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Fruit and Nut Notes

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- Volume 7 -

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SACRAMENTO VALLEY REGIONAL
PRUNE NEWSLETTER

IN THIS ISSUE:

Meeting Announcement:

-free meeting– **Nitrogen Management in Orchard Crops**

July 24, 2014 - Red Bluff Elks Lodge, Red Bluff CA

Full color articles and photos are available on our Website: cetehama@ucanr.edu

WELCOMING
2 New UC Advisors

Introducing ***Emily J. Symmes*** - New IPM Advisor

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 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.

Introducing ***Katherine Pope*** - New Farm Advisor

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 grower, 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. 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.

Joe Connell, Farm Advisor Retiring
Beginning a new Chapter in Life!

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 individuals and the 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!

Joe Connell, you will be greatly missed!

Scouting for Spider Mites in Prunes

Dani Lightle, UCCE advisor, Glenn, Butte & Tehama Cos.

Spider mites are a perennial pest that growers of all crops can commiserate over with their drink of choice. In prunes, spider mites are responsible for mottling and bronzing of leaves and, in severe cases, defoliation that leads to sunburn injury of limbs and fruit. There are two spider mite species found on prune in California: two-spotted spider mite and Pacific spider mite (Figure 1). The mite species are very difficult to tell apart, but survey work has shown that two-spotted spider mite is generally more prevalent in the Sacramento Valley. Species identification is not really important because their management is similar.

Spider mites overwinter as mated females in weeds or in bark cracks of the prune trees and are not controlled by dormant sprays. In the spring and early summer, when weeds are mowed or dry up, the mites move up into the canopy. Because mites crawl up the trunk, infestation often begins in the interior of the tree and moves outwards as it becomes more severe. High populations of spider mites result in webbing on the tops and undersides of leaves.

Fortunately, cultural and biological control of spider mites can be very effective if natural enemies are not disrupted with in-season use of broad-spectrum pesticides. Stressed trees are more susceptible to mite damage so reduce tree stress through optimum irrigation and fertilization practices. Natural enemies that feed on spider mites include 6-spotted thrips and predatory mites (Figure 2). Predatory mites are smooth and pear shaped, and move about the leaf much faster than spider mites. Preserve predatory mites in the orchard by minimizing the use of pesticides that are hard on predators, such as pyrethroid (such as Asana®, Warrior®, etc.) and sulfur applications.

Scouting for mites should be conducted weekly from June until mid-July. Select two locations per 40 acre block for scouting – ideal locations would be areas that are stressed or dusty, or have a history of spider mite damage. At each location, examine 2-3 interior and exterior leaves on 10 different trees (20-30 leaves total) for the presence of spider mites and predators using a hand lens. Record the percentage of leaves that have mites and their relative abundance (occasional mite; mites on 20-40% of leaves with occasional eggs; mites on > 40% of leaves with many eggs and webbing), as well as the relative abundance of predatory mites. At each location, compare the mite populations to the decision making table (Table 1) to determine when treatment is necessary. A scouting record sheet is also available to track mite populations over time (http://www.ipm.ucdavis.edu/PMG/C606/prune-mitesample.pdf).

Table 1. Decision making guidelines for treatment of spider mites in prune.

Spider Mite Population	Predator Mite Population	Treatment Decision
Light *occasional mite on < 20% of leaves checked*	---	No treatment, scout next week
Light to moderate *mites on 20-40% of leaves; no webbing; occasional eggs*	Low *1 predator on < 50% of leaves*	Treat
	High *1+ predators on > 50% of leaves*	No treatment, scout next week
Moderate to high *mites on > 40% of leaves; webbing present; abundant eggs*	---	Treat

Figure 1. Spider mite adults (top) and mite eggs (bottom). The round eggs are spider mites and the oblong egg in between them is a predatory mite egg.

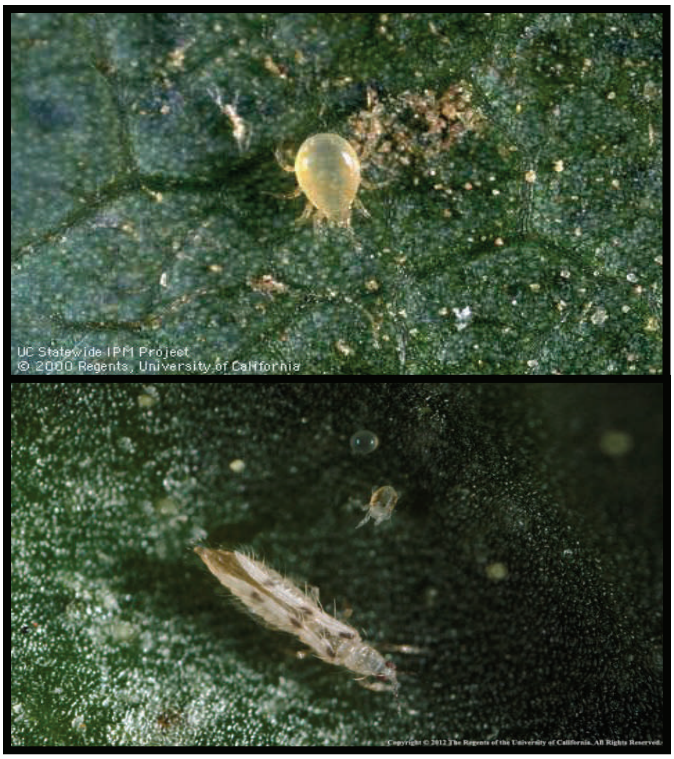

Figure 2. **Predatory mite (top) and predatory six -spotted** thrips (bottom).

Deficit Irrigation for French Prune

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

The April 2014 Sacramento Valley Regional Prune newsletter discussed “Irrigating French Prune During a Drought” (e-version available at cetehama.ucanr.edu). This discussion builds upon that article with ideas on managing irrigation with a severe reduction in irrigation water. A pressure chamber is a very useful tool for measuring Stem Water Potential (SWP) as an indicator of actual tree water stress. The new publication, "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. To complement SWP, soil moisture sensors can be used to detect any water loss to percolation below the root zone. A complete discussion of irrigation management is available at cetehama.ucanr.edu. Click on irrigation/water program then select on farm irrigation scheduling tools.

Regulated Deficit Irrigation (RDI) is a strategy of withholding irrigation water to levels less than full evapotranspiration (ET). Water is withheld at specific times and in specific amounts during the season with the goal of conserving water while limiting detrimental effects on the tree, the developing crop and future production. The challenge in manipulating crop water stress is evaluating when and how severe water stress really is. Fortunately pressure chambers and measurements of SWP are gaining in use and guidelines are available to predict the impact of water stress on tree and crop performance. RDI is a stress management strategy that can help manage relatively small curtailments (10 to 20 percent) in water supply but it doesn’t really address severe reductions in water supply. Research on water stress management for prune is limited so suggestions represent best estimates and glean from experiences in almond. The following are four scenarios for prune drought irrigation management.

#1. No irrigation water available

There are few inexpensive and effective management options with a no water allocation. This situation may occur in water districts with lower priority water rights or where other beneficial uses take priority over crop irrigation. Development of groundwater is often the first management step taken to avoid a no irrigation water scenario. In a situation where there is no water, the goal would be to keep the trees alive through the drought until adequate water can be supplied. Expectations for yield and fruit size would not be high in a drought year and the carry over effect may extend into the following year as well. Thinning the fruit more than normal to lessen the crop load and weight on the tree limbs may be important to maintain tree structure. This should help shade the fruit bearing wood for next season and protect it from sunburn and secondary diseases. Prune orchards that endure a whole season with no irrigation may require two years of normal irrigation to once again approach typical production levels. In almond, pruning off major scaffolds to reduce transpiration surface did not help manage the situation. Unpruned trees that survived the no water situation recovered to full production more readily than heavily pruned trees once normal irrigation resumed. Spraying trees with a light reflecting material did not make any differences in tree water stress. So the best strategy for prune might be to do nothing drastic and conserve as much soil moisture as possible. Good weed control to conserve moisture makes sense. Mulching to reduce evaporation might be a possibility in some orchards.

#2. Severe reduction in water available (25-50% ET)

Tree stress and effects on fruit will be inevitable when managing with this little water. Like the no water scenario, the primary goal may be to save the trees. More than normal fruit removal might be important to keep limbs upright and protect fruit wood from sunburn particularly with a 25% water allocation. Suggestions vary but the best estimate is to allocate most of the water evenly throughout fruit sizing from May through July. This strategy should help lessen fruit cracking that can be aggravated by large swings in crop stress. For example, if the water allocation is 12 acre-in/acre consider four 3-inch irrigations spaced evenly throughout fruit sizing, possibly one irrigation in May, June, July, and in early August. An irrigation applied when water stress is high might aggravate end cracking. Research done back in the 1960's suggested that the June irrigation might be the most damaging for end cracking. Water applied after final fruit sizing should not promote end cracking since the fruit is no longer increasing in size. Here again, the pressure chamber can be used to monitor for severe water stress. Stress level guidelines are published in the pressure chamber publication # 8503 previously cited. If the goal is to save the trees, fruit defects may be of less concern. A foliar zinc spray in the early fall to defoliate may help conserve soil moisture going into winter. Almost all tree water use is transpiration through the leaves so even though crop removal may help protect tree structure and lessen sunburned wood it does not appear to be a significant way to reduce tree water use.

#3. Moderate reduction in Water available (50-80% ET)

There are two general approaches to working with relatively modest reductions in water availability. Frequent irrigations with less applied water (frequent sips) compared to infrequent irrigation with more applied water spaced farther apart (full drinks). Prune irrigation research is not available to favor one approach over the other. The full drink approach would have the greatest risk of water loss below the root zone via deep percolation but should reduce water loss from surface evaporation compared to more frequent water application. Either way the strategy would be to spread the water stress over the season applying 20 to 50 % less water than ET per irrigation. In an RDI strategy, French Prune appears to tolerate mild water stress relatively well after final fruit sizing. In a prune irrigation experiment conducted by Fulton et.al. (2011) fruit continued to size until about mid August so it might make sense to reduce applied water after final fruit size particularly for a 20 % reduction scenario. Under a moderate reduction in available water scenario consider no irrigation following harvest.

#4 Full water availability (100% ET)

For prune growers with access to adequate groundwater or a full allocation of surface water, efficient irrigation management is always the objective to optimize costs and revenues. Good irrigation management improves tree health, saves energy, conserves water and reduces the risk of fertilizer leaching. Keeping trees adequately supplied with water through June with mild water stress after fruit sizing in July and early August (-12 to -13 bars, suggested) appears to be a good approach to maintain fruit size and achieve sugar accumulation.

Chill model comparison – Why two models judged last winter very differently

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

Depending on how you count chill accumulation, last winter was either one of the warmest on record in the Central Valley or just about normal. Based on the behavior of most prune trees at bloom, the chill accumulation model that counted this last winter as historically low chill – the Dynamic Model – is probably more representative of how the flower buds were counting chill than the traditional Chill Hours model. In the last Prune newsletter, Franz Niederholzer, UCCE Farm Advisor, Colusa/Sutter/Yuba Counties, compared the two models, and showed how chill accumulation has differed over the last nine years in the Sacramento Valley using the Durham CIMIS weather station as an example. While there's growing evidence that the newer Dynamic Model may be the more accurate model to use for California tree crops and in other Mediterranean climates, it can be difficult to trust something new without knowing how it works. So how does the Dynamic Model work, and what makes it different from other chill models?

The math behind the Dynamic Model is more complex than the Chill Hours model, which just counts each hour between 32-45° F as one chill hour. But, while the Dynamic Model has some complex equations, it's based on some fairly simple components. Accumulation of chill according to the Dynamic Model is a two-step process. In the first step, a 'chill intermediate' is accumulated, but this accumulation can be subtracted from given subsequent warm temperatures. In the second step, once the 'chill intermediate' accumulates to the certain threshold, it is converted into a permanent 'chill portion'. The accumulation of this chill portion cannot be negated or subtracted from by later warm temperatures. Accumulation of a new chill intermediate starts again from zero. The chilling requirement of different crops and cultivars is measured in chill portions. The Dynamic Model requires hourly temperature data.

The Dynamic Model differs from the Chill Hours model in the rate at which the 'chill intermediate' accumulates, and the fact that the accumulation can be subtracted from given warm temperatures. The chill intermediate accumulation depends on temperature, with hours at 43-47° F (6-8° C) having the maximum chill value, and chill value dropping at lower and higher temperatures, down to no chill value at 32° F (0^{o}C) and 54° F (12° C). In this way, the Dynamic Model allows for different temperatures to have different chill values, rather than all temperatures in a range having the same value. Rather than saying, 'We had X chill hours but they were warm chill hours' and trying to guess at what difference that warmth made, the Dynamic Model puts a value on that difference. It also expands the range of temperatures considered effective for chill accumulation.

Another thing that the Dynamic Model does which the Chill Hours model does not is account for warm temperatures that follow after cold temperatures. Last January was a prime example of the need for this component. There are a number of ways in which warm temperatures can subtract from chill accumulation in the Dynamic Model. Chill subtraction is highest if the warm temperatures quickly follow cool temperatures, for example when a warm day follows a cool night. The longer the duration of warmth in that daily cycle, the more subtractions. Twelve hours of warm daytime temperatures subtracts more chill than 8 hours, for example. However, very short exposure to warm temperatures, say an hour at 68° F on a January afternoon, has no subtracting effect.

Because the Dynamic Model is much newer than the Chill Hours model, researchers don't have exact estimates for the chilling requirements of all California's important tree crops and cultivars. While researchers work on that, it may be valuable to watch chill accumulation with both models to see if, as occurred last year, one indicates normal winter conditions while the other indicates cause for concern. Chill accumulation for both models using CIMIS weather station data, along with additional information on the models, how to calculate accumulation with your own weather data, and estimates of chilling requirements for some crops in Dynamic Model Chill Portions is available at http://fruitsandnuts.ucdavis.edu/Weather_Services/chilling_accumulation_models.

Meeting Announcement

NITROGEN MANAGEMENT in ORCHARD CROPS

July 24, 2014 — 1 pm to 4 pm

Red Bluff Elks Lodge, 355 Gilmore Road, Red Bluff,

Please -RSVP- by calling the Tehama Cooperative Extension Office (530) 527-3101

This workshop will feature Professor Patrick Brown, University of California Davis, Department of Plant Science. Dr. Brown specializes in soil and plant nutrition with a focus on perennial orchard crops. Nitrogen management in orchard systems will be emphasized in this workshop. He will discuss requirements of perennial tree crop systems, application technology and development of productive and environmentally sound fertilizer use. He will present information related to almond, walnut, prune and other tree fruit, nut, and vine crops.

The latter portion of the workshop will foster an interactive exchange among growers and agricultural professionals in the audience and the workshop hosts and speakers. The objective of this session is to apply the research-based knowledge and tools for determining N fertilizer needs and ways of supplying it efficiently. Collectively, we will seek to build upon our working knowledge and tools for N management to support growers who are faced with increasing regulation.

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