanced harvest entails removal of nuts from the orchard shortly after maturity. Reducing the amount of time open, mature nuts are on the tree or orchard floor reduces exposure to navel orangeworm, hull rot and aflatoxin. There is also the potential for enhanced tree health and management. Advancing harvest would allow for timely irrigation at bud development. Avoiding water stress at that time could improve next year's yields. Earlier removal and avoiding on-ground contact would give growers options in floor management, weed control and ant and vertebrate pest control.

There is also the food safety aspect. Eliminating contact with the ground reduces contamination.

Shake and Catch

With shake and catch harvest, Brown said on-farm hulling could be an option,



Over the top almond harvester by the Spanish fire Tenias was on display at the 2018 Almond Conference. Photo courtesy of Cecilia Parsons.

but more research is needed. There is a challenge with soft shell varieties. One interim step suggested would be to transport the nuts off-site for spreading and drying. Mechanical hulling onsite would require new machinery.

Additional machinery and drying costs could cut into a grower's bottom line. New infrastructure may be necessary with equipment and harvest date change. There is also a possible impact

Continued on Page 64

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of machine drying on nut quality and yields.

Methods and consequences of in-field hull return and incorporation are also unknowns with advanced harvest.

Shake and Catch Trial

A shake and catch trial with an OMC Magnum Catchall showed positive results in a fifth leaf orchard, Brown said. There was some spilling of nuts in trees over 15 feet in height, and he noted that tree crotches need to be higher as current shake and catch equipment is not designed for 24 inch crotch height. Poor positioning of the shoe can also cause loss of nuts due to limited operator experience. The operation is also slower, shaking only 20 trees per hour compared to 60 with conventional equipment. This could be offset by the single pass needed compared to three to four with conventional harvest.

Other Options

Other existing options for harvest include modified grape harvest machines, over the top machines and wrap around harvest machine.

Brown said trials showed the modified grape harvest machinery is hard on trees with possible lasting effects. The over the top, manufactured by Tenias in Spain, and exhibited at The Almond Conference 2018 performed well with some positives. Brown said the moving shaker head appeared to

be efficient and the skirt conforms easily around the tree trunk. He also noted the machine is too heavy to be used on clay soils and there are concerns about excessive spur pruning.

Brown said some possible cultural and environmental benefits to advanced off ground harvest are still being evaluated.

Those include postharvest tree health and greenhouse gas mitigation.

Research Priorities

Advanced harvest research priorities named by Brown include:

- Early harvest mechanics, with a focus on shaker practice and technology
- Catch frame design
- Hulling
- Drying

In biology and horticulture, research is needed in tree management for optimal shaking, timing, quantifying disease and tree health benefits, maturity and nut quality, hull breakdown and impact on nutrient dynamics, soil health and greenhouse gas dynamics, water use, economics and cost/benefit analysis.

Long term research priorities include:

- Tree architecture and orchard design with size controlling rootstocks
- Grafting
- Pruning and tree density
- Planting design with cultivars in row or self fertile varieties
- Precision harvest

Brown said critical questions about advanced and off ground harvest to be answered are:

- Will this harvest method work in all California almond environments, cultivars, age and planting designs?
- What does this harvest method mean for future tree architecture and orchard designs?
- Will size-controlling rootstocks be desired?
- What will be the spacing need?

Finally, the net benefits and costs must be considered.

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GROWER PROFILE— PARSONS FARM

By JENNY HOLTERMANN | Contributing Writer

FOUR GENERATIONS AGO THE PARSONS FAMILY moved from orange groves in Pasadena to the Greenfield area of lower Kern County, in the early 1900's to farm. It was an era where farmers traded ranches to experiment with different agricultural growing areas. They moved around Kern County until they settled in Buttonwillow, a small farming town alongside Interstate 5. The Parsons family started building houses and set roots in Buttonwillow. As the next generations; John Parsons, his brother and brother-in-law were farming cotton, rice and various other commercial row crops. Through the years the family split the ranches up and in 1984 brothers Julien Sr. and Walter Parsons began farming with their father, John.



Julien Jr. and Julien Sr. Parsons. All photos courtesy of Jenny Holtermann.



Mummy pistachios.

An advertisement for Hilbers Incorporated. At the top is the logo: a large red 'H' followed by 'HILBERS INCORPORATED' in bold black letters, with 'CONTRACTORS & ENGINEERS' in smaller black letters below. Below the logo is a photograph of a red steel building with a vintage truck parked in front. The text 'Steel Buildings' is written in a cursive font over the photo. Below the photo, the text reads: 'WHETHER IT'S A DESIGN-BUILD PROJECT OR RENOVATING AND/OR EXPANDING AN EXISTING BUILDING, HILBERS, INC. HAS THE EXPERTISE TO SEE YOU THROUGH TO THE COMPLETION OF YOUR PROJECT!' and 'LOCALLY OWNED AND FAMILY OPERATED SINCE 1983. A NAME YOU CAN TRUST!'. At the bottom, contact information is provided: 'HILBERSINC.COM | 530-673-2947', '770 N. WALTON AVE SUITE 100', 'YUBA CITY, CA 95993'. A small red 'H' logo is in the bottom right corner.

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Pistachios

Row crops, cotton, sugar beets, alfalfa and rotation crops made up the farming portfolio until 1993 when the Parsons started planting pistachios. There were only two other pistachio orchards in the area but cotton prices were starting to decline and the Parsons knew they needed to look for a more permanent and consistent commodity. Julien Sr. reflects back on the transition, "Cotton was starting to get tough. There were good years for the generation before us, but when input costs started to go up and water was beginning to become an issue. We had to think of something else."

Parsons Farms started small with 30 acres of pistachios, but every few years they added more acreage. Ranging from 30 acres every few years to this last year adding 500 acres of new pistachio plantings. With half of their acreage bearing and the other half nonbearing, the Parsons are in the pistachio business for the long haul.

Almonds

Today, Julien Sr. and his brother Walter along with sons, Julien Jr. and Jeff make up Parsons Farms. About half the acreage is in pistachios, which Julien Sr. and Julien Jr. manage. Walter and Jeff handle the open ground, ranging from cotton, processing tomatoes, onions, carrots and garlic. Jeff also started diversifying the family business into almonds six years ago when the cousins came back to the family farm. Their mix of crops and responsibilities works well for the family and bringing in the next generation on the land.

With the implementation of the Sustainable Groundwater Management

Act (SGMA), the Parsons are cautious about expanding too much more into pistachios and see the need to keep row crops in their portfolio. Julien Sr. explains, "We will always have to keep some open land; in case we have those really dry years where we might need to fallow land to have enough water to keep the trees alive. One thing we like about pistachios is we can cut back their water considerably. We aren't going to kill the trees but we can keep them alive on pretty minimal amount of water."

Implementation of SGMA

The Parsons farm stretches over two different water districts, each with a different plan to make it through the implementation of SGMA. When water becomes tight and not as available, the Parsons have the flexibility to pull water from the row crops and prioritize their pistachios. Pistachios are a very durable crop, that can survive and often times thrive under pressure. There are certain

Continued on Page 68

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Parsons Farms pistachio orchard.

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agricultural practices the Parsons have made a priority to focus on.

Winter Sanitation

Winter sanitation is a key priority to pistachios, as navel orangeworm (NOW) has become a disease to watch for over the years. Mummy shaking, pruning and using a sanitizer has become part of their winter sanitation process. The pistachio sanitizer sweeps the nuts into a loose windrow, has a shredder that picks up the nuts off the ground, breaks them down into pieces and lays them back on the orchard floor.

“The 11-foot surface mower splits up the nuts and the environment will take care of the rest. Once it is cracked open and you have an opening in the nut then the environment will dry it out or the birds come,” notes Julien Jr. to the success of the pistachio sanitizer. Not having to send a separate mower or disk through the orchard has ensured they create hard centers down the rows. This has helped to reduce dust and create efficiencies during the growing season.

“Between the shredding of the prunings and the sanitized nuts, you can get a thick two inches of organic matter across the orchard floor,” Julien Jr. explained the benefits of not

having to disk or till their fields.

Julien Sr. added, “After a good rain you can even drive through the orchard rows immediately. The mushrooms are growing everywhere, so you know nature is working. The roads might be slick, but the orchards are fine. After all the work we do, in the summertime there isn’t much dust. With the single line drip, it is our hope the water is going right down and we are hoping to increase water penetration.” It is the Parsons goal the organic matter is helping to ensure all the beneficial nutrients are staying in the soil and hopefully even advancing their irrigation practices.

Longevity of the Pistachio Trees

With no intention of having to take out the pistachio orchards, it is important to ensure the longevity of the tree and the health of the orchard. There is no real idea of how long pistachio trees will be productive. Some of the original trees in the area were only taken out because of poor rootstock and disease pressure.

Julien Sr. talked about the pistachio yield as the trees age, “The average yield year after year ends up the same as a 10 or 15-year old block. Actually, the older the tree, the more consistent the yield and they don’t fluctuate as much as they age.” He goes on to note that the alternate bearing years are more predictable and you can plan for the years you know the yield will be lighter. Planning is more of a focus on the alternate bearing years where the yield might be down, but the general input costs remain the same.

Julien Sr. mentions, “The input costs are not super high once you get a tree established. Establishment costs are really tough with crews tipping and tying every week because they grow so fast. Then you get to the years where the water use is pretty low, you are not spraying a lot, you aren’t doing a lot to them.” The pistachio growing costs are most expensive during the initial years and are easier to manage as they mature.

Alternate Bearing

The biggest downside to the alternate bearing yield is the marketability. There is a lot of investment into new markets but they have to be careful in the off-yield years. Julien Sr. notes, “One problem with alternate bearing is having enough pistachios to

“**The 11-foot surface mower splits up the nuts and the environment will take care of the rest. Once it is cracked open and you have an opening in the nut then the environment will dry it out or the birds come.**”



Julien Sr. inspecting the pistachios left on the tree after harvest.

want to leverage the price to match a high demand crop either and not have the product.

There is much more control over the crop and the price with few

markets across the globe through the different processors they sell to.

There will always be challenges associated with farming any commodity. Pistachios seem to compliment the soil type on the west side of Kern County and the water uncertainty in the future. With more intense labor needed for the row crops and all the challenges facing California agriculture in the years to come, the Parsons see pistachios as a means to help their farm transition into the next generation. As the water situation unfolds there will probably always be a place for some row crops in the mix, but pistachios may just be the key to keeping stability and consistency into the future.

supply all the new markets from year to year. If you go out and find all these new markets for a 500-million-pound crop that demands pistachios, then the next year you have a 200-million-pound crop, those same people are asking where the pistachios are and you don't have them that year." He goes on to add, they don't

players in the marketing side of the pistachio business. Pistachios from the grower, go directly to the processor who sells direct to consumers. The processor is responsible for hulling, drying, roasting, flavoring, packaging and sending to final consumer. Once the pistachios leave the Parsons field, they are off to

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CAL/OSHA RELEASES REVISED DRAFT NIGHTTIME LIGHTING STANDARD FOR AGRICULTURE

By ROGER ISOM | President/CEO, Western Agricultural Processors Association (WAPA), Contributing Writer



IN APRIL OF THIS YEAR, Cal/OSHA (California Division of Occupational Safety and Health) held a public hearing to consider specific requirements for lighting standards for working around agricultural equipment at night. The proposed new standard entitled “Outdoor Agricultural Operations During Hours of Darkness” was a result of a request by the Division of Occupational Safety and Health (DOSH) submitted to the Cal/OSHA Standards Board in 2013 claiming they had investigated a number of accidents occurring in agriculture during nighttime work activities, including serious injuries and one fatality. In reviewing the information, it was determined that these accidents occurred primarily in the early 2000’s when mechanical grape harvesting at night started to take off. There were no accidents after 2005. Labor group proponents for the changes testified that “rampant sexual harassment and poor farmworker eyesight were the drivers for the changes. However, they changed their story this year when the hearing was heard in April and stated that workers’ cars were being broken into and knife cuts from farmworkers harvesting corn at night were the primary reasons. None of these claims could ever be substantiated.

Reflective Safety Vests

The proposed regulation required that workers wear reflective safety vests during nighttime activities, to which all parties agreed is a good recommendation. But the more problematic requirement was a provision that required 10 foot-candle light power within a 25 foot radius of all operating agricultural equipment. While most agriculture equipment is equipped with headlights, only some equipment has lights in the rear and it is rare that any equipment has side lighting. This means that supplemental lighting must be brought in to meet the standard. Supplemental lighting is expensive, subject to additional regulatory requirements depending on the air district you are in, and

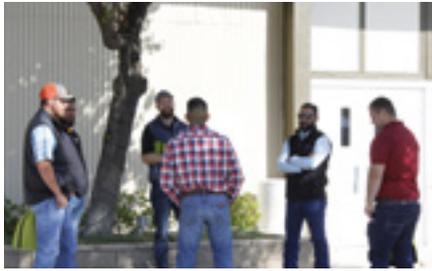
most agricultural operations would have extreme difficulty in meeting the standard.

Revised Proposal

After the hearing in April, Cal/OSHA considered the comments and in October revised the proposed standard and released it for a 15 day public review. One of the biggest changes is to allow for “task lighting” where the lighting could be provided by a head lamp or other light, as long as it meets the appropriate illumination. However, in some instances the changes make the regulation harder to comply with or has been made too vague to work with. For example the rule now requires lighting of 5 foot-candle illumination to be provided for “general movement throughout the space” during outdoor agricultural operations. In addition, 5 foot-candle illumination shall be provided for pathways leading to and around restrooms and drinking water, inside restroom facilities and in storage areas accessed by employees. The standard still requires illumination in areas within 25 feet of agricultural equipment where workers are present to be at least 5 foot-candles, while working on exposed point of operation equipment or operationally visible moving parts of machinery must be at 10 foot-candles, and maintenance work on equipment must be at 20 foot-candles. However, one caveat contained in the proposed revisions is the area lighting should be measured at approximately 30 inches above the floor. This still requires portable light towers to be brought in to provide the necessary lighting.

Comments on the proposed 15 day revisions were due on October 18th, and a number of agricultural organizations submitted comments opposing the proposed regulation in general and highlighting the concerns with some of the proposed revisions. The Standards Board is scheduled to hear this sometime in next few months.

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An Active Governor Delivers on Rural Priorities While Simultaneously Targeting Environmental Issues

By EMILY ROONEY | President, Agricultural Council of California

THOSE OF US IN CALIFORNIA AGRICULTURE have grown accustomed to the major metropolitan areas and the coastal communities garnering the vast majority of political and media attention from our news outlets and our elected officials. Historically, government dollars flow that direction in the form of projects for housing, roads, infrastructure, entertainment, and so on.

In an unusual twist of events, we now have a governor from San Francisco that has visited the Sacramento and San Joaquin Valleys more during his first year in office than any governor in recent history.

Governor Newsom

Governor Newsom first visited Paradise on a joint visit with President Trump and Former Governor Brown in wake

of the catastrophic fires in 2018. And within a few days of taking office, Governor Newsom surprised his entire Cabinet with a trip to an area right outside of Ceres to highlight the drinking water concerns of the local community. He then followed up with trips to Parlier, Fresno, and other areas, to visit with agricultural and community leaders to learn about local issues.

Newsom immediately prioritized the need for drinking water solutions in disadvantaged communities—which helps resolve problems that impact both rural and agricultural populations. Ultimately, he dedicated \$241 million to this effort. The Governor also reined in High Speed Rail, citing the vast budget problems with the project.

In an effort to make changes at the State Water Resources Control Board, Governor Newsom made new appointments to the Board during the first half of the year. Additionally, he has been dedicating significant resources from his Administration to make changes to rules finalized last December that would divert more water away from farming and rural communities to fish populations, regardless of science. It is widely known that Newsom supports the efforts at the state water board to create “voluntary agreements,” which allow local water districts, farmers and community leaders to create solutions that will build flexibility in the surface water system. These potential agreements would assist fish populations in a variety of ways, such as improving habitat, as opposed to automatically releasing more water, which may or may not resolve any issues in the long run.

Last, but not least, Governor Newsom vetoed SB 1. As you may recall, SB 1 would have preserved Obama-era environmental standards, therefore interfering with California’s ability to utilize the best available science in our environmental protection efforts. The Governor stated that he vetoed the bill because California already has the authority it needs to push-back on Trump’s changes in federal regulations, however, this was also a ‘win’ for agricultural and rural communities that rely so much on various water projects.

All of this focus on rural communities occurred within his first ten months in office.

Chemical Use

At the same time, this Governor demonstrated a strong focus on environmental issues, particularly chemical use. California is the first state in the nation to begin the process of cancelling Chlorpyrifos. It is expected that the sale of

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this pesticide will end in California in February of next year. With looming questions around other chemicals, such as 1, 3-D or Telone, we can expect more of an investigation into chemical use throughout the remainder of the Newsom Administration.

Single Use Packaging

During the final days of legislative session, the Administration signaled support for reforming the way we produce, handle and manage single-use packaging in our state. While the use of beverage bottles took the headlines, from a food perspective, we consider everything from almond and walnut packages to citrus netting, as single-use. We will continue to work on this issue in the upcoming months heading into next year.

Wildfire Crisis

Just to add a layer of complication to the mix, this Governor's work on the wildfire crisis will be vital to his legacy. Newsom is rightfully prioritizing human health and safety in his work on this issue. It is also clear he is extraordinarily frustrated by the utilities, the neglect of the power infrastructure and the over burdensome use of the Public Safety Power Shutoff system. Not only is it adversely impacting our farms and processing plants throughout the Sacramento and San Joaquin Valleys, but emissions from the wildfires are also reversing much of the environmental work the state has committed to, specifically in reducing greenhouse gases.

PUC Changes

Newsom has made several significant changes to the California Public Utilities Commission (PUC), the board that regulates the utilities. Some of these appointees are discussing the need for "diversity" in the utility supply and other changes to our power supply. It will be interesting to watch him lead on this issue, and hopefully head-off future catastrophic disasters in the meantime. The right kind of reform on the utility front will benefit not only agriculture, but all of California.

Rural Resiliency

Many political insiders in and around Sacramento are calling this the Governor's "Rural Resiliency" strategy—putting a spotlight on issues impacting many of the overlooked segments of the state. More skeptical minds wonder if he will use this rural approach to build a future platform to run for President. Either way, issues such as poverty and rural communities appear to be

moving to the top of his agenda. Those of us in agriculture will likely support and oppose some of his ideas for rural California. However, we need to maximize this opportunity on all fronts and engage in the conversation or risk being left behind.

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NIGHT WORK in Agriculture Standard Imminent

By AMY WOLFE | MPPA, CFRE, President and CEO AgSafe, Contributing Writer

FOR NEARLY HALF A DECADE, Cal/OSHA (California Division of Occupational Safety and Health) has been considering the creation of a regulation that specifically addresses the unique hazards found while working at night in agriculture. After many starts and stops, sufficient traction was reached in 2018 to meaningfully move the process forward and now the

industry faces only a few bureaucratic hurdles before the long-discussed standard is reality. It is critical that anyone engaging in activities between sunset and sunrise understand the various steps to take to ensure compliance.

Lighting

Fundamentally, the risks to be addressed by the new standard are the

hazards inherent in the workplace when natural light, provided by the sun, is no longer available. Poor visibility that could result in physical harm or the unsafe execution of duties, as well as potential vehicular and worker traffic collisions, create the greatest pause for concern. As a result, it stands to reason

Continued on Page 76

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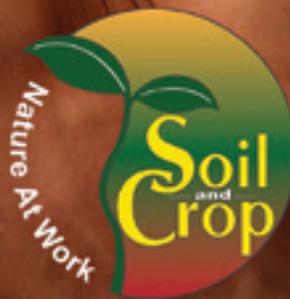
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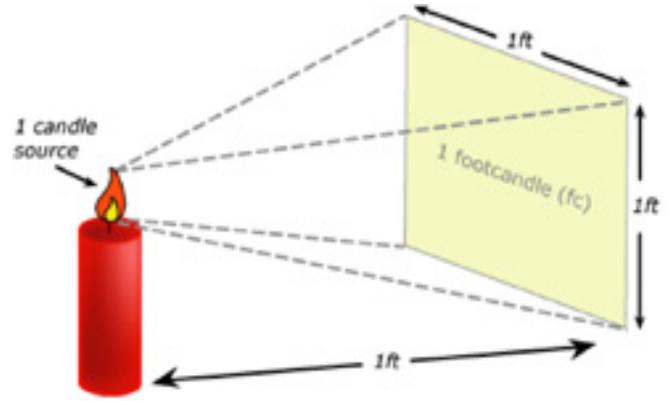
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that at the core of the proposed standard are lighting requirements for the various tasks or areas of outdoor work.

The following table, taken directly from the proposed standard, addresses the amount of light that must be provided by the employer:

Foot-candles	Lux	Areas or Tasks
0.09-0.19	1-2	Poultry harvesting or catching operations
3	32.29	Meeting area and meal/rest area
5	53.82	General movement during outdoor ag operations; Pathways leading to and around restrooms and water; Inside restrooms; Storage area accessed by employees; Areas within 25 feet of agricultural equipment where workers are present
10	107.64	Intermittently exposed or exposed point of operation equipment; Operationally visible moving parts of machinery; Task lighting for active agricultural operations (harvesting, irrigation)
20	215.30	Task lighting for maintenance work on equipment



Foot-candles refers to the amount of light produced from a source at a distance of one foot. Photo courtesy of AgSafe.

“As employers look to address compliance, they will find that most lighting sources will be provided to them in lumens.”

It is important to note that Cal/OSHA makes reference to foot-candles and lumens, both of which are units of measuring light. Foot-candles refer to the amount of light produced from a source at a distance of one foot. In simpler terms, it is the distance unit of measurement from the source of light. However, lumens measures brightness and from a practical perspective, is the unit of measurement found on light bulbs. As employers look to address compliance, they will find that most lighting sources will be provided to them in lumens.

Another essential distinguishing factor in the standard is that light will be measured 30 inches off the ground. To ensure

adequate lighting is available, employers will need to use a light measuring device and place it at that height from the ground for accurate analysis. Requests to Cal/OSHA, at the time of writing, for insight into the type of light measuring tool they intend to be used by enforcement staff have gone unanswered.

In this final draft language of the proposed standard, Cal/OSHA has not dictated the type of lighting that must be provided. However, an employer is responsible for providing personal hands-free lighting, if needed, to meet the illumination requirements. As such, it is up to each agricultural operation to evaluate their current work systems and decide the best sources of light that ensure the greatest possible protection for their workers.

Written Programs, Training and PPE

While lighting is at the heart of this proposed standard, fundamental occupational safety elements exist to round out its core tenants. Employers will be required to train workers at the start of each shift, reviewing the following details:

- Location of meal and rest area and how to safely access it in the dark
- Location of restrooms and how to safely access them in the dark
- Location of drinking water and how to safely access it in the dark



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- Location of bodies of water and other potential hazards, including high traffic areas

As with any training, this must be documented, and records appropriately maintained. In addition, employers must provide at no cost and require employees to wear Class 2 high visibility safety clothing. This could be a vest or jacket; the type of

clothing is at the discretion of the employer.

Lastly, while the proposed standard does not specifically state as such, Cal/OSHA has an expectation based on the Injury and Illness Prevention Program regulation, that employers document the specific program elements that are unique when working at night. In simplest terms, an employer



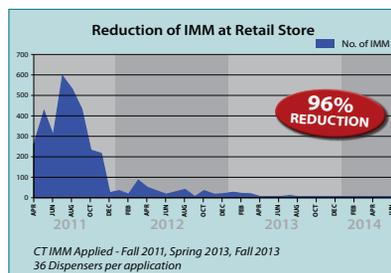
Employers will need to train workers at the start of each shift on the location of meal and rest areas, restrooms, drinking water, and bodies of water and other potential hazards, including high traffic areas. Photo courtesy of James Collier Photography.

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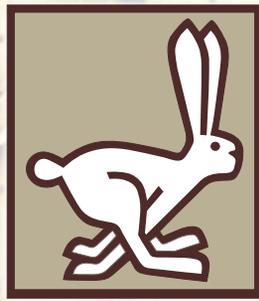


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needs to evaluate their operating procedures and make note of how work is done differently at night so as to ensure the health and safety of workers. This includes identifying new hazards, which are addressed during employee training, as well as considering how emergency response procedures would unfold outside of “normal” business hours. Ultimately, as the agricultural industry continues to use the hours between sunset and sunrise as a viable time to work, it will soon be incumbent upon us to comply with a standard designed to ensure continued workplace safety.

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Whole Orchard Recycling, a Grower's Perspective

By THE ALMOND BOARD OF CALIFORNIA



CHIRSTINE GEMPERLE FARMS 135 ACRES of almonds in Stanislaus and Merced counties with her brother Erich. In November 2018, the pair pulled out 20 acres of old trees and decided to try Whole Orchard Recycling (WOR) for the first time on that same 20-acre block.

Christine lives on the land that underwent WOR and had a front row seat to the whole process.

WOR involves grinding trees into small chips then spreading that material across the field and disking it about six inches into the soil. For many growers uncertain of what to do with their old trees, WOR provides a sustainable solution with multiple benefits for soil health as well as yield increases for the new orchard planted on the same ground.

“What amazed me is looking at these massive mountains of chips when they shredded the orchard,” said Christine, who is active on the Almond Board of California’s (ABC) Biomass Workgroup and a member of ABC’s Board of Directors. “Once you start working it into the soil and you take out big pieces, it was like it was never there.”

Rather than rushing to plant new trees, Christine and Erich decided to take their time. They spread chicken manure from the family’s egg operations to add nitrogen to the soil. They ripped the soil before and after plowing the chips in and then hired crews to remove any of the remaining roots. In May 2019, they fumigated to control nematodes, letting the land rest for a month afterward. Finally, they laid out the grids for the new orchard in August, and then installed sprinklers and planted new trees in late September. They intend to plant a soil-building bee forage crop between the rows of trees once rain begins to fall this winter.

What amazed me is looking at these massive mountains of chips when they shredded the orchard,” said Christine

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The advertisement features a large background image of a factory interior with various pieces of machinery. A smaller inset image shows a specific piece of equipment, possibly a huller or sheller, with a hopper and conveyor system.



Christine Gemperle. All photos courtesy of Christine Gemperle.



WOR—Gemperle Farms.

On-Farm Benefits of WOR

Multiple research projects funded by the Almond Board of California and executed by the University of California (UC) indicate that Whole Orchard Recycling:

- Increases soil organic matter and soil structure,
- Improves water retention and infiltration,
- Pushes carbon back into the soil, and
- Helps the almond industry move closer to achieving its Almond Orchard 2025 Goal of putting everything grown in the orchard to optimal use by 2025.

“This is one practice that is a win-win for everyone involved,” said Tanya Wood, the Agricultural Affairs specialist for the Almond Board. “It helps to meet water and nitrogen use efficiency. It generates greater yield over time, which means more money in growers’ pockets. And growers can feel good that they’re using a practice that is better for the environment.”

Wood estimates about 20,000 acres of almond trees have been recycled in the past decade.

Depending upon tree density, Wood said an orchard can generate from 30 to 65 tons of organic material per acre. Within that woody biomass is carbon, a food source for microbes that live within the soil.

In addition to feasting on carbon, the microbes also use much of the soil’s available nitrogen, Wood said. For that reason, in the first year after replanting growers should expect to double the amount of nitrogen applied to new orchards on acres where WOR took

place. In the second year, as the wood chips continue to break down, they will start to release plant-ready nitrogen into the new trees’ root zone, Wood explained.

Continued on Page 82

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Cost Analysis Weighs in WOR's Favor

While Whole Orchard Recycling is not cheap, there are programs to help offset the cost. Plus, as burning restrictions continue to increase and biomass power plants pay less for wood chips, University of California (UC) researchers report that the grower's costs to implement WOR are increasingly favorable compared to the cost of hauling chips to a power plant, particularly when considering long-term yields.

Wood said that pulling trees and grinding them into chips two inches or smaller typically costs about \$600 an acre, and then spreading them evenly and plowing them back into the soil can run another \$300 to \$400 per acre. Growers can find a complete Cost-Benefit Guide on the UC Davis website dedicated entirely to WOR at OrchardRecycling.UCDavis.edu

In an effort to promote orchard recycling and reduce burning, the San Joaquin Valley Air Pollution Control District offers an economic incentive to growers in the form of the Alternative to Open Ag Burning incentive pilot program. Growers can receive anywhere from \$300 to \$600 per acre, up to \$60,000 total, for participating in the program. Those who are interested should call (559) 230-5800 or visit ValleyAir.org for more information. The California Department of Food and Agriculture (CDFA) also offers incentive funding for almond industry members to

For instance, researchers continue to study whether recycling trees suffering from various diseases is a good idea.

conduct Whole Orchard Recycling through its Healthy Soils Program. More information about that program may be found at CDFA's updated Farmer Resource Portal, found at CDFA.CA.gov/FarmerResources/.

As hinted above, researchers predict that over time the cost of WOR can more than pay for itself and set up a grower's soil for success in helping to produce higher yields.

A study conducted by Brent Holtz, a UC farm advisor in San Joaquin County, and others shows new orchards planted in soil where trees had been recycled can produce up to 1,000 pounds more almonds per acre.¹

It is important to note, however, that Whole Orchard Recycling may not be the right fit for every situation. For instance, researchers continue to study whether recycling trees suffering from various diseases is a good idea. The concern is whether the disease will be perpetuated in the soil.

Guangwei Huang, the Associate Director of Food Research and Technology for the Almond Board, believes that 20,000 to 30,000 acres of almonds easily could be recycled every year for the next decade with the increased focus on sustainability and zero waste.

"Over the last few years, the topic of Whole Orchard Recycling is resonating more and more with growers," he said.

For Gemperle, WOR just made sense.

"The idea of burning a whole orchard to me is ridiculous," she said. "Old trees are such a great resource. And while Whole Orchard Recycling does require some upfront costs, I think over time we're going to find out even more of its positive impacts."

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

¹Holtz, B.; Browne, G.; Doll, D.; Lampinen, B.; Gaudin, A.; Culumber, M.; Yaghmour, M.; Gordon, P.; and Jahanzad, E. (2018), "Whole orchard recycling and nitrogen considerations in second generation almond orchards" University of California Agriculture and Natural Resources, P. 18 https://ucanr.edu/sites/Nut_Crops/files/285677.pdf



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UC Davis 2020 Short Course: Principles of Fruit and Nut Tree Growth, Cropping, and Management

By CRYSTAL NAY | Contributing Writer

Students tour a screen house at Foundation Plant Services and look at virus-free rose cultivars grown from meristematic tissue. All photos courtesy of Kevin Taniguchi.



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University of California (UC), Davis has you covered. From March 23-April 2, 2020, UC Davis will be hosting a short course focusing on the tree growing basics in an agricultural business setting.

Who Should Attend

The course is open to anyone interested in learning how to grow and care for a related orchard, along with the various aspects it entails. "It's designed to give a thorough introduction to people who are brand new to farming," says Kevin Taniguchi, manager of the Fruit and Nut Research and Information Center at UC Davis, "whether they've just bought a small plot, are taking over a farm, transitioning from field crops to tree crops, or are considering work as a farm manager."

The course typically sells out every year and hosts many international attendees from places like Australia, Greece, Turkey, Chile, and other locales that feature a Mediterranean climate. However, this year's is geared towards California growers. It's a great place to network with other growers, as well as meet other people who can offer some insight into caring for an orchard.

What You'll Learn

If you don't know every step between buying a piece of land and getting your product into the hands of the people who can take it to market, don't worry. You'll learn about it all. There are entire



Dr. Astrid Volder, Dr. Bruce Lampinen, and Dr. Ted DeJong are all present during the roots growth discussion, as students examine the root system of almonds trees.

days dedicated to subjects like planting, pathology, and pest management. The course will also cover things like buying your land and soil analysis, setting up your orchard, pressure bombs and tree stresses, water usage and irrigation, root management, flower and leafing, basic biology, pruning, harvest, and more.

“It’s basically everything within the first three years up until harvest,” says Taniguchi.

While the course briefly touches upon citrus and avocados, the primary focus is on tree nuts, such as almonds, walnuts, and pistachios, along with stone fruit, like nectarines.

Because this is a program hosted by the Fruit and Nut Center, there will be a host of experts available to attendees, including farm advisors, UC Davis staff, and expert pomologist researchers

from the College of Agricultural and Environmental Sciences.

Course Format

This course is an intensive two-week program. Week One begins in a lecture style for the first part of the day, then tours attendees through working farms and fields around the Davis area for the

Continued on Page 86

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second half of the day. Week One is from 8 am-5 pm, Monday-Friday.

Week Two consists of a field trip farther down the California Central Valley with a final destination in Selma, California. During this trip, students will visit breeders and packers, and see real, in-action facilities and their operations. Transportation is provided.

Those who are local to the area in Week Two are welcome to provide their own transportation and meet the rest of the class on location. Week Two is from 8 am-5 pm, Monday-Thursday.

There is also the option of participating only in Week One, with the possibility of adding Week Two after, pending availability.

The Ultimate Goal

California has an extensive community of growers, other agriculture experts and researchers to complement one of the most versatile growing regions in the country. All these elements foster an environment that supports one all-encompassing goal: to create a better California grower.

“We want to help create the most knowledgeable, technologically advanced, and up-to-date growers right here in California,” says Taniguchi.

Part of achieving that goal is encouraging new growers to interact with experienced farmers. It can often seem intimidating to call your farm advisor, especially for new growers who may have a lot of questions. There are many things that people do in order to support a healthy orchard, and many times no one else really knows about it, even though the information could benefit a lot of other growers.

This is another reason UC Davis is building an environment where people can share information, trade business cards, make friends, and connect with one another.

Registration and Cost

Registration is open until February 1, 2020, and fairly easy to do. The link is available on the Fruit and Nut Research and Information Center’s website at fruitandnuts.ucdavis.edu.

The cost for Week One only is \$1,975. The cost for the entire two-week program is \$3,190. Payment is required in full at time of registration.

There is the option to enroll for the first week only, and then decide to add the second week. However, Week Two of the program is capped at 30 students, and fills up much faster.

For more information regarding this course, contact the UC Davis Fruit and Nut Research and Information Center at fruitandnuts@ucdavis.edu or 530-754-9708.

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