Colusa Orchard Newsletter

Tree Crops and Nickels Soil Lab

University of California Cooperative Extension

Colusa County

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Farm Advisor

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Drought Irrigation

This edition of the Colusa Orchard newsletter features an irrigation guideline prepared by Dr Ken Shackel, Pomologist at UC Davis who gave the drought irrigation presentation at our February almond growers meeting. Based on field research and past experience, Dr Shackel has devised a watering schedule for almonds to affectively utilize severely restricted water allotments.

Application rates are listed in the table as inches per month when given only a 5-acre inch or a 10-acre inch water allocation. (Colusa County Water District allotment is normally 1.9-acre ft.). The application rates are by the month and compute to 11% or 22% of normal Etc rates and apply a constant % of Etc over the entire season. This constant application strategy is widely viewed as the best way to limit tree stress under extreme deficit irrigation conditions. Actual current season Et rates for Colusa County are available from the Nickels weather station. (see below)

The 11% or 22% multipliers should be applied to these real-time ET figures using crop coefficients to calculate amounts to apply for actual tree water

demands of the 2009 season. However, we can best utilize this water by delaying irrigations until stored soil moisture has been exhausted. The good news is that the Arbuckle area has received 12 inches of precipitation since July 1, 2008 and 9.5 inches since December 1st .

Soil moisture probes at Nickels Soil Lab (Arbuckle soil series-gravelly sandy loam) show that winter rains have filled the soil profile to a depth of 5 ft as of March 8th. This soil type holds 1.77 inch of available water per foot, however, only about 75% of this is usable. So, the soil will provide about 6.5 inches of usable soil moisture (5 x 1.77 x .75). Measurements at Nickels have also consistently shown that trees extract moisture from the entire soil area not just from the drip-wetted zone. Thus, moisture stored out in the middles is also available.

Given normal springtime water demand by almonds, 6.5 inches of soil moisture should supply tree water demand into mid-May. To avoid serious tree stress, irrigations should begin by that time for the Arbuckle gravelly soil. But by waiting to irrigate until mid-May, we will have saved the water listed in the table for April and May that can then be added to the summer and post-harvest applications. Other soil types have different water holding capacities so the amount of stored moisture will vary. (Arbuckle loam 2.0", Cortina 1.8", Hillgate 2.8", Myers 3.1") The depth of moisture should be determined and monitored in your orchard to help guide irrigation timing. The use of a pressure chamber is a much more reliable method to gauge tree water stress but, without the use of this instrument, the above soil method provides a good estimate when to start irrigations and gain maximum benefit from minimal water allocations.

Almond Drought Irrigation Schedule

	Normal	5"	10"
Month	**Etc**	**(11%)**	**(22%)**
March	3.41		
April	4.12	0.51	1.02
May	6.10	0.75	1.51
June	7.45	0.92	1.84
July	7.74	0.99	1.99
August	6.77	0.87	1.75
September	4.67	0.59	1.19
October	2.87	0.37	0.74
November	1.36		
TOTAL	44.5	5.0	10.0

UCCE has developed a drought management website http://UC ManageDrought.ucdavis.edu which may be helpful. There are two parts to the web site which have been completed so far.

One portion is information on irrigation scheduling. A second portion has synthesized and document research UC has done over the years on managing crops with limited water supplies, and a third section of the web site covering irrigation system management is being developed.

Nickels Weather Station Information

The Nickels Soil Lab maintains a weather station that records a wide variety of atmospheric data on a hourly and daily basis including; min/max/ave temperatures, min/max/ave relative humidity, dew point, precipitation, evapotranspiration, wind direction/speed, solar radiation, and 3 air temperature thresholds. Data is available each morning for the previous day. The accumulated freezing temperatures will be listed as the number of hours below 32, below 30 & below 28 degrees.

http://www.ipm.ucdavis.edu/calludt.cgi/WXDESCRIPTION?STN=Nickels_Soils_Lab.P

Bee Activity This Season

Data from the weather station from February 1 to March 8 shows a total of 92-bee flight hours have accumulated for the 2009 bloom season in Arbuckle. The 92- hour figure compares to 175 hrs for 2008, 140 hrs for 2007 and 130 hrs for 2005.

Bee hours are calculated by the weather station processor using four weather parameters. Potential bee activity is listed as the number of hours above 55 degrees when wind is less than 15mph, given a sufficient level of sunlight without rainfall.

Local Insect Trap Data on Web

Key orchard insect pests are monitored at the Nickels Soil lab throughout the growing season. Insect trap catches are presented weekly for six locally important orchard pests at http://cecolusa.ucdavis.edu/

Insect	Trap used
Oriental Fruit Moth, *Grapholita molesta*	1C trap + pheromone
Peach Twig Borer, *Anarsia lineatella*	1C trap + pheromone
Navel Orangeworm, *Amyelois transitella*	Black egg trap+ bait
Codling Moth, *Cydia pomonella*	1CP trap + pheromone
Walnut Husk Fly, *Rhagoletis complete*	Yellow sticky trap + ammonium carbonate
Olive Fly, *Bactrocera oleae*	McPhail bucket +yeast tablet in water

Included in this newsletter is the March 2009 update to **Fungicide Tables for Almonds and Walnuts**. Complete tables are online at: http://www.ipm.ucdavis.edu/.

ALMOND—FUNGICIDE EFFICACY – 2009

Fungicide	Resistance risk (FRAC)[1]	Brown rot	Jacket rot	Anthrac -nose	Shot hole	Scab[2]	Rust[3]	Leaf blight	Alternaria leaf spot [2]	PM-like[4]	Silver leaf
Adament**	high (3/11)	++++	++	++++	++	+++	+++	ND	++	ND	----
Benlate[5]	high (1)	++++	++++	----	----	+++	+	++++[6]	----	----	----
Distinguish	high (9/11)	++++	++++	++++	++	ND	ND	ND	ND	ND	----
Elite**	high (3)	++++	+/-	+++	++	++	+++	ND	+	ND	----
Indar	high (3)	++++	+/-	+++	++	++	NR	ND	+	ND	----
Inspire*	high (3)	++++	+	ND	++	+++	ND	ND	+++	ND	----
Inspire Super**	high (3/9)	++++	++	ND	++	+++	ND	ND	+++	ND	----
Orbit	high (3)	++++	+/-	++++	++	++	+++	ND	++	ND	----
Pristine	medium (7/11)[7]	++++	++++	++++	++++	++++	+++	ND	+++	+++	----
Quash*	high (3)	++++	++	++++	+++	ND	ND	ND	++	ND	----
Rovral + oil[8]	low (2)	++++	++++	----	+++	+/-	++	ND	+++[9]	ND	----
Scala	high (9)[7]	++++	++++	ND	++	----	ND	ND	NR	----	----
Topsin-M /T-Methyl /Thiophanate-Methyl[5]	high (1)[7]	++++	++++	----	----	+++[8]	+	+++[6]	----	++	----
Vangard	high (9)[7]	++++	++++	ND	++	----	ND	ND	+[9]	----	----
Abound	high (11)[7]	+++	----	++++	+++	++++	+++	+++	+++[10]	+++	----
Elevate	high (17)[7]	+++	++++	----	+	ND	ND	ND	ND	ND	----
Gem	high (11)[7]	+++	----	++++	+++	++++	+++	+++	+++[10]	+++	----
Laredo	high (3)	+++	----	++	++	----	+	+++	----	+++	----
Rovral/Iprodione/ Nevado	low (2)	+++	+++	----	+++	----	----	ND	++[9]	----	----
Bravo/Chloro-thalonil/Echo /Equus[11,12]	low (M5)	++	NR	+++	+++	+++	NR	NR	NR	----	----
Captan[12]	low (M4)	++	++	+++	+++	++	----	+++[6]	+	----	----
CaptEvate*	low (M4/17)	+++	+++	+++	+++	+++	----	+++	+	----	----
Maneb	low (M3)	++	+	++	++	++	+++	++	----	----	----
Ph-D**/Endorse**	medium (19)	++	++	----	++	----	ND	ND	+++	----	----
Rally[13]	high (3)	++	----	++	+/-	----	+	+++	----	+++	----
Ziram	low (M3)	++	+	+++	+++	+++	----	++	+	----	----
Copper[14]	low (M1)	+/-	+/-	----	+-	+[15]	----	----	ND	----	ND
Copper + oil[14]	low (M1)	ND	ND	----	+	+++[15]	----	----	ND	----	ND
Lime sulfur[12]	low (M2)	+/-	NR	----	+/-	++[15]	NR	NR	NR	----	NR
Sulfur[12]	low (M2)	+/-	+/-	----	----	++	++	----	----	+++	----
PlantShield***	low	----	----	----	----	----	----	----	----	----	+++***

Rating: ++++ = excellent and consistent, +++ = good and reliable, ++ = moderate and variable, + = limited and/or erratic, +/- = minimal and often ineffective, ---- = ineffective, NR = not registered, and ND = no data

* Not registered on almonds in California

** Registration pending (in California)

*** Section 24C (special local needs) registration approved in California.

[1] Group numbers are assigned by the Fungicide Resistance Action Committee (FRAC) according to different modes of actions (for more information, see http://www.frac.info/). Fungicides with a different group number are suitable to alternate in a resistance management program. In California, make no more than one application of fungicides with mode of action Group numbers 1, 4, 9, 11, or 17 before rotating to a fungicide with a different mode of action Group number; for fungicides with other Group numbers, make no more than two consecutive applications before rotating to fungicide with a different mode of action Group number.

[2] Field resistance of *Alternaria* sp. and *Cladosporium carpophilum* to strobilurin and carboxamide fungicides has been detected in almond orchards.

[3] Of the materials listed, only sulfur, Abound, Gem, and some of the DMI fungicides (FRAC Group No. 3) are registered for use in late spring and early summer when treatment is recommended.

[4] PM-like refers to a powdery mildew-like disease on almond fruit that is managed with fungicides with activity against powdery mildew fungi.

Continued on next page . . .

Almond—Fungicide Efficacy, continued

[5] Strains of the brown rot fungi *Monilinia laxa* and *M. fructicola* resistant to Benlate (label withdrawn), Topsin-M, and T-Methyl have been found in some California almond orchards. Resistant strains of the jacket rot fungus, *Botrytis cinerea* and powdery mildew fungi, have been reported in California on crops other than almond and stone fruits and may have the potential to develop in almonds with overuse of fungicides with similar chemistry. Resistant strains of the scab fungus, *Cladosporium carpophilum*, have been found in California.

[6] Excellent control obtained with combination of Benlate and Captan; activity of Topsin-M and T-Methyl should be similar to that of Benlate.

[7] To reduce the risk of resistance development start treatments with a fungicide with a multi-site mode of action; rotate or mix fungicides with different mode of action FRAC numbers for subsequent applications, use labeled rates (preferably the upper range), and limit the total number of applications/season.

[8] Oil is a "light" summer oil, 1-2% volume/volume.

[9] Not registered for use later than 5 weeks after petal fall.

[10] Efficacy reduced at high temperatures and relative humidity; experimental for Alternaria.

[11] Bravo Ultrex, Bravo WeatherStik, Echo, Echo Ultimate, and Chlorothalonil are currently registered.

[12] Do not use in combination with or shortly before or after oil treatment.

[13] Efficacy is better in concentrate (80-100 gal/acre) than in dilute sprays.

[14] The low rates necessary to avoid phytotoxicity in spring reduce the efficacy of copper.

[15] "Burns out" scab twig lesions when applied at delayed dormant.

ALMOND—TREATMENT TIMING

Note: Not all indicated timings may be necessary for disease control.

		Bloom			Spring[1]		Summer	
Disease	Dormant	Pink bud	Full bloom	Petal fall	2 weeks	5 weeks	May	June
Alternaria	----	----	----	----	----	+++	+++	+++
Anthracnose[2]	----	++	+++	+++	+++	+++	+++	++
Brown rot	----	++	+++	+	----	----	----	----
Green fruit rot	----	----	+++	----	----	----	----	----
Leaf blight	----	----	+++	++	+	----	----	----
Scab[3]	++	---	---	++	+++	+++	+	---
Shot hole[4]	+[5]	+	++	+++	+++	++	----	----
Rust	----	----	----	----	----	+++	+++	+[6]

Rating: +++ = most effective, ++ = moderately effective, + = least effective, and ---- = ineffective

[1] Two and five weeks after petal fall are general timings to represent early postbloom and the latest time that most fungicides can be applied. The exact timing is not critical but depends on the occurrence of rainfall.

[2] If anthracnose was damaging in previous years and temperatures are moderate (63°F or higher) during bloom, make the first application at pink bud. Otherwise treatment can begin at or shortly after petal fall. In all cases, application should be repeated at 7- to 10-day intervals when rains occur during periods of moderate temperatures. Treatment should, if possible, precede any late spring and early summer rains. Rotate fungicides, using different fungicide classes, as a resistance management strategy.

[3] Early treatments (during bloom) have minimal effect on scab; the 5-week treatment usually is most effective. Treatments after 5 weeks are useful in northern areas where late spring and early summer rains occur. Dormant treatment with liquid lime sulfur improves efficacy of spring control programs.

[4] If pathogen spores were found during fall leaf monitoring, apply a shot hole fungicide during bloom, preferably at petal fall or when young leaves first appear. Re-apply when spores are found on new leaves or if heavy, persistent spring rains occur. If pathogen spores were not present the previous fall, shot hole control may be delayed until spores are seen on new leaves in spring.

[5] Dormant copper treatment seldom reduces shot hole infection but may be useful in severely affected orchards and must be followed by a good spring program.

[6] Treatment in June is important only if late spring and early summer rains occur.

WALNUT—BACTERICIDE EFFICACY - 2009

Material	Resistance risk (FRAC#)[1]	Walnut blight[2]	Phytotoxicity
Bordeaux[2]	low (M1)	+++	NP
Fixed coppers[2]	medium (M1)	+++	++[3]
Copper-maneb[4]	low (M1/M3)	++++	NP
Copper-maneb-surfactant (single application)[5]	low (M1/M3)	+	NP
Zinc-Copper Bordeaux	low (M1)	+++	NP
Regalia	low	++	NP
Serenade	low	+	NP

Rating: ++++ = excellent and consistent, +++ = good and reliable, ++ = moderate and variable, + = limited and erratic, and NP = not phytotoxic.

[1] Group numbers are assigned by the Fungicide Resistance Action Committee (FRAC) according to different modes of actions (for more information, see http://www.frac.info/). Fungicides with a different group number are suitable to alternate in a resistance management program. In California, make no more than one application of fungicides with mode of action Group numbers 1, 4, 9, 11, or 17 before rotating to a fungicide with a different mode of action Group number; for fungicides with other Group numbers, make no more than two consecutive applications before rotating to fungicide with a different mode of action Group number.

[2] Copper resistance occurs within sub-populations of *Xanthomonas axenopodis* pv. *juglandis*.

[3] Phytotoxicity of fixed coppers can be reduced with the addition of lime or agricultural oils to the tank mixture.

[4] Maneb refers to Manex registered under a Section 18 Emergency registration for the last 14 years.

[5] A single application with a surfactant is not recommended because of build up of populations on buds that may increase disease in subsequent years.

WALNUT—TREATMENT TIMING

Note: Timings listed are effective but not all may be required for disease control. Timings used will depend upon orchard history of disease and weather conditions each year.

Disease	Catkin emergence	Terminal bud break	1 week after bud break	7-10 day intervals[1]	May[2]
Walnut blight (on fruit/nuts)[3]	++	+++	+++	++[1]	+

[1] A temperature-leaf wetness model (e.g., XanthoCast) is available for determining optimum timing of bactericide applications.

[2] Late spring rains are less conducive to disease provided bloom is not delayed by low chilling.

[3] Male and female flowers are susceptible beginning with their emergence, depending on wetness and temperatures conducive to disease development.

Sacramento Valley
Walnut Pruning Workshop

March 18th, 2009

At Nickels Soil Lab
Greenbay Rd., Arbuckle
10am - 12am

Topics:

"Pruning One Year Old Walnut Trees
For Hedge Row and Standard Planting"

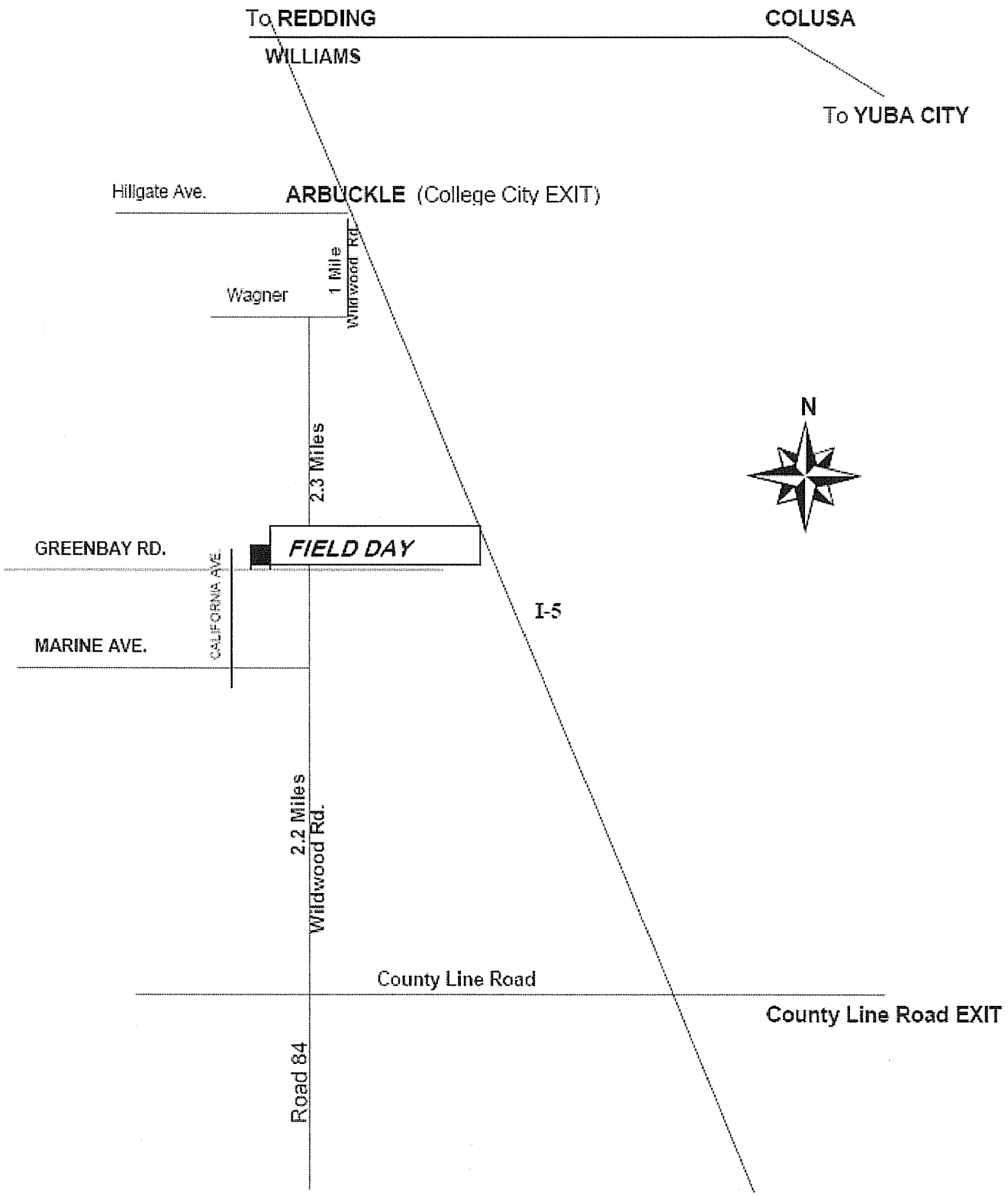
Janine Hasey, UCCE Farm Advisor, Sutter/Yuba
John Edstrom, UCCE Farm Advisor, Colusa

"Walnut Hedgerow Pruning,
Canopy Development and Yield"

Dr. Bruce Lampinen, Pomology Specialist, UC Davis

For more information contact:
UCCE Solano at 707-784-1320 or UCCE Sutter-Yuba at 530-822-7515

Directions to Nickels Soil Lab, Arbuckle



WALNUT DEHYDRATOR WORKSHOPS—2009

April 7 in Tulare
(Tulare County CE Office, 4437-B S. Laspina Street)
April 8 in Stockton
(San Joaquin County CE Office, 2101 E. Earhart, Ste. 200)
April 9 in Yuba City
(Sutter-Yuba Counties CE Office, 142 Garden Highway)

Time: 10 a.m.— 3 p.m. (registration opens at 9:30 a.m.)
Cost: $50 per person, includes lunch and instructional materials
Register: on-line at http://postharvest.ucdavis.edu, or mail your payment using the form below, no later than March 24th.

10 am	**Electronic Sorters and Hullers**- Chris Sinclair, Woodside Electronics, Woodland, California *-How to use them effectively*
10:30 am	**Dryers** – Jim Thompson, Bio. & Ag. Engineering Dept., UC Davis, and Don Osias, Applied Instrumentation, Walnut Creek, California *-Basics of design* *-Energy efficient operation* *-Strategies to increase capacity*
12:15 pm	**Lunch** (provided)
1 pm	**New Dryer Designs** – Don Osias *-A look into the possibilities for new designs*
1:30 pm	**Walnut Storage** – Jim Thompson *-Guidelines for maintaining nut quality*
2 pm	**Food Safety** – Linda Harris, Food Science & Tech. Dept., UC Davis *-Good management practices in harvest, hulling and drying*

Please register me for the Walnut Dehydrator Workshop on:
__ April 7 (Tulare) __ April 8 (Stockton) __ April 9 (Yuba City)

__ My check for $50, payable to the "UC Regents" is enclosed.
__ Please charge my credit card.

Account _____ Expiration __/__ CVC Code _____

Name _____ Address _____

Company _____ C/S/Z _____

Email _____ Phone _____

Postharvest Technology RIC, Dept. of Plant Sciences MS2, UC Davis, One Shields Ave., Davis, CA 95616. Phone: 530-752-6941 Email: postharvest@ucdavis.edu