



Lake County Winegrape Growers

Sustainable Winegrowing Newsletter

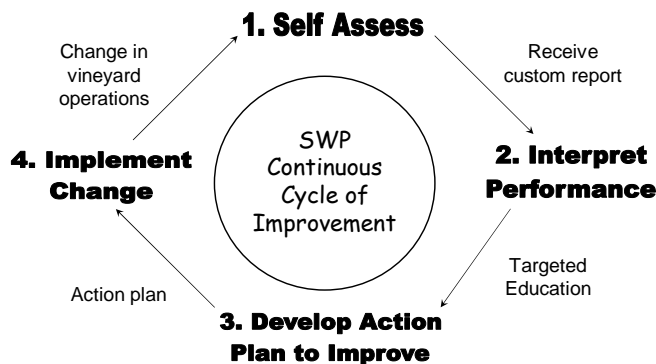
Putting the Workbooks to Work

By Erica Lundquist, Ph. D.

LCWC Viticulturist

Lake County is a leader in the statewide program to promote sustainable winegrowing with over 70% grower participation in Sustainable Winegrowing Practices (SWP) workshops during 2002-2003. Since then a major emphasis of the Lake County Winegrape Commission Sustainable Winegrowing Education Program has been to provide continuing education for improvement in the sustainability of winegrowing practices.

The SWP workbooks and workshops are intended to be a tool to promote a continuous cycle of improvement. You're not done once you have filled out an assessment! The chart to the right shows how the workbooks can continue to promote improvement. In step 1 growers attend a meeting and fill out an assessment of the sustainability of their vineyard operations. In step 2 growers receive a custom report showing their scores as well as Lake County and state average scores for the self assessment criteria. The LCWC uses these scores to target education for improvements in sustainability. In step 3 growers use their custom report and knowledge of their vineyard operations to develop an action plan to improve sustainability. Step 4 is the most important part of the cycle, implementing changes to improve sustainability.



Following are a few highlights of growing season management where LC growers scored very well on sustainability, and suggestions where changes could be implemented.

In the area of vineyard water management, the Lake County workbook scores showed areas of excellence, for example most Lake County growers have engineered microirrigation systems (criterion 5-4). Practices that could be improved include increasing the use of plant and soil water status monitoring devices (criteria 5-1 and 5-9) and use of weather station evapotranspiration (ET) measurements for irrigation scheduling (criteria 5-10

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and 5-11). Start with the article by Mark Greenspan in this newsletter for information on these practices. Testing distribution uniformity of microirrigation systems, criterion 5-5, can help save water and pumping costs and improve vineyard uniformity. The SWP workbook includes a summary of how to perform a quick field evaluation for uniformity.

In the area of pest management Lake County growers scored very well and in an important area of sustainability, using fewer and less risky pesticides, criteria 6-3, 6-4, 6-22, 6-23, and 6-38. Although Lake County growers scored well on pest monitoring, criteria 6-1, 6-12, 6-20, and 6-26, for insects and mites, disease, weeds, and vertebrate pests, respectively, many could improve their scores by maintaining written records of pest incidence. Written records are vital for judging pest control success and improving future pest management decisions. Scores

indicated that some growers could improve in criterion 6-13, powdery mildew management, by making use of the U.C. Grape Powdery Mildew Index. Use of the index frequently reduces the number of mildew control applications while improving their effectiveness. The index is explained in the workbook, and can be accessed for local weather stations through growers section of the LCWC website, www.lakecountywinegrape.org.

The LCWC plans to continue the SWP cycle with growers returning to complete vineyard assessments in the coming winter. Repeating the cycle allows growers and the LCWC to determine where improvements in sustainability have been made, and where education and improvements are needed. The LCWC also continues to offer monthly educational meetings to help growers remain up-to-date on sustainable and premium winegrowing topics.

FREE! FREE! FREE!

(Get your Vine Mealybug traps and Pheromone now.)

By Chuck Morse, Deputy Agricultural Commissioner

The Lake County Department of Agriculture is strongly encouraging growers to obtain Vine Mealybug (VMB) traps from them by the end of June. The VMB is a pest that has dire consequences if it is allowed to become established in a vineyard. Early detection is critical to giving the vineyard owner/operator a chance at possible eradication. To that end, the Lake County Department of Agriculture is deploying and servicing over 100 traps countywide in all of the major growing regions. We hope to have most, if not all, of our traps out by the end of June. The trapping season runs from July to first rains and significant cool-down in early winter. A very important part of the overall detection effort are the traps that growers deploy and then return to the Ag. Dept. for reading. Working together, we can effectively double the trapping data for the county and you, as growers, will know what is (or hopefully is not!) in your vineyard. The knowledge gained either way is very important. We will coordinate with growers to assure that the same vineyard is not trapped with a grower trap (or traps) as well as a county program trap.

Please stop by the Department of Agriculture (883 Lakeport Blvd. in Lakeport) to pick-up your VMB traps and pheromone completely free of charge. These traps have been purchased by CDFR and distributed to the counties specifically for this purpose. We have literature on how to assemble the trap and we will answer any questions you might have. Come in when you get the chance, M-F, 8AM to 5PM (our front counter is closed from 12 to 1 for lunch). We hope you will take advantage of this free program to monitor for vineyard pest that is a significant threat to any vineyard in Lake County.

For questions or more information, please call Chuck Morse at the Lake County Department of Agriculture – 263-0217.



Vine mealybug females at base of leaf petiole. Note ants tending VMB. Male VMB are much smaller and can only be identified using a microscope.

Winegrape Irrigation Basics

So, another year with a wet spring and we can put off thinking about irrigation for a bit longer... Or can we? In my mind, we should be thinking about irrigation long before we need to turn the pumps on. Actually, we should always be thinking about irrigation. Water management (including irrigation) is the single most influential viticulture practice that we perform each year and it has a significant potential to impact wine quality, yield, vine health and vineyard sustainability. Even though we have had a wet spring, long-term weather records (1) indicate that Lake county gets about 33.5 inches of precipitation a year but almost zero precipitation during June, July and August. Grapevines will use from 17 inches (VSP trellis) to 22 inches (horizontally split trellis) of water each year in Lake County (2). It doesn't really matter how much rainfall we receive in the winter and spring, our soils will only hold about 5 to 9 inches of available water anyway. The difference must be applied through irrigation or by imposing moderate deficits, which reduce water consumption.

I like to promote an integrated approach to irrigation management, which means to consider three major aspects of the practice: Scheduling, Monitoring and Strategy (not necessarily in that order). Strategy is the most logical aspect to discuss first, but since its discussion includes items discussed in scheduling and monitoring, should I

To find information on the status of vine mealybug in Lake County, answers to frequently asked questions, educational events, publications, and links to other VMB websites, check the local UCCE website.

You can access the Lake County UCCE VMB web page through the link on the LCWC website or type in:

http://celake.ucdavis.edu/Viticulture262/Vine_Mealybug.htm.

**By Mark Greenspan, Ph. D.
Advanced Viticulture
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start with scheduling first? No! We need to look at monitoring first, since we will be using that skill to determine when to begin irrigating in the first place!

MONITORING: Monitoring means getting out in your vineyard and looking at the vines. We can tell a lot about the water status of the vines just by knowing what to look for. This is especially important before we begin to schedule irrigations in the spring, when we are waiting for the "grand period of growth" to slow down and we can gain some control over our vines. We generally want to wait to begin irrigating until the vines slow down or stop growing. We can use a shoot tip rating, as explained in my Practical Winery & Vineyard (PWV) article (3), or simply measure shoot length at weekly intervals on a set of shoots that are marked (the same shoots need to be measured each time). When shoot growth ceases, or slows down substantially, we may begin irrigation. However, if the shoot growth slows down before the shoots are long enough (about 40 inches or 20-22 nodes), we will need to irrigate earlier. Generally, that doesn't happen in the North Coast unless there are other non-water-related factors. Irrigating too early in the season is a mistake that is all-too-commonly made throughout California.

There are other visual indicators of water stress that are discussed in the PWV article, but growth is most important. Besides visual monitoring, soil moisture and

plant water status measurements are valuable tools for irrigation monitoring. Soil moisture sensors (there are too many to discuss here) are useful as a supplemental tool in determining the trigger for irrigation, indicating a threshold level for either soil moisture content or soil matrix potential (suction force). However, I don't generally recommend soil moisture monitoring for drip irrigated vineyards once irrigation has started because the point source application of water confounds the measurement of soil moisture. A much better tool for vineyard water status monitoring is the pressure chamber (or pressure bomb, as it is sometimes called). The pressure chamber is a portable instrument that measures the suction (or tension) in the water column within the vine. The greater the suction force, the more stress the vine is experiencing. The nice thing about this instrument is that it gives us a non site-specific, quantifiable assessment of vine water status that can be referenced to the experiences of other growers in other regions. A more thorough discussion of the pressure chamber can be found in the PWV articles (3,4,5).

SCHEDULING: There are some that schedule irrigation based on vine water status and/or soil moisture readings. In other words, a critical (threshold) level of soil or vine water status is reached, which triggers a (usually) high volume irrigation event. This is repeated throughout the season. I do not recommend that practice! The threshold model does not work well with drip irrigation and tends to exaggerate the weakness in the weak areas of the vineyard, which will dry out during the long periods that occur between irrigation events. Instead, once irrigation begins, irrigation scheduling should be based on a water use model and monitoring should be employed to adjust and tune the model during the growing season. A water use (or water budget) approach simply means that we replace all or a portion of the water being used by the vineyard through irrigation. The portion of the replacement water can be adjusted during the season to keep our vineyard near our target levels of water status (per the pressure chamber). But we need to have a means to quantify the water being used before we can assess how much to apply.

The water use model commonly used for vineyards is an evapotranspiration (ET) model. ET is a measurement of the water being evaporated from the soil and transpired by the vines. In drip irrigation, soil evaporation is minimal, so most of ET is made up of vine transpiration. It is difficult to measure ET in vineyards, so we use a model to estimate it. The model commonly in use is called reference ET (ET_0), which is an estimate of water use for an irrigated grass crop. Actually, it is a model that uses weather factors as inputs. California has a network of

weather stations (CIMIS) that provide ET_0 . There are no CIMIS stations in Lake County, but The Lake County Winegrape Growers website has a link to a weather station network in Lake County supported by UC Cooperative Extension. Most, but not all, have daily ET_0 available. Locate the station that is closest to your vineyard(s).

The ET_0 value gives us the daily water use (in inches) for a grass crop. We need to convert that value to a grape ET using a crop coefficient (K_c), which is a multiplier and is always less than 1 (i.e. vineyards use less water than an irrigated grass crop). The crop coefficient is highly dependent on the number of exposed, transpiring leaves per unit ground area, and so is a function of both trellis type and of time of year. Larry Williams gives a good discussion about crop coefficients, as well as some values in his PWV article (5). He also uses a degree day model to provide seasonal variation in K_c . I use a monthly variation model for K_c , which seems to work satisfactorily. It is important to realize that the ET and K_c models are just approximations. They are not nor will they ever be entirely accurate! However, they are quite sufficient for irrigation scheduling if we use the same weather station for ET_0 and the same K_c model from year-to-year. Consistency is more important than accuracy! We will apply a management factor (K_m) to this value anyway, to incorporate our deficit irrigation (or other) strategy and to allow us to "steer" the irrigation applications up or down. If we apply this model year after year and refine our K_m each year we no longer care that the model is accurate or not. We have adjusted the model to work for us!

Finally, a word or two about irrigation frequency and volume. The ET model gives us an estimate of accumulated depletion, but does not tell us how often to apply water. We could shorten the interval and apply less water each time or lengthen it and apply more. Drip irrigation is designed for frequent irrigation events of lower volume. I hear many growers say that they irrigate each block once a week for X amount of hours. I think they would be better off irrigating twice or even three times per week and distributing X amount over those 2-3 irrigation events. This is especially true for warm to hot regions. Irrigating more frequently and with less volume will help to even out the water usage throughout the vineyard. Weak areas in a vineyard are usually caused by soils in those areas having low water holding capacity. Large volumes of irrigation will be inefficient since the weak soils will not hold the moisture within the rooting zone while the soils in the "stronger" areas will. Hence, the weak soils dry out more quickly and the vines become stressed between irrigations. So, irrigating in shorter "bursts" can reduce the discrepancy between water availability in the weak and strong regions thus evening

out the vineyard. Furthermore, adding emitters in weak areas is counter-intuitive. Weak vine areas actually use LESS water than strong areas due to fewer leaves! The only justifiable method of adding emitters would be to add more emitters of lower discharge so as not to increase the volume of water going to each vine.

There is one exception to the short, frequent irrigation regime I just discussed. Hillside vineyards whose irrigation systems require substantial filling and draining time should not be irrigated with very short irrigation cycles, as the filling and draining times will create application non-uniformity. In these situations, a balance between the two extremes must be found.

STRATEGY: I don't have enough room to discuss strategy in this article. For a discussion on strategy, refer to my PWV article (4). But be sure to discuss strategy with your winemaker or grape buyer and don't make any drastic changes all at once. Irrigation is an evolving process!

Inside the Black Box- Grapevine Root Distributions Summary of a Recent Study

By Erica Lundquist, Ph. D.
LCWC Viticulturist

Matching rootstocks to soil conditions is one important factor in developing a well-balanced vineyard that is capable of producing excellent wine quality. A frequent assumption to explain the ability of grapevine rootstocks to influence vine vigor is that different rootstocks have an inherent capacity to achieve different rooting depths. In a recent review and analysis of information on grapevine root distributions, Smart et al. (2005) took a thorough look at the available information and reached some interesting conclusions.¹

Although there were few studies examining the lateral spread of grapevine roots, the available studies showed that in general, root densities remain high at 1 to 1.5 m from the grapevine trunk. Two studies that were reviewed found that increasing vine density (closer spacing) reduced root system size and increased root density.

With regard to vertical root distributions, the authors found that grapevines are generally deep rooted. They looked at over 200 root studies and found that on average 63% of roots were present in the top 60 cm and 80% in the top meter of the soil profile. The root studies did not attempt to excavate to determine the maximum rooting depth of grapevines.

¹ Smart, David R., Erin Schwass, Alan Lakso, and Lisa Morano. 2005. Grapevine Rooting Patterns: A Comprehensive Analysis and Review, In *Proceedings of the Soil Environment and Vine Mineral Nutrition Symposium*, L. Peter Christensen and David R. Smart Editors, American Society for Enology and Viticulture.

References:

- (1) Lakeport weather station (now off-line). Records from 1951 through 2001 online at www.ipm.ucdavis.edu.
- (2) Lake County weather page. <http://www.wxnet.com/winegrape/>. Use the WINDS link button or link directly using <http://www.wxnet.com/wfw/pages.dll>.
- (3) M. Greenspan. Integrated Irrigation of California Winegrapes, Monitoring and Scheduling. *Practical Winery and Vineyard*. March/April 2005. p21.
- (4) M. Greenspan. Integrated Irrigation of California Winegrapes, Strategy. *Practical Winery and Vineyard*. May/June 2005.
- (5) L. Williams. Irrigation of Winegrapes in California. *Practical Winery and Vineyard*. November/December 2001. (<http://www.practicalwinery.com/novdec01p42.htm>)

Perhaps surprisingly, different rootstocks showed no clear differences in vertical root distribution patterns. The authors conclude that "root density rather than rooting depth per se may be a key difference among rootstocks with diverse performance in terms of vine vigor."

Physical barriers to root growth were found to have the largest effects on root distribution. Presence of rigid soil layers that were resistant to root penetration was one obvious limitation to root growth. A high seasonal water table or extreme stoniness in the lower soil profile also restricted rooting depth.

Soil texture was not found to have a consistent effect on grapevine rooting depth. For example, a comparison of St George growing in a deep sandy loam soil in the Central Valley with St. George growing in a deep clay loam in the Napa Valley showed similar and deep root distributions.

A few of the studies that were reviewed examined the effect of cultural practices on grapevine root distributions. Not surprisingly, tillage in the surface layer greatly reduced the presence of vine roots. The presence of permanent grass cover also greatly reduced the amount of roots in the top 20-30 cm of the soil profile.

The authors made some interesting conjectures about the origins of grapevine rooting patterns. They reasoned that in the wild, grapevines usually grow suspended on trees with their root systems in competition with tree roots for water and nutrients. Smart et al. suggested that "grapevines have evolved to develop deep root systems with relatively low overall densities, which may increase the probability of encountering available resources."

Calendar of Local Events

Finally Drying Out- Management after a Wet Spring Join Mike Boer and Bill Oldham of Ag Unlimited in a discussion of pest, fertility, and irrigation management after this cool, wet spring. We will visit the Quercus vineyard, and David Weiss will talk about his experiences with the hoe plow for weed control this spring. Sponsored by Ag Unlimited and the LCWC. Free of charge. Coffee and pastries will be served. June 16, 2005, 9-10:30 a.m. Quercus Ranch labor camp, 4150 Soda Bay Rd., Kelseyville. Contact: Erica Lundquist (707) 245-8384 or erical@lakecountywinegrape.org.

Crop Estimation Having a good idea of the size of your crop can be very valuable for communicating with wineries and can help with your financial projections. Randy Krag, Vineyard Operations Manager at Red Hills Vineyard Company, will demonstrate a straightforward sampling and measurement strategy for crop estimation. Sponsored by the LCWC. Free of charge. Coffee and pastries will be served. July 19, 2005, 9-10:30 a.m. Red Hills Vineyard Company, 8059 Highway 29. Contact: Erica Lundquist (707) 245-8384 or erical@lakecountywinegrape.org.

LCWC August Meeting- TBA.

Mendocino County Vineyard Meetings on Organic & Sustainable Winegrowing Practices Free tailgate meetings among growers. 3:30-4:30 Vineyard tour and discussion, 4:30-5:30 p.m., conversation, wine & appetizers. Bring a bottle of wine. Sponsored by Fetzer Vineyards, UCCE Mendocino County, & Ag Unlimited. June 28, 2005 Parducci Vineyards, 501 Parducci Rd. Ukiah, July 20, 2005 Roederer Estates, 4501 Highway 128 Philo, August 9, Tomki Vineyards 2270 Road E Redwood Valley. Contact: Quay Sutherland (707) 744-7445 or Ann Thrupp (707) 272-1152.



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