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Central Sierra

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Greetings Foothill Grape Growers! As 2011 winds down and 2012 begins I am in the process of writing up research projects, attending trainings, and planning future programs to assist you in optimizing your vineyards. Special thanks to the Amador Winegrowers Association who helped make the cross-county grower wrap-up meeting held Dec. 2 a success, attendees had good insights to share and cross-county relationships were established. I wish you all a Happy New Year and I hope to see you at future workshops-stay tuned for Foothill Grape Day 2012 details!

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2011 Grape Grower Wrap-up Meeting Synopsis

Thanks to everyone who helped make the 2011 Wrap-Up meeting held Dec. 2 a success! About 75 people attended, with Calaveras, Amador and El Dorado counties all well represented. Dick Martella, Amador Winegrowers Association President, and grill jockey Rob Cowan did an outstanding job of barbequing the tri-tip for everyone to enjoy. We had a fine lunch with plenty of wine and dessert provided by those attending and then went into some good discussion about the 2011 season.

We used the "world café" style of discussion: this meant I, as facilitator, posed a question for everyone at their tables in small groups to discuss. One person at each table was designated "host" and took notes on their group's discussion. After about 20 minutes, everyone but the host moved to another table to continue the discussion-this mixed up the group so different people got to interact. After another 20 minutes, each of the hosts reported to the entire crowd what each group talked about**. Everyone did a really excellent job of participating** and I think we all enjoyed the exchange. Special thanks to my table hosts: Bill Naylor, Pat Rohan, Greg Baiocchi, Ann Johnson, Betsy Tsumbas, Lannie Staniford, Carol Laubach, Dick Martella, and Joel Metzger.

The question I posed for everyone to discuss was this:

How might your vineyard <u>Risk Management Plan</u> CHANGE, based on your experience this past season?

<u>What is Risk Management?</u>

- Anticipating the unexpected
- Having a PLAN
- Survival $ustainable-We want to do more than survive. Sustainable with a dollar sign for economic sustainability.
- Farming with *confidence i*n a rapidly changing world (actual USDA risk management agency quote)

<u>5 Major Types of Risk in Ag.:</u>

1. **Production Risk**-everything that affects your crop quantity and quality. Weather (FROST), disease, pests, etc.
2. **Price/Marketing Risk**-both the cost of farming (inputs) and the price you will receive for your grapes/wine. Winery and buyer relationships.
3. **Financial Risk**-securing a loan, having debts, or factors that affect your credit.
4. **Legal Risk**-government actions that affect your farming operation. Regulations.
5. **Human Resource Risk**-both labor and personal. Labor relations, labor supply. Farm accidents, safety. Personal crisis, such as divorce. Illness or loss of someone critical to your farming operation.

I asked the group to try to pay attention to trends: by variety, region or county, microclimate or farming practice. Here is a summary of what came up in group discussions:

1. **<u>Production Risk</u>**
   - Weather-Frost Protection and Pruning
     - When to prune
     - How impact frost damage
     - Leave more buds to insure you have a crop, can remove later
     - Push out pruning as long as possible March – April
     - Use double pruning to slow bud break.
     - Use kicker canes – as much as 4 weeks delayed bud break.
     - Microsprinklers work? – in low lying areas.
   - Crops Smaller, Bunches smaller
     - Growing conditions
     - Last year – bud differentiation during cold weather
     - This year more will use kicker canes for more fruit
   - Heavy vs Light crop this year $\longrightarrow$ different experiences
   - Powdery Mildew

- When to spray?
  - UCDavis Mildew Model-Does it work here? Foothill microclimate effects.
  - Can enter own weather data into the Mildew Model.
  - Mildew and canopy management. Keep it open.

- Bunch Rot
- Quantity
  - Prune to add a bud? Will it be cost effective or cost more to remove (thin bunches) later?

Vs.

  - Quality
    - Head pruned-need more information on managing head pruned vines.
    - Vs.
    - Trellis pruned –which is more cost effective?
- Multiple bad years and the effect for next year's crop…
- Weed control
  - Bad last year
  - Split applications this year?
  - Rain influence on pre-emergent sprays
  - Weed seeds
  - Spray as soon as leaves drop
  - February – March
  - Earlier & more aggressive
- Diversify to limit risk
  - Crops (sheep, walnuts, grapes, in the old days…)
  - Varieties (early vs. late)

2. <u>Price/Marketing Risk</u>

- Winemakers – discussed securing long range contracts
  - Locking in $
  - Quality bad this year (all bad?)
- Vs. Growers – discussed agronomic concerns
- Wine Quality
  - Flavor
  - Color

  } Better w/cooler weather?
- Economics
  - Growers can't sell / can't get price
  - Need to market business, as important as farming

    Grower → Winery → Co-op

- Selling – Marketing
- Developing connections
  - Too many buyers-how not to turn them away
  - Website

- What do you do when your buyer isn't buying?
- Getting PAID
  - Contract – 3 payment plan

  Vs.
  - Handshake agreement
- Hardest part of growing is marketing
- Pricing?
  - What if it's last minute?

  Tri-County partnership → Marketing
- El Dorado Co-op Success
- Taking **PRIDE** in product (Quality) - $$

3. **Financial Risk**
   - Is crop insurance worth it?
     - Big – vs.
     - Small farm
     - Great year Vs 30% loss
   - Use of crop insurance (cost effective)
   - Early frost and loss of crop (get insurance, no more inputs, so can be cost effective)
   - Share or scrounge equipment and tools this year, improvise, not buy
   - Co-op model for sharing
4. **Human Resource Risk**
   - Labor – Shortage at harvest
     - Fairness-labor paid per ton
       - Affect pruning cost for labor this year?
       - Share labor pay strategy amongst counties so growers know
   - Succession Planning for farm → What's next?
5. **General**
   - Differences in foothill farms
     - Size
     - Scope
     - Need a plan no matter what size!
       - Plan in your head or written? – Specific to **you – your farm**
       - Need a back-up plan.
   - Ag is RISKY, no matter what! (Weather)
   - Create a 12 month calendar for RISK
     - What are the Risks? → Create website
   - Sharing information-how can we? Website?
   - Group WEBSITE – multi county outline of Risks, when, what to do?
   - Sharing what works where, under what conditions
   - Participation – taking advantage of what's available, i.e. UC powdery mildew field days

- Proprietary Information Vs Shared. Some like to keep their information close to the vest. Stronger if share.
  - Where to find what?
  - Timing of events

  } 1 common spot - **WEB**
- Chat-room concept for web & question people can post.

Winter Reading: Flowering and Fruitset in Grapevines

This past season many growers experienced lower yields, either due to fewer bunches or poor fruit set, termed "hen and chicks" or "millerandage" when set is partly successful, and "coulure" when set is strongly compromised. Growers attending the 2011 wrap-up meeting cited widely varying loses from 30%-70%, while others expressed a "great year!". I observed frost damage in vineyards at higher elevations and in low lying microclimates affecting the loss of buds, and therefore bunches, and millerandage and coulure affecting set in some varieties regardless of elevation (i.e. even in lower, supposedly warmer elevations). This led me to wonder about the factors that affect flowering and fruitset in grapes-a subject which is more complicated than one might think.

Coulure observed in Grenache Noir 2011 season.

"Flowering and Fruitset in Grapevines" by Peter May (available for $50 from the UCDavis Bookstore), is an excellent synopsis of grape flowering research for those interested in an academic, scientific text on the subject-with emphasis on Australian data. May wrote the book after grape growers in Australia experienced an unusually prolonged cool and wet spring in 2001 that resulted in significant losses for them in 2002 and 2003. The UC ANR leaflet "Grapevine physiology-How does a Grapevine Make Sugar?" by W.M. Kliewer, now, unfortunately, out of print (I'm checking on whether I can scan and post it online), provides more grower-friendly reading on grape physiology. Here are a few interesting things that I've learned so far from my reading.

The development of your grape crop extends over 2 seasons. In the spring of season 1, about 15 months (Australian data) before harvesting the resultant crop, the primordia- groups of microscopic cells that are a part of the developing organ before all its parts are formed-of the flower infloresence, tendrils, and shoots are determined in the leaf axils on shoots. Flower infloresence and tendrils are not distinguished at this time. The primordia remain, invisible to our eyes, all season in the leaf axils and in fall, before season 1 dormancy, the branching of the infloresence, the number of potential flowers, and what becomes the wings of the cluster are formed.

So the maximum crop size you will see this year in 2012 was already determined last year in 2011-although the weather and your forthcoming cultural practices will greatly affect what yield you will actually see. The actual size of your 2012 crop will depend not only on the fruitfulness of the buds, but on the percent that break and develop into shoots, the number of flowers that set fruit, the size of berries and the sugar that accumulates.

As soon as season 2 spring growth starts (budburst), the inflorescence primordia in the axils develop and organize into the structures which will become the actual flowers-stamens, pistils, etc. This process remains invisible to our eye and studies in molecular biology have helped us learn more. Research in Southern France showed that this process starts 12-15 days after budburst in Carignan and Grenache (note: in reading about this subject, timing of every process was variety specific, as many of you have already observed!). At this time, temperature (both high and low) can influence the number of flowers formed.

Exposure of leaves and buds to light is the single most important factor that influences bud fertility in most of California, according to Kliewer. This is part of the reason, along with increased sugar production, for open canopy management during the season: the flower primordia for next year's buds need light to form. In the foothills, obviously, temperature is also important and it may be difficult to differentiate solar radiation and temperature on buds (i.e. the more light that hits the buds, the warmer they will be). When pruning, canes that have grown in the sun are those that are desirable for fruit wood since those buds will be more fruitful. Recall Andy Walker's advice about choosing those canes that are round in shape with relatively short internodes, as compared to the undesirable canes which are flat and have long internode spaces.

There have been few research reports on the effects of cold temperatures on flowering-these mainly conducted in lab studies where temperatures could be controlled. May cites the Australian researcher Ebadi who exposed Chardonnay and Shiraz flowers to a period of cold (53.6°F day/48.2°F night) three days before anthesis (flowering) and found negative effects on female flower part development which decreased the number of flowers significantly.

Nutrition affects flowering and set. Early grape flower growth has to compete with shoot growth and is initially dependent on nutritional reserves, stored mainly in the vine trunk and roots, from the previous season(s). Defoliation of vines in season 1 can carry over into poor flowering in season 2, presumably an effect on the flower primordia that are formed during season 1. Once the first leaves reach half their size, the vine stops relying on stored carbohydrates and then depends on nutrition formed from photosynthesis, with the shoot apex a stronger sink than flowers. So, an overly vigorous shoot can outcompete the flowers (ahh, the importance of "vine balance" in all things viticultural). The researcher Coombe showed that removing the shoot tips before flowering can improve set, but basal leaves need to be present to "feed" the flowers.

Nitrogen (N) is important for amino acids that are in flowers and fruit; however, the late great UC Specialist Pete Christensen talked about how excess nitrogen can adversely affect fruit set as well. N need can be assessed by the vigor of your vines since wine grape varieties and their associated rootstocks can differ greatly in their petiole $N\text{-}NO_3$ analysis. According to May, there is no information that phosphorus, potassium or magnesium have a direct effect on flower development, except for the nutritional effect on the vine overall. Boron (B) is needed to ensure pollen germination and Zinc (Zn) has an effect on seed formation -see this newsletter's article on B and Zn deficiency for more information.

Improving flowering and set. In addition to ensuring proper vine nutrition, good choice of pruning wood, and creating an open canopy to allow light, several viticultural decisions may also improve flowering and set. In some cases, clonal selection can have an effect on set. May cites that Grenache, a variety prone to coulure, has exhibited more set as Grenache clone 70-available commercially in CA. as ENTAV-INRA 70. However, Grenache 70 tends to overset in a good year likely influencing wine quality characteristics. Rootstock choice can also affect set, by helping control strong shoot growth and vigor that can be associated with poor fruitset-i.e. 3309C had a low to medium influence on scion vigor, whereas St. George increases scion vigor.

Temperature is still probably the biggest factor affecting flowering and set for foothill growers. The length of time surrounding flowering when low temperatures can be detrimental spans several weeks, with frost being the worst case, of course. UC Biometeorologist Rick Snyder gave several methods for frost control at the workshop I held last winter-both passive-ground cover management, cold air diversion, and, probably the most important in my view, site selection and active management-i.e. for those who have water, the proper use of sprinklers. Rick's powerpoint can be reviewed on my website frost protection page at http://cecentralsierra.ucanr.org/Agriculture/Viticulture/Frost_Protection/

Have you checked out the new

UCCE – Central Sierra website?

View previous newsletter issues, Grape Day presentations,

links to UC resources, workshop updates and more at

http://cecentralsierra.ucanr.org/Agriculture/Viticulture

Born Deficiency in Grapes

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.

Why boron (B) is important in plants: functions in the differentiation of new cells, with B deficiency, structural parts of cells are not properly formed. Regulates the carbohydrate metabolism in plants. B deficiency in grapes can drastically affect vine growth and fruit set by limiting pollen germination and normal pollen tube growth.

B in soil: Native B is mostly in the form of borosilicate minerals, which resist weathering and release B slowly. This is especially true of foothill soils formed from igneous rocks of the Sierra Nevada which is low in total B. Much of the available B is held by the organic and clay fraction of soil-through "complexing" and anion adsorption. Therefore, B is less leachable than are other neutral or negatively charged plant nutrients. B deficiency also occurs on sandy soils, in low spots or near irrigation valves where excessive leaching with irrigation water occurs. Vineyards irrigated with canal water originating in the Sierra Nevada are subject to B deficiency, as are those receiving well water with low B.

Root effect: any condition which limits the roots ability to pick up B can induce deficiency. Nematodes, phylloxera, and drought stress are sometimes associated with B deficiency symptoms.

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.

Symptoms: B deficiency is easily confused with other disorders (petiole analysis helps determine). Two types of deficiency: 1.) temporary, early spring and 2.) early to mid-summer deficiency.

1.) Temporary, early spring deficiency: stunted, distorted shoot growth, zig-zagged, appears after bud-break, numerous lateral shoots from stunted shoots, then shoots elongate normally by late spring. More common after low rainfall winters or in shallow soils (think caused by drought induced deficiency). Lower leaves can be misshapen, symptoms differ among varieties: Grenache-fan shaped leaves with internveinal chlorosis; Chenin blanc-leaves have wide fan-shaped appearance and prominent veins; Barbera-leaves are more rounded but misshapen appearance.

2.) Early to mid-summer deficiency: Occurs more consistently year to year than early spring deficiency. Symptoms appear in around June -severely affected vines have no crop. Clusters appear to burn off or dry around bloom time. Poor set-clusters can have normal sized as well as shot berries. Berries are very round to somewhat flattened, instead of the oval or elongated normal berries in most varieties. Can be

confused with Zn deficiency-except Zn deficiency causes shot berries of normal shape, and most remain hard and green. Leaf symptoms include a mottled yellow color between veins that may develop into a "burned" look. Can be confused with Esca-but B deficiency shows primarily on younger leaves. Shoot tips may stop growing and die, resulting in excess lateral shoot growth.

Correcting B deficiency: (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 know you are generally low on B. Petiole analysis can help confirm B deficiency and your need for a B fertilizer program.

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.

Zinc Deficiency in Grapes

Why zinc (Zn) is important in plants: needed for auxin, elongation of internodes, formation of chloroplasts (chlorophyll-role in photosynthesis), and starch. In grapes, zinc is essential for normal leaf development, shoot elongation, pollen development and set of fully developed berries. *The most widespread micronutrient deficiency of grapes in CA.

Zn in soil: sandy soils have lowest levels. After weathering from minerals, Zn is adsorbed by clay particles and organic matter and held in exchangeable form. Less available at pH > 6.0 Calcareous soils (such as limestone) fix Zn so it is not available. Clay soils high in magnesium often have low Zn.

High N which stimulates vigorous growth, or vigorously growing young vines, often show Zn deficiency.

Rootstock effect: vigorous rootstocks, such as Dogridge, Salt Creek, Harmony, and Couderc 1613, are predisposed.

Petiole analysis:
Deficient at < 15 ppm
Questionable at 15-26 ppm
Adequate at > 26 ppm
Zn levels in tissue don't change much during the season.

Symptoms: little leaf, stunted laterals, mottling of leaves, deep petiolar sinus or, in severely affected leaves, sinus is shallow. New growth of leaves is smaller and distorted. Chlorotic pattern in leaves with veins darker green. Straggly clusters, underdeveloped or shot berries. Berries can remain green and hard.

Correcting Zn deficiency:
*Daub spurs, fresh pruning cuts with ZnSO4 (36% Zn) at a concentration of 1 lb. ZnSO4 in 1 gal. water. 2-4 gal. per acre usually sufficient, with one worker walking behind a group of pruners. Higher concentrations can cause injury. Some reports of growers spraying spur pruning cuts with ZnSO4 at same concentration at less than 100 psi pressure (no research data on that). Not effective on cane pruned (not enough surface area).

*Foliar sprays: Apply 2-3 weeks prior to bloom. If petiole sampling at bloom, remember Zn levels will be artificially high on sprayed vines. Fall treatment, used to correct Zn deficiency in fruit trees, has not been found effective in grapes.

Use 4 lbs. ZnSO4 (36% Zn) + 3 lbs. lime in 100 gal. water/acre. Higher volume is better than a concentrate spray: want to wet flower clusters and undersides of leaves. Lime is added as a softener to prevent burn.

"Basic" ZnSO4 contains up to 50% Zn and is neutralized to prevent foliage burn. It is available under various trade names and should be used at label recommended rates. Basic ZnSO4 is not fully soluble and requires good tank agitation. May need to flush your sprayer lines.

No advantage to using more expensive, chelated Zn products. They have been found less effective on a label recommended and cost per acre basis.

*Soil applications only for sandy soils. In dormant season, a band of concentrated ZnSO4 (1 lb. per young vine or 2-3 lbs. per mature vine) can be shanked in furrows 8-10" deep, about 18" on either side of vine.