

What Is this Wacky Weather Doing to Grapes?

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The ability of a vine to withstand cold winter temperatures is due to its ability to acclimate or adapt to cold environmental conditions. The reverse of this acclimation process – **Deacclimation** – occurs as the vines prepare to leave cold winter temperatures and begin to resume active growth as daylight periods lengthen and temperatures rise in the spring.

Over the past few weeks, we have experienced record warm temperatures and bright sunny days with limited precipitation. By the time you read this, we should have some cooler temperatures and much needed precipitation to balance out the bizarre March weather and slow things down. Even so, bud break is still expected to be a few weeks earlier than what occurs most often across Ontario.

Below is a generic view of acclimation, to a period of maximum or optimum hardiness (Dec-Feb) followed by deacclimation during the dormant period for a grapevine. The lines are smoothed out to show the general trend from the time of the grapevine entering dormancy in the fall to the point of bud break in the spring. This year the curve of deacclimation is much steeper than has been observed in the past few years

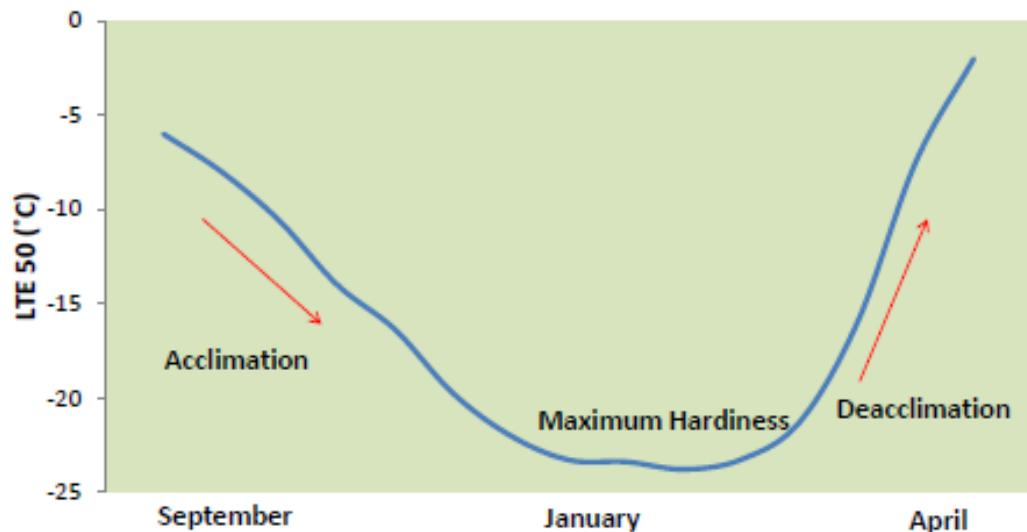


Figure 1. Profile of bud cold hardiness during the dormant season

So what is changing.

The dormancy we observe from mid January onward is environmentally controlled – it is the below freezing temperatures that keep the plant from growing. During deacclimation progressively warmer temperatures enable the vine to begin to have water redistribute back to proximity of the bud cells.

The sap flow observed in spring is the change in water concentration outside of the vine in the root zone relative to that inside the vine. Water moves from high concentration (in the soil around the roots) to low concentration (inside the vine) to re-establish a water balance.

As vines deacclimate, some of the changes inside the cells that allowed them to survive very cold temperatures are reversed. The vascular plugs are digested by enzymes, allowing water to move into proximity of the buds. Hormone levels that kept the cells dormant decline and some of the cryoprotectants that helped dehydrate the cells are metabolized. This allows the cells to rehydrate and freeze at higher temperatures. Water starts to move into the roots and trunk as storage starches are metabolized into sugars in the xylem.

Of concern to many growers is the movement of water into the vine as sap flow begins and the potential for freezing injury (freezing of water inside the vine and cell injury). As water content in the vine increases and cells rehydrate the temperature at which freezing can occur increases as cryoprotectants are lost and cell functions resume. This loss of hardiness is much faster than the rate in which hardiness developed in the fall and is extremely rapid as we approach bud break.

With these warm temperatures, the vines are on wild ride to bud break and we should do our best to slow the process as much as we can. Some work has been done in Ohio on using oils (at very high rates and NOT labelled for this use in Ontario , applied 4 to 6 weeks prior to expected bud break) with sporadic results. I am not advocating this practice at this time as it is unproven here and no data on our cultivar and rootstock combinations and climatic profiles. Plus there is the potential negative impact on soil structure from moving heavy sprayers through vineyards under these spring conditions. Until there is more data to support it, it would be an expensive gamble following the US research trial rates.

So what does all of this mean?

1. Growers should be aware that those vines that enter dormancy earliest are likely to lose hardiness in the spring at a faster rate than those that matured later last fall. The old saying - early to bed early to rise – is pretty much true for grapes. Baco is picked first each fall and breaks bud first in the spring. Cabernet Sauvignon is the last to mature and be harvested and last to start growth in the spring.
2. Vines are reasonably hardy until sap flow begins in the spring and then hardiness levels can be lost at a rate of up to 4 degrees C or more in a week. Be aware that phloem and xylem tissue in trunks and canes are less hardy by a few degrees or more than buds, especially as sap flow resumes.

3. With no snow cover and low soil moisture at the surface, the ground is absorbing more sunlight and will warm the root zone earlier leading to earlier vine growth. Do NOT work the ground early as this will warm the soil faster and push the vines into growing even earlier!
4. If you are using wind machines, you should constantly adjust your start-up temperature as we have longer days and warmer daytime temperatures. Be aware of the www.ccovi.ca/vine-alert web page that has the latest information on bud hardiness. If you are concerned about trunk injury, you may wish to set your start up temperatures a few degrees warmer than those identified as causing bud injury
5. Vines that are pruned earliest will lose dormancy sooner (bud break will occur earlier) than those pruned late in winter.
6. Always monitor the weather forecasts and be prepared. For up-to-date hardiness levels of vines check the CCOVI VineAlert pages at www.ccovi.ca/vine-alert and PDF summaries are also available at KCMS Applied Research web pages at www.kcms.ca/research.