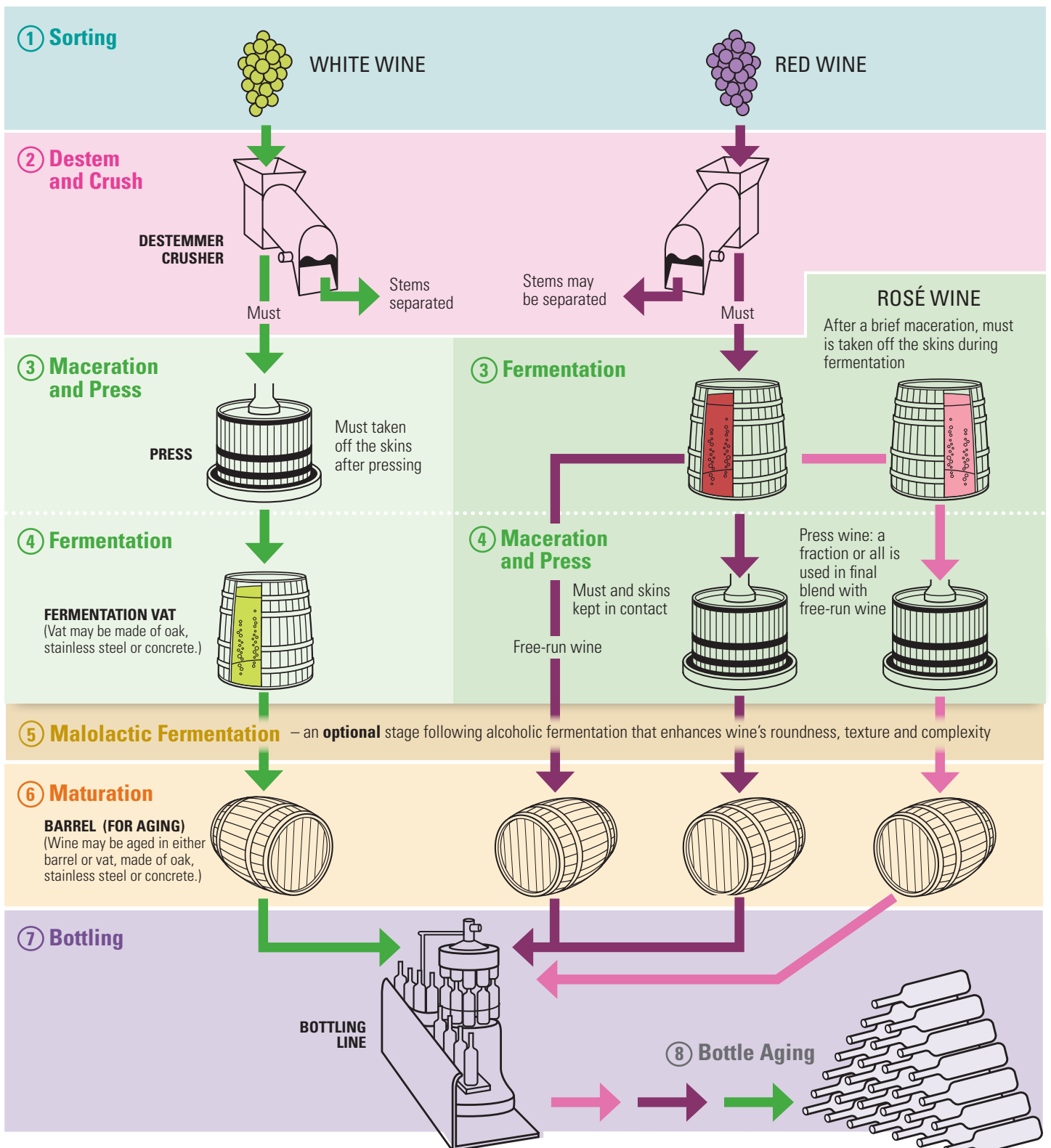


WINEMAKING

Introduction

This is a general overview of the basic steps winemakers follow during the winemaking process. There are exceptions and restrictions to the process outlined below that are unique to each country's wine regulations.



Making Still Wine

1 Sorting: harvested grapes are sorted at the winery.

- Whole bunches or clusters of healthy grapes are separated from damaged fruit, leaves, dirt, etc. before crush. For some fine wines, there's a selection process in the vineyard or berry-by-berry sorting.



2 Destem and Crush: stems are separated and grapes are crushed.

- Red grapes are completely or partially destemmed, or left as whole clusters. White grapes are almost always completely destemmed.
- For reds, a percentage of stems are sometimes kept during fermentation to affect the structure, color, weight and texture of the wine.



- Typically, destemmed grapes are crushed to break open the skins.
- Methods are employed not to break pips or seeds inside the grapes, which impart unpleasant, harsh elements to the wine.
- At the end of crush, the collected juice is called free-run juice. Lower in tannins, it is 2/3 of the total juice from the grapes.
- The crush yields a mixture of liquid, skins and solids called must.



3 Maceration and Press: the must may macerate (soak together) for a period before pressing.

- For red wine, the must macerates and undergoes fermentation to extract the phenolics (tannins, anthocyanins for color, and flavor compounds) in the grapes. Pressing occurs afterwards.
- For rosé wines, maceration is kept brief, producing lightly colored juice that is separated from the red grape skins during fermentation.
- For white wine, grapes are pressed immediately before fermentation and the skins are removed. The fermenting wine does not macerate with the skins.
- Maceration is usually simultaneous with fermentation; some winemakers extend it before or after fermentation, or both.
- Today's sophisticated inflatable membrane and pneumatic presses can execute long, slow periods of precise, minute amounts of pressure for an extremely gentle pressing.



- Top winemakers use various methods and high-tech presses to gently press grapes without crushing the seeds. One traditional technique is to use only the weight of uncrushed berries on each other to do the pressing.

- In 'press juice,' tannins are higher than in free-run juice. Typically, 1-6 pressings produce this important component, which is often blended with free-run juice.

4 Fermentation: this process turns must into wine. The metabolism of yeast converts sugar to alcohol + CO2.

- Typically, red wines are fermented for 1-2 weeks at 50–86°F. White and rosé wines are fermented for 2-4 weeks at 50–68°F.
- Fermentation occurs in vats of stainless steel, lined concrete or wood.
- Fermenting at too low a temperature inhibits extracting the best material from the grapes; too high and aromatic and flavor complexity are lost.



Vat Material and Character of the Wine:

- Steel tanks make wines with clean, fresh aromas and flavors; temperature-controlled systems are necessary.
- Concrete tanks have excellent heat retention and consistent temperature control. Concrete allows the softest micro-oxygenation, which results in soft, round, plush-textured wines.
- Wood vats have good heat retention and allow for soft micro-oxygenation. Wood has the unique ability to maintain wild yeasts, which can produce aromatic, complex and profound wines.

5 Malolactic fermentation (MLF): an optional method that influences a wine's style.

- After fermentation has turned the grape sugars into alcohol, the wine is full of malic acid.
- MLF converts this to softer, creamier lactic acids, enhancing the wine's roundness, texture and complexity.
- Typical for red and sparkling wines, full or partial MLF is used by many winemakers for Chardonnay, Roussanne and some other white grapes; most winemakers block MLF for Riesling, Sauvignon Blanc and other white grapes to retain fresh, crisp acidity.



- MLF is caused by bacteria either present in older wineries or added soon after fermentation begins in newer wineries; the process is initiated by warmer spring temperatures or by heated "malo rooms."
- Most winemakers initiate MLF after alcoholic fermentation has completed.

6 Maturation: the wine ages in vat or barrel to complete its aroma and flavor development.

- Wine is aged in large stainless steel or concrete vats, large wood casks or small oak barrels.
- Aging in stainless steel helps the wine retain its fresh fruit aromas and lively, bright acidity.
- Aging in large concrete or old wood vessels can soften the wines with a process of micro-oxygenation.
- Micro-oxygenation introduces minute amounts of oxygen, which helps soften

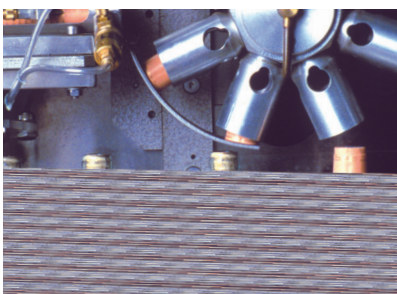


tannins and makes the wine rounder, with a darker, more stable color.

- Aging in new oak vats or barrels adds some wood tannins to the wine and aids the development of phenolics.

Oak Factors that Determine Flavor Profile:

- Oak used to make vats and barrels has been predominantly French or American; the French is fine-grained and the American is coarse-grained.
- Fine-grained oak imparts neutral, cinnamon and vanilla aromas; coarse-grained oak contributes overt vanilla, dill, butter, coconut and cedar aromas.
- The interior is charred or toasted by fire.
- The length of time that wood for barrels is seasoned, or kept outdoors to dry, and the degree of toast applied during coopering impart distinct aroma and flavor profiles to the wine.



7 Bottling: preparing the wine for release.

- Normally, after barrel aging, there's a final blending (assemblage) in tank to ensure uniformity in the finished wine.
- Finished wines often undergo fining or filtration to remove impurities. Protective measures include adding SO₂ to protect the wine and using sterilized bottles.

- "Natural wines" feature absolutely no fining, filtration or additives prior to bottling. Some winemakers feel this is the best way to express terroir; others feel the complex microbiology of wine makes this approach risky.
- Sometimes robust red wines are kept a year or two in bottle longer than required by law to help the wines integrate and round out before release.



8 Bottle Aging: the wine ages further in bottle.

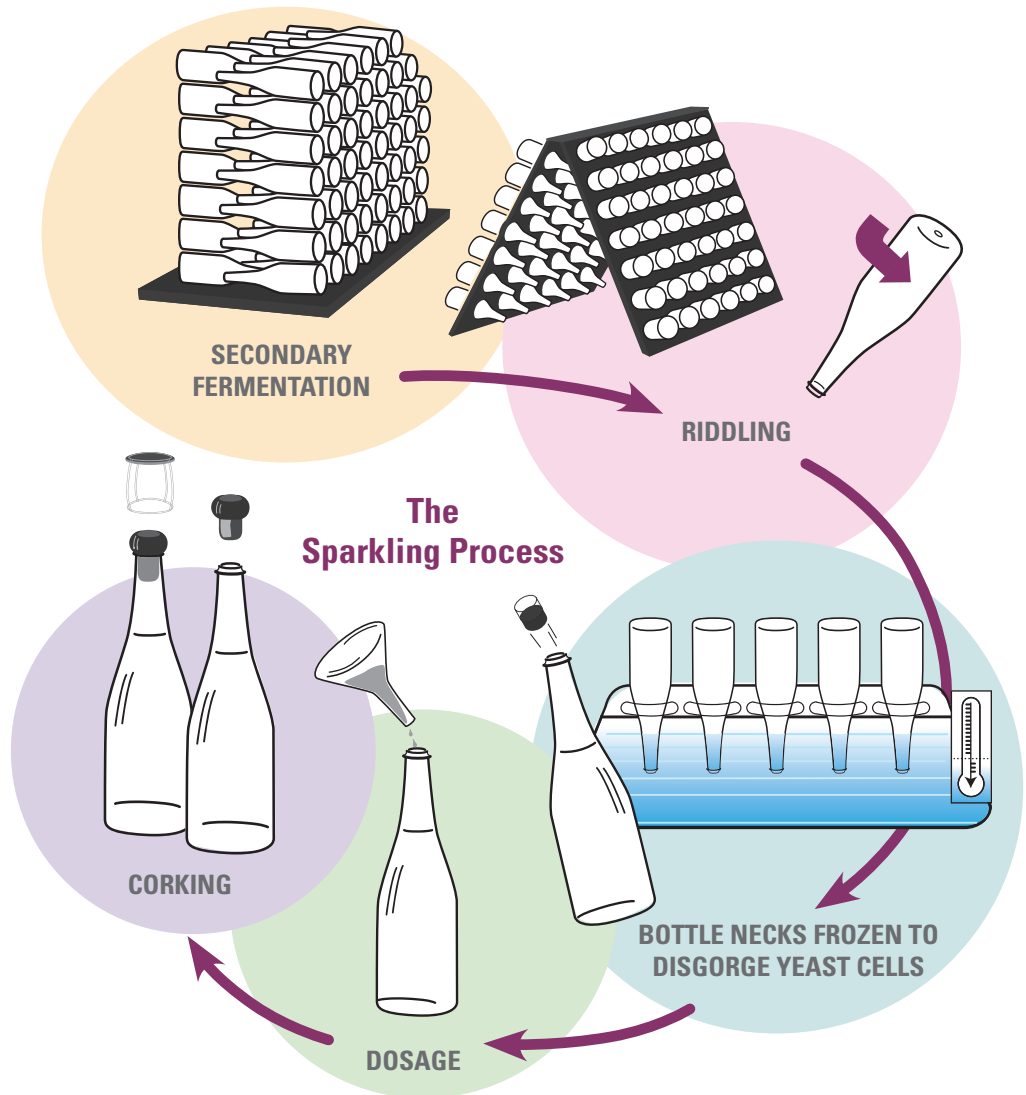
- The great majority of all wines are produced for immediate drinking, and most whites and rosés show their best while still youthful.
- Some wines are designed to benefit from bottle aging in optimal cellar conditions.
- During their slow evolution over years in bottle, fine wines lose bold, primary fruit characters but gain tremendous depth and complexity by acquiring secondary and tertiary aromas and flavors, including forest floor, cigar box, and leather for reds; caramel, nuts, marzipan and beeswax for whites.
- When stored in optimal cellar conditions (50–55°F and 70–90% humidity), fine wines can age and evolve well for a few years to several decades.



Making Sparkling Wine

Champagne Method (also Traditional Method or *Méthode Traditionelle*) Used to make *Champagne* and *Cava*

- After a standard still-wine vinification, the wine is bottled.
- A wine/sugar/yeast mixture called the *liqueur de tirage* is added and the bottle is sealed. This feeds the yeast and initiates a secondary fermentation.
- Key to the Champagne Method is this secondary fermentation, where the released CO₂ cannot escape the sealed bottle and makes the wine effervescent.
- After fermentation, the bottle is tilted gradually, or riddled, over 9 months to several years, to collect the dead yeast cells. The bottle neck is frozen and the cells are removed, or “disgorged.”
- Before the bottle is finally recorked, the “dosage,” a wine and sugar syrup mixture, is added to give the wine its final style and sweetness, ranging from Brut and Extra Dry to Sec, Demi-sec, etc. Brut Nature is the driest Champagne style, made with no dosage.



Charmat Method

Used to make *Prosecco*

- Developed by Eugene Charmat of Bordeaux in the early 20th century
- This process is less expensive, faster and less labor-intensive than the Champagne method; better suited to ready-to-drink wines.
- After a standard still-wine vinification, the wine is transferred to tank, where effervescence is created by adding yeast and sugar to initiate a second fermentation.
- After a rapid fermentation, the process is stopped by cooling the wine when it reaches a required level of effervescence.
- The wine is clarified, a “dosage” is added to adjust sweetness and the resulting sparkling wine is bottled.
- This process takes 30-60 days, while the Champagne Method takes 9 months to 5 years.

Making Fortified Wine

Port and Sherry are the best known examples of fortified wines.

- During still wine vinification and before fermentation is complete, when the desired amount of grape sugars have converted to alcohol, the wine is fortified with grape spirit. This halts fermentation and produces a wine with 15–22° alcohol.
- For Ports, the wines from different vineyards are tasted and earmarked for different Port types and aging; Vintage, Late Bottled Vintage and Ruby are aged in large vats, and aged Tawnies are matured in small casks called pipes.
- For Sherries, there are two main types, Finos and Olorosos, and many styles, including Cream and PX. Sherries are aged in a solera system, where numerous Sherries of different ages are blended together.

Cross Section of a Grape

