

WEST COAST NUT

January 2018 Issue

SPOTLIGHT:

Economic Outlook for
the 2018 Almond
Pollination Season

In This Issue:

2018 New Employment Laws—
What Employers Need to Know

An IPM Approach for Spider Mite Control
in Almonds

Walnut & Almond Pest Management:
Preparing for a Successful New Year

The Ins and Outs of Pistachio Nutrition

January 31, 2018

NORTH VALLEY
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FEATURED ARTICLE

The supply of colonies for California almond pollination relies heavily on out-of-state apiary shipments which have been steadily increasing with almond acreage.

See the full story on page 4





Economic Outlook for the 2018 Almond Pollination Season

By Brittney Goodrich | Assistant Professor, Department of Agricultural Economics and Rural Sociology, Auburn University

As 2017 winds down, many almond growers are likely beginning to think about the upcoming 2018 almond pollination season. What will honey bee colony strength, winter mortality rates, and almond pollination fees look like this year? The following article summarizes some factors that may provide insights into your 2018 almond pollination decisions. In addition, I outline contractual components that you may consider for 2018 and future almond pollination seasons.

USDA (United States Department of Agriculture) estimates that there were 1 million bearing almond acres in 2017. According to the USDA Cost of Pollination Survey, 1.7 million colonies were used in almond pollination in 2016, with an average of 1.9 colonies/acre. This

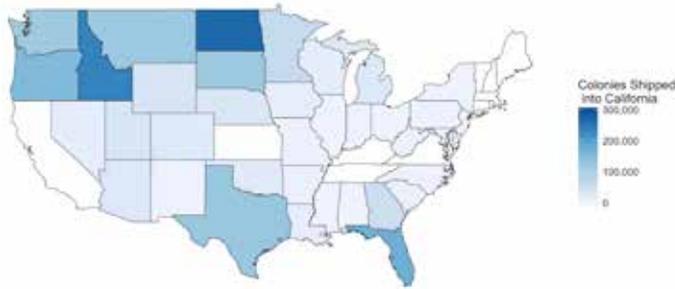
suggests colonies demanded for almond pollination in 2018 will likely be around 1.9 million, approximately 73 percent of the total U.S. honey bee colony population on January 1, 2017.

The supply of colonies for California almond pollination relies heavily on out-of-state apiary shipments which have been steadily increasing with almond acreage. According to apiary shipment numbers provided by the California Department of Food and Agriculture (CDFA), 1.7 million colonies were shipped into California for the 2017 almond pollination season. As of November 15, 2017, approximately 522,000 colonies have been shipped into California for the 2018 almond pollination season. This is a decrease of about 14 percent from colony shipments that

had arrived in California by November 15, 2016.

The primary influence on the supply of available colonies for almond pollination is colony health throughout the U.S. Colony health issues can impact both the strength of colonies (approximate number of bees/hive) and the total number of colonies that survive the winter. **Figure 1** (page 5) shows a heat map of the number of colonies shipped into California for 2017 almond pollination from each state. The top five states shipping colonies into California included North Dakota, Idaho, Florida, Oregon, and Texas. The next paragraphs highlight a few natural disasters that occurred during the summer and early fall which could impact available colonies for almond pollination from some of these top shipping states.

Figure 1: Honey Bee Colony Shipments into California for Almond Pollination by State of Origin, Season 2017

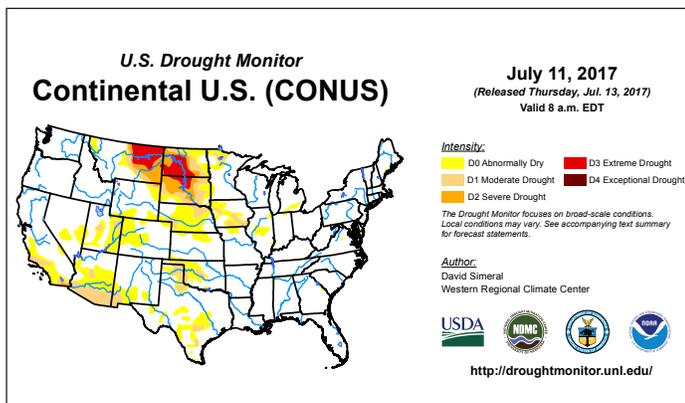


Source: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services.

A drought occurred this summer throughout major honey producing states of North Dakota, South Dakota, and Montana (see **Figure 2**). This drought limited the availability of natural food sources, so many colonies had to be supplemented with protein patties and sugar, which is less than ideal for colony health. Additionally, beekeeping operations in this area were likely affected by low cash flows due to lower than average honey production, which may inhibit their ability to purchase quality inputs to maintain or improve colony health. This area shipped over 510,000 colonies to California for the 2017 pollination season, amounting to 30 percent of the total honey bee colony shipments. As of November 15, 2017, approximately 366,000 colonies have arrived in California from these states for 2018 almond bloom. Comparing shipments prior to November 15 for the 2017 and 2018 almond pollination seasons, colony shipments from this region have decreased by 15 percent for the upcoming season. High winter mortality rates and low colony strength due to this drought could have considerable impacts on the

supply of available colonies for almond pollination. So far, comparing this year's shipments to those prior to November 15 for the 2017 almond pollination season, there has been a 58 percent decrease in colony shipments from these states. This appears to be a significant decrease, however most colonies from Florida and Texas arrive within one or two weeks of almond bloom. This significant decrease may in part reflect beekeepers' decisions to delay shipment until closer to bloom.

Figure 2: United States Drought Monitor July 11, 2017



supply of available colonies for almond pollination.

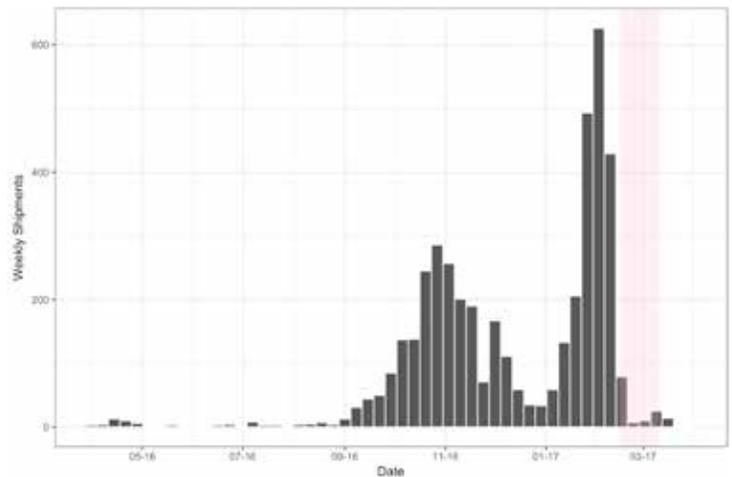
Hurricanes Harvey and Irma brought high winds, rainfall, and substantial flooding in Florida and Texas. These states provided 18 percent of the colonies for California almond pollination in 2017. It remains unclear how many colonies in these

for re-entry at the BPS. Any rejections must be cleaned off-site and then return to the BPS and be re-inspected to enter California. This may cause substantial delays, so it is important to make sure your beekeepers are aware of this change so they may get their loads properly cleaned before departure. **Figure 3** shows weekly bee shipments into California, with the 2017 almond bloom period highlighted. Most bee shipments are coming in within a week or two of almond bloom, so delays could be costly, especially if you have early blooming orchards.

Per-Colony Fees

Figure 4 (page 6) shows actual

Figure 3: Histogram of Weekly Apiary Shipments into California for 2017 Almond Pollination Season (Almond Bloom Period Highlighted)



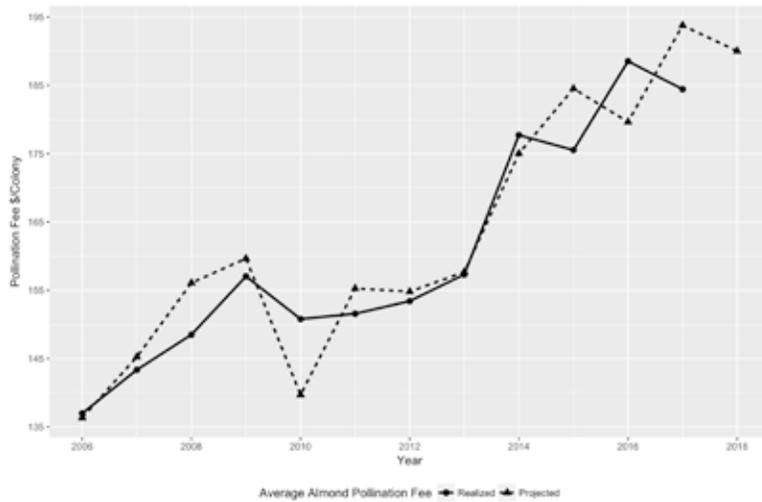
Sources: Apiary Shipments through California Border Protection Stations, CDFA Plant Health and Pest Prevention Services; Blue Diamond Grower's Crop Progress Reports.

A final supply issue to note is a change in the regulations of bee shipments into California. Due to numerous bee sting incidents at California's Border Protection Stations (BPS), bee shipments that are rejected due to inadequate cleaning will no longer be allowed to be cleaned

and projected almond pollination fees reported by members of the California State Beekeeper's Association. The 2017 average fee was \$184.43. The highest fee reported was \$200 and the lowest \$165. The average projected fee for 2018 was \$190 per colony. Overall, per-colony almond pollination fees have been increasing on average since 2006, so almond growers can expect to pay fees around \$185-200 per colony for the standard 8-frame average for the 2018 season. Variation in fees will exist based on contracted and delivered colony strength. (For detailed information on colony strength in almond pollination

Continued on Page 6

Figure 4: California State Beekeeper’s Association Survey Average Projected and Realized Almond Pollination Fees, 2006-2018

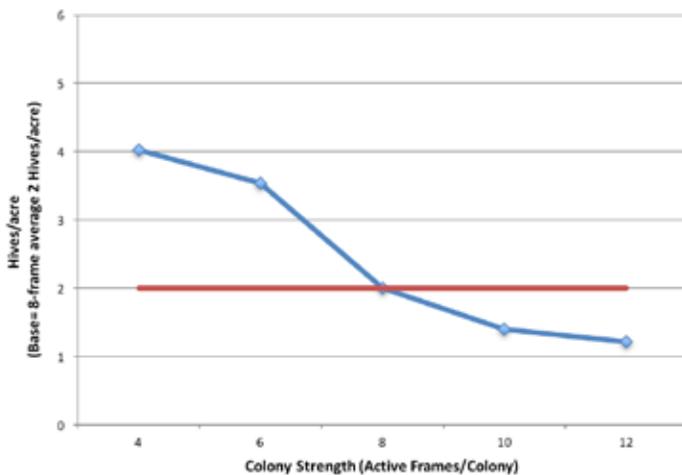


Continued from Page 5

see Goodrich and Goodhue (2016).)

As almond bloom approaches and the supply disruptions from the previously mentioned natural disasters are realized, strong colonies may become hard to find. This may drive almond pollination fees upward from the projected range. It is important to communicate with your beekeepers about their anticipated colony strength and total colony numbers available for almond pollination. If your beekeeper is unable to

Figure 5: Honey Bee Hives/Acre and Colony Strength Pairs that Pollinate the Equivalent of 2 Hives/Acre with 8 Active Frames



Source: Eischen, Graham, Rivera & Traynor (2007) The effect of colony size and composition on almond pollen collection.
 Note: This graph represents equivalence in weight of pollen collected, not almond yield. Should not be interpreted as a measure of optimal stocking density!

meet the colony strength requirements of your contract, it is helpful to keep in mind that colony strength and the number of hives per acre can be substituted. **Figure 5** shows the pollination equivalents at varying hive densities and colony strengths using the rule of thumb and standard colony strength requirement as a base. Lower colony strength requires additional hives per acre for the

same amount of pollination to take place, however these lower strength colonies should involve lower per-colony fees.

Almond Pollination Contracts

Almond growers and beekeepers have many different choices when it comes to the structure of their almond pollination agreements. Some may prefer a formal written contract with many explicit contract provisions, and others

prefer an informal oral agreement based on experience with and an underlying trust of the other party involved. The following paragraphs include a discussion of different contract formats and components based on findings from a survey I conducted with almond growers at the 2015 Almond Conference. The survey asked 114

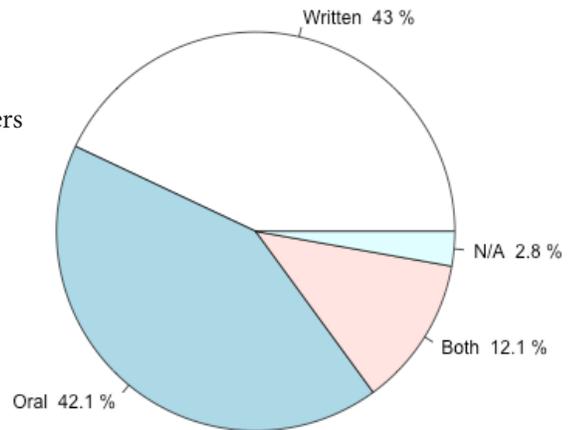
almond growers about the contract provisions typically used in their almond pollination agreements.

Contract Form: Written vs. Handshake

One of the most important contract decisions is whether to require a formal written contract, or rely on a handshake agreement. Based on almond growers’ responses of the basic type of agreement used in 2015, formal written and handshake (oral) agreements were used to about the same extent. **Figure 6** shows that in 2015, 43 percent of respondents used pollination agreements in a formal written form, 42 percent of respondents used pollination agreements that were informal oral agreements and 12 percent of respondents used a combination of written and oral agreements during 2015.

Both types of agreements have

Figure 6: Form of Pollination Agreement, 2015 (N=107)



their advantages and disadvantages for almond pollination. Written agreements are more easily enforceable in a court of law, while informal agreements allow more flexibility and show a trustworthy relationship between grower and beekeeper. However, as almond pollination fees continue to increase, it may be time to consider switching to a more formal agreement that lays out specific terms and conditions for almond pollination in case disputes do arise.

Colony Strength Requirements

Early literature on pollination markets suggests the industry standard colony strength requirement was a 4-frame average in the 1970s (Cheung, 1970). Today the standard is an 8-frame average, so colony strength has become more important over the years as the pollination efficiencies of stronger colonies have been realized. Nearly 45 percent of survey respondents stated that their largest pollination agreement contained a minimum average frame count specification of 8 frames. However, there were some deviations from this standard. Sixteen percent of growers reported minimum average frame count requirements above 8, and 17 percent of growers reported minimum average frame count requirements below 8. Over 14 percent of respondents required no minimum average frame count.

Higher colony strength requirements mean more inputs for

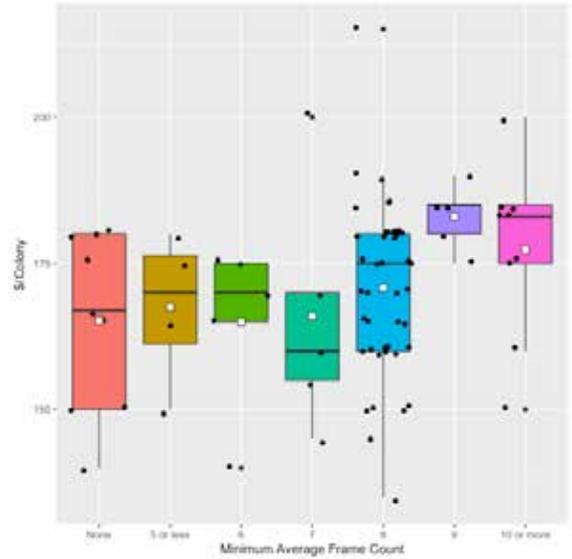
the beekeeper, so these higher costs must be reflected in the pollination fee. **Figure 7** shows box plots of the growers' reported almond pollination fees by the minimum average frame count required in the contract. The white square denotes the average for each category, while each black dot represents a price/colony strength observation. It is easily seen in this figure that there are many observations for minimum averages of 8-frames, and far fewer for the other frame count categories. Average fees seem to be higher for those frame requirements of 8 and above, however I did not find statistically significant differences, likely because of the small sample size of other frame count categories. This figure suggests that higher frame count contracts involve premiums over the standard pollination fee.

Additionally, I asked growers about whether or not they offered a per-frame bonus to incentivize

beekeepers to provide high strength colonies. For example, a per-frame bonus contract would give a base pollination fee per colo-

Continued on Page 8

Figure 7: Per-Colony Almond Pollination Fees by Minimum Average Frame Count Requirement, 2015 (N=82)



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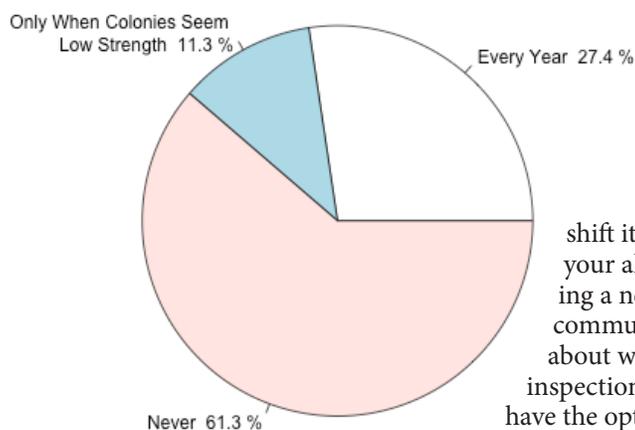
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ny for an 8-frame average and if the beekeeper provides colonies of more than an 8-frame average the beekeeper would receive a bonus per colony for the number of frames he/she is above the 8-frame average. Just over 20 percent of respondents offer such incentive contracts.

Colony Strength Inspection and Enforcement

Colony inspections by a third party may be required in almond pollination agreements to verify that minimum colony strength requirements have been met, or to provide beekeepers with their bonuses for delivering high colony strength. As seen in **Figure 8**, most respondents (61 percent) stated that they never pay a third party to perform inspections to verify colony strength, while nearly a third stated that they pay for a colony strength

Figure 8: Frequency of Third Party Colony Strength Inspection (N=106)



inspection to be performed every year. A smaller portion of respondents (11 percent) pay for a third-party inspection to verify minimum requirements have been met only in years when they believe colony strength is low.

Colony strength inspection can be an explicit clause in the pollination contract, or it can be implicit. For example, of the respondents who pay a third party to perform colony strength inspections every year, 38 percent stated they had a clause related to inspection specifics in their pollination contract while the other 62 percent

Table 1: Percentage of Respondents by Stated Actions Allowed by Pollination Agreements in Response to Low Delivered Colony Strength (N=105)

Action	Percentage
No Action	0.9
Communicate with Beekeeper to Bring More Colonies to Compensate	73.8
Impose Per-Frame Penalty (For Number of Frames Below Average)	22.4
Impose Percentage of Total Pollination Expense or Fixed Penalty	28
Remove Colonies and Replace with Others	8.4
No Longer Contract With in Future	41.1
Impose Another Penalty	2.8
Not Applicable	5.6

Note: Respondents were allowed to select multiple actions, so these percentages sum to more than 100 percent.

have no explicit clause regarding colony strength inspections.

Colony strength inspections have the potential to be costly for you and your beekeeper. Every time a hive is opened, there is a chance the colony's queen can be accidentally harmed. If a queen is killed during inspection, the colony will shift its focus from foraging in your almond orchard to producing a new queen. It is important to communicate with your beekeeper about when and if a colony strength inspection will be performed so they have the option to monitor.

Survey respondents were also asked what actions they could take according to their pollination agreements if a beekeeper provided colonies below the minimum average frame count requirement. **Table 1** shows the percentage of respondents who selected each action. Less than 1 percent of respondents would have taken no action if colony strength was too low, so unsurprisingly colony strength is an important element of almond pollination transactions. Most of the respondents reported that if colony strength was too low, they would communicate with their beekeeper to bring more colonies to compensate for the low strength (74 percent), and over 40 per-

cent of respondents said that low colony strength in one year would impact future pollination contracts with that beekeeper. Approximately 22 and 28 percent of respondents said that they would impose a per-frame or fixed monetary penalty for low colony strength, respectively. When faced with low colony strength, relatively few respondents would remove the colonies and find another pollination provider (8 percent) or impose some other penalty (<3 percent).

Survey respondents were asked about the strength of the majority of initially delivered colonies to their almond orchards relative to their pollination contract's colony strength requirement in 2015. Only two percent of respondents said that most delivered colonies were below the colony strength requirement, so it seems that the incentives and/or enforcement worked well for the surveyed growers in acquiring desired colony strength in 2015.

Other Contract Components

Additional clauses in pollination agreements other than colony strength requirements can outline conditions that may be beneficial for you and your beekeeper. Survey respondents selected various other clauses that were included in their 2015 almond pollination agreements. **Table 2 (page 10)** reports

Continued on Page 10



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the percentage of respondents, with both written and oral agreements, who indicated that their agreement contained a specific clause. The three most common clauses used in respondents' pollination agreements related to (1) beekeepers having access to colonies after initial colony placement, (2) pesticide application while colonies are in the almond orchard and (3) late colony placement. Over one third of respondents did not have any of the listed contract clauses in their pollination agreements.

Nearly 38 percent of respondents with an oral pollination agreement had at least one of these clauses, so it is possible to discuss some of these issues with your beekeeper even if you don't have a formal written agreement. Your beekeeper may be willing to give you a discount if you can provide certain amenities, such as locked orchard gates to deter bee

Table 2: Percentage of Respondents Whose Contracts Included Various Clauses (N=95)

Clause	Percentage
Pesticide Application	0.9
Colony Theft	73.8
Colony Collapse Disorder (CCD)	22.4
Late Colony Placement	28
Bloom Percentages for Approximate Move-in/Move-out Dates	8.4
Beekeeper Access After Colony Placement	41.1
Inspection Specifics	2.8
Unpaid Balances	5.6
Minimum Number of Colonies per Drop	
None of the Above	

Note: Respondents selected all provisions in their pollination agreements so the percentages sum to more than 100.

theft, well-maintained roads, or a portion of payment up front to help cover some of their transportation or preparation costs. This last suggestion has the added value of

securing the beekeeper into the contract.

Summary

As you begin making decisions for 2018 almond pollination, keep in mind that it has the potential of being a rough year in terms of health and colony numbers for many beekeepers. Increasing hive density in your orchard as a substitute for colony strength may allow you more flexibility if strong colonies become scarce. Communication with your pollination provider is key to a successful 2018 pollination season, as well as maintaining a secure supply of pollinators going forward.

References:

Cheung, S. N., 1973. The Fable of the Bees: An Economic Investigation. *Journal of Law and Economics* 16(1), 11-33.

Goodrich, B. and Goodhue, R.E. "Honey Bee Colony Strength in the California Almond Pollination Market." *ARE Update* 19(4) (2016): 5-8. University of California Giannini Foundation of Agricultural Economics.

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WALNUT & ALMOND PEST MANAGEMENT: PREPARING FOR A SUCCESSFUL NEW YEAR

By Emily J. Symmes | Sacramento Valley Area IPM Advisor
University of California Statewide IPM Program and Cooperative Extension

With the wild ride of the 2017 growing season now behind us, January is a good time for orchardists to take stock of the key issues of the previous year and begin outlining their production and pest management activities for the upcoming season. During the dormant period, one of the most critical activities that can be done is to sit down with your orchard manager, pest/crop adviser, and your record books to review your pest management history and devise a plan-of-attack for the coming season. Heading into the season armed with lessons learned from successes and failures of previous years, and with strategies on how to deal with potential issues will save time and stress. This will allow you to take a more thoughtful and

proactive approach to pest management, as opposed to being reactionary when faced with pest issues that may arise while you are dealing with the myriad of other time-sensitive crop production tasks.

NOW

The “elephant-in-the-room” for insect pest management in nut crops in 2017 was navel orangeworm (NOW). By now you have heard far and wide the damage that was inflicted by this pest to California’s nut crops in the recent harvest. In particular, damage statewide in almonds was significantly higher in 2017, costing the industry millions. You have also surely heard by now, at numer-

ous industry and academic events, the renewed emphasis placed on sanitation efforts targeting this pest in almonds, walnuts, and pistachios. In spite of decades of research confirming sanitation as the single most important baseline activity for reducing NOW damage, sometimes it takes a year like 2017 (when sanitation efforts were largely disrupted by continuous winter rainfall) to remind the industry just how vital this practice is. At a recent conference, the following statement was made, “Sanitation—just do it!” That simple summation is really the key. No amount of sprays or control efforts later in the season can get the low damage result that is desired by

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your processor if sanitation is not part of the overall NOW management strategy.

Remember that sanitation has a two-fold impact: (1) direct reduction of overwintering populations by increased larval mortality, and (2) reduced egg-laying and development sites of the early spring generations. Therefore, this single management activity sets up the cleanest slate possible in your orchard, and also

limits population build-up throughout spring by any that survived the winter in your own orchard or that may be migrating in from surrounding areas.

Knock, shake, or pole nuts during the dormant season, and disc or flail nuts on the ground by the 1st of March. Greater destruction of mummy nuts (almonds and walnuts) = greater mortality and fewer viable development sites (yes, NOW will lay eggs in the spring on

mummies on the ground!). Guidelines for almonds suggest that sanitation targets for the southern San Joaquin Valley are fewer than an average of 0.2 mummies/tree and fewer than 8 ground mummies/tree. In the northern San Joaquin Valley and Sacramento Valley, aim for a target of fewer than an average of 2 mummies/tree. Remember that these targets are for the “typical” year. In years with a milder winter, orchards with greater carry-over mummy infestation, or those in close proximity to external sources of NOW, sanitation targets may need to be lower. No thresholds are available for walnut mummies, so use “the cleaner the better” strategy as it works for your particular operation. Remember to focus on areas around the field, huller, etc., where orchard debris is located and thus may play host to overwintering NOW.

In addition to total mummy load in the orchard, mummy infestation is another key piece of information that can provide an indication of the extent of NOW pressure you may be facing in the upcoming year. This, along with additional in-season monitoring measures (trap data, visual observations of egg-laying activity) will help guide your pest management decisions as the season progresses. Post-harvest or during the dormant period, obtain a sample of the mummy nuts in the orchard and evaluate the number of NOW in those mummies. This, coupled with the total mummy load will provide valuable information in predicting the size of the NOW population in your orchard once spring insect activity resumes, and can be a critical piece of the “NOW management puzzle” when deciding if and when treatments are needed. Companies are available that provide mummy “crack-out” services to assist you in evaluating this population measure and what it means for your particular orchard management strategy targeting NOW.

Scale

The rainfall of last winter and spring may have caused some difficulty in applying dormant/delayed-dormant treatments targeting scale pests in walnuts, and dormancy is a good time to head out and get an idea of whether treatments may be warranted in the coming



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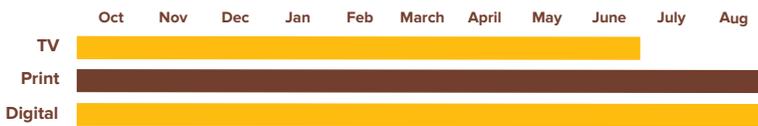
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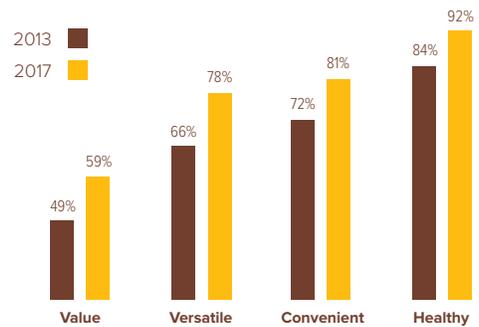
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Continued from Page 14

months. In particular, keep an eye out for live walnut scale adults (**Photo 2, page 17**) and frosted scale nymphs (**Photo 3, page 18**). In 2017, a number of orchards reported unusually high populations of frosted scale, while walnut scale incidence seems to be waning, likely due to successful treatments over the last few years. Data suggests that an every two-to-three year rotation of walnut scale treatments is effective in keeping populations low, while allowing natural enemies to provide additional control in the “off” years. For walnut scale, research has shown that dormant/delayed-dormant treatments of insect growth regulators are highly effective. They can also be effectively controlled later in the season after monitoring indicates that crawlers have emerged (typically early May). Research has been initiated evaluating timing and materials specifically for frosted scale, and early results indicate that delayed-dormant insect growth regulators are also effective against this pest. Comprehensive scale monitoring guidelines can be found at: sacvalleyorchards.com/walnuts/insects-mites-walnuts/walnut-dormant-monitoring-and-treatment-decisions/.

Scab

A number of diseases were more prevalent in 2017 due to the high level of winter and spring precipitation. Dormant activities for diseases impacting almond production include monitoring for scab, and possible treatments for scab, bacterial spot, and shot hole. The most important of these activities during dormancy, however, is scab monitoring. Later, more effective treatment tim-

ings exist for all three of the disease noted above (dormant treatments for these diseases are only suggested in addition to later timings if disease pressure is severe). Visit the treatment timing table for key almond diseases at: ipm.ucanr.edu/PMG/r3902111.html#TREATMENT.

The fungus that causes scab overwinters in twig lesions, and spores are spread by wind or rain. This disease is worse in wet springs and therefore tends to be more prevalent in the Sacramento Valley. However, with the increased rainfall statewide in 2017, scab outbreaks occurred in orchards typically not affected by the pathogen. As a result, there may be carry-over inoculum in your orchard that should be monitored during the dormant period. A dormant sample can reveal the presence of scab lesions and whether treatment for this disease is warranted. These samples can be done while scouting for other pests, including San Jose scale, European fruit lecanium, and mite eggs (European red mite and brown mite). To sample for scab, randomly select 35 to 50 trees from each orchard or block, and examine at least 40 first-year green twigs for the presence of scab (**Photo 1, page 18**). In severe outbreaks, dormant or delayed dormant applications of liquid lime sulfur, copper + oil, or chlorothalonil + oil may be needed to reduce disease im-

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UC Statewide IPM Project
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Photo 2: Body of live adult walnut scale with cover removed.
Photo Credit: UC Statewide IPM Program

pact. However, in many orchards, spring sprays targeting other diseases (i.e., shot hole) will effectively control the spread

of scab. Scab resistance to quinone outside inhibitor fungicides (strobilurins) has been documented, so avoid

the use of FRAC mode-of-action group 11 fungicides in orchard with scab. With the use of all pesticides, have a resistance management plan in place ahead of time, so that on-the-spot treatment decisions can be made taking into account your rotational strategy.

Bloom Sprays

Bloom sprays for almond diseases will be right around the corner at press time. Begin thinking now about how you will approach pest management activities when bees are present in the orchard. Follow the Honey Bee Best Management Practices outlined at the Almond Board website (almonds.com/pollination, and links therein). I'll summarize a few key take-home messages here. First, avoid insecticide applications when bees are present. The only insect pest that can be effectively treated during this time is peach twig borer, and there are other alternate treatment timings that are just as effective. One exception is the use of

Continued on Page 18

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Continued from Page 17

Bacillus thuringiensis (Bt) during bloom, which has been shown to be relatively bee-safe. Visit ipm.ucanr.edu/PMG/r3300211.html for more information on peach twig borer treatment options and timings. Bear in mind however, that any spray (even just water) contacting active bees can impact their ability to fly. That leads to the second message—fungicide applications are often needed during bloom to protect the crop. There is often no way around these applications when bees are present. To minimize impacts on bees, fungicides should be applied in the late afternoon and evening, when the bees have finished foraging for the day, and with enough time to dry before they become active again the following morning. Be(e) cautious with tank mixes. A wealth of searchable information on the toxicity of pesticides, and mixes of pesticides, to adult honey bees and the develop-

ing brood is available online in the University of California Bee Precaution Pesticide Ratings database (ipm.ucanr.edu/bee precaution/). Maintain communication with all parties involved when bees are present in the orchard and have an agreed-upon plan of which pesticides might be used during this critical time.

The University of California Integrated Pest Management program (UC IPM) has just published the latest comprehensive revisions of the Pest Management Guidelines (PMG) for both almonds and walnuts. These reflect the latest research-based information for managing all types of pests affecting these cropping system (insects, mites, diseases, weeds, nematodes,



Photo 3: Overwintering frosted scale nymphs. Photo Credit: UC Statewide IPM Program



Photo 1: Overwintering scab lesions in almond. Photo Credit: UC Statewide IPM Program

and vertebrates). The Walnut PMG now includes *Botryosphaeria/Phomopsis*, as well as significant updates to walnut husk fly, scale pests, and weeds, among many others. Visit the Walnut PMG at: ipm.ucanr.edu/PMG/selectnewpest.walnuts.html. The Almond PMG now includes bacterial spot, powdery-mildew fruit russetting, a refined weed section, and significant updates to navel orange-worm management and numerous other pests. Visit the Almond PMG at: ipm.ucanr.edu/PMG/selectnewpest.almonds.html.

Best wishes for a successful 2018!

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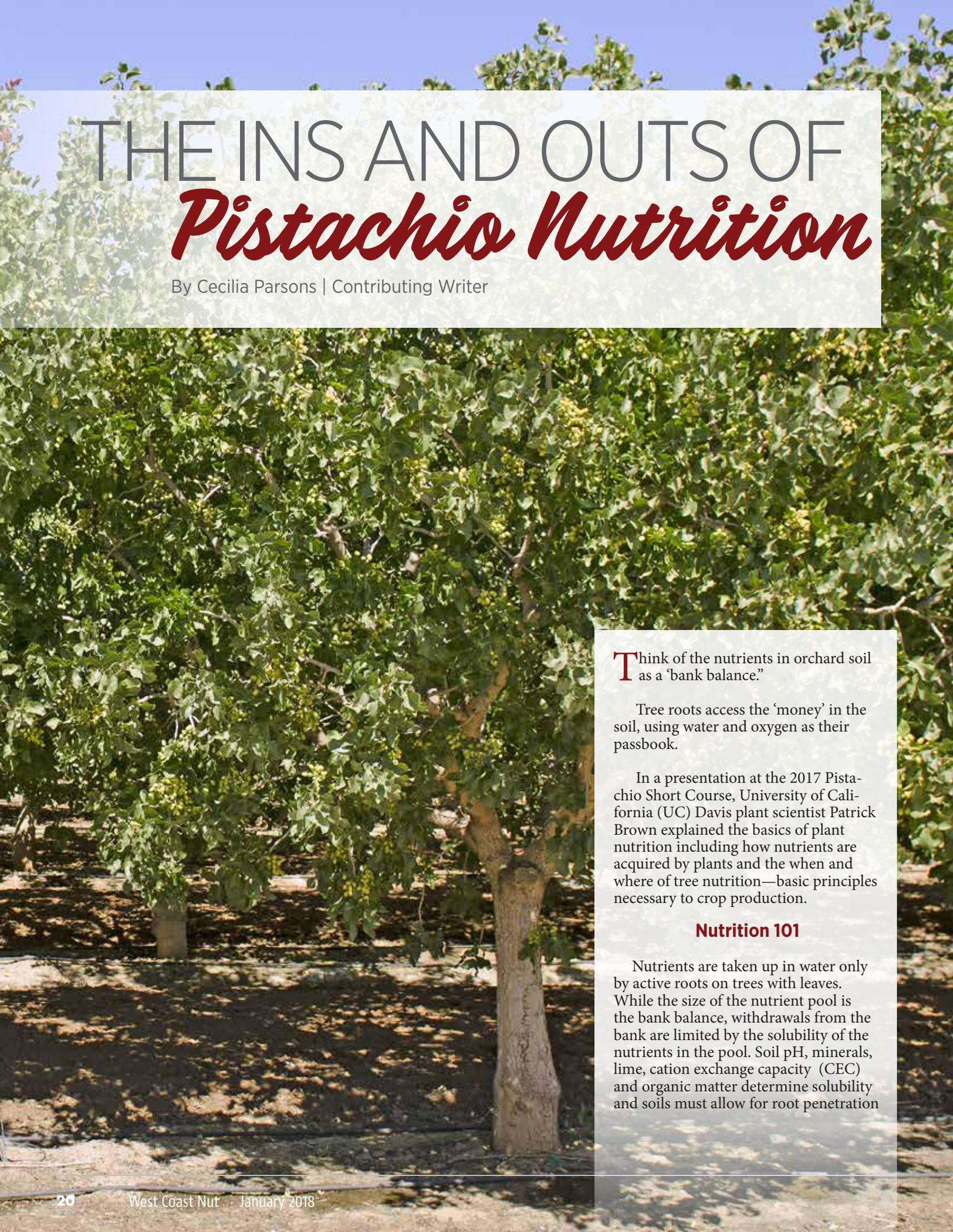


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THE INS AND OUTS OF *Pistachio Nutrition*

By Cecilia Parsons | Contributing Writer

Think of the nutrients in orchard soil as a ‘bank balance.’

Tree roots access the ‘money’ in the soil, using water and oxygen as their passbook.

In a presentation at the 2017 Pistachio Short Course, University of California (UC) Davis plant scientist Patrick Brown explained the basics of plant nutrition including how nutrients are acquired by plants and the when and where of tree nutrition—basic principles necessary to crop production.

Nutrition 101

Nutrients are taken up in water only by active roots on trees with leaves. While the size of the nutrient pool is the bank balance, withdrawals from the bank are limited by the solubility of the nutrients in the pool. Soil pH, minerals, lime, cation exchange capacity (CEC) and organic matter determine solubility and soils must allow for root penetration

plus provide adequate water and oxygen for root growth.

The pH range of 6.5 to 8.0 is optimum for most macro nutrients in fertilization plans. Nitrogen, sulphur, magnesium, calcium and boron are mobile nutrients and soluble in most soils, but they can also be leached or displaced.

Nutrients that have restricted solubility and movement in soils must be in the same place as tree roots to be taken up. Those with limited solubility include manganese, zinc, copper, nickel, iron and phosphorus. Soils that limit root growth can cause deficiencies in zinc, iron and copper. Brown noted that potassium is mobile and available to roots in some soils, but not in others. Soil tests to determine potassium-fixation are essential to management of this nutrient.

Other factors that can affect nutrient uptake include poor root growth, salinity of soil or water, nutrient imbalance, or low or high native soil fertility for one or more nutrients. Weeds, drought or

soil saturation can also impact nutrient uptake.

Brown said the mobility of an element determines how fertilizers should be managed, where and when symptoms of deficiency and toxicity will appear. Boron is the only element that varies in mobility between species. It is highly mobile in almond, but immobile in pistachio and walnut.

The mobile elements nitrogen, phosphorus, potassium move in both the xylem, from roots to leaves and phloem. Photosynthesis and growth drive uptake and movement. Elements that move poorly through the soil; calcium, zinc, manganese, iron and boron move almost exclusively in the xylem—in a one-way flow with water. These cannot be stored for later use and have limited long term effectiveness.

Immobile nutrients can cause deficiencies in specific plant parts, Brown said. For example, flowers on a plant can be deficient in boron, while leaves can

have sufficient supply.

Focus on Nitrogen, Potassium

Leaf, water and soil samples are all good tools for determining fertilizer rates. Understanding plant nutritional needs also helps growers.

How to sample, knowing the critical values for each nutrient and recognizing plant symptoms are also important steps in a successful nutrition plan. Nutrients are used most efficiently, Brown said, when they are applied at the right rate, the right time, the right place and come from the right source.

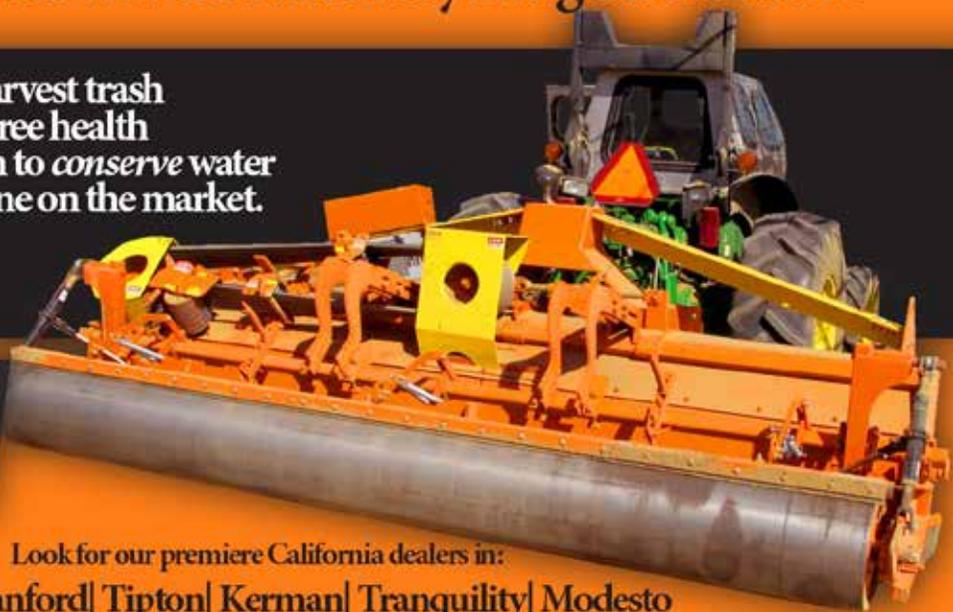
There are some limiting factors in leaf sampling and critical value analysis. Numbers are not strong in small-scale yield trials, and leaf sampling provides no guideline on how to fertilize. Numbers can indicate a deficiency, but there is no clear direction on how to respond. Leaf sampling is a monitoring tool,

Continued on Page 22

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Brown emphasized, but it is not an adequate management tool.

One of the challenges with leaf sampling is the variability of the tree canopy. Levels of N and K can be different from top to bottom and on fruiting and non-fruiting branches. Samples collected in July are too late in the season to influence management.

Samples should be collected soon after full leaf expansion—30 to 50 days after bloom. Sub terminal leaves on non-fruiting branches should be collected from a minimum of 13 trees at least 25-30 yards apart. From each tree, 10 leaves should be taken around the canopy from well exposed branches between 5-7 feet from the ground. In non-uniform orchards, each soil zone should be sampled separately.

Spring samples can predict summer tissue values according to UC Davis. The model for interpreting spring analysis can be found at <http://fruitsandnuts>.

ucdavis.edu/weather_Services/Nitrogen_Prediction_Models_for_Almond_and_Pistachio/.

Mandated Nitrogen Management

Achieving optimal productivity with restricted nitrogen use will require enhanced efficiency, Brown said. Application rates will be based on specific crop N budget estimations and account for all applied nitrogen. He noted that regulations are still being developed, but there will be training and testing required to sign off on nitrogen plans.

The nitrogen cycle in an orchard is a balancing act, Brown said. Supply can come from several sources including water, residual in the soil, manures, cover crops and compost along with commercial fertilizer applications. Nitrogen can be lost below the root zone and volatilize from the soil. Demand for this nutrient comes from the harvested nuts, also the husks, leaves, prunings removed from the orchard.

Average nutrient removal per 1000 pounds of crop is 28 pounds for nitrogen, 25 pounds for potassium and 3 pounds for phosphorus. Annual tree growth requires 25 pounds of nitrogen (averaged over 20 years).

Choosing the right rate of application, Brown said, requires setting a realistic yield goal. Orchard history and environmental condition will play a part as will visual evaluation of trees in April and after fruit set. Growers' fertigation scheduling should take into account the high

mobility of nitrogen and possibility of leaching by irrigation water. To avoid leaching and increase efficiency, nitrogen should be added toward the end of the irrigation cycle and applied in as many small doses in a year as possible.



After conducting a preseason yield prediction, demand is calculated minus the nitrogen levels in soil and irrigation water. Applications of nitrogen should meet the difference. Timing of applications should meet demand of that stage of production. The first application, when leaves emerge supplies 12.5 percent of the annual N demand. The next two applications supply 25 percent each of the annual demand. Final application of 37.5 percent is in July, the time of the greatest crop demand.

Symptoms of nitrogen deficiency include pale new leaves, reduced shoot growth and older leaves that yellow and drop. At that point, Brown said, yield is affected.

Leaf symptoms of potassium deficiency will appear early to mid summer. They include small leaves with scorched margins and sparse foliage with pronounced dieback. Yields will decline as potassium levels decline.

Phosphorus deficiency, not common in California, shows as interveinal chlorosis, the bright yellow, desiccated leaves. Signs are seen first on leaves next to clusters.

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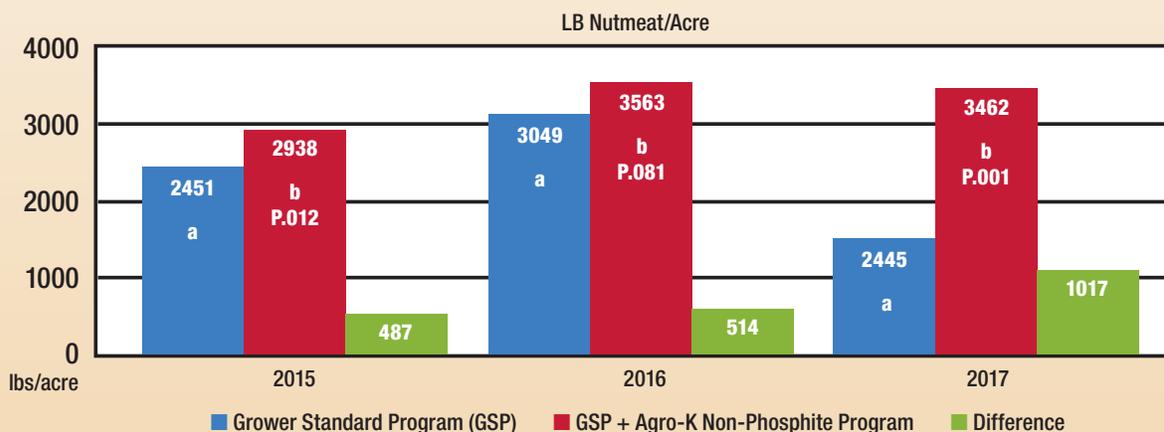
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Nut set can be influenced by boron which enhances pollination. Calcium is synergistic with boron and enhances its affect. Molybdenum plays a direct role in nut set and retention. Agro-K's **Vigor-Cal-Bor-Moly** is the perfect mix to apply from pink bud to early bloom. Applying **Vigor-SeaCal** with **AgroBest 9-24-3** just prior to and during the bloom period provides rapid penetration, uptake and translocation of calcium and phosphate to help drive cell division setting the stage for large, dense nuts with maximum weight.

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Yield results of three consecutive years of replicated data, *on the same trees*, are shown in the charts. **The increases on the treated plots equaled 486, 514 and 1017 lbs./ac in 2015, 2016 and 2017 respectively. These nut meat yields were statistically different from the grower standard practice all three years. This is an average annual yield increase of 25% over the three year period.**

The trial was replicated six times on 4th, 5th and 6th leaf *Independence* variety almonds using the same replicate plots in both years to demonstrate not only efficacy of a complete foliar and soil nutrient program but also the cumulative benefits of the Agro-K program built on sound agronomic principals and designed to maximize yield and minimize alternate bearing.

Almonds naturally tend towards alternate bearing. Meeting peak nutrient demand at all stages of crop growth and tree development is critical to maximizing tree growth and health in the current year and to set the stage for next year's production. Achieving consistent above average yields year over year requires a thorough understanding of plant physiology and nutrient demands, the right tools to address the nutrient requirements on a timely basis, and the commitment to stick to a long-term **Science-Driven** approach to nutrient management. If you are interested in increasing yields on a consistent basis, talk to your PCA today about Agro-K!



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2018 New Employment Laws—What Employers Need to Know

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

As we head into the new year it is time to begin looking at regulations that take effect January 1, 2018. While many are focused on the impending legalization of recreational marijuana, it

is important not to get bogged down and forget about the other significant laws that will affect all California employers. Below you'll find a brief description of the coming regulations and how em-

ployers need to update their processes to remain compliant.

AB 1008: "Ban the Box" bill, will

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prevent employers with five or more employees from asking about an applicant's criminal history on a job application. Employers should remove all questions

related to conviction history from their job applications. Additionally, employers should train hiring managers on the types of information that may be obtained during a background search for conviction history information by the effective 2018 date.

AB 168: Prohibits questions about an applicant's salary history. Employment applications and interview protocols need to be updated in order to comply. A potential employee may provide this information voluntarily; however, the employer is prohibited from relying on the salary information in determining whether to offer the job or salary to an applicant. Employers will also be required to provide job applicants with a pay scale for the position, if requested. It is recommended that employers update job applications and interview questions without references to previous compensation. In addition, each position needs to have a written and easily distributed pay scale.

SB 63: The New Parent Leave Act expands the current California Family Rights Act benefits to smaller employers. Twelve (12) weeks of unpaid parent leave will be required for employers with 20-49 employees located within a 75 mile radius of the corporate office. The employee handbooks and new employee orientation protocol should be updated accordingly.

SB 396: Expands sexual harassment prevention training requirements to include a discussion of gender identity and expression as well as sexual orientation. Employers will be required to post a new poster regarding transgender rights, available from the Department of Fair Employment and Housing. The new poster can be found at https://www.dfeh.ca.gov/wp-content/uploads/sites/32/2017/11/DFEH_E04P-ENG-2017Nov.pdf.

AB 450: The Immigration Worker Protection Act prohibits employers from voluntarily agreeing to allow Immigrations and Customs Enforcement (ICE) agents to enter non-public areas of a workplace or accessing employment records without a warrant, subpoena or court order. Additionally, employers will be required to provide notice to current employees of an inspection of Form I-9 within 72 hours of receiving a federal Notice of Inspection.

SB 306: Authorizes the Division of Labor Standards Enforcement (DLSE) to investigate an employer when retaliation or discrimination is suspected, with or without a filed complaint. Employees can also seek an injunction to prohibit an employer from terminating an employee if the allegation of retaliation is made before completing an investigation.

SB 295: Requires farm labor contractors (FLCs) to provide sexual harassment prevention and reporting training to employees in a language they can understand, and provide the DLSE with the number of persons trained along with a list of training material used. Growers who use FLCs need to request evidence of this compliance to minimize the potential for joint employer liability.

This is merely a brief overview of the latest regulations food and farming employers have to navigate. If you have questions about the specifics, please visit us at www.agsafe.org, call us at (209) 526-4400 or via email at safeinfo@agsafe.org.

Don't forget to check out the ACTIVATE18 conference schedule. Jennifer Douglas Phillips, Esq. will be discussing these topics and more during An-



Under AB 1008, growers need to update employment applications to remove criminal history questions. Photo courtesy Milwaukee Journal.



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nual Updates on New Human Recourses Laws on Wednesday, February 28, 2018 from 4:15pm - 5:15pm. ACTIVATE18 conference sessions can be found at <http://www.agsafe.org/activate2018/>.

AgSafe is a 501c3 nonprofit providing training, education, outreach and tools in the areas of safety, labor relations, food safety and human resources for the food and farming industries. Since 1991, AgSafe has educated nearly 75,000 employers, supervisors, and workers about these critical issues.

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

SB 295 requires farm labor contractors (FLCs) to provide sexual harassment prevention and reporting training to employees in a language they can understand. Photo courtesy of AgSafe.

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Precision Irrigation is the Wave of the Future

By Cecilia Parsons | Contributing Writer

Soil variability across an orchard, stage of growth or maturity of the crop, and weather are all factors in determining the irrigation amounts and timing.

Irrigation based on demand and fine-tuned for soil types and weather conditions can absolutely improve orchard health. University of California (UC) advisors and researchers report.

Precision irrigation is done with the use of data from sensors, weather forecasting, climate models, imagery, mapping and soil sampling. Application and integration of these new and old technologies to design an irrigation schedule that matches plant needs has resulted in better yields, water and energy savings, uniform harvests and improved nutrient efficiency.

Franz Niederholzer, University of California Cooperative Extension (UCCE) farm advisor in Colusa, Yuba and Sutter counties, said in orchards with variations in soil types where irrigation water is applied uniformly, the result is often unmatched plant and soil moisture status. That scenario can lead to saturated soils, driving phytophthora pressure and hull rot or stress due to low plant water availability.

Almond Board of California (ABC) reports that over the last 20 years a majority of almond growers have adopted

irrigation strategies based on technology. The combination of tracking weather conditions and evapotranspiration and soil based monitoring to schedule irrigation is now common in almond production. The aim, according to Spencer Cooper, Senior Manager of Irrigation and Water Efficiency for ABC, is to increase efficiency of not only water use but also nutrient applications.

Cooper said research continues into different types of precision irrigation. ABC is sponsoring research to determine effects of precision irrigation in regard to smaller sets and with variable soil types. Cooper said ABC is looking at nutrient management and increased water efficiency. Variable rate irrigations may also help with disease control, he added.

“More than 80 percent of almond growers now use a demand based irrigation schedule,” Cooper said. How they determine the demand varies. Most common are soil moisture sensors combined with weather station reports. There is also increased interest in mapping to set up irrigation management zones that take into account soil variability in scheduling irrigation amounts.

H2o Optimizer president and lead agronomist, Brian Bassett, uses a system of sensors, data validation and analysis and combining precision technology

to give customers specific recommendations for irrigation and nutritional management.

This Fresno-based consulting company collects geophysical, multispectral imagery, topology, deep soil cores and detailed lab analysis to identify areas of significant variability to design or retrofit irrigation system layouts. Plant and soil based sensors are installed in target areas within the irrigation system design based on soil profiles. The base data, weather and real time sensors are combined into an software as a service (SAAS) that can hit moving targets including weather and stage of production while accounting for soil variability. Bassett said the precision irrigation scheduling is data driven, gathering information from a wide range of sources including UC weather, plant and soil data models. The validated information given to growers along with recommendations for irrigation will allow growers to make better decisions in regards to water and nutrient use, Bassett said.

“One single technology won’t solve all growers problems with irrigation, and without automation achieving the full potential of any irrigation technology can be difficult to impossible,” Bassett said.

Dr. Shrini Upadhyaya, UC Davis researcher and agriculture and biolog-

ical engineering professor, is using a different sensing system to determine irrigation scheduling. His strategic water management trials at the Nickels Soil Lab in Arbuckle use plant water status as a trigger. Upadhyaya has been testing a continuous leaf monitoring system to conduct precision irrigation in almond orchards. The monitoring system consists of a wireless mesh network using sensors to report soil and plant water status and a controller system to start and stop water applications. Upadhyaya explains that plant water status is a term used to express the state of water stress in the plant. Stem water potential is most often used to measure plant water status level.

The objective with the trial is to maintain a level of stress that is optimal for the tree. An added advantage to strategic management is an opportunity to save water.

Leaf temperature, ambient temperature, wind speed, relative humidity and incident solar radiation are measured with the continuous leaf monitor. Upadhyaya said the sensing is done 24 hours a day, but the noon to 5 p.m. information is most valuable in determining irrigation decisions. At Nickels Soil Lab, he said three monitors soil and plant characteristics based management were used to obtain an average reading.

Dr. Upadhyaya said the leaf monitor can be a useful tool to provide plant water status information to implement precision irrigation. His most recent study study at Nickels showed that management zone based precision irrigation that uses plant water stress could save water. Compared to ET based irrigation, about 30 percent savings is possible, while water savings is about 16 percent compared to soil moisture based irrigation.

Significant improvement in water productivity was achieved in plant water status based precision irrigation compared to grower practice (2110 lb./acre-ft for plant water stress based irrigation compared to 1870 lb./acre-ft for grower practice).

During the 2016 growing season, irrigation scheduling was based on plant water stress. The goal was to maintain stem water potential at about 13 bars

during the pre hull-split and at about 16 bars during hull-split. Upadhyaya reported during that time water savings of 25 and 14 percent were realized. Crop yields and bud formation were not affected.

Going forward, Dr. Upadhyaya said a universal version of the leaf monitor is under development in the private sector. The sensor, he said, would interface to wireless network communication hardware and act like a 'soil moisture' sensor that can interface with any network. He stated that the cost of the continuous leaf monitor is about \$1,000 but there is potential for significant reduction in price in the future.

In his research, Dr. Upadhyaya said there is a noticeable change in tree response to the water stress as the season progresses either due to acclimatization, age or an unknown reason. He uses a stress index to determine plant water status. The stress index requires the behavior of the same leaf that is monitored under fully saturated and highly stressed conditions. Dr. Upadhyaya said his research team has developed a way to determine a highly stressed response, but he still needs a robust way to determine leaf response under fully saturated conditions. He said they are currently analyzing 2017 data to accomplish this.

"We know that this precision irrigation strategy can save water and improve



Continuous leaf monitor.

productivity. Controlling the stress level during the hullsplit period is expected to enhance uniform maturity of nuts and decrease the incidence of hull rot," Dr. Upadhyaya said.

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When considering replant of almond orchards, a grower would do well to become educated on the potential “replant problems” associated with doing such. Among the issues at hand are soilborne diseases, which Mohammad Yaghmour, University of California Cooperative Extension (UCCE) Orchard Advisor, Kern/King counties, says is a challenge in orchard replant.

“A key challenge in orchard replacement practices is how to manage replant problems,” he said. “Growers face restrictions on soil fumigation, changes in rootstock usage, and new orchard residue management practices, etc., all of which can affect management of replant problems.”

According to Greg Browne, United States Department of Agriculture/Agricultural Research Service (USDA/ARS) Davis, as much as one-third of California’s almond and stone fruit acreage is infested with potentially debilitating plant parasitic nematodes, and

even more of the land is impacted by Prunus replant disease (PRD), a poorly understood soilborne microbe-induced disease complex that suppresses early growth and cumulative yield in replanted almond orchards.

Additional soilborne problems include aggressive pathogens such as *Phytophthora* and *Armillaria*, which cause crown and root rots, Yaghmour said.

In a 2016 report, Browne stated severity of PRD varies significantly, and predicting the degree of PRD impact in any given soil is challenging. He said PRD afflicts successive generations of almonds planted at the same location and is associated with poor health of the trees’ fine roots and incidence of several planting parasitic fungi and oomycetes. “The severity of the disease varies greatly among orchards, but it is observed most commonly on loam, sandy loam, and sand soil textures in California,” Browne added. “PRD can occur on its own or in combination with other replant prob-

lems.”

Plant parasitic nematodes have the potential to compromise all phases of an orchard’s productive life by inflicting root damage. Studies, research and time have found several rootstocks for almonds and stone fruit have shown genetic resistance to root knot nematodes, but little resistance has been demonstrated against the other two major nematode pests affecting these crops—the ring nematode and the root lesion nematode.

Browne explained, replant soil fumigation has controlled these key replant problems, but the traditional fumigant of choice, methyl bromide, has been phased out, and other soil fumigants are increasingly regulated and expensive.

For instance, due to required buffer zones (to protect bystanders from unintended exposure), many fields have large areas that cannot be treated using

Continued on Page 34

Management of Soilborne Diseases in Replanted Almond Orchards

By Julie R. Johnson | Contributing Writer



The impact of Prunus replant disease at the Madera replant trial; stunted trees in the foreground were planted in plot of nonfumigated replant soil, while larger trees in the background of the same row were in plot of preplant fumigated soil. All Photos courtesy of UCCE/Browne/Yaghmour.

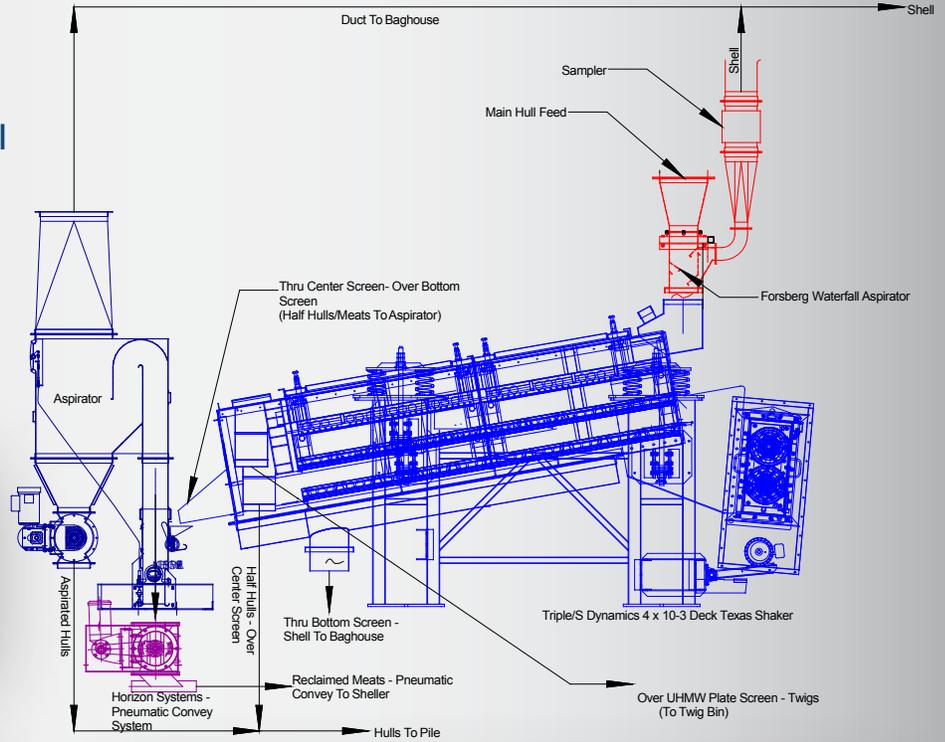


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conventional fumigation.

Researchers are testing fumigant and non-fumigant alternatives for management of almond replant soilborne diseases in multiple-year trials.

Reducing Use of Fumigation

Among research to reduce dependence on fumigation are a number of practices.

Yaghmour discussed two of those practices in a previous West Coast Nut article, "Considering New Orchard Replacement Options."

The two highlighted practices were whole orchard recycling (WOR) and anaerobic soil disinfection

Prunus Replant Problems

- Heavily researched, starting in the 1940's
- Symptoms appear to be universal
 - Stunted shoot growth
 - Loss of fine feeder roots
- Identified a wide variety of causalities
 - Abiotic
 - Biotic
- Disease control through fumigation



Healthy almond tree (L) vs. PRD-affected tree (R)

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(ASD), as potential elements in new orchard replacement strategies.

WOR, the grinding and incorporation of almond biomass back into the soil, is a sustainable alternative to biomass burning that could improve air and soil quality, Yaghmour said.

Studies have shown after six growing seasons, the WOR grinding treatment actually resulted in higher levels of soil organic matter, electrical conductivity, total carbon, and soil nutrients compared to the burn treatment.

Another consideration undergoing research in almond and other nut crops is anaerobic soil disinfection (ASD). Yaghmour explained, researchers have found that ASD mechanisms may be multiple and complex, including the generation of organic acids, metal ions, volatiles, and microbial population shifts that are lethal or suppressive to soil pests.

There are currently six WOR replant trials being conducted throughout major almond producing regions in California. Also, six new ASD trials were established in the San Joaquin Valley in 2016 to



Field fumigation when replanting almond orchards is often necessary in the fight against soil borne diseases.

soilborne pathogens and development of cultural practices that effectively remediate replant problems may remove dependence on soil fumigation,” he said.

Fumigation Based Options

There are two almond replant trials underway in Madera County, one near Firebaugh and the other near Madera, focused on fumigant-based options for control of PRD. The Firebaugh trial included soils of Dinuba fine sandy loam, El Peco fine sandy loam and Fresno fine sandy loam, whereas the Madera trail included El Peco, Fresno, and Lewis sandy loams and Tujunga loamy sand.

The control plots were ripped with Telone rig shanks but received no fumigant.

Browne said the ongoing trails are designed to help optimize soil fumigation practices by identifying fumigant formulations that are particularly

examine several aspects of the practice, including its impact on PRD and nematodes.

Browne believes over the long term, breeding of rootstocks that broadly resist or tolerate soilborne pathogens and

development of cultural practices that effectively remediate replant problems may remove dependence on soil fumigation.

“Over the long term, breeding of rootstocks that broadly resist or tolerate

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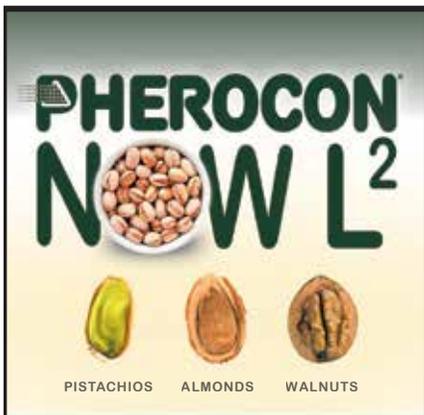
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effective for control of the PRD disease complex and by determining the effectiveness of different fumigation rates and novel fumigant delivery methods.

Costs and benefits were evaluated for alternative fumigants applied by shanks in conventional strip and full-coverage treatments and applied by shanks or drip in novel spot treatments that targeted tree planting sites.

The fumigant formulations were:

- Methyl bromide (MB), 98 percent; chloropicrin (Pic), 2 percent, as a warning agent (MBC Concentrate, TriCal Inc.)
- 1,3-D, 98 percent (Telone II)
- Chloropicrin (Pic), 99 percent (Tri-Clor)
- Mixtures of 1,3-D:Pic, including 63:35 (Telone C35) and 39:60, (Pic-Clor 60)
- Iodomethane (IM):Pic 50:50 (Midas)

In both trials, most of the preplant soil fumigation treatments showed enhanced canopy growth through the first and second yield years (the third and fourth growing seasons after planting, respectively) when compared to the nonfumigated control sites.

Browne said GPS-based software and hardware systems were developed to deliver spot fumigation treatments by tractor to tree planting sites. The new spot treatment system was designed for planning, mapping and treating all tree sites in a replacement orchard and is considered to be much safer and faster than spot fumigation treatments applied with a hand-held probe. Spot treatment can reduce the amount of fumigant required to treat an orchard acre by 50 percent to 90 percent, but evaluations of the GPS-controlled tractor application system were needed.

In addition to the spot treatment, the trial conducted preplant strip fumigation treatments as well. The MB treatments were applied by injecting fumigant in soil depths of 18-20 inches through two shanks spaced 60 inches apart. One pass was made for each tree row.

The other fumigant treatments were applied with a Telone rig (TriCal Inc.), which also injected fumigants at soil depths of 18 to 20 inches, but through



three or five shanks (depending on the treatment) spaced 20 inches apart and tipped with horizontal “wing” attachments.

Browne reported, at Firebaugh, compared to the control, preplant strip treatments with MB and 1,3-D boosted photosynthetically active radiation (PAR) interception by 20 percent and 39 percent, respectively, in yield year one. Thereafter, these fumigation treatments had little effect on PAR interception. Other fumigant treatments at Firebaugh, including Pic and combinations of Pic with 1,3-D or IM, were generally more effective than the MB and 1,3-D treatments, boosting mean PAR interception by 56 percent to 97 percent in yield year one and 11 percent to 22 percent in yield year two compared to the control. By yield year three (the fifth growing season after planting), however, none of the treatments affected PAR interception.

In the Madera trial, PAR responses to fumigation were generally more similar among the treatments than in the Firebaugh trial. At Madera, increases in PAR interception due to preplant fumi-



When replanting almond orchards soil management for lesion nematodes, which stunt tree growth by burrowing in and killing roots, needs to be considered.

gation ranged from 34 percent to 68 percent in yield year one and 35 percent to 69 percent in yield year two compared to the non-treated control. The increases in PAR interception between yield years one and two were generally less at Madera than at Firebaugh. Pressure bomb readings taken in yield years one and two at Madera suggested that tree water stress was responsible for the lesser growth.

Soil sampling from all replicate plots of the control, MB strip and 1,3-D:Pic 63:35 broadcast treatments detected negligible to small nematode population. Browne reported these results suggest that PRD was the dominant replant problem in these trials, but it is possible that plant parasitic nematode populations will build and have future economic impacts.

Despite the long-term uncertainties, of the trials, Browne said there are indications that effective preplant soil fumigation can be an essential step in maximizing net revenues in replanted almond orchards, at least when 'Nemaguard' rootstock is used in the replanted orchard and PRD is active.

"Furthermore, our findings suggest that at orchard sites at risk for PRD and not infested with plant parasitic nematodes, growers can increase net revenues by using strip treatments with Pic or mixtures of Pic with 1,3-D instead of treatments with 1,3-D alone," he added. "Finally, the efficacies and efficiencies of GPS-controlled spot fumigation treatments indicate that they may have important applications where site or air quality sensitivities permit use of only very low rates of fumigant per acre."

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BEST MANAGEMENT PRACTICES **FOR FUNGAL DISEASE IN ALMONDS**

By Cecilia Parsons | Contributing Writer



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Fungal disease management in almonds requires year-round vigilance.

The overall process for integrated pest management of fungal diseases calls for knowledge about the life cycle of the disease, the crop and environmental triggers.

Emily Symmes, University of California Cooperative Extension (UCCE) Integrated Pest Management (IPM) advisor in the Sacramento Valley, said actively assessing all stages of a fungal disease, monitoring and tracking weather patterns will help growers be proactive in disease management.

Speaking at the Mid Valley Nut Conference in Modesto, Symmes noted one more key components of a good IPM program is evaluation of fungicide treatments done over the past year.

Growers Advised to have a 'Game Plan'

“Make a note of what happened, what worked and what didn’t work in your IPM program to help you plan for next year,” she said.

Moisture and temperature are the drivers for fungal diseases. Rain or fog, irrigation systems that wet the canopy of the tree or even humidity created by tighter tree spacing can

create an environment for fungal growth. Infections occur when a pathogen, environmental conditions and a susceptible host meet at the right time.

Continuous monitoring for diseases helps growers notice when symptoms develop. Monitoring after a treatment can indicate if the timing of the application was good or off and if coverage was adequate. Monitoring for disease is not always easy, Symmes said. Unlike insect pests, diseases can be difficult to identify.

“With pathogens, growers really need to be ahead of the game, scouting for disease symptoms, knowing the life stages—when they will sporulate, and watching weather patterns,” she said.

The stage of the growing season is also important. Many key fungal diseases in almonds start in all stages of bloom to petal fall. Depending on variety and location and history of the orchard will drive IPM decisions.

Fungal disease management uses cul-

tural, mechanical, physical and chemical tactics, Symmes said. Cultural practices that can help prevent diseases include planting schemes that allow for more air movement, irrigation management and pruning. In addition to pruning, a mechanical tactic is removal of diseased wood from the orchard to reduce the amount of inoculum in the orchard.

Symmes said that knowing the genetic susceptibility of almond varieties to fungal disease will help growers make choices when planting or if they know their variety is susceptible, they can make some management choices to improve the vigor of their trees. Managing elements, irrigation and nutrition will help those trees be more robust, she said.

Diseases of Note

The fungal disease anthracnose is less common in the San Joaquin Valley, Symmes said, but not in El Nino years. The disease can be severe in warm, wet springtime weather conditions, affecting flowers, leaves and fruit. Symptoms of

this disease, which can be confused with leaftooted bug feeding, may appear three weeks after petal fall. Profuse gumming occurs as the infection progresses. Infected nuts show round, orange, sunken lesions on the hull.

Other symptoms include spur and limb dieback. Leaves on infected spurs develop marginal necrosis beginning with water soaked areas that fade in color. Leaves die but remain attached to branches.

Nonpareil almonds have low susceptibility to anthracnose. Almond varieties with high susceptibility include Thompson, Merced, Price, Peerless, Winters, Monterey, Fritz and Butte.

In orchards with a history of anthracnose infection, Symmes suggests considering bloom treatments with re-applications at 10-14 day intervals if wet conditions persist. Chemistries should

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be rotated. Best management practices include pruning out dead wood.

Grayish black, soft appearing spots on leaves, fruit and twigs are signs of a Scab infection. Severe infection can cause early defoliation and weaken trees.

Scab is more common in Sacramento Valley almond orchards and occurs during prolonged wet spring weather or where irrigation wets tree foliage. All almond varieties are susceptible with Carmel, Peerless and Monterey having the least resistance.

Fungicide treatment five weeks after petal fall is effective, but earlier treatment may improve control. In orchards with history of Scab infection, dormant copper/oil sprays are advised.

Shot hole sprays may control scab. However, a scab treatment may be required if rain occurs into mid- to late spring. Scab resistance to quinone outside inhibitor fungicides (also known as



Emily Symmes speaking at the Mid-Valley Nut Conference.

strobilurins) has been documented and Symmes said to avoid use of Fungicide Resistance Action Committee (FRAC) Group number 11 fungicides in these orchards.

The presence of black fruiting structures in the fall indicate a spring treatment for shothole is warranted. If not detected, growers should look for lesions on the leaves in the spring. If monitoring indicates presence of shothole, petal fall and leaf emergence treatments are effective. Zinc applications in the fall hasten leaf drop and can prevent increases in inoculum levels.

Rust appears as small, yellow spots on the upper surface of leaves. On the lower leaf surface the spots are more rusty red colored and the rust colored spores produced in the lesions erupt through the surface. This disease occurs sporadically throughout most almond growing areas and is most serious in young orchards where bloom sprays have not been applied.

Reducing orchard humidity is one method of control.

Resistance management

Resistance management with fungicide materials is critical to their long-term efficacy.

“We have good materials and used responsibly, they can remain effective,” Symmes said.

Pathogens that require multiple treatments over a season, Symmes said, can become resistant if fungicides with different modes of action are not rotated. When possible multi-site mode of action materials are recommended. Fungicides should be rotated or tank mixed when possible and single mode of action applications should be limited.

The FRAC web site has fungicide numbers for resistance management and also supplies the risks associated with each product. Symmes said that rotating with different FRAC numbers, and tank mixing where legal helps keep fungicides effective.

Growers should plan well in advance of bloom which products they will use for fungal disease outbreaks.

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An IPM Approach for Spider Mite Control in Almonds

By Kathy Coatney | Editor

David Haviland, University of California Cooperative Extension (UCCE) Kern County entomology farm advisor spoke at the recent South Valley Nut show about using an IPM (integrated

pest management) approach to spider mite control.

Haviland said, certain cultural controls, like keeping the trees healthy and

minimizing dust, should be year round practices that will help control spider mites.

“Both of those in general can help, and we know that there are miticides that can be effective, the question is when do you need to use them, and what can you do to prevent needing their use?” Haviland asked.

Haviland has been doing research on biological control of spider mites to answer these question with funding from the Almond Board of California and a Pest Management Alliance Grant from the California Department of Pesticide Regulation (DPR).

Spider Mite Predators

Spider mites have several predators that can help control them, and historically the most important have been Phytoseiids, which are predatory mites. More recently, particularly in the San Joaquin Valley, the sixspotted thrip has been very effective at controlling spider mites, Haviland said.

Key points on the sixspotted thrips:

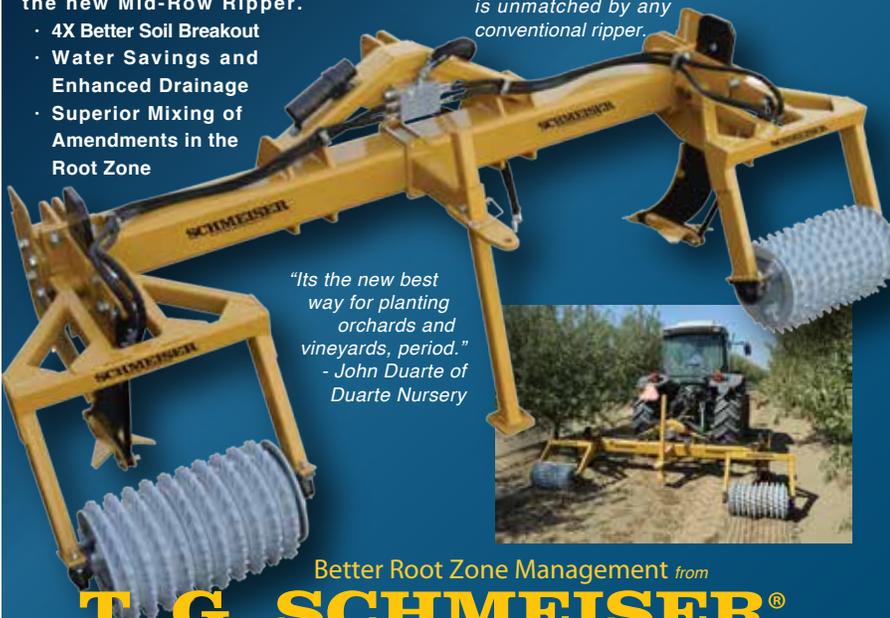
- The entire lifecycle is on the host
- The sixspotted thrips feed almost exclusively on spider mites
- The sixspotted thrips will eat all stages of the mites—eggs to adults
- When the mites disappear as a food

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source, the sixspotted thrips will actually eat each other

- Because sixspotted thrips are cannibalistic, they can survive once all the spider mites are gone

Sixspotted thrips are also very effective at getting inside of webbing. “They like to be in very tight spaces, and will actually get under the webbing, and control the mites and their eggs where they are hidden,” Haviland said.

“Sixspotted thrips are everywhere in the San Joaquin Valley. The question is how many do you have, when do they show up, and how quickly do they provide control of the spider mites,” Haviland said.

Monitoring

In the course of his research, Haviland has done evaluations with monitoring tools.

“We evaluated many different kinds of sticky traps and found that one of

them, called a yellow strip card that we get from Great Lakes IPM, is very effective at collecting the sixspotted thrips,” Haviland said. “There are two different sizes available and either one will work. We prefer the small three by five inch cards because they are easy to use and cost less than a quarter.”

The cards can be hung in the orchard, and they give a very good indication of whether or not the thrips are present, Haviland said.

“You want cards to be in the field so you can see if the thrips are present and in what numbers. That becomes an added piece of information when making decisions about whether or not you need to spray for mites,” Haviland said.

When to Spray

In the field, when spider mite outbreaks occur sixspotted thrips are doubling their population every 3.4 days, Haviland said.

“That’s more than twice as quickly as the spider mites, so because of their rapid population increase, plus how many mites they eat once they show up, they can be extremely effective at controlling the mites,” Haviland said.

The key with biological control of spider mites is don’t spray too early because the biological control needs something to eat, Haviland said.

“Growers that tend to be super proactive on their spray programs, and spray as soon as they see mites, but before they’re actually at a threshold, they tend to have reduced biological control,” Haviland said.

The goal should be to monitor the mites weekly, wait for a threshold, and that will be the time to treat, Haviland said.

“Our experience with growers is that they want to treat earlier than a thresh-

Continued on Page 44

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Continued from Page 43

old for fear of how quickly mites can increase and defoliate trees. However, our experience has been that even if you wait until after that threshold maybe another week, we're actually getting even better biocontrol," Haviland said.

"In some cases, by waiting another week we realize that there's no reason to treat at all because the sixspotted thrips come in and completely clean up the mites," Haviland said.

"In other cases, if we do treat, the biological control that's present helps clean up any mites that get missed by a miticide spray. So whether the biocontrol works on it's own, or whether it's just present and cleans up what gets missed by a miticide, either way there's benefit to having them there," Haviland said, reiterating the importance of not treating the mites too early.

Balancing Act

What it comes down to is, it's a balancing act to get the sixspotted thrips in the orchards, allow them to become established on spider mites, and then time treatments in a way that thrips eat the survivors.

"I would think of it this way, sixspotted thrips will always show up, the question is will they show up in high enough numbers, quick enough to control mites, without needing a miticide, or will the mites get too far out of control before the thrips provide the control," Haviland said.

Haviland's research is looking at ways to monitor this. "The first thing is, you



Sixspotted thrips. Photo by Jack Kelly Clark. Courtesy of UC Statewide IPM Program.

don't want to treat too quickly for mites, and the University of California (UC) recommends presence-absence monitoring program. A detailed description can be found at the UC Statewide IPM Program's web site (<http://ipm.ucanr.edu/PMG/C003/almonds-mites.pdf>)," Haviland said.

Sample about 15 leaves per tree, on at least 5 trees, to determine the presence and absence of mites. If there are spider mites on about 30 percent of the leaves, it's recommended to treat with a miticide, Haviland said.

One common criticism of the monitoring form is the amount of time it takes to complete the sampling. However, Haviland states that, "If you have no mites, there is no need to fill out the form. Likewise, if your trees are webbed over you don't need to fill out any forms. However, during critical weeks when

contemplating whether or not a treatment is needed, filling out the monitoring form can help make the most educated decision to minimize spraying and maximize biocontrol.

"And again, in our studies, even if you are above the official UC threshold, if you have sixspotted thrips present, you probably don't need to make a treatment," Haviland said.

By having healthy trees, reducing dust, and allowing some mites in the orchard for the sixspotted thrips to get established, growers will find in many cases that no miticide is needed, Haviland said. In other cases, one miticide treatment is more than enough, he added.

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control spider mites. “We’re talking about road management to keep dust from coming up off of roads and make sure people are driving slowly,” Haviland said.

“Reducing dust at harvest may also help reduce mites, but unfortunately current harvest practices make that difficult,” Haviland said.

Avoiding Tree Stress

Normal cultural practices are to reduce irrigation in preparation for harvest, but doing that stresses the tree. “That’s kind of unavoidable, so it’s really a matter of keeping the tree as healthy as possible, as vigorous as possible, as least stressed as possible, until it’s time to prepare for harvest, at which point backing off on water is a normal production practice needed for uniformity of hullsplit and to prepare for harvest,” Haviland said.

Don’t Starve the Predators

Haviland stressed two points when it came to predators—don’t starve them,

and don’t kill them. There are many insecticides that will kill the natural enemies, particularly some of the pyrethroids that are used for navel orangeworm and leaffooted bug control.

The importance of avoiding the use of organophosphates and pyrethroids during the dormant season and in-season is critical. By doing this, it helps improve the biological control that is present for spider mites, Haviland said.

“For example, at hullsplit it’s common to spray for navel orangeworm. Products like Intrepid and Altacor don’t have any known effects on the predators of spider mites, whereas pyrethroids, and there’s several of them registered, are all broadspectrum products that effect the predators of mites. Other products that negatively impact sixspotted thrips are ones containing abamectin and spinosyns such as spinetoram or spinosad,” Haviland said, so it’s important to be selective on the chemicals used to treat other pests.

A good IPM approach determines how many good bugs are in the orchard,

how many bad bugs, and what are the trends over time in those populations. Putting that information together is the best way to make the most informed decisions on whether or not a miticide spray is needed, Haviland said.

Research Continues

Haviland will continue with the research. “We’ve been working on this for a few years, and we will definitely be continuing to work in this area for several more years. We continue to learn a lot every year, but with each new question answered, there are new questions being asked,” he said.

“Each year as we learn more, we’re forming the next year’s questions to try and dig deeper to improve how information on biological control can be used in IPM programs for spider mites,” Haviland said, so stay tuned for future information.

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ARE YOU IN COMPLIANCE WITH OSHA'S HAZARD COMMUNICATION STANDARD?

By Roger A. Isom | President/CEO
Western Agricultural Processors Association

Are You in Compliance with OSHA's Hazard Communication Standard?

It is a question being asked of tree nut farms, hullers and processors on a more frequent basis. The Hazard Communication Standard was modified a few years back and had compliance milestone dates in 2013, 2015, and 2016. It is critical to make sure that your operation has met those require-

ments and is effectively implementing the standard when handling hazardous chemicals. Should you be unfortunate enough to have an inspection by CalOSHA, it will be one of the questions asked. Just this past week a walnut huller was asked to provide a copy of their Hazard Communication plan during an inspection of an accident that was related to machinery.

The new Hazard Communication (Haz-Com) Standard went into effect on May 25, 2012. Employees must have been trained on how to read Safety Data Sheets (SDS) by December 1, 2013, and chemical manufacturers and distributors must reclassify their chemicals according to the new guidelines and produce compliant reformatted SDS and labels as of June of 2015. And full compliance was required as of June 16, 2016 including training, labeling and written programs in place and implemented.

Written Program

So what does an effective Hazard Communication Program entail? A Hazard Communication program includes labels on containers of hazardous chemicals, safety data sheets (SDSs) for hazardous chemicals and training for workers. First, you need to have a written program. The written program must identify responsible staff and who will be responsible for particular activities, including training. The written program will show how the new standard is being implemented at your operation, including labeling, and training. It will require employers to maintain a list of hazardous chemicals and the SDS for each of those chemicals.

Labeling of Containers

Under this newly revised standard all containers of hazardous chemicals must have labels with the following information: product identifier, signal word, pictograms, hazard statements, precautionary statements, and the name, address and phone number of the responsible party. You can use the same label from the supplier or an approved alternatives, but they must be labeled! Many times in the hullers or processors we will come across a "secondary container" with no label. This is a huge



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Gas Cylinder  <ul style="list-style-type: none"> • Gases Under Pressure 	Corrosion  <ul style="list-style-type: none"> • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals 	Exploding Bomb  <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  <ul style="list-style-type: none"> • Oxidizers 	Environment (Non-Mandatory)  <ul style="list-style-type: none"> • Aquatic Toxicity 	Skull and Crossbones  <ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic)

“no-no” under the newly revised standard. Why might you ask? Let me share a real world example with you. Employee #1 was working for a firm that manufactured architectural and ornamental metalwork. He and a coworker were at a remote jobsite prepping a metal staircase for finishing. They used a product designed to give the metal a black patina, which would then be coated with a clear sealant. This was selenious acid. The product was a clear blue liquid that they transported in a bottle that had once held Gatorade. The Gatorade label was still on the bottle. The bottle was stored in the back of a pickup truck near a cooler where Employee #1 kept his lunch. Employee #1 walked away from the work area back to the truck to get a drink. He drank from the Gatorade container before he realized that it contained not Gatorade, but the selenious acid. He spat out as much as he could, but he had already swallowed some of the liquid. He was driven to an emergency room about 30 to 40 minutes away. He died about 48 hours later.

Whether it is cleaning solution or oil, any “secondary container” must have at least the product identifier and general information concerning the hazards of the chemical. Employers must be

as to how to handle the chemical in the event of an emergency. Without that information being readily accessible, precious time could be lost. All suppliers must provide a copy of the SDS when requested to do so. So check your chemical inventory and your SDS on site. If you do not have an SDS for each and every chemical, request one immediately. Many of the SDS can now be downloaded online!

Training

Finally, training must be conducted with all employees on the hazardous chemicals in their work area. The training must be conducted in a manner and language that employees can understand. The employees must understand how to read a label and an SDS, and have a general understanding of what that information means. They must also know the protective measures available when using these chemicals and what to do in the event of an emergency.

While there are numerous regulatory requirements for tree nut farms, hullers and processors, HazCom is one of those requirements that simply can't be forgotten. You will be asked!

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diligent to ensure there are no unlabeled spray bottles or containers used in the workplace.

Safety Data Sheets (SDS)

The new Safety Data Sheets (SDS) replace the old Material Safety Data Sheets (MSDS). The new SDS are designed to a worldwide standard to ensure all suppliers provide all of the necessary information utilizing consistent and uniform methodology and information. Each SDS has 16 specific sections covering first aid and fire-fighting measures to disposal instructions and handling and storage requirements. The SDS must be kept on site and must be readily accessible to workers in their work areas during the work shifts. This is a simple requirement that must be adhered to. In the event of an emergency there are always specific requirements for first aid, as well

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SUSTAINABILITY AS A WAY OF BUSINESS AT GEMPERLE FARMS

By Almond Board of California

Right: Father-daughter duo Richard Gemperle and Tanya Gemperle-Goncalves place sustainability at the center of all farming operations at Gemperle Family Farms. Photo courtesy of Almond Board.



Sustainability is an integral part of the business model at Gemperle Family Farms in Denair. So much so, in fact, that Richard Gemperle, owner and president of the family farm's almond division, hired a full time sustainability manager—daughter Tanya Gemperle-

le-Goncalves—to oversee sustainability initiatives and growing practices on the family's 1,500 acres of almonds in Stanislaus and Merced Counties.

Tanya brings a master's degree in Environmental Change and Management from Oxford University in England to the job. In addition to overseeing the gradual three-year transition to certified organic on part of the farm's almond acreage, she also takes a broad approach to ensuring Gemperle Farms' compliance with third-party sustainability certification programs and participation in the Almond Board's California Almond Sustainability Program (CASP).

About a third of Gemperle's acreage is enrolled in third-party sustainability certification, earning a five- to 10-percent premium for its almonds from discerning buyers. But it's not just the premium that motivates this family.

"Everything costs money," Richard said. "Maybe we are not getting paid to do all the things we are doing but if you are farming incorrectly, it costs money. If you aren't utilizing your inputs correctly you are wasting money."

The certification also dovetails easily into CASP, which looks at various aspects of the farming operation with an ecological, financial and social eye toward long-term sustainability.

"We had already aggregated a lot of information about what we were doing sustainably, so then it was just a matter of taking time to fill out the modules for CASP," Tanya said. "Sustainability is such a big topic and it is hard to encapsulate all aspects of it, but CASP does a good job."

Richard Gemperle said the value of CASP for the individual grower comes from the practice of compiling what they are doing into one online portal. At the same time, it gives the almond industry a good data set to accurately represent statewide sustainable farming practices. This data set is a valuable asset when farming practices come under scrutiny from a public that doesn't understand how almonds are grown.

For example, CASP provided the Almond Board with industry-wide data to refute misconceptions about water use in almonds. "It's amazing how fast a sector of agriculture can become a

An advertisement for Hilbers Incorporated, Contractors & Engineers. The ad features a large image of a modern steel building with a glass facade. Text on the ad includes "HILBERS INCORPORATED CONTRACTORS & ENGINEERS", "STEEL BUILDINGS", "AGRICULTURE", "PUBLIC WORKS", "COMMERCIAL", "PROUDLY FEATURING BUTLER BUILDINGS", and contact information: "hilbersinc.com", "1210 Stebler Ln.", "Yuba City, Ca. 95993", "530-673-2947". A small text block at the bottom left reads: "As a dedicated partner in the agricultural community, Hilbers is committed to not only meeting your expectations, but protecting your investments. Hilbers Inc. has assisted many farmers, processors and packers by providing pre-engineered buildings as cost-effective solutions for machine and equipment storage, cold storage, commodity bulk storage, food processing, and fumigation. Whether it's a design-build project or renovating or expanding an existing building, Hilbers has the expertise to see you through to the completion of your project and help your industry grow."

villain, and we saw that last year during the drought,” said Richard.

In addition to its sustainable certifications, Gemperle Farms also has several blocks in various phases of the three-year transition to certified organic to meet demands of a growing client base. From variety selection to irrigation system design, all new orchards are planted with organic in mind.

Richard acknowledges the transition to organic is risky, and also costly, as the farm faces drops in production and increased input costs to manage organically. However, he expects higher premiums will help offset those costs in the long run and also further set Gemperle Farms apart.

“In transition, you have this gap where you have the increased costs and decline in production while you are still selling at conventional pricing,” he said. “That’s why it is so daunting. But we expect once we are there to see premiums from 30 percent to 100 percent on average over our conventionally grown almonds,” Richard said.

Organic blocks aside, all almonds at Gemperle Farms are grown the same whether or not they are part of a certification program. Sustainable practices include:

- The use of pest monitoring and softer IPM (integrated pest management) friendly pest management materials
- Non-synthetic fertilizers and nitrogen sampling, budgets and calculators to optimize fertilizer uptake efficiency
- Irrigation budgets, ET^o and soil moisture monitoring to time irrigation sets and duration
- Minimal tillage and cover crops
- Emissions-reducing higher tier motors and modifications to reduce dust from harvest equipment
- Solar power to fuel supplemental irrigation wells

Tanya said her degree from Oxford reflected her interest in the interface of agriculture and the environment, and the regulations that impact that relationship. In fact, she focused her master’s thesis on the Irrigated Lands Regulatory Program.

Her job as sustainability manager reaches from the ground floor to the sell-

ing floor, from monitoring soil moisture sensors and IPM traps, to applying for various cost-share incentive programs and managing certifications.

“We just applied for a new Healthy Soils Program that provides incentives to farmers to implement a list of practices, such as cover crops and minimal tillage, that can increase soil carbon sequestration,” Tanya said.

The cover crop program also includes specially designed seed mixes provided by Project Apis m., which are spread on orchard middles to provide supplemental bee forage outside of almond bloom.

Sustainability’s Role in Almond’s Future

Tanya said the process of filling out the modules for CASP helped her think differently about some of the sustainable farming practices already in place in the orchard.

“It did bring a few extra things onto my radar,” she said. “For instance, while

we already do pump efficiency tests, filling out the module helped me think differently about it. CASP can help us learn where to focus to get the greatest sustainability benefits.”

Richard notes that Gemperle Family Farms is continuously working to improve its specific sustainable farming practices. But the overall goal remains the same.

“I would define sustainability as this,” Richard said. “If we continue to farm exactly as we are for 50 years, how will we affect the soil, water and other resources? Are we still a viable farm? If not, what are we doing that can cause degradation of that system and how can we improve it?”

Learn more about the California Almond Sustainability Program at Almonds.com/Growers/Sustainability.

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AN EYE IN THE SKY: DRONES IN AGRICULTURE



Photo courtesy of Terry Brase.

By Terry Brase | Precision Ag instructor at West Hills College

One of the most discussed precision ag technologies in the last four years has been Unmanned Aerial Systems (UAS), not only because it is a “cool” technology, but also because there is confusion in its use or misuse. Can I fly these without a license and if I’m not getting paid? What do I do with all of this imagery? Do we already have too much data? This article will outline some examples of how West Hills College uses UAS in permanent nut and row crops while educating our students about UAS as tools for the grower.

The Farm of the Future at West Hills College has invested in several types of UAS to educate our students on their use. Precision agriculture courses in Control Systems, Software and Processing, and Geospatial Technologies that apply to UAS are

under development, but the focus will always be on the capture, processing and interpretation of imagery. The imagery is what makes UAS a tool instead of a toy. Each system listed in this article provides a different level of usefulness in the field or orchard and a different perspective for students to learn from.

Before beginning with specific examples of UAS, some terms need to be defined. A “UAV” is an Unmanned Aerial Vehicle and refers to the aircraft that can be flown autonomously (as opposed to Remote Control aircraft that is also unmanned but designed to be flown remotely using controls). “UAS” refers to the vehicle and the software that controls, assists the flight, and processes the imagery (therefore is it more than a vehicle, it is a system). The term “drone” is a broad term that describes an aerial

vehicle for autonomous flight usually for military use, though more recently the

Continued on Page 52

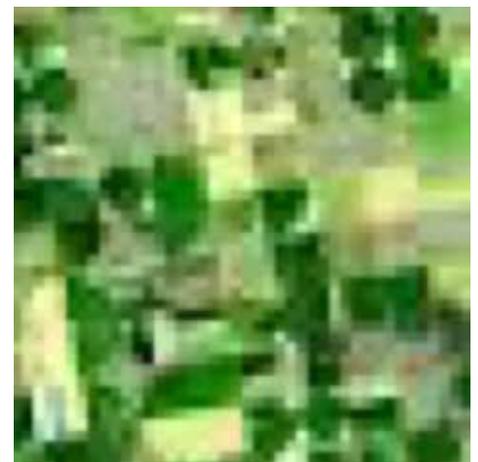
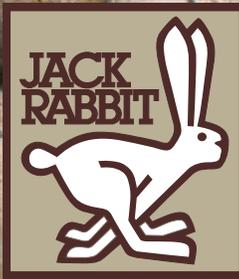


Figure 1. Photo courtesy of Terry Brase



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Continued from Page 50

term is applied to any UAS.

One of the first UAV that West Hills College acquired was a DJI Phantom 2. It is a quadcopter (rotor craft) with a RGB (Red, Green, Blue) camera, which amounts to a toy since agriculture applications are somewhat limited. The Phantom 2 has GPS and IMU (Inertial Measurement Units such as gyroscopes and accelerometers) that assist in making its flight more stable. Anybody that has flown a cheap remote controlled craft can attest to how difficult it is to fly even in the quietest areas and much less in outdoors and windy conditions. The GPS and IMU make the Phantom 2 an excellent craft for students to practice flight and taking video or pictures.

There are two problems with the use of this craft for precision agriculture. First, the RGB camera means Red, Green, and Blue colors are captured. This type of camera captures the natural

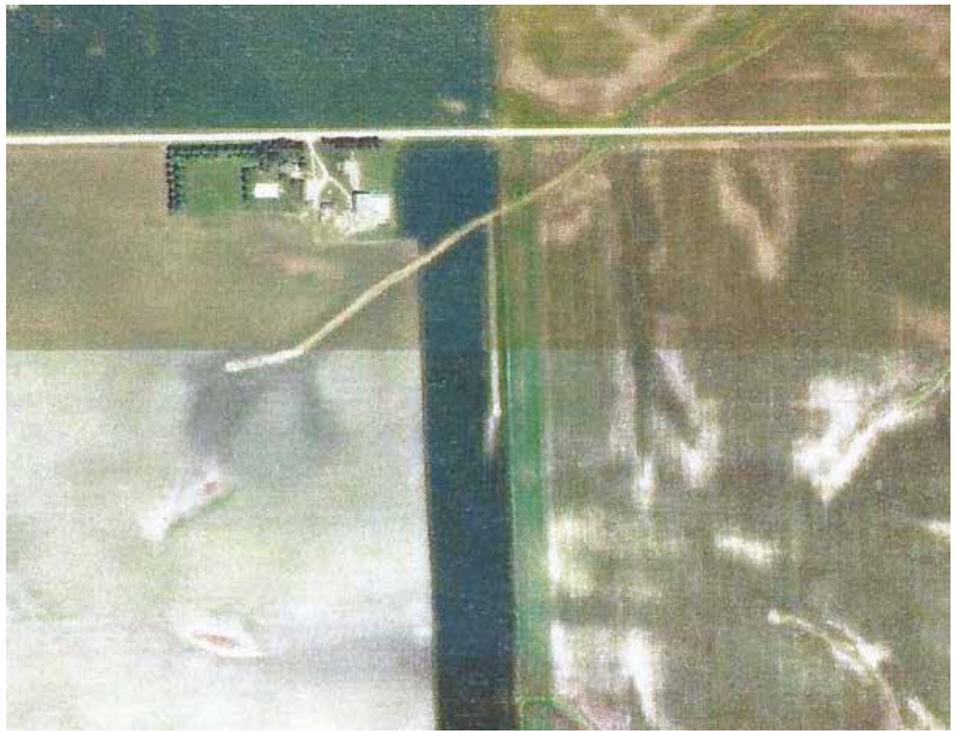


Figure 2

reflectance in the same way a person's naked eye does. The resulting image is known as a natural color. The fact that this image is from 200 to 400 feet above

ground level allows a person to view an entire field or crop with a "bird's eye" view. This does allow the user to see some variability and patterns within the field. However natural color is not as good as false color infrared imagery. (There is a more detailed description of infrared and how an imagery sensor works at the end of this article.)

The other problem with this UAS is that these images cannot be georeferenced. This means that the GPS will calculate a position for the UAV, but it doesn't get attached to the image. Without this referencing the images cannot be used within a Geographic Information System for further analysis. This also means that it cannot be orthorectified to put the image to scale. Depending on the height of the flight, a large amount of distortion can occur within the images. The example image in **Figure 1** (page 50) demonstrates how the ground surface is distorted because of the height of the camera. The main use by West Hills College is for students to practice calibrating, positioning, and data management with an aerial vehicle. As far as agriculture use, there is little valid use of this device for precision agriculture.

The second example of West Hills College UAS is a DJI Phantom 4 (quad rotor). Similarly to the Phantom 2,

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it also has GPS and IMU for stable flight and a RGB camera. However this system has a major advantage over the Phantom 2.

The system allows for the geotagging of the imagery. This results in images similar to **Figure 2 (page 52)** which are rectified and reduces the distortion. These images can also be added as a data layer within a GIS for analysis. In addition, this craft can be flown autonomously. This means that a flight mission is created to guide the craft on a series passes over the field taking pictures. All these pictures are then georeferenced and mosaicked to create a full field view.

The problem though remains that it is still a color image that has limited usefulness for analysis. Some patterns



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16 Years in Walnuts | 30 Years of Sorting in the Field

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are visible, and the fact that it is georeferenced means that location coordinates can be determined for ground trothing (finding the location on the ground and checking what is actually there).

West Hills has used this imagery for a leaf off evaluation of our pistachio orchard. It has also been used for an evaluation of irrigation in our garlic and for documenting research plots of sugar beets. Figures show examples of each. The limitation for this system is still limited analysis with a RGB image. The cameras can be replaced, but usually at a major cost that doubles or triples the original cost of the aerial vehicle. Usage is identification of field problems and focused scouting. Focused scouting refers to a technique where, instead of randomly passing through a field to find problems, a UAS image is used to focus the scouting to areas that show abnormalities.



Hovering high. Photo courtesy of Terry Brase

The third example of a UAS that West Hills has is a PrecisionHawk Lancaster 5 (fixed wing UAS). This is another step up from the previous example. Like the Phantom 4, this system will do autonomous flight, has GPS and IMU, and the capability to geotag images. It also has the advantage of being a fixed wing, which usually has a faster flight and can cover more acres in one flight. The real advantage of this specific platform is that it has a multi-spectral camera. A multi-spec camera has the capability to capture reflectance in light ranges outside the visible light, such as infrared. These infrared images can be used to create NDVI (NOTE: many people refer to NDVI

as an image. NDVI is NOT a reflectance band of light or a type of imagery. It is an index that is created from bands of imagery, specifically blue or red and infrared).

Another advantage that this UAS offers is scalability in that there is a 2.2 pound payload which can carry not only a multi-spec sensor but can be switched for a multitude of other sensors including: natural color; thermal (for a specific band of infrared that is based on temperature); LiDAR (active sensor that captures very accurate elevation for construction) and others.

In addition the Lancaster 5 has its own software that processes the imagery to create a variety of products. Now this should be taken as a positive and a negative. On the positive side, having a dedicated software means that it is simple and should work well with the imagery coming from the UAV. This specific software will create a variety of vegetative indexes including NDVI, EVI, and multiple others. Each index uses different bands of reflected light and infrared and combines them into a value which interprets different things. The

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Georeferenced images—focused scouting. Photo courtesy of Terry Brase

Continued from Page 54

NDVI, for instance, is an indicator of plant stress and vigor as opposed to EVI which is an enhanced version of NDVI which takes into account atmospheric conditions. Therefore, each is used differently, and both are more valuable than a natural color image.

On the negative side, this is proprietary software that only works with this specific device. It is somewhat limiting to have software that only works with one device. It is cloud based that has an advantage that it can be used on any computers that work with the internet. This imagery will be more useful for decision making. The fixed wing will cover larger fields and more acres and can be used for focused scouting and for individual georeferenced images. But the real value is in the full field mosaicked image,

which shows plant stress, which can be used for zone management and analysis for helping to identify cause and effect of variability in the field.

The fourth example of a UAS that West Hills College uses is a DJI S900 (a hexacopter, 6 rotor UAS) which again is a step up from the previous UAS. The S900 provides flexibility in that with a proper gimbal (the equipment from which a camera hangs from) a variety of sensors can be used with it. The Lancaster 5 UAS did have several types of sensors, but was limited to Lancaster 5 sensors. The S900 allows the student to set up a UAS from scratch as opposed to using one straight from the box. This means an open source software can be used to process the image rather than a proprietary software as the previous

Continued on Page 58

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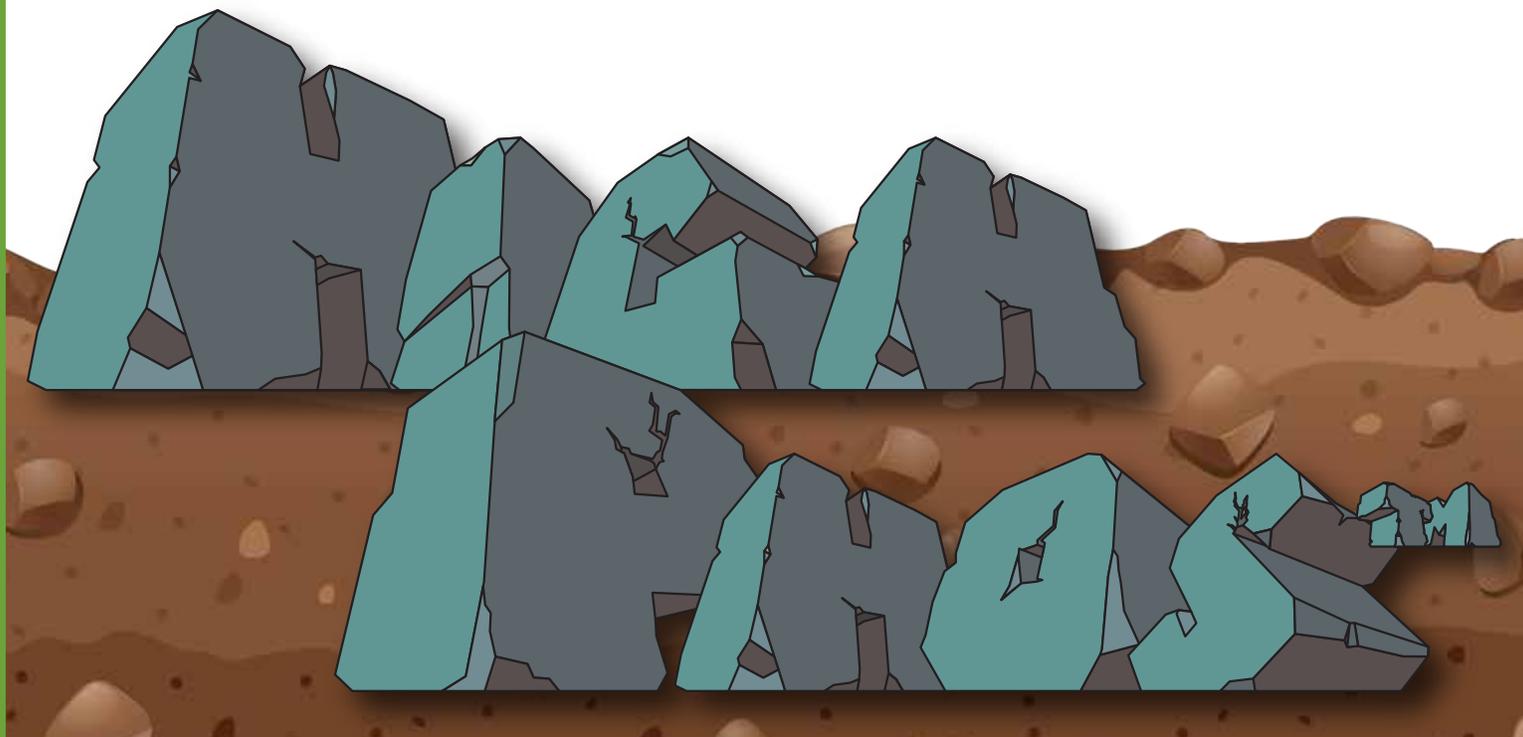
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Continued from Page 56

platforms. Both increase the flexibility in how the UAS is used and is valuable for the student to know.

At this point, it is important to make a comparison of multi-spectral cameras, or more properly, sensors. Sensors record the reflectance from objects digitally in the form of color bands of wavelengths. Though it sounds like there are distinct portions of light, actually there is a continuous continuum of light wavelengths which means it's up to the sensor to capture specific wavelengths that can be used. Many of the cheaper equipment are consumer grade cameras that come with an installed filter that allows infrared to be captured. Other cheaper cameras use one sensor and then have some way of separating the colors and then recombining them into a color image.

Why does this have to be done? Because digital detectors do not determine wavelength they just measure how much there



Tool or toy? Photo courtesy of Terry Brase

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UAS small Unmanned Aerial Systems.
Photo courtesy of Terry Brase

is. The filter or separating of color is necessary to determine the color and then it can tell how much red, green, and blue there are for the final color image. The more expensive and high quality cameras use one sensor for each color bandwidth. This allows a very specific bandwidth resulting in a more useful image for analysis. Currently West Hills has all single sensor cameras that rely on the software to separate the individual bands for creation of NDVI or other vegetative indexes.

Finally it should be noted that UAS are just one platform for remote sensing data. There is also ground based, satellite, and manned flight. Future articles will focus on these technologies and their value to precision agriculture.

In summary, hopefully this article has provided the background necessary to make a decision on the use of a UAS. If you are interested in purchasing, you may still want to discuss your specific needs with a professional before deciding. Also remember: it is the imagery that you get from the UAS that will make it a tool and not a toy.

—Reprint from Progressive Crop Consultant
Vol. 2, Issue 4

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WALNUTS

7:30 AM	Walnut Seminar Registration
8:00 AM	Trade Show PCA-CE Credits: 15 minutes; Other
8:30 AM	Welcome
8:35 AM	Agricultural Commissioner's Update Butte County Agricultural Commissioner's Office PCA-CE Credits: 30 minutes; Laws & Regs
9:00 AM	Understanding Bot and Mold of Walnut and Disease Management Dr. Themis Michailides, UCCE Plant Pathology Specialist, Kearney Agricultural Research and Extension Center PCA-CE Credits: 30 minutes; Other
9:30 AM	Update on Training Walnuts During the Canopy Development Phase Dr. Bruce Lampinen, UCCE Walnut Specialist, UC Davis
10:00 AM	Trade Show PCA-CE Credits: 15 minutes; Other
10:30 AM	California Walnut Board Update TBA, California Walnut Board
11:00 AM	Updates on Walnut Blight Control Dr. Jim Adaskaveg, Plant Pathology, UC Riverside PCA-CE Credits: 30 minutes; Other
11:30 AM	Spraying Carefully to get the Most out of Your Pesticide Dollar Dr. Franz Niederholzer, UCCE Farm Advisor, Sutter, Yuba & Colusa Counties PCA-CE Credits: 30 minutes; Other
12:00 PM	FREE TRI-TIP LUNCH Navel Orangeworm Management—Current and Future Prospects Bill Lingren, CEO for Trécé Inc.; PCA-CE Credits: 30 minutes; Other



ALMONDS

1:00 PM	Almond Seminar Registration
1:15 PM	Diagnosis and Management of Canker Diseases of Almond Dr. Florent Trouillas, UCCE Plant Pathology Specialist, Kearney Agricultural Research and Extension Center PCA-CE Credits: 30 minutes; Other
1:45 PM	Water Management in Almonds: Spotlight on Early Season Allan Fulton, UCCE Irrigation and Water Resources Advisor, Tehama, Colusa, Glenn & Shasta Counties
2:15 PM	Butte-Yuba-Sutter Water Quality Coalition Update Rachel Castanon, Program Coordinator, Butte County Farm Bureau PCA-CE Credits: 30 minutes; Laws & Regs
2:45 PM	Trade Show PCA-CE Credits: 15 minutes; Other
3:15 PM	Whole Almond Orchard Recycling and the Effect on Second Generation Tree Growth, Yield, and Fertility Dr. Brent Holtz, UCCE Farm Advisor, San Joaquin County
3:45 PM	Navel Orangeworm Management Update Dr. Emily Symmes, UCCE Sacramento Valley Area IPM Advisor PCA-CE Credits: 30 minutes; Other
4:15 PM	Almond Board of California Update TBA, Almond Board of California
4:45 PM	Adjourn



California Almond Sustainability Program Recognized Globally by SAI Platform

SACRAMENTO, Calif. December 6, 2017 – The Sustainable Agriculture Initiative Platform (SAI Platform) and Almond Board of California (ABC) announced today the outcome of a benchmarking effort with the ABC’s California Almond Sustainability Program (CASP) and SAI Platform’s Farm Sustainability Assessment (FSA). CASP almond growing and processing practice assessments paired with the U.S. and California regulatory systems results in an FSA 2.0 Gold-level equivalency.

“The California Almond Sustainability Program achieved the highest level of equivalency – Gold – with the Farm Sustainability Assessment,” according to Joe Rushton, FSA Manager at SAI Platform. “Gold equivalence reflects the comprehensiveness of the Almond Board’s sustainability program, coupled with applicable federal and state regulations, and demonstrates how the California Almond Sustainability Program can be

used as an equivalent means of assessing sustainable practices relevant to the California Almond industry.”

California Almonds are the first nut-specific program to be benchmarked to FSA 2.0, and one of only two U.S. sustainability initiatives that achieved a Gold level of equivalence. Almond trees thrive in California with the unique combination of a Mediterranean climate, rich soils, natural resources, talent and infrastructure to farm almonds. More than 80% of the world’s supply of almonds are grown in California.

Richard Waycott, ABC president and CEO, commented that, “establishing equivalency with the FSA’s Gold level is an important step in recognizing the California Almond industry’s well-established practices and commitment to being an economically, environmentally and socially responsible crop for California and the world.”

CASP has been a valuable tool enabling farmers to assess their own practices and confidentially compare their performance to peers. Moving forward, the industry now has a basis for exploring how the California Almond Sustainability Program can be leveraged throughout the supply chain.

“Our objective for working with SAI Platform’s FSA is to increase efficiencies throughout the supply chain, from the almond orchard to customers, by increasing confidence in California Almond farmers’ practices and reducing the need for redundant questionnaires,” said Waycott.

The FSA 2.0 Gold equivalence provides the California Almond industry with a way to communicate on-farm practices and address stakeholder sustainability questions in a more harmonized and consistent manner.

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