



COOPERATIVE EXTENSION ... UNIVERSITY OF CALIFORNIA

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SACRAMENTO VALLEY REGIONAL WALNUT NEWSLETTER



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WALNUT BLIGHT MANAGEMENT USING BUD POPULATION INFORMATION

Richard P. Buchner - UC Farm Advisor, Tehama County
Steven E Lindow - Professor of Plant Pathology, UC Berkeley

Depending upon weather conditions, pathogen population and walnut variety, walnut blight caused by the bacterium *Xanthomonas juglandis* can cause significant crop loss. We have measured over 50% crop damage on Chandler walnuts when overwintering bud populations were high and spring rainfall favored disease. Conversely, we have measured little to no disease on Chandler walnuts with low bud population levels even when wet spring weather favored disease. Over the years we have measured a relationship between initial inoculum in dormant buds and subsequent disease severity and have successfully used that relationship to predict disease. In the 2010 walnut blight experiments in Tehama County, spring weather and rain fall simulation using above tree sprinklers again failed to trigger walnut blight disease on Chandler due to initial low pathogen populations. Also in the 2010 experiments, we sprayed seven trees with a suspension of walnut blight bacteria and caused 61.4 percent walnut blight damage compared to 2.6 percent on unsprayed trees with a very low initial bud pathogen population. This provided another indication that the amount of pathogen in buds early in the season can influence walnut blight disease at least on late leafing varieties.

Three things are necessary for a disease to occur: pathogen, host and favorable weather. Plant pathologists refer to this as the disease triangle. If we can reduce or eliminate any leg of the triangle we can greatly favor reduced disease. We have some control over the host (late leafing varieties), no control over the weather but we can monitor the pathogen and use bud population levels to our advantage.

Walnut blight epidemics can proceed in either a monocyclic or polycyclic manner. In a monocyclic disease, infections that happened during the spring do not lead to inoculum that can spread and cause secondary infections. Infrequent rainfall during the spring can be one reason why monocyclic progress of the disease can occur. In contrast, if infections during the spring lead to productions of inoculum that can spread to and infect new tissue, the disease is polycyclic (analogous to compounded interest on money). Frequent spring rainfall would tend to favor such disease epidemics. Why walnut blight bacteria are sometimes monocyclic and sometimes polycyclic is not always clear and both have been observed in our blight experiments although monocyclic disease progress is most common. For Chandler walnuts in our experiments we have measured very low pathogen populations and very little blight damage suggesting a monocyclic growth pattern. Also in 2010 we measured 11 orchards (Chandler, Howard or Hartley) for initial pathogen population and found 7 with no detectable pathogen. Blight disease pressure is low in those orchards and that information can be used to make in-season spray decisions. Late leafing varieties with no history of damage and low pathogen population levels in buds are low risk compared to early leafing varieties with high pathogen counts in bud samples. Bud population sampling can also be used to measure if walnut blight populations are building or are adequately suppressed using spray applications.

If you would like to check initial walnut blight pathogen populations, here's what you do:

- 1) Sample buds in December, January, February, March or early April for late leafing varieties. Buds can be sampled to the time they start to open. Early samples will allow more time to design disease control strategies.
- 2) Select 100 dormant walnut spurs with nice fat terminal buds. Cut off about a 3 inch length. Spurs reachable from the ground are easy to collect and represent a good sample location because bacteria sprinkle down through the tree canopy.
- 3) Walk the entire area collecting a random sample. One or two buds per tree should spread the sample adequately. Deciding how many samples to collect will depend upon experience on an orchard by orchard basis. One sample could easily represent 50 acres if experience suggests reasonable uniformity.
- 4) Save spurs in a paper bag and store in a cool dry place. The paper bag will allow samples to breathe and eliminate condensation. The lab will select a 30 terminal bud subsample to plate on agar and save the remaining buds as a backup sample. The results will look like figures one and two.
- 5) Mail to California Seed and Plant Lab; 7877 Pleasant Grove Rd. Elverta, California 95626. You might want to phone ahead at 916-665-1581.
- 6) Cooperative Extension Advisors can help interpret results of pathogen assessments and discuss the relative disease risks those measurements indicate.

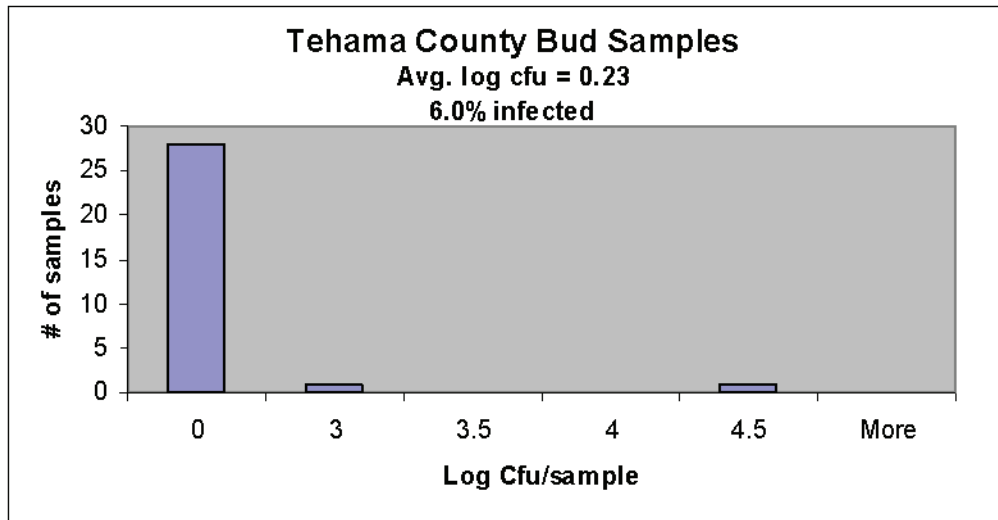


Figure 1. Incidence of populations of *X. juglandis* on Chandler walnut buds sampled following harvest on 12/1/10. This is a Histogram typical for a low population sample. Notice that over 25 buds had no detectable pathogen and few buds were in the ten to the third (1000 colony forming units) or more range. This would be an example of a low risk orchard.

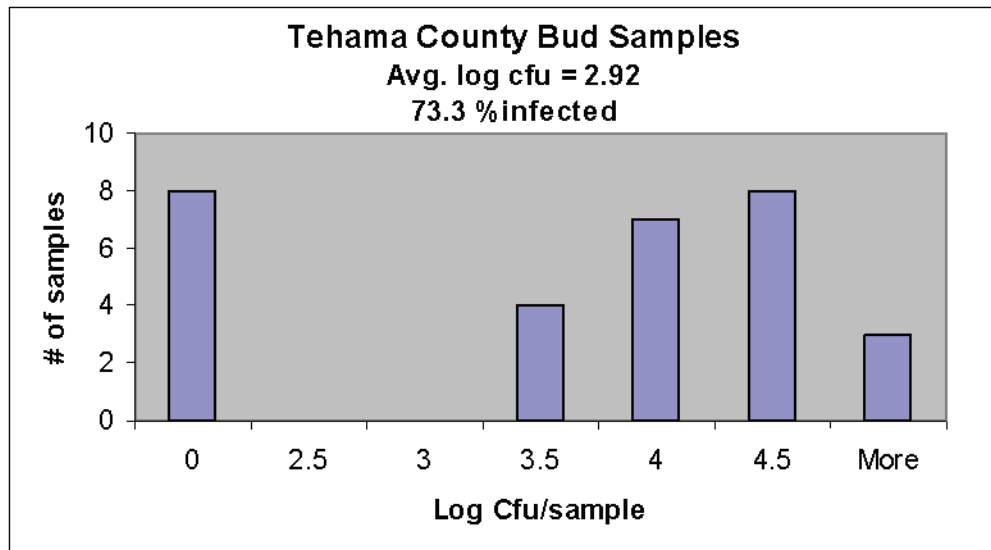


Figure 2. Incidence of populations of *X. juglandis* on Chandler walnut buds sampled following harvest on 12/1/10. This is a Histogram typical for a high population sample. Notice that only 8 buds had no detectable pathogen and most of the buds were in the ten to the fourth (10,000 colony forming units) or more range. This would be an example of a high risk orchard.

SECTION 18 FOR MANZATE FLOWABLE AND PRO-STICK FUNGICIDE

Richard P Buchner –Farm Advisor, Tehama County



The section 18 for Manzate Flowable and Manzate Pro-Stick fungicides was issued February 24, 2011 and amended March 4, 2011 to allow for the use of existing stocks to control walnut blight. The section 18 will expire June 15, 2011 and covers Butte, Calaveras, Colusa, Glenn, Merced, Placer, Sacramento, San Benito, San Joaquin, Santa Clara, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo and Yuba counties. These products must be tank mixed with a fixed copper product registered for use on walnut and not exceed 10 applications per season. Applications can only be made upon a written recommendation by a licensed pest control advisor or local farm advisor documenting that the weather is favorable for disease development and/or the disease is present.



INCIDENTS OF WALNUT SCALE ARE INCREASING

Carolyn DeBuse, UCCE Farm Advisor, Solano and Yolo Counties

Janine Hasey, UCCE Farm Advisor, Sutter and Yuba Counties

Bill Krueger, UCCE Farm Advisor, Glenn County

The infestation of scale insects in walnuts has been on the rise since 2004. Several conventional and organic orchards alike have seen an increase in walnut scale. Previously it was believed that scale insects populations were kept in-check by natural predators and parasitoids. This no longer seems to be working in many locations. Reasons for this are unclear. Past use of broad range insecticides may have suppressed scale populations more than understood. The phasing out of these chemicals in favor of pesticides specifically aimed at only one insect or group of insects such as the use insect growth regulators (IGRs) or pheromone mating disruption for codling moth may have resulted in increased scale populations. It may also be the case that there are a few pesticides that are suppressing the natural predators and parasitoids at higher levels in the orchards. It has been shown that pyrethroids, spinosad, spinetoram, and neonicotinoids used in-season may decrease natural predators and parasitoids while not controlling the scale. Heavy applications of kaolin clay used in organics to discourage codling moth egg laying and in many orchards to decrease sun burning also discourages parasitoids from laying on scale if they are coated with clay. Any or all of these factors or some unknown factor could be playing a part in promoting scale populations. Be on the lookout and monitor your orchard so that scale does not get out of hand.

This is a great time to start monitoring for scale. Look for scale on prunings. Before leafing out you can easily look at the fruit wood and monitor for the presence of scale and determine which species are involved. Walnut scale and San Jose scale are armored scale that will over winter as adults. Walnut scale will be grouped together in a “daisy” flower shape with the males clustered around the larger females. Their coatings will be a whitish grey. San Jose scale over winter in the black cap stage with their waxy coatings colored black and grouped randomly or found separately along the branches. These two are the most problematic scale found in walnuts with heavy populations killing fruit wood or even splitting bark on larger scaffolds if numerous enough. The other commonly found scale are not known to cause economic damage in walnuts include frosted scale, European fruit lecanium scale, and Italian pear scale which resides under lichens and moss. High populations of any scale insects should be treated.

If treatment of scale is needed, an effective time to treat is delayed dormant in March before leafing occurs to achieve best coverage and to avoid killing natural enemies. If a high level of parasitism is observed, treatments may be delayed until after crawlers emerge in late spring, normally in May. Monitor for crawlers by encircling small branches that have adult scale present with double sided sticky tape. Remove and examine the tape with a hand lens for crawlers twice a week. Treat orchard as the population of crawlers peaks. Italian pear scale is controlled by lichen or moss removal typically with copper.

Control options -

There are several control options available for orchards with heavy walnut or San Jose scale populations, minimal parasitism, weakened or dying fruitwood, and for in-season control, crawlers detected on sticky tape:

- The insect growth regulator Seize 35 WP. Coverage is very important. Use rates are 4 to 5 oz product/acre and a nonionic surfactant may be used to increase efficacy. Because it is an insect growth regulator, it may take the summer for scale to cycle out.
- Supracide 25WP at 8 lbs product/acre. Do not combine with oil or use more than once per growing season.
- Lorsban 4 EC at 4 pts product/acre. Do not make more than two applications per season.
- Narrow range oils can suppress low to moderate populations during the summer. Recommended for in-season control only directed at the crawlers. Do not apply to drought or diseased stressed trees or in temperatures over 90°F. This is the option for organic orchards.

In some orchards where heavy walnut scale and extensive dieback has been observed, we've also seen an increase in the fungal diseases *Botryosphaeria* and *Phomopsis* that cause cankers in infected limbs. We believe that the scale weakens these limbs and predisposes them to infection. Dead and dying wood should be pruned and removed and scale should be treated in these orchards. For more information on these canker diseases and management guidelines, see http://cesutter.ucdavis.edu/newsletterfiles/Sacramento_Valley_Walnut_News20862.pdf

For more information on scale go to the UC IPM website; www.ipm.ucdavis.edu or re-read the article in our May 2009 Walnut Newsletter at your cooperative extension websites.



Walnut scale (<http://ipm/PMG/r881300311.html>)



San Jose scale (<http://ipm/PMG/r881300411.html>)



IVANHOE WALNUT BLIGHT UPDATE

Janine Hasey, UC Farm Advisor, Sutter/Yuba Counties

'Ivanhoe' is an early harvesting variety developed by the UC Davis Walnut Breeding Program and released in 2010. You can refer to the 2010 summer issue of our regional walnut newsletter for detailed information on 'Ivanhoe' at this website: http://cesutter.ucdavis.edu/newsletterfiles/Sacramento_Valley_Walnut_News20862.pdf

Because of field observations establishing Ivanhoe's susceptibility to walnut blight, we believe it is not an acceptable variety for northern California but would make an excellent choice in areas where walnut blight is not a major concern. More evidence reinforcing Ivanhoe's blight susceptibility was discovered last fall in Yuba County on young trees. The photos below show twig cankers that were confirmed to be caused by infection of the walnut blight bacterium. Twig cankers like these are quite rare and underscore the extreme susceptibility of 'Ivanhoe' to walnut blight.

Photos 1 and 2. Walnut twig cankers on 'Ivanhoe' limbs.



EARLY SEASON GROUND SQUIRREL MANAGEMENT

Kathy Kelley Anderson, UCCE Farm Advisor, Stanislaus County

Ground squirrels: Controlling adult ground squirrels before they reproduce in the spring is a critical part of good management. Optimal time for control is during the breeding season when both males and females have emerged from hibernation. At this time, a majority of the squirrels are aboveground foraging for food and breeding. Burrow fumigation is the method of choice at this time of year when squirrels feed on green vegetation and are not interested in baited grains. A fumigant program followed by anticoagulant baiting in the summer can control 90% of the population. Squirrels typically breed from late January to early March, but the time can vary with the weather and location. For the best results, use burrow fumigants about three weeks after the first squirrels emerge from hibernation. Read the label carefully and follow directions and label rates. Applying more fumigant than recommended to each burrow does not increase control. Fumigation of holes with aluminum phosphide is prohibited within 100 feet of an occupied dwelling. A fumigation management is required. Save material and labor costs by treating only active burrows. Shovel holes or drag middles and edge areas to cover burrow openings and treat only those that are re-opened. Fumigate following rain or irrigation since soil moisture is necessary to release the gas. The best timing is early morning or evening when ground squirrels are most likely to be inside the burrows. Check all treated burrows a couple of days after fumigation and retreat any that have opened. More information can be found on the UC ground squirrel best management practices website at <http://groups.ucanr.org/gsbmp>.

CLONAL PARADOX WALNUT ROOTSTOCKS AND PEST INTERACTIONS UPDATE



Janine Hasey, UC Farm Advisor, Sutter/Yuba Counties
Michael McKenry, Extension Nematologist, UC Kearney Ag Center
Greg Browne, USDA Plant Pathologist, UC Davis

The standard walnut rootstocks are seedling Paradox and seedling black. Paradox seedling, which is a hybrid seedling between a black walnut species (usually northern California black) and English walnut, has been the rootstock of choice because of its greater vigor and relative resistance to most species of *Phytophthora*, compared to northern California black rootstock. However, seedling Paradox is highly susceptible to crown gall disease caused by *Agrobacterium tumefaciens*. Because of this susceptibility, many growers have opted to use the black rootstock, which has less trouble with crown gall in spite of the lower vigor. Work is underway to develop hybrid walnut rootstocks with desirable vigor as well as good resistance to soilborne pathogens. In the meanwhile, growers may want to consider using clonal Paradox walnut rootstocks where one expects nematode problems or other site specific diseases such as *Phytophthora* or crown gall.

The first Paradox clone to be micropropagated was ‘Vlach’ which came from a vigorous Paradox tree in Stanislaus County and has been available since 1999. Two other clonal Paradox rootstocks, ‘VX211’ and ‘RX1’, were released in 2007 after years of evaluation for vigor, resistance to nematodes, crown gall, and *Phytophthora*. They were identified as superior seedlings from the UC/USDA-ARS Paradox Diversity Study; micropropagated (cloned) and retested for their traits of interest before their release. Long-term evaluations of these rootstocks are continuing in greenhouse and field studies.

Clonal Paradox rootstocks provide options in selecting a rootstock to manage site specific problems or issues in orchards. The table below is our current state of knowledge and provides a guide for selecting the most appropriate clonal Paradox rootstock for certain situations. It should be noted that none of these clonal rootstocks have high levels of resistance but show promise in being able to grow because of some level of resistance or tolerance to the specific disease causing agent. The listings for ‘RX1’ and ‘Vlach’ clonal rootstocks have been updated to reflect a range of low to moderate resistance to crown gall based on more recent screening studies. For nematodes, the first letter in the table designates the nematode’s ability to reproduce in the presence of the rootstock. Rootstocks designated as “susceptible” under the nematode headings will produce far fewer nematodes per gram of root than those designated as “highly susceptible”. The second part deals with the rootstock’s response to the nematode. Only “VX211” has some tree tolerance to nematodes.

These clonal Paradox rootstocks are readily available through the walnut nursery trade as individual plants often sold in containers or as nursery grafted or budded field grown trees. For more information on walnuts in the nursery trade, how they are propagated and understanding the terminology, a handout is available at your local UC Cooperative Extension office or on the web at <http://fruitsandnuts.ucdavis.edu>.

Vigor and responses to selected nematode and disease pathogens by available clonal Paradox walnut rootstocks ¹

Trait of interest	‘Vlach’	‘VX211’	‘RX1’
Rootstock Vigor	High vigor	High vigor	Moderate vigor
Resistance to <i>Phytophthora citricola</i> (a cause of crown and root rot)	LR	MR	MR
Resistance to <i>Phytophthora cinnamomi</i> (a cause of root and crown rot)	LR	LR	MR
Resistance to <i>Agrobacterium tumefaciens</i> (cause of crown gall)	LR - MR	LR	LR - MR
	LR = low resistance	MR = moderate resistance	
Root Knot Nematode	S-IT	S-ST	S-?
<i>(Pratylenchus vulnus)</i>	Nematode’s ability to reproduce	HS = highly susceptible	
	Tree response to nematode	S = susceptible	
		ST = some tree tolerance to nematode presence	
		IT = tree intolerant to nematode presence, i.e. reduced tree vigor/health in presence	

¹Based on data from ongoing UC and USDA-ARS trials

²Tolerance due to a post infection resistance mechanism



FROST/WEATHER FORECASTING RESOURCES

Janine Hasey, UC Farm Advisor, Sutter/Yuba Counties

The National Oceanic and Atmospheric Administration (NOAA) National Weather Service provides weather forecasts, watches, warnings, and advisories. Their website at www.weather.gov/sacramento is an invaluable tool for weather forecasts. Click on “tables” on the left side, and you can make custom weather tables and set weather forecast intervals as close as one hour apart. It also forecasts dew point temperature that is critical for frost protection. Another website for detailed frost protection information is <http://biomet.ucdavis.edu/> provided by Rick Snyder, biometeorologist at UC Davis.



FRUIT & NUT NOTES

SACRAMENTO VALLEY REGIONAL WALNUT NEWSLETTER

The "SACRAMENTO VALLEY REGIONAL WALNUT NEWSLETTER" is a collaborative effort of walnut research specialists working together to provide Sacramento Valley growers and industry leaders the latest research and information effecting walnut production in today's changing environment. This newsletter will be published quarterly, be sure to look for upcoming issues!

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ORCHARD FLOOR MANAGEMENT FIELD DAY DEMONSTRATION AND HERBICIDE TRIAL



Located at a Yolo County walnut and almond orchard
Just north of Co rd 98 and Co. rd. 30 (see map)
10 – 11 am Wednesday, April 27, 2011
1 hr CE credit

*Weed Experts: Brad Hansen, Weed Specialist, Plant Sciences, UC Davis and
John Roncoroni, UCCE Weed Science Farm Advisor, Napa County*

Orchard Support: Carolyn DeBuse, UCCE Orchard Systems Farm Advisor, Solano and Yolo Counties

The trials were designed to evaluate premium residual herbicides plus burndown materials for dormant season application in tree nut crops. Several newer materials are being compared to the old standbys for their relative efficacy against hairy fleabane and a wide assortment of winter and summer annual weeds in young almond and walnut orchards.

Specific herbicides in the small plot tests include:

Roundup WeatherMax
Treevix
Matrix
Princep
Pindar GT
Gallery T&V

Rely 280
Prowl H20
Gramoxone Inteon
Alion 200
Chateau

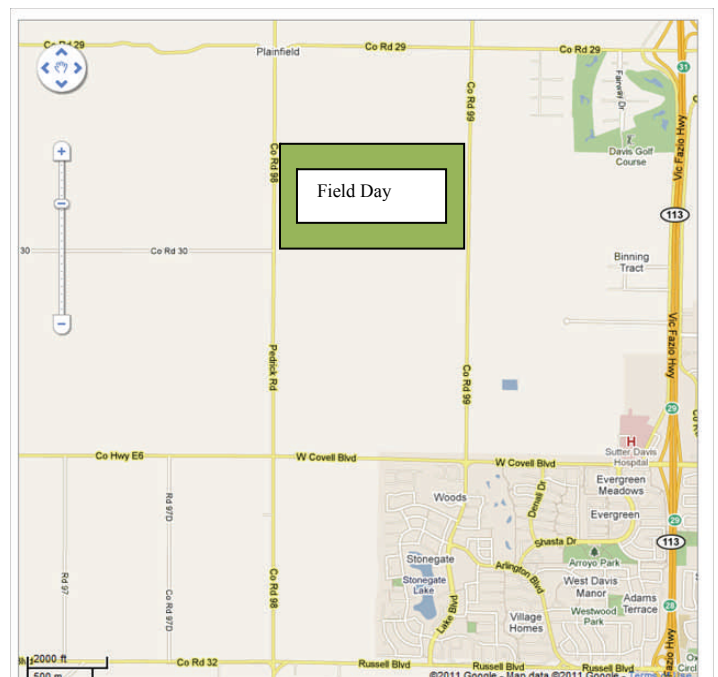
Additionally, large-plot demonstrations by the grower included:

- 1 oz Treevix + 4 oz Matrix + 2 pt Rely 280 + 4 pt Goal
- 1 oz Treevix + 4 oz Matrix
- 2 pt Rely 280 + 3 pt Pindar GT

For more information or Questions please contact the yolo county UCCE office at 530-666-8143

Directions/Map

Field trial is north of Davis on the east side of county road 98 just north county road 30 can be accessed from county road 99 as well. Trial is in the center of the two orchards





**GOPHER AND GROUND SQUIRREL CONTROL
IN ORCHARD CROPS
FIELD MEETING**



Thursday, April 14, 2011
Time: 10:00 am -12:00 pm
DiFiore Ranches Riverbottom Walnut Orchard
Live Oak Blvd 1/8 mile south of Pease Road, Yuba City
(see directions below)

Agenda

Introduction

Janine Hasey, UC Farm Advisor, Sutter/Yuba Counties

Regulatory Update

Jan Kendel, Ag Biologist, Sutter County Agricultural Dept

Gopher and Ground Squirrel Control/ Demonstration

*Roger Baldwin, IPM Wildlife Pest Management Advisor,
UC Kearney Ag Center*

During this presentation/demonstration, Roger will be covering practical information on how to incorporate pocket gopher and ground squirrel control methods into an IPM program. Control topics that will be discussed and demonstrated include trapping, burrow fumigation, and use of rodenticide baits. Roger will also discuss new changes in requirements for using rodenticides and burrow fumigants. Additionally, time will be spent demonstrating monitoring procedures to help identify the efficacy of utilized control measures and the potential need for additional control actions.

Sponsored by University of California Cooperative Extension, Sutter/Yuba Counties

Co-Sponsored by: Sutter County Agricultural Department

**2 hours (includes .5 regulations) PCA and Private Applicator hours approved;
CCA pending**

To reach the river bottom orchard in Yuba City, go east on a road off Live Oak Blvd that is 1/8 mile south of Pease Road and across from Beymer Well Service. A sign will be posted. Cross the railroad tracks and follow the road over the levee. A sign will be posted for parking. When leaving the orchard, pay careful attention to the railroad tracks that do not have a sign posted and be on the lookout for a train.



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