

The Process of Winemaking

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Some Background Information

Enology, a word that comes from the Greek words for wine and study, is the term that is used to describe the science of winemaking. This science has its roots in prehistoric times, as the effects of alcohol were probably discovered when rotten fruit was consumed and found to have an intoxicating effect, which was viewed as pleasant. Fermented liquid could be stored for a long time without fear of decomposition, and a reliable drinking source was obtained (Wade, 1999).

Red Wine

Making the Must

Grapes intended for red wine are initially processed in the crusher-destemmer.

The grapes are separated from the stems and gently crushed into a pulpy material called 'must'. The must is transferred into fermenting tanks where it will 'cold soak' for a few days. Cold soaking allows the juice to gain color and fruit flavor (Edgefield, 10/12/00). The addition of more sulfur dioxide is usually necessary at this point to suppress the growth of wild yeast and bacteria that had not been killed by the first sulfation (Napa Valley Vinters, 10/12/00).

Fermentation

After a couple days of cold soaking, the must is inoculated with yeast and fermentation begins. The carbon dioxide that is produced by the fermentation pushes skins to the top of the tank or bin, making a 'cap' on top of the liquid. This cap is kept in contact with liquid as much as possible because gives the juice color and tannins. Tannins are the group of chemicals that naturally exist in the skin and seeds of the grapes (and many other plants). They give finished wine varying degrees of astringency (Napa Valley Vintners, 10/12/00).

There are two ways that the cap is kept in contact with the wine: 'punching down' and 'pumping over'. In the process of punching down, the caps are manually pushed down into the juice, usually with a pole device. Historically, people have used their feet for punching down the

cap. For larger quantities of wine, pumping over is more common: a pump that is attached to the bottom of the tank, and the juice is pumped over to the top of the cap and circulated this way for 15-20 min. Either process may be used, but both must be repeated two to four times a day, until fermentation is complete (Edgefield, 10/12/00).

Pressing and Settling

The amount of time that a wine ferments varies on the type of grape and the method of the winemaker. In average musts, yeasts convert sugar into alcohol and carbon dioxide in 10 to 14 days. In wines that have a higher concentration of sugar, fermentation can take up to months. Although there is no definitive test to tell when fermentation is done, the loss of cloudiness in the must indicates that fermentation is complete (Deutsches Wieninstitut, 12/8/00). After fermentation, the juice (now wine) is pressed away from skins into a holding tank, where it sits for a few days to allow sediments and dead yeast cells to settle out (Edgefield, 10/12/00).

Aging

The wine is put into oak or redwood barrels for aging. Aging allows oxygen to enter, and water and alcohol to escape. The acidity decreases, clarification takes place, and components of wine form compounds to enhance flavor and aroma. The wood also contributes to the flavor. Malo-lactic fermentation commonly occurs during the aging of red wines, and contributes to the mellowing of the wine.

Red wines are aged for several months to several years, depending on the type and quality of the wine desired (Napa Valley Vinters, 10/12/00). Some red wines are aged up to forty years. It is important to note, however, that it is a common misconception that wines must be aged. While some wines improve with age, others can and should be drunk immediately. It is possible that if wines are aged for too long, the tannins that give the wine its flavor will precipitate out, and the wine will go 'over the hill' (UC Davis, 10/29/00).

White Wine

Pressing the grapes

Grapes that are meant for the production of white wine are picked and immediately processed in the winepress.

The grapes are gently squeezed for about 2 hours and the juice is pumped (or fed by gravity) into holding tanks (Edgefield, 10/12/00). In the tanks, the juice is chilled, and sediment from the fruit drops to the bottom. The sediments are removed and wine is ready to be fermented with yeast (Edgefield, 10/12/00).

Fermentation

The juice is transferred to fermenting vats, and the yeast is added. With the addition of yeast, the term wine can now be used to describe the grape juice. The species of yeast that is used to ferment grape juice into wine is *Saccharomyces cerevisiae*. This yeast is a domesticated species that has been acclimatized to the effect of free sulfur dioxide. In case some wild yeast still exists in the juice, the domestic species can dominate and the fermentation will be able to proceed in a predictable fashion (Vine, 1981).

The juice is put in large vats from which air is excluded. In this way, oxidation is prevented and the growth of bacteria is discouraged (Napa Valley Vintners, 10/12/00). The most problematic bacterium is of the genus *Acetobacter*. This organism has the potential to convert wine into vinegar overnight. Fortunately, *Acetobacter* is sensitive to free sulfur dioxide and preventative measure against the bacteria can be taken (Vine, 1981).

Fermentation is a process that takes place slowly over a period of ten to thirty days. The temperature of the liquid is maintained at approximately 25°C, as severe changes in temperature can kill the necessary yeast cells (Wine Making, 10/12/00). Certain types of wines are fermented in ways that give them their characteristic flavors. For example, Chardonnay is placed in oak barrels to ferment, and an oaky flavor in the final wine product results (Edgefield, 10/12/00).

Malo-lactic Fermentation

Oak fermented wines may go through secondary fermentation, called malo-lactic fermentation. This is a reaction in which malic acid is converted into lactic acid, and results in the texture of the wine changing from crisp and light to creamier buttery (Edgefield, 10/12/00). Malo-lactic fermentation can either be introduced, or may naturally occur. It is not an

easily predicted reaction: it may begin immediately, or it may take months for the process to begin. The progress of malo-lactic fermentation is monitored with paper chromatography. The benefits of secondary fermentation are that it reduces the amount of total acidity and causes a mellowing of the tartness in the wine (Vine, 1981).

Aging

The amount of time that a wine is aged is equal to the time that elapses between fermentation and drinking. White wine tends not to be aged for long, though some 'complex' white wines can be aged for 3-7 years. This process is much more common in red wines. It is described in more detail in the red wine section (UC Davis, 10/29/00).

Separation, Chilling, and Bottling

After fermentation, the wine is drawn off to separate it from the dead yeast cells and other sediments that have precipitated from the juice. The wine is chilled to create more clarification, and then bottled (Edgefield, 10/12/00).