

Making Wine

Why California Produces 90% of America's Wine

American wine is now made in all fifty states, so why is almost all of it from California? When you go wine tasting in California, France, Spain, Italy, Portugal, and other countries known for great wines, virtually all the grapes will be from a single species: *Vitis vinifera* (pronounced VI-tiss vih-NIH-fur-ah). This species is native to Europe and was first brought to America in the mid 1800's. Within this species, there are hundreds of subspecies, which we call "varietals" (Cabernet sauvignon, Chardonnay, Zinfandel, etc.). *Vitis vinifera* is sensitive to winter cold. Sure, Washington state has a stellar wine region, but every few years, many of their vines are killed off by unseasonably cold weather. Lots of grapes grow in New York, but they can only survive along large bodies of water like the Finger Lakes. Most of the southern US is below this approximate line of winter cold, but then another problem appears: Pierce's Disease.

Pierce's Disease is a bacterial infection spread primarily by the glassy-winged sharpshooter. The infection dehydrates and kills the *Vitis vinifera* vine. Pierce's is prevalent in the southern and southeastern US and much of the East coast, so *Vitis vinifera* is extremely hard or impossible to grow in these areas. People still try to grow it, but as in cold climates, it takes special (expensive) farming techniques, and many vines are routinely lost.



A couple of other grape species native to America grow very well in areas where *Vitis vinifera* cannot. *Vitis Labrusca*, better known as the Concord grape, is resistant to cold and is produced in large quantities in New York for Welch's and other grape juice and jelly manufacturers. *Muscadinia rotundifolia*, usually referred to as Muscadine, is native to the Southeastern US and resistant to Pierce's Disease. It's widely grown for fresh fruit as well as for wine, though its sugar content (and therefore, alcohol) is less than *Vitis vinifera*, and the wine made from it tastes...well...let's just say it's an acquired taste.

In addition to winter kill and Pierce's disease, excessive heat and humidity can also become a problem. Many *Vitis vinifera* varietals are susceptible to Powdery Mildew and other diseases created by excessive moisture. Even in areas where the humidity is low, if summer temperatures get too hot, the vine can shut down to protect itself, sacrificing the fruit. At the very least, grape vines grown in very hot regions need a lot of water (more than 500 gallons per vine in one season). You should now see why California is a very special place when it comes to producing wine grapes. It's really the only place in the US where growing great grapes is relatively easy and economical.

Growing Grapes

On the one hand, a grape vine is like a weed. It wants to take root, grow, and climb. On the other hand, getting a grape vine to produce the exact grapes you want can be a challenge. Grape vines don't grow from seeds. A grape vine starts with a cane that is pruned off of a living *Vitis vinifera* vine. To eliminate various soil-borne diseases, the cane is usually "grafted" onto a piece cut from a "wild" grape varietal that is native to America. Grafting is like mending a broken bone. You notch each piece, stick them together, wrap the joint, and the two pieces fuse together, creating a single plant. The wild portion becomes the root (we call this "root stock"). Grafting gives you the best of both worlds: disease and pest resistance below ground and great grapes above ground. We plant new vines in Spring and early Summer. In three or four years, the vine produces its first full crop.

There are many ways to grow grapes. In Lodi, we mainly use two vine configurations or "training" methods. All really old vines and a lot of newer Zinfandel vines are "head trained." The vine grows up along a stake and spreads its arms out in all directions. A couple of grape clusters grow on each shoot from each arm. The vines are typically planted ten feet apart with ten feet between rows. Because the grape clusters are everywhere on the vine, they must be picked by hand. The more common configuration is called a "trellis." We put stakes at every vine position and run a wire horizontally along each row about five feet above the ground. The arms or "cordons" grow out along the wire about three feet in either direction. The annual shoots grow up from the cordons, and a couple of clusters on each shoot hang just above the wire. The grape clusters are all at roughly the same height and in a straight line, so they can be harvested by a machine.

Grape vines lose their leaves and go dormant over the winter, usually after the first day of freezing temperatures. In February and March, we cut off or "prune" most of the growth ("canes") from the previous year, leaving two or three new buds that will become new shoots in the spring. Each shoot has a specific number of leaves, tendrils, and grape clusters, so we use pruning to control the number of grape clusters each vine will have. Pruning is the most critical step in growing grapes. The goal is to achieve "vine balance." If you have too much foliage relative to the amount of fruit, it shades the fruit and keeps the great flavors from developing. If you have too much fruit and not enough foliage, the vine will not get enough energy from the sun to ripen all the grapes. In June, we usually pull leaves so that air can circulate around the grape clusters and flecks of sunlight can shine on them. In July, we may thin the crop by cutting off some fruit to ensure that all the remaining clusters fully ripen.

How do we know when to harvest? As grapes turn from hard green berries to soft blue, red, or green berries, they start accumulating sugar and water. This dilutes the natural acid in the grape. We harvest based on sugar content, acid, pH, and flavor. To be honest, most Lodi farmers and winemakers harvest based on the sugar content. Yeast converts sugar to alcohol, so the amount of sugar in the grape determines how much alcohol will be in the final wine. Sugar is measured in "Brix." Winemakers sometimes adjust the harvest date based on flavor. Unless we want a specific wine style, we usually just make sure there is enough acid and that pH is not too high.

Grape harvest is an exciting time in Lodi. People are in the vineyards at first light hand picking the head trained vines and ultra-premium trellised grape vines. At night, the lights of the mechanical harvesters are everywhere. Grape trucks run 24/7 from the middle of August until all the grapes have been harvested and delivered to the winery (usually the end of October).

Winemaking

The grapes have been delivered to the winery and now it's time to make wine. When the trucks or macro bins arrive at the winery, the first thing we do is weigh the delivery and check the sugar content. Most farmers get paid based on tonnage and sometimes based on sugar. If the winery is buying the grapes, there is usually a minimum sugar level specified in the contract. Within minutes or a few hours at most, the grapes are "crushed." We don't actually smash them with our feet like in the movies. The grape clusters move along the inside of a stainless steel bin, pushed by an auger over a grate with holes that are a little larger than the grape berries. This separates the berries from the stems (we call this "destemming"). The stems get pushed out the end into a waste bin, and the berries fall through the grate onto stainless steel rollers that are separated by a distance slightly smaller than the berry. Passing through the slightly smaller gap between rollers gently breaks the berries open and releases their juice. At this point, we have a "must," which is a sloppy mixture of grape juice, skins, and seeds. Some red wines go immediately into refrigerated storage for a few days to extract fruit flavors and colors from the skins and seeds (a "cold soak").

For white wines, almost immediately after crushing, we press the must to squeeze out all the juice and then discard the skins and seeds. This solid waste is called "pomace." White grapes have very few flavor components in their skins, so we can start fermenting the juice right away. For red grapes, we leave the juice in contact with the skins and seeds while we ferment. Red grape juice itself is clear, like water. The skins and seeds contain all the color and flavor components, which leech into the juice while the skins, seeds, and juice are in contact (called "maceration"). To start fermentation, we add yeast. The yeast converts the sugar in the grape juice to alcohol, turning juice into wine. When all the sugar has been converted to alcohol (we call that "dry"), the white wine is done. For red grapes, we press the wine from the skins and seeds and discard the pomace.

Now that we have wine, there are several things we can do with it. Newly pressed and fermented wine is still cloudy from tiny particles that passed through the tiny holes in the press. We let the wine sit for days or weeks to allow these particles to settle to the bottom of the tank or barrel. We then drain or pump the wine out of the container from an opening a few inches above the bottom, leaving behind a sludge of dead yeast and other particles at the bottom of the container (called "lees"). This separation process is called "racking." We usually rack a wine two or three times before bottling. Most white wines are run through a filter and bottled after only a few weeks of settling and racking to preserve their crisp fruit flavor. Most red wines are put in oak barrels or at least put in contact with pieces of oak for months or even years to mature.

Aside from the grapes themselves, the only flavoring we're allowed to add to wine, at least in California, is oak. Oak wood contains vanilla and tannin compounds that diffuse into the wine that it is in contact with. The wine can either extract these compounds from the inside surface of oak barrels or from the surfaces of oak pieces that are added to the wine. Different types of oak (French, American, etc.), the amount of fire applied to the oak's surface ("toasting"), and even the particular forest where the oak comes from are all variables that the winemaker can control to achieve a particular flavor or balance in the finished wine. We age certain white wines, like Chardonnay, in oak barrels for a short time to give them a softer flavor and richer mouth feel. Most red wines are pretty harsh by themselves, so oak aging is necessary to make them drinkable. Each winemaker varies the time that the wine spends in contact with oak according to his or her tastes in order to fine tune this delicate balance.

A couple of terms you, as a wine drinker, will often hear is "new oak" and "neutral oak." New oak is just that—new. The wood has not yet come in contact with wine. Obviously, as the wine extracts flavor compound from the oak wood, the amount of flavor compounds in the wood decreases and wine seeps farther into the wood. Each time an oak barrel is used, it has less wood flavor compounds to give to the wine. After about three to five uses, the barrel is considered "neutral" and no longer contributes flavor to the wine. Why do we use neutral barrels? Because another goal of barrel aging is to allow tiny amounts of oxygen into the wine. We call this "microoxygenation." Too much oxygen spoils wine, but a tiny bit of oxygen matures the wine, making its flavors more complex and making the wine more drinkable.

There are a variety of special things a winemaker can do to a wine before it's bottled. The nuances of wine production processes are beyond the scope of this greatly simplified overview of wine making. However, as a wine drinker, there are a couple of processes that will interest you. Some small wineries advertise their wines as "natural" or "native" fermentation. The idea is that they don't add commercial yeast but rather rely on the yeast naturally present on the surface of the grapes ("wild" yeast) to ferment the juice into wine. This is supposed to give the wine a more natural flavor that showcases the fruit itself. It is true that "wine happens" to grapes whether or not you add yeast. There is enough native or wild yeast on the grape skins to start fermentation. However, these yeast species don't do well in alcohol and tend to die mid-way through fermentation. The commercial yeast hanging around the winery, which does tolerate alcohol, usually finds its way into the must and helps finish the otherwise "natural" fermentation.

A common term you will hear when tasting wines, particularly white wines, is malolactic fermentation or "MLF" or "ML." All grapes contain malic acid, which, if left alone, will be consumed by lactic acid bacteria to produce lactic acid, carbon dioxide gas, and diacetyl (pronounced die-ass-ah-TEAL). This process is called malolactic fermentation or "MLF." Diacetyl is the chemical compound that gives butter its flavor, so if the wine goes through MLF, it will have a buttery flavor. Lactic acid is about half as acidic as malic acid, so wine that has gone through malolactic fermentation is softer on your tongue.

Red wines already have so much color and flavor that you don't notice the small amount of added buttery flavor, so just about every red wine goes through MLF. However, white wines rely on the subtle flavors in the juice, so MLF will *really* affect a white wine's flavor and aroma. Winemakers either want their wine to go through MLF or take steps to prevent it altogether. They don't want MLF to happen in a sealed wine bottle where the dissolved carbon dioxide gas will create a fizzy, nasty wine. For most white wines, the winemaker kills off and/or filters the lactic acid bacteria from the wine immediately after alcoholic fermentation to prevent MLF. This gives a white wine its crispy, fruity, fresh taste. Sometimes, a winemaker will allow a percentage of the batch to go through MLF, then blend it with wine that has not, in order to soften the final wine without adding a noticeable buttery flavor.

Another term you may hear is “unfined and unfiltered.” Fining is the process of putting something in the wine to remove something else. For example, many wineries add egg whites to red wine which glom onto phenolic compounds that cause astringency and bitterness and settle them to the bottom. Most wineries add clay (“bentonite”) to white wines to grab the really tiny particles and help them rapidly settle to the bottom, rather than wait for them to naturally settle over a long period of time. Fining always removes some flavor and aroma compounds. An “unfined” wine may have a little more of the grape's flavor, but it will probably not be brilliantly clear and may even leave chunkies on the bottom of your glass (watch that last sip!).

Filtering removes both large and small particles, making the wine brilliantly clear. Of course, it also removes some flavor and color compounds. Unless the label or tasting notes say “unfiltered,” the wine has undergone some type of filtering. Almost all commercial wines today are “sterile” filtered. This removes microscopic bacteria that can cause various types of spoilage in the bottle. If a wine is unfiltered, it doesn't mean that it *will* spoil. It just has a higher risk of spoiling if something wasn't done right in the winery. If you buy a \$200 bottle of wine, it's probably unfiltered, but the winery spent a lot of money and took great care at every step to ensure that the bad bacteria were not there to begin with. If you buy a \$20 bottle of wine that is unfiltered, you take your chances, especially if you want to age it.

Wine specifications will list something called “residual sugar” or “RS.” During fermentation of most wines, winemakers add the appropriate type and amount of yeast to convert all the sugar into alcohol. The wine is then called “dry.” You may still perceive it as slightly sweet, but that would come from the fruit and not from sugar. For some wines, particularly white and rosé (pronounced rose-A), winemakers stop the fermentation just short of dryness and leave a little bit of sugar in the wine. A dry red wine will have less than 0.3% RS, a sweet rose maybe 3% to 5%, and a port wine about 5%. Most Lodi wines are dry, but you may see a few here and there with a small percentage of residual sugar. They will taste really sweet, and you will notice a sugary stickiness on your lips.

The last thing we do to wine before putting it in the bottle is add sulfur dioxide (or SO₂, pronounced “ess-oh-TWO”), which helps control harmful bacteria that could spoil the wine. All non-organic wines (and even some organic wines) have a warning label that says “contains sulfites.” All grapes naturally contain sulfur compounds. We dust grape vines with pure sulfur powder (which is organic) early in the growing season to control mildew. At certain points in the winemaking process, we add SO₂ to control bacterial growth. In the US, there is a limit to how much SO₂ we can add to wine, but most wineries stay far below that. Some people think sulfites in wine trigger allergies that cause headaches. This is true for an extremely small percentage of wine drinkers. However, most people get headaches from drinking too much and not staying hydrated.

Bottles, Corks, and Labels

We bottle wine to make it relatively stable. Winemakers worry constantly until the day after the wine is bottled, then they only worry a little bit after that. One big winemaking decision is the type of “closure” that keeps the wine in the bottle. If you buy enough wine, you will probably see natural corks, synthetic corks (they feel like plastic), and screw caps. Natural cork is the traditional wine bottle closure. The most important thing about natural cork is that it allows the wine to age in the bottle by permitting very tiny amounts of oxygen to get into the wine. Synthetic corks are cheaper than natural cork and eliminate the problem of cork taint (see Wine Faults on page 14). You will usually see these on bottles costing less than \$10. Though a few synthetic corks are engineered to allow a specific amount of oxygen through, they normally seal up the bottle pretty tight. Screw caps are becoming more common, even on higher priced wines. They seal the bottle air tight. The premise of screw caps is that 98% of wine is consumed within twenty-four hours of purchase. Only a tiny percentage of American wine gets aged. If you are buying a wine to drink right away, don’t be turned off by screw caps. Besides, they’re easier to open.

Labels are the most important part of wine packaging, both for marketing and legal reasons. A surprising number of people make wine purchase decisions based on the label alone. That’s why it’s common to see a winery spend tens of thousands of dollars to design a label. The label also satisfies legal requirements. There are very strict requirements for what you can and can’t say on a wine label. A lot of them have to do with percentages of things in the wine. For example, the most common thing on the wine label is the appellation (the AVA for a US wine). If a wine says “Lodi” on the label, 75% of it must be from grapes grown within the Lodi AVA. If the label has a year, 85% of the grapes must have been harvested during that year. If the label says “Lodi” *and* has a year, then 75% of it must be from Lodi grapes and 95% must have been harvested during that year. Note that it doesn’t matter when the wine was bottled. If the label has a vineyard designation, for example “Mohr-Fry Ranches,” then 95% must be from that particular vineyard. The term “Estate Grown” is popping up on a lot of Lodi wines lately. “Estate Grown” means that the winery owner controls all the grape growing, either through land ownership or contract, but does not bottle the wine on his or her property. “Estate Bottled” means Estate Grown *plus* the wine is actually bottled on the winery owner’s property. There are no legal definitions for “old vine” or “sustainable.” They are strictly marketing terms.