

MAKING PORT WINE

by
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Port wine originated in Portugal's Douro Valley where it is produced from a blend of different grape varieties including Bastardo, Tinta Francisca, Tinto Cao, Touriga Francesa and Touriga Nacional and others. In California, Port style wines are often made from a single grape variety. Almost any kind of red grape can be used. But, grapes with high sugar content and intense fruity flavors seem to make the best Port, so Zinfandel is often the variety of choice. Fifty years ago, more than 50 percent of the wine produced in California was dessert style wine, and most California Port style wines were made to the "10 by 20" rule which meant that the wine contained 10% sugar and 20% alcohol.

FORTIFIED WINES

The traditional method of making Port is to add high proof (HP) brandy to the fermenting wine. Enough brandy is added to increase the alcohol content to at least 18%. Yeast cells cannot survive at the high alcohol level produced by the added brandy and fermentation stops. Port wines, and many other types of desert wines, are made using this fortification method. There are two variations of the fortification method, and each variation has advantages and disadvantages.

Traditional Port Method

The traditional method has been used for hundreds of years. It requires the least amount of high proof brandy, and this is the method used by most large Port producers today. Brandy is added when about half the sugar is gone, so fermentations only last for two or three days. Skin contact times are short, so color and flavor extraction is poor. Consequently, it is necessary to pump over or punch down the fermentations almost continually to enhance color and flavor extraction. In addition, leaving the desired amount of sugar in the wine can be difficult. Pressing large batches of must requires some time, and fermentation continues and sugar is lost while the must is being pressed. So, controlling the sugar content is difficult.

Small Producer Method

In this method, the brandy is added before the fermentation is pressed. After the added brandy has stopped the fermentation, the liquid and solids can remain together for as long as desired. So, color and flavor extraction is seldom a problem when this method is used. Since the high proof is added before the fermentation is pressed, the timing is not as critical and leaving the desired amount of sugar is easier. But, some HP brandy will be lost when the pomace is discarded, and this is the major disadvantage of this method. However, only 10 percent or so of the brandy is lost. So when making small quantities, the cost of the lost brandy is not very significant when compared to the advantages of this method. The differences in the methods are shown in Figure 1.

TRADITIONAL METHOD	SMALL PRODUCER METHOD
1. Crush	1. Crush
2. Ferment	2. Ferment
3. Press	3. Fortify
4. Fortify	4. Macerate
5. Age	5. Press
	6. Age

Figure 1. Two production methods.

Using the Small Producer Method

The traditional method of making Port by pressing the fermentation before the brandy is added requires special treatment to obtain adequate color in the wine and the timing of the brandy addition is critical.

Making small quantities of Port wine using the traditional method is difficult, so only the small producer method will be discussed here.

Grapes

In California, Zinfandel, Cabernet Sauvignon, Cabernet Franc, Merlot, Syrah and many other red varieties have been successfully used to make Port wines. Well-balanced grapes with intense, fruity flavor profiles will make the best quality wine.

Very ripe grapes are preferred for making Port wine, so the grapes should be picked at 26 to 28 Brix if possible. Very ripe grapes have more red fruit flavors and more flavor intensity. A slight “prune” flavor in the grapes seems to integrate well with other flavors and can add a positive note to the wine.

A significant fraction of the alcohol in Port wine is produced before the primary fermentation is stopped. So, riper grapes require a smaller alcohol addition and wine flavor dilution is minimized. (Flavor dilution is the biggest disadvantage of using 100 proof Vodkas for fortification).

How Much Brandy

The amount of alcohol needed to stop an active fermentation depends on several factors and many winemakers feel an alcohol content of at least 18 percent is necessary. If the added brandy does not stop fermentation, the finished product will become just a dry, high alcohol wine. There is not much demand for dry, high alcohol wines, so have a little extra brandy on hand just in case it is needed to stop the fermentation.

High proof (180 to 190) brandy is the preferred type of alcohol for fortification and the Table can be used to estimate how many gallons of HP brandy is needed. For example, the table shows that 5.0 gallons of HP brandy are required when 500 pounds of grapes, at 26 Brix, are being fermented.

The amount of brandy needed to stop the fermentation depends on the ripeness of the starting grapes, fermentation temperature and several other factors. So, the Table only gives an estimate of how much bandy is needed to stop fermentation.

Play safe and have a little extra brandy on hand just in case it is needed.

Pounds of Grapes	24 Brix Juice	26 Brix Juice	28 Brix Juice	30 Brix Juice
100	1.1	1.0	0.87	0.80
250	2.7	2.5	2.2	2.0
500	5.5	5.0	4.4	4.0
1000	11	10	8.7	8.0
2000	22	20	17.4	16.0

Crushing

Crushing is done the usual way. The grapes are crushed and the stems discarded. A normal amount of sulfite is added at the crusher or stirred into the fermenter. The acid level can be adjusted if necessary, but Port wines are usually low in acid (a TA of 0.55 to 0.60). Ripe grapes contain some raisins and the Brix may increase by one or two points as sugar leaches out of the raisins. So, cold-soak the crushed grapes for about 24 hours and then take the final Brix reading and use this value to calculate the brandy

Fermenting

Strong, active fermentations are more difficult to stop so many winemakers do not add extra nitrogen or other yeast nutrients when starting Port fermentations. They like to have the yeast working under moderately stressful conditions so the fermentations are less vigorous and can be stopped more easily. But, high Brix musts can be difficult to start, so sometimes it is necessary to add a little nutrient just to get the fermentation started. Depending on conditions, most Port fermentations last 3 to 4 days before the brandy is added.

There are two schools of thought on what constitutes suitable yeast for Port production. Some winemakers prefer a yeast with a low alcohol tolerance like Epernay II because the fermentation will be

easier to stop. However, starting a high Brix fermentation using low vigor yeast may prove difficult. It is often necessary to use a large yeast starter and to add the must to the starter using the doubling technique.

Other winemakers prefer to use vigorous, high alcohol yeast like *Prise de Mousse*. These winemakers don't like slow starting, sluggish fermentations, and they are prepared to add whatever quantity of HP brandy is needed to stop a vigorous fermentation.

Fortifying

Timing the brandy addition is important and in hot weather, close attention to the fermentation is required or you may lose the sugar. When the sugar has dropped to about 16 percent, many winemakers start measuring the Brix every few hours. They record and plot the data on a sheet of graph paper. Then they extrapolate the curve to try and predict when the brandy addition should be made. (There is a strange quirk of nature working here because brandy additions always seem to occur between midnight and 5:00 A.M.).

The added brandy must be thoroughly mixed to prevent the fermentation from continuing near the bottom of the fermenter. A significant amount of sugar may be lost in this situation, so add the brandy in a way that facilitates mixing. Small, open fermenters are best mixed by punching down. But, good mixing may require punching down for 20 or 30 minutes. Regardless, monitor the fermentation carefully and don't lose your sugar.

Pressing

The high alcohol level breaks down the cell structure of the grapes, so pressing a fortified fermentation is relatively easy. Color and tannin extraction is more rapid at the higher alcohol levels, so the wine should be checked often. Most Port fermentations are pressed a day or two after the brandy addition. **But, when to press should be determined by taste and by the depth of color.**

Bulk-Aging

Barrel aging is an important part of making high quality Port style wines. Some high quality Port wines are barrel-aged for ten years, but most Port style wines are aged in barrels for a year or two. Newer barrels add desirable oak flavors to the wine. However, aging in barrels changes wine characteristics in other ways. Alcohol and water evaporate through the barrel staves so barrels must be periodically topped up with additional wine saved specifically for that purpose. This evaporation of water and alcohol results in a small but significant concentration of flavors. Besides concentrating flavors, aging in barrels also allows small quantities of oxygen to slowly enter the wine. This oxygen combines with tannins in the wine and contributes to the development of smooth flavors, and is an essential part of aging high quality wines.

Bottle-Aging

After the Port is bottled, oxygen is no longer available, and a different type of aging takes place. Bottle-aging contributes to wine quality because it produces "bottle bouquet. As the wine ages, aromas (grape odors) gradually decrease, and the wine becomes less and less varietal in character. As the aroma decreases, the bouquet develops and increases in intensity. High quality Port wines are often aged in the bottle for five to ten years so the bottle bouquet can develop fully.