Sacramento Valley Walnut News
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Submitted by:

Janine Hasey
UCCE Farm Advisor
Sutter, Yuba and Colusa Counties

New IPM Advisor Introduction

Emily J. Symmes, UCCE Area IPM Advisor, Butte, Colusa, Glenn, Sutter, Tehama, and Yuba Counties

In June 2014, I began working as the Area Integrated Pest Management (IPM) Advisor for Butte, Colusa, Glenn, Sutter, Tehama, and Yuba Counties based out of the Butte County Cooperative Extension Office in Oroville. I was born and raised in the Sacramento Valley (mostly Chico) before heading off to pursue my education in the early 2000s, returning to live in the Durham area in 2012.

I began working in agriculture as a young teenager, and quickly decided that I wanted to pursue a career where I could serve the agricultural community and its consumers while advancing pest management practices. I earned B.S. and M.S. degrees in Entomology from UC Riverside, where my study and research emphasized insect mating and feeding behaviors and the spread of plant pathogens by insects, specifically whiteflies and aphids. In 2012, I completed my PhD in Entomology at UC Davis, where my research focused on alternatives to current monitoring and management practices for aphid pests in prune orchards, using aphid sex pheromones to improve monitoring capabilities and impact of pest and natural enemy populations.

I have enjoyed numerous opportunities to work in many different aspects of agriculture. In my early years, I started by fielding phone calls and acting as a field scout for pest management consultants. Later, while contributing to academic and applied research, I became part of a great network of information sharing among Extension Specialists, Advisors, growers, PCAs, and others. I look forward to working with Sacramento Valley growers and continuing to be a part of our agricultural community. Please feel free to contact me any time at ejsymmes@ucanr.edu or at the Butte County UCCE office in person or at (530) 538-7201.

New Farm Advisor Introduction

Katherine Pope, UCCE Farm Advisor Sacramento, Solano and Yolo Counties

I'm excited to have recently joined the UC Cooperative Extension team as the Farm Advisor for almonds, prunes and walnuts in Sacramento, Solano and Yolo Counties. I grew up in Sacramento and Yolo Counties, mostly in south Sacramento, and on a boat between West Sac and Clarksburg. I am excited to be able to put down roots and contribute to the continued prosperity of agriculture in my home region.

After straying from California in my college years, I returned to UC Davis in 2008 for a Ph.D. in Horticulture and Agronomy and an M.S. in International Agricultural Development. My dissertation research centered on temperature and bloom timing in almonds, pistachios and walnuts. Since finishing the Ph.D. in fall 2013, I have been working on fertilizer management research and tools for walnut growers, such as a monthly nutrient demand budget and updated leaf sampling protocol, with numerous UC Davis labs, UCCE Farm Advisors, the California Walnut Board, and the California Department of Food and Agriculture.

I've already had a lot of great conversations with growers in the counties where I'll be working. I'm looking forward to getting up to speed on the challenges and opportunities, to getting to know folks, and to working together to find ways for UC research to best be of service to you, the growers and pest control advisers. Please feel free to call (530-666-8733), email (kspope@ucanr.edu) or just stop by the UCCE Yolo County office at 70 Cottonwood Street in Woodland, to ask questions, share concerns, or to just introduce yourself.

Advisor Retirement – Thanks!

Joe Connell, UCCE Farm Advisor, Butte County

I am retiring on June 26th after nearly 34 years as an orchard and landscape horticulture Farm Advisor in Butte County. What a great experience this has been! It's been quite an honor to work with farmers and agriculture in communities throughout Butte County! What a privilege to work with so many talented UC scientists and educators who brought their expertise to Butte County to help us solve our local problems!

I can't think of a better job than to work with all of the fine growers, PCAs, and others in the Ag Industry I have come to know. In gratitude, I want to say "Thanks!" for helping me learn and grow over the years and for making this such an enjoyable career.

Thirty-eight years ago in 1976, I began work with UCCE in Stanislaus County as a Summer Assistant to Farm Advisors Norman Ross and Jewell Meyer. In 1977-78 I was blessed by a Farm Advisor Internship with UCCE Advisors Steve Sibbett in Tulare County and Clem Meith in Butte County. I learned much from these experienced Advisors and I will be forever grateful to them. I became a Fresno County Farm Advisor working with nut crops, citrus and subtropicals in 1978. I moved to Butte County in 1980 to serve as Farm Advisor working with almonds, olives, citrus and landscape horticulture. There have been other changes in crops and responsibilities over the years but working with local growers and our good research cooperators has been great fun.

Average almond yields per acre have doubled in the last 30 years. This is the result of variety improvements, changes in pruning practices, planting density, harvest timing, and better pest and disease control materials with greater safety for applicators, consumers, and the environment. I am pleased to have been able to play a small role in these improvements by working with many of you.

Our UC ANR administration called for position proposals in January and we submitted four proposals for Butte County including one for a new Orchard Systems Advisor (position #038 on the list). In our system, vacancies are not automatically re-filled but rather proposals are reviewed and evaluated based on need from a statewide perspective. These proposals are posted on-line and you have an opportunity to let our administrators know what impact and value a particular position would bring to your operation. I

encourage you to let your thoughts be known. Go to: http://ucanr.edu/sites/anrstaff/Divisionwide_Planning/2014_Call_for_Positions/, follow the instructions, scan down the page until you find the positions of interest, click on the position, then add your thoughts in the comment box and click "save comment". **The public comment period is open through July 21, 2014.**

Once again, thanks for a wonderful career, great support, and the super relationships with the individuals and industries I've served. I plan to stay in Chico so I will hope to see you at field days and research conferences in the future. Best wishes to you always!

Scale Identification and Lifecycles in Walnut Orchards

Dani Lightle, UC Cooperative Extension Advisor, Glenn, Butte, and Tehama Counties.
Richard Buchner, UC Cooperative Extension Advisor, Tehama County

Increased incidences of scale have been observed in Sacramento Valley walnut orchards for about 10 years. Increased scale incidence, along with increased awareness of scale because of its recently confirmed association with Botryosphaeria (review the article "Understanding and Managing Botryosphaeria and Phomopsis" from the previous walnut newsletter, available at http://cesutter.ucanr.edu/news_204522/Sacramento_Valley_Walnut_News_135/?newsitem=51120), has resulted in questions about scale identification, life cycles, and treatment timing.

Reasons for scale increases in walnut are not entirely known. Commonly, when a secondary pest emerges as a problem, it is because something else within the system has changed, allowing conditions to favor the pest. For example, the parasitoids and/or other biological control agents that were previously keeping scale populations regulated may have become disrupted by changes in pesticide use. Alternatively, broad spectrum insecticides that are no longer used may have been providing more scale control than previously thought. Cultural changes may also play a role, with factors such as changes in tree spacing and canopy management contributing to more favorable conditions for scale.

Walnut scale is an armored scale (the cover is separate from the body) that has become relatively common in walnut orchards. In high populations, it is found in crusted layers on older branches and scaffolds. Walnut scale appears to have a 'daisy' – like outline when mature (Figure 1). The outlines of the daisy are usually the male scale. Walnut scale female lays eggs underneath her protective cover before dying. The eggs hatch into an immature insect known as a 'crawler'. Crawlers are small and yellow (Figure 3), and mobile; they seek out new feeding sites either by crawling, carried by the wind, or even by hitch-hiking a ride on the feet of birds. Crawlers are very small and will require magnification to see. Once the crawler selects a new feeding location, it settles down, secretes the protective waxy cover, and remains sedentary for the remainder of its life. Walnut scale completes two generations per year (Figure 4).

Frosted scale is a soft scale (cover is the body wall of the scale) that has also been observed in walnut orchards this year. Unlike walnut scale, which can colonize older wood, frosted scale is typically found only near the actively growing tips of walnut shoots. Frosted scale has a domed appearance, frequently described as an 'army helmet' (Figure 2). For a brief period in spring, frosted scale are covered with a white waxy coating for which they are named; however they do not have the distinctive waxy

appearance the rest of the year. Like walnut scale, frosted scale lay their eggs under their protective cover. The crawlers move to new (green) shoot and leaf growth where they feed for the duration of the summer. In the fall, crawlers move back onto woody permanent growth, where they overwinter. In spring, the scale rapidly develops into adults (accompanied with the distinctive frosty wax), followed by mating and egg laying for the next generation. Frosted scale has only one generation per year (Figure 4).

Several other species of scale have been reported in walnut over the years, although none of them appear common at this time in the upper Sacramento Valley. Another armored scale, San Jose scale, can be distinguished from walnut scale by a smooth body margin as opposed to the scalloped pattern of the walnut scale body margin. Natural predators appear to keep San Jose scale in check. European fruit lecanium is a species closely related to frosted scale. It is indistinguishable from frosted scale most of its lifecycle; however, in the spring it does not develop the frosty coating like frosted scale does. Italian pear scale has also been found in walnut, and usually lives underneath lichen or moss. Most blight spray control programs control lichens and, by extension, Italian pear scale.

Treatment timing is important for good scale control. A delayed dormant spray is the traditional timing and, depending upon the pesticide, has done a good job of controlling this pest while also causing less harm to beneficial parasitoids. During the growing season, the scale cover, which helps to protect against predators, also conveniently protects the scale from many pesticides. Scales are very susceptible to pesticide application during the crawler stage when they are exposed. Timing of the crawlers depends on which species is in your orchard, as well as the seasonal conditions. To monitor for scale, wrap a piece of double-sided sticky tape around a branch where you see scale populations. Remove the sticky tape weekly and check for the presence of crawlers (usually on the margins of the tape) using a magnifying lens (Figure 3). Replace the tape with a new piece each week.

Research for effective scale control products and optimal application timing is on-going by Bob Van Steenwyk (UC Research Entomologist, UC Berkeley) and Janine Hasey (UCCE Farm Advisor, Sutter/Yuba/Colusa counties). Insect Growth Regulator (IGR) products appear to be effective but additional research is necessary to learn how to use these products most efficiently. Additional information is available at http://www.ipm.ucdavis.edu.

Figure 1. Walnut scale with the scalloped or daisy-like outline.

Figure 2. Frosted scale with waxy coating (left) and adult frosted scales (right). Scales with multiple holes in them have been parasitized.

Figure 3. Scale crawlers trapped on a double sided-sticky tape used for monitoring.

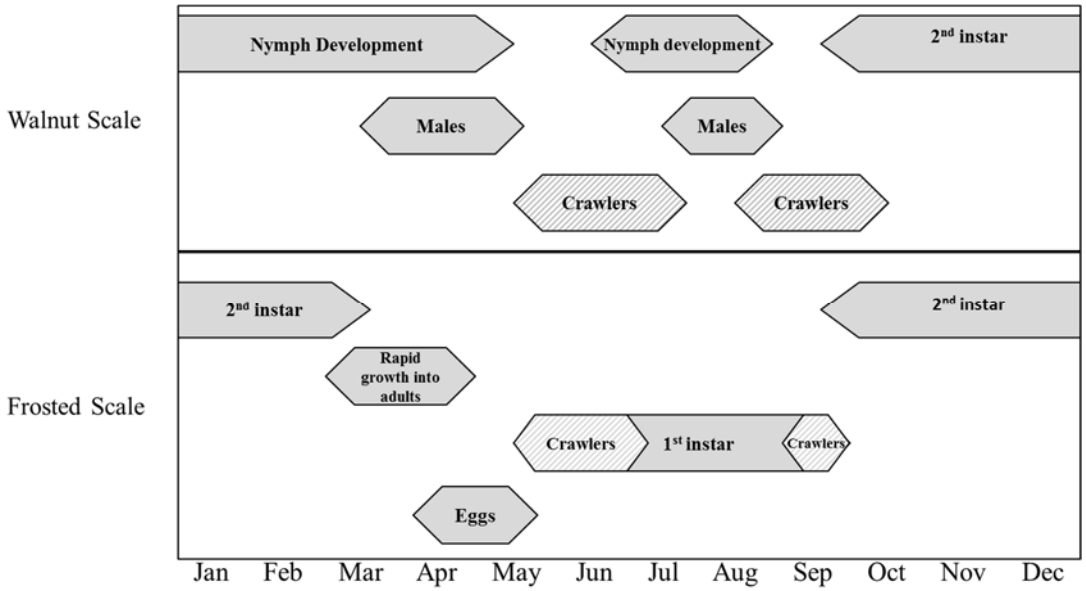


Figure 4. Approximate timing of lifecycle stages of walnut scale and frosted scale in walnuts in California. Scales are most susceptible to contact insecticides when they are in the crawler stage.

Walnut Husk Fly Trap and Low Volume Spray Study Update

Janine Hasey, UCCE Farm Advisor, Sutter, Yuba, and Colusa Counties
Bob Van Steenwyk, Research Entomologist, UC Berkeley

Walnut husk fly (WHF) in 2014 is following the same pattern as other insects and emerging very early in the Sacramento Valley. Based on early June trap catches this year, we are revising the timing of when to hang traps to the first of June instead of mid-June. Timing of control relies on monitoring adults with yellow sticky traps baited with ammonium carbonate lures.

Because the commercial WHF trapping system was not accurately monitoring WHF population emergence in 2011, studies were conducted in 2012 and 2013 to examine the effectiveness of different commercially available traps and lures. The 2012 study was reported on last year and can be viewed at http://cesutter.ucanr.edu/newsletters/Sacramento_Valley_Walnut_News47868.pdf. This article summarizes the 2013 trap study and low volume insecticide application trials. For more information on the performance of the various traps and lures, low volume sprays, and insecticide efficacy, see Walnut Research Reports 2013 at http://walnutresearch.ucdavis.edu. For information on WHF biology and spray timing, see http://cesutter.ucanr.edu/Orchard_Crops_254/Walnut_Problems_727/.

Trap/Lure Study: A trial was conducted in a commercial (Payne) orchard in San Benito County. Eleven trap and lure treatments were placed about 6 feet above the ground. All traps were checked and trap positions were rotated within the block weekly to correct for position effects. Traps were placed in trees 27 June and were monitored until 11 September. Traps were changed either once a month, when traps captured over 100 flies, or when the yellow panel surface lost its stickiness. UC Super-charged lures were changed weekly and all other lures were changed every four weeks.

Since this is a summary article, only the data for the standard trap/lure and trap/lures found to be most effective are presented.

- Standard trap - Trécé Pherocon® AM/NB traps with UC super-charged ammonium carbonate lures (**T-Carb)**
- Alpha Scents back folding trap with Alpha Scents brand RHACOM lure (**AS-Alpha**)
- Alpha Scents back folding trap with Trécé Mega lure (**AS-Mega)**
- Suterra WHF trap with Suterra WHF biolure (**S-Sut**)

Results: Female/male trap catches - AS-Alpha trap/lure performed better than the T-Carb, with higher female and male catches. S-Sut trap/lure also captured more females than T-Carb but did not capture more males; AS-Mega however, did not catch significantly more females or males than T-Carb (Table 1).

Total trap catches - The AS-Alpha captured significantly more total WHF than AS-Mega and T-Carb while S-Sut was not significantly different from any treatment.

Trap differences - In 2013, Alpha Scents and Suterra traps captured more flies than Trécé traps, regardless of lure used. This result was different from the 2012 study where no difference was observed between the Alpha Scents and Trécé traps.

Other observations - We saw a decline in female captures of the population through the season that was also observed in 2012.

Trap/Lure Conclusions

- The AS-Alpha , S-Sut, and AS-Mega were the most effective trap/lure combinations.
- The increase in trap/lure effectiveness was related more to lure efficacy although the Alpha Scents and Suterra traps captured more WHF compared to the Trécé trap in 2013.

Controlling WHF with Reduced Application Time

Studies were conducted in 2012 and 2013 to determine whether WHF control can be achieved with a new low volume technique (10 gal/ac using skip row) as compared to conventional application methods (100 gal/ac to every row).

Low volume spray studies: The 2013 trial was conducted in three commercial orchards in Linden (Vina), Modesto (Vina) and Rio Oso (Hartley). Three treatments were replicated once in each orchard. Each replicate was a minimum of 4 acres. The grower selected the insecticides and attractant/feeding stimulate (Nu-Lure) for the experiment and applied each at the suggested label rate for WHF in walnuts. The three treatments were:

- Grower standard (GS) at 100 gal/ac, applied to every row, driving at 2 to 3 mph.
- Low volume (LV) at 10 gal/ac, applied to every other row, driving at 4 to 8 mph using the same amount of toxicant and bait on a per acre basis as GS.
- Untreated check.

The GS treatment was applied with standard air-blast speed sprayer delivering 100 to 125 gal/acre and operating at 2 to 3 mph. The LV treatment was applied using modification of the standard grower's speed sprayer. All but the top two nozzles were closed and the two top nozzles were replaced with ¼ in. barb adapters. The barb adapters provided two high-pressure, solid streams of toxicant that were directed toward one another to meet about 10 to 15 ft. in the air. Upon meeting, the fluid dispersed in large droplets. Air baffles were adjusted to direct the air-flow vertically, enabling the fan to drive the toxicant 40 to 50 ft. in the air before subsequently spilling back over the tops of trees. The output of the two nozzles was measured and paired with an increased tractor speed between 4 to 8 mph that produced the desired output (10 gal/acre). The speed was determined by the grower and was based on orchard floor conditions and grower and equipment safety.

Treatments were applied two weeks after the first fly captures in the adult traps in each orchard and the LV and GS treatments were applied on the same day. Each orchard was treated 1 to 3 times throughout the season with untreated plots treated in Linden and Modesto in late August due to significant WHF infestation.

Results: There was no significant difference in the number of WHF captured among the three treatments in 2013. The LV and GS treatments were effective at suppressing WHF infestation throughout the season. The 2012 and 2013 data were combined and is shown in Fig. 1. There was significantly lower infestation in the LV and GS treatments compared to the untreated check and there was no significant difference between the LV and GS.

Low Volume Spray Conclusions:

- Low volume (10 gal/ac) applied at 4 to 8 mph was as effective controlling WHF as standard volume (100 gal/ac) applied at 2 to 3 mph using the same rates of insecticide and bait.

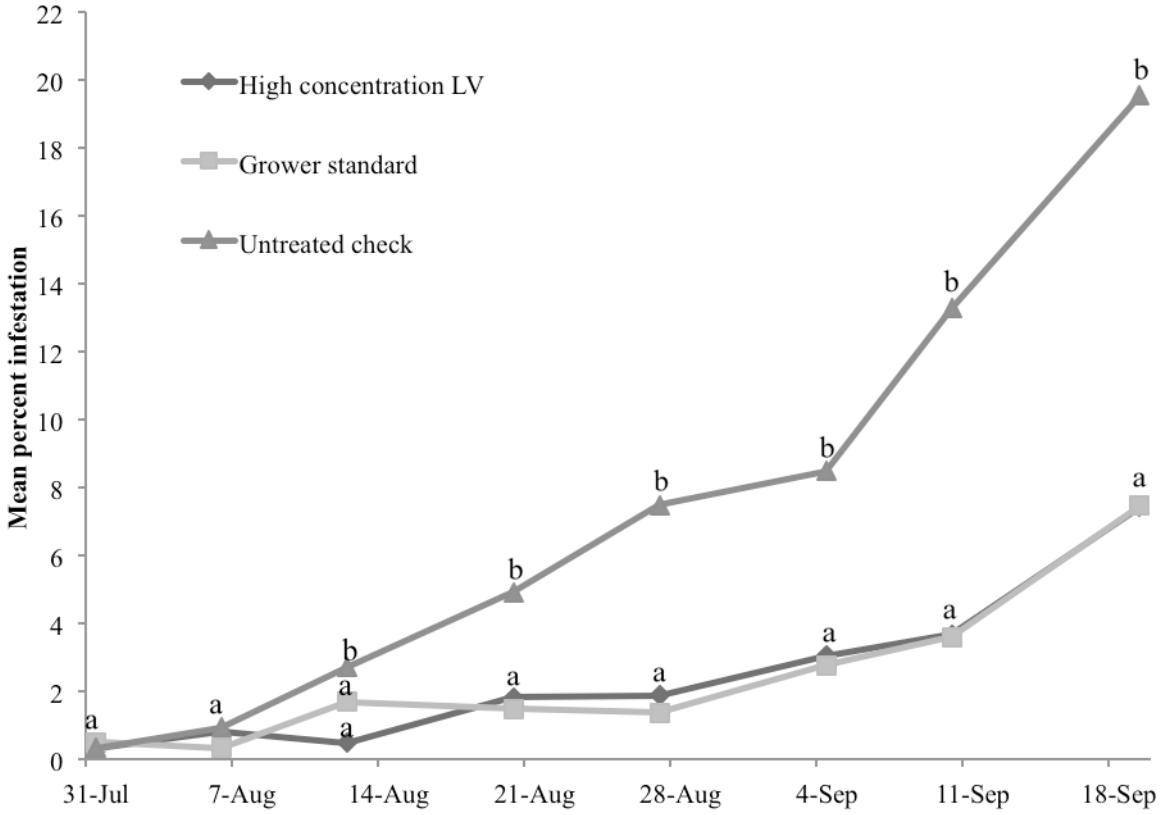
- The modification of the equipment is very minor and inexpensive.
- The LV technique is most effective in mature orchards with minimal canopy closure and a smooth orchard floor.
- Thus the LV technique is a viable option that can reduce the time and cost of application while maintaining or improving WHF control.

Table 1. Seasonal mean total female and male WHF captured in San Benito Co. - 2013 (only most effective traps /lures and standard are shown)

Treatment	Females	Males	Mean total WHF
AS-Alpha	8.4 a[1]	10.4 a	18.8 a
S-Sut	7.3 a	8.5 ab	15.8 ab
AS-Mega	6.8 ab	8.4 ab	15.2 b
T-Carb	5.3 bc	7.0 bc	12.3 bc

[1]Means followed by the same letter in a column are not significantly different (Fisher's protected LSD, P≤0.05)

Figure 1. Mean percent WHF infestation per week for 2012 and 2013 combined in various locations, CA.



Irrigation Management Tools for Developing Walnut Trees

Richard P. Buchner – UCCE Farm Advisor, Tehama County
Allan E. Fulton – UCCE Farm Advisor, Tehama, Glenn, Colusa and Shasta Counties

Irrigation management decisions for young trees are more challenging compared to mature trees. In mature, full bearing orchards, the leaf area and root zone are relatively constant within a month or so after leafout. In developing orchards (years 1-6) irrigation managers have to account for an expanding canopy and enlarging root zone. Water loss through stomata at the leaf surface represents the primary way trees lose water, so as the leaf area expands water loss increases. Roots provide water uptake surfaces. As roots elongate horizontally and vertically, they improve access to additional soil moisture from storage of winter rainfall and rainfall that occurs after leafout as well as irrigation. In addition to a rapidly growing tree and changing evapotranspiration, water placement with an irrigation system is much more critical in developing orchards, particularly in the first year. Irrigation managers have to get adequate water to a much smaller target as first year root systems are small. Water placement is even more critical for potted trees.

We have visited orchards where the root zone in first or second year trees is completely dry following a seemingly adequate irrigation. The water did not get to the small developing root systems. Sometimes misplacement of the water encourages weed competition and other challenges. As trees grow, root systems expand and placement becomes less critical. Ultimately for mature trees, the crown area is purposely kept dry to discourage Phytophthora infection.

The goal in a developing orchard is to grow a large, structurally sound bearing area quickly. Several tools/techniques are available to help with irrigation decisions to get young walnut trees off to a good start.

1. Orchard Evapotranspiration – Real time daily or weekly estimates of orchard evapotranspiration (ET) are available, but they are typically projected for mature orchards with larger, more constant canopies. The challenge for young, developing trees is to adjust ET values to accurately predict water loss for a small expanding leaf area as well as accounting for expanding access to soil moisture as root systems grow. Figure 1 shows how that might be done. Orchard ET is covered in much greater detail at http://cetehama.ucanr.edu/Water___Irrigation_Program/Weekly_Soil_Moisture_Loss_Reports/

2. Applied water – Measurement of applied water and/or knowledge of irrigation system performance are necessary to know whether the amount of irrigation and rainfall match estimates of real-time orchard ET. Flow meters are relatively inexpensive and fairly easy to install. Irrigation system evaluations may be available for growers in Tehama, Glenn, and Butte Counties from the Tehama County Resource Conservation District Mobile Irrigation Lab. During the past decade, the Mobile Irrigation Lab has been a free service. However, there may be a fee for the service in the future. For more information see http://www.tehamacountyrcd.org/services/lab2.html.

3. Soil moisture monitoring – Visual evaluation, tensiometers and/or resistance blocks are the typical tools for use in developing trees. Once the orchard is developed, more sophisticated soil moisture monitoring devices may be used. One simple and effective method is to auger holes directly under the planted tree and visually evaluate soil moisture for adequacy. Visual inspection will indicate whether enough water is penetrating the soil in the smaller root zone. Soil color and how well the soil sample adheres to the auger and/or your hand are related to moisture content.

Figure 1. Water use estimates for first, second, third and fourth leaf walnut trees. PAR is a measure of sunlight interception. PAR stands for Photosynthetically Active Radiation.

Tensiometers and resistance blocks are available to measure root zone soil moisture tension. Placement is critical when installing these devices. They are only as good as the root zone they represent. Some irrigation managers place a resistance block in the root mass at planting. Blocks can be checked frequently using a hand held meter. Tensiometers use a pressure gauge to indicate soil moisture tension. Additional information on measuring soil moisture can be found at http://cetehama.ucanr.edu/Water___Irrigation_Program/On-farm_Irrigation_Sceduling_Tools/.

4. Midday Stem Water Potential – More and more irrigation managers are using pressure chambers to measure midday Stem Water Potential (SWP). In simple terms, the pressure chamber measures the "blood pressure" of a plant. The higher the blood pressure the greater the water stress. The pressure chamber has the advantage of measuring tree response to soil moisture conditions. The disadvantage might be cost and SWP measurements must be made between 12 to 4 pm. Irrigation management

using SWP is illustrated in Figure 2. Notice that -6 to -8 bars water stress was maintained in season for shoot growth and -10 to -12 bars water stress was allowed in September to slow growth and prepare trees for winter. Again, more information is available at http://cetehama.ucanr.edu/files/20516.pdf.

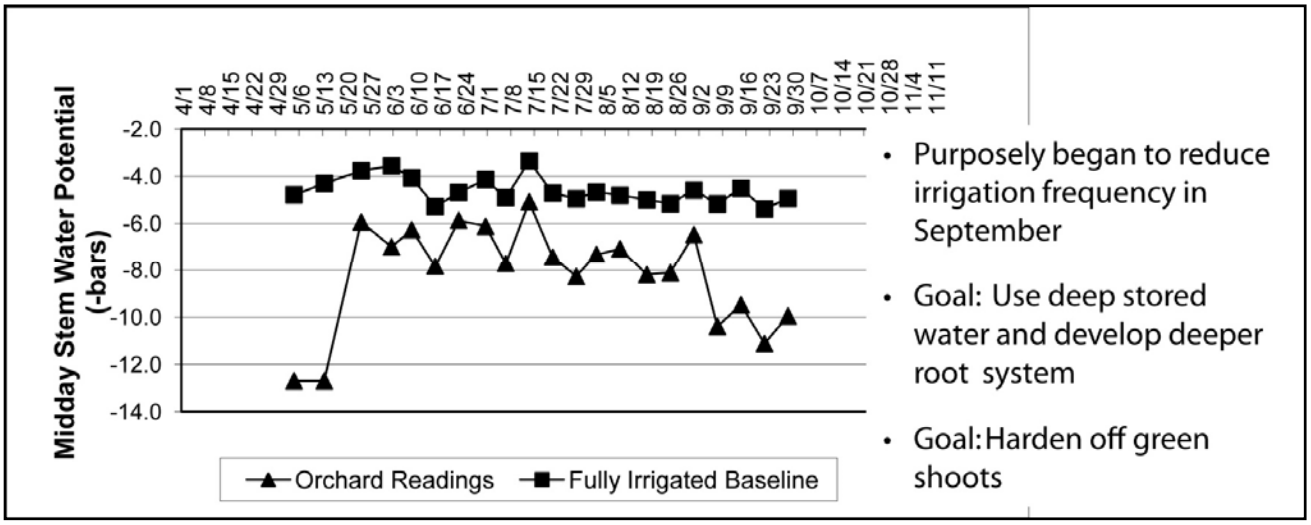


Figure 2. Example of how a pressure chamber SWP is used to manage irrigation in a first leaf walnut orchard. The baseline represents SWP when soil moisture is not limiting ET.

5. More information specifically for developing orchards is available at http://cetehama.ucanr.edu/Water___Irrigation_Program/Irrigation_Management_-_Water_Resource_Meetings/. Refer to the third presentation on the list titled "Irrigation Management Tools for Developing Orchards (34 slides).

   "Using the Pressure Chamber for Irrigation Management in Walnut, Almond and Prune" (ANR Publication #8503) is posted at http://anrcatalog.ucdavis.edu/pdf/8503.pdf