Managing high potential alcohol fermentation

By Gordon Specht

Since the mid-1980's winemaking conditions and practices have been evolving rapidly. The practice of delayed harvesting of grapes results in higher must pH and sugars as well as greater nutrient imbalance putting the yeast under extreme conditions. While producing beneficial flavours, this viticulture practice increases soluble solids concentrations in musts and results in higher potential alcohol levels, often close to inhibitory amounts. Sluggish or stuck alcoholic fermentations are still observed, in part due to longer "hang-times" of grapes prior to harvest. Other problems resulting from high potential alcohol concentrations include the production of H_2S and other reduced sulphur aromas as well as excessive volatile acidity.

Aside from the genetic differences in yeast's alcohol tolerance, the way the yeast is prepared at the yeast production facility, and then managed during rehydration and through the yeast's growth phase by the winemaker will have a substantial influence on the yeast's ability to tolerate higher potential alcohols. A new method for preparing active dried yeast to better handle the trend of higher potential alcohols coming from higher maturity fruit will be presented.

The importance of aerobic survival factors on maintaining the yeast membrane fluidity and their resulting tolerance to high alcohol, good yeast nutrition and other good fermentation practice considerations when dealing with high potential alcohol musts are all keys to fermenting difficult musts. In high potential alcohol reds some additional good fermentation practices include:

- Aeration or oxygen additions when the cap forms (usually when 15 g/L sugar is fermented) and again at 1/3rd sugar depletion.
- Temperature management during yeast rehydration, the initial phase of the fermentation and at the peak of fermentation.
- Regular movement of the yeast back up into suspension during their death phase towards the end of fermentation.

In higher potential alcohol white musts some additional good fermentation practices include:

- Initial juice turbidity level optimum between 80 to 150 Nephelometric Turbidity Units (NTU)
- Aeration or oxygen addition as soon as the fermentation is active (usually when 15 g/L sugar is fermented) and again at 1/3rd sugar depletion.
- Temperature management during yeast rehydration, yeast inoculation at the end of the fermentation.
- Regular movement of the yeast during their death phase towards the end of fermentation

The yeast and fermentation management points reviewed in this presentation should be applicable for most high potential alcohol fermentations that winemakers will encounter. The beneficial contribution of yeast and how they are managed is becoming more significant especially when viticultural practices have optimized grape quality and fermentation conditions allow the winemaker intervention and control.