

Gleanings

Hill Country Vineyard update

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TOPICS INCLUDE:

- “In the Vineyard”
- Winter Fertilization?
- Winter Vineyard Management
- Late Spring Frost Re-Visited
- Announcements

“In the Vineyard”

Most regional vineyards have slipped into dormancy in “good shape.” Late season rains encouraged new terminal vine growth and increased the likelihood of foliar diseases; however, most growers maintained fungicide applications, protecting the canopy and carbohydrate production. A gradual arrival of cooler temperatures (rather than a sudden shift) allowed movement of carbohydrates into vine storage tissues; including roots and other permanent vine parts.

In the Hill Country, where very low winter temperatures are common, the vineyard manager should keep post-harvest vine canopy in good condition. Good carbohydrate “reserves” for winter vine survival, even bud break and early vine growth rely on the storage of nitrogen in the root and vine structures.

Winter Fertilization?

Much controversy exists about the topic of grapevine fertilization during the winter. The logic behind this application: Central Texas winters typically have ideal soil temperatures for root growth and development. Increased root development can increase the vines ability to uptake nutrients over the course of winter. Our long drought has limited nutrient uptake, affecting vine growth and fruit quality. Fertilization with small amounts of nitrogen (~10-15 units) between Thanksgiving and Christmas, only **AFTER** vines have entered complete dormancy is recommended in the Hill Country region. This should be accompanied by adequate irrigation during the winter, approximately once per month if no rainfall has occurred in your vineyard. Supplemental irrigation should be reduced or cease as you begin pruning operations, so as not to encourage earlier bud break.

Winter Vineyard Management

Our “balmy” winter temperatures (as my brother who lives in Fairbanks, Alaska where today’s temperatures are -41°F calls them) can be a great opportunity to work in the vineyard.

“Can I begin Pruning?” You should *never* begin pruning at this time of year in our region because of wildly fluctuating temperatures. Pruning can advance bud break, which is detrimental when vines have just entered dormancy.

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The primary reason NOT to prune now is that you can increase the vines susceptibility to BOT Canker and other fungal trunk pathogens because wound healing is slow and disease spores can easily enter the vine. (More on this topic next month.)

Chores in the vineyard during winter should include repair, replacement or addition of the trellis system. Evaluate your trellis wires, and make any necessary changes during the vines dormant period when buds and newly developing shoots are less likely to be knocked off with moving wires. End posts and intermediate vineyard posts should also be evaluated and repaired if necessary.

In smaller vineyards that do not mechanically harvest fruit, removal of all old clusters or rachis tissue from dormant vines is critical. Spores from diseases like black rot, phomopsis and summer bunch rot complex are harbored in grape rachises and if we have a rainy spring the spores can explode into a BIG problem! Cut and drop them into a bucket and destroy later, rather than dropping them to the ground.

General sanitation is another good winter vineyard chore. Removal of brush and debris in and around the vineyard, along fence lines surrounding the vineyard, etc. will help reduce over-wintering of diseases and insects, like the green June beetles and others.

Check out your toolbox >re-evaluate your vineyard disease, insect and weed control management strategies for the upcoming season now. Inventory of chemicals and supplies on hand and those needed to purchase for the new season should be done as well as maintenance and repairs on tractors, spray rigs and other misc. equipment. Develop a **strategy, rather than a rigid program** for control of all seasonal pests. This means that a rough calendar of spray timing and products should be put together by the vineyard manager to be prepared for spring bud break and the ever changing Texas weather.

Late Spring Frost

Many growers attended the annual TWGGA Grape Camp (Advanced Grower Day) in November and listened to presentations and discussion on **Spring Frost Protection**. I would like to review this topic for regional grape growers to consider before spring 2010.



2009 Frost Events Revisited

- Damage was extremely variable within the region, within vineyards, and within varietal blocks, due to scattered carbohydrate storage within the vine.
- Despite high estimates of loss many vineyards harvested good yields.
- Hail damage was isolated.
- Each of the 3 frost “events” presented different conditions, requiring different protection methods.
- Secondary fruit on most varieties helped salvage the season.
- Extreme low temperatures (teens and twenties) caused trunk & cane death on weakened wood.

Why do Hill Country vineyards experience frequent late spring frosts and losses?

- Poor *site selection* with low elevation and little to no air movement.
- *Extreme temperature fluctuations* mid-winter cause xylem flow and vine growth, increasing susceptibility to frost damage.
- *Poor varietal selection*.

Passive Controls to Mitigate Frost/Freeze Damage to Vines

➤ Proper Site Selection

The amount of frost AND freeze damage to your vineyard is directly proportional to your specific site conditions. Many prospective grape growers want to use family property to establish a vineyard, which may be a marginal or poor site, rather than seek out a more ideal site with high elevation.

A little test: Stand on the site where you think you want to plant a vineyard... look around, off into the horizon in every direction and ask yourself the following question: Is the elevation where you are standing lower than the surrounding area? *If so, you are likely in a “frost pocket” and should NOT plant here.*

Physical characteristics of a site such as **Elevation AND Wind Drainage** should be the first consideration when evaluating a site for growing grapes commercially.

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Passive Controls Continued

If physical structures such as hills or other native vegetation surround the vineyard frost and freeze damage is more likely to occur. Air movement through a vineyard during frost events helps to move cold air away from the vineyard and aids in control of leaf wetness driven diseases like downy mildew and black rot during the growing season.

If the site “passes” the test with high elevation and good wind drainage you can proceed on to the chemical evaluation of soils, etc.

Have you already planted in low-lying areas prone to late season frost damage and have lost crops? Choose one of the **Active** or **Passive** protection methods as discussed below, abandon those blocks or re-plant with more suitable varieties.

- **Proper Selection of Varieties**
Choosing varieties that break bud later can mitigate frost susceptibility. Cabernet Sauvignon, Mourvedre, Syrah and Vermentino are examples of “late” varieties and Chardonnay, Chenin Blanc, Malbec and Sangeovese are “early” varieties.
- **Develop double trunks in frost susceptible sites** for easy trunk renewals when damaged.
- **Use double-pruning technique**>
In large vineyard plantings where pruning cannot be delayed too long hedge vine growth above catch wires early (Jan-Feb.), then final prune late or even after bud break (March.)
- **DO NOT over crop vines**, which weakens vines and reduces cold hardiness.
- **Maintain good disease prevention** all season long using necessary spray program to encourage good vine health and to promote better cold hardiness.
- **Avoid soil cultivation** which increases air spaces in the soil. Soils with more and larger air space hold and transfer heat poorly.
- **Irrigate Vineyard** Wet soils hold more heat and transfer more heat. Irrigate top soil levels well in advance of frost events.
- **Provide good vine nutrition** all season.

Active Controls to Mitigate Frost/Freeze Damage to Vines:

➤ **Use of Overhead Sprinklers**

Mason County and surrounding area growers have utilized overhead sprinkler irrigation for the past several years to protect vines from late spring frost damage. How do they work? The conversion of water to ice releases energy in the form of heat. Sprinkler risers located above the vineyard canopy are turned on prior to actual freezing temperatures, protecting the vines. It is important to understand that water-contacted tissues stay at or above 32° F if water is continually applied. (Ice is poor insulation.) Some seasons have required 30+ hours of continuous water pumping. Growers using this system can pay for the system usually in one season of use.

Understanding and assimilating weather factors, the physics of heating with water, crop phenology, critical temperatures and how to design and operate a system will lead to more successful outcomes.

Much of the following information comes from Monte Nesbitt, Extension Specialist, Texas AgriLife Extension and his 2009 Grape Camp.

Difference between Freeze & Frost Events:

Advective (Freeze)

- Arctic Cold Front
- Wind Speed >4 mph
- Variable Cloudiness
- Cold Air Depth=500 to 5000 ft
- **Ground, air and leaves = same temperature.**
- May last 24-72 hours
- All portions of plant at risk

Radiational (Frost)

- **Cold Front Passed**
- **Winds <4 mph**
- **No clouds**
- **Cold Air Depth=50 to 150 ft (Inversions likely)**
- **Ground is coldest**
- Exposed leaves & buds colder than air temperature
- **May occur for 1-2 hours**
- **Outer, top of plants at risk**

Temperature Inversion

- Ground cools quickly from radiation loss
- Calm conditions prevent air mixing
- “Strong Inversion” means significant temperature difference between surface and warm air zone.

What is Dewpoint and what does it have to do with freezing events?

- Dewpoint Temperature: The temp at which water vapor condenses to liquid, & the temp at which air reaches water vapor saturation.
- High (near 32° F) dewpoints slow the rate of temperature decline, especially as fog or moisture in air appears. **Low dewpoints indicate relatively dry air and fast rates of temperature decline.**
- Dewpoint temperature is considered the basement temperature. Dry air has to move in to move the air temperature lower than dewpoint.

Temperature Measurement:

<u>Difference Between Dry Bulb & Wet Bulb Temperatures at 30 °F</u>	<u>Relative Humidity</u>
<u>None</u>	<u>100%</u>
<u>0.5°</u>	<u>96%</u>
<u>1.0°</u>	<u>93%</u>
<u>1.5°</u>	<u>89%</u>
<u>9.0°</u>	<u>44%</u>
<u>9.5°</u>	<u>42%</u>
<u>14.5°</u>	<u>19%</u>
<u>15.0°</u>	<u>17%</u>
<u>18.0°</u>	<u>5%</u>

- Wet bulb temperature must be known at the time a decision to run water is made.
- Plant temperatures will decline from dry bulb to wet bulb temp instantly when water is applied.

Monitoring Data Needed:

- Hourly data
- Dewpoint temperature
- Dry bulb temperature
- Wet bulb temperature
- Wind speed
- Cloud/sky conditions
- Inversion strength

High winds accompanied some of the freeze events in 2009; and for growers who used overhead sprinklers to control frost damage, this proved to be more harmful than beneficial. Why? Windy conditions create evaporation, which is an endothermic reaction and super-cools or removes the heat that was being generated by the overhead irrigation. Caution should be used with overhead sprinklers for frost control under windy conditions.

- **For successful outcomes, rotation time of heads must be short (30-60 seconds) and system output must be capable of offsetting volatilization losses in wind.**
 - **More sprinklers are better**
- System start-up must be made in consideration of dewpoint or wetbulb temperatures.

Final Considerations for Use of Sprinklers:

- Water volume must support multi-day freeze/frost events. Thirty (30) +continuous hours of pumping has been common, thus the building of ponds to supplement the system may be necessary.
- System failure (electrical or filtration) can cause greater damage than no irrigation.
- “Marginal” frost events can lead to difficult decisions of whether to run water or not.
- Trellis and branch damage may occur under excessive ice loading.

Some California grape growers are using micro-sprinklers successfully, which differs from the above option in that smaller water quantities are required and are applied more precisely to the vine structure. Although not currently utilized in Texas vineyards this system may have potential here.

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Doss Valley Vineyard with SHuR Farms Cold Air Drain

AIR MOVEMENT-Wind Machines, Cold Air Drains and Helicopters

Wind machines blow air horizontally to mix warmer air aloft with cooler air near the surface. A Cold Air Drain does the opposite, moving colder air from the surface upwards some 300' allowing warm air in the inversion layer to move downward and protect sensitive foliage. Wind machines, heaters and sprinklers can be operated in conjunction with each other to protect vine tissues.

Success of these systems is based upon the following:

- Heat inversion layer actually exists (no wind)
- Correct configuration of equipment takes into account the micro topography and microclimate of vineyard
- You don't punch a hole in the inversion layer releasing heat into the atmosphere.

What is an inversion layer? It is a zone of warmer air temperatures that rise upward from the vineyard floor during cold events. **NOTE: This does not happen if windy conditions exist.** One local vineyard and a peach grower using air movement for frost protection have experienced varied results. Proper placement and configuration is critical to the success use of wind machines.

Helicopters can also be useful to move an inversion layer downward during a freeze event. The cost of helicopters to be on standby at your site during a possible freeze event is much less than the actual flight time cost. I used this method successfully in my own vineyard operation, saving thousands of dollars worth of grapes. Agitation can cause ice formation if the passes are too infrequent.

Soil heat accumulation differs with soil type, soil cover and soil moisture. Wet, bare soil warms more quickly than soils with grassy row middles, however in central Texas it is more important to have row middles that can easily be traversed (no mud) with tractor spray equipment immediately after a rain event to prevent diseases.



Helicopter flying over vineyard

Chemical Applications to Vines Prior to Freeze Events

Much discussion exists regarding certain chemicals that interfere with the freezing reaction. Mode of action of products like copper sulfate and copper hydroxide is that they act as a bactericide, killing ice-nucleating bacteria. These disease control products are commonly used on apples and pears **only for radiational frost**, and not for the severely low temperatures (20°F) like we experienced during the 2009 frost events. There is no documentation that these chemicals prevent frost damage.

Announcements

Pruning Demonstrations

Three pruning workshops will be held throughout Region 5 during January and February for area grape growers. I would encourage you to attend one of these free workshops to review pruning techniques; including grapevine anatomy and physiology, pre-pruning/hedging techniques, balanced pruning methods and cordon renewals. Watch for schedule to be sent via e-mail to you soon.

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TWGGA Annual Conference

Hold Feb. 18-20, 2010 for the Texas Wine and Grape Growers Association (TWGGA) event to be held in Dallas this year. For more information contact TWGGA @ 817-424-0570 or <http://www.txwines.org/>

Comments or Suggestions

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