VIT TIPS

San Joaquin Valley Viticulture Newsletter

UC CE University of California Agriculture and Natural Resources Cooperative Extension

JUNE/JULY 2015

Career Reflections

Maxwell Norton, UCCE Merced & Mariposa

In 1979, I began as the grape and tree fruit advisor in Merced County. Over the years, when others were on sabbatical or when positions were vacant, I enjoyed visiting with growers in Madera and Fresno Counties. On July 1st, I will be retiring from this fine organization. Thirty six years have gone by quickly and I still think this is the best job in agriculture!

A really interesting feature of viticulture in our region is how very diverse it is. We have big and small growers, growing grapes for wine, raisins, fresh shipping, concentrate, and even canning. Our grapes go into all kinds of wine programs; we have small boutique wineries and some the largest wineries in the world. We have very diverse soils and water from various sources - the ground, the Sierra, and even Shasta Dam.

When I began, it was still common to blow on Sevin®+Dibrom® dust for worm control. Multiple sprays were applied for leafhopper control. Leafhopper resistance was common. After introducing and demonstrating the UC IPM program for grapes, growers have eagerly implemented solid IPM practices that have made their programs more effective, safer for workers, and easier on the environment. When I started, there were "old" chemistry insecticides and miticides and very few fungicides available. It was fun being able to be among the first to test many of the new chemistries in commercial trials.

Several years ago, I decided to test the mechanical pruning program that was becoming common in Australia. Working with three different varieties, it was fun to see how wine grapes in the SJV quickly adapted. You can find mechanically pruned grapes scattered around the state, but this practice is still not widely used - yet.

This is not my area of research, but it has been amazing to witness close up how the raisin industry has transformed itself. I remember some early systems that were tried, such as mechanically harvested berries deposited on a continuous tray or spraying a food grade substance on the berries to greatly speed up drying. We learned a lot from these efforts and the industry exists today because of growers' efforts to change and adapt.

It is interesting that even after 36 years, I note that we still come across new problems and new pests and diseases that we have never seen before. The grape industries will need to continue to invest in research to solve these new problems and adapt to a changing world. I hope I was able to help here and there. Thanks for letting me be a part of it.

In This Issue

Around the San Joaquin Valley

County Updates

Tulare & Kings Counties

Allison Ferry-Abee

Several new field experiments are underway in Tulare County. We are looking at canopy management practices for Autumn King and deficit irrigation during veraison to increase Brix. We are hoping that these experiments will provide information for specific cultural practice recommendations for table grapes. Stay tuned!

Madera, Merced, & Mariposa Counties

Lindsay Jordan

With a warm and early start, phenological events continue to run ahead of the historic average. By mid-April, bloom was in full swing for earlier varieties like Rubired and there was favorable weather for set at this time. Storms brought hail in Merced and Madera counties in early April and May. I personally saw the hail hit vineyards and orchards in the area south of Chowchilla. Hail was sporadic in the area, but where it did hit, it caused extensive damage to the canopy and clusters.

Pictured: Hail fell in Madera County, collecting on vineyard floors (upper) and causing damage to canopies (lower)

Fresno County

George Zhuang

By the end of May, most varieties had completed fruit set. Throughout June and July, vineyards need to be monitored for powdery mildew and spider mites. The powdery mildew risk assessment index on the Fresno-Madera weather station network can be used to determine optimal spray intervals. Vine mealybug has also been getting a lot of attention recently; pest management guidelines can be accessed through the UC IPM website, available at http://www.ipm.ucdavis.edu

Maxwell Norton Retires

Maxwell Norton has used his expertise in tree fruit, grapes, and farmland preservation to serve UC Cooperative Extension as a Farm Advisor for 36 years, working out of the Merced County Extension Office. He has farmed in Stanislaus and San Joaquin Counties and has been a statewide UC Agriculture & Natural Resources Program Leader for agricultural productivity. He will retire July 1st, 2015.

A luncheon to honor Maxwell's contributions UCCE and celebrate his retirement will take place Saturday, July 25th, 2015 at the Italo Lodge in Merced, CA. To RSVP, please call 209-385-7403.

Sour Rot Control

Allison Ferry-Abee, UCCE Tulare & Kings

Sour rot can be a big issue for grapes in the Southern San Joaquin Valley and it is also difficult to control. Sour rot is caused by a variety of fungi, but the two most common species are *Botrytis cinerea* and *Aspergillus* spp. Grapes become susceptible to sour rot infection after veraison. Infections can be identified when berries begin to visibly soften and decay. Gray, green, and/or black spores may be seen on the berry surface and berries smell sour. The sour smell is caused by acetic acid (vinegar) producing bacteria that invade berries following fungal infection.

The fungi and bacteria that cause sour rot are always present in vineyards. But for sour rot to occur, two conditions must be met:

1. Berries must be over 8^0 Brix
2. *Either* free moisture must be present for several hours *or* berries must be wounded.

Since you can't do anything about the first condition, all disease controls are focused on reducing free moisture and wounding in the vineyard when berries are ripening. Any wounds that occur on berries are sufficient entry points for the fungi, including wounding from powdery mildew infections, thrips and omnivorous leaf roller (OLR) damage, bird damage, sunburn injury, and growth cracks. Because of this, most sour rot control strategies are more about reducing berry injury than controlling the fungi and bacteria themselves.

Besides controlling powdery mildew, thrips, and OLR, there are several other options that will significantly reduce your sour rot disease risk:

1. Removing leaves surrounding clusters has been shown to reduce sour rot. Leaf pulling reduces humidity in the fruit zone and prevents dew formation on clusters.

2. Fungicide applications after veraison (especially after rain events) may help reduce sour rot. Fungicides are not the most effective control available, but if you have a history of sour rot in your vineyard, they can be part of your control arsenal. For details on specific pesticide recommendations, see the UC IPM website (http://www.ipm.ucdavis.edu/)

3. Practice proper irrigation and fertilizer practices. This can reduce growth cracks on berries and reduce available entry points for fungi.

Managing Irrigation to Maximize Grape Production

George Zhuang, UCCE Fresno

Growers that I've talked to are concerned about maintaining grape production with less water. The easiest solution to this problem is twofold: Don't start watering until you need to and, when you do, only apply what you need. Some factors to consider:

- When should seasonal irrigations be initiated?
  - Identifying grapevine symptoms of water stress
  - Measuring vine water status
  - Measuring soil water tension or content

- How much water to apply?
  - Identify when deficit irrigation may be used to reduce water use but maximize yield and quality

When to initiate seasonal irrigation

Grapevine symptoms of water stress

Shoot growth is one indicator of a vine's water status. For mildly stressed vines, shoot growth will slow and internodes will shorten. Under severe water stress, shoot tips and tendrils dry and may die on the primary and lateral shoots.

The angle of the leaf blade to its petiole is another indicator of water stress—the angle decreases as water stress increases.

Becoming competent in the visual detection of vine water stress is a useful qualitative skill that can help you evaluate your irrigation program.

Measuring vine water status

Vine water stress can be quantified by taking measurements with a pressure chamber. These "water potential" measurements are commonly made on leaves at midday (taken ±1 hour of solar noon, so between 12:30 PM to 2:30 PM). Leaf water potential is a direct measurement of vine water status and is an accurate and reliable indicator for vine water stress. Studies indicate that when midday leaf water potentials decline to ≤-10 bars, it is a good time to begin irrigation. Measurements made after irrigations have commenced are also useful for monitoring the effectiveness of the irrigation program.

Measuring water in soil

Soil acts as a reservoir for water, but only a limited amount of water in the soil is available to vines. Therefore, knowing the soil water content or tension is useful in scheduling and monitoring vineyard irrigation events. To determine the soil water content, a grower can simply collect a soil sample using a shovel or auger. Then, the sample is weighed as-is from the field, dried, reweighed, and the moisture content calculated from the difference in weight.

However, tools that give more immediate feedback are available. Water tension can be measured using tensiometers and soil water content can be measured with neutron probes or time domain reflectometry. For soil water tension, place two tensiometers directly beneath the drip line, side by side, (12-18 inches to the side of an emitter) with one monitoring the 1 to 2 foot depth and the other measuring moisture in the lower soil profile, 3 to 4 feet deep (Fig. 1). Generally, a pair of tensiometers for every 20 acres is adequate,

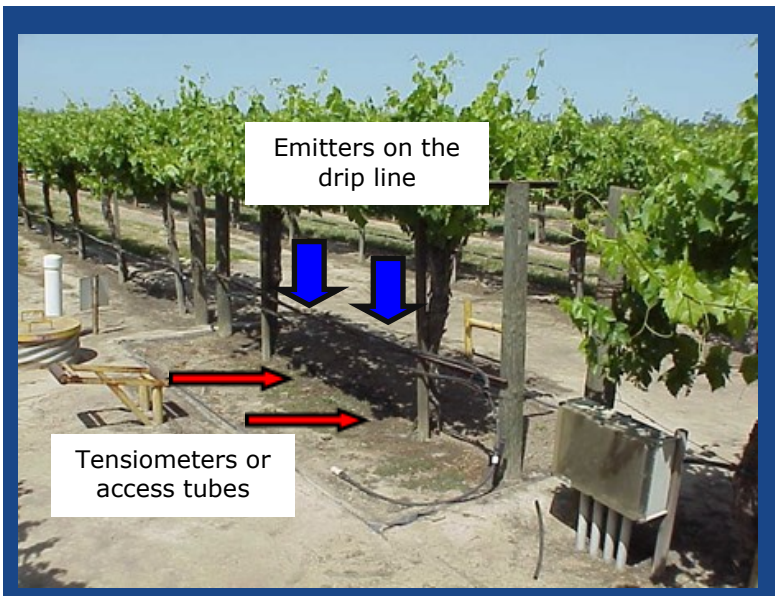

Figure 1. The recommended location of tensiometers or neutron probe access tubes to measure soil water content or matric potential (image courtesy of Dr. Larry Williams).

but more tensiometers are recommended if you have variable soil. Irrigation should be initiated once pre-determined values of soil tension have been reached at the different soil depths. Generally, irrigation should begin before soil tensions at an approximate 2-foot depth approach -40 to -50 centibars, but the irrigation threshold values will depend on soil type.

Two access tubes for a neutron probe can be placed side by side directly beneath the drip line to a depth of 6-9 feet (Fig. 1). Placing additional access tubes between vine rows is recommended for more accurate data on water use, since it will indicate the water depletion across the vineyard floor. Soil water content measured by neutron probe reflects the total water content. Irrigation should be initiated when the soil allowable depletion is less than the difference between measurements from the neutron probe and soil water-holding capacity. Soil allowable depletion can be variable depending on soil type (1.4 to 4.4 inches from sandy to clay, respectively).

Overall, soil water content is highly correlated with midday leaf water potential. Growers can use soil and vine measurements to validate irrigation scheduling based on experience and visual observation.

How much water should be applied?

Once irrigation begins, growers should only apply the amount of water that is needed. General vine water use estimates for Thompson Seedless with a large canopy, like a crossarm trellis, can be found in Table 1 (below).

Another way to precisely quantify how much water to apply is to use crop evapotranspiration (ET_c) information. ET_c can be calculated as $ET_c=ET_o \times K_c$, in which ET_o is the reference evapotranspiration and K_c is the crop coefficient. Currently, UCCE is working with Department of Water Resources to provide weekly ET_c values to growers using ET_o from CIMIS stations and K_c.

K_c can be estimated by using the following equation: $K_c=(SA\% \times 0.017)-0.008$, where SA% is the proportion of shaded area on the vineyard floor. Recently, K_c values calculated from aerial and satellite images of the normalized difference vegetation index (NDVI) images have become available for commercial use. An efficiency factor (70%-90%) can also be used to adjust ET_c based on the irrigation efficiency of a drip system.

...Irrigation continued on page 6

Table 1. Vine water use (drip irrigation schedule) for a large canopy or a crossarm trellis*.

Month	Date	Gallons per acre/day	Month	Date	Gallons per acre/day
April	1-7	700	**July**	1-7	4700
	8-14	1000		8-14	4900
	15-21	1300		15-21	5050
	22-30	1650		22-31	5000
May	1-7	2050	**August**	1-7	4900
	8-14	2400		8-14	4800
	15-21	2700		15-21	4550
	22-31	3100		22-31	4400
June	1-7	3550	**September**	1-7	4100
	8-14	3900		8-14	3800
	15-21	4250		15-21	3500
	22-30	4500		22-30	3200

*Raisin vineyard canopy covers 75% or more of the land surface during summer months.

(*Raisin Production Manual*, UC ANR Publication 3393)

...Irrigation continued from page 5

Opportunities to deficit irrigate to maximize yield and quality

Deficit irrigation is a very powerful tool for growers to consider as the drought continues. For raisin and wine grapes, deficit irrigation can be used to save water while maximizing production. Sustained deficit irrigation (SDI) is the practice of purposely deficit irrigating throughout the growing season, where only a fraction of the full ET_c will be applied. For Thompson Seedless grapevines, SDI at 60% to 80% of ET_c was sufficient to maximize the yield without reducing sugar accumulation by berries or raisin quality. Similarly, 80% of ET_c in a Merlot vineyard maintained yield and fruit quality. In terms of wine grape quality, timing deficit irrigation is critical. About 65-75% of final berry size is determined in the time period from fruit set to veraison. Regulated deficit irrigation can be applied during this stage to achieve better fruit quality with reduced berry size. Given that a smaller berry has higher skin/pulp ratio, deficit irrigation can result in more color, tannin, and flavor at harvest. Importantly, deficit irrigation doesn't decrease bud fruitfulness the following season.

For table grapes, more research is needed to fully understand the potential impact of deficit irrigation on berry size and fruit quality. Generally, deficit irrigation is not recommended until after veraison in table grapes.

Overall, deficit irrigation at approximately 80% ETc appears to maximize yield and quality of wine and raisin grapes while minimizing water use.

I would like to acknowledge the irrigation information provided by Dr. Larry Williams and technical support from Dr. Matthew Fidelibus, Dept. of Viticulture and Enology, UC Davis.

Upcoming Events

Kearney Grape Day

August 11, 2015
Kearney REC in Parlier, CA

More information to come

For further information or special needs accommodations, contact mwfidelibus@ucanr.edu

Vit Tips would like to say...

Congratulations to Matthew Fidelibus for winning the 2015 Extension Distinction Award from the American Society of Enology and Viticulture

Follow @grapetweets on Twitter to keep up to date on his research and outreach

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Contact your local viticulture farm advisor or UCCE county office to be added to the e-mailing list or if you wish to receive a mailed copy.

Our programs are open to all potential participants. Please contact your local UCCE county office (two weeks prior to the scheduled activity) and/or the event organizer listed if you have any barriers to participation regarding accommodation.

Contact Us

Questions? Concerns? Follow up? Please feel free to contact us.

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