Subject: Grape Notes, Vol. 11 No. 1
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To Grape Notes Subscribers:

Article below is from Penn State University and has some good information about winter injury on grapevines and what we might expect this year.

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Any questions can be directed to our new email address: umassfruit.umass.edu

Many thanks, ~ Sonia Schloemann, UMass Extension Fruit Program

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Winter notes: What is going on in your vineyard right now?

By Michela Centinari

This past November and December were surprisingly warm months in Pennsylvania with temperatures rising into the 60s and even 70s °F (Figure 1a, b). In January temperatures dropped to single digits in many eastern U.S. regions [1] followed by a virtual temperature rollercoaster ride in the next months (Figure 1). On a positive note, viticulture specialists from Virginia Tech (T. Wolf and T. Hatch) did not observe any winter injury in Cabernet Sauvignon and Merlot buds and canes collected on January 8 (northern Virginia) [1].

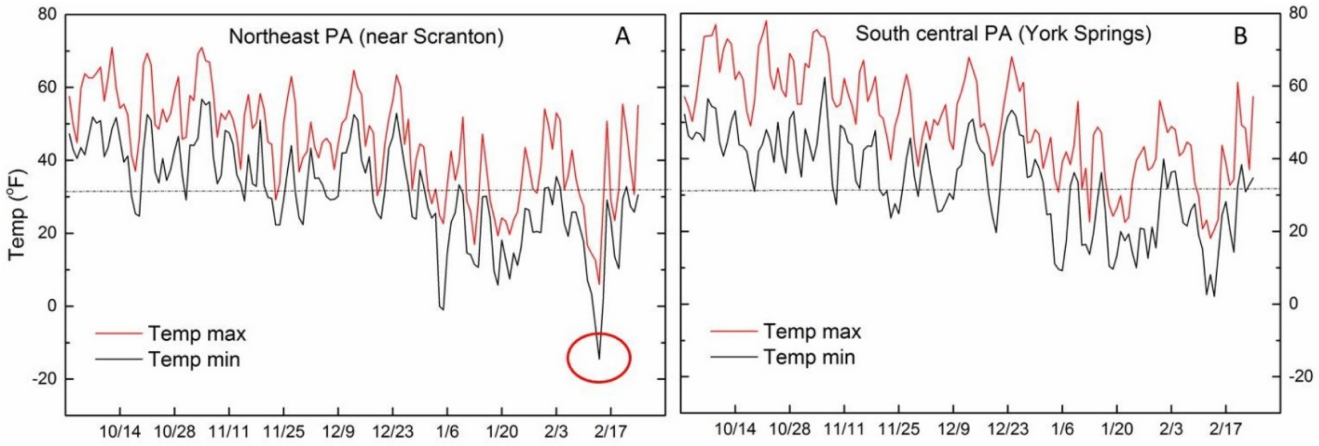

Figure 1. Daily maximum and minimum temperatures recorded in (A) northeast PA, near Scranton (Lackawanna County) and in (B) south central PA, York Springs (Adams County) during the 2015-2016 fall and winter. Dashed line indicates freezing temperature (32 degrees F).

In many regions of Pennsylvania temperatures in January and February did not reach the critical low threshold (Figure 1B) that tends to injure many of the cultivars grown in PA and we are not currently concerned about winter injury in the majority of the state. However, on February 14 temperatures of -10°F and below were recorded in some areas of the state (report from growers from northeastern PA and Figure 1A). The lowest temperature in Pennsylvania (-19°F) was recorded in Potter County on February 14 [2].

Although we are not aware of the extent yet, we anticipate winter injury in some of the cultivars grown in those areas.

A few reminders about the cold hardiness process:

In late summer/early fall, cold-tender grapevine tissues produced during the growing season gradually acquire cold hardiness and transition to a cold-hardy stage (known as *cold acclimation*) as a response to low temperatures and decreasing day length [3] (Figure 2). Bud (and other tissues) cold hardiness reaches its maximum level in mid-winter (known as *maximum hardiness*). Later in the winter as temperatures increase, the buds begin to lose hardiness (known as *deacclimation*) [4]. The deacclimation stage ends in budbreak and active growth.

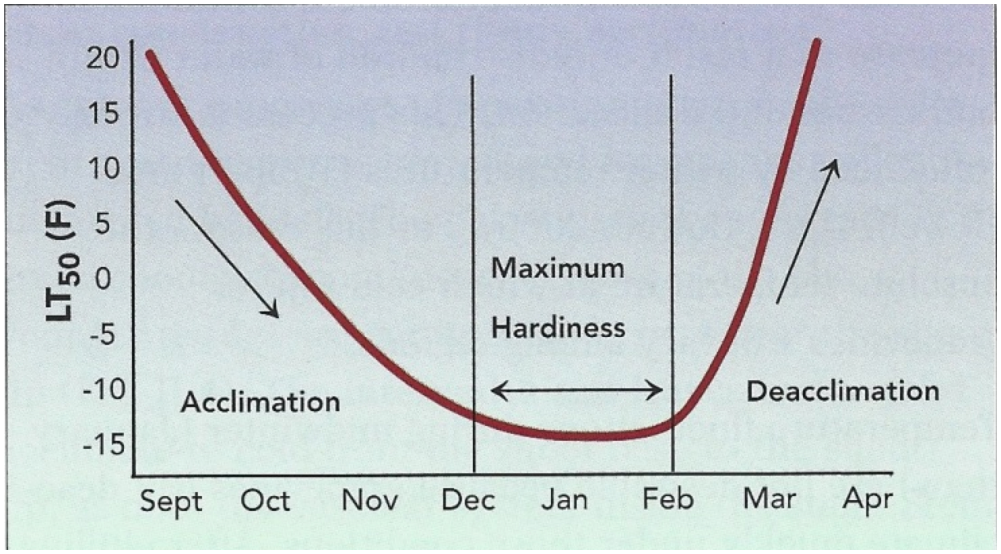

Figure 2. Profile of bud cold hardiness in grapevines. Figure from Zabadal et al. 2007.

It is a well-known fact that bud cold hardiness depends heavily upon the grapevine species and cultivar. For the past two winters (2013-2014; 2014-2015) many growers in the eastern and midwestern U.S. have had the unfortunate opportunity to test this in their own vineyards. However, in addition to its genotype, the cold hardiness of a specific cultivar is determined by environmental conditions, such as seasonal temperatures and their variation, and by vineyard management practices [3]. It is important to remember that **exposure to decreasingly lower temperatures plays a major role in the ability of the vine to acquire its maximum cold hardiness.** In other words:

- The colder the region, the closer a vine gets to its maximum cold hardiness potential [4]. For example, bud cold hardiness of Chardonnay and Riesling in the Finger Lakes region of NY (cooler region) was found to be 2 to 3°F greater than that of the same cultivars grown in Virginia (warmer region) [4] (Figure 3).

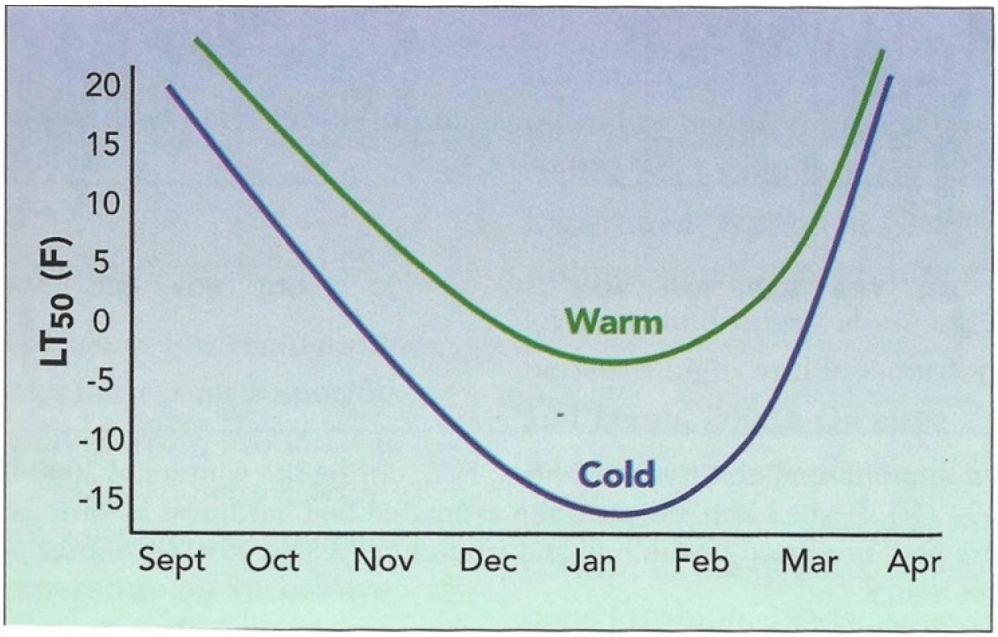

Figure 3. Profile of bud cold hardiness of the same grapevine variety in a cold (New York) and a warm (Virginia) region. Figure from Zabadal et al. 2007.

- "The type of winter determines the extent of bud cold hardiness" [5], thus the absolute cold temperature that injures the same cultivar may vary between winters. J. Londo (Geneticist, USDA, Grape Genetics Research Unit, Geneva, NY) reported that the average mid-winter LT50 (lethal temperature for 50% of the buds) for *labrusca* varied from -24.71 °F in 2012-2013 (defined as a mild-cool winter in upstate NY) to -26.8°F in 2013-2014 (cold winter but with big swings in temperatures) to -26.5°F in 2014-2015 (sustained cold winter) [5]. However, species and cultivars may vary in their response to different temperatures/winters. For example, Tim Martinson, senior viticulture Extension associate at Cornell University, did not observe a decrease in bud hardiness of Riesling vines this year as compared to last year [1].

A few of the things that Penn State Extension recommends to growers:

- **Plan on pruning the hardiest cultivar first and finish with the least hardy [4].** If a cold event occurs late in the winter, like in the middle of February, and cold-sensitive cultivars were not pruned yet, you can still assess bud cold damage and adjust pruning severity accordingly [3]. Leaving extra buds on the vines, and adjusting shoot number after bud break certainly cost growers more money, but it also increases the chance to produce a crop, hopefully close to normal.

- **If your site is an area with moderate to high risk of cold damage events, consider keeping some freeze-tolerant grape cultivars in the mix to reduce the economic downside risk.** These are considered cultivars that you can rely upon to "pay the bills." Cold-hardy cultivars, most of which were released by the breeding program of the University of Minnesota (i.e. Marquette, La Crescent, Frontenac, etc.), are increasing in popularity mostly, but not only, in regions where *vinifera* or other inter-specific hybrid varieties are not well suited or have struggled to survive and perform well in the long term.

Thanks to The Northern Grapes Project we are gaining a better understanding of how to optimize viticultural, winemaking, business management and marketing practices of these fairly new cold-hardy cultivars. For example, important information on Cost of Production in Cold Hardy Grapes was recently published in the Northern Grapes Project newsletter [3]. The fact that most consumers may still be unfamiliar with those varieties and the wine styles they produce doesn't necessarily mean that they not will have chance to stand alone as a varietal wine if they produce high quality wines.

- As Zabadal et al. [4] pointed out "***Minimizing winter injury is usually not the primary goal of a grape grower; however it must be given attention because of its huge impact on profitability***". Each grower should carefully evaluate if the cost of vine management practices that reduce vine winter injury can increase the business profit.

- Finally, the most important step, making informed decisions before planting a vineyard and **always** applying good viticulture practices, which includes keeping the vines healthy and in balance.

Only time will tell what weather conditions the rest of winter and early spring will hold in store for us. However, if your vineyard is located in a frost prone area and you have dealt with spring (post-budbreak) freeze damage in previous years, this would be a good time to review the frost protection practices available and assess if and what options could be used for your specific situation (see for instance: Frost Protection in Orchards and Vineyards by R. Evans, USDA or Methods of Vineyard Frost Protection by P. Domoto, Iowa State University).

A two-year study was conducted by our research team at Penn State to evaluate "low-cost" frost protection practices for their efficacy to avoid/reduce crop losses due to spring freeze injury. We tested the effect of a vegetable-based oil (Amigo oil) to delay budbreak on two *vinifera* (Lemberger and Riesling) and two inter-specific hybrid cultivars (Noiret and Traminette). We also tested the impact of KDL (Agro-K's Potassium Dextrose-Lac®), sprayed shortly (»24 hours) before a frost event, on reducing frost damage to young grapevine shoots. The impacts of Amigo oil and KDL applications on yield components, fruit composition and perceived wine quality were also assessed. **Results from this trial will be presented at the 2016 Pennsylvania Wine Marketing and Research meeting: http://bit.ly/PAWMRB2016Symposium.**

References

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