



In This Issue



- 2019 UCCE Winter Walnut Meetings
- Newsletters are going online!
- 2019 IPM Breakfast Meetings
- Growing the Valley Podcast
- Scale Pests, NOW, and Flatheaded Borers
- Cost and Expense Considerations in a Lean Price Year
- Tracking Winter Irrigation Needs
- Updated Walnut Cost Study

Luke Milliron
UCCE Farm Advisor
Butte, Glenn,
Tehama Counties

With special thanks to Barbara Bechtel Office Specialist Butte County

2019 UCCE Winter Walnut Meetings

Wednesday, January 30th 7:00am-2:30pm (talks start at 8:00)	North Sacramento Valley Almond & Walnut Day **Glenn County Fairgrounds, 221 E Yolo St Orland, CA 95963 **Please note venue change this year to the Glenn County Fairgrounds due to use of the previous venue as a Red Cross site from the Camp Fire.
Friday, February 8th 8:00am-1:00pm	Tehama County Walnut Meeting Elks Lodge, 355 Gilmore Rd, Red Bluff
Thursday, February 28th 12:30pm-4:30pm	Sutter-Yuba-Colusa Walnut Day Veterans Memorial Hall, 1425 Veteran's Memorial Circle, Yuba City
Tuesday, March 5th AM: Nickels PM: Wheatland (Back-up if rain: March 7th)	Walnut Canopy Management Nickels Soil Laboratory (NSL), Arbuckle Walnut Training Systems (no pruning/no heading) Wheatland
Wednesday, March 6 th 8:00 am - 12:00 pm	Yolo-Solano-Sacramento Walnut Meeting 70 Cottonwood Street, Woodland

Butte County Newsletters are Going Online!!!

Sign-up today for full color, full content, and immediate newsletters and other updates delivered to your e-mail! New issues can be e-mailed to you, and old issues will be archived at ucanr.edu/buttenews



Starting January of 2020, we will no longer be mailing hard copy newsletters, unless you make a special request by calling the office at (530) 538-7201 (note: substantial delivery delay, limited content, and no color).

ucanr.edu/ButteGoesOnline

ANR NONDISCRIMINATION AND AFFIRMATIVE ACTION POLICY STATEMENT FOR UNIVERSITY OF CALIFORNIA, May, 2015 It is the policy of the University of California (UC) and the UC Division of Agriculture & Natural Resources not to engage in discrimination against or harassment of any person in any of its programs or activities (Complete nondiscrimination policy statement can be found at (<http://ucanr.edu/sites/anrstaff/files/215244.pdf>)). Inquiries regarding ANR's nondiscrimination policies may be directed to John I. Sims, Affirmative Action Compliance Officer/Title IX Officer, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1397.

Cooperative Extension Butte County ♦ 2279-B Del Oro Avenue Oroville, CA 95965

Office (530) 538-7201 ♦ Fax (530) 538-7140 ♦ cebutte.ucanr.edu/

2019 IPM Breakfast Meetings

Join Area IPM and Farm Advisors to discuss current pest management and production issues. We will largely focus on orchard crops (but everything is on the table for discussion!). These meetings are open to all interested growers, consultants, PCAs, CCAs, and related industry.

Meetings will be held the **second** Friday of each month (8:00-9:30am ***note new start time***) from March through October and will cover a wide range of timely pest and orchard management topics. Meeting locations will be rotated throughout the Sacramento Valley each month. Please contact Emily Symmes to request topics or bring your questions to the meeting!

- March 8th, 2019 (Butte County): Red Rooster Café, Durham
- April 12th, 2019 (Yuba-Sutter-Colusa Counties): Location TBA
- May 10th, 2019 (Tehama County): Field Meeting, Location TBA
- June 14th, 2019 (Glenn County): Field Meeting, Location TBA
- July 12th, 2019 (Butte County): Field Meeting, Location TBA
- August 9th, 2019 (Yuba-Sutter-Colusa Counties): Field Meeting, Location TBA
- September 13th, 2019 (Tehama County): Rockin' R Restaurant, Red Bluff
- October 11th, 2019 (Glenn County): Berry Patch Restaurant, Orland

Details will be posted at sacvalleyorchards.com. **RSVPs required** at (530) 538-7201 or ejsymmes@ucanr.edu

****DPR and CCA Continuing Education hours requested****

Industry Partners: Sponsorships for venue and refreshment costs are welcome and appreciated. If you would like to sponsor one or more of these meetings, please contact Emily Symmes to inquire.

Growing the Valley Podcast: Walnut episodes posted!

Listen to the UC Cooperative Extension podcast hosted by Butte County Farm Advisor Luke Milliron and Madera County Farm Advisor Phoebe Gordon! Listen and learn more at: growingthevalleypodcast.com // **Subscribe at Apple iTunes and Google Play Music**



Scale Pests, Navel Orangeworm, and Flatheaded Borers

Emily J. Symmes, Sacramento Valley Area IPM Advisor

University of California Cooperative Extension and Statewide IPM Program

As we ring in the new year, there are a few pest management considerations during the dormant and delayed-dormant period that should be on your radar. As summarized in Farm Advisor Janine Hasey's article in this newsletter, cost-saving measures are always an important consideration, particularly in "lean" commodity price years. The basis of Integrated Pest Management (IPM) theory centers around economic concepts – treating pest populations only when doing nothing will cost you more than doing something, and treating at the most effective time using the best methods and materials available.

Scale pests – walnut scale, frosted scale, European fruit lecanium. Recent research has shown that there are two primary effective timing(s) for treating scale pests in walnuts: delayed-dormant and spring (crawler) timing. Knowing whether or not treatment is indicated begins with evaluating scale populations during the dormant period. This monitoring step should not be omitted as a cost-saving approach. Remember – the most expensive pest treatments are the ones that aren't needed or don't work.

To monitor for scale pests during the dormant period, examine scaffolds, limbs, and branches for presence of pests and evidence of biological control activity. Make sure to look at recent prunings as well, or get up in the tree canopy on a pruning tower, as population densities or viability may differ at different heights of the tree. The decision tree (Figure 1) and photos below can be used to help you determine whether populations may require treatment. In the case of walnut scale, the scale cover can remain attached to the tree long after the insect beneath has died. Take time to peel back the scale covers to evaluate the viability of walnut scale populations (live or dead, Photos 1 and 2), as research has indicated that properly-timed treatments using insect growth regulators (IGRs) can suppress populations for two to three years. Allowing more time between pesticide treatments saves money in application and pesticide costs AND allows the resident natural enemy populations to build up and provide FREE biological control.

Insect growth regulator materials (IGRs) are effective tools for managing scale pests if population evaluations indicate the need for treatment. These can be applied delayed-dormant (March), or when crawlers begin to emerge later in spring. Some considerations for each timing are bulleted below.

Delayed-dormant timing:

- Treat only if dormant monitoring indicates need.
- Often this will be a stand-alone treatment (only the insecticide in the tank for this pass through the orchard).
- Benefit to having the treatment completed before April/May, when other orchard activities ramp up, possibly limiting ability to precisely time crawler application.
- Follow up with spring crawler monitoring using double-sided sticky tape for walnut scale, visual observations of eggs/crawlers beneath frosted scale bodies.

Crawler timing:

- Time treatment to the emergence of crawlers (targeting peak crawler emergence; in our research trials, this has typically been approximately one week after detection of the first crawlers). Use the monitoring methods noted above. For walnut scale, look for the appearance of small, yellow, mite-sized crawlers to build up on the edges of sticky tapes. For frosted scale and European fruit lecanium, lift the adult female bodies and visually look for eggs (small, white, shiny in appearance; resemble tiny grains of rice) and crawlers (small, yellow, mite-sized; will be actively moving out from beneath the scale body).

- DO NOT time this treatment based on calendar (e.g., first week of May). Our monitoring over the past several years indicates that crawler emergence timing can be variable (we have observed onset of emergence as early as third week of April and as late as third week of May).
- Cost-saving benefit if coupled with another well-timed application (e.g., insecticide for another pest, fungicide, bactericide, nutrient) by saving a pass through the orchard.

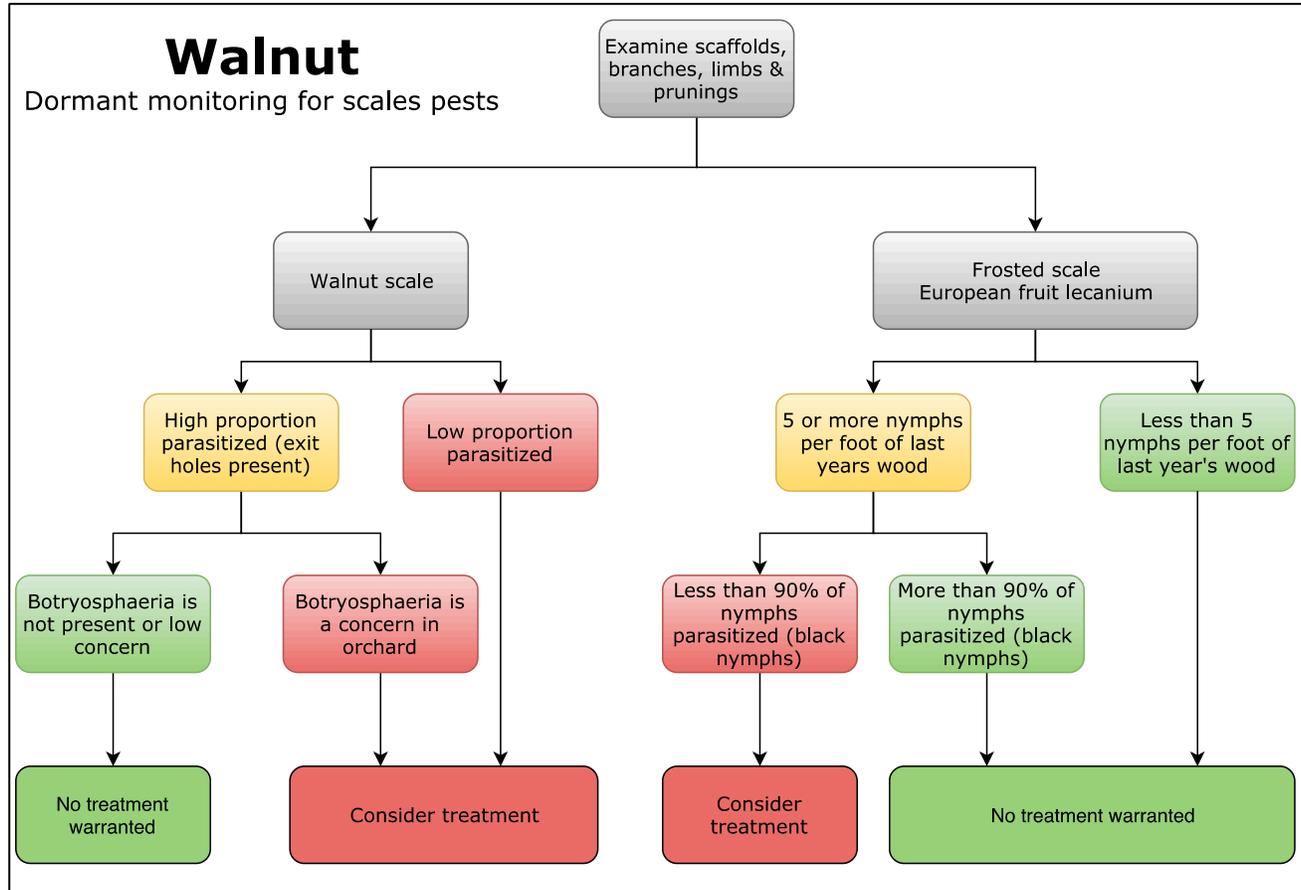


Figure 1. Dormant monitoring decision tree for scale pests in walnut (© EJ Symmes and DM Lightle 2018).



Photo 1. Live walnut scale adults.



Photo 2. Dead walnut scale adult. (Photo: E.J. Symmes)



Photo 3. Parasitized walnut scale adult.



Photo 4. Healthy (non-parasitized) frosted scale nymphs.



Photo 5. Parasitized frosted scale nymph.



Photo 6. Pacific flatheaded borer larva.

Navel orangeworm. In general, 2018 seems to have seen less harvest damage caused by navel orangeworm in California nut crops relative to 2017. Following the high damage year, nut crop growers throughout the state took more aggressive approaches to managing NOW, including more intensive sanitation efforts, increased adoption of mating disruption, and in some cases, additional in-season insecticide treatments. Growers who embraced this multi-tactic IPM strategy saw the best improvements to harvest damage. However, NOW remains a formidable pest with the potential to cause severe damage and losses in economic returns if growers do not remain vigilant.

So, how do we approach NOW management keeping the bottom line in mind? Give yourself the best-case-scenario heading into the season by minimizing the resident population in your orchard and limiting NOW development resources during the season prior to husk split. Avoid over-reliance on late-season insecticide applications (the most effective of which are newer chemistries that are not inexpensive). Treating at husk split can take the edge off of the impacts of immigrant NOW populations. In general, however, research has shown that efficacy of husk split treatments is limited in walnut orchards due to coverage issues, and can be challenging when considering pre-harvest intervals.

Yes, sanitation can be a relatively costly investment, but one that is worthwhile if you consider that this single activity can reduce your resident moth population to the tune of millions to tens of millions of resident moths by late summer. To get the best bang-for-the-buck with your sanitation efforts, evaluate mummy densities in trees, on the orchard floor (including berms and soil cracks), and areas in and around the orchard where nuts and debris accumulate. An additional step of cracking out some of the mummies to determine infestation rates can further indicate the areas of greatest sanitation need. In walnut orchards, there are often fewer mummies left behind in the tree canopies by mid- to late-winter (relative to almonds and pistachios), especially if we get some good wind and rain storms. This can save costs if shakers or polling crews are not needed to go back through the orchard to knock mummies down. That said, if your winter evaluation indicates significant mummies in the tree canopy, consider spot shaking or hand poling in those areas. If financial resources are a limiting factor for sanitation activities, begin in the areas of most concern (i.e., areas with most mummies, highest overwintering NOW infestation, blocks with historically high harvest damage). Blowing nuts off of berms into orchard middles prior to destroying them can provide added impact for your efforts.

Flatheaded Borers. BOLO (be on the lookout!). In the northern San Joaquin Valley this year, unusually destructive flatheaded borer populations were observed (Photo 6). This is not a new pest in walnut production, and has typically been opportunistic in nature, selectively infesting diseased, damaged, or otherwise stressed trees (often young trees). The nature of the observations in 2018 indicated that the infestations were potentially more severe and not necessarily limited to young, damaged, or stressed trees. Modest information is available about flatheaded borers in walnut (ipm.ucanr.edu/agriculture/walnut/Pacific-Flatheaded-Borer/). An extension article by Jhalendra Rijal, UCCE Area IPM Advisor (Northern San Joaquin Valley), with additional information on the 2018 observations and photos is available at: ipmcorner.com/single-post/2018/11/17/Pacific-Flatheaded-becoming-an-issue-in-walnuts. UC research has been initiated to investigate this issue further. At this time, no additional treatments are indicated, and we are still working to determine the prevalence of this issue in other regions of the state. If you observe unusual flatheaded borer damage in your orchard in the Sacramento Valley, please contact Emily Symmes at ejsymmes@ucanr.edu.

Cost and Expense Considerations in a Lean Price Year

Janine Hasey, UCCE Farm Advisor, Sutter, Yuba, Colusa Counties

Since last summer, coffee shop talk has been centered on the low price of walnuts. We all hope to see improvement in pricing soon. Even if prices increase, there are cultural and pest management options to improving your profit margin. We will have one article in each of our 2019 newsletter issues that will focus on labor and cost cutting considerations appropriate to the season, while discussing those operations you should not scrimp on, starting with this winter issue.

Winter/early spring labor saving strategies

Planting bare root finished trees (June bud or nursery grafted)

Typically bare rooted finished trees are about 5 to 6 feet tall at delivery and cut back to 3 to 6 buds after planting. Research and grower observation trials have shown trees left unheaded after planting grow as well or better than those headed back (photo 1). Initially unheaded trees may grow more slowly but fewer problems like bending in the wind have been observed.

A 5-year study comparing different heading heights at planting using several varieties and rootstocks was conducted by UCCE Walnut Specialist Bruce Lampinen at UC Davis. He headed back trees to 3, 6, 9, or 12 buds at planting. After 1½ years and for the remaining 3 years, there were no significant differences in tree height between the treatments. On finished trees at planting, consider skipping the heading back step to save money, but not the painting step. For more information, visit sacvalleyorchards.com/walnuts/horticulture-walnuts/walnut-tree-training-different-nursery-products/

Photo 1. Unheaded nursery grafted Chandler on RX1 on October 10, 2018. Yellow arrow indicates unheaded height at planting in February 2018. (Photo: J. Hasey)

No prune/no heading young tree training method

Since 2004, there have been 14 statewide replicated trials either completed or ongoing comparing the no pruning/no heading training method to the minimum pruning training method. Varieties compared include Chandler, Howard, Forde, Solano, Tulare, and Livermore on seedling or clonal Paradox or own-rooted Chandler and Howard. There are no trials comparing trees on black rootstock.



Additionally, there are many grower trials and those who have adopted the no pruning/no heading method. In two completed studies, yields were not significantly different for any pruning treatment after 7 years. There were no benefits to pruning compared to the unpruned/unheaded treatment during the young development stage of walnut trees.

Advantages to unpruned/unheaded training during the orchard development phase include:

- Early increased yield (photo 2)
- The crop is distributed over more primary scaffolds
- Less limb breakage in years 5 to 7

Disadvantages to pruning include:

- **Labor costs to prune and dispose of prunings**
- More scaffold breakage in years after pruning stops
- Lower canopy shades more rapidly leading to quality problems
- More pruning wounds exposed to *Botryosphaeria* infection

The only additional cost to the no pruning/no heading method may be the need for stake extensions during the 2nd leaf growing season. For more information, visit sacvalleyorchards.com/walnuts/horticulture-walnuts/training-young-walnut-trees-minimum-pruning-vs-no-pruning-compared/

Delayed dormant pest management cost-saving strategies

If an insect growth regulator insecticide was used for scale within the last two years, monitoring may indicate that a spray is not needed this year. See the article by Emily Symmes on pest management updates in this issue.

Photo 2. Unpruned/unheaded Solano on RX1 in Sutter County was mechanically harvested in 3rd leaf. (Photo: J. Hasey)



Tracking Winter Irrigation Needs

Allan Fulton, UCCE Irrigation and Water Resources Advisor, Tehama, Colusa, Glenn & Shasta Counties
Luke Milliron, UCCE Orchards Advisor, Butte, Tehama & Glenn Counties

Benefits of refilling the soil moisture profile

The dormant winter season is a time when evapotranspiration (ET) is low and it is an opportunity to refill the soil profile in your orchards prior to the next season. Some benefits include:

- Moist soils tend to be warmer and reduce the risk of winter kill from severe cold snaps.

- A full profile before leaf-out should delay the need for the first crop irrigation (except for frost protection) and provide better aeration to discourage diseases as the trees grow.
- Banking water for use later in the season which may help lessen summer pumping. It is particularly important in orchard soils that have very slow infiltration (silt and clay soils).

Tracking rainfall to gauge need for winter irrigation

Concerns of irrigating during a dry autumn were quenched along with the Camp Fire in late November when heavy rains came to the Sacramento Valley. Weather forecasts give an 80% chance of a weak El Niño during winter 2018-2019, that may bring above average rainfall (climate.gov/enso). Although the need to irrigate to replenish soil moisture has been abated for the time being and the forecast is promising, it is wise to continue tracking rainfall levels and the resulting soil moisture profile in your orchards. By tracking rainfall, it is possible to substitute irrigation for the shortage in rainfall on a monthly basis beginning in December until enough rainfall in combination with irrigation has been received to refill the soil profile at least three feet deep. Tables 1-4 demonstrate the idea of tracking rainfall to help gauge if and how much winter irrigation might be needed.

The tables show average monthly rainfall and total rainfall for four different areas in the Sacramento Valley and compares rainfall measured in the past two fall and winter seasons at four area CIMIS weather stations.

It highlights that total rainfall in 2017/18 generally lagged well behind average rainfall amounts from October through February, one notable exception was rainfall in November 2017 in the Chico (Durham) area. As a result, winter irrigation was a fairly common practice in 2017/18.

Focusing on the 2018/19 fall and winter season, rainfall in October was below average. Late November rains brought that month's total closer to the average in Red Bluff and Williams and above average in Woodland. Like the previous year, rainfall in November in Chico (Durham) area was the outlier, almost doubling the historic average and bringing localized flooding following the Camp Fire. So far, December rainfall through the 17th is lagging below average. As always, using site specific rain gauges rather than depending upon regional weather stations that are some distance away will improve accuracy. Also, different lengths in the orchard dormancy period for almond, prune, and walnut will also influence decisions.

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Avg. Monthly	1.2	2.8	4.2	5.0	4.1	3.2	20.5
2017/18 Winter	0.2	2.2	0.0	3.1	0.1	2.4	8.1
2018/2019 Winter	0.5	2.4	*1.8	?	?	?	4.7

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Avg. Monthly	1.4	3.3	4.6	4.8	4.4	4.3	22.8
2017/18 Winter	0.5	4.0	0.1	3.5	0.3	3.4	11.8
2018/2019 Winter	0.7	6.4	*1.9	?	?	?	9

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Avg. Monthly	0.8	2.4	2.9	3.3	2.6	1.8	13.8
2017/18 Winter	0.2	0.1	0.0	2.3	0.1	1.9	4.6
2018/2019 Winter	0.5	2.0	0.6*	?	?	?	3.1

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Avg. Monthly	1.1	2.4	3.7	4.5	4.1	3.0	18.7
2017/18 Winter	0.7	1.4	0.0	3.5	0.3	2.9	8.8
2018/2019 Winter	0.9	3.1	1.2*	?	?	?	5.2

* Precipitation reported is for December 1-17, 2018.

How Much Winter Irrigation is Needed?

Winter irrigation is only given consideration when rainfall is in short supply. How much irrigation water is needed is determined by how much water the soil profile can hold. Most orchard soils will hold between 1 to 2 inches of available water per foot of depth. Sandy soils will hold less water than silt and clay soils. So, when rainfall is very low, 5 inches or more of winter irrigation should go a long ways towards refilling at least a three-foot soil profile, where the vast majority of roots in mature almond and walnuts trees are found. More or less irrigation may be needed depending upon how deep the root system is thought to reach.

Most micro and mini sprinkler systems will apply between 1.25 and 2.0 inches of water per 18 to 24 hours of irrigation. So two or three winter irrigations, at most, should help. Drip irrigation applies water at lower rates and wets a smaller fraction of the orchard floor so this needs to be considered.

Leftover moisture from last season's post-harvest irrigations and effectively stored winter rainfall will reduce the amount of winter irrigation needed. Not all rainfall will be effectively stored in the soil profile as it depends upon the soil conditions and intensity of the storm. Relatively wet soils and particularly those with rolling topography will be prone to more runoff, especially if it is an intense storm. Light showers may be prone to evaporation, especially if they are followed by warmer, sunny weather. An orchard floor with vigorous winter vegetation will also transpire water and reduce stored moisture. As a general rule of thumb, on average only 50 to 60 percent of the actual rainfall will likely be effectively stored in the soil profile.

Eliminate the Guess Work

Given the extended forecast, December rainfall in 2018 is likely to far-exceed levels in 2017 (precipitation was virtually absent). Total rainfall in 2018/19 may go a long way towards the objective of refilling the soil profile to a depth of five feet or more. Soil moisture monitoring is the best way to measure the extent of soil profile refilling. Checking soil moisture by hand is a very basic method to evaluate soil moisture conditions. There are many online stores where soil augers can be purchased (try: JMC Backsaver, AMS samplers; Forestry Suppliers; and Ben Meadows). The USDA, NRCS also offers a nicely prepared publication with color pictures titled *Estimate soil moisture by feel and appearance*: nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051845.pdf

There are also a wide variety of soil moisture sensors that can also be used. Refer to the article *Soil moisture sensor selection is confusing* for more insight: sacvalleyorchards.com/blog/soil-moisture-sensor-selection-is-confusing/.

Updated Walnut Cost Study

UC Cooperative Extension and the UC Davis Agricultural Issues Center have recently updated and published the walnut cost study, "2018 Sample Costs to Establish and Produce English Walnuts in the Sacramento Valley". The study is based on best available production practices and cost estimates, and may be used to guide production decisions, estimate and prepare budgets or evaluate loans.

The cost study for walnuts, along with many other commodities, may be downloaded at coststudies.ucdavis.edu or sacvalleyorchards.com/other-resources/