

The Importance of Temperature Control in Winemaking

Temperature control during the winemaking process has been recognised since Roman times when wines were fermented in *dolia* frequently buried in the ground. Today there are far easier and precise ways to achieve numerous benefits, some of which are covered later on. I know that several UK wineries use cold rooms as a means of temperature control but I believe that this way is not as efficient as using a specific chilling unit; wines need to be pumped into tanks in the cold room and, generally speaking, the least manipulation the better. A chilling unit will chill the wine in situ without the need to transfer it to a cold room. Secondly, a cold room needs to be equipped with specific tanks for chilling the wine unless tanks are moved from the winery into the cold room and, presumably, back again – extra time and hassle, not



to mention twice as many tanks to be cleaned. Thirdly, the temperature of the individual tanks in the cold room cannot be regulated separately whereas a chilling unit could regulate one tank's fermentation at 12 degrees C and another tank at 16 degrees C, for example. The most recent temperature control equipment usually involves either a water or glycol solution being pumped around the winery in a ring main connected to individual tanks. This connection can be either via external jackets on the tanks or by using mobile or fixed cooling/heating exchange plates or coils positioned in tanks. The monitoring of tanks' temperatures can be achieved either manually or automatically by using solenoid valves linked to digital thermometers to ensure a constant pre-programmed temperature. The units may be single or 3 phase, chilling only or reversible (which can heat but not at the same time) and their cost is related to the unit's output, often measured in kilowatts. Extreme care should be taken when calculating your winery's requirements as each calculation is specific to the winemaker's processing capacity. Temperature control is essential for the following practices.

Skin contact maceration

This process extracts aromatic compounds from the skins of certain white grape varieties prior to pressing. The grapes are chilled to keep the temperature below 10 degrees C which offers protection against oxidation and limits the growth of unwanted micro-organisms. Even

“neutral” aroma grapes can have improved body and structure with such maceration. Similarly with red grapes, a cold soak or pre-fermentation maceration is considered (depending upon variety, vintage etc) to improve its colour and its colour stability. Such a soak does not extract pip tannins – these require ethanol.

Cold settling (white and rosé wines)

Once pressing is complete, the must needs to be settled to an optimal turbidity level prior to racking and subsequent fermentation. The use of chilling equipment enables this process to be controlled, rather than simply relying on either enzymes or ambient air temperature. Chilling the must speeds up the settling, reduces the risk of oxidation and prevents spontaneous fermentation from wild yeasts.

Fermentation

The temperature of the fermenting must is of utmost importance and it needs to be carefully controlled. If allowed to become too hot or too cold, fermentation is likely to stop. The fermentation temperature will also have an effect on the eventual style of the wine. A cool fermentation proceeding at a slow, gentle rate will generally conserve the primary grape aromas and will result in a higher production of fruity esters leading to crisper, cleaner and more aromatic white wines. If white or rosé wines are fermented at too high a temperature, many of the desirable aromas are volatilised and fill the winery with a wonderful smell rather than the finished wine!



Malolactic fermentation

If the malolactic fermentation is desired, then the wine is often heated to 18-22 degrees C to encourage the lactic bacteria. Traditionally winemakers would wait until the spring time with the onset of warmer weather, but this leaves a large window between the end of the primary fermentation and the start of the malolactic fermentation where the wine is not protected by SO₂ and thus susceptible to spoilage. Encouraging a rapid malolactic fermentation immediately after the primary fermentation using temperature control equipment should ensure that any potential spoilage problems are kept at bay.

Cold stabilisation

Potassium bitartrate is less soluble at cooler temperatures; chilling the wine in its tank over a period of time will encourage the tartrate crystals to form and settle in the tank rather than in the bottle. Chilling to negative temperatures can only be achieved by using glycol and it



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should therefore be remembered to use food-grade glycol, in case of any eventual leaks. Digressing a little, the major constituent of anti-freeze is glycol and it is interesting to note the damage caused to the Austrian wine industry during the 80s. However, to reach a lethal dose you would have needed to have drunk 28 bottles of the wine per day over a 2 week period!

Year round temperature control

Wines stored at a constant, preferably low temperature, age at a significantly lower rate than those at higher temperatures. Temperature control can be used to ensure that the wines in tanks are stored at say 12 to 14 degrees C all year round. The rate of oxidation is dependant upon temperature and roughly doubles for a rise of 10 degrees C. Whilst producing wines in France, I would sometimes have to warm them up slightly during the bottling run, typically during the months of January or February. Labels were applied immediately during the bottling process and if the wines were too cold, condensation would form on the bottles, rendering labelling difficult or impossible. Using temperature control to take the chill out of the wine in tanks prevented condensation and ensured that the labels stuck. Warming the wine will also enable fill levels to be more easily determined.

Conclusion

Whilst not an exhaustive list, I have tried to briefly illustrate the principal benefits of using temperature control during the winemaking process. Your winery's temperature control needs will depend upon the amount of grapes you are processing and over what time period, the future expansion potential and, of course, your budget. Put simply, I consider temperature control a necessity rather than an optional extra for making quality wines.

Jeremy Broyd

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SWVA Varietal Compendium

For the last two years Vine Post, has included an article by a member about grape variety they have been growing for many years using that experience to describe its foibles in a depth which goes beyond the textbooks. Articles to date have included Bacchus, Madeleine Angevine, Kerner and Seyval Blanc and these have now been brought together in a single publication which can be made available to SWVA and UKVA members for £2.20 + postage and to non-members for £5.00 + postage. Such a publication will be invaluable to those new to viticulture and wondering which variety to plant or to those who have been growing grapes for years and are contemplating replanting with a different variety.

It is the intention to update the Compendium annually by including the year's articles.

To order a copy or for more information, contact Will Gissane, Editor, Vine Post at news@swva.info