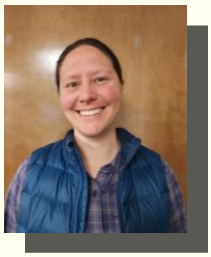
Sacramento Valley Walnut Newsletter

UC CE UNIVERSITY OF CALIFORNIA Agriculture and Natural Resources Cooperative Extension

Fall 2025

In This Issue



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Walnut Orchard Tasks

Guadalupe Tejeda, Orchard Systems Lab Assistant, Glenn County

Tree Phenology: Post-harvest (mid-October), trees begin reallocating resources to replenish carbohydrate reserves, a process that extends through mid-November. Leaf drop commonly begins in mid-November and finishes by the end of the month. By December, walnut trees have moved into their dormancy phase. Instead of using resources for fruit production or trunk growth, which happens during the growing season, the goal during the winter is to survive and feed future tree growth once they come out of dormancy. Majority of carbohydrates that are stored in the tree for dormancy are located within the roots and serve as energy reserves during this time. For walnut trees to have enough energy reserves to survive during the dormancy phase, post-harvest management is an essential task.

Evaluate pest damage: Nuts should be harvested on time to reduce the potential for any damage to be caused by naval orangeworm and preserving kernel quality. During harvest, nuts should be sampled so that the year's pest management program can be evaluated. Samples can be frozen and examined later in the winter when time allows. When evaluating the nuts taken for sample, careful inspection should be done to distinguish navel orangeworm damage from codling moth damage. Navel orangeworm can be identified through the crescent-shaped marks located in the backside of the head, usually brown in color. It often leaves webbing and copious frass within the shell of the nut. If there are black, mushy hulls found that have no damage to the kernel and have shells stained black, this is an indication of walnut husk fly present in the orchard.

Orchard Floor & Weed Management: If planting cover crops, plant after harvest to help in nitrogen management as well as reducing water runoff.

From October through December weed surveys should be conducted. Records of these surveys should be kept for future references. Pre-emergent herbicides should be applied from November through December. Pre-emergent herbicides should be applied in the row before any fall weeds emerge in the orchard. However, if weeds have already begun to emerge, a post-emergent herbicide should also be included in the weed management plan. Sweeping away any left-over leaf debris should be considered immediately before any applications of pre-emergent herbicides are done to allow the herbicide to fully encounter soil and be effective. An update on pre-emergent herbicides applied in winter can be found in this issue.

Plant Nutrition: Throughout the months of October and November, nut production should be analyzed, and the findings used to figure out how much nitrogen should be applied for the following year to replenish diminished nitrogen in orchards.

Orchard Sanitation: Remove mummy nuts from the end of November through December to prevent naval orangeworm (NOW) and any other diseases that can thrive in leftover nuts. Huller waste materials should also be removed to reduce overwintering sites where NOW can survive. Infested piles of wood and pruning should be burned removed from the orchard to manage walnut twig beetles.

Throughout the month of December, dormant spur sampling should be conducted to determine treatment for scale & mites.

Disease Management: A survey of the orchard should be done to look for any dead or infected branches that could contain Phomopsis and Botryosphaeria cankers. Pruning to reduce inoculum should be done only if there is a prediction of a dry period. If no dry period is occurring, then pruning should be done during the summer. Be watchful for any black hulls with stems still attached since this may indicate a Botryosphaeria infection. Early signs of Botryosphaeria infection can be identified when wilting and flagging leaves are located on branches beyond the infected site. Any nuts that have dried, black hulls can also indicate issues with water management.

Vertebrate Management: Gopher management is done from October to December since mounding activities are at their peak. Since gopher populations are at their lowest during early winter, management for these vertebrates at this time of year is more productive than waiting until gophers have already reproduced. Flood irrigation, tilling, baiting, trapping, certain fumigants, and gas explosive devices are all various methods used to help in gopher management. More information regarding overall vertebrate pest management can be found here.
When it comes to California ground squirrels, see the article in this issue.

Orchard Removal: If an orchard is being pulled, trees should be cut and painted with Garlon as well as ripping, backhoe or slip plow usage, and fumigation. Dead tree removal should occur from October through the first half of December.

Post-harvest Ground Squirrel Management

Clarissa Reyes, Orchard Systems Advisor, Sutter-Yuba, Butte & Placer counties
Roger Baldwin, Professor of Cooperative Extension, University of California, Davis

I've received multiple farm calls regarding extreme ground squirrel infestations in orchards over the past two years. Potential reasons for high ground squirrel populations are an increase of abandoned orchards with no pest control, increased restrictions on tools for ground squirrel control, and an increase in vegetative food sources for rodents after a period of drought. Problems in nut orchards include damage to nuts, tree bark, trunks, scaffold limbs, and underground root systems, chewed irrigation lines, and in the most extreme case I saw this summer, complete crop loss. It can be difficult to control squirrel populations mid-season, when there are a lot of nuts as a food source and when some squirrels may be estivating (hibernating due to summer heat). However, here are some post-harvest and dormant season management practices that may help knock squirrels back before next year.

Post-harvest: Bait with zinc phosphide-treated grain (2.0%)

- Zinc phosphide bait consists of grain treated with the toxin and can be a cost-effective method for controlling ground squirrels, especially when populations are high. To be effective, bait must be used at a time of year when ground squirrels are feeding on seeds and will readily accept baits.
- Zinc phosphide is an acute toxin and kills ground squirrels after a single feeding, so it can reduce numbers more quickly than anticoagulant rodenticides, which require multiple feedings.
- Zinc phosphide is applied via broadcast applications or spot treatments. It is not generally allowed for use in bait stations, although this may change in the future.
- This bait has a distinctive odor and taste, so squirrels can eat a little and get sick, but not die, and then learn that the bait is bad (become "bait shy").
- If you want to improve chances that they will eat the zinc phosphide bait, you can pre-bait the area. Before broadcasting or spot treating with treated bait, you should prebait with untreated grain 2-3 days prior to the application of zinc phosphide. Check for bait consumption a few days later. If they are taking the pre-bait, apply the zinc phosphide per label specifications. If bait is not readily consumed, a zinc phosphide application is not likely to be effective.
- Most squirrels will die underground and not be visible. Additionally, zinc phosphide has very low to almost no secondary exposure risk to predators or scavengers, making it safer for use than anticoagulant rodenticides from this perspective.
- However, zinc phosphide is acutely toxic and has no antidote. As such, it poses a greater risk of primary exposure to nontarget species than do anticoagulant rodenticides.

Late winter/early spring: Fumigation

- You can fumigate with gas cartridges, aluminum phosphide tablets/pellets, pressurized exhaust machines, and carbon dioxide injection devices.
    - Aluminum phosphide is often cheaper, but a restricted materials permit is required for using aluminum phosphide.
    - If using aluminum phosphide, place the tablets deep into the burrow and then cover the opening with newspaper or some other material before covering the entrance with loose soil. The newspaper acts as a barrier to keep the tablets from getting buried by the soil. If buried, the gas will not evolve from the tablets at a fast enough rate to be effective.
    - Gas cartridges should be lit and inserted into the burrow. All openings where smoke is detected should be buried with loose soil to hold the gases in.
    - Pressurized exhaust machines and carbon dioxide injection devices use a probe to inject the compressed gas into the burrow entrance. Be sure to treat all active burrow entrances unless you know they are connected to another entrance that you are treating. Burrow entrances should be closed while you are injecting carbon dioxide or pressurized exhaust into them.
- Fumigation should happen in early spring (after bloom for almond) when soil moisture is high. This is very important; sufficient soil moisture is required to maximize effectiveness of burrow fumigants, and most do not work well at all if the soils are dry. For best control, use burrow fumigation about 2-3 weeks after the first ground squirrels emerge from hibernation.
- Do not treat inactive burrow systems.
- After the initial fumigation, recheck burrows and re-fumigate any that have been re-opened.

Next season: Bait stations with anticoagulant bait (e.g., diphacinone or chlorophacinone 0.005%)

- Bait stations can be effective when squirrels still have limited food availability during late spring/early summer, when there is less green vegetation to feed on, but nut crops have yet to set.
- Place bait stations near runways or burrows and secure them so they cannot be tipped over. If ground squirrels are moving into the crop field from adjacent areas, place bait stations along the perimeter of the field where ground squirrels are invading, one station every 20 to 100 feet depending on ground squirrel density in a given area.
- Successful baiting via bait stations usually requires 2 - 4 weeks. Anticoagulant rodenticides are chronic-feed materials, meaning they generally need to be consumed over the course of several days to get a lethal dose. As such, you need to regularly check bait stations to make sure they maintain a constant bait supply. If bait goes missing after only a day or two, more bait stations may be needed.

Notes on zinc phosphide, aluminum phosphide, and anticoagulants: These are restricted chemicals and need to be on a grower's pesticide use permit in order to use them. They can be added to a grower's private applicator card or a state issued applicator license via your Ag Commissioner's office, who will then send the updated permit to the grower or chemical dealer via email.

Also, the mention of products is not a pesticide recommendation, simply the sharing of research results. Consult your PCA and always read the pesticide label; the label is law.

Trapping:

- Can be effective as a follow up approach to other tools, but it is not generally the primary tool for ground squirrel control unless the population size is small or if you are an organic producer.
- Can use kill traps or live traps. Examples of kill traps include body gripping traps, tube traps, and automatic repeating traps. Examples of live traps include single and multi-catch cage-style traps.
- Traps must be checked daily. If using live traps, ground squirrels must be euthanized humanely either via shooting in the head or through the use of a carbon dioxide euthanasia chamber.
- Prebaiting traps (a period where bait is placed in traps but the traps aren't activated) can increase the effectiveness of a trapping program. Keep prebaiting until the bait is removed from all or almost all of the traps on a regular basis. When that occurs, it is time to set the traps.
- Trapping always takes more traps than you think. Many traps are needed for a trapping program to be successful, but the general number of traps will vary depending on the density of ground squirrels in an orchard.

Additional resources on ground squirrel management can be found at http://www.groundsquirrelbmp.com/

Irrigation dripline damaged by ground squirrels. (Photo: C. Reyes)

Only one nut left on this almond tree - complete crop loss from ground squirrels by July. (Photo: C. Reyes)

Ground squirrel burrows in background, almond shells on ground as evidence of crop loss in foreground. (Photo: C. Reyes)

Ground squirrel burrows (Photo: C. Reyes)

Ground squirrel bait station (Photo: R. Baldwin)

Pre-emergent herbicides: 2025 herbicide demonstration trial for walnut

Ryan Hill, UCCE Agronomy and Weed Science Advisor, Tehama County

Newsletter Article Overview

The 2025 walnut pre-emergent herbicide demonstration trial is completed, and the results show strengths and weaknesses of 19 different herbicide treatments, applied either in February or March.

Takeaways:

1. All treatments were applied with a strong post-emergent mix, but hairy fleabane and white clover were not adequately controlled with post-emergent treatments alone. Control was dependent on the addition of an ALS inhibitor herbicide (products like Craze, Matrix, or Mission).
2. Summer annual weeds were best controlled by products with long residuals (products like Alion, Chateau, Brake On! (not registered in CA), and Prowl.
3. Yellow nutsedge was controlled by treatments with Zeus or Craze.
4. Conclusion: Pre-emergent treatments in late winter must account for winter annual weeds that have already emerged and perennial weeds while also maintaining good residual control further into the summer.

Introduction

Winter pre-emergent herbicide applications are critical to get right if yearly weed management operations are going to be successful in walnut orchards. Poor selection of herbicides or missed timing could make the difference between good control and battling an overwhelming infestation of weeds. In walnut orchards I have regularly heard two comments concerning pre-emergent herbicide applications in walnut orchards:

1. Those who apply pre-emergent herbicides in the fall, just after harvest, tend to have the cleanest orchards.
2. February or March are the most common times to apply pre-emergent herbicides in walnut orchards.

Maybe my perception is incorrect, but these weed control strategies seem to be at odds. When it comes to winter annual weeds, it is likely safest to apply pre-emergent herbicides before germination due to several common weed species with herbicide resistance issues (hairy fleabane, Italian ryegrass, annual bluegrass). Applications later in the winter will have to deal with emerged weeds, potentially resulting in more escapes and misses.

However, herbicide treatments in February or March are common, and many growers have been successful with these treatments. Why is this, and what is the key to achieving good control later in the winter? Success at later timings depends on how much post-emergent activity you are getting out of your tank mix. Some pre-emergent herbicides can contribute to your post-emergent activity. Common pre-emergent herbicides like Goal, Chateau, Matrix, Pindar, and others add some extra post-emergent activity to tank mixes when used in winter months. Dr. Brad Hanson (UCCE Weed Specialist at UC Davis) discussed this topic when he addressed tank mixes of Alion and Matrix in his UC Weed Science Blog article (linked here). My recent work with rimsulfuron on established johnsongrass also explored this subject (linked here). These prior discussions focused on rimsulfuron products as tank mix partners for pre-emergent applications, but I wanted test a broader range of products applied in February and March. This year's walnut preemergent herbicide demonstration made some progress toward that goal.

I will discuss my findings next, and at the end of this article I have included results tables. All products except one are currently labeled for use in walnut orchards, though with some restrictions on orchard age. The one unlabeled product in this study was Brake On!, manufactured by SePRO, currently pending registration in CA. This is not an exhaustive list, and the data provided here does not constitute a recommendation of any product.

Trial design

In 2025, I arranged my pre-emergent demonstration trial to evaluate individual products and tank mixes for weed control efficacy when applied in February and March. This trial was installed in the Loybas Hill region of Tehama County, in a 4-year-old walnut orchard with Tehama silt loam soil. A post-emergent mix of 2 qt/A Roundup Powermax 3 and 2 qt/A Rely 280 was added to every plot in February, and pre-emergent herbicides were applied either in the mix, or one month later in March. The tables at the end of this article show the full list of treatments and when they were applied. The first table represents weeds that were present at application, hairy fleabane and white clover. The second represents weeds that grew to be prominent in May and June, so their control depended on residual activity from my herbicide treatments lasting long into the summer.

Results overview

White Clover and Hairy Fleabane (Table 1): Both weeds were controlled by all three group 2 herbicides tested: Craze, Revolt, and Mission. Revolt was weaker on fleabane while Craze was weaker on clover and these differences also showed up in the tank mix treatments with both products applied with Prowl. February and March treatments with these three herbicides produced very similar results. The 12 fl oz/A rate of Chateau also effectively suppressed both species.

Summer annual weeds (Table 2): The primary weeds in the categories recorded here were grass weeds (jungle rice and large crabgrass) and broadleaf weeds (prostrate knotweed, spurge, and pigweed). Many herbicides provided good control until June (3-4 months after treatment) but only Alion, Brake on! (not currently labeled for CA), and March-applied Mission maintained "good" control of broadleaves through July. Only Alion and Prowl maintained "good" control of grasses through July.

Yellow Nutsedge (YNS; Table 2): Zeus was the best tested product for nutsedge control, but Craze also showed some effects in July by keeping nutsedge coverage low. Rimsulfuron products like Matrix and Revolt are also labeled for YNS control, but labels suggest sequential applications, and the application timings used in this trial may not have been ideal to target YNS with this product.

Summary and cautions:

This is a single trial only representing one weed population and one soil type, so results may vary by location. However, hopefully this demonstrates the importance of tank mixing to control emerged weeds as well as future emergence. Group 2 herbicides like Revolt, Mission, and Craze can provide good post-emergent control in addition to their pre-emergent activity. But be cautious, this herbicide group is notorious for herbicide resistance. Do not overuse this class of herbicides or you will likely start seeing weeds escaping your treatments.

Look through the following tables if you are interested in seeing more information on efficacy in these trials. To see weed coverage data, view the report on the UCCE Tehama website here.

Thanks to the California Walnut Commission for supporting this work.
For any questions or additional information, contact Ryan Hill at 530-527-3101 or rjahill@ucanr.edu

Weed control tables:

Control was determined by calculating % reduction in weed coverage, relative to the plot with the worst infestation. Control is summarized by four categories. These categories may not represent each grower's threshold of tolerance for weed control, but they can still provide relative comparisons between the products tested.

Poor control is indicated by a "p", representing control between 0 and 50%.
Moderate control is indicted by an "m", representing control between 50 and 70%.
Good control is indicated by a "g" and highlighted light green, representing control between 70 and 90%.
Excellent control is indicated by an "e" and highlighted dark green, representing control between 90 and 100%.

Table 1: The effect of different pre-emergent herbicides on two weeds that were present at application, hairy fleabane and white clover.

		% control of weed species present at application			
		Hairy fleabane		**White clover**	
February treatments		May	June	May	June
Alion	3.5 fl oz	p	p	m	m
Goal	5 pt	g	m	m	m
Chateau	6 fl oz	p	p	m	m
Chateau	12 fl oz	g	g	m	g
Brake On	42 fl oz	m	p	p	p
Prowl	4 qt	p	p	p	p
Revolt	4 oz	m	m	e	e
Craze	5.7 oz	e	e	m	g
Craze	8.6 oz	e	g	m	m
Mission	2.85 oz	e	e	e	e
Zeus	8 fl oz	p	m	p	m
Zeus	12 fl oz	p	p	p	m
Craze+Prowl		e	e	e	g
Revolt+Prowl		g	g	e	e
March Treatments					
Prowl	4 qt	p	p	p	p
Revolt	4 oz	e	g	e	e
Craze	8.6 oz	e	g	e	e
Mission	2.85 oz	e	e	e	e
Zeus	12 fl oz	p	p	p	p

Table 2: The effect of different pre-emergent herbicides on weeds that germinated or sprouted in summer. Summer annual broadleaves included prostrate spurge, knotweed, and pigweed and summer annual grasses were primarily crabgrass and jungle rice.

		% control of summer annual weeds				% control yellow nutsedge	
		Broadleaves		Grasses			
February treatments		June	July	June	July	June	July
Alion	3.5 fl oz	g	g	e	e	p	p
Goal	5 pt	p	p	g	p	p	p
Chateau	6 fl oz	m	p	m	p	p	p
Chateau	12 fl oz	e	m	m	p	p	p
Brake On	42 fl oz	g	g	g	m	p	m
Prowl	4 qt	m	p	e	e	p	p
Matrix	4 oz	g	p	g	p	p	p
Craze	5.7 oz	p	p	p	p	p	p
Craze	8.6 oz	p	p	p	p	p	g
Mission	2.85 oz	e	p	e	p	p	p
Zeus	8 fl oz	p	p	p	p	m	g
Zeus	12 fl oz	p	p	p	p	g	e
Craze+Prowl		g	p	e	e	g	g
Matrix+Prowl		e	p	e	g	p	p
March Treatments							
Prowl	4 qt	m	m	e	g	p	m
Matrix	4 oz	m	p	m	p	p	p
Craze	8.6 oz	p	p	p	p	m	g
Mission	2.85 oz	e	g	g	p	m	p
Zeus	12 fl oz	p	p	p	p	m	e

New Staff Research Assistant: Guadalupe Tejada

Hello everyone, my name is Guadalupe Tejeda, and I'm the new Orchard Systems Lab Assistant for the UCCE Glenn County office based in Orland. In this position, I will be helping with research and outreach efforts focusing mainly on walnuts, prunes, almonds, and olives. I grew up in Dixon, CA, where agriculture has always played a large role in my daily life. I was raised on a small farm, and I've also been surrounded by family and friends who were also involved in agriculture.

I earned my bachelor's degree in plant and soil science, specializing in crops and horticulture, with a minor in agricultural business from Chico State in 2024. While at Chico State, I worked as an undergraduate research assistant and researcher, which allowed me to gain hands-on experience in prune and almond orchard projects that collaborated with UCANR and the UC Davis Conservation Irrigation Lab.

This position is the start of my professional career, and I'm enthusiastic to be part of the team. I look forward to collaborating with the region's growers, industry partners, and colleagues to help address challenges and find solutions to further support the work being done in the agriculture community.

If you have any questions, need assistance, or wish to introduce yourself, please feel free to reach out to me at gtejeda@ucanr.edu. I am excited to be part of this wonderful community and look forward to collaborating and working with you!

Save the Dates: Fall & Winter Meetings

Next month on November 20 at UCCE Sutter-Yuba:

***9 AM – 12 PM**: Groundwater Management & Recharge Meeting - Colusa, Sutter, and Yuba Counties*

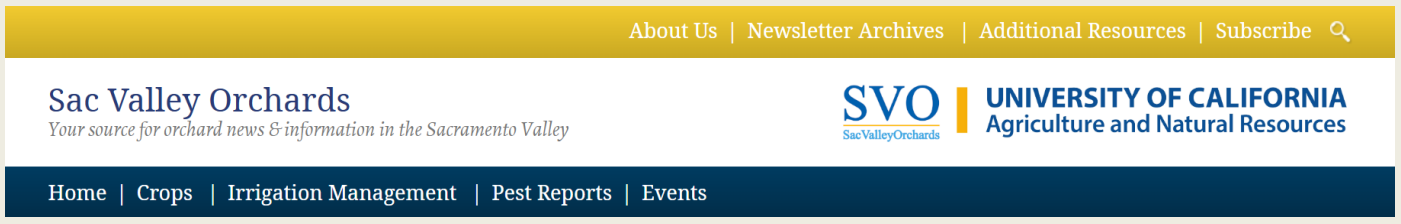
- Dr. Thomas Harter (UCCE Specialist, Dept of Land and Water Resources) will present an overview of groundwater concepts.
- Dr. Helen Dahlke (UCD Professor of Hydrologic Resources) will discuss groundwater recharge principles and research.
- Speakers from local water agencies will provide an overview of GSA roles, status updates on overall subbasin hydrology and GSPs, and current groundwater recharge projects.

***1 PM – 3 PM**: Third Thursday: Sac Valley Tree Crop IPM Review*

- UCCE farm advisors will talk about IPM problems they encountered over the 2025 season and invite others to share their experiences and any significant challenges. DPR credits will be applied for.

Program	Date	Location
Groundwater Management & Recharge Meeting	Nov 20, 2026 9 am – 12 pm	142A Garden Highway, Yuba City
Third Thursday: Sacramento Valley Tree Crop IPM Review	Nov 20, 2026 1-3 pm	142A Garden Highway, Yuba City
Almond Board of California Annual Conference	Dec 10-12, 2025	Sacramento
North Valley Nut Conference	Jan 14, 2026, 7 AM - 12 PM	Silver Dollar Fairgrounds, Chico
Yuba/Sutter Spray Safe	Jan 14, 2026	Yuba City
North Sac Valley Prune Day	Feb 26, 2026	Red Bluff
Sutter-Yuba Walnut Day	Mar 4, 2026	Yuba City
North Sac Valley Walnut Day	Mar 5, 2026	Red Bluff

These newsletter articles, and the latest orchard announcements, events, and resources are available at our website



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