Oklahoma State University and Oklahoma Cooperative Extension Service

Le Vigneron

A newsletter for the grape growers and wine makers of Oklahoma

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- Eric T. Stafne
- William McGlynn

Inside this issue:

Harvest in the Post-Freeze Era

Since this is the first issue of Le Vigneron since the Easter freeze, I will give some analysis of the event, as well as some suggestions for future events. One thing we know about Oklahoma weather is that we can never predict it. March of 2007 was the 2nd warmest recorded for the entire state — 8 °F above normal. Some areas of the state were even warmer than the average. Northeast Oklahoma was 9 °F above normal. All of this warm weather lead to much earlier than normal budbreak. At the OSU Experiment Station in Perkins we recorded budbreak of 'Chardonnay' on March 20. The early physiological activity of the vines predisposed them to damage from the freeze. The extreme cold of the freeze compounded the injury. Some areas of the state avoided the freeze entirely or could use management such as running irrigation to minimize any damage. Other portions of the state had no such luck. When temperatures reach 28 °F or below for any appreciable length of time one should expect to see some injury to the vine. If one has access to a wind machine, heaters or overhead irrigation, then it is possible to alter the temperature in the vineyard and save the crop (and minimize vine injury). However, if temperatures reach 24 °F or below, there is essentially very little a grower can do to stop damage from occurring. In light of the freeze, I expect to see a reduction in grapes harvested this year, especially from vinifera grapes. Grapes derived from *V. vinifera* are often non-fruitful on secondary buds. Hybrid and American grapes are often fruitful on secondary buds, with varying degrees of crop. Some cultivars this year seem to be somewhat prolific in spite of the freeze ('Vignoles', 'Cynthiana', and 'Chambourcin' to name a few). This spring freeze was unusual because of the warm March that preceded it and due to the coldness and duration of those cold temperatures. I have observed some permanent plant damage and even plant death, but in most cases that was on vinifera grapes. Some areas of the state may consider hybrid grapes as a more viable option in the future.

2007 OSU Grape Management Short Course Update

Eric T. Stafne

The 2007 OSU Grape Management Short Course is going strong. We have had four classes so far, with three more to follow. The smaller size of this years class has made for a more interactive experience for both the attendees and the presenters. One of the interesting aspects of the 2007 class is that most of the students don't even have grapes in the ground yet. This fact allows us to hopefully guide the students around the pitfalls that many new grape growers encounter. I am convinced that this course offers potential and current grape growers a wealth of knowledge, as well as the opportunity to interact with OSU staff on a one-to-one basis. I am looking forward to the next three class sessions when we really delve into some of the main issues what grapes grow best and where.

Feedback Needed on Potential Idea for "Grape Data Collection Network"

Eric T. Stafne

Recently at the OGGWMA summer meeting at the OSU Cimarron Valley Experiment Station, I brought up the idea of collecting data from growers around the state. Gary Butler furthered that idea by saying that if I could come up with a form to collect the data and decide what data to collect that it could be sent out to grape growers. This is an excellent idea. Since we don't have the capability at this point to have research vineyards across the entire state, growers that collect important data will definitely be a great asset to us. Right now this is just an idea, but it could grow into a reality with just a little input. Here is what I propose: Step 1 is to find out the level of interest for this type of network, Step 2 if the network is of sufficient interest we work on developing a list of important data to collect and put it into a paper and electronic form that can easily be submitted, Step 3 would be to hold workshops around the state for those interested in participating on how, when, and why to collect the data, Step 4 would be a trial run (probably 1 year) on how the network works, and Step 5 would be to publish the collected data on a yearly basis in this newsletter and/or other forums for the good of all grape growers. It is my belief that any information submitted would be invaluable to us as researchers but also to potential grape growers. There may also be opportunity for grant funding dollars at some level to ensure the success and continuity of this program (although the sources are undetermined at this point). We could create a model for other grape growing states, especially those that have had little previous research. If you are interested in this idea, please let me know.

Observations of Freeze Damage at Stillwater

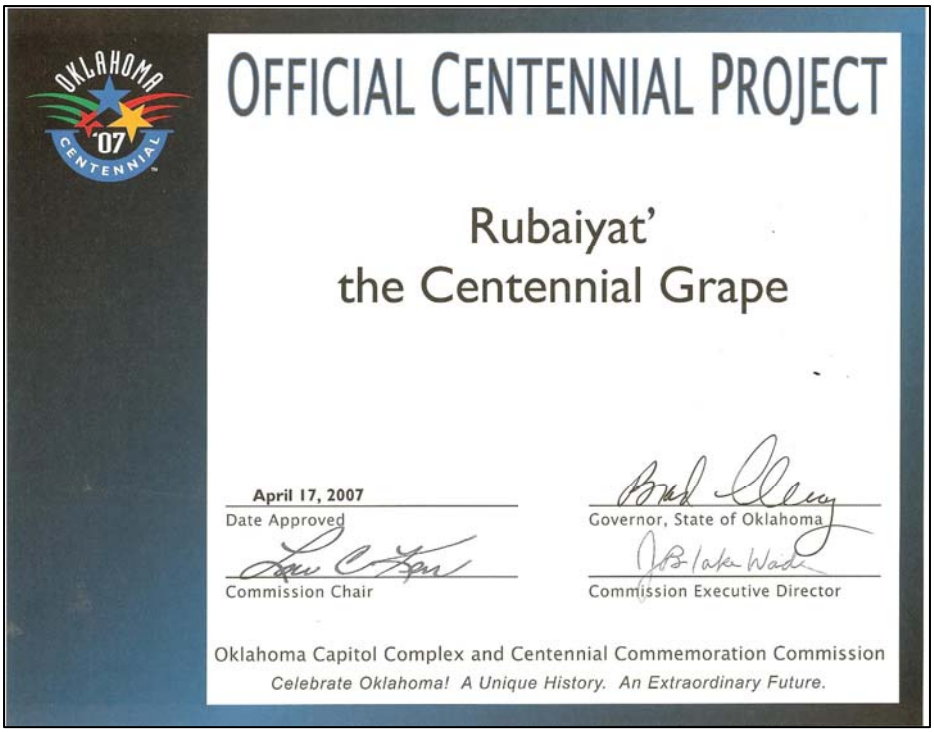
Eric T. Stafne

In May, I took ratings of the experimental portion of the Woodland Park vineyard for freeze damage. In 2005 and 2006, cold winter temperatures damaged vines. Coupled with the Easter freeze event of 2007, some of the cultivars were severely damaged or even killed. The table on the right side gives the average ratings for each cultivar in the trial. This data averages over rootstock, as I have not analyzed that data yet. As is quite obvious, the hybrid cultivars fared much better than the vinifera grapes. This trial is on a low site in a frost pocket, thus exacerbating the damage. Temperatures at this site reached below 0 °F in December 2005, about 5 °F in 2006, and around 20 °F in the Easter freeze. 'Vignoles' and 'Frontenac' were relatively uninjured and should provide normal crops. Of the recently released cultivars from New York, 'Corot Noir' performed best and 'Valvin Muscat' was similar to 'Chambourcin'. 'Noiret', 'Chardonel', and 'Traminette' all fared somewhat worse, presumably due to a high portion of vinifera parentage and early budbreak. All of the vinifera grapes were devastated. This illustrates the need to choose superior sites for vinifera grapes in Oklahoma, especially north of I-40.

Freeze damage at Stillwater, April 2007.

Cultivar	Average Damage Rating	Type
Vignoles	4.5	Hybrid
Frontenac	4.2	Hybrid
Corot Noir	3.9	Hybrid
Valvin Muscat	3.5	Hybrid
Chambourcin	3.5	Hybrid
Noiret	2.3	Hybrid
Chardonel	2.2	Hybrid
Traminette	2.1	Hybrid
Chardonnay	1.0	Vinifera
Riesling	0.7	Vinifera
Cabernet Franc	0.5	Vinifera
Cabernet Sauvignon	0.4	Vinifera

0 = vine dead; 1 = dead to ground, re-sprouting from roots; 2 = cordons and portion of trunk dead; 3 = portions of cordons damaged; 4 = minimal noticeable damage; 5 = no visible damage



'Rubaiyat' Named Centennial Grape of Oklahoma

Eric T. Stafne

On April 17th, 'Rubaiyat' was named the centennial grape of Oklahoma. All of this came about when Tom and Max Knotts were at Perkins in March talking to me about hosting the OGGWMA summer meeting. I mentioned to them that I had heard on the radio about different items being designated "centennial projects". This intrigued me, so I discussed it with Tom and Max, knowing that they are big proponents of 'Rubaiyat'. They ran with the idea and brought it to the Oklahoma Centennial Commission for approval. This could be used as a marketing strategy for the OGGWMA, by selling "centennial" vines or wine. In this year of celebrating 100 years of statehood, many people would like to be part of the celebration and the history behind it. I have written an article on the history and potential of the 'Rubaiyat' grape. If you would like an electronic (pdf) copy of the article, just email me and let me know. I believe this could be a way to provide some revenue for the OGGWMA (perhaps for research?).

July is the Month for Petiole Analysis

Eric T. Stafne

Mid-July is the time to take petiole samples and determine nutrient requirements for your grapevines. Soil samples help to determine what nutrients exist in the soil, but that doesn't mean those nutrients are available to the plant. The most accurate way to assess what nutrients grapevines are taking up and what they are deficient in is a petiole analysis. The following link gives specific instructions on how to take a petiole sample and what labs will do the analysis: http://www.okstate.edu/ag/asnr/hortla/ftpcns/images/petioleanal.pdf . Unfortunately, this is not a free service, but by determining the nutritional needs of your grapevines you may save money on expensive fertilizer or make more money by maximizing crop potential. The link also provides an interpretation of lab results for each nutrient.

Viticulture Education Program for Grape Growers Administered by OSU

Eric T. Stafne

Viticulture Education Program

This program is a cooperative effort among Oklahoma State University – Stillwater (OSU-S), Oklahoma State University – Oklahoma City (OSU-OKC), Tulsa Community College (TCC), and the Oklahoma Grape Growers and Winemakers Association (OGGWMA). It is administered by OSU-S.

This is a two-tier professional education program. The Basic level provides college training in the fundamentals of horticultural science, plus applied training in viticulture and related techniques through OSU Cooperative Extension. The Advanced level provides further college training in horticultural science and related disciplines, plus further applied training through OSU Cooperative Extension. There is a five-year total time limit to complete the program. The Basic level would need to be completed in two years, and the Advanced level would need to be completed no more than three years after completing the Basic level.

The list of approved courses and workshops may change over time. Participants should obtain approval from OSU-S prior to enrollment in courses or workshops other than those specifically listed. Knowledge testing will be required at completion of short courses and Extension workshops. A grade of "C" or better will be required in all college-level courses. Participants who anticipate matriculating towards a college degree in horticulture at OSU-S, OSU-OKC, or TCC should contact an academic advisor at the appropriate institution for guidance in college course selection. Those intending to eventually pursue at B.S. in horticulture should contact Dr. Brian Kahn, Department Undergraduate Advising Coordinator at OSU-S.

OSU-S will collect a one-time program registration fee of $25. Any additional fees for courses, workshops, conferences, pesticide applicator testing, etc. will be paid directly by program participants to the appropriate entities. Participants are responsible for documenting attendance at events, and agree to provide transcripts for purposes of verifying satisfactory completion of required college courses. Participants completing each level of the Viticulture Education Program will be duly recognized with a framed certificate at the annual conference of the OGGWMA.

For more information, or to register for the program, participants may contact me or:

Viticulture Education Program

c/o Ms. Stephanie Larimer

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Sulfur Dioxide and Wine Stability

William McGlynn

Sulfur dioxide (SO2) is one of the most commonly used processing aids and additives in the wine industry. Indeed, although SO2 has only been in common use for about the last 200 years, it's difficult to imagine how winemakers got along without it. Common uses for SO2 in the winery include:

- To kill or inhibit the growth of microorganisms. SO2 is used at a concentration of 300-500 parts per million (PPM) as a sanitizing agent for equipment, tanks, hoses, etc. in the winery. Because the inhibitory effect of low doses of SO2 on microorganisms is temporary, it is also often used to inhibit the growth of wild yeast and spoilage bacteria in grapes and must prior to and shortly after inoculation with a commercial yeast culture. SO2 is also used to stabilize finished wines and prevent secondary fermentation and other microbial spoilage.

- To prevent oxidation. SO2 reacts with dissolved oxygen in must and wine and thereby prevents it from oxidizing other components in the wine. SO2 also inhibits the action of oxidative enzymes such a laccase and tyrosinase that would otherwise act to oxidize phenolic compounds in the wine. Oxidation destroys anthocyanin pigments, promotes the formation of brown compounds, and may work to reduce desirable flavors and mouthfeel and increase off-flavors. SO2 also likely works to reverse certain oxidation reactions, e.g. oxidation of phenolic compounds, when those reactions are still in their early stages.

To directly control off-flavors. SO2 binds with certain compounds, for example acetaldehyde (commonly associated with a "green" flavor, as in unripe fruit), that can cause off-flavors if present in excess.

As indispensable as SO2 may be to making quality wines, there are some important things to keep in mind regarding its use. For example, there are definite limits to the use of SO2 as a sanitizing agent for facilities or equipment. SO2 is more effective against bacteria than it is against yeasts or molds. And unlike other sanitizers such as quaternary ammonium compounds, SO2 has little or no residual killing power. In addition, its ability to kill microbes is pH dependent – the recommended upper pH value for a sanitizing solution containing SO2 is about 3.3. Therefore SO2 alone is rarely sufficient to insure adequate winery sanitation; it's especially unlikely to completely control spoilage yeasts and undesirable molds.

Also, as everyone who has mixed up a batch of SO2 knows, SO2 has a pungent aroma and is quite volatile. An excess of SO2 in the must can impede a successful fermentation. And an excess of SO2 in a finished wine can bleach color and impart a musty "wet wool" aroma. High levels of SO2 have also been associated with undesirable reductive character flaws in finished wines (often described as cabbage-like or "burnt match" flavors/aromas), but studies have shown that the link between SO2 concentration and off-odors and off-flavors is not a simple one. Clearly too much SO2 can cause problems. But too little SO2 in a finished wine leaves it vulnerable to quality loss and spoilage. So how much is enough?

Unfortunately, the question of how much SO2 is enough on is not always easy to answer. As noted above, SO2 is bound up by other chemical constituents commonly found in wine. As a result, added SO2 may exist in either free or bound forms in a wine. Only the free form has the desirable preservative effects. Beyond that, any free SO2 present in the wine will exist as both molecular SO2 and sulfite ions. Only the molecular SO2 is effective as a preservative. The ratio of molecular SO2 to sulfite ions is pH dependent, the lower the pH the greater the percentage of molecular SO2 versus sulfite and the less free SO2/sulfite is needed to maintain the desired, effective level of molecular SO2. In very rough terms, the free SO2 concentration needed to ensure wine stability starts at about 10 PPM for a wine with a pH value of 3.1. We can approximate the needed free SO2 concentration in higher pH wines by adding 10 PPM free SO2 for every 0.1 pH unit increase in the pH. In other words, a finished wine with a pH of 3.5 would likely need roughly 50 PPM free SO2 to insure it's stability during storage and a wine with a pH of 3.8 would need a free SO2 concentration of about 80 PPM. White wines will generally need a slightly higher free SO2 concentration than red wines because of their sensitivity to browning. And sweet wines will need a higher concentration than dry wines for successful preservation because the residual sugar provides a more favorable environment for the growth of spoilage yeasts and bacteria.

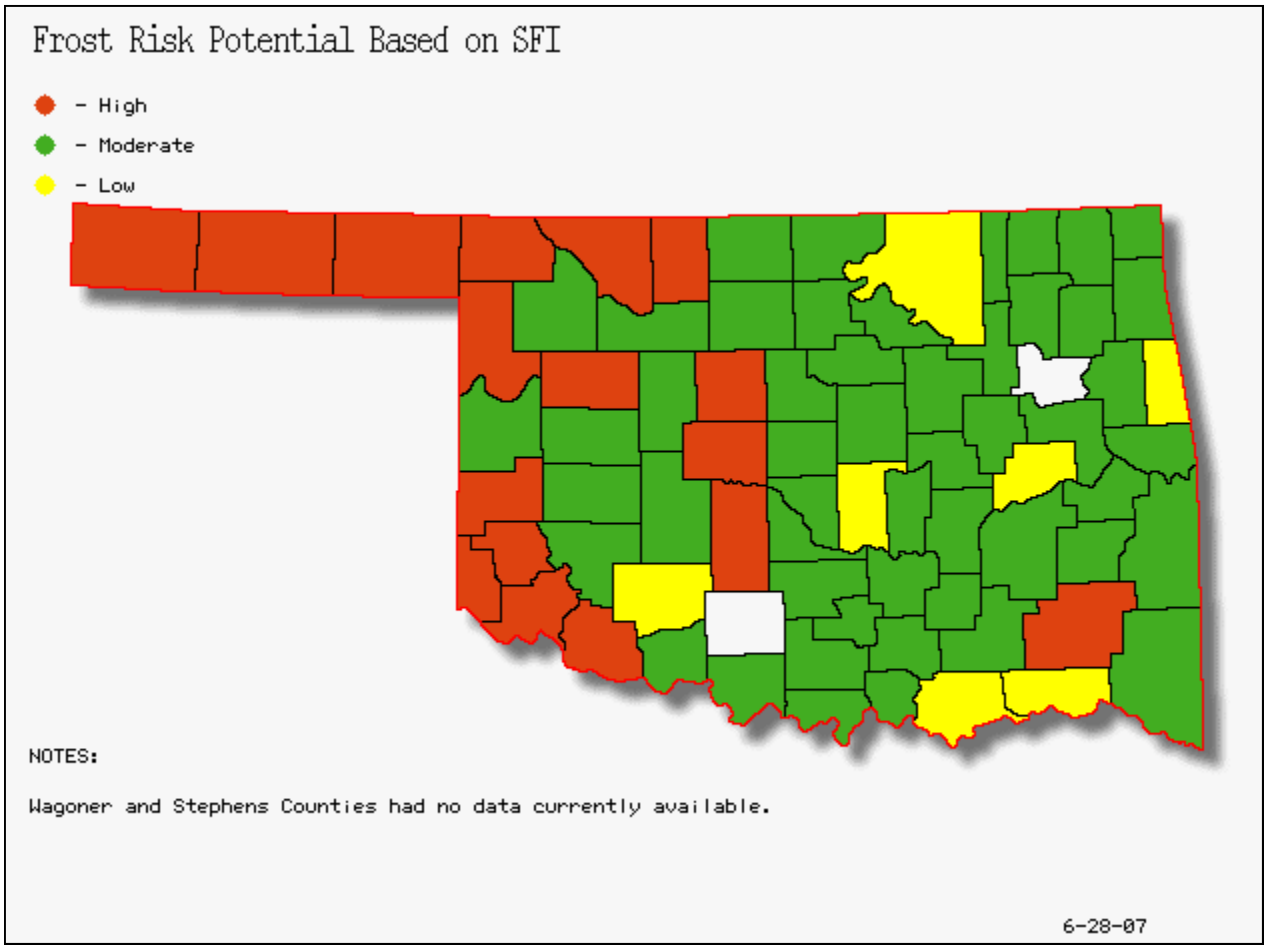
Continued on Page 8

Where Are Oklahoma Grapes Most Susceptible to Spring Frosts?

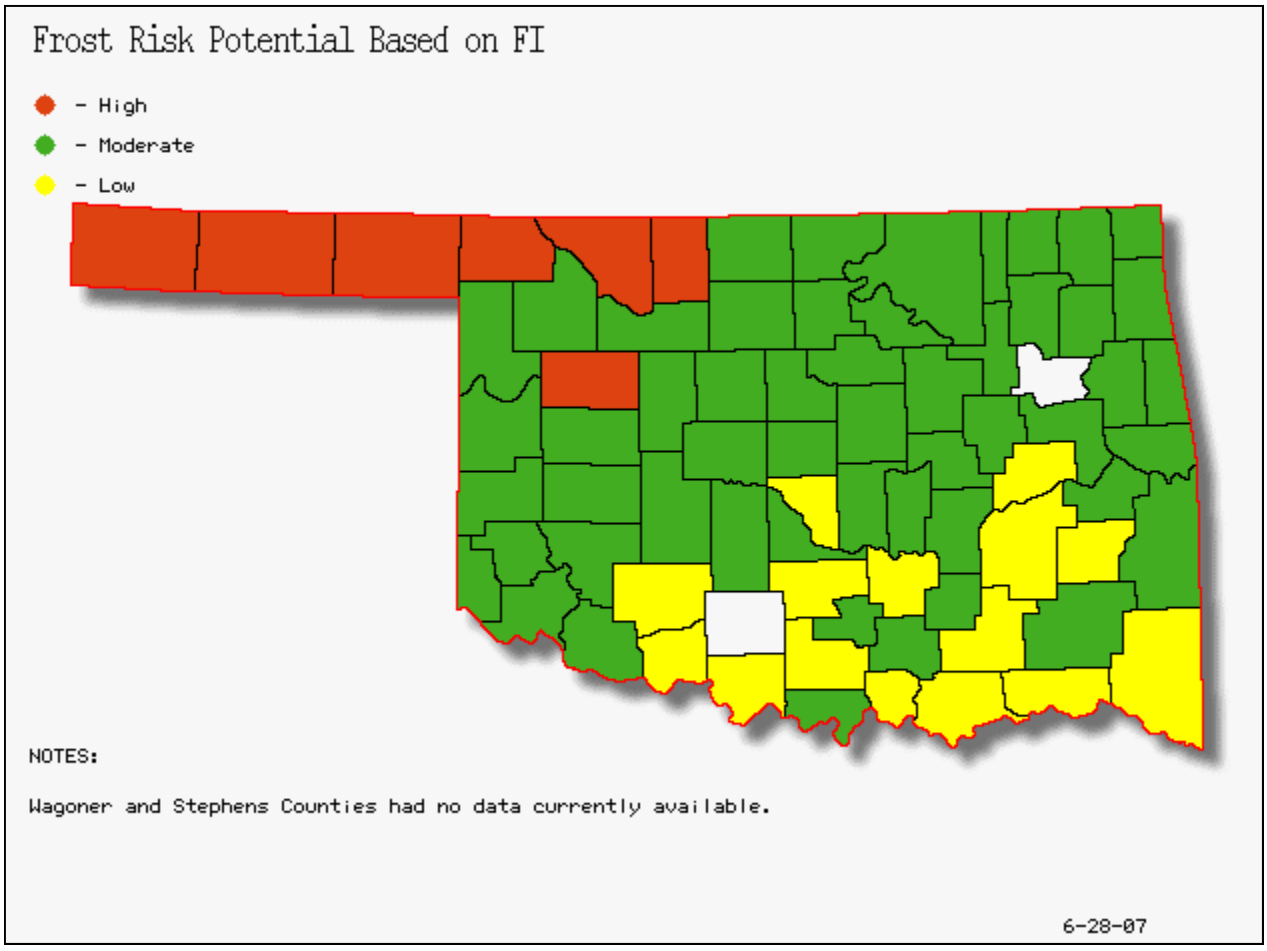
Eric T. Stafne

Up until now there has been essentially one index that measured spring frost risk for grapes. That index is called, imaginatively enough, the Spring Frost Index (SFI). This was introduced by John Gladstones in 2000 at a symposium on cool climate viticulture. His reasoning was that for a specified time period (in this case April), the mean average temperature minus the mean average minimum temperature would be an indicator of spring frost risk at a particular location. These average temperatures take into account not only the cold events that occur, but also the warm temperatures that may lead to earlier initiation of budbreak. Overall, it seems reasonable (and I have more detailed discussion of this in my freeze report — www.oklahomawines.org/2007Freeze.pdf.). The figure below is a representation of Oklahoma with the calculated SFI based on data from 1994-2007. Most of the state is in the moderate category as one would expect. There are some out of place results however. There are very few counties in the "low" category and some one would not expect at all, such as Osage and Adair counties. The opposite is also true of those in the "high" category, with Pushmataha Harmon, Jackson, and Tillman counties all represented. These results gave me pause in whether or not this index indeed gave correct indications of frost risk. Of course, the index is only as good as the weather data it was based on and the location from which the temperature reading was taken may have been affected by factors like proximity to a body of water or low elevation. In looking at the figure below it may be difficult to determine just what is going on. There seems to be little pattern at all. For this reason, I started to develop my own index that will give better, more consistent results.

Continued on Page 7



The index that I developed is currently called the Frost Index (FI). When I can come up with a better descriptive name then I will call it something else, but the calculation won't change. I decided to include not only temperature as a factor in the index, but also duration of frost period, and severity of frost events. Unfortunately with the mapping program I used to develop the figure below, I couldn't include the full breakdown of the "Moderate" category which included "Low to Moderate risk", "Moderate risk", and "Moderate to High risk". But, the figure below does, I believe, give a better representation of spring frost potential. I won't bore you with all the statistical data, but the FI is significantly correlated to number of frost/freeze events, last frost date, and a factor I called cold severity (total number of degrees below 32 F for April). As is apparent, the majority of Oklahoma is in the "moderate" category, but in comparison to the SFI, there are many more counties in the "low" category. For counties in the "high" category grapes grown would be in significant danger of being damaged due to spring frosts or freezes. The quantification of just how often that would occur is difficult to say, but in general, it would be almost a yearly occurrence. Those in the "low" category would rarely have problems with spring cold events, but would not be immune. I hope that this index can be of use to grape growers, especially those that are trying to decide whether or not they should put in a vineyard at a particular location. As an aside, this index cannot account for factors like slope, aspect, elevation, proximity to water, etc. Just like the SFI it is only as good as the weather data that has been recorded at a particular site. There can also be variation within a county. The FI was calculated based on one site in each county, except for Payne county where I calculated the index for both Perkins and Stillwater. To illustrate the differences that can be observed in one county, Perkins was found to be in the "Low to Moderate" category, whereas Stillwater was in the "Moderate to High" category. If any of you are wanting to calculate this for yourself, you should have at least 10 years of data to work with. I can give you the formula for calculating the FI if you think it can be useful. I believe that modifications of this index can also be used to construct indices for grape cultivars based on budbreak as well as other horticultural crops.



OKLAHOMA STATE UNIVERSITY AND OKLAHOMA COOPERATIVE EXTENSION

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We welcome feedback and suggestions. Any responses can be mailed or emailed to the addresses on the left. We will strive to provide useful, pertinent, and timely information.

Initially this newsletter will be published 4 times per year in January, April, July, and October. If warranted the timing can be amended to better serve the grape growers and wine makers of Oklahoma.

'Vigneron' is the French word for someone who grows grapes for use in wine making.

Sulfur Dioxide and Wine Stability cont.

However, simply knowing how much free SO2 we need to insure wine stability is not enough. As noted above, some added SO2 will almost certainly be bound to other chemicals in the wine rendering is unable to act as a preservative. Therefore, in addition to the pH of the wine, we need to know how much SO2 is going to be bound up after it's added. Unfortunately there is no foolproof method for calculating this in advance. Red wines are likely to bind more SO2 than white wines and sweet wines are likely to bind more SO2 than dry wines, but these are simply rules of thumb. The only certain way to determine how much SO2 a wine is likely to bind is by measuring its binding capacity. Perhaps the most practical way to do this is to add a known quantity of SO2, wait a least a couple of days for binding to occur, and then test and adjust the free SO2 concentration as needed.

Several common methods exist to test both free and bound SO2 concentrations in juices, musts, and wines. One very common method uses small, self-contained test kits called Titrets. These use a variation on the common lab technique known as the "Ripper Method." This method relies on a color change caused by the reaction between a starch indicator solution and iodine. It is a quick and fairly reliable method, but it has some limitations. Because the test relies on a color change, it can be difficult to use with deeply colored wines. Also, certain other compounds in the wine, especially phenolics, can interfere with the reaction and cause erroneously high free SO2 readings. Because of these issues a different assay, such as the aeration/oxidation test, ideally should be used to measure SO2 concentrations in red wines.