

# White and Sweet Winemaking

Relatively speaking, white winemaking is far less involved compared with red winemaking.

This chapter will focus on winemaking options for white wine and then look at how high volume, inexpensive wines and premium wines are made. It should be noted that although this chapter will focus on the internationally important grape varieties Chardonnay, Sauvignon Blanc, Riesling and Pinot Grigio, there are numerous other grape varieties that can be made in similar styles, using the same techniques. Sweet winemaking is largely (but not exclusively) the preserve of white wine and therefore it will be covered in this chapter too.

## IMPORTANT OPTIONS IN WHITE WINEMAKING

The processes and main choices involved in making white wine can be seen in the diagram on page 57. Throughout this process there are important decisions that need to be made concerning skin contact, clarity of the juice, fermentation temperature and vessel, the use of lees, malolactic fermentation (MLF) and other maturation options.

### Skin Contact

In most instances, the juice spends little time in contact with the skins in order to reduce the risk of oxidation. The grapes are crushed, the free run juice is separated off and the remaining grape mass is sent to the press. To limit the contact between the juice and the skins further some winemakers choose a different approach and load the press with whole bunches of uncrushed grapes. This process is gentle, reduces the risk of oxidation, and can potentially lead to wines with more purity and delicacy.

However, in the case of certain aromatic varieties, some winemakers choose to keep the juice in contact with the skins for a short period to increase flavour intensity and texture. This happens at a sufficiently cool temperature to inhibit fermentation and usually only lasts for a few hours.

### Clarity of the Juice

Freshly pressed grape juice contains fragments of cells from the grape skins and the pulp. If the juice is fermented in this untreated state, unpleasant aromas can form and the fermentation may even stop prematurely. The juice therefore needs to be clarified before fermentation begins. This can be done using the same techniques used to clarify wine before bottling (settling, centrifugation, fining and filtration). Some winemakers choose to retain a small amount of these fragments or 'solids' in the juice. It is thought that this makes the finished wine less susceptible to oxidation, and it can add complexity and a richer texture. However, the risk of off-flavours forming means that this technique is rarely used for wines that are intended to show pure varietal character.

## Fermentation Temperature and Vessel

The optimum temperature for white wine fermentations is between 12°C and 22°C. Fermentation at too low a temperature results in the creation of pear drop aromas and can fail to capture varietal fruit characters. Fermentation at higher temperatures can encourage more complex, non-fruit aromas to develop, but the risk is that varietal fruit characteristics will be lost.

Where stainless steel fermentation vessels are used, temperature control mechanisms are normally applied to prevent temperatures running too high. White wines may also be fermented in barrels. It is not as easy to control fermentation temperatures in barrels but their small size and the fact they are normally housed in cool cellars means that they tend to dissipate heat effectively. Nevertheless, fermentations in barrels still normally run at the higher end of the temperature range.

## Post-fermentation and Maturation Options

There are a number of important choices a winemaker faces post-fermentation. First, a white wine may be matured in oak or stored in inert vessels with or without the addition of oak staves or chips. Second, the winemaker may wish to use the fine lees to add texture and flavour to their wine. Finally, the winemaker may choose to allow or block MLF.

## Blending

Blending may help the winemaker improve consistency, enhance the balance of a wine and create a certain style. Many white wines are based on pure primary fruit flavours and for these styles the role of blending may focus on ensuring consistency rather than on enhancing complexity. The reverse may be true for some non-aromatic varieties such as Chardonnay where the winemaker may use varying amounts of lees contact, MLF and oak treatment on different batches of wine. These can then be blended together to achieve a more complex style.

## Clarification and Stabilisation

Most white wines will undergo some form of fining

and/or filtration to improve the clarity and stability of the wine. The relatively pale colour of most white wines compared with red ones makes any haze or sediment readily apparent. Also, white wines that contain some residual sugar are at risk from microbiological infection and in such cases the winemaker may wish to sterile filter the wine to remove any yeast or bacteria that may be present.

### **PRODUCING HIGH-VOLUME, INEXPENSIVE WHITE WINES**

These wines are widely produced and enjoyed by a large proportion of wine consumers. They are not particularly complex, nor are they designed to mature in bottle, but for many they provide excellent value: an easy drinking beverage, from a trusted source, at a reasonable price. Some of these wines are made from a single variety and will state the name of the grape variety used on the label (varietal labelling). However, it can be easier to make high volumes by blending different grape varieties. These wines often do not mention grape variety and instead are simply labelled 'dry white' or 'fruity white'.

The grape varieties that tend to be made into high-volume, inexpensive wines are often fairly neutral in flavour. Chardonnay and Pinot Grigio are classic examples. The restrained varietal character of these grapes means the wines they produce appeal to a wide range of consumers. Chardonnay and Pinot Grigio are also both easy to ripen, especially in warm climates. In these regions the grapes can have insufficient acidity at harvest but this can be corrected in the winery.

Chardonnay can be made in an unoaked style and display pure fruity flavours such as peach and melon. Alternatively the wines can be oaked, giving additional flavours of vanilla and toast. Both styles may contain some residual sugar to make them more palatable to a wider range of consumers. Pinot Grigio is usually made in an unoaked style, with light pear drop aromas and flavours, a light body and medium acidity.

Due to its current popularity, Sauvignon Blanc is also sometimes used to make high-volume inexpensive wine but rarely at the lowest price points. The vigorous nature of this grapevine lends itself to high yields, but herbaceous flavours can dominate if the fruit is underripe.

### **Winemaking Choices**

Many of these wines are based on pure, simple primary fruit flavours and careful handling in the winery is required to avoid oxidation. SO<sub>2</sub> will be monitored throughout the winemaking process and the juice and wine are usually handled protectively. The grapes will be destemmed and crushed, and then pressed. The grapes for many high-volume, inexpensive wines are grown in warm or hot regions and therefore acidification is one of the most common adjustments made to these wines. Chardonnay in particular can be flat and flabby when acid levels are too low.

Before fermentation, the juice will be highly clarified to ensure fruity flavours are retained during fermentation. Settling using gravity may be too slow, tying up valuable tank space for too long, therefore, where possible, the winery may use a centrifuge or filter to speed up the process.

Stainless steel tanks are the fermentation vessels of choice for these wines. Fermenting at cool temperatures can help to preserve as many primary fruit aromas and flavours as possible. This is vital if the grapes have relatively little flavour, for example when Pinot Grigio has been grown to produce high yields. Commercial yeasts will be used to ensure a quick, reliable fermentation.

If the winemaker wants to retain acidity and primary fruit aromas, MLF will be prevented by chilling the wine and adding SO<sub>2</sub>. The wine will also be racked off its lees as soon as fermentation has finished and stored temporarily in another inert vessel. Some Chardonnay wines may undergo MLF if a soft, buttery style is desired. Barrel ageing is an expensive and time-consuming process and for this reason oak chips or staves may be added to a stainless steel vessel to give a toasty flavour, if required.

Many of these wines contain some residual sugar. This is more often the case for Chardonnay than Pinot Grigio. Often the wines will be fermented dry and then sugar, in the form of unfermented grape juice or RCGM, will be measured out and added. This allows the level of sweetness to be precisely controlled.

The consumers who buy these products expect their wine to be clear and bright and without sediment. For this reason, these wines are typically stabilised, fined and sterile filtered. Even though the shelf life of these wines tends to be very short, SO<sub>2</sub> levels will be topped up at bottling to minimise the risk of oxidation.

### **PRODUCING PREMIUM WHITE WINES**

Premium white wine is a wide-ranging category. Although a huge range of price points can be covered under this heading, the common factor is that the main focus of the winemaker is to make high-quality wine, often at the expense of volume.

It must be noted that the explanations below are generalisations and thus only cover some of the major styles of wine made from each of the highlighted varieties. Furthermore, the winemaking practices for premium wines often do not follow a precise formula, and the best winemakers will adapt their techniques according to vintage conditions, vineyard plot, and the style of wine they want to make. The choices of aromatic and less-aromatic grape varieties will be looked at separately.

### **Aromatic Grape Varieties: Sauvignon Blanc and Riesling**

Wines made from these grape varieties have pronounced aromas and flavours. They include Sauvignon Blanc and Riesling, as well as Muscat,



Gewurztraminer and Torrontés. The aim of the winemaker is to retain and enhance the primary fruit character and aromatic potential of these grapes in the final wine, and thus the steps in the winemaking process will be tailored to achieve this particular style.

### Sauvignon Blanc

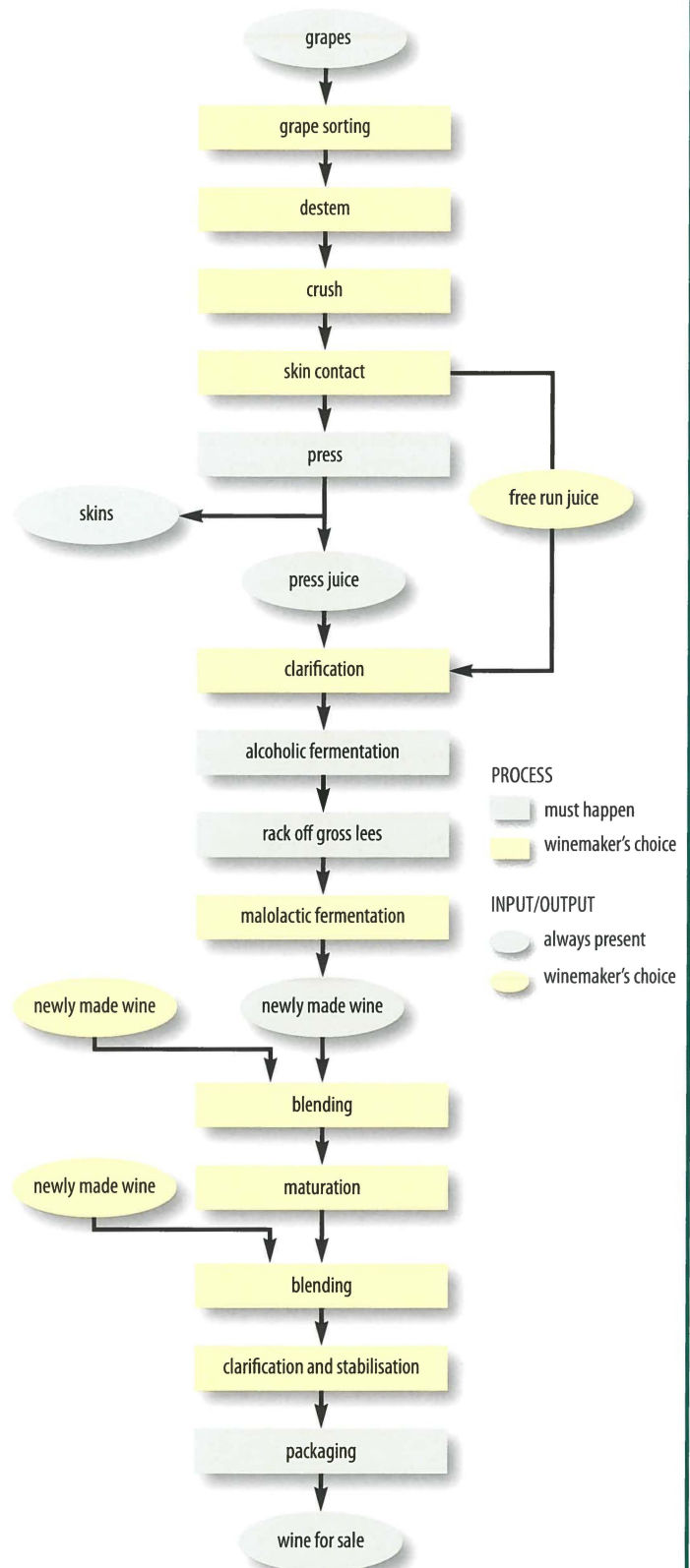
Sauvignon Blanc is a highly aromatic grape variety with high acidity. It is early ripening so is well suited to cool climates where the temperatures help to retain the variety's refreshing characteristics. A number of wine regions are capable of making high-quality Sauvignon Blanc but the Loire Valley, France and Marlborough, New Zealand are perhaps the most famous. Sauvignon Blanc wines from Sancerre and Pouilly Fumé in the Loire Valley show elegance and restraint. The cool climate gives aromas and flavours of green apple and asparagus often with a hint of wet pebbles. Marlborough is similarly cool but long hours of intense sunlight give wines with very vibrant flavours. The wines display powerful aromas of gooseberry, elderflower, grapefruit and passion fruit. Some may also have herbaceous notes. Other classic New World countries producing fresh, fruity Sauvignon Blanc include South Africa and Chile. Margaret River in Western Australia also produces high-quality Sauvignon Blanc, but here it is frequently blended with Semillon to give a slightly less aromatic but fuller bodied wine. In most cases, wines made from Sauvignon Blanc are best drunk young while their intense fruity flavours are still fresh.

There are also some examples of Sauvignon Blanc where the winemaker takes a very different approach and uses techniques more associated with the production of non-aromatic varieties. Pessac-Léognan in Bordeaux is the classic region where this style is common. The wine is fermented and matured in at least a proportion of oak giving a rounder body to the wine, and spicy toasty notes. In Pessac-Léognan, Sauvignon Blanc is blended with the non-aromatic Sémillon grape, which further adds to the body and richness of the wine. Some New World countries also make a small proportion of oak matured Sauvignon Blanc as a point of difference from their usual fresh, fruity wines. Both California and New Zealand are noted for doing this. These oaked styles will be covered in section *Other styles of Sauvignon Blanc* on page 60.

### Riesling

Riesling is capable of producing a variety of wine styles from different regions in the wine world. It is very tolerant of cold winters and buds late so avoids spring frosts, making it suitable for cool climates. In such locations it can produce wines with green fruit flavours and often floral notes. In warmer climates it becomes richer in flavour, with more predominant citrus and stone fruit, but arguably loses some delicacy. Riesling is mid- to late-ripening depending on the style of wine being produced; left on the vine it can accumulate sugar without losing its naturally high acidity, and is therefore

## MAKING DRY WHITE WINE



## SWEET WINEMAKING

Most wines are fermented to dryness: the yeast consume all the sugars present in the juice. Sweet wines contain unfermented sugar and they can be made in a number of ways:

### Stopping the Fermentation

Fortification (the addition of grape spirit) is the traditional way of stopping fermentation while sugar is still present. This kills the yeast and no further fermentation is possible, although it radically alters the structural balance of the wine. (Fortified Wines are covered in Chapters 43–45.)

Fermentation can also be stopped by adding a high dose of  $\text{SO}_2$  or by chilling the fermenting wine. This wine must be filtered to remove any remaining yeast. Once this has been done it is vital that no yeast come into contact with the wine because fermentation will then resume. This is an approach used for high-quality German *Kabinett* and *Spätlese* as well as sweet sparkling wines such as Asti from Italy. Stopping the fermentation by adding  $\text{SO}_2$  or chilling typically results in wines that are low in alcohol.

### Adding a Sweetening Component

In some countries, particularly Germany, medium-sweet wines can be created by the addition of unfermented grape juice, or *Süssreserve*. This is made by filtering the juice before fermentation starts, or by dosing it with  $\text{SO}_2$ . *Süssreserve* is added to dry wines when they are ready to be bottled.

Rectified Concentrated Grape Must (RCGM) can also be used to achieve the same effect and is often used to add a little sweetness to high-volume inexpensive wines.

### Concentrating Grape Sugars

Many of the best sweet wines come from grapes that are extremely rich in sugar. This can be achieved in a number of different ways, all of which concentrate acids and flavours at the same time.

**Noble rot** – This is used in the production of most of the very best sweet wine including Sauternes, Tokaji, and *Beerenauslesen* and *Trockenbeerenauslesen* from Germany and Austria. It is caused by the fungus *Botrytis cinerea*. This is the same fungus that causes grey rot; however, under specific conditions noble rot can form instead. First, the grapes must be fully ripe before the development of the rot. Second, the grapes must be grown in a region that provides humid misty mornings followed by sunny dry afternoons. Damp conditions in the morning allow rot to develop on the grapes. The fungus punctures the grape skin with microscopic filaments, leaving tiny holes in the skin. The warm sunny afternoons slow the development of the rot and cause water to evaporate from the grape, concentrating its acids, flavours and sugars. The fungus also generates its own unique flavours in the grape. Wines made from grapes affected by noble rot have distinctive honey, apricot, citrus zest and dried fruit aromas.

The spread of noble rot is never uniform and several pickings by hand may be needed to select the best grapes. This is an expensive process as it requires skilled labour over a prolonged period of time. Furthermore, in some regions famous for this style of wine, such as Sauternes, the ideal conditions for noble rot do not occur every year. If conditions are too damp the fungus will develop too rapidly and cause grey rot, splitting the grape berries and encouraging infections. Although *Botrytis cinerea* is the cause of both noble and grey rot, the term *botrytis* is frequently used as a synonym for noble rot, and the term 'botrytised' is often seen on sweet wine labels.

**Drying grapes on the vine** – This is often referred to as *passerillage*. Once grapes have reached full sugar ripeness they begin to dehydrate and turn to raisins on the vine, increasing the sugar concentration in the juice. Warm dry autumns are needed for this to happen or else grey rot can develop. These wines have an over-ripe fruit character (dried fruit, tropical fruits) and a richly textured mouthfeel. Wines made in this way are sometimes labelled as Late Harvest.

**Drying grapes after picking** – This causes healthy harvested grapes to dehydrate, again concentrating the sugar in the juice. Conditions must be dry and warm for this to be successful, and care must be taken to remove all rotten grapes or the rot will spread. This technique is used in the production of the *passito* wines of Italy, such as Recioto della Valpolicella D.O.C.G. The wines can have a raisiny quality.

**Freezing grapes on the vine** – Healthy grapes are left hanging on the vine into the winter months. When freezing temperatures arrive, the water in the grape pulp turns to ice. When the grapes are picked and pressed, this ice remains in the press and the sugar content of the resulting juice is increased. This technique is used to produce *Eiswein* in Germany and Icewine in Canada. These wines have a very pure varietal character. The same effect can be replicated artificially by freezing picked grapes at a winery.

When sweet wines are made by grape sugar concentration techniques, the alcoholic fermentation stops naturally when the yeast have converted as much sugar into alcohol as they can. This can happen at quite low levels of alcohol, sometimes as low as 7% abv, because yeast struggle to survive in very sugary environments. German *Trockenbeerenauslesen* are classic examples of this style.



perfect for making well-balanced wines in a range of sweetness levels. It is also widely used to make botrytised dessert wines.

Riesling is one of the most long-lived white wines, renowned for its ability to mature for years and sometimes decades in bottle and still taste surprisingly fresh. When mature, Rieslings develop flavours of honey and toast, but still retain high levels of acidity. Some Rieslings develop aromas that are often described as petrol-like.

Germany is the homeland of Riesling. German Riesling can be made in a range of sweetness levels. The sweet wines are typically made from botrytised grapes. In premium wines any sweetness, regardless of its level, is always perfectly balanced against high acidity, creating wines that can be very concentrated yet refreshing at the same time. In Europe, Alsace and Austria also make premium Rieslings. In Austria, Riesling can be made in a full range of sweetness levels, but most wines are either dry or very sweet. Alsace mainly specialises in dry Rieslings; late harvest and botrytised sweet wines are made when vintage conditions permit.

Australia is well known for its Rieslings, particularly those from the Clare and Eden Valleys. They are often bone dry, with refreshing high acidity and many display aromas of lime. Dry Rieslings are also made in Washington State, USA. A fruity, off-dry style of Riesling is generally produced in New Zealand and the Finger Lakes AVA of New York State, USA.

### Winemaking Choices

Aromatic grapes and juice need to be handled carefully to retain the fruit and floral aromas of the freshly picked grapes. SO<sub>2</sub> levels will be monitored throughout the winemaking process. Crushed fruit or whole bunches may be loaded into the press, either immediately or after a little skin contact depending on the winemaker's approach. The juice must be relatively clean before fermentation to ensure there is nothing in the juice that could mask the fruit flavours. A gentle method of clarification will usually be used, such as settling.

Inert vessels are generally used for the fermentation of aromatic varieties; any extraction of flavour from the vessel may interfere with the pure fruit character from the grapes. Stainless steel is often the material of choice for New Zealand producers of both Sauvignon Blanc and Riesling, allowing easy temperature control. Large old oak vessels (*foudres*) are sometimes used for Riesling in Alsace allowing a small amount of oxidation to take place; this can enhance the texture of the wine and add a little complexity to the flavours without adding unwanted oak aromas. Cool fermentation temperatures give a slow, steady fermentation, as well as encourage the formation of primary fruit aromas and flavours in the wine. The choice of yeast depends on the approach of the winemaker.

Sauvignon Blanc will usually be fermented until dry; Riesling on the other hand can be made in a whole



*Botrytis cinerea*: the fungus is clear to see on the grape skins.



*Passerillage*: the grapes have shrivelled but remain fungus free.



Frozen grapes: the grapes have been left on the vine to freeze in the winter.

range of styles from dry to lusciously sweet. Premium-quality sweet Riesling wines will generally be made by prematurely stopping fermentation either by chilling or adding SO<sub>2</sub>, leaving the desired level of residual sugar. For the sweetest Riesling wines made from botrytised grapes, the fermentation stops naturally.

Aromatic grape varieties generally see very little post-fermentation winemaking before bottling. High acidity is a desirable feature in both Sauvignon Blanc and Riesling, and therefore MLF is avoided by adding SO<sub>2</sub> to the wine straight after fermentation. The buttery aromas that can sometimes result from MLF may also interfere with the pronounced fruit aromas of the wine. Riesling may undergo a period of lees contact to add texture and flavours. Aromatic grape varieties will generally be bottled as soon as possible after fermentation; the aromas gained from maturation in new oak are usually not desirable. However, in Alsace, and sometimes in Germany, Riesling may be kept in large old oak vats for up to a year.

Riesling is rarely blended with other grape varieties. Sauvignon Blanc is also usually a varietal wine, but, as mentioned above, it may be blended with Semillon for greater body as seen in some Bordeaux whites and the wines of Western Australia.

**Other styles of Sauvignon Blanc** – To create the creamy, spicy style of some Fumé Blanc in California and the whites of Pessac-Léognan in Bordeaux, Sauvignon Blanc is barrel fermented. The winemaker may favour ambient yeasts to achieve a greater complexity of flavours. The wines are then matured on their lees for a number of months during which time they will usually undergo MLF. It is common to use new oak barrels for at least a proportion of the wine.

#### **Less Aromatic Grape Varieties: Chardonnay and Pinot Gris/Grigio**

Chardonnay and Pinot Gris/Grigio are both more neutral in aroma and flavour than Sauvignon Blanc and Riesling. This can be very positive from a winemaker's point of view, as they can arguably play a more active role in influencing the style of the final wine. The key aim for less aromatic varieties is to enhance the base material provided by the grapes. This may be achieved by doing relatively little and keeping the grape flavours in a relatively pure form. Alternatively, the winemaker may choose to use a range of techniques to add more complexity and texture to the wine.

#### **Chardonnay**

Chardonnay can be grown and ripened without much difficulty in a wide variety of climates. It is, however, early budding, which means that it can suffer in areas where spring frosts are common. In cool climates Chardonnay can display flavours of green fruit and citrus, whereas in more moderate climates the flavours lean more towards fleshy fruits, such as white peach and melon. In warm

and hot regions ripe tropical fruits, such as banana and pineapple, are typical. In such climates Chardonnay can lose acidity quickly towards the end of the ripening process, and thus the timing of the harvest is critical.

The subtle aromas and flavours of Chardonnay make it the perfect blank canvas for a host of different winemaking techniques. Purely focusing on Burgundy in France, Chardonnay can take many different forms. In the north of the region, the wines of Chablis often have high acidity and show green apple and citrus notes, sometimes with a hint of wet stones and slate. In the Côte d'Or, the best wines combine subtle notes of stone fruit with creamy oak flavours. Further south in the Mâconnais, the wines can be even more ripe and rounded, with hints of toasty oak. Most wines go through MLF and many producers use extended lees ageing. With age the best wines develop complex aromas of nuts and/or mushrooms.

Outside of Burgundy the style of Chardonnay, and therefore the techniques used to make it, are more dependent on the preferences of the individual winemaker rather than the traditions of a particular wine region. Many used to be heavily oaked but producers of premium Chardonnay are now heading firmly away from this style of winemaking. Regions that have built up a reputation for premium Chardonnay include Russian River Valley and Los Carneros in California; Adelaide Hills, Geelong and Mornington Peninsula in Australia; Gisborne and Marlborough in New Zealand; and Casablanca Valley in Chile. However, this is not an exhaustive list and high-quality Chardonnay wines are made in nearly every winemaking country.

#### **Pinot Gris/Grigio**

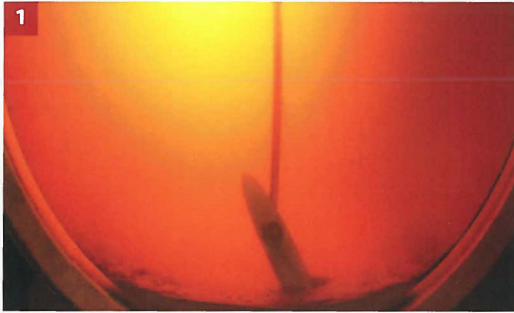
This grape variety is called Pinot Gris in France and Pinot Grigio in Italy. The wines from these two countries can be very different in style. In other countries, winemakers will generally, but not always, choose to label their wines Pinot Gris or Pinot Grigio to indicate whether their wine is more similar to the French or Italian style.

Premium Pinot Gris/Grigio wines can often be almost unrecognisable from the huge volumes of less expensive Pinot Grigios on the market.

Pinot Gris/Grigio is early budding and early ripening, and in warm climates or when left on the vine it can accumulate high sugar levels, but lose much acidity. Alsace is the classic French region for this variety where the wines are usually dry or off-dry, often with an oily texture, ripe tropical fruit flavours and a hint of ginger and honey. The grape skins often have a deep colour, meaning that these wines can be golden in appearance. A number of winemakers in New Zealand also label their wines as Pinot Gris. These wines have the same viscous mouthfeel and medium acidity, but usually show more pure fruit flavours, and often have slightly more residual sugar. Tasmania, Australia and Oregon, USA also make Pinot Gris in a rich and often dry style.

The regions of Alto Adige, Trentino and Friuli-Venezia





#### LEES STIRRING

1. The winemaker uses a rod to stir the lees in the barrel. The rod is lowered to the bottom of the barrel, where a layer of lees has collected over time.
2. The rod is dragged through the lees to stir them up.
3. With continuous stirring the lees become fully mixed into the wine.



Giulia in north-east Italy make high-quality Pinot Grigio wines in a dry style. The wines here can show a much greater depth of flavour than the cheaper versions made in high volumes from the Veneto plain. The choice of clone can be influential here as well as climate and viticulture. The premium Pinot Grigios from the northerly alpine regions of Italy are made from the Pinot Gris/Grigio clones typically found in Germany and France, which have small berries and are capable of greater flavour concentration. By contrast, the high volume, inexpensive Pinot Grigio wines from the Veneto tend to be produced from a clone known for its pale skin and large fleshy pulp. It produces relatively neutral wines, especially when combined with high yields and early harvesting.

#### Winemaking Choices

Winemakers face a range of options during the winemaking process for less aromatic grape varieties depending on the style they want to produce. As with aromatic varieties, the grapes can either be crushed or loaded into the press as whole bunches; the latter technique being common for Chardonnay. For some non-aromatic grape varieties, controlled exposure to oxygen at this stage is often thought to improve the wine's ability to age. This technique would be detrimental for more aromatic grape varieties causing them to lose some of their delicate aromas.

Clarification is likely to be carried out using a gentle method such as settling. Depending on the style of wine being produced, the winemaker may choose to leave some solid matter in the grape juice for added complexity and texture.

Fermentation may take place in a range of vessels. Stainless steel or concrete may be used to retain fresh fruit flavours and are often seen in the production of Chablis, the Pinot Grigios from north-east Italy, and Pinot Gris from New Zealand. Large, old oak vessels are more commonly used for Pinot Gris in Alsace. Small, new oak barrels can be used to give toasty flavours and a rounder texture, as seen with Chardonnay from the Côte d'Or. Fermentation temperatures and the choice of yeast may vary. Some Pinot Gris style wines contain residual sugar. Winemakers in New Zealand may ensure their wines are made in this style by prematurely stopping the fermentation by chilling or adding  $\text{SO}_2$ . In Alsace, the high degree of ripeness in the grapes may mean that the fermentation stops naturally, leaving some residual sugar.

There is an even greater range of options open to the winemaker after fermentation. A substantial amount of flavour can be added to wine made from non-aromatic varieties at this stage. One of the most fundamental decisions is whether to put the wine through barrel maturation and, if so, whether all the wine or just a small proportion will be matured in oak. New oak *barriques* may be used to impart the toasty flavours often found in Côte d'Or and New World Chardonnays. Older oak and larger barrels, more typically used in the production of Chablis and Pinot Gris/Grigio, impart less flavour but still allow a gentle oxidation to promote complexity. In contrast, a short storage period in stainless steel or concrete will retain fresh fruit flavours.

MLF may be encouraged in non-aromatic varieties to give the wines a rounder, creamier mouthfeel. It is used in almost all the premium white wines of Burgundy,

including Chablis, where it helps to soften sharp acidity. However, because MLF decreases the perception of acidity and diminishes primary fruit flavours, it may not be desirable for fruity styles of wine. Extended contact with the fine lees is another technique that is often used in the production of both Chardonnay and Pinot Gris to

give a richer, rounder mouthfeel. Many winemakers enhance these effects using a technique called lees stirring. This involves breaking up the sediment of fine lees and mixing it with the wine.

Premium Chardonnay and Pinot Gris are not usually blended with other grape varieties.