VIT TIPS

San Joaquin Valley Viticulture Newsletter

UC CE University of California Agriculture and Natural Resources Cooperative Extension

Summer 2016

Measuring Plant Water Status Using a Pressure Chamber

Allison Ferry-Abee, UCCE Tulare & Kings Counties

Whether you are performing regulated deficit irrigation or just trying to irrigate more efficiently, you need an accurate way to determine how much water to apply to vines and when. Measuring soil moisture (such as with tensiometers) is a common method to time irrigation, but since soil type and plant size make a huge difference in how much and how often water is required, it takes a fair amount of expertise in your specific vineyard to fine-tune irrigation using soil moisture alone. An alternative method is to measure the water status of the plant directly, which can help you understand how your vines are responding to your irrigation regime.

A common tool to measure plant water stress is a pressure chamber. Pressure chambers are relatively inexpensive, portable, and offer real-time measurements that are easy to understand. A leaf blade is placed into a sealed chamber with the petiole exposed. The chamber is put under pressure, either with a hand pump or a CO_2 or nitrogen tank (depending on the model). The pressure in negative centibars when sap exudes from the petiole is the stem water potential. As plants transpire, water evaporates from the plant, which pulls water from the roots. This action is applied in reverse in a pressure chamber, which measures how much force is required to push sap from the blade back into the petiole. The greater the water stress, the more negative the pressure values.

Midday Leaf Water Potential vs. Stem Water Potential

There are a few options for measuring plant stress using a pressure chamber, but midday stem water potential and midday leaf water potential are the most useful and practical. For both methods, the water potential is measured at the time of the day with the highest water demand—solar noon (1:00 PM in California in the summer and early fall because of daylight savings time). For practical purposes, the time to measure leaves is extended one hour earlier and later to give more time. For leaf water potential, the leaf is measured as quickly as possible after removal from the vine to prevent excess evapotranspiration. In stem water potential, leaves are covered with a foil-covered bag and left on the vine for an hour or more before measurement. The goal of this extra step is to stop transpiration and allow water levels in the leaf to equalize with the rest of the vine. Stem water potential tends to be slightly more accurate, but is also more time consuming.

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Pictured: Covering a leaf in a foil bag for midday stem water potential measurements. (Photo by A. Ferry-Abee)

Around the San Joaquin Valley

County Updates

Kern County

Ashraf El-Kereamy

As reported by David Haviland (Entomology advisor, UCCE Kern County) glassy-winged sharpshooter (GWSS) egg hatch has begun in General Beale area vineyards. A significant amount of egg masses were found in this area. Evaluation of the GWSS being found on sticky cards revealed that a high percentage of females being captured had a white patch of brochosomes on the wings, indicating that they are gravid and laying eggs. In order to prevent the spread of GWSS, grape growers should be in the process of treating for sharpshooters.

Tulare & Kings Counties

Allison Ferry-Abee

The effects of El Niño, including big temperature swings, thunderstorms and hail appear to have largely settled down for the season. Continue to be on the lookout for unusual pest symptoms for the year, though. Late, warm spring rains may have an effect on powdery mildew and botrytis incidence and severity.

Fresno County

George Zhuang

Raisin and wine grape varieties have gone through bloom. Canopy separation, shoot thinning and basal leaf removal can improve the fruit zone microclimate and light exposure to renewal shoots/buds, which can reduce disease pressure and increase fruit quality and next year's fruitfulness. If you have done your bloom petiole samples, adjust the nutrition management based on the lab results. Monitor for powdery mildew and vine mealybug on site and manage fungicide/ pesticide use accordingly.

Madera, Merced, & Mariposa Counties

Lindsay Jordan

With wet soils from spring rains, irrigation regimes should be adjusted throughout the late spring and early summer to ensure over-watering does not create unwanted, excessively vigorous canopies which promote disease and can negatively impact fruit quality.

Upcoming Events

Surface Irrigation Efficiency Workshop

June 3, 2016
9am—12pm

At the UC Kearney Agricultural Center
9240 S. Riverbend Ave.
Parlier, CA
In the Nectarine Room

Free Registration
To register for the workshop or for additional information, please email or call Dan Munk (email:dsmunk@ucanr.edu or call 559-241-7515). Event registration is optional but preferred to estimate attendance.

San Joaquin Valley Winegrowers Association & UC Cooperative Extension with CSWA support present:

The Annual Viticultural Research Roadshow

June 9, 2016
1-5pm

At the FEOC Nielsen Conference Center
3110 W. Nielsen (West of Marks)
Fresno, CA

To register for the Roadshow and for more information, please visit:
www.idrinkwine.net

Dry-on-Vine Raisin Grape Canopy Management for Open Gable Trellises

Matthew Fidelibus, UC Davis Viticulture & Enology

George Zhuang, UCCE Fresno County

Canopies distinctly separated into fruiting and renewal sections are a striking feature of overhead arbor dry-on-vine (DOV) vineyards (Figure 1). With such systems, canopy separation provides good sunlight exposure to renewal shoots, which should help optimize bud fruitfulness and minimize bud necrosis. Canopy separation also facilitates pruning and harvesting, and might provide a better microenvironment for raisin drying compared to a non-divided canopy. The success of the overhead arbor system has inspired attempts to adapt canopy separation to other trellis systems in hopes that it would help overcome certain inherent limitations or management problems.

A well-known example of the use of canopy separation on other trellising systems is the within-row-alternate-bearing (WRAB) for 'Thompson Seedless' on traditional trellises. Vines subjected to the WRAB system were pruned in such a way that fruiting canes and renewal shoots were left on opposite sides of vine trunks such that each were adjacent to similar structures of neighboring vines, resulting in divided canopies with alternating fruiting and renewal sections between vine trunks. A complete description and illustration of the WRAB system can be found in a California Agriculture article online: http://ucanr.edu/datastoreFiles/391-325.pdf. Several years of testing showed that the WRAB method *per se* did not affect yield compared to vines with non-divided canopies whose fruit were dried on trays (see the California Agriculture article cited above for details). Raisin grades were higher from WRAB DOV vines compared to tray dried raisins, but this was likely an effect of drying method rather than canopy separation, as similar results were found in a different study comparing the effect of drying method on raisin quality (http://ow.ly/tBSs300kJZC). A subsequent study that specifically tested the effect of canopy separation on 'Thompson Seedless' DOV performance did not show any consistent benefit of canopy separation on traditional trellises (http://www.pubhort.org/aps/61/v61_n2_a10.htm) and the use of WRAB techniques on traditional trellis is now uncommon.

Even though no clear benefit of the WRAB DOV system was shown for traditional trellis systems, many growers have experimented with it on open gable systems, in an attempt to improve fruitfulness and thereby yield. The effect that different canopy separation methods may have on raisin yield and quality on an open gable trellis was recently tested in a multi-year experiment at the Kearney Agricultural Center in Parlier. We subjected vines to one of three different canopy separation methods: 1) center-divided, with moveable rake wires to pull the renewal shoots away from the fruiting shoots on the trellis arms and toward the catch wire in the center of the trellis, 2) non-divided (Figure 2, A), or 3) WRAB. Vines assigned to the center-divided or non-divided treatments were cane pruned, leaving six to eight 15-node canes, and approximately 10 two-bud spurs per vine. Canes and spurs were left on all cordons; the only difference between those treatments was the use of rake wires and a center-mounted foliage catch wire to separate renewal shoots from fruiting shoots in the center-divided vines. Vines assigned to the WRAB treatment were pruned such that the cordons between any two adjacent vines were either entirely spurs or canes, creating fruiting or renewal zones that alternated between pairs of vine trunks (Figure 2, B).

...Canopy Management continued on page 6

Figure 1. An overhead arbor trellis system with canopies divided into alternating fruiting and renewal sections.

...Water Status continued from page 1

Both are excellent methods to better understand the water needs of vines. The basic steps for each are listed below.

Midday Leaf Water Potential

- Measure from 12:00-2:00 PM
- Use leaves fully exposed to the sun
- Wrap leaves tightly in a clear bag and cut off the leaf with a sharp razor blade
- Quickly insert the leaf into the pressure chamber
- Slowly pressurize the chamber
- Carefully watch the petiole with a magnifying loupe; as soon as sap can be seen exuding from the petiole, stop increasing the pressure
- The pressure in negative centibars is the leaf water potential

Midday Stem Water Potential

- Measure from 12:00-2:00 PM
- Use leaves in the shade
- Wrap leaves tightly in a bag covered in aluminum foil to block out the sun (this keeps the bag from becoming a mini greenhouse)
- Leave the leaf and bag on the stem for 90-120 minutes
- Cut off the leaf with a sharp razor blade and measure as above

General Tips for both Methods

- Take at least three measurements per vineyard block or soil type and average the results
- Choose leaves that are fully expanded and healthy, with no holes or pest damage
- Try to keep the timing between cutting the petioles and beginning pressurization consistent, and raise the pressure in the chamber at the same rate for all samples
- Always have someone who is well-trained take the measurements (preferably the same person). Consistency is critical for accurate results
- Pick one of the above methods and stick with it—don't switch between leaf and stem water potential throughout the season

Pictured: Using the pressure chamber. (Photo A. Ferry-Abee)

Managing Potassium in Vineyards

Ashraf El-Kereamy, UCCE Kern County

Potassium (K) is one of the most important macro elements required in relatively large quantities to ensure good vine productivity and high fruit quality.

Physiological role of potassium

Potassium activates a large number of enzymes that catalyze several physiological processes. Potassium also regulates cell pH to optimize different enzymatic reactions that control vine growth and development. It helps regulate the osmotic pressure of different parts of the vines. For example, potassium plays an important role in opening and closing stomata, the pores on leaves through which carbon dioxide and water vapor may pass to enable photosynthesis and transpiration. By closing their stomata, water-stressed vines can greatly reduce the water lost through transpiration, and K plays a major role in this process as the efflux of potassium from guard cells reduces their turgor which, in turn, closes the stomatal pores. Under potassium deficiency, the stomata close very slowly which reduces the vines' tolerance to water stress. Conversely, accumulation of K in the roots creates an osmotic pressure that increases the water flow into the roots and improves vine tolerance to water deficit.

Potassium is involved in maintaining the energy in plants; K deficiency negatively affects the vine energy level and reduces photosynthesis, and increases respiration which slows vine growth and development. Sugars are produced in the leaves and transported to the fruit through a transport system that requires energy. Inadequate K supply reduces the available energy and consequently, reduces the transport of sugars to the berries. Sugars are essential to obtain high fruit quality and good red coloration. This transport system is also essential for water and nutrient uptake and transport through the vine. Foliar K application alone or in combination with ethylene releasing compounds is effective at improving grape color with some side effect on reduced berry size. Although a high level of K fertilizer could help in improving vineyard productivity and fruit quality, excessive K fertilization could negatively affect the uptake of other nutrients such as calcium and magnesium.

Determining the requirement for potassium and deficiency symptoms in vineyard

It is very important to check the bloom petiole K content and soil nutrient analysis before applying potassium fertilizers. Beside the petiole analysis, check the vineyard for visual signs of K deficiency. For more information visit (http://iv.ucdavis.edu/Viticultural_Information/?uid=143&ds=351).

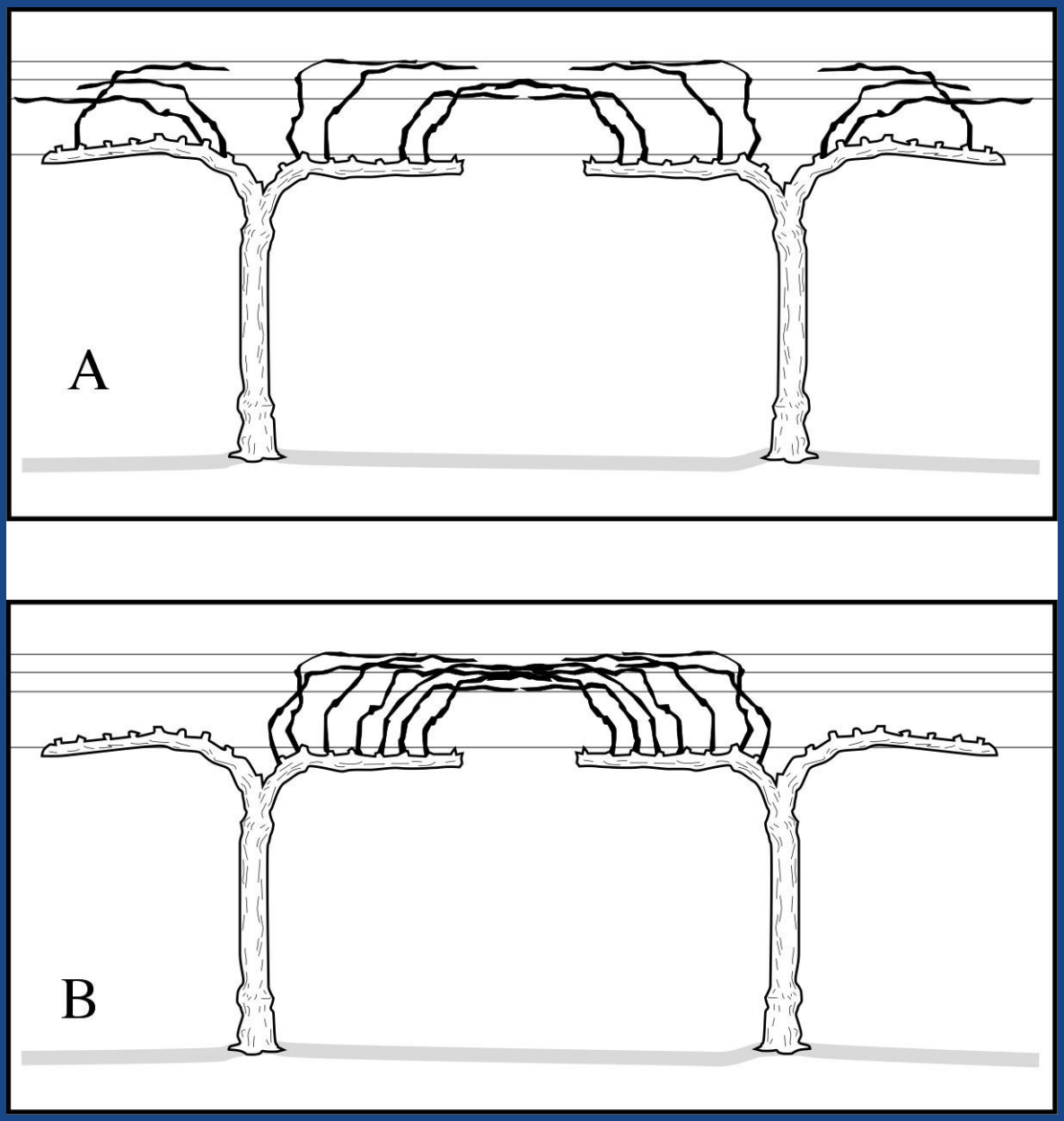
The symptoms depend on the level of the K deficiency and variety. In a severe deficiency, symptoms appear around bloom. The symptoms appear as a fading of the green color of leaves between the main veins and the leaf margins become necrotic and tend to curl upward. Leaves in the middle of shoots usually show K deficiency first.

Pictured: Potassium deficiency symptoms where the green fades from the margins (above) or a brown discoloration can be seen in some red varieties, like Cabernet franc (below).

...Canopy Management continued from page 3

In general, the renewal shoots on vines with WRAB canopies had a higher proportion of external leaves, and fewer leaf layers, than vines subjected to other canopy management treatments. Light intensity in the renewal zone was also highest in vines with WRAB canopies in spring, but as the canopy developed, treatment effects on light intensity diminished. Despite somewhat improved canopy structure and better light exposure in spring, none of the canopy separation treatments have improved raisin yield or quality in any of the three study years. Thus, other factors, such as irrigation and nutrient management could be more important that canopy separation in regards to optimizing raisin grape yield on an open gable trellis.

Figure 2. An open gable dry-on-vine trellis system showing vines with non-divided canopies (A), and canopies separated in the Within-Row-Alternate-Bearing (WRAB) style (B).



Wet Spring & Phomopsis

As predicted with spring rains, phomopsis infections have been seen throughout SJV vineyards.

Take the time to evaluate if your fungicide program adequately controlled for phomopsis, to help guide your pest management decisions in future years.

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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.

Contact Us

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

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