Canes and Casks – Yeast in Winemaking

Part of our mission at the Southern Oregon Wine Institute is to provide wine industry outreach. This May we will be presenting a technical symposium on the topic of wine yeast, so I thought it might be interesting to discuss this magnificent organism.

Yeasts are unicellular microscopic organisms, and the yeast species domesticated by humans are important because they metabolize sugar into alcohol and carbon dioxide. For thousands of years humans have utilized the alcohol to make beverages like beer and wine, and the carbon dioxide to leaven bread. In modern times yeast has become an important organism for scientists trying to understand how all cells work.

Yeasts are eukaryotes, meaning their cells contain DNA packaged into a nucleus, like human cells. Unlike human cells, yeasts are fast growing, cheap to grow and maintain, and easy to manipulate genetically and biologically, thus making them ideal model organisms in the study of universal cell functions such as cell aging, cell growth and division (relevant to cancer), and myriad cell processes relevant to human disease. The first yeast genome was deciphered in 1996 and publically funded databases house the genome and catalog associated research findings. The information is freely available to the public, thus fostering continued research. Just last week researchers published a study of their work building the first synthetic chromosome (a large section of DNA), in a yeast cell.

While we rarely discuss yeast genetics in the wine cellar, there are several aspects of yeast, and yeast selection, which are important to winemakers. The yeast used in winemaking grow and multiply through a process called budding; where a mother cell makes a copy of itself and the daughter cell produced has the same DNA. Occasionally similar yeast strains may share DNA by producing sexual spores. This means that over time there have developed specific yeast strains with a particular set of characteristics, similar to the development of different grape varietals like Chardonnay and Pinot Gris. To give an example of the differences in winemaking: some yeast strains require lower levels of nutrients than others, some are better at fermenting at low temperatures, others are tolerant to high alcohol levels, some produce sediment which is easier to remove from a sparkling wine bottle, still others are said to amplify particular fruity or vegetable aromas in the wine.

As winemaking, baking, and brewing became industrialized companies captured the yeast strains which they felt produced the highest quality or most interesting products and began growing these yeast and selling them. These commercial yeast strains were often named after the place where they were first obtained. For instance a popular commercial yeast strain in Oregon Pinot Noir production is RC-212. The “RC” stands for Romanée-Conti, one of the most famous vineyards in the birthplace of Pinot Noir, Burgundy France. All commercial wine yeast strains have been selected to be strong, healthy fermenters with limited production of off odors, so winemakers use them because they can be confident they will obtain high quality wines in every fermentation lot, year after year. Winemakers also use commercial yeast because adding a large quantity of healthy yeast can significantly speed up the fermentation process, which is a great benefit if the winery has limited tank space. With several hundred commercial wine yeast strains to choose from, winemakers may experiment with different strains to find the one

which works best for a particular wine style or combine lots fermented with different strains to increase the complexity of their wines.

Still, winemaking obviously has occurred for centuries in the absence of commercial yeast companies. Some modern winemakers feel it is important to utilize local, or “native,” yeast in their winemaking to better express the uniqueness of their wines. The yeast species which are best for winemaking are rarely found in the vineyard, but are abundant in cellars where wine is produced. Once a healthy population of wine yeast has been established in the cellar it is possible to make great wines without the use of commercial yeast. This method of winemaking usually takes more time to complete and must be monitored more closely, but winemakers who eschew the use of commercial yeast feel it is worth the extra effort.

Does it matter in the end which commercial yeast strain, if any, is used to produce a particular wine? The fact that there are hundreds of different wine yeast strains available to winemakers, and a group of winemakers who don’t use commercial strains at all, would suggest that the differences among different yeast strains are important to winemakers. The fact that there are hundreds of successful wine brands suggests that these differences may be important to consumers as well.