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Things We're Dwelling on Now...

Stuck fermentations and glucose/ fructose ratios

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This time of year, most winemakers hope to add SO₂, drop the temperature, and put the wines down for a long winter's nap (kerchief and cap optional). When the fermentation hasn't finished, however, the nap has to wait. Stuck or sluggish fermentations remain a huge problem in the wine world, and from what we've heard, this year has been no different. Environmental factors (temperature, pH, nutrition, toxins, etc.) are known to cause problems with yeast growth and development early on, but issues near the end of fermentations aren't as easy to understand or control.

Many researchers have looked-and continue to look- at sugar and how yeast process it. We know that yeast can metabolize both glucose and fructose (vinifera, at least, tend to start with a 1:1 ratio), and researchers have found that when yeast just have one or the other in a synthetic media, they seem to perform equally well. In wine, however, when a fermentation stops below 2% RS we can see up to a 10:1 ratio of fructose to glucose remaining. Many studies have demonstrated that most yeast strains tend to be glucophilic (preferring glucose), especially at lower sugar concentrations. The key factor may be transport systems- the machinery that brings the sugar molecules inside the cell for processing. Glucose and fructose seem to rely on the same transporter, and the transporter prefers glucose. Further, transport systems, like other membrane-based architecture, are sensitive to ethanol. Current work is focused on identifying yeast strains that are not just able to survive in high alcohol environments but are also able to operate the HXT gene system, which is responsible for controlling the sugar transport apparatus. Strains that can maintain transport as higher ethanol levels are reached may be what we think of when we think of "fructophilic" yeast.

So, what's the take-home message of all this? Unfortunately, it seems to be the clichéd "further information required." Winemakers across NY have reported problems with glu/fru ratios, and Riesling in particular seems prone to this malady. One solution proposed by our Swiss colleague Jürg Gafner is to simply fix the ratio by adding glucose. In the meanwhile, we hope that all of your fermentations are smooth and your winter naps are stress free. Best wishes for a happy, healthy, harmonious holiday and a wonderful new year.

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