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Foothill Vineyard News
Central Sierra

Issue #9, October, 2013

Greetings Foothill Grape Growers and Winemakers!

This issue is the hard copy equivalent of my new format E-newsletter, available via email, delivering information to those of you who are online in a more interesting way with photos and links to resources you can use. This issue features full articles on cover cropping and post-harvest fertilization. Look for more news coming soon on an upcoming canker disease/wrap-up meeting I'm currently planning. There is much to do and learn, so please read on!

Lynn Wunderlich

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IN THIS ISSUE:

Foothill Vineyard Post-Harvest Activities

Check in with your winemaker and vineyard manager for a post-game analysis. Was quality good, great (!), less than expected (why)? Logistics and timing? Labor? Leaves in bin? Now is the time to meet with your team and discuss how to meet your wine growing goals next year.

Become more active in your local grower/vintner association.

Erosion control on slopes.

Save your soil! Rock diversion dams (top) and straw bale waddles (below) can help reduce deadly erosion on foothill slopes in the winter.

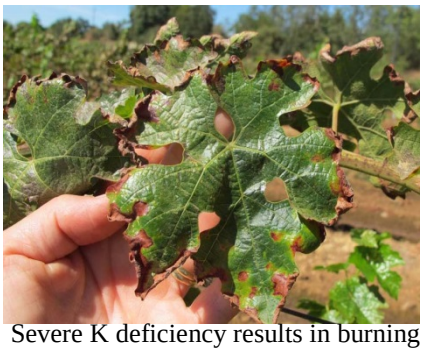
Foothill Vineyard Post Harvest Activities: **FERTILIZING**

L.R. Wunderlich, UCCE Farm Advisor

Information summarized from "Grapevine nutrition and fertilization in the San Joaquin Valley"-Pete Christensen, Amand Kasimatis, and Fred Jensen. UC ANR pub. 4087 (the "black book")-now out of print.

If your vines are in need of some boron or potassium, you can make your fertilizer application post-harvest and get better uptake and save yourself the time next spring. Exceptions: Nitrogen should **not** be applied in fall due to possible loss by leaching from winter rains (better to do a split application in spring and early summer). Foliar fall sprays of zinc, used to correct zinc deficiency in fruit trees, has **not** been found effective in grapes; however, soil applications ONLY for sandy soils can be applied in the dormant season with a band of concentrated ZnSO4 (1 lb. per young vine or 2-3 lbs. per mature vine) shanked in furrows 8-10" deep, about 18" on either side of the vine.

Boron and potassium fall fertilizer applications to soil are helped by rainfall pushing the material to the root zone. The other advantage in applying post-harvest is that the results should be picked up in next year's petiole sampling; while, for instance, boron applied foliarly in spring will make your petiole sample look artificially sky high.



Severe K deficiency results in burning of leaf margins. Cab. Sauv.
Photo: L. Wunderlich

POTASSIUM (K). If your vines are potassium deficient, and many foothill vineyards are due to the nature of our soil parent material, then late fall or early winter is an excellent time to apply potassium fertilizer, allowing winter rainfall to move the material into the soil. The latest K should be applied to soil is before bud break. Applying in fall allows you to make the applications where you see foliar symptoms, which don't show until the very end of the season ("red leaf" symptoms can be due to potassium deficiency).

Symptoms are not corrected immediately after treatment. A small improvement in vine growth or leaf color may not appear until the following summer, a full response isn't attained until the 2nd or 3rd year after treatment.

*Petiole analysis:
Deficient at < 1.0%
Adequate above 1.5-2.0%
*Based on work by the late P. Christensen, UC Viticulture Specialist. Some labs indicate higher levels for adequate (i.e. 3.0%). In my experience, vines with higher petiole numbers have still exhibited symptoms of K deficiency.

K deficiency in Zinfandel (top) and Sauv. Blanc. (bottom).
Photo: P. Christensen.

Soils high in clay and clay colloids "fix" K fertilizer; meaning the potassium then is unavailable or only slowly available (as it solubilizes) to the vines. K fixation by soil can be beneficial, as it serves against rapid leaching of K from soil. The problem with some of our foothill soils is that K fixation can be so great it requires a large amount of K fertilizer to overcome the fixation and make K available.

Potassium Rates. Since a large amount of K is needed to overcome most foothill high K-fixing soils, the quickest response (and, again, it takes several years to see a total response) can be obtained by a single heavy application rather than annual applications, according to information from Christensen et.al. Their recommendation is as follows:

- Severe deficiency: 5-6 lbs. of K_2SO_4 per vine or 4-4.5 lbs. of KCl per vine.
- Moderate deficiency: 4 lbs. of K_2SO_4 per vine or 3.5 of KCl per vine.
- Mild deficiency: 3 lbs. of K_2SO_4 per vine or 2.5 of KCl per vine.

The symbol "K", used for the element, is from the Latin word for potassium-Kalium. Potassium is usually reported in terms of the oxide, K_2O, also called potash.

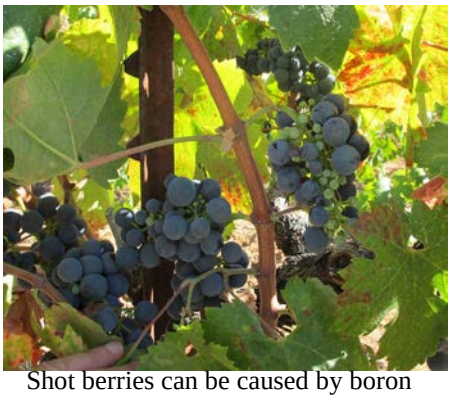
Potassium chloride (KCl, muriate of potash) contains 52% of actual K, 62% K_2O.
Potassium sulfate (K_2SO_4, sulfate of potash) contains 44% of actual K, 53% K_2O.

Although KCl may be more economical, it should be used with caution because the Cl will contribute to soil salinity.

Potassium Application. Place the fertilizer as close to the root zone as possible, under the drip and in a hole (not on the surface) and leave the hole uncovered to allow rainfall to move the fertilizer in. Rocky foothill soils mean application by hand, unless a French (row) plow or other furrow applicator can be used.

Foliar sprays are popular with some foothill growers. Work by Christensen applying repeated sprays of 4-5 lbs. of KNO_3 in 100 gals. of water did not increase K petiole leaves or reduce deficiency symptoms over a test period of 3 years. Higher rates of foliar K can be toxic to vines and I have seen what I believe is K "burn" on vines that have been treated. Peacock showed work in table grapes that foliar K increased brix, but there remains concern that foliar applications in wine grapes can result in undesirable juice characteristics (high pH).

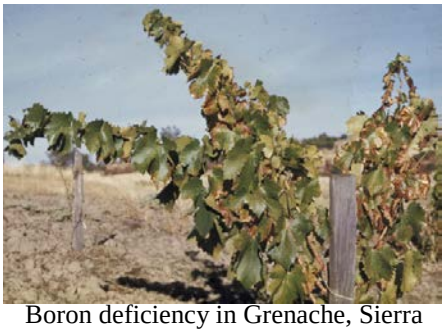
Foothill research. In 2010 I conducted a small K and P fertilizer trial in a "red leaf" vineyard. The block tested negative for leafroll virus (another potential cause of "red leaf") so I contacted Pete Christensen, the late UC Viticulture Specialist who conducted a large body of research on grape nutrition, and was advised to apply several soil treatments, including a "high" K treatment at 5 lbs. of K_2SO_4 per vine and a "low" K treatment of 2.5 lbs. of K_2SO_4 per vine. The application was made prior to bud break and rain, and we showed an increase in petiole K the next season but no relief of "red leaf" symptoms. This year the grower called me to say there were obvious foliar difference between those vines that received our K**, three years ago**, and those that were untreated. The grower is also concerned about overly high levels of K in the vine that may contribute to undesirable characters in the juice. I hope to continue this work to help determine an appropriate K fertilizer regime for our foothill grown vines, including a treatment of foliar applied K.


Shot berries can be caused by boron deficiency. Photo: L. Wunderlich

BORON (B). (Note higher than recommended rates can cause toxicity). Because B deficiency can drastically affect fruit set and vine growth, and the cost of treatment is relatively low, B fertilizer application is recommended over entire vineyard blocks that have a deficient spot or as "insurance" against deficiency if you <u>know</u> you are generally low on B. Petiole analysis can help confirm B

deficiency and your need for a B fertilizer program.

Petiole analysis:
Deficient at < 25 ppm
Questionable at 26-30 ppm
Adequate at > 40 ppm
Possibly toxic at 100-150 and above (confirmed with blade analysis, presence of symptoms, and/or soil analysis)
Toxic at > 300 in leaf blades
B levels don't vary much along shoot or during the growing season, except in soils with excess B, then petioles increase during the season. B does accumulate in blades, so it is higher in older leaves in high B soils.


Boron deficiency in Grenache, Sierra foothills. Photo: P. Christensen.

Boron Fertilizers: Industry used to express B as percent of boron trioxide (B_20_3) but now it is common for labels to state the amount of *actual* B, i.e. Solubor (U.S. Borax) contains 20.5% actual B, the label states that 4.9 lbs. of Solubor provides 1 lb. of boron. Solubor D.F. (formulated for foliar spray solutions) contains 17.5% B, so 5.7 lbs. of Solubor DF provides 1 lb. of actual boron.

The basic recommendation is 1lb. actual Boron/acre/year for soil application(equivalent to 5 lbs. of 20% formulated B fertilizer) with amounts adjusted to frequency of application, local experience, rainfall amounts, irrigation practices, and results monitored through tissue testing. Soil applications can be made during the fall or winter to allow winter rains to carry in the fertilizer.

Boron can be successfully applied through the drip using fertigation at a rate of 1/3 lb. per acre annually for two years to correct a mild deficiency; depending on the leaching potential a higher rate may be needed.

Foliar sprays can also be used to correct B deficiency, either as an emergency treatment or as a method of vineyard maintenance. Work done by Christensen, Beede and Peacock showed that B can be applied safely to foliage in the fall, postharvest (but while a good canopy remains), at a rate of 1 lb. actual B per acre. Alternatively, spring and summer sprays can be applied but the rate should be reduced to ½ lb. per acre per application because young foliage is more sensitive to phytotoxicity, not to exceed 1 lb. per acre for the season.

Foothill Vineyard Post Harvest Activities: **Cover Cropping**

L.R. Wunderlich, UCCE Farm Advisor

Is Cover Cropping for YOU? Cover crops, and I use that term to mean intentionally planted covers-not just letting the natural ground cover grow, can have many benefits **in the right site with the right choice of cover. In the wrong site, however, cover crops will compete too much for precious water** with the grape crop, and can also affect frost incidence on the vine and pests like thrips and gophers.

Note: I am including this as a "post-harvest" activity; but many savvy growers who use cover crops prepare their seed beds when they have a chance prior to harvest, so they can catch the first rains. Large seeded varieties (peas, oats, barley) can withstand the cold and be planted in November; others need to be in by October.

How do you determine if cover cropping will help you?

1. **Know your site!** You should know the soil depth in various parts of your vineyard, the soil texture, permeability, organic matter content and water holding capacity. (By the way, these are all the factors we have been exploring at our Soil Pit Field Days with Toby O'Geen.) You should also be familiar with your microclimate: when and where frost occurs and how temperatures (which affect seed germination) might vary on your parcel. You should know your average rainfall and how much water you have to irrigate.

   In other words, you should know your "site capacity", which is a combination of factors that determine the potential to produce your crop. Rootstock selection, vine spacing and trellising choices, along with cultural management decisions like cover cropping, all consider your site capacity. (Remember! There are a lot of different site capacities in the foothills. Yours is uniquely YOURS). If you have deep soils, loaming texture with high water holding capacity, and are in a moderate microclimate, you have high site capacity which means you will probably need to fight the vigor of the vines. One way you can do this is by planting a cover crop which will compete with the vines and slow them down.

   If, however, you have a shallow site, with sandy textured soils, low water holding capacity and/or not a lot of available irrigation water, your site capacity is low which means you need to think carefully about installing a cover crop which can decrease your capacity even more. Perhaps your site is "moderate" in capacity, but you'd like to increase your water holding capacity in the soil or soil permeability, then you might also choose a cover crop understanding that it will take years of diligent management to achieve change in the soil and that the choice of cover and how it is managed will affect your site in numerous ways.

2. **Understand what cover crops can provide, so you can choose and manage them appropriately.** One reason I distinguish a cover crop from natural ground cover is that cover crops require careful planning and management while natural covers are typically managed almost as an afterthought (this doesn't mean you can't get benefits out of natural covers). There are a large number of plant choices for cover crops, the choice will depend on what you want the cover to provide and determine how it is managed.

Cover crops can be either tilled-in to the soil (roots cut) where they will decompose or they can be no-till, i.e. mowed or rolled, (roots remain) which means they will be more competitive during the spring and into summer.

The benefit of tilling in a cover is to "build soil". This is why they are sometimes referred to as a "green manure". When a leguminous cover is chopped and tilled in at its flowering time nitrogen from root nodules where N-fixing bacteria reside is released. The better the cover is chopped before tilling in, the faster it decomposes. This process requires microbial processes and will "tie up" some N before a flush of N is released, which can affect the nutrition of the crop, especially if the process is slow due to dry soil conditions and/or there is a large grass component, which has a large carbon to nitrogen ration and uses nitrogen to break down, to the cover mix. Soil organic matter can be built this way over the long haul, which will help with water holding capacity. "Tilth" of the soil can be increased, leading to better permeability. Once the cover is tilled in, the aisles can be clean cultivated, with no competition to the vines.


Barley


Oats


Austrian Winter Pea


Magnus Pea

A typical mix of tilled-in cover crop plants might include barley, oats, and Austrian Winter or Magnus peas.

- Oats tolerate wet, heavy soils and low pH soils, common in the foothills. However, oats are less tolerant to drought and cold temps.
- Barley is inexpensive and fast growing, providing good biomass and competition against weeds. It is not as tolerant to wet conditions as oats.
- Austrian Winter pea has pink and red flowers, is dormant during the winter but produces large biomass if allowed to grow into spring. Magnus peas have large light and dark pink flowers and large tendrils; it grows during the winter and matures earlier than Austrian Winter, allowing for earlier tillage in spring.

The benefit of no-till covers is that they can increase soil permeability with permanent deep root structures, they can prevent erosion on slopes, they can effectively compete with weed species (i.e. yellow starthistle) and they can compete for water with the vine in high site capacity situations which means they can help de-vigorate the vines; which may help with vine balance in these types of sites. These permanent covers can provide nectar and pollen for beneficial insects as well.

A typical mix of no-till cover crop might include ‘Zorro’ fescue, ‘Blando’ brome, rose clover and sub clover mix.

- ‘Zorro’ fescue is a fast growing, early maturing grass. It is well suited to soils with rocks, volcanic pumice or gravel. It’s a good choice for erosion control with minimal seedbed preparation needed. It can be mowed to 4 inches but try to avoid mowing for a month in spring, around early May, to allow reseeding. ‘Zorro’ fescue can substitute for ‘Blando’ brome where quicker fall growth and greater drought tolerance is needed, but it is more expensive than ‘Blando’ brome.

- ‘Blando’ brome, also referred to as ‘soft chess’, is low growing, mowable, and matures early. It has strong seedlings, excellent reseeding, and dense, fibrous roots. A good choice for reducing erosion without competing excessively with the vines.

- Rose clover grows well on rocky, dry soils with low pH but does poorly in wet, heavy soils. Reseeds well but stand can be thin and let weeds encroach.

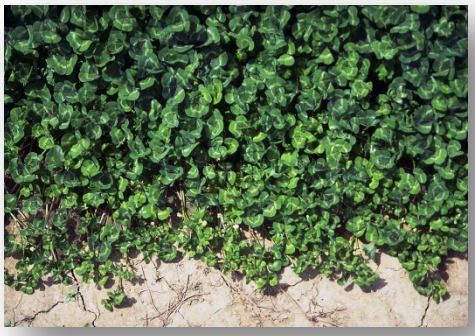
- Subterranean clover (sub clover) tolerates close mowing, provides weed suppression, is loved by livestock, and likes low pH soils.

Photo credit: Cover Cropping in Vineyards. A Grower’s Handbook. UCANR Publication 3338.

‘Zorro’ fescue

‘Blando’ brome

Rose clover



Subterranean clover

For more information on cover cropping, check out our UC resources.

UC Integrated Viticulture online page with many cover crop resource links:

Cover Cropping in Vineyards: A Grower's Handbook. Chuck Ingels. ANR publication 3338 available at http://anrcatalog.ucdavis.edu/SustainableandOrganic/3338.aspx

UC Integrated Viticulture website:

http://iv.ucdavis.edu/Viticultural_Information/?ds=351&reportnumber=516&catcol=2603&categorysearch=Cover%20Crops

"Selecting the right cover crop gives multiple benefits". 1994. California Agriculture article by Chuck Ingels et.al.
http://ucanr.org/repository/cao/landingpage.cfm?article=ca.v048n05p43&fulltext=yes

Weed Research and Information Center blog on using cover crops to suppress weeds at:
http://ucanr.edu/sites/wric3/?blogtag=cover%20crops&blogasset=32026

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