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D4: Sparkling Wines

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Standard Options in Sparkling Winemaking 1

This first part of the study guide covers the natural and human factors that lead to the styles of the principal sparkling wines of the world. Climate is considered in The Growing Environment before a consideration of grape varieties, grape growing and harvesting in the section on Grape Growing. A substantial section on Winemaking follows, which in particular covers the two main methods employed, traditional method and tank method.

This part of the study guide also acts as a reference section for all the regional sections that follow. Thus, for example, the sections on Champagne or on Prosecco refer back to the explanations of Winemaking set out here.

1.1. The Growing Environment

Cool climates where grapes struggle to ripen are ideal for sparkling wines. The grapes are just-ripe in flavour, but retain the acidity required for high-quality sparkling wines. Sugar accumulates slowly, giving still, base wines with low alcohol (around 9–11% abv). This is necessary because the second fermentation used in many methods of making sparkling wines produces an additional 1–2% abv.

Grapes for sparkling wine therefore tend to be grown in regions that are at greater latitudes, such as Champagne, England or Tasmania, or that have local cooling influences, such as those near to the coast (Sonoma) or at high altitude (Trentodoc). In warmer areas, the grapes tend to have riper fruit flavours and lower acidity compared to grapes grown in cooler sites. This may be desirable for short-aged wines (e.g. those made by tank method or with short time on the lees in transfer or traditional method), as the fruit will provide the only or dominant flavours. However, to make elegant, balanced, long-lees-aged sparkling wines less intense fruit flavours are usually preferable.

Less expensive sparkling wines may be grown in areas where land is cheaper and easier to cultivate, for example on flat, fertile plains. In some cases, grapes for sparkling wines are grown in places that are simply less suitable or unsuitable for still wines (grapes would not achieve the concentration and/or ripeness needed for good-quality still wines).

1.2. Grape Growing

GRAPE VARIETIES

The most commonly used grape varieties for making premium and super-premium sparkling wines are Chardonnay and Pinot Noir.

Chardonnay

This variety is well suited to the production of autolytic styles of sparkling wines. These wines are noted for their aromas that include brioche and/or biscuit (graham cracker); see the SAT for a full list. Chardonnay's subtle apple and citrus aromas and flavours compliment rather than compete with the aromas from yeast autolysis, the breaking down of dead cells (see Lees Ageing). Its early ripening of fruit flavours is an asset in cool conditions and it also retains the high levels of acidity and low levels of alcohol needed in sparkling wines while avoiding under-ripe flavours.

Chardonnay growing on chalky soils in Champagne

Thus, it brings apple and citrus flavours and high acidity to the blend. However, being early budding, it is vulnerable to spring frosts. It is also prone to coulure and millerandage. It has more disease resistance than Pinot Noir, but is susceptible to powdery mildew, grapevine yellows and to botrytis bunch rot in wet periods before harvest. Yields can be high in the best years without loss of quality, making this an attractive option for growers.

Pinot Noir

This variety is also an early budding and early ripening variety and is therefore suited to a cool climate. Being early budding also makes it prone to spring frosts. It is prone to coulure. The yields are more moderate than Chardonnay and the quality drops if the yield level is too high. It is thin skinned and more disease prone (downy mildew especially, powdery mildew, botrytis bunch rot, fan leaf and leaf roll). It lends body to the blend.

Chardonnay and Pinot Noir are used to produce sparkling wines in wine regions across the world. However, other sparkling wines are made from grape varieties that are local to their region, for example Macabeo, Xarel-lo and Parellada in Cava, or Glera in Prosecco. Factors within the grape variety that can influence the style of the wine are:

- intensity of aromas (aromatic or neutral grape variety)
- ability to retain acidity while ripening
- how the base wine responds to autolysis where applicable, for example, Chardonnay becomes creamy, whereas Xarel-lo becomes toasty and smoky.

Glera growing on hills of Prosecco

VINEYARD MANAGEMENT

Grapes for sparkling wines are often grown at higher yields than for still wines. High acid levels, low potential alcohol levels and delicate flavours are desirable in most sparkling wines, and these characteristics are better achieved by high yields. Therefore, the output from the vineyard land can be maximised. In cool, relatively rainy climates, such as Champagne, this can provide some assurance that even if some damaged fruit has to be removed, a reasonable sized crop can still be harvested.

A range of training and trellising techniques may be used depending on the region, its climate, the varieties grown and the nutritional status of the soils. However, a priority in all areas will be to obtain clean, healthy fruit. The perception of any off flavours from diseased fruit can be enhanced by the effects of effervescence in the wine. In addition, the enzyme laccase released by botrytis-infected grapes can cause serious oxidation.

HARVESTING

Harvesting occurs earlier than for still wine production in order to achieve the high acid, low alcohol profile desired for sparkling wine. Early picking also means that the grapes are less likely still to be on the vine as rainy autumn weather starts, reducing risk of fungal disease. Although low potential alcohol and high acidity is desirable, unripe flavours are not, and are thought to become more prominent as the wine matures.

Hand harvesting and machine harvesting are both used for sparkling wine production, depending on location and local wine laws. Hand harvesting permits sorting at picking and post-harvest selection to exclude disease-infected grapes. Hand picking and collecting in small crates minimise the splitting and crushing of the grapes, as well as the subsequent oxidation of this juice along with extraction of phenolics (including colour and tannin). However, hand harvesting is slow, labour-intensive and can be expensive. Machine harvesting

can rupture the skin of the grapes, resulting in phenolic extraction and oxidation. The advantages of machine harvesting are that it is faster, so for large estates the grapes are more likely to all be picked at the desired point of ripeness, and it is cheaper. Diseases or damaged grapes can be removed by hand just prior to machine harvest, allowing a degree of selection, however, this does increase costs. It also permits night-time harvesting, thus delivering cooler grapes. This is an advantage because oxidation is slowed down, resulting in fresher wines.

1.3. Winemaking

PRESSING

Whole-bunch pressing is often practised for premium traditional method sparkling wines. This is one of the gentlest forms of pressing, providing a delicate juice that is low in solids and phenolics (including tannins and the anthocyanins that provide colour). The stems also help to create a network of channels through which the juice can flow easily, minimising the pressure required. However, fewer bunches can be loaded into the press at any one time compared to crushed grapes, and therefore this process is more time consuming.

Pressing should be performed as quickly and gently as possible, especially for the black skinned grape varieties, minimising maceration with and extraction from the skins, which would bring unwanted colour and tannins. These phenolic compounds can make the wine taste bitter and feel coarse on the palate. Both pneumatic and basket presses are commonly used, due to their ability to press very gently. It is common to split the juice into different press fractions, and in some regions the maximum amount of press juice (as opposed to free run juice) that can be used is controlled. The different press fractions can make useful blending options. The juice from press fractions is higher in phenolics, solids and pH than the free run juice. Wines made from press juice tend to be faster maturing, and therefore this fraction can be useful in wines with a short maturation that are made for immediate consumption.

Pneumatic press

The juice is clarified before fermentation and the winemaker can choose any of the options available for clarification when making still white wines. If there is excessive tannin or colour at this stage, fining (e.g. with casein, gelatine or PVPP [polyvinylpolypyrrolidone]) may be used to amend the juice.

PRIMARY FERMENTATION

Fermentation temperatures of 14–20°C (57–68°F) are typical for the primary fermentation to retain fruit flavours but ensure the temperatures are not too cold for the yeast. The low pH of the juice makes the environment quite stressful for yeast. Most primary fermentation takes place in stainless steel tanks to allow large volumes to be fermented with temperature control and for ease of cleaning the tanks before and after fermentation.

A reliable healthy ferment is a priority in sparkling winemaking. Cultured yeasts that are able to ferment reliably to dryness in high acid and low pH conditions are typically used. Some strains of yeast can promote certain flavours in the wines, for example thiols or esters. This may be positive in tank method sparkling wines that are based on fruity flavours. However, pronounced primary flavours are generally not wanted in autolytic styles of wine as they may compete with the flavours from autolysis. Therefore, these wines will be made using a neutral yeast that does not enhance these flavours.

It is common to use the same yeast for both the first and second fermentation; therefore, the stressful environmental conditions of the second fermentation need to be considered when choosing a yeast strain. During second fermentation, the yeast must be able to start fermenting in alcoholic conditions (10% abv is too high for many yeasts) with low pH, and continue fermenting through low temperatures, in high pressure and with poor availability of nutrients. Rapid autolysis and easy flocculation (the process by which fine particles clump together) are desirable in traditional method wines. ‘Prise de mousse’ (EC1118) is one of the most common cultured yeasts used in sparkling wine production.

Stainless steel fermentation tanks

Malolactic conversion may be used to reduce acidity in an excessively acidic wine. It can also be used to enhance texture. The lactic acid that is produced in malolactic conversion is perceived to be creamier in texture than other acids, such as tartaric. (The buttery flavours found on white wines that have undergone malolactic conversion are not typically found on sparkling wines. This is because diacetyl, which gives the buttery flavour, is metabolised by the yeast during the second fermentation.) If malolactic conversion does not take place at this stage, there is the risk that it could take place during the second fermentation. This is problematic for traditional method wines as it can turn the wine hazy, which would be difficult to rectify in the bottle. Therefore, if malolactic conversion is not desired, the wine may be sterile filtered.

There are many commercial yeasts on the market with companies listing the claimed properties of the yeast. For example, Lallemand offer an Epernay selection, LALVIN DV10™. It claims an ability to work in low pH, high total SO_2 and low temperature situations and that its neutral character enables the subtle primary fruit to be clearly expressed.

HANDLING OF THE BASE WINE

There are many options open to the winemaker for refining and modifying the base wine before it undergoes second fermentation. Some winemakers choose to mature the base wine in oak and/or leave the wine on its lees. The aromas and flavours of oak (vanilla, toast and spice) are usually magnified in the sparkling wine and therefore, where new oak is used, it will only be a very small proportion of a blend. Most often, seasoned barrels will be used. If the producer is creating a fruity style of wine (e.g. Prosecco or Asti), oak will not be used.

Barrel ageing of base wine

ASSEMBLAGE (BLENDING)

The blending of wines, from different vineyard sites, grape varieties, vintages and wines that have undergone different winemaking techniques is one of the hallmarks of sparkling wine production. Similar to the production of still wines, the purpose of blending is for:

- **balance** – for example, Pinot Noir can lend more body to a blend, whereas blending in Chardonnay can give higher acidity; the same effect could come from using warmer and cooler vineyard sites with the same single grape variety
- **consistency** – for example, many sparkling wine producers make a non-vintage blend and, for this style of wine, consistency of the product from one year to the next is very important

- **style** – for example, a producer may choose to make their least expensive wine in an early-drinking style, and therefore want to create an approachable style with more ripe fruit and less acidity; their top wine may be styled to be suited to longer ageing, both on and off the lees, and therefore have more concentrated flavours and higher acidity
- **rosé wines** – some rosé sparkling wines are made by blending red and white base wines and thus blending defines this style of wine
- **complexity** – a greater range of flavours may be captured by blending different grapes varieties, vineyard sites and vintages, or blending base wines that have undergone different treatment (e.g. oak maturation); for instance, older wines can add more dried fruit characters to the fresh fruit of the current year
- **minimisation of faults** – if a batch of wine has a minor fault, it can be rescued and sold if it is blended with a larger volume of a sound wine
- **volume** – in areas with small vineyard holdings, winemakers are likely to blend the wines from different vineyards to produce viable volumes of certain wines; blending grape varieties or reserve wines can also help to increase volumes
- **price** – for example, inexpensive and mid-priced wines in particular may need to be made to a certain price point. Blending in cheaper grape varieties, for example Meunier (previously known as Pinot Meunier), alongside the more prestigious varieties of Chardonnay and Pinot Noir may enable a producer to keep prices affordable, while still benefiting from the well-known names of the prestigious varieties. Cheaper wines may also make more use of press wines, as opposed to free run juice.

For traditional method wines, the final blend should be stabilised for tartrates and proteins before being bottled for second fermentation. For all methods of production for sparkling wine, base wines should be clarified before second fermentation. Again, any of the methods used in still wine production can be used for sparkling wine.

TRADITIONAL METHOD

Second Fermentation

In the Traditional Method, second fermentation occurs in the same bottle in which the wine is later sold. A *liqueur de tirage* is added to the base wine to achieve a second fermentation. This is a mixture of wine and/or must, sugar, cultured yeasts, yeast nutrients and a clarifying agent such as bentonite and/or alginate (seaweed extract to facilitate riddling). The amount of sugar used depends on the degree of effervescence required. In most fully sparkling wines, 24 g of sucrose per litre is added. During fermentation, the yeast converts the sugar to alcohol (about +1.5% for an addition of 24 g/L of sucrose) and CO_2. Unable to escape from the bottle, the CO_2 produces a pressure considered appropriate for most sparkling wines, namely six atmospheres (also referred to as ‘bar’). Less sugar will be added if the winemaker wants to create a sparkling wine with lower pressure. The sugar added at this stage does not affect the final sweetness of the wine as the yeast ferment the wine to dryness.

The second fermentation is often called the *prise de mousse*, which literally means ‘capturing the sparkle’. This fermentation requires inoculation of the wine with a cultured yeast that is able to ferment in unfavourable conditions. The strains that are commercially available

have slightly different properties, but all with the aptitude for commencing fermentation in wine with 9.5–11% abv, a moderate temperature of around 16˚C (61˚F) and pH values often below 3, and later withstanding high pressure as it completes fermentation in the bottle. Yeast cells must also flocculate readily to produce a coarse sediment that can be efficiently removed by riddling.

After addition of the *liqueur de tirage* and inoculation, the wine is bottled and sealed with a crown cap that holds in place a small plastic pot in the bottle to catch the sediment. The bottles are stored horizontally '*sur latte*' at a constant temperature of approximately 10–12˚C. The length of the fermentation depends primarily on the temperature. A cooler temperature results in a slower fermentation, and some claim that this produces a more complex finished wine. In many cases, the fermentation lasts 4–6 weeks. A stable temperature is also important to maintain yeast viability under difficult fermentation conditions.

Lees Ageing

After fermentation, the producer will normally choose to age the wines before removing the yeast. The bottles can be stored horizontally in stacks or in metal cages, at temperatures of around 10˚C. The length of time for yeast contact during maturation varies. The duration of lees ageing can be a minimum of nine months; for example, for Cava. More typical is 15–18 months, at which point the effects of autolysis become detectable. The length of time depends on the style sought (fresh fruit character v. lees-aged character), the price that can be attained for the wine at the end of the process and the financial ability to invest in longer periods of lees ageing.

The benefits of this lees ageing are derived from autolysis, the enzymatic breakdown of dead yeast cells. Autolysis usually continues for four to five years but has been known to last for ten years. It is best known for producing compounds that add a brioche and/or biscuit complexity.

Large number of bottles sur latte (left) and small number of bottles sur latte (right)

Some sparkling wines are kept on the lees after autolysis has finished. The anti-oxidative qualities of yeast cells protect the wine from oxidation, in comparison to a disgorged wine of the same age. However, the longer a wine is kept in this state, the faster its evolution once disgorged. This is because the older a sparkling wine becomes, the less it can withstand the sudden shock of oxygen at disgorgement. In Champagne an example is Bollinger 'R.D.' ('recently disgorged'), which is intended to be drunk soon after release.

Riddling and Disgorgement

After ageing *sur latte,* the wines are either placed into *pupitres* for hand riddling or moved to computer-controlled gyropalettes for riddling (*remuage*).

The basic effect is the same for both mechanisms. The process of gradually twisting or rotating the bottles while bringing them from the horizontal to the vertical position (cap down) allows the lees to flocculate and slowly move towards the neck of the bottle. Manual riddling takes up to eight weeks to complete, while riddling using gyropalettes takes three to four days.

Gyropalette

Pupitres

Bottles being stored sur pointe

Lees in the neck of the bottle

If wines have to be stored before they are disgorged, they are stored upside down on their necks (*sur pointe*) so that the lees remain in the neck of the bottle.

With the yeast collected above the closure, the yeast must now be removed with minimal loss of wine and pressure. This process used to occur by hand, and sometimes still does, however, for the main part, disgorgement has become an automated process. The bottles are cooled to approximately 7°C (45°F) and the necks are immersed in a bath of frozen brine. This quickly freezes the yeast sediment in the neck, easing its extraction and ensuring the sediment does not fall back into the wine when the bottle is turned upright. Cooling also increases the solubility of carbon dioxide and so reduces the likelihood of the wine gushing upon opening. The disgorging machine inverts the bottle (so that it is now upright), removes the crown cap and allows the pressure within the bottle to eject the frozen yeast plug. *Liqueur d'expédition* is added before the bottle is fitted with a cork, wire muzzle and metal capsule.

The *liqueur d'expédition* is a mixture of wine and sugar (the sugar is referred to as the dosage) or RCGM (rectified concentrated grape must). It tops up the bottle where some wine may have escaped during disgorgement and determines the sweetness of the final wine. There has been a growing trend, albeit from a small base, of Brut Nature (no dosage) and especially Extra Brut (a dosage that results in a wine with less than 6 g/L final sugar).

The role of the dosage is to balance the acidity, which is especially important in young wines. The perception of acidity rounds out with age, thus the older the wine at disgorgement, the smaller the dosage required. However, at least some sugar is usually desired to encourage the development of classic post-disgorgement aromas. The sugar in the *liqueur d'expédition* reacts with compounds formed during yeast autolysis in a process called the Maillard reaction. This encourages the development of roasted, toasted vanilla aromas, and the cork-sealed sparkling wines may be stored for an extra few months to allow the development of these aromas before release onto the market.

Most sparkling wine is labelled with the EU's labelling terms for sweetness in sparkling wines.

TRANSFER METHOD

The transfer method was developed in the 1940s to avoid the cost of manual riddling while retaining the brioche and/or biscuit notes attained through yeast autolysis in bottle. It also has the benefit of reducing bottle-to-bottle variation given that the wine from individual bottles is blended together in a tank before final bottling. This also means it is generally easier to make final adjustments to the wine. With advancements in automated riddling, many of the key advantages of the Transfer Method have become less significant. However, it can still deliver some cost and time savings for high-volume producers by removing the need for riddling. Transfer method is used in Champagne (and other regions) to fill bottles smaller than 37.5 cL and larger than 300 cL, as these sizes are difficult to riddle.

The production of the wine up to riddling is essentially the same as the Traditional Method, with second fermentation taking place in bottles. However, because riddling does not take place, fining agents to aid flocculation do not need to be added within the *liqueur de tirage*. After lees ageing in bottle, the wine is chilled to 0°C before discharge. The bottles are opened by a transfer machine and the wine is poured into pressurized receiving tanks. The wine is usually sweetened, SO_2 is added, and sterile filtering is carried out just prior to bottling. The back labels of such wines may state 'Fermented in bottle' rather than 'Fermented in this bottle'.

ANCESTRAL METHOD

In this method partly fermented must is put into bottles and the remaining sugar is converted into alcohol and CO_2, providing the effervescence. Sugar levels in the partly fermented must can be measured accurately and therefore the final level of pressure can be estimated. The phase of fermentation in the bottle will throw a deposit of dead yeast. It is a winemaker's choice whether to disgorge and fill up the bottles or, more commonly, to keep the light sediment as part of the wine's style. Typically, no dosage is added in either case.

However, because there is no intervention in the fermentation process once the bottle has been sealed, the outcome can vary. Fermentation will often slow down and stop altogether after a few months because the yeast becomes unviable after this time and due to a lack of yeast nutrients, resulting in an off-dry wine. However, fermentation may start up again later in some bottles. These bottles will have higher pressure and less residual sugar.

While ancestral method was typical of certain areas of France, this method has been revived in small-scale production around the world. It is often called Pet Nat, the abbreviation of *Pétillant naturel*, and there are no set regulations. The wines are often low to medium in alcohol, slightly cloudy, dry to off-dry with unconventional flavours sometimes compared to cider. They are bottled without additional SO_2 and intended for early drinking.

TANK METHOD

The tank method is known by a number of names: Cuve Close, Charmat and Martinotti. It enables large volumes of sparkling wine to be made inexpensively, quickly and with significantly reduced labour costs in comparison to the traditional method. There is no riddling or disgorgement, and typically no dosage or long period on the lees during second fermentation, all of which add cost. In summary, the wines can be made and released for sale quickly. It is generally the preferred method when the winemaker wants to preserve the primary aromas and flavours of the grapes and does not desire autolytic characteristics. It is hence often used for producing fruity wines made with semi-aromatic (e.g. Glera) or aromatic (e.g. Muscat) varieties.

The tank method is often seen as an inferior method of sparkling wine production. This is partly because of the prestige of the traditional method (especially Champagne) and partly because, as an inexpensive method,

Charmat tanks

the quality of the grapes that are used is often lower than those used for traditional method wines.

The first fermentation for tank method wines is typically 16–18°C (61–64°F) to retain fresh floral and fruit aromas and flavours, but avoid the flavours associated with very low fermentation temperatures. Sugar and yeast are added, and a rapid second fermentation takes place in pressurised tanks (also known as reinforced tanks), with the wine remaining in the tank for as little as one month. This fermentation is typically arrested by cooling the wine to 2−4°C (36–40°F) when the desired pressure and residual sugar has been reached. If removed from the yeast lees immediately, the sparkling wines will retain the fruity aromas and flavours.

Occasionally, the wine may be aged on the lees, for example, for nine months if a lees-matured attribute is desired. The temperature is reduced to 2−4°C (36–40°F) and paddles within the tanks are used to stir up the lees to maximise the contact between the lees and the wine. However, because expensive pressurised tanks are then tied up for months, many of the economic advantages of the tank method are lost.

At the end of fermentation or lees contact, the wine is cold stabilised to precipitate tartrates. The yeast is removed by centrifugation or filtration. Sugar levels may be adjusted, and sulfur dioxide levels are checked and corrected prior to sterile filtration and bottling. Wine is chilled to –2°C (28°F) to stabilise and to reduce the effervescence, and then bottled with a counter-pressure filler. (Counter-pressure filling is a system used with other carbonated drinks in which the bottle is first filled with CO_2 under pressure. The bottle is then filled with the chilled wine replacing the added CO_2. This system prevents the entrance of oxygen and the loss of CO_2.)

ASTI METHOD

The Asti method is a variation of the tank method that produces a sparkling wine in a single fermentation. The sugar, which is converted into CO_2 (and hence gives the bubbles in the final wine), comes from the sugar in the original must, not through later *tirage*. The must is fermented in reinforced tanks. During the first stages of fermentation, the carbon dioxide is allowed to escape through a valve in the tank. Part way through the fermentation, the valve is closed and the carbon dioxide is retained. The timing of this will depend on the level of pressure and amount of sugar desired in the final wine. The wine continues to ferment during which time the sugar levels continue to fall and pressure in the tank increases. Once the desired residual sugar levels and pressure is obtained, the fermentation is stopped by rapidly chilling the wine and filtering it under pressure to remove the yeast.

CARBONATION

The least expensive (and least prestigious) method of sparkling wine production is injection with carbon dioxide under pressure. Although the bubbles may die quickly in a fully sparkling wine, carbonation can be used successfully for *pétillant*, lower pressure wines. Carbonation also has the advantage of leaving the aroma and flavour characteristics of the base wine intact and thus it is suitable for aromatic or fruity sparkling wines. The base wine ideally needs to be of good quality, as any faults will be accentuated by bubbles.

EU LABELLING TERMS FOR SWEETNESS IN SPARKLING WINES

LABELLING TERM	LEVEL OF RESIDUAL SUGAR
Brut Nature/Bruto Natural/Naturherb/Zéro dosage	0–3 g/L*
Extra Brut/Extra Bruto/Extra Herb	0–6 g/L
Brut/Bruto/Herb	0–12 g/L
Extra-Sec/Extra-Dry/Extra Trocken	12–17 g/L
Sec/Secco/Seco/Dry/Trocken	17–32 g/L
Demi-Sec/Semi-Seco/Medium-Dry/ Abboccato/Halbtrocken	32–50 g/L
Doux/Dulce/Sweet/Mild	50+ g/L

* Dosage cannot be added; any slight residual sugar present remains naturally after fermentation.
Note: There is a tolerance of +/– 3g/L permitted for each of these bands, e.g. Brut can be up to 15 g/L.

CLOSURES

The classic method of sealing sparkling wine is with a cork. Although the released cork from a sparkling wine bottle has a 'mushroom' shape, prior to bottling it looks like any other cork but significantly fatter (31 mm in diameter). Sparkling wine corks are commonly composed of agglomerate cork onto which two disks of natural cork have been glued. This is because it is virtually impossible to cut a cork of this width from a cork tree of the appropriate age.

On corking, the cork is compressed by the machine's jaws to around half its diameter and inserted into the bottleneck, where it immediately tries to expand back to its original size. Because the inside neck diameter is 18–21 mm, the cork remains compressed to about 60–70 per cent of its original diameter. In such a compressed state, the cork adheres tightly to the glass, preventing the wine from leaking. Recent technology has allowed for the removal of cork taint aromas from cork particles. This has resulted in increasing use of technical corks for sparkling wine, such as DIAM.

Some producers of ancestral method wines use a crown cap as part of the informal styling of their wine. A synthetic closure with a resealing mechanism has been trialled by a few mass-market sparkling wine brands, such as Yellow Tail. However, the cork firmly remains the favourite closure for most sparkling wines.

MOUSSE

Many factors affect the formation and size of bubbles, the transit of the bubbles through the wine and the way the bubbles collect at the top of the liquid. These include:

- The amount of sugar available to be turned into alcohol and CO_2; the more sugar that is available and can be converted, the more CO_2 there will be.
- The capacity of CO_2 to be dissolved in wine, which depends on many factors including the grape variety used, the health of the grapes (presence of botrytis reduces the amount of bubble formation) and the winemaking processes.
- The length of time on the lees – some CO_2 is lost as time on the lees lengthens; however, longer time on the lees will produce a longer lasting foam.
- How well the disgorgement process is carried out; if carried out well, little CO_2 is lost.
- Time in the bottle and the type of closure.
- The size and shape of glasses, the way the glasses are cleaned, the temperature of the wine when served (the lower the temperature, the less CO_2 will be released) and how the wine is served.

As there are so many variables in the formation of bubbles in sparkling wine, this study guide does not comment on the nature of mousse in the wines discussed. In general, it is the case that wines that are not aged on the lees for an extended period (e.g. most tank method wines) will have lively but short-lived bubbles in comparison to traditional method wines that have been aged on the lees for 18 months or more.

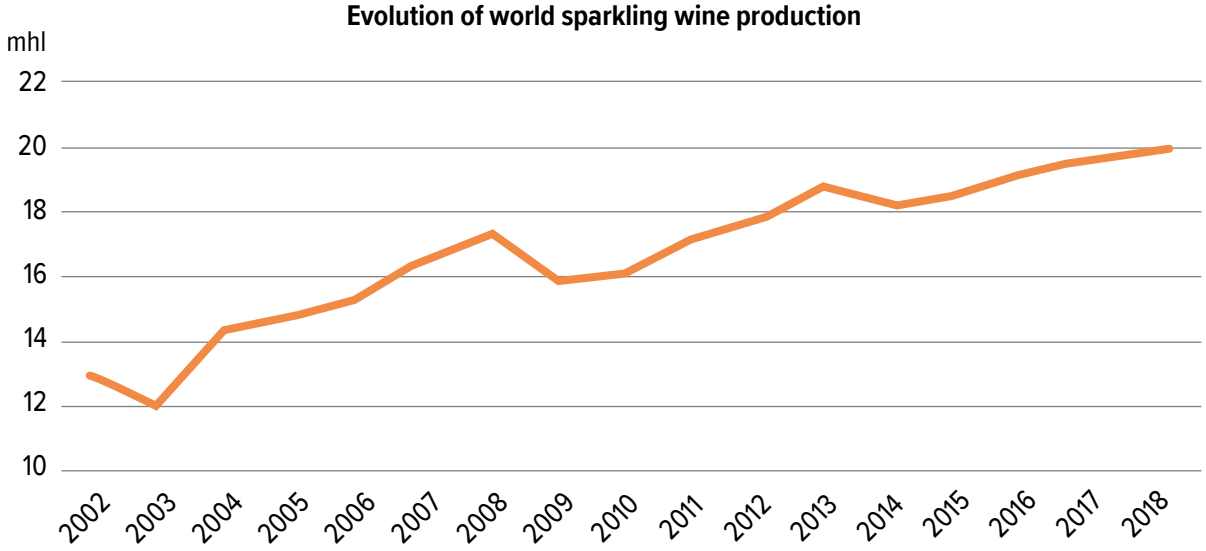
Overview of the production, consumption and export of sparkling wine

2

PRODUCTION

The production of sparkling wine has grown significantly in this century with nearly 60 per cent growth in the years 2002–2018. In 2018, the category represented seven per cent of all wine production. (The data available for all the major markets was last published in 2020 on the basis of data up to 2018.)[1]

Evolution of world sparkling wine production



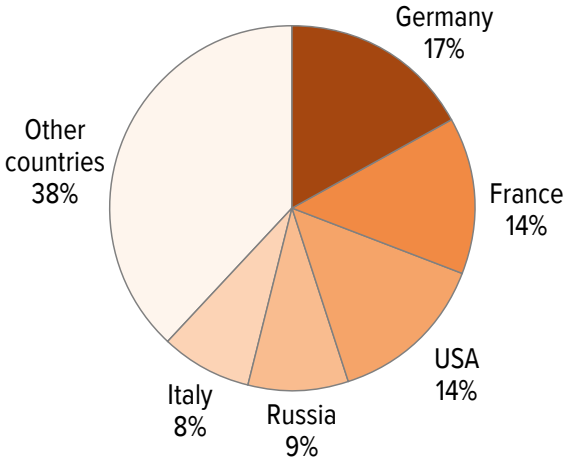
Source: OIV

Five countries—Italy, France, Germany, Spain and the USA, in that order—accounted for 80 per cent of production in 2018. Italy has shown by far the most growth (mainly due the success of Prosecco and to a lesser extent Moscato d'Asti), followed by Spain and USA.

CONSUMPTION

In terms of consumption of sparkling wine, the top five markets are Germany, France, USA, Russia and Italy, together representing 60 per cent of global consumption.

Breakdown of sparkling wine consumption in 2018



Source: OIV

Export and import

The main exporting countries in 2018 were Italy, France and Spain, with Italy leading in export by volume (43 per cent) and France leading significantly in export by value (52 per cent). The largest import markets were UK and USA by volume and USA and UK by value.

Reference

1 The statistics in this introduction are all drawn from *OIV Focus: The Global Sparkling Wine Market, State of the world vitivinicultural sector in 2019*, OIV, 2020 (retrieved 23 June 2022)

Champagne 3

Champagne is a wine appellation located in north-east France. It is widely considered to produce the most prestigious sparkling wine in the world, also called Champagne.

Champagne is a protected region and wine style. In the past many producers from other regions and countries labelled their sparkling wines 'Champagne' (and some countries still do) to share the prestige of this French region. The *Comité Interprofessionnel du Vin de Champagne* (CIVC, now known as the *Comité Champagne*) has worked tirelessly to ensure that Champagne remains a traditional method sparkling wine from grapes grown within the appellation. Champagne and the styles it produces have served as the model for traditional method sparkling wines around the world.

Le Mesnil-sur-Oger, Côte des Blancs

STYLES OF CHAMPAGNE

There are several styles of Champagne. Most Champagne is a white, fully sparkling, non-vintage Brut wine made from a blend of the three main varieties, Pinot Noir, Meunier and Chardonnay. These wines typically have medium intensity aromas and flavours of apple and lemon fruit with brioche and/or biscuit autolytic notes, high acidity and medium alcohol. They are typically good to outstanding quality and mid- to premium-priced. Vintage and prestige cuvée wines command premium and super-premium prices.

There is a range of styles of Champagne, the most common of which are detailed below. The EU labelling terms for sweetness in sparkling wines are used for all these wines.

- **Non-vintage or NV** – This is a wine blended from a number of vintages. The wine usually follows a set house style. Blending of different parcels of base wine with some wines from earlier vintages can smooth out vintage variation, creating a product with the same profile every year.
- **Vintage** – By law, 100 per cent of the wine must come from the year indicated. Theoretically, these wines are only produced from the best vintages; however, there is often some variance as different producers rate some vintages more highly than do others. In some years, the growing conditions have been so favourable that a vintage is almost universally declared, for example 2002 and 2008. The vintage wine will still reflect the house style, but can be a unique wine, showing the characteristics of the year.
- **Rosé** – In Champagne, these pink wines are usually made by blending red wine with white. In French, these wines are known as *rosé d'assemblage*. However, skin maceration of black grapes is also permitted and then the wine is 'bled off', i.e. drawn off the skins. Hence, in French, these wines are known as *rosé de saignée*.
- **Blanc de Blancs** – A white wine made from white grapes only. These wines can be leaner and more austere in youth, but often have an unmatched ageing potential.
- **Blanc de Noirs** – A white wine made from black grapes only. The wines are fuller bodied than Blanc de Blancs are. However, they are generally thought to age more rapidly than Blanc de Blancs wines.
- **Grand Cru** – This term is often mentioned on the label as a quality statement. All the grapes must have been grown within the vineyards belonging to grand cru villages.
- **Premier Cru** – This term is often mentioned on the label as a quality statement. All the grapes must have been grown within the vineyards belonging to premier cru and/or grand cru villages.
- **Prestige Cuvée** – This is usually the top wine in a Champagne producer's range. However, some houses, such as Krug, specialise in making a range of prestige cuvées. These wines should be the product of a strict selection of the best grapes, together with meticulous winemaking techniques. They can be non-vintage or vintage wines.
- **Late release, recently disgorged wines** – These are wines that have seen extended ageing on lees, and are disgorged just before release onto the market, ready to be consumed immediately. The wines have a different flavour profile from wines of the same vintage that were disgorged earlier, and they initially seem more youthful. However, after their disgorgement they age more rapidly than standard vintage wines. It is thought that the impact of disgorgement (the ingress of oxygen and disturbance of the liquid) is greater in older wines. Bollinger's R.D. or Dom Pérignon's P2 are examples of this style.

In addition, in the Champagne region there are appellations for still rosé wine from Pinot Noir (AOC Rosé des Riceys, a tiny appellation in the Côte des Bar) and still wine, AOC Coteaux Champenois, which can be red, white or rosé but in practice is mainly a light-bodied, high acidity, pale ruby Pinot Noir.

KEY DEVELOPMENTS IN THE HISTORY OF CHAMPAGNE

Historically, wine produced in Champagne was pink and still, made from the Pinot Noir variety, which has remained one of the main varieties of the region. In the cold winters of this northerly region, fermentation would halt but it could start again as temperatures rose, resulting in sparkling wine. These slightly fizzy wines became fashionable in the English market. In the mid-seventeenth century, the glass produced in coal-fired ovens in England enabled bottles to be created which could reliably withstand pressure.

Dom Pierre Pérignon (died 1715) contributed to the development of Champagne as it came to be by producing the first white wine from black grapes, inventing the still widely used Coquard basket press and by blending wines (*assemblage*) to make a superior wine from grapes grown in different areas of the region. He also is thought to have re-introduced the cork stopper into France and pioneered the use of stronger, English glass, in the production of Champagne. However, the wines in his period were still only slightly fizzy, with Dom Pérignon himself regarding fizziness as a fault.

In the nineteenth century further developments included controlled second fermentation in the bottle using a measured amount of added sugar and yeast to produce a known pressure in the bottle. In addition, riddling (*remuage*) using pupitres, was developed by Madame (known as Veuve, 'widow') Clicquot.

This enabled the next step of disgorgement, following the dipping of the neck of the bottle in an ice-cold bath of salty water, enabling the rapid production of clear wine on a large scale. Due to this, in the last quarter of the century, a dry style of Champagne was created. This established itself first in the English market, alongside the, then popular, sweet style.

In the early part of the twentieth century the vineyard area of Champagne was defined, with the current AOC boundary being set in 1927. This was critical in terms of the latter defence of the Geographical Indication (with the later slogan, 'Champagne only comes from Champagne, France', Comité Champagne). The concept of *échelle des crus* (literally 'ladder of growths'), a rating system used to determine grape prices, was introduced. Although the market now determines prices, the ratings of the *échelle des crus* system were used to define the grand cru and premier cru villages.

The *blocage* system, later called reserve wines, was also introduced. Initially, a portion of the young wines was set aside as an insurance policy against future disasters that might reduce yields. However, it has become a system of storing reserve wines to enable vintage variation to be reduced and quality raised by blending for non-vintage wines. The practice of keeping reserve wines has contributed to higher overall quality by adding depth and complexity and thereby raising the average quality of non-vintage Champagne.

3.1. The Growing Environment and Grape Growing

LOCATION AND CLIMATE

Champagne is in north-east France, just south of the 50th parallel, directly east of Paris. It is a large region that extends 150 km from north to south and nearly 120 km from east to west. There are five sub-regions: three around Epernay (the Montagne de Reims, the Vallée de la Marne and the Côte des Blancs), the Côte de Sézanne (south of the Côte des Blancs) and the Côte des Bar, 100 km south and closer to Chablis than to Epernay.

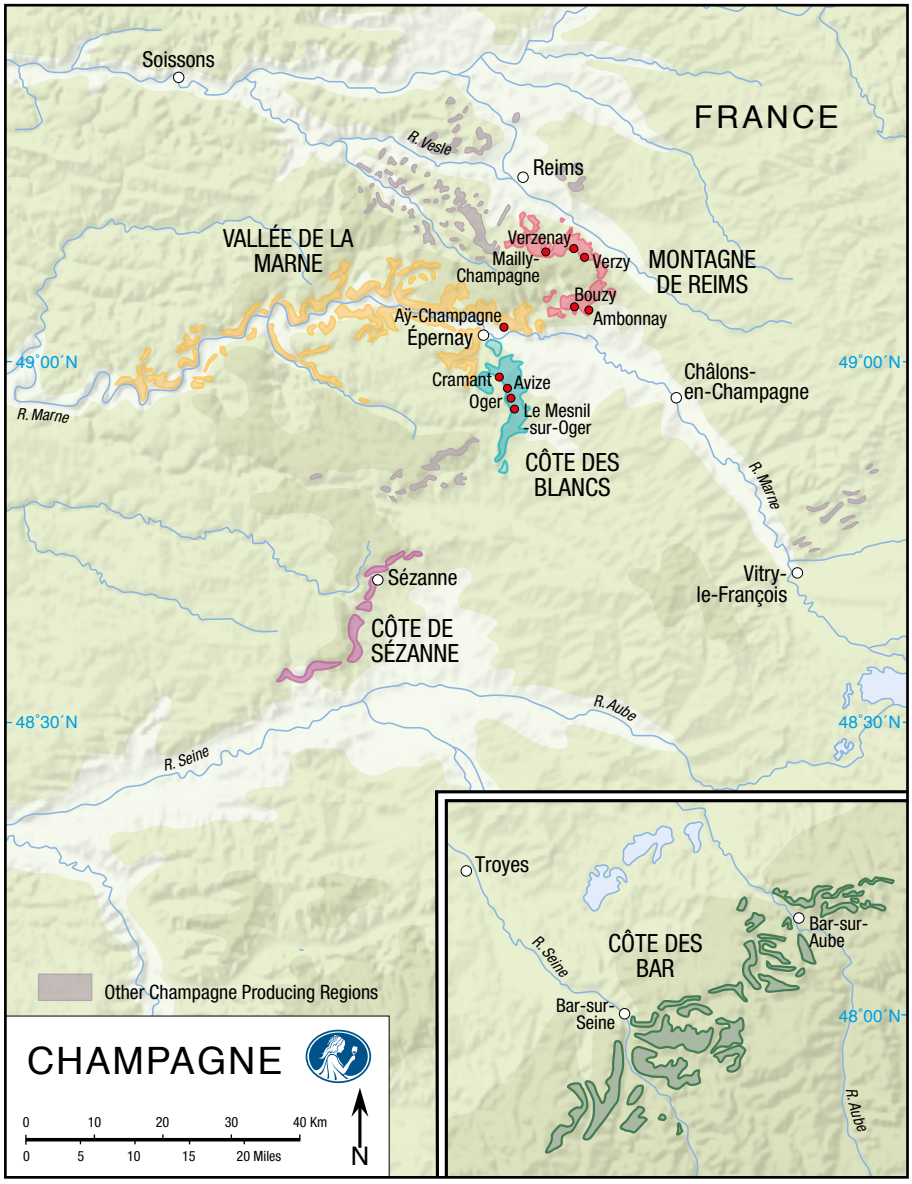
The climate is cool continental, with some oceanic influence. Rain, 700 mm per year, is adequate for grape growing. While it would only be possible to ripen grapes successfully

a couple of years in each decade for table wine, the low average annual temperature of 11°C (52°F) results in the low-alcohol, acidic base wines that are ideal for the production of traditional method sparkling wine. Rain is spread throughout the year. Rain during flowering or fruit set can reduce yields and can also be a problem during harvest due to the spread of fungal disease and dilution of the crop.

Over the last 30 years the climate has warmed, harvest dates have moved forward on average by 18 days, average acidity has dropped and potential alcohol has risen by 0.7%. As Champagne is a cool region, the result has been the conditions to produce more consistently ripe grapes and fewer poor vintages.

TOPOGRAPHY AND SOILS

The wider region of the Paris basin has a thick layer of chalk, an old seabed. The chalky hillsides of Champagne in the northern part of the region have proved the most valuable for growing high-quality grapes suitable to make base wines. High chalk content is widely thought to be beneficial in the production of high-quality Chardonnay in particular.



On this map, the grand cru villages mentioned in the text are shown with a red dot. The map does not show all the grand cru villages in Champagne.

The most common soil types in the region are chalky soils with limestone subsoil and chalk itself. The latter is highly porous and stores water, providing a steady supply of water even in dry periods. Most vineyards are at 90–300 m above sea level. Well-drained soils and planting on slopes mean that rainfall provides sufficient water to survive while avoiding water logging which would be negative for vine health.

FIVE MAIN PRODUCTION SUB-REGIONS

Montagne de Reims

This sub-region is best known for its black grapes, especially the grand cru villages of Mailly, Verzenay, Verzy, Ambonnay and Bouzy. It is more of a wide plateau than a mountain. Unusually, some top villages face north, providing excellent cool-climate sites, though they are more frost prone. The wines tend to have very high acidity and are austere in youth. There are also important vineyards of Chardonnay in this sub-region. Soils types vary, but the grand crus are on chalky soils, providing an excellent balance between water retention and drainage.

Vallée de la Marne

The major plantings here, west of Epernay, are Meunier on clay, marl and sandy soils, producing fruity wines. Bud break for Meunier is later and the ripening earlier than for Chardonnay and Pinot Noir, making it well-adapted to this frost-prone valley. Chardonnay is also grown and used to blend into early-drinking wines. The Grand Cru village of Aÿ is located here.

Côte des Blancs

The name of this sub-region, which runs at right angles to the Vallée de la Marne due south from Epernay, comes from the fact that it is almost exclusively devoted to the cultivation of white grapes. It has the purest form of chalk, providing an excellent balance between water retention and drainage, and is 95 per cent planted with Chardonnay. This area includes the four grand cru villages of Cramant, Avize, Oger and Le Mesnil-sur-Oger. These can produce wines of great intensity and longevity, which tend to be somewhat austere in their youth.

Côte de Sézanne

This sub-region is a continuation of the Côte des Blancs, with mostly clay and clay/silt soils and some pockets of chalk. It is mostly planted with Chardonnay on warmer south-east facing slopes, leading to fruitier, riper grapes. In general, the quality of the grapes is rated lower than those from the three sub-regions listed above.

Côte des Bar

A large area in the south of the Champagne region that has nearly a quarter of the vineyard area mainly planted with Pinot Noir. The soils here, Kimmeridgian calcareous marls, are also found in nearby Chablis and Sancerre. The steep slopes and soils with stony limestone elements have excellent drainage, helping Pinot Noir to ripen well. The relatively small plantings of Pinot Noir in the other sub-regions makes this a very important source of full flavoured, ripe Pinot Noir to blend into non-vintage blends. Merchants based in the northern part of Champagne buy much of the wine.

GRAPE VARIETIES

The three principal varieties account for over 99 per cent of the nearly 35,000 hectares of vineyard in the region. While there is still more Pinot Noir (38 per cent) and Meunier (32 per cent) planted, Chardonnay (30 per cent) is increasingly being planted.[1] This is because there is demand for it from the big Champagne houses. It commands a slightly higher price per kilo for growers and it produces larger yields. Tiny amounts of other varieties – Pinot Blanc, Arbanne, Petit Meslier and Fromenteau – are grown and are either blended into wines or contribute to niche cuvées; for example, Champagne Laherte's Les 7 is made with all seven permitted varieties.

For Chardonnay and Pinot Noir, see Grape Growing in Standard Options in Sparkling Winemaking.

Meunier

Meunier, often called Pinot Meunier, is a black grape variety. It is a mutation of Pinot that has white hairs on its leaves giving it a 'floury' appearance (*meunier* means miller in French). Meunier is an early budding variety, but it buds later than Pinot Noir and Chardonnay. As a result, it is less prone to spring frosts in the cool Vallée de la Marne. Meunier also does well on heavier soils (more clay) where the other varieties would not succeed. As it ripens earlier than Pinot Noir, Meunier can be helpful in seasons where the harvest is interrupted by rain. However, it is particularly sensitive to botrytis infection.

Meunier is a reliable producer of typically fruity wine and contributes softness to the Champagne blend. This is particularly important for non-vintage wines, which are often aged on the lees for shorter times than vintage wines and are often drunk on release rather than being cellared and bottle aged.

Meunier tends not to be used in wines intended for long ageing, though it has champions at Krug and among growers (e.g. Egly-Ouriet).

VINEYARD MANAGEMENT

Planting

Regulations specify a maximum inter-row spacing of 1.5 metres and an intra-row spacing of 0.9–1.5 metres, with total spacing (the combination of these two figures) never reaching more than 2.5 metres. This produces an average planting density of around 8,000 vines per hectare. Generally, grapes for sparkling wines can be grown at high yields because it is not necessary for tannins to be ripe or flavours and colours to be particularly concentrated.

Training, Pruning and Trellising

The training, pruning and trellising of the vine has been regulated in Champagne since 1938. There are four approved systems:

- **Taille Chablis** – This system is widely recognised as the best for Chardonnay. It usually has 3–4 cordons (old wood) but may have up to a maximum of five. At the end of each cordon is a spur with up to five buds. It is a form of spur pruning, retaining a large proportion of permanent wood, which can protect against frosts. Spurs are grown at yearly intervals and must be trained to a maximum of 0.6 m above the ground to ensure that the ripening fruit gets the benefit of solar energy (heat and light) reflected from the soil, especially on chalk.

For diagrams of these four training systems, see the Comité Champagne's website.

Cordon du Royat

- **Cordon du Royat** – This system is used for Pinot Noir and Meunier. The vine has a single cordon that is spur-pruned, and the shoots are vertically positioned.
- **Guyot** – This replacement cane system with vertical shoot positioning is permitted in lesser-rated vineyards for all three varieties. Single or double Guyot is permitted.
- **Vallée de la Marne** –The method is similar to Guyot, but with a higher number of buds. It is being used less now than in the past.

The average number of fruiting buds per vine for all these systems must not exceed 18 per square metre.

Hazards, Pests and Diseases

The main climatic dangers come from:

- occasional severe winter frost, which can kill vines or parts of vines
- spring frosts destroying new buds and reducing yields
- disruption to flowering and fruit set due to cold and rainy weather in June, which can reduce yields or lead to the production of ripe and unripe grapes together
- violent storms and hail in summer, which can damage grapes and vines
- hot and humid weather in summer, especially after heavy rainfall, leading to the rapid spread of botrytis.

As in other regions, downy and powdery mildew have to be dealt with as the need arises. The dagger nematode, which spreads fanleaf virus, is also common.

Sustainable Viticulture

Sustainable viticulture is promoted by the *Comité Champagne*. Champagne is one of the first regions where this approach has been promoted at a regional level. The use of pesticides has been reduced with sexual confusion techniques increasingly used to control pest populations. Soil protection methods have been put in place, such as the management of groundwater on slopes and the increased use of cover cropping to enhance biodiversity.

The Comité Champagne publishes achievements and future targets for sustainable viticulture. Read more here.

Sustainable practices are carried forward to the winery as well, where water management schemes have often been put in place as well as the recycling of waste and by-products. In 2010 the *Comité Champagne* introduced a lighter weight Champagne bottle for non-vintage cuvées. Many producers prefer to use different bottle shapes, which are often heavier, to distinguish their vintage and prestige wines. The new bottle is nearly 60 g lighter than the original and the estimated annual reduction in CO_2 output is 8,000 metric tonnes.

Harvest

The *Comité Champagne* is responsible for setting harvest dates and yields each year. It does this by taking grape samples from approximately 450 control plots from the time of *véraison*, and measuring the rate of colour change, the average weight, the sugar concentration and acidity and the incidence of botrytis. These findings also determine the permitted yield for the year and the required minimum alcohol by volume (e.g. minimum potential alcohol of 9.5 per cent). The harvest dates are only start dates, and individual producers can choose to start picking a day or several days later. Alternatively, by derogation, they can apply to the INAO (*Institut national de l'origine et de la qualité*) to start picking their grapes earlier than the official opening date for their particular village. For example, a derogation may be sought if botrytis is threatening the crop and it is necessary to pick at below the minimum alcohol by volume normally required.

The setting of yields by the *Comité Champagne* seeks to protect the quality of wine (by avoiding over-cropping, which could result in dilution of fruit flavour). It also seeks to protect the price of Champagne and regulates supply and demand.

In good vintages, a proportion of the crop may be set aside as reserve wines, a precaution against future crop failure or lower quality vintages. The *Comité Champagne* is also responsible for managing the levels of these reserve stocks. The upper limit of yields is controlled by EU law at 15,500 kilos/hectare, yields achieved in the big production years of 2006 and 2007. Part of this was put into reserves.

The Champagne AOC regulations specify whole bunch pressing, and grapes are handpicked. Picking whole bunches by hand can avoid crushing and oxidation and microbial spoilage, thereby preserving fruit quality. The harvest generally lasts around three weeks. It is thought to require the labour of around 100,000 people each year. The grapes are collected in perforated bins with a maximum capacity of 50 kg. Approximately 1,900 pressing centres located throughout the Champagne region keep transportation times to a minimum.

Hand harvest is carried out by a mainly travelling workforce. Workers often return loyally year after year to the same producers, the best of whom pay the pickers a premium for quality rather than just by weight.

3.2. Winemaking

Champagne is made by the traditional method, historically often known as the *méthode champenoise*.

Whole bunches of grapes are pressed with a gradual increase of pressure. This is to ensure high juice quality, low phenolics (avoiding extracting tannins from the skins and seeds) and to make white wine from black Pinot Noir and Meunier grapes.

Traditionally, 4,000 kilos of grapes, a unit known as a marc, were loaded by hand into a basket press. While many wineries work in this way, pneumatic and hydraulic horizontal presses are also used. The maximum yield is normally 79 hL/ha (hectolitres per hectare), but as noted previously this can be raised to 98 hL/ha and the surplus put into reserve if this is agreed by the *Comité Champagne*.

The juice is separated into fractions. Juice extraction is strictly limited to two parts, the *cuvée*, the first 2,050 litres (per 4,000 kilos of grapes) made up of free run juice and the first pressing, and the second part, the *taille*, of 500 litres. Limiting total pressing protects wine quality by avoiding over-extraction of phenolics and maintains fruit flavours.

The two fractions have markedly different qualities. The *cuvée* is rich in acids and produces wines with great finesse and long ageing potential. The *taille* has lower acidity but is richer in colouring pigments and phenolics. It can be a useful addition to some blends, helping to produce wines that are more expressive in youth but do not have the same ageing potential. As a result, a higher proportion of *taille* is used in non-vintage rather than vintage or prestige cuvée wines. If the natural levels of sugar in the juice are not high enough, chaptalisation is permitted to produce a wine with a minimum alcohol level of 11% abv. The alcohol level of the final wine may not exceed 13% abv, a stipulation of EU wine law.

ALCOHOLIC FERMENTATION

Many producers choose to ferment their wines in temperature-controlled stainless-steel tanks. However, an increasing number of quality producers are re-introducing some oak, particularly in the form of large oak *foudres*, for the first fermentation. This is being done largely to introduce more textural richness and mouthfeel. For fermentation temperatures and choice of yeast, see the section on Primary Fermentation in Standard Options in Sparkling Winemaking.

Many Champagne winemakers will encourage malolactic conversion to take place at this stage, to reduce and soften the acidity of the final wine. Some winemakers choose to avoid malolactic conversion, feeling their style of Champagne is better without this modification; others will use it as and when they consider it to be beneficial, for example in cooler years. With warmer harvests, putting the base wine through malolactic conversion is very much the choice of the producer.

BLENDING

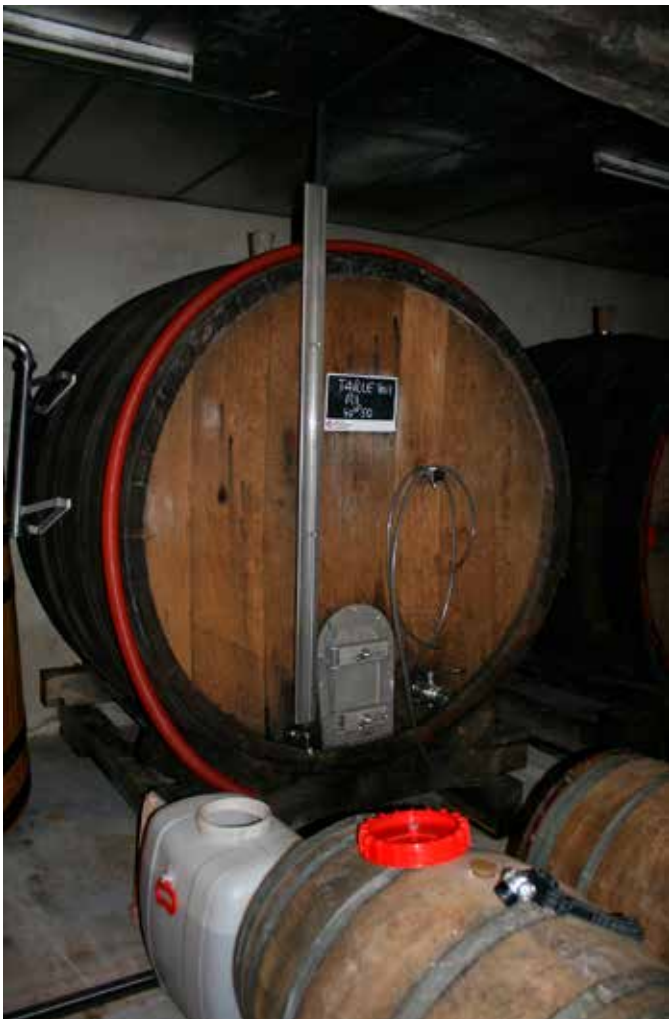
The aim of blending (*assemblage* in French) is to create a wine that is greater than the sum of its parts. Blends may combine wines from different vineyards, grape varieties and vintages, and relies on the experience of the *chef de cave* (master blender) to predict the development of a wine over time, before second fermentation and maturation has even begun.

Blending is particularly critical for non-vintage Champagnes, as here the base wines must be blended to achieve a constant style year on year, reducing the influence of the vintage and retaining the specific style of the Champagne house. This is easier to achieve if the *chef de*

cave has a number of base wines available. The larger houses have the capacity (and the financial strength) to store a large quantity of different reserve wines, meaning that more than 100 wines can be available for blending. This also reduces the risk that a wine cannot be made in any one year because of damage caused by disease, frost or localised hail.

In addition, the use of reserve wine to create a particular wine style is an important element of the choices available to a winemaker: 10–15 per cent of reserve wines, often from the last one or two vintages, is typical of many large brands. Some premium brands have large proportions of older wines (30–40 per cent) to create added depth and complexity.

How the wines are stored can also make a difference. If producing large volumes of wine, reserve wines will be kept reductively in stainless steel containers. Using these wines as a blending component can make a small but important difference in terms of the complexity of the final wine. Others choose to age reserve wine in old oak that can add mildly oxidative notes. Options that are more unusual include ageing reserve wine for many years in magnums (e.g. Bollinger) or keeping a perpetual reserve. In the latter, a proportion of wine is drawn off every year for blending and it is replaced by young wine, thereby creating a blend of younger and older wines to use as reserve wine with a view to adding complexity.



Containers for reserve wine in a small winery

Rosé Champagne may also be blended at this stage. Most rosé Champagne is made by blending a small proportion of still, dry red wine (made from locally grown Pinot Noir and/or Meunier) with the white base wines to achieve the desired colour and flavour profile. A few rosé Champagnes are made by using contact with the black grape skins. (An example would include Laurent Perrier, who make some of their rosé in this way.) Yeast absorbs colour pigments from the wine during each fermentation, so achieving the desired colour in the finished sparkling wine requires experience and expertise.

SECOND FERMENTATION AND MATURATION

Champagne is made by the traditional method and therefore *liqueur de tirage* is added at this stage (see the Traditional Method section of Standard Options in Sparkling Winemaking).

The practice of lees ageing is deemed one of the most important stages in the production of all traditional method sparkling wine. It is during this time that the brioche and/or biscuit

characters typical of all Champagne wines develop, through yeast autolysis. The brioche and/or biscuit flavours can be more prominent in Champagne than in warmer climates due to the lower intensity of primary fruit present.

Non-vintage wines have to spend a minimum of 15 months maturing in the producer's cellar, 12 months of which must be maturation on the lees. The same 12-month minimum rule applies to vintage wines, but they cannot be released until three years after *tirage*. (However, in practice most vintage wines will be aged for much longer on the lees than the 12 months required.) Lees ageing can continue for many years, but little change is thought to take place much beyond a decade. Keeping wine undisgorged and in contact with its lees does help to protect the wine against oxidative development, however, and can lead to 'late disgorged' wines that can attract higher prices. All time spent on lees adds to the production cost of Champagne and therefore to market price.

For details on riddling and disgorgement, see the Traditional Method section in Standard Options in Sparkling Winemaking. The sweetness of the Champagne is determined by the amount of sugar in the *liqueur d'expédition*. However, the nature of the wine in the *liqueur d'expédition* is also important; this can be youthful base wines from the current vintage giving light fresh flavours, or aged reserve wine set aside in cask, barrel or magnum to provide aromas of baked apple and dried fruit. In rosé production, the *liqueur d'expédition* can also be used to correct colour differences.

The Champagne bottle is then sealed with a cork. The cork must display the name 'Champagne' and state the vintage where appropriate.

Freezing unit for disgorgement

3.3. Wine Law and Wine Business

Unusually for a very large French wine region, Champagne is a single appellation. (It shares this structure with Alsace but is much larger.)

THE QUALITY HIERARCHY IN CHAMPAGNE

In the early twentieth century, a system known as the *échelle des crus* was created to establish the prices to be paid for grapes. The 17 villages that became the grand cru villages were all rated 100 per cent, 42 premier cru villages 90–99 per cent and 257 other villages 80–89 per cent. Historically, prices were fixed by the *Comité Champagne* and then the price paid reflected the percentage given to the village (e.g. 100 per cent for a grand cru village). This system ended under pressure from the EU, but the designation of grand cru and premier cru villages continues and grapes from grand cru vineyards are still the most expensive to buy. Prices today are determined by the market with the biggest buyer of all, Moët & Chandon, in effect setting the trend.

The grand cru or premier cru designation is for a village as a whole. If the grapes all come from that village, the name of the village can appear on the label (e.g. 'Grand Cru Cramant') or simply Grand Cru if the fruit comes from a number of grand cru villages. It has been a matter of controversy that the grand cru or premier cru designation refers to the village as a whole, not to individual vineyards, as inevitably there is variation within a village due to aspect, soil and other factors and some villages are much bigger than others. As a result, and because of the need to produce large volumes of wine, the large Champagne houses tend to focus on blended wines and to emphasise the quality of vintage or prestige cuvées, rather than promoting the names of individual villages or vineyards (in contrast to the use of village names in Burgundy).

Champagne and Champagne Grand Cru

House: Bollinger

Co-operative: Le Mesnil

Grower: Alain Leboeuf

STRUCTURE OF THE INDUSTRY

The industry comprises more than 15,000 growers, who own around 90 per cent of the vineyards, and 360 Champagne houses.[2] The vast majority of growers sell their grapes either to the Champagne houses or to co-operatives. Some growers keep their grapes (or a proportion of their own grapes) to make their own wines, known as grower Champagnes. Co-operatives provide a bridging point between the growers, who own the majority of the vineyards, and the houses, who sell most of the Champagne but only own about 10 per cent of the vineyards. Brokers, too, play an important role in finding wine for the houses, acting as a go-between.

These different types of business are reflected in the codes on Champagne bottles that include:

NM: *Négociant manipulant*

These businesses, commonly referred to as 'houses', buy grapes, must or wine to make Champagne on their own premises and market it under their own label. All the big Champagne houses belong to this category. A company in this category is often called by the abbreviation *négociant* and the group as a whole the *négoce*.

RM: *Récoltant manipulant*

These businesses, commonly referred to as 'growers', make and markets their own label from grapes exclusively sourced from their own vineyards and processed on their own premises.

CM: *Coopérative de manipulation*

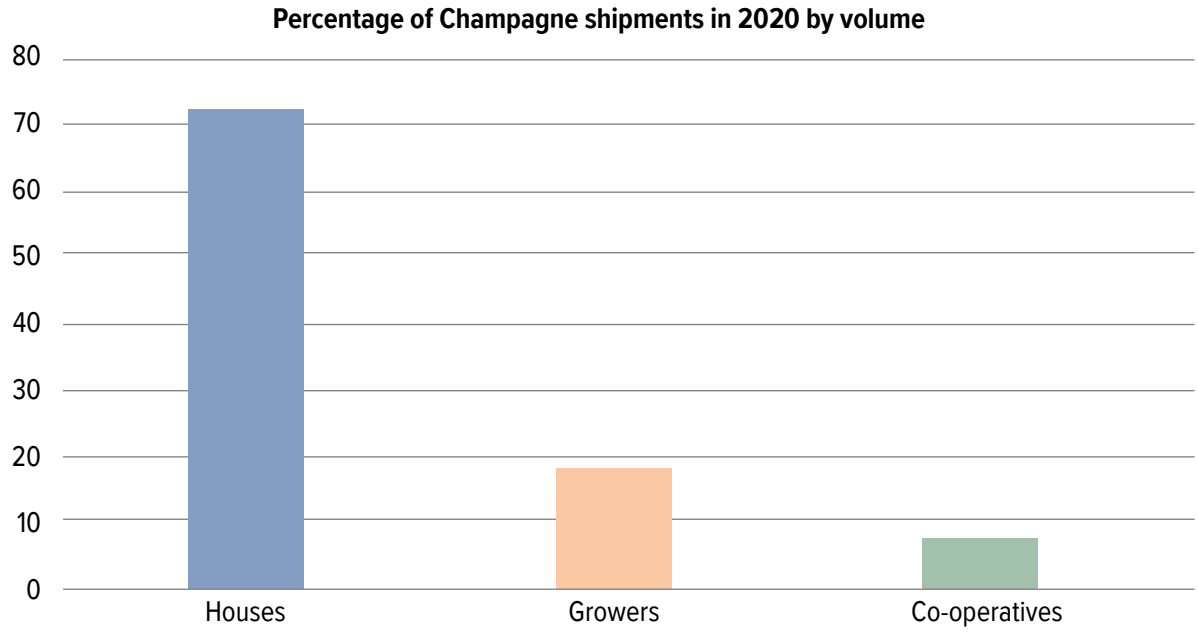
These businesses are co-operatives that market Champagne under their own label from members' grapes.[3]

From a commercial point of view, there are major groupings of the houses based on the companies that own them. Thus:

- LVMH, the largest of the groupings, owns Moët & Chandon, Dom Pérignon, Mercier, Veuve Clicquot, Ruinart and Krug
- Vranken Pommery Monopole owns Vranken, Pommery, Monopole Heidsieck, Charles Lafitte and Bissinger.

The top five of these groupings account for two-thirds of all sales by value.[4]

COMMERCIAL CONSIDERATIONS



Source: Comité Champagne[5]

Just under half of all Champagne sales are to the domestic market and the rest is exported. Total shipments were around 300 million bottles per year in the decade to 2019.[6]

However, the houses, co-operatives and growers have different strengths:

- The houses not only have the biggest sales, but also are also relatively strong in export. markets; the Champagne houses now account for 73 per cent of all Champagne sales and 88 per cent of exports.[7]
- Overall sales of bottled wine from co-operatives are small and evenly split between the home and the export market. However, Nicolas Feuillatte is the third biggest Champagne selling brand on its own.
- Growers sell most of their wine in the home market.

One of the roles of the *Comité Champagne* is to manage the relationship between the Champagne houses, the co-operatives and the growers. Each of these groups have one or more organisations that represent them.

Recent years have seen the co-operatives diversifying their businesses. In addition to selling base wine to the large houses (which then goes into the brand of the large houses), they have moved into making and promoting their own brands, At the same time, the large houses have moved to buy their grapes directly from growers or via agents, and deal less with the co-operatives.

SUPPLY AND DEMAND

Influencing the Supply of Champagne

The region is able to influence the supply of Champagne by the mechanism of setting the maximum yields of grapes (number of kilos per hectare) that can be made into Champagne in the coming harvest. There are two parts to the system: grape yields for base wine for the coming year; plus, an allowance for wines to go into reserves. This is done in the light of current stocks, world demand and the progress of the season until the decision is made in late July. The average yield over the last decade is 10,500 kilos/hectare and so a decision to vary this by 10 per cent or more would make a significant difference. If producers need to have additional stocks for sale, they can take wine out of their reserves.

The region is also conducting a review that includes the possibilities of additional land being made available for the production of Champagne grapes around the perimeter of the appellation. This review is ongoing.

Demand

As noted, the domestic market consumes half of all Champagne produced. The average bottle price is low, due to the volume of inexpensive Champagne sold in supermarkets in France. However, the percentage of the cheapest wines (under €12) has dropped steadily recently, while the percentage of wine over €20 has risen steadily.

The main export markets for Champagne are UK, USA, Japan, Germany and Belgium in that order (by volume, 2018 figures). The two most valuable markets with highest price paid per bottle are the USA and Japan. The UK has the biggest market by volume and the lowest average per bottle price in the top ten export destinations.[8]

More generally, Champagne has been re-positioning itself away from the volume market in the light of the growth of mid-priced sparkling wine, especially Prosecco. There has been less use of chemical fertilisers for environmental reasons than in the past and lower maximum yields are being set. The focus is now wines at higher price points. Volume has dropped by 10 per cent but value has risen by a quarter in the decade to 2018.

Cost of Production in Relation to Price Sought

Prices for grapes are high in Champagne (€6.10 per kilo, with around 1.2 kg of grapes needed to produce one 75 cL bottle of Champagne) and represent a very large proportion of the cost of the product. If grand cru or premier cru grapes are to be used, the price will be higher still.

Vintage Champagne is more expensive to produce than non-vintage. It is more likely to be made from higher rated (i.e. grand cru and premier cru) and therefore more expensive grapes. It cannot be sold for three years, as against 15 months for non-vintage, which delays the financial return on the goods produced. This can lead to cash flow problems for new businesses.

Rosé Champagne is marginally more expensive to produce, as red wine is required. This is typically more expensive to produce than white base wine because of generally lower yields in the vineyard are needed to achieve the required ripeness, concentration levels of flavour and colour.

Using oak for the primary fermentation or base-wine ageing in any style of Champagne is also likely to increase costs.

All these factors contribute to the price that the producer will seek.

ROUTE TO MARKET

The large Champagne houses put significant resources into marketing and advertising. Estimates can vary, but this can account for around 20 per cent of the price of a bottle. In broad terms, the costs are for the grapes (50 per cent), total production costs (30 per cent) and commercialisation (20 per cent).

Many of the larger houses now own and run their own distribution systems, often through their own companies set up in particular markets to deal with selling their wines there. Many of the major brands are part of conglomerates that have the distribution system in place to support several brands. There has been shift towards having more and more control over distribution among the large players, as this is the only way they can control the price at which their wine is sold in different markets. This is essential if they wish to limit grey market trading, where a product is bought and sold outside of the manufacturer's authorised trading channels.

Some Champagne houses prefer to use agents to distribute their wine, with the Champagne house typically providing a budget to promote and market the wines.

A relatively small number of growers sell their wines internationally, in a number of different markets. They typically use specialist agents who champion growers' wines in small specialist wine shops, and to private clients and the hospitality sector. The agents will typically sell a range of different growers' Champagnes. Lacking money for other forms of marketing, growers will often promote their wines through visits in person to key markets.

NEW PRODUCTS AND TRENDS

The following are examples of some of the recent developments in the Champagne market:

- There is a small, niche market for Brut Nature wines sold primarily in specialist wine shops and restaurants that have a considerable selection of Champagnes.
- The two driest categories, Brut Nature and Extra Brut, have gained ground. Both grew by more than a third in sales in the decade to 2018.[9] Interest in these styles in the domestic hospitality sector has also grown.
- At the other end of the sweetness scale, major Champagne houses have launched sweet wines that are intended to be drunk over ice and in cocktails. This trend was started by Moët & Chandon Ice Impérial that is Demi-Sec and has been heavily promoted in the upmarket travel sector.
- Rosé Champagne is increasingly in demand in line with the demand for rosé in general. This is reflected by the investment made by the two biggest brands, Moët & Chandon and Veuve Clicquot, both in production facilities for making red wine and in marketing. The percentage of rosé Champagne shipments has increased from 3 per cent to approximately 10 per cent since the beginning of the century.[10]
- At the top of the market, in terms of price, there is increased interest in single-vineyard Champagnes. This is not new, as Philipponnat launched Clos des Goisses in 1935 and Krug's first vintage of Clos du Mesnil was the 1979 vintage. However, the trend for single-vineyard wines has increased during the course of this century and has allowed producers the opportunity to achieve higher prices for their wines.[11]
- Grower champagnes continue to attract increasing interest. The fruit is grown and the complete winemaking process is carried out by the same, often small, company. The grower is free to allow marked variations (varieties, blends, vintage or non-vintage) in wines from year to year. Significant examples can be found in all sub-regions including

Domaine Jacques Selosse (Côte des Blancs), Champagne Jacquesson (Montagne des Reims) and Champagne Drappier (Côte des Bar).

References

1 *From vine to wine: grape varieties and vineyards*, Comité Champagne (retrieved 23 June 2022)

2 *Key market statistics*, Comité Champage for 2020 (retrieved 23 June 2022)

3 The full list of codes are available *Champagne Growers and Houses*, Comité Champagne (retrieved 23 June 2022)

4 *Ranking by turnover*, Union des Maisons de Champagne (retrieved 23 June 2022)

5 *Key market statistics, Comité Champage for 2020* (retrieved 23 June 2022)

6 *Les expéditions de vins de Champagne 2020*, Comité Champagne (retrieved 23 June 2022)

7 As above

8 *The Economy of Champagne, 2020*, Comité Champagne, p. 5 (retrieved 23 June 2022)

9 Jefford, A., February 2020, *Wine trends in 2020, Champagne by the numbers*, Wine Scholar Guild (retrieved 23 June 2022)

10 *Les expéditions de vins de Champagne 2020*, Comité Champagne (retrieved 23 June 2022)

11 As above

4 Other Traditional Method Sparkling Wines of France

The term *Crémant* is used to denote some regional French traditional method sparkling wines made outside of the Champagne region. Before 1985, the term *Crémant* was used to refer to a semi-sparkling style within Champagne. However, when the EU banned the term *méthode champenoise* as a description of the traditional method for making sparkling wines, Crémant came to be used exclusively for traditional method sparkling wines outside of Champagne. In the following decades, more regions created a Crémant and production grew.

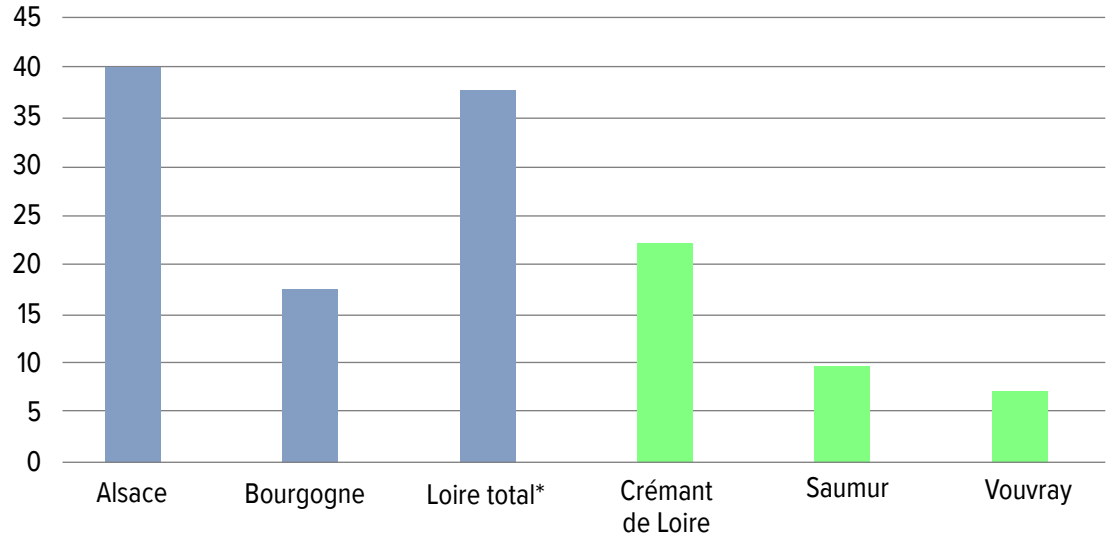
There are eight Crémant appellations in France, but the Diploma Specification only deals with the three largest: Alsace, Bourgogne and the Loire. In addition, the sparkling wines of the appellations of AOC Saumur and AOC Vouvray will be considered in the Loire Valley chapter.

The permitted grape varieties for the various Crémant wines reflect the typical varieties of their regions, as spelled out in more detail in the following chapters.

The common features for all the Crémant wines are:

- whole bunch pressing and therefore hand harvesting
- maximum yield at pressing of 100 litres per 150 kg of grapes
- minimum of nine months' ageing on lees during second fermentation in the bottle
- minimum 12 months' maturation between *tirage* and release, which includes the nine months' ageing on lees
- maximum 13% abv in the finished wine
- minimum four atmospheres pressure.

Crémant production in millions of bottles, 2020



* The figure for 'Loire total' is the sum of Crémant de Loire, Saumur and Vouvray sparkling.[1]

While Alsace and the Loire are the largest and most important sources of traditional method wines outside of Champagne, the production of each is still only about 10 per cent of the production of Champagne.

Each of the three Crémant appellations covered here has introduced a top tier to allow for greater qualitative differentiation. These typically have greater requirements for time on lees. See the further details under each appellation.

Reference

1 *Bourgogne Wines Press Kit March 2021*, Bourgogne Wine Board (retrieved 23 June 2022); Conseil Interprofessionnel des Vins d'Alsace (private communication, email November 2021), Vins Val de Loire (private communication, email November 2021)

5 Crémant d'Alsace

Crémant has become an important part of wine production in Alsace. It now accounts for about 25 per cent of total production of wine in the region.[1] Approximately 500 producers make Crémant, many making it on a small scale and alongside their still wine production. The area of vineyard declared each year for Crémant has grown by 15 per cent over the last ten years to 3,600 hectares, reflecting increased demand for sparkling wine in general.[2] The most important variety for sparkling wine is Pinot Blanc.

Typically, Pinot Blanc-based Crémant has medium intensity apple and pear fruit with brioche and/or biscuit-like autolytic notes, medium (+) to high acidity and a light to medium body. Most wines are in the Brut style.

5.1. The Growing Environment and Grape Growing

CLIMATE

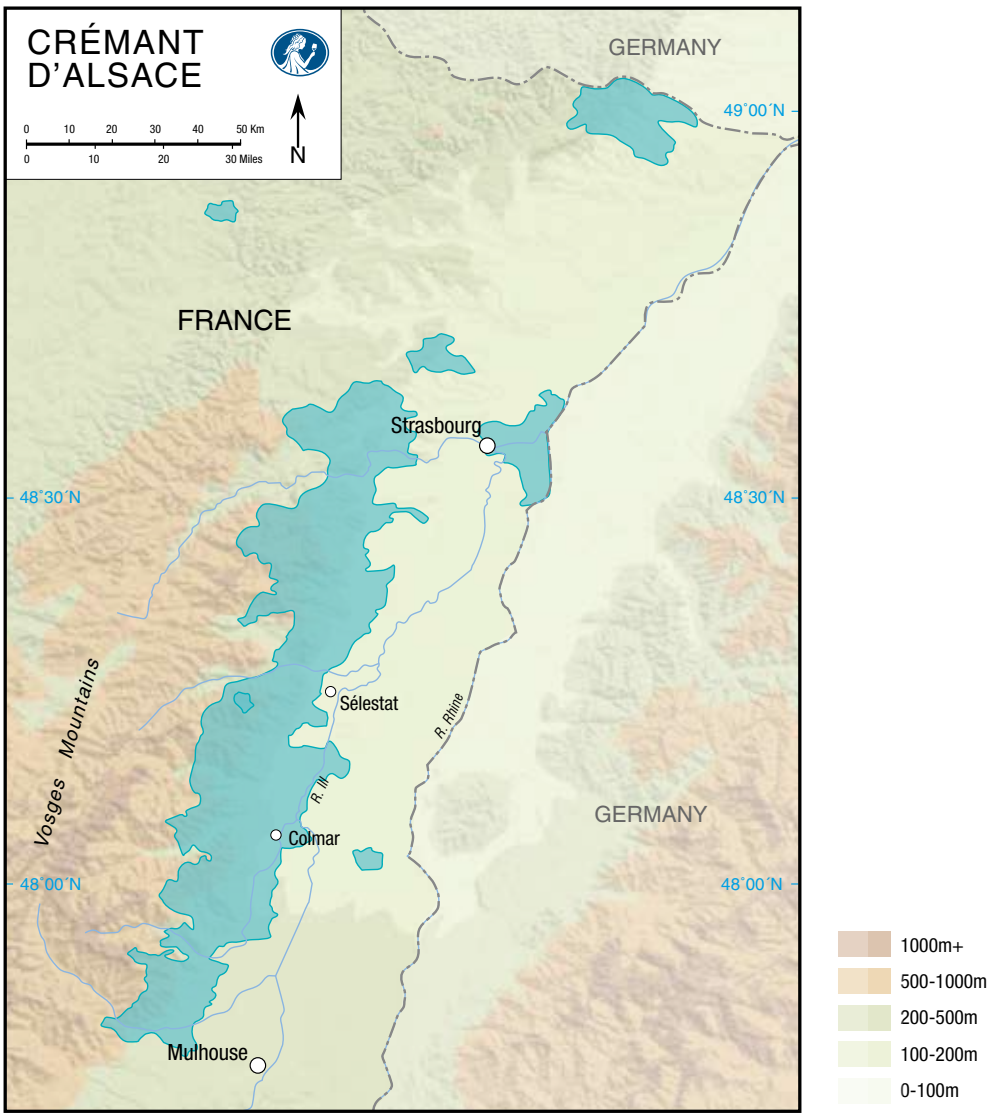
The vineyards for both still and sparkling wine are mainly on the eastern flanks of the Vosges foothills at elevation ranging from 200 to 400 m. The Vosges protect vineyards from prevailing westerly winds. As a result, the climate is sunny and continental. It is often rather dry and hot during the growing season, though rain at harvest can be a problem. Shortage of water can be a problem, as irrigation is not permitted. In this climate, grape ripening progresses with hot days and cool nights (due to the continental climate), giving flavour ripeness while retaining the high acidity that is ideal for traditional method sparkling wine. Spring frost can be a problem and has become worse in recent years with warmer and earlier springs resulting in early bud break. This in turn makes the vines more vulnerable to spring frost and leads to reduction in yields.

SITE LOCATION

Growers reserve their best sites for Riesling and the other noble varieties to be made into still wines. Pinot Blanc is grown on a range of sites – usually lower level elevations (high fertility and therefore not suited to top-quality grapes for still wines) and some cooler sites in the higher valleys where grapes for still wines would struggle to ripen. For example, Pinot Blanc for Crémant has been planted in the Munster valley, with its cool airflows retaining acidity in the grapes.

GRAPE VARIETIES

The varieties used for Crémant d'Alsace are Pinot Blanc, Auxerrois, Chardonnay, Riesling, Pinot Gris and Pinot Noir. This group of mostly low aromatic varieties is well known for its suitability for traditional method sparkling wine. Pinot Blanc, 20 per cent of the total Alsace vineyard area, is a major ingredient. (This figure is for Pinot Blanc and Auxerrois combined, as the two varieties are not distinguished in the record keeping; in reality, most of the vines are Pinot Blanc.) Pinot Blanc is early budding, making it vulnerable to spring frosts. It is prone to fungal diseases. It is also early ripening which, combined with the early picking necessary for sparkling wines, means that the harvest is much earlier than for other varieties. The early date is a help to wineries handling the full range of Alsace varieties, allowing them to spread out the harvest and reception of grapes at the winery. Pinot Blanc contributes pear and apple aromas and high acidity to Crémant.



The other common aromatic varieties of Alsace, such as Gewurztraminer and Muscat, are not permitted. Riesling is allowed, but little used as growers prefer to use it for still wines. Pinot Blanc is an inexpensive variety, though some top growers will put the more valuable Pinot Gris (with its more prominent fruit) in their blends to raise quality.

Crémant d'Alsace is the only Alsace appellation allowing the use of Chardonnay. It is a tiny part of the total vineyard area (1 per cent).

Crémant d'Alsace Rosé can only be made from Pinot Noir. These wines can be of very good quality with medium to medium (+) flavour intensity of red-berried fruit.

VINEYARD MANAGEMENT

In general, vines for grapes intended for Crémant are pruned to a greater crop load than for still wine, as the base wines do not need a high concentration of flavours. The maximum yield is 80 hL/ha, very similar to that allowed in Champagne. Growers must declare in July that they are going to make Crémant from particular vineyards.

Harvest for Crémant is early – the last days of August to first part of September – because just-ripe fruit with high acidity is sought. Harvest is by hand, as whole-bunch pressing is mandatory. This is with a view to producing high-quality juice with low phenolic content.

5.2. Winemaking

As potential alcohol is low, the must is often chaptalised. Winemaking then follows the standard procedure for traditional method to produce a fully sparkling wine. Wines are typically made entirely from grapes from a single vintage, i.e. no reserve wines. Time on the lees during second fermentation is typically relatively short (e.g. 12 months), resulting in wines that show mainly primary fruit. However, better producers, including the top co-operatives (e.g. Cave de Turckheim), increase the time on lees substantially (e.g. two years for Cave de Turckheim's most inexpensive sparkling wine). This results in wines with brioche and/or biscuit autolytic notes and more complexity. The vast majority of wines are Brut. Dosage levels are typically in the 8–10g/L range with the sugar balancing the high acidity.

Rosé wines are made by maceration on the skins for 12–24 hours to get the desired depth of colour.

5.3. Wine Law and Wine Business

The main AOC regulations have been covered – grape varieties, yield and time on lees.

Production of Crémant d'Alsace is divided between co-operatives (43 per cent), merchant houses (37 per cent) and independent growers (20 per cent)[3]. The largest single company is the co-operative Maison Bestheim, one of the pioneers of Crémant d'Alsace. Through a series of mergers and acquisitions,[4] it now makes wine, sparkling and still, from the fruit of nearly 1,400 hectares. The company owns half of these vineyards and the other half is owned by 450 growers. Other significant producers on a much smaller scale include Valentin Zusslin and Muré.

Crémant d'Alsace has grown in volume of production, more than doubling between 2000 and 2014. In 2020, it produced nearly 40 million bottles per year. Most of the wine is sold in France (around 72 per cent), but exports are also rising as world demand for sparkling wine continues to rise.[5]

Crémant d'Alsace Emotion

This prestige category was launched in 2012 to create a top-quality category for Alsace sparkling wine. This category requires a minimum 75 per cent Pinot Blanc, Chardonnay and Pinot Noir, separately or together, and a minimum 24 months on lees. However, while some very good, long-lees-aged wines are made in the region (e.g. Domaine Jean-Claude Buecher), the new category has not proved popular.

References

1 Alsace wines 2018, Conseil Interprofessionnel des Vins d'Alsace (CIVA), PowerPoint presentation, received May 2018

2 Evolution de la production Alsace AOC par appellation, 2018', CIVA, report, received May 2018

3 Personal communication, CIVA, email, May 2018

4 Company profile in Keiflin, C. and Mercier, D 2015, *Excellence in Alsace*, Editions du Signe

5 *Production AOC Crémant d'Alsace – 2020*, personal communication from CIVA (email, 1 October 2021)

Crémant de Bourgogne 6

Crémant de Bourgogne is a sparkling wine, typically made from Chardonnay (now the most used variety for Crémant de Bourgogne) and Pinot Noir. It accounts for about 10 per cent of wines produced in Burgundy. Production has more than doubled since the turn of the millennium. Production is around 170,000 hL (average production 2014–2018)[1].

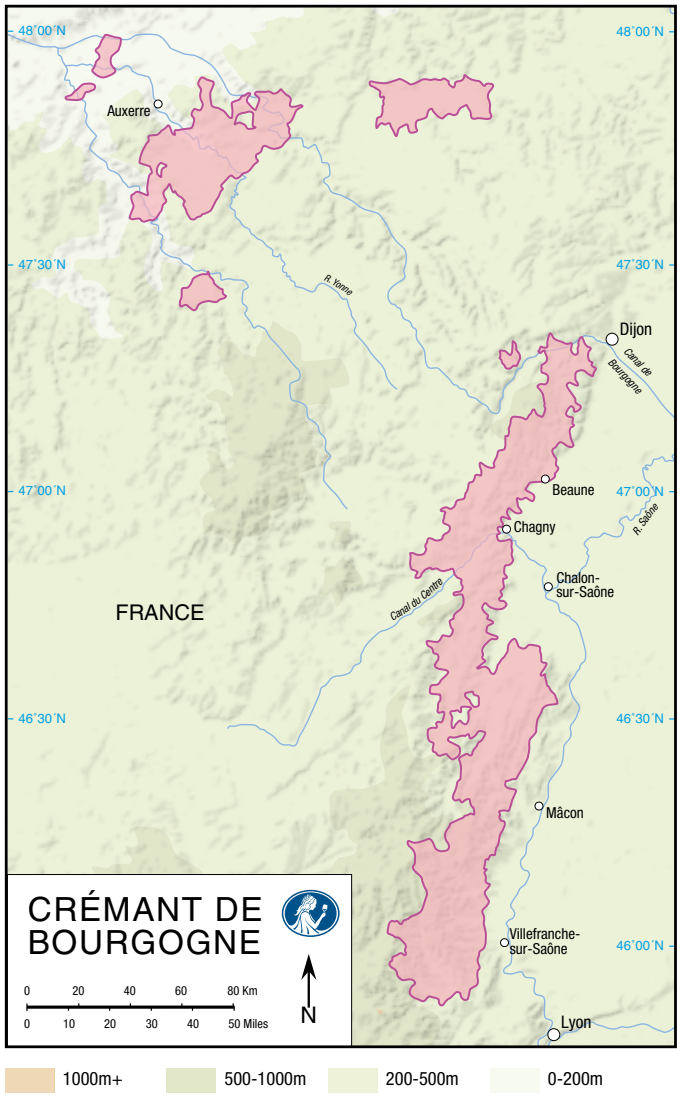
The wines come in a range of styles. Most are white wines made in a Brut style with medium (+) acidity to high acidity. The medium intensity fruit ranges from apple and lemon (cooler areas) to apricot (warmer areas), with brioche and/or biscuit autolytic notes. In addition to the standard white sparkling wines, Blanc de Blancs, Blanc de Noirs and rosé are made.

6.1. The Growing Environment and Grape Growing

The appellation boundary is the same as for Bourgogne AOC. Fruit can be sourced from any of the Burgundy *departéments*: Yonne (Chablis), Côte d'Or (Côte d'Or), Saône-et-Loire (Chalonnais, Mâconnais) and Rhône (Beaujolais). The north to south distance is about 250 km, which can influence style if regional fruit is kept separate in a specific wine (further details in the climate section below).

The main sources of grapes for Crémant are:

- the Mâconnais, especially for Chardonnay (e.g. the large co-operative Cave de Lugny), and the Côte Chalonnaise, especially around Rully
- Beaujolais
- areas around Chablis in the Yonne department and Châtillon-sur-Seine, which is immediately south of the southernmost part of Champagne



The largest single producer of Crémant de Bourgogne, Veuve Ambal, specialises in Crémant. The company owns vineyards in six different areas of Burgundy that provide nearly 30 per cent of their needs: read about their six estates here.

- Hautes Côtes de Beaune and the Hautes Côtes de Nuits
- flatland vineyards on the Côte d'Or.

In general, these areas are the cooler (and therefore better suited to producing grapes for sparkling wine) and/or the cheaper vineyard areas in the Burgundy appellation.

CLIMATE AND VINEYARD MANAGEMENT

Because of the size of the region, there is a range of climates. The northern areas have a cool climate, in that there is typically no distinct hot, dry summer period. This far north, vines need to face south or south-east to gain maximum warmth and light. These areas produce wines with high acidity and a light body.

The central area has the most continental climate, with low, sometimes freezing, winter temperatures, and drier, sunny summers, producing wine with just-ripe fruit and high acidity. However, because of the high value of grapes for still wines on the Côte d'Or, very little of this fruit goes into Crémant.

Vineyard for Crémant de Bourgone

The southern area (Mâconnais, Beaujolais) has a Mediterranean influence, with high summer temperatures, producing wine with riper fruit character and lower acidity. However, they are also at risk from summer storms.

Growers of grapes for Crémant face the common hazards affecting Burgundy as a whole: hail, spring frost, fungal diseases and esca.

The maximum yield for Crémant de Bourgogne is 75 hL/ha. The allowed maximum yield for Crémant de Bourgogne is significantly higher than for the still wines of Burgundy. If growers wish to take advantage of this higher yield, as stated, they are required to declare that the vineyard will be used for Crémant before the end of March, i.e. at the end of winter when decisions about pruning have been made.

GRAPE VARIETIES

The range of varieties typically grown for still wine are also permitted for sparkling wine. These include Gamay, Pinot Gris, Pinot Blanc, Pinot Noir, Aligoté, Chardonnay and Melon. For the proportions of these grape varieties permitted, see Winemaking.

In practice, Pinot Noir and Chardonnay are the dominant varieties for Crémant de Bourgogne as both can display autolytic traits well.

6.2. Winemaking

The base wine is made from early-harvested fruit. The wines go through malolactic conversion if this is desired by the individual producers.

Fully mechanized bottling line at Veuve Ambal

For Crémant de Bourgogne, the blend must be a minimum of 30 per cent Chardonnay, Pinot Noir, Pinot Blanc or Pinot Gris, either alone or in a blend. The maximum permitted amount of Gamay in a blend is 20 per cent. In practice, however, mainly Chardonnay and Pinot Noir are used for white wine as there is very little Pinot Blanc or Pinot Gris planted. Similarly, most rosé wine is made mainly from Pinot Noir.

6.3. Wine Law and Wine Business

The main AOC regulations have been covered – grape varieties, yield and time on lees.

Around two-thirds of Crémant de Bourgogne is made by merchant houses, around 30 per cent by co-operatives and just 2 per cent by independent winemakers themselves. This reflects the high investment costs of producing traditional method sparkling wine. However,

many independent winemakers take grapes grown for Crémant to a specialist sparkling wine producer to make the wine for them and receive the finished bottles back to sell.

Crémant de Bourgogne has seen substantial growth this century. Sales have risen by a third in the decade to 2017. The biggest volumes are marketed by the *négociants* and co-operatives, with the top ten companies being responsible for 90 per cent of volume. Significant producers include Jean Charles Boisset and Louis Bouillot. Exports account for nearly 40 per cent of sales and continue to grow.[2] Principal export markets are the USA and Sweden, with exports rising rapidly in the UK, Belgium and Germany.

To develop a quality hierarchy with Crémant de Bourgogne, and to get a better return for grapes grown for Crémant, two top tiers were recently introduced:

Crémant de Bourgogne Eminent
This category has an additional lees-ageing requirement of 24 months minimum.

Crémant de Bourgogne Grand Eminent
This category has a number of requirements, including:

- for whites: Pinot Noir and Chardonnay only
- for rosé wines only, 20 per cent of Gamay is allowed
- a vintage is optional, but is commonly used
- a minimum of 36 months' lees ageing and three months in the bottle before release
- Brut designation only.

Sourcing grapes can be a challenge for Crémant producers in Burgundy. In addition to the general problems of small harvests affecting the region as a whole (due to hail and frost), rising prices for still wine from Chardonnay and Pinot Noir from Burgundy can reduce the availability of grapes for Crémant. For example, growers in Rully, which used to be a centre for Crémant production, can now get better prices for still wines.

References

1 Récolte, Vins de Bourgogne, Année 2018, BIVB Bourgogne Wine Board, report, received January 2020

2 Personal communication, BIVB, email, January 2020

Loire Valley

7

In total, there are seven sparkling wine appellations in the Loire, three of which are within the Diploma Specification: Crémant de Loire, sparkling Vouvray and sparkling Saumur, all dealt with in this chapter. The production of Crémant de Loire is roughly equal to sparkling Vouvray and Saumur combined. Total sparkling wines account for about 13 per cent of all Loire appellation wines. Production is centred in Saumur for Crémant de Loire and sparkling Saumur.

There is a Champagne connection in the Loire for both Crémant and sparkling Saumur, as major companies are owned by Champagne houses. Bouvet-Ladubay was owned by Taittinger for more than 40 years from the early 1970s; Gratien & Meyer is owned by Champagne Alfred Gratien; and Langlois-Chateau is majority-owned by Bollinger.

Historically, the first sparkling wine cellars in the Loire were based around Saumur due to the availability of caves suitable for ageing wine.

About 90 per cent of Crémant de Loire is white. In general, the Chenin Blanc-dominant wines have medium intensity apple and citrus flavours with light toasty autolytic notes. Wines

with two to three years of age can develop honeyed aromas. The wines have high acidity. Most wines are Brut in style, but Demi-Sec is also made. Brut Nature is increasingly popular. The prices are mainly mid-priced, with a few wines at premium prices.

7.1. Crémant de Loire

Crémant is becoming an increasingly important part of Loire production. In terms of vineyard area declared for Crémant production, this increased from 1,600 ha in 2012 to more than 2,600 ha in 2017. There are about 600 producers of Crémant de Loire.[1]

Fruit for Crémant is grown in the middle Loire districts of Anjou-Saumur and Touraine only. This is about a 200 km stretch of river Loire and its tributaries, which help to moderate the temperature. Within this area, the zone south and south-west of Saumur is the source of most of the fruit for Crémant.

Chenin Blanc for Crémant de Loire

THE GROWING ENVIRONMENT AND GRAPE GROWING

Climate

The Atlantic Ocean extends its cool, mild influence to just east of Tours, in the centre of Touraine. This covers most of the area delimited by the Crémant de Loire appellation.

The cool climate helps to produce grapes with low potential alcohol and high acidity levels, perfect for the base wines used in sparkling wine production. However, fungal diseases and untimely rain (during flowering, fruit set and at harvest) can be a problem.

Soils

In such a large region, there is a wide range of soils, including clay-limestone, flint-clay, sand, gravel and tuff. There is more schist and limestone in Anjou and more chalk in Touraine. Overall, key properties include the good drainage and water retention characteristics of limestone elements. Historically, the underlying tuff rock has been excavated for buildings including castles. As in Champagne, the resulting caves are ideal maturation chambers for lees-ageing sparkling wines as there is little fluctuation in temperature and humidity.

The best-exposed sites are generally used for still wines, as they need a greater level of ripeness, whereas maintaining acidity is more important for sparkling wines. Thus, vineyards for sparkling wine are often likely to be less well-exposed sites with a higher proportion of clay. However, soils with excessive clay are not classified within the appellation, as they would be too cold and lack good drainage.

Due to high lime content in the soils, rootstocks with high tolerance of lime such as Fercal and Riparia Gloire de Montpellier are used to protect the vines from chlorosis.

Grape Varieties

Crémant de Loire can be made from the common varieties of the region – including Chenin Blanc (the major part of most wines), Cabernet Franc, Cabernet Sauvignon, Grolleau Noir and Gris, Pineau d'Aunis, Pinot Noir – and Chardonnay. A maximum of 30 per cent Cabernet Sauvignon and Pineau d'Aunis is allowed in the blend, together or separately. Notably, Sauvignon Blanc is not allowed (though see Saumur Mousseux); its aromatic profile is typically not well suited to traditional method.

Vines are pruned to a greater crop load than for still wine, as the base wines do not require high levels of fruit concentration. The maximum yield is 74 hL/ha. Producers declare in July to make Crémant.

WINEMAKING

The most common type of press used is the pneumatic press, to produce juice with a low level of phenolics. Base wines are typically fermented in stainless steel tanks, as oak flavours are not desired. However, some top cuvées are fermented in oak (e.g. Bouvet-Ladubay's Cuvée Trésor). Practice varies regarding malolactic conversion, with some putting wine through full or partial conversion, while others avoid it.

Wines from different areas within the Crémant de Loire appellation may be blended before second fermentation in the bottle to maintain consistency in the larger brands. Time on lees varies from the minimum nine months (in which primary fruit will be the main characteristic) up to two years (for a more obviously autolytic style). Use of reserve wines is not typical in mid-priced bottlings but is more common in premium wines.

Tuff cave used as cellar

WINE LAW AND WINE BUSINESS

The main AOC regulations have been covered – grape varieties, yield, and time on lees.

Prestige de Loire

A new top tier sparkling Loire category, Prestige de Loire, was launched in 2018 (with wines dating back to 2010) on the initiative of InterLoire. The aim was to establish the wine at a minimum price of €10 in France. It applies across the Crémant de Loire, Anjou, Saumur and Vouvray appellations.

The wines must be white only, made from Chenin Blanc, Cabernet Franc, Chardonnay and Pinot Noir, singly or blended. A minimum of 24 months' ageing on lees is required, the wines must be vintage-dated and must be in the Brut style (including Brut Nature and Extra

Brut). Producers must also achieve a set of environmental standards, aiming at sustainable viticulture, within five years.

Structure of the Industry

Crémant de Loire production is divided between 19 merchant houses, 10 co-operatives and 400 producers. Nine large houses account for 80 per cent of the production.[2] Important companies include Ackerman, Bouvet-Ladubay, Gratien & Meyer, Veuve-Amiot and Langlois-Chateau.

The larger houses make use of both their own fruit and the fruit bought in from growers. For example, Langlois-Chateau owns 73 ha of vineyards in Anjou-Saumur, but also buys in grapes from local growers to bottle under their label. For their Crémant, 25–30 per cent of the crop is grown in their own vineyard, the rest being bought as grapes. Buying grapes rather than must means that the health of the grapes can be checked and then pressed according to requirements.

About half of all Loire sparkling wine is sold in France and the rest exported. The main export markets are Germany, USA and UK.[3]

Range of Crémants and other sparkling wines

7.2. Saumur Mousseux and Vouvray Mousseux

The sparkling wines of Saumur and Vouvray are in many ways like Crémant de Loire, including being made by second fermentation in the bottle and a minimum of 12 months between tirage and release. In both appellations, more sparkling wine is made than still, in a ratio of approximately 60:40. Deep cellars carved from tuff are a feature of both areas and are ideal for lees ageing in bottle.

In both Saumur and Vouvray, *mousseux* is an option within the wider Saumur or Vouvray appellations, which include other options, for example still white wine.

Saumur Mousseux

The vineyard area for Saumur Mousseux is around 1,300 ha. In Saumur, the wines must be a minimum of 60 per cent Chenin Blanc and may contain a maximum of 10 per cent Sauvignon Blanc. Rosé wines must be a minimum of 60 per cent Cabernet Franc and again may contain a maximum of 10 per cent Sauvignon Blanc. Mechanical harvest is allowed, and more juice can be extracted (100 litres from 130 kilos) than for Crémant, enabling producers to make more wine, and in a cheaper way, but at a potentially lower quality.

Vouvray Mousseux

In Vouvray, Chenin Blanc is the dominant variety, which must make up the great majority of the blend (can be 100 per cent) for Vouvray Mousseux. The one other grape variety permitted is Orbois (a white variety local to the Loire), which must make up the minority of a blend.

The vineyard area for Vouvray Mousseux is around 1,200 ha. The production rules are broadly similar to Saumur. There is also a tiny production of Vouvray Pétillant (lightly sparkling) and a growing fashion for Pet Nat.

In both AOCs, vines are pruned to allow a greater crop load, 20 per cent greater for sparkling than for still wine as the base wines do not require high levels of fruit concentration. The maximum yields for sparkling wines are 65 hL/ha for Vouvray and 67hL/ha for Saumur.

It is common for producers in Saumur and Vouvray who focus mainly on still wines to entrust the secondary fermentation stage to a specialist, as a number of producers have neither the equipment nor the expertise to complete the production of sparkling wines. Base wine is transported in bulk to the specialist, who will then carry out the bottling, second fermentation, lees ageing and disgorgement. The bottles are generally returned to the producer for labelling and distribution. Berger Elaborateur in Saint-Martin-le-Beau (Cher Valley) is one of the best-known specialists. However, sparkling wine houses and co-operatives (e.g. Cave de Vouvray) carry out all the stages of production in-house.

Making sparkling wine in Saumur and Vouvray can be an attractive option for growers. There is less risk as grapes can be picked early at lower minimum ripeness (avoiding the possibility of late season rain or botrytis spoiling or reducing the crop) and permitted yields are higher than for still AOC wine.

References

1 *2018-2019 Press pack*, National Federation of Manufacturers and Mixers of Crémant (retrieved 23 June 2022)

2 Morris, R., 2018, *The Loire Sparkles*, Meininger's Wine Business International, p. 34 (retrieved 23 June 2022)

3 *Économie du vignoble du Val de Loire, 2019*, Vins du Val de Loire, p. 17 (retrieved 23 June 2022)

Cava

8

Traditional method sparkling wines have been made in Spain since the late nineteenth century, principally in or close to the city of Barcelona, in Cataluña in north-east Spain. The early pioneers included members of the Ferrer and Raventós families who founded the Freixenet and Codorníu groups of companies. These two companies are by far the biggest producers today.

The word Cava began to be used informally in the 1960s, as the industry recognised it would need a generic term for traditional method sparkling wine on the journey towards Spain's eventual membership of the EU. Cava became enshrined in Spanish law in 1972 as a protected denomination for sparkling wines made by the traditional method. When Spain joined the EU in 1986, Cava was recognised as a quality sparkling wine produced in specific regions. In 1989, the EU authorities gave it PDO (protected designation of origin) status named after a wine, rather than a place. However, unusually for a PDO wine, grapes can be sourced from a number of different, unconnected areas. Wine production is regulated and overseen by the *Consejo Regulador del Cava*.

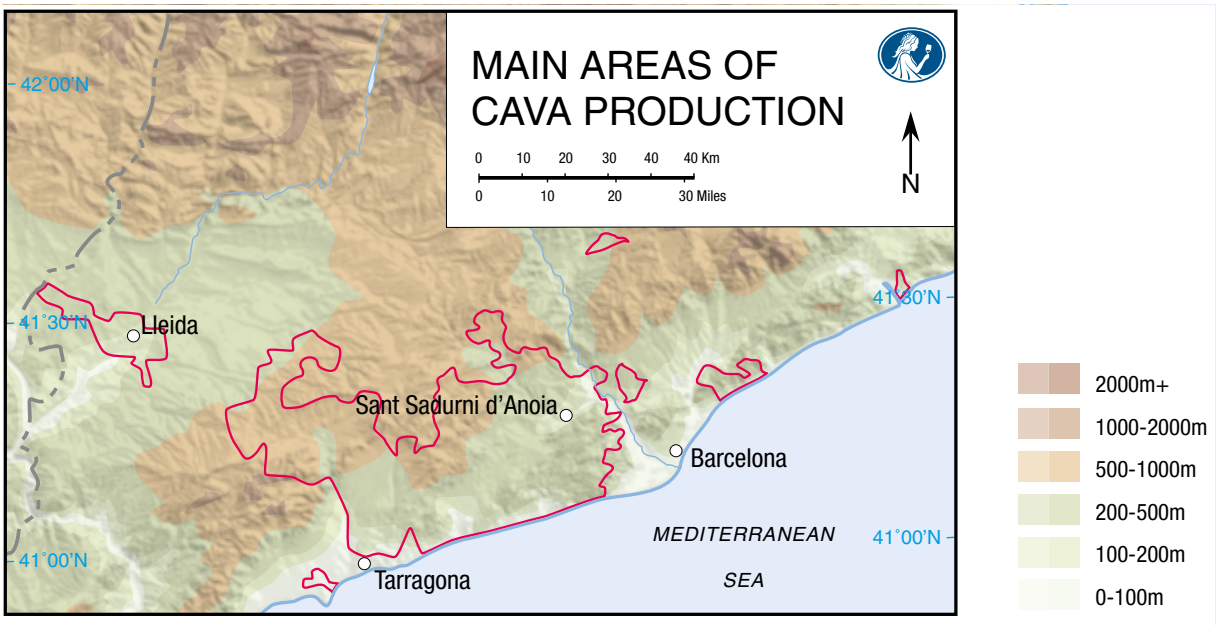
Traditionally, the wines were made from three local varieties: Macabeo, Xarel-lo and Parellada. Chardonnay is increasingly used in blends, though quality producers are also putting renewed emphasis on the local varieties.

8.1. The Growing Environment and Grape Growing

LOCATION AND CLIMATE

Most grapes for Cava are grown and most Cava is produced within Penedès in Cataluña – more than 95 per cent in both cases. Grapes may also be grown and Cava produced in a number of areas other than Cataluña, for example, in parts of Rioja (500 km from Barcelona) or Valencia (350 km to the south of Barcelona).

There are significant differences between the locations in which Cava is made. The more important areas are Penedès, Lleida and Tarragona.



Cataluña

Penedès region – This is the main area of production and has a predominantly Mediterranean climate with bright, sunny summers, mild winters and moderate rainfall (540 mm) spread through the year. The vineyards range from the coast to higher altitudes inland with the largest extent being at 200–300 metres. A minority of vineyards are up to 700–800 metres above sea level. Here, summer nights can be distinctly cool, producing grapes with more intense flavours and higher acidity than grapes grown at more typical, lower altitudes. The soils vary too, from alluvial soils and clay at lower altitudes to stony clay and granite sub-soils at higher altitudes. All soils types are relatively poor in nutrients, with adequate drainage and water retention making them suitable for viticulture.

These variations express themselves in the styles of wines made. For example, Macabeo-based wines made from grapes grown in higher altitude vineyards have more flavour and higher acidity than grapes grown closer to sea level, giving them an ability to age well in the bottle. There is a myriad of blending opportunities available to producers, making this the prime location for Cava production. For the Clàssic Penedès DO (*Denominaciones de Origen*), see Recent Developments in Cava and Other Spanish Sparkling Wines.

The principal towns are Sant Sadurní d'Anoia, in and around which the principal Cava producers are located, and Vilafranca del Penedès, where the *Consejo* has its headquarters.

Vineyard near Sant Sadurní d'Anoia

Lleida province – Lleida is the Catalan name for this province, which is called Lérida in Spanish. The land in this province rises up into the mountains, including both slopes and a high plain (range is 100–700 metres). The climate is Mediterranean nearer the coast with increasing continental influences further inland. An irrigation system with water from the Pyrenees has turned this former semi-desert into productive vineyard land. It also can be used

to provide frost protection in spring. In general, wines have riper fruit flavours from grapes grown lower down and have fresher flavours and higher acidity from grapes grown at higher altitude.

The province is important for the pioneering 2,200–hectare Raimat estate, producing mainly still wines. This is the largest single-vineyard estate owned by one family in Spain, the Raventós, who also own Codorníu. It pioneered growing Chardonnay that goes into Raimat and Codorníu wines.

Tarragona province – The grape-growing areas are mainly low lying or undulating hills with a Mediterranean climate. The wines here are quite simple in the main, Macabeo-dominated and for early drinking. Within the province, the Conca de Barberà area is the home of Trepat, the black variety that is increasingly valued for Cava Rosado (rosé wines).

Other Areas of Northern Spain

The most important other area is in Rioja, where the Cantabrian Mountains protect the region from excessive rainfall coming from the Atlantic. Grapes grown at higher altitudes (e.g. in Rioja Alta at 425 m above sea level) can have higher acidity than fruit grown at lower altitude, which makes them particularly well suited to quality sparkling wines. The only varieties used here for Cava are Macabeo (locally known as Viura) and Chardonnay. Macabeo ripens much later here than in Penedès where it typically grows as lower altitude.

GRAPE VARIETIES

White Grape Varieties

Local white grape varieties, Macabeo, Xarel-lo and Parellada, make up the vast majority of plantings for Cava, with smaller, but still significant, plantings of the international variety, Chardonnay. The varieties are picked at different times and each grape variety may be picked over a one- to two-week period to gain different characteristics, and to provide different base wines for blending.

Macabeo – This grape variety makes up 37 per cent of vineyards registered for Cava.[1] It is typically planted at 100–300 metres above sea level in Penedès but with some planted higher in Rioja and Lleida. It is late budding (and thus less at risk from spring frosts), is picked first of the local varieties and is high yielding. Macabeo is susceptible to botrytis bunch rot and bacterial blight (a serious disease associated with warm, moist conditions which reduces yields and for which there is no cure). Wines made from Macabeo have light intensity apple and lemon aromas and flavours. In areas other than Cataluña, Macabeo (Viura in Rioja) is the only Spanish indigenous white grape planted, and on occasion in those areas produces a single varietal Cava. However, increasingly, and more normally, it is blended with Chardonnay.

Xarel-lo – This grape variety accounts for 26 per cent of vineyards registered for Cava and is typically planted at sea level and up to as high as 400 metres in Penedès. It is indigenous to Cataluña. Mid-budding (and therefore prone to spring frosts in some years) and ripening, it is susceptible to powdery and downy mildew, but otherwise has good disease resistance. It gives greengage and gooseberry notes, has herbal (fennel) notes that set it apart from the other varieties and can become earthy when fruit is over-ripe. It has a reasonable affinity with oak.

Parellada – This grape variety makes up 19 per cent of vineyards registered for Cava and is typically planted on higher sites (e.g. 500 m) in Penedès. It is indigenous to Cataluña and is the lowest yielding and latest ripening of the three main indigenous Spanish white grapes. The best vineyards are planted at highest altitudes. It needs to be planted at altitude to give it a long-ripening season to reach flavour maturity without excessive potential alcohol. It adds finesse and floral notes. It is early budding (and is therefore prone to spring frosts) and susceptible to powdery mildew.

Chardonnay – This grape variety makes up 9 per cent of vineyards registered for Cava. It adds body, richness and finesse. The choice of clone and rootstock are vital for balanced ripeness because otherwise it would ripen too quickly and accumulate too much potential alcohol.

Black Grape Varieties

Small volumes of rosé Cava (Rosado) are also made using the following varieties.

Garnacha Tinta – This grape variety is used less and less because of its tendency to oxidise but contributes ripe red fruit and some spicy notes.

Trepat – Trepat is a variety local to Conca del Barberà with strawberry flavours and high acidity. It can legally only be used in Rosado production, but is increasingly used in that style.

Pinot Noir – Pinot Noir is used for Rosado blends and as a single variety; it is often made into Blanc de Noirs wines.

Monastrell is allowed in the production of Cava but is little used. Tempranillo is not permitted in Cava production.

VINEYARD MANAGEMENT

Vines are typically planted at low to moderate densities (1,500–3,500 vines/hectare) with either traditional bush vines or single or double cordon. Low-density vineyards with moderately high yields are suitable because producers are not looking for intense primary flavours in base wines. Irrigation is permitted, though strictly controlled, to relieve hydric stress and protect the future viability of vineyards. Yields may not be increased by irrigation.

Rootstocks are chosen for tolerance to lime, where needed, and to control vigour. Macabeo in particular tends to grow excessive shoots and leaves and produces little fruit if planted on the wrong rootstock.

Misty, humid mornings mean that botrytis and downy mildew can be a threat. Powdery mildew can also be an issue during periods of dry weather. Vines are treated with copper and sulfur to counteract them. Canopy management measures, such as removing leaves from the north side of the row, are used to aid air circulation and reduce shade within the canopy. Grapevine moth is an issue, with some producers treating this using sexual confusion techniques.

Grapes are typically tested for sugar levels, acidity and pH in order to make a decision on picking dates. Full phenolic ripeness is not needed for most Cava, as the juice will be extracted quickly to avoid excessive phenolic pick up. Low potential alcohol and appropriate acidity are important criteria in setting a picking date, which is typically earlier than for still wines.

A recent development has been testing for gluconic acid values (indicator of botrytis infection) in grapes. Too high a level can have a negative effect on yeast in the secondary fermentation process and will result in a subsequent drop in wine stability. If grapes have values that are too high, they will be rejected, maintaining the quality of the final wine.

Producers can choose whether to pick mechanically or by hand. The vast majority of grapes are harvested by hand (90 per cent) as vineyards are very widely scattered in ownership, fragmented and on very uneven terrain, though gradually more grapes are being machine-harvested. Grapes for high-quality wines are all picked by hand. Most of Freixenet production is from small contracted growers and is picked by hand, while Codorníu have their own vineyards in Penedès and at Raimat, which are mostly picked mechanically. Recent improvements in mechanical harvesting have meant that this method can deliver 80 per cent whole berries. In addition, grapes can be picked at night, raising quality at lower price points.

Basic fruit, if handpicked, can be selected in the vineyard and transported in 25 kg crates. Handpicked premium fruit is transported in smaller crates (e.g. 10 kg) to avoid grapes splitting, which could lead to microbial spoilage. Quality focused producers often press whole bunches for base wines with low phenolic content. The big companies press grapes in the region where they are grown to avoid oxidation and to maintain quality. The juice is refrigerated and transported to the main wineries in Sant Sadurní d'Anoia.

8.2. Winemaking

Pneumatic presses are used for a soft press. This is to maintain wine quality by avoiding the extraction of phenolics. Rosado must be made from a minimum of 25 per cent black grapes and by contact with the skins, rather than by blending red and white base wines. Yield is restricted to 79 hL/ha with a limit of 100 litres being pressed from 150 kg of grapes.

Grapes are typically picked early enough to have sufficient natural acidity without adjustment. Large producers use cultured yeasts, either from strains that they propagate themselves (Freixenet; Cevipe co-operative) or that they buy in (Codorníu, choosing the appropriate strain for the conditions in each vintage). The first fermentation takes place in large-format stainless steel tanks at controlled temperatures, 14–16°C (57–61°F), to preserve fruity aromas. Malolactic conversion is typically prevented to preserve acidity. Thereafter the wines are made by the traditional method.

The wines are typically from the fruit of one season, whether they are marketed as vintage or non-vintage. The use of reserve wines is not common because vintage variation is limited and storing reserve wines would add cost.

Historically, wines were disgorged by hand, but Cava producers, in line with the large volumes produced, were the early adopters of the gyropalette on an industrial scale. More recently, the process of disgorgement has been made even faster. This has been achieved by a combination of yeast strain selection and the use of bottles with smooth glass on the inside surface to speed up flocculation. In addition, an automated rotating drum has been developed to replace the gyropalette. The entire disgorgement process can now take as little 80 minutes. The large companies plan to match disgorgement and finishing dates to reflect peaks in demand.

Most Cava is Brut with 8–9 g/L as a typical dosage level. Medium-Dry (Semi-Seco) is popular in certain markets (Spain, Germany). Quality producers have a new focus on the Brut Nature style.

8.3. Wine Law and Wine Business

Grape varieties and yields have been dealt with above. While most Cava is Brut in style, young Cava and Cava *Reserva* may be produced in a range of styles of sweetness. However, Cava *Gran Reserva* and *Cava de Paraje Calificado* (see below) may only be Brut, Extra Brut or Brut Nature.

Historically, there were three main categories of Cava with different styles:

Cava

Young Cava must undergo a minimum nine months of lees ageing (tirage to disgorgement). When made as a white wine, it has light to medium intensity lemon, apple and herbal notes, light brioche and/or biscuit autolytic notes and medium to medium (+) acidity. The wines are typically acceptable to good in quality and inexpensive to mid-priced.

Cava Reserva

Reserva must spend a minimum of 15 months ageing on lees, meaning that the autolytic notes are more evident. The wines are typically good to very good in quality and mid-priced.

Cava Gran Reserva

These wines must undergo a minimum 30 months of lees aging, and so can show pronounced toasty, smoky autolytic notes. The wines are typically very good to outstanding in quality and premium in price.

However, in response to discontent with the perceived image of Cava as an inexpensive wine of only good quality, Cava DO has responded in two ways. First, in 2017, the new category of Cava de Paraje Calificado, single estate Cava, was introduced. Then, changes were made in 2022 merging the three above categories and Cava de Paraje Calificado into two new categories: Cava de Guarda and Cava de Guarda Superior. The requirements for the new categories are set out below.

Cava de Guarda

This is the new name for young Cava DO category, requiring a minimum of nine months of lees ageing in the bottle. In addition, now the wine must be traceable from vineyard to bottle.

Cava de Guarda Superior

This new category includes Cava Reserva, Cava Gran Reserva and Cava de Paraje Calificado. All wines labelled in this way will have to:

- be made from vines that are a minimum of 10 years old
- be certified grown organically
- have a maximum yield of 10 tonnes per hectare
- be traceable from vineyard to bottle
- state the year of harvest.

In addition, Cava de Guarda Superior wines may use the ‘100% Integral Producer’ (Elaborado Integral) stamp if the company carries out the entire production itself (growing the grapes to bottling the wine).

They may also state their zone of origin. This can be either a large area such as Comtats de Barcelona or a subzone such as Valls d’Anoia-Foix.

The *Consejo Regulador del Cava* administers four separate registers regarding the whole production process of Cava. These are:

- growers
- producers of base wines
- storekeepers of base wines
- Cava producers

Although these are separate registers, it is feasible, and quite common, for a Cava producer to figure on all four registers.

There is a good deal of cross flow between all four entities and across all geographical regions. For example, it is legal, indeed common, for grapes grown in Tarragona to be turned into base wines there, but to be transported up to the Barcelona region to be turned into finished Cava, so long as all movements are appropriately logged and all other legal parameters are met with.

As previously mentioned, Cava production is notable for the huge scale of the biggest companies. Freixenet and Codorníu produce around 75 per cent of all finished Cava. The Cevipe co-operative processes 55 million kilos of grapes a year but produces no finished Cava. It sells base wines to other companies (e.g. Freixenet).

Total shipments of Cava were 250 million bottles in 2019, just under one-third of which went to Spain and the rest was exported. The shipments grew rapidly from 1980 to 2010 and has plateaued since then. The high-volume export markets are Germany, Belgium, UK and USA. The basic Cava category makes up 88 per cent of the wine sold with Reserva accounting for 11 per cent and Gran Reserva and Cava de Paraje Calificado 2 per cent together. Rosado makes up 9 per cent of sales.[2]

Cava sales have increased by just over 50 per cent since 2000, but by only small percentages since 2010. Recent initiatives are intended to raise standards and to increase sales in the context of increased demand for sparkling wine around the world.

RECENT DEVELOPMENTS IN OTHER SPANISH SPARKLING WINES

Other producers and areas historically associated with Cava have also responded to the perceived image of Cava. Two Spanish regions have created categories for traditional method sparkling wines.

In 2014, the Penedès DO introduced a category called Clàssic Penedès for sparkling wines made from certified organic grapes grown in the DO. The wine must be made by the traditional method with a minimum of 15 months ageing on the lees. The strapline is ‘making DO Penedès the first appellation in the world to offer a category of premium sparkling wines that are 100% organic’. Producers using this category include Albet I Noya and Loxarel.

Can Cava become more than a very successful commodity wine? Read Andrew Jefford’s opinion piece: Cava fights back.

Also in Penedès, a number of high quality producers (examples include Gramona and Recaredo) left the Cava DO in 2019 and founded the producer group Corpinnat. This commits members to making sparkling wines by the traditional method with 100 per cent organic grapes, grown in Penedès, harvested by hand and vinified entirely on the premises of the winery. 90 per cent of the grapes used must be approved local varieties. The wines can be labelled Corpinnat. There are three categories with minimum ageing on the lees of 18, 30 and 60 months.

In 2017, the Rioja DOCa (Denominación de Origen Calificada) approved the use of the name Rioja for sparkling wines with the new category, Espumoso de Calidad de Rioja (Quality sparkling wine of Rioja) and implemented it in 2019. The grapes must be hand harvested and the wine made by the traditional method. There are three tiers: Crianza, aged on the lees for a minimum of 15 months; Reserva, minimum 24 months; Gran Añada, minimum of 36 months.

References

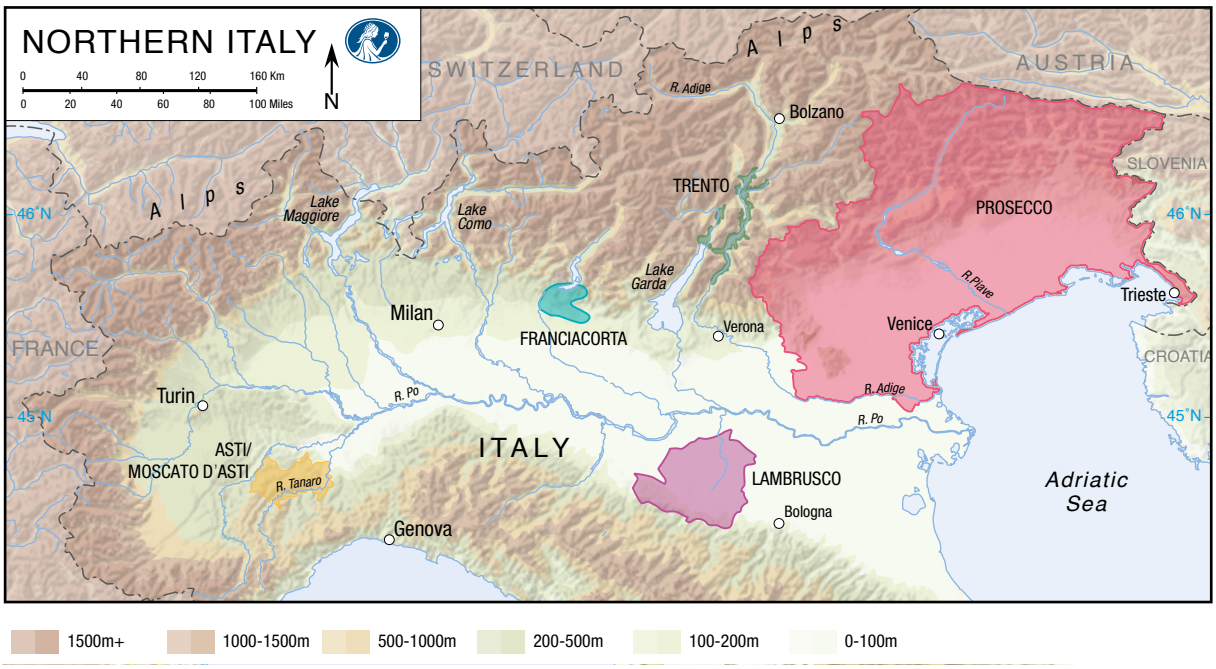
1 2019 data, *Cava 2020 global report*, D.O. Cava (retrieved 22 September 2021)

2 As above.

Sparkling Wine in Italy

9

Sparkling wine is made in most Italian regions, often for a local market. This study guide covers Prosecco, Asti, Lambrusco, Franciacorta and Trentodoc.

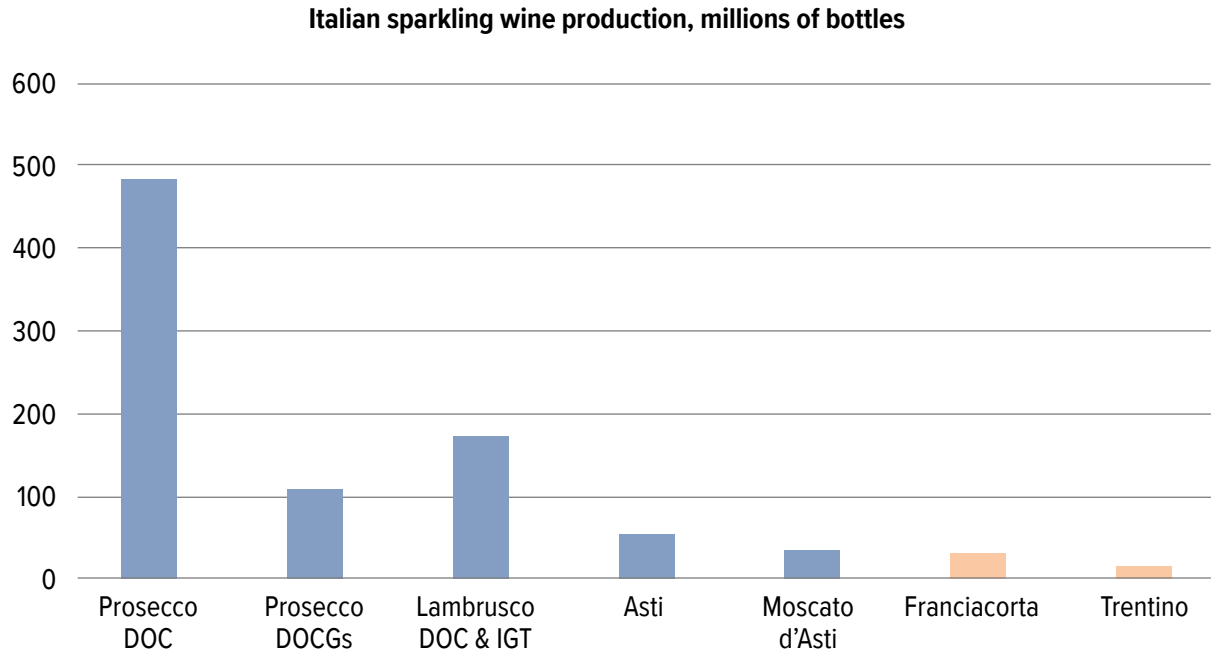


In recent years, Italy has become a major producer of sparkling wine due to worldwide demand for Prosecco. As a result, Italy overtook France as the largest exporter of sparkling wine by volume in 2009 and has consolidated that position since then. (France remains the largest exporter by value.)

Within Italy, there are two sectors:

Tank method – the great majority of Italian sparkling wine production is made by the tank method and half of this is Prosecco. The tank method for sparkling wine was developed in Italy in the late 1880s (named after Martinotti) and refined by the Frenchman, Charmat. Prosecco and Lambrusco are mainly made by this method. Asti uses a variation on the method. Tank method wines are classified depending on their level of pressure in the bottle: either as *spumante* (minimum 3 bar of pressure) or *frizzante* (1–2.5 bar).

Traditional method – In terms of bottles produced, the traditional method wines covered in this study guide together produce an equivalent of around four per cent of all Prosecco production. Franciacorta production is nearly 18 million bottles per year and Trentodoc just over 9 million.[1] The entire traditional method sector is one-tenth of the size of Champagne production.



Sources: Data from 2019 and 2020 as available, Il Corriere Vinicolo, WineNews, Drinks Business.[2]

Note: This chart is produced from data from different sources and has been created to give a general picture only of the levels of production of the Italian sparkling wine regions.

References

1 These are 2019 production figures that are more typical of recent years than the 2020 figures that were affected by the Covid pandemic. Sources: Franciacorta consortium (private communication, email 27 September 2021), Trentodoc consortium (private communication, email 30 November 2021).

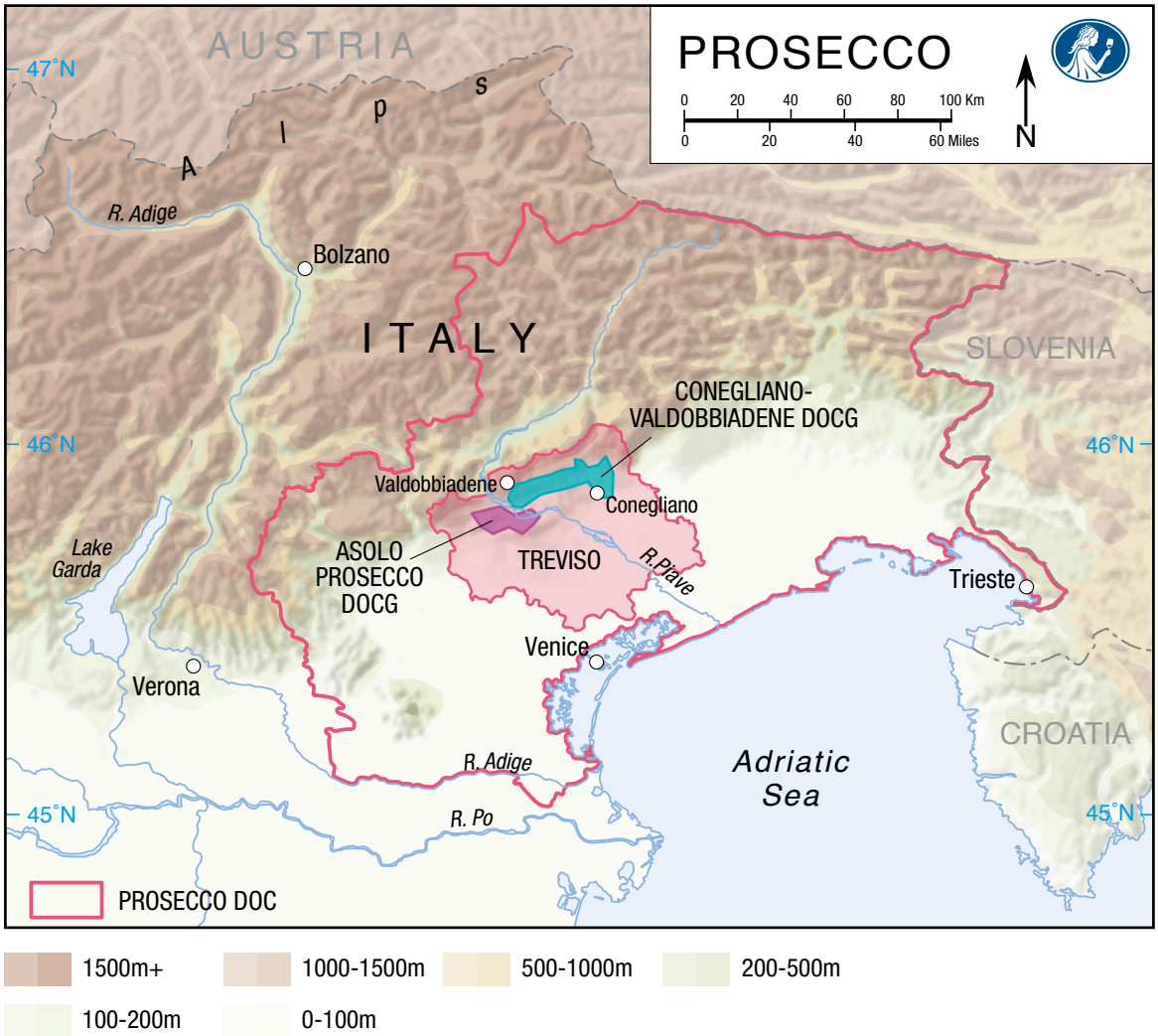
2 *L'Italia dello spumante vale 750 milioni di bottiglie, Dossier Spumante* 2021, Il Corriere Vinicolo, Unione Italiana Vini, 3 May 2021 (2020 production figures unless otherwise stated; retrieved 23 June 2022), Schmitt, P., 20 March 2020, *Category analysis: A rosé future for prosecco*, Drinks Business, (2019 production figures, retrieved 23 June 2022); Istituto Trentodoc, private communication, November 2021; *Lambrusco, nasce un "superConsorzio" unico da 16.600 ettari e 170 milioni di bottiglie*, WineNews, 29 September 2020, (2019 production figures; retrieved 23 June 2022).

Prosecco

10

Prosecco is principally made from the Glera grape variety grown in north-east Italy and made with the tank method. It has light to medium (-) intensity apple and pear aromas, a light body, medium to medium (+) acidity and low or medium alcohol. In terms of sweetness, the wines range from Brut to Demi-Sec, with Extra Dry being the most common style. They are produced in both fully sparkling (*spumante*) and lower pressure (*frizzante*) styles.

The wines are mainly acceptable to good quality in Prosecco DOC (Denominazione di Origine Controllata) and good to very good quality in Conegliano Valdobbiadene DOCG (Denominazione di Origine Controllata e Garantita) area. The DOC wines are mainly of light intensity, while the DOCG wines typically show medium intensity and greater definition and range of primary fruit than the DOC wines (pear, apple, peach). The price of DOC wines is mainly mid-priced with some inexpensive examples in supermarkets. The DOCG wines are mainly mid-priced, with a few wines at premium prices.



Prosecco has been a huge commercial success that in turn led to the revision of the DOC/Conegliano Valdobbiadene DOCG regulations in 2009. The principal variety now officially

known as Glera was previously known as Prosecco. The name was changed so that Prosecco could be used to designate defined areas that were entitled to use the name and to prevent other regions or countries from exploiting the success of the name.

Since then, there have been the following PDOs:

Prosecco DOC

The former IGTs (Indicazione Geografica Tipica) devoted to Prosecco, covering nine entire provinces in the regions of the Veneto and Friuli, were combined and expanded to become this vast DOC from Trieste to Vicenza, with plantings now at 24,000 ha.[1] While the denomination includes mountains and hills, the grapes are overwhelmingly grown on the plain. The geographical indications Treviso or Trieste may be added Prosecco DOC if the grapes have been grown and the wine made within these two areas. From the point of view of volume of production, Treviso is much more important.

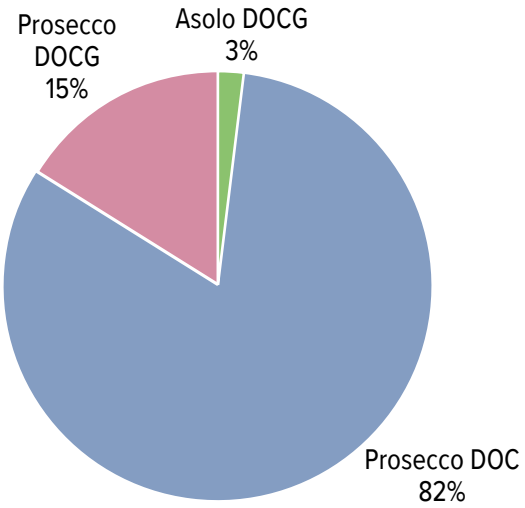
Conegliano Valdobbiadene – Prosecco DOCG

This is the hilly, historic area between the towns of Conegliano and Valdobbiadene (8,100 ha)[2] in the Veneto. In 2009, it was promoted from DOC to DOCG. Most vineyards are between 200–320m. The name of the DOCG is Conegliano Valdobbiadene – Prosecco. Producers must use either or both names of the towns of Conegliano and Valdobbiadene. Within the *spumante* category, the term 'Superiore' may be added and/or 'Prosecco' omitted. In this case, Superiore is part of the name of the wine and implies no difference in terms of winemaking (e.g., it does not require a higher alcohol level).

Asolo Prosecco DOCG

This is a separate DOCG of more than 2,000[3] ha in the hilly area south of Valdobbiadene. Within the *spumante* category, the term 'Superiore' may be added.

Production volumes in 2020 in the three denominations are summarized in the following chart:



Sources: Consortiums of Prosecco DOC, Conegliano Valdobiaddene DOCG and Asolo DOCG

10.1. The Growing Environment and Grape Growing

CLIMATE AND SOILS

The climate in Prosecco DOC in general is warm and moderately continental, with moderate rainfall. The flat plain is affected by moist air and fog from the rivers of the region, increasing the number of sprays needed to combat disease. In the hillier areas of the two DOCGs there are cooling influences coming from altitude itself and the higher diurnal temperature ranges, which make for longer, slower ripening. As a result, wines from the DOCG areas can have higher acidity and more intense fruit flavours.

Soils across this very large region vary considerably, but, in general, they are more fertile on the plain, contributing to higher yields and lighter intensity wines.

GRAPE VARIETIES

Glera

Glera is a vigorous, semi-aromatic variety capable of very high yields. It is susceptible to millerandage, to powdery and downy mildew, to drought in summer and to grapevine yellows. As the first two buds do not bear much fruit, it has to be trained long, typically on vertically trellised systems with 8–12 buds (see the next section). Low to medium planting densities (3,000 plants per hectare) are normal due to the vigour of the variety. The permitted yields are high – see Wine Law and Wine Business.

Scientific research has identified three varieties called Prosecco, but in practice, these are normally blended.

While many wines are 100 per cent Glera, up to 15 per cent of other local varieties or certain international varieties are permitted.

VINEYARD MANAGEMENT

Training, Pruning and Trellising

Common options for Glera are Sylvoz, double-arched cane and single or double Guyot.

Sylvoz – This is a high cordon system with shoots that hang downwards. It is well suited to high vigour sites such as on the fertile, flatter land of Prosecco DOC and where the aim is for high yields, but it is sometimes used in Conegliano Valdobbiadene DOCG. It is inexpensive to create initially, minimises winter pruning and is suitable for machine harvesting, all of which reduces cost. The height of the cordon provides some protection from frost. The disadvantages are that it may encourage over cropping, it requires careful monitoring and trimming of the canopy to avoid excessive shading and it is difficult to distribute the clusters evenly.

Double-arched cane – This is a form of replacement cane pruning where the canes are

Double arched cane

bent into arches. This improves the evenness of growth and the fruitfulness of Glera and it increases the ventilation of the canopy, reducing the incidence of fungal diseases. This system is very common on the hillside sites of Conegliano Valdobbiadene DOCG where high fruit quality is the main aim. The disadvantages are that individual branches must be tied in on every plant (adding to cost) and care must be taken to maintain an open canopy by repeated shoot thinning.

Guyot – This form of training is used on the flatter land where, after winter pruning, it is possible to work with machines, reducing cost.

Vineyard Management in Prosecco DOC

In general, work in the vineyard and harvesting on the flatter land of Prosecco DOC can be done by machine. The vineyards are large and there are considerable economies of scale. High yields of grapes on the plains lead to wines of lower concentration. In the DOC, mechanical harvest is the norm, saving on cost.

Vineyard Management in Conegliano Valdobbiadene DOCG

The best wines in this DOCG come from south-facing hillside sites leading to more concentration in the final wine. This is due to reduced fertility (poorer soils and better drainage than on flatter sites) with greater day/night temperature differences and therefore slower growth. Consequently, there is a longer season for flavours to develop in the grapes and higher acidity. Lower, but still generous, yields in this DOCG area lead to higher concentration of flavours. The steepest parts of this DOCG are terraced with grassy banks called *ciglione*. These must be maintained and repaired, adding cost.

Work has to be done by hand in the steeper parts of the hills of this DOCG area, at higher cost. In this DOCG, producers choose whether to pick by hand (adding cost) and or whether to machine harvest. Fruit for the categories Cartizze, Rive and *sui lieviti* (see below) must be picked by hand.

Grassed terraces in the DOCG

Prosecco DOC vineyard

Cartizze vineyard

10.2. Winemaking

If the grapes have been picked by hand, then the winemaker can choose whether to press whole bunches (which some believe preserves primary fruit flavours) or to destem and press.

Fermentation of the base wine lasts for 15–20 days at a controlled temperature of around 18°C (64°F) to preserve primary fruit. Malolactic conversion is blocked for the same reason and to retain acidity. Second fermentation in tank takes one month at 12–15°C (54–59°F), again to preserve the primary fruit. After a short time on the lees (a few weeks), the wines are then chilled, filtered and bottled.

Traditionally, Prosecco has been made without final adjustment of the sweetness (i.e. no dosage). The winemaker calculates how much sugar is required at *tirage* to provide both the required level of CO_2 (*spumante* or *frizzante*) and the sugar that will remain in the final bottled wine (Brut, Extra Dry, Dry). However, since 2014 it has been possible to adjust the sweetness when the wine is racked off the lees of second fermentation.

Some quality-focused winemakers, especially in Conegliano Valdobbiadene DOCG area, slow the process of second fermentation down (by lowering the temperature) or age the wine on the lees for a few months for extra complexity. There are a few examples of a longer form of tank method, *Charmat lungo*, conventionally regarded as keeping the wine in contact with the lees for at least nine months. Contact with the lees is ensured by agitating the lees with an insert within the tank.

OTHER STYLES OF PROSECCO

Prosecco Col Fondo/*sui lieviti*

This is a traditional style typically producing lightly cloudy, dry wines in a *frizzante* style. The phrase *rifermentazione in bottiglia* (refermentation in the bottle) must appear on the bottle. Second fermentation is in the bottle and the wine is left undisgorged and is bone dry. It is typically finished with a crown cap and contains sediment. It can be aged for a short time. Production levels are tiny, but, as with Pet Nat, it is fashionable in some wine bars and specialist wine retailers. The traditional name for this style is Col Fondo. However, Conegliano Valdobbiadene DOCG regulations now require the wines to be called *sui lieviti* (on the lees).

Tranquillo

A tiny amount of still wine is made, labelled *Tranquillo*.

10.3. Wine Law and Wine Business

WINE LAW

All Prosecco categories require the wine to be made with a minimum of 85 per cent Glera. High yields are permitted with lower limits for the higher quality denominations:

- **Prosecco DOC** – maximum yield is 125 hL/ha
- **Conegliano Valdobbiadene DOCG** – maximum yield is 94.5 hL/ha;
  - if with a mention of a ‘Rive’, 90 hL/ha
  - Superiore di Cartizze DOCG or Cartizze – maximum yield is 85 hL/ha
- **Asolo Prosecco DOCG** – maximum yield is 94.5 hL/ha, the same as Conegliano Valdobbiadene DOCG

There are no minimum ageing requirements, as the aim is to express the primary fruit in the wine. The wine must be sold in bottle. If labelled with a vintage, then the wine must be 85 per cent of that vintage.

Rive + place name – Rive is a local word meaning the slope of a steep hill and is followed by a place name (e.g. Rive di Soligo), the name being a single commune or vineyard. The grapes for a Rive wine must be grown in one of 43 Rive, picked by hand and harvested at lower maximum yields and the vintage must be shown on the label.

Superiore di Cartizze DOCG or Cartizze DOCG – A historic, delimited single-vineyard of 108 hectares located in Valdobbiadene with a requirement for a lower yield and only made in the *spumante* style. With steep hillsides and vineyards on slopes with very good drainage, this has traditionally been regarded as the highest quality area, producing wines with a fuller body and, normally, residual sugar above the level of Brut. The word Prosecco is not normally used in conjunction with Cartizze, thus the bottles are labelled either Valdobbiadene Superiore di Cartizze DOCG or Valdobbiadene Cartizze DOCG.

The indication of the vintage on the label is only required on Rive wines and *sui lieviti*.

WINE BUSINESS

Prosecco (both DOC and Conegliano Valdobbiadene DOCG) has seen outstanding growth recently, led by exports.

Asolo has also expanded rapidly. While production levels are small compared to the other two denominations, production rose from one million to 18.7 million bottles in the period 2013–2020.[4]

Prosecco DOC

Prosecco DOC accounts for roughly half of Italy's considerable sparkling wine production on its own and has led Italy to become the world leader in the export of sparkling wine by volume. It more than doubled in production between 2011 and 2016.[5] Production volumes in 2020 reached 500 million bottles, Of these, 80 per cent were sparkling (*spumante*) white wine, 17 per cent semi-sparkling (*frizzante*) and 3 per cent the recently introduced rosé sparkling.[6]

The average size of vineyard holdings is rising, but still averages around 2.5 hectares, with many growers selling their grapes to merchants and co-operatives. There are roughly 11,600 growers, but only 1,200 producers of base wine and only 350 makers of sparkling wine, including large companies such as Zonin. Co-operatives account for just over half of the fruit grown, while private companies bottle three-quarters of the wine.[7] In other words, co-operatives make large volumes of base wine that they sell to private companies to finish. Treviso is both the most important area for the volume of production and for the sale of base wines to the bottling companies. As noted, the name Treviso can appear on labels after Prosecco DOC as long as the fruit is grown and the entire production takes place in the Treviso province.

The domestic market (22 per cent by volume) has seen steady growth. In Italy, nearly 70 per cent is sold in supermarkets. Exports (78 per cent) tripled in the decade to 2014. The main exports markets by consumption are UK, USA and Germany. These three markets account for nearly two thirds of all exports by volume.

In these large markets, Prosecco has become a brand and is seen as an everyday luxury. In some markets, it appears to be bought as an alternative to the cheapest discounted Champagne or as an alternative to still, inexpensive and mid-priced rosé. The popularity of Prosecco cocktails has also contributed to this growth. After the substantial growth of recent times, the aim is now to stabilise and maintain the current levels of sales in the face of increasing competition.

In 2019, Prosecco DOC added the Brut Nature and Extra Brut categories aimed at those who are looking for a drier style. As a result, it will be sold in the full range from Brut Nature to Demi-Sec. In 2020, the category of Prosecco DOC *spumante* rosé was introduced, to be made from Glera with up to 15 per cent of Pinot Noir, made as a red wine. It can only be made as *spumante* and the range of sweetness is limited from brut nature to extra dry.

A challenge for Prosecco DOC has been to protect the name. Some Australian growers (for example in the King Valley) are continuing to use the name Prosecco for their Glera-based sparkling wines.

All the Prosecco denominations require the wines to be sold in bottle only and they have been vigilant to stop other sparkling wines being sold on tap as Prosecco.

Conegliano Valdobbiadene – Prosecco DOCG and Asolo DOCG

For Conegliano Valdobbiadene DOCG wines, Extra Dry is the most common style (around 60 per cent) followed by Brut (around 30 per cent). In 2019, an Extra Brut category (0–6 g/L) was introduced.

The 32 large companies each producing more than 1 million bottles a year account for nearly 90 per cent of production. Around 60 per cent of Conegliano Valdobbiadene DOCG wine is sold in Italy (the largest sales are in northern Italy) and 40 per cent is exported. While sales in Italy have continued to grow, exports have outperformed them. The top three markets in sales and value are UK, Germany and Switzerland.[9] Significant producers, among many, include Nino Franco and Bisol.

The challenges for Conegliano Valdobbiadene DOCG are to improve recognition of its potentially higher quality wine among consumers who see Prosecco as a generic brand and to achieve a higher price for their wine. With Conegliano Valdobbiadene DOCG region now fully planted, continued growth depends on achieving higher prices. Thus far, it has seen excellent growth in both volume and price.

The challenge for Asolo DOCG is to make its name better known by those who wish to buy a DOCG level wine.

References

1 *Recognising Prosecco DOC 2020*, Consorzio Prosecco DOC, received September 2021

2 Press kit 2021, Consorzio Conegliano Valdobbiadene Prosecco Superiore DOCG, received September 2021

3 Cartella Stampa 2021, Consorzio Asolo Prosecco, received September 2021

4 Asolo Prosecco Trend, Studio Cru, private communication, email 28 September 2021

5 Recognising Prosecco DOC 2020, Consorzio Prosecco DOC, received September 2021

6 All the 2020 Prosecco DOC statistics: as above

7 Schmitt, P, 2016, 'Bubbling under', *The Drinks Business*, p. 36–42

8 2020 figures, Conegliano Valdobbiadene Prosecco Superiore DOCG, press kit, p. 27, received September 2021

Asti

11

Asti DOCG and Moscato d'Asti DOCG are typically sparkling, lower alcohol wines made from Moscato Bianco (Muscat Blanc à Petit Grains) grown in a single delimited area within three provinces of Piemonte: Asti, Alessandria and Cuneo. The vast majority of the wines are made by a modification of the tank method, commonly referred to as the Asti method. The wines have pronounced aromas and flavours of orange blossom, grapes and peach. They have medium acidity, and most examples are lower alcohol than most wines and sweet. Asti DOCG (also known as Asti Spumante) is typically slightly higher in alcohol and fully sparkling. Moscato d'Asti DOCG is lower in alcohol, is semi-sparkling and typically has higher residual sugar than Asti DOCG. The two wines are of good to very good quality and tend to be inexpensive or mid-priced.

10.1. The Growing Environment and Grape Growing

The climate in the area covered by the Asti DOCG is moderate continental with cold winters and hot, dry summers. There is adequate rainfall with spring and autumn as the rainiest seasons. The former can affect fruit set.

The regulations require the grapes to be grown on hillside sites (for better sunlight interception and better drainage) with a preference for limestone and clay soils. Maximum yields are restricted to 75 hL/ha for tank method wines.

Moscato Bianco, the Italian name for Muscat Blanc à Petit Grains, is an aromatic, early budding, mid-ripening variety with a small berry size. It is prone to powdery mildew and botrytis bunch rot and therefore needs careful canopy management to avoid shade and enhance air circulation. It has a thin skin and, due to its scent, is attractive to bees, wasps and flying ants, which feed on the fruit. It is also susceptible to mites. Clonal selection has sought to make it more resistant to disease, perfumed and higher yielding.

In this area, it is planted at medium density and typically trained with the Guyot system with vertical shoot positioning. Guyot is the preferred system as, in combination with low fertility soils and moderate rainfall, the vine does not over crop. VSP ensures

Ripe Moscato grapes

Steep hillside vineyards in Asti DOCG

good exposure to sunlight, avoiding excessive humidity, and thereby reducing risk of fungal disease and ensuring good ripening of the fruit. In hot years, growers have to be careful not to remove too many leaves to avoid sunburn to the fruit.

The most aromatic juice is obtained from grapes grown on the limestone soils, but, due to its commercial success, vines have also been planted on clay.

Harvest date is decided by ripeness of the fruit with desired acidity, as the acidity is needed to balance the high sweetness of the final wine. Harvest takes place in early to mid-September, normally well before the October rains. For Asti, grapes are picked slightly earlier to ensure high acidity; for Moscato d'Asti, they are picked slightly later for the high aromatic intensity. Hand harvesting is required on the steeper slopes or where whole bunches are desired. Mechanical harvesting is an option increasingly used (as it is much cheaper) where it is possible.

11.2. Winemaking

If whole bunches have been picked, then these can be whole bunch pressed which some believe produces the best quality. If grapes are destemmed first or picked by machine, they are pressed at this point as rapidly as possible in order to minimise oxidation. The must is then clarified.

Much production of Asti and Moscato d'Asti takes place in two separate phases and often on two different sites. The first phase is the production, clarification and filtration of the must (juice) followed by chilling and storage. Must that is not required immediately is refrigerated (to 2–3°C / 36–37°F) to be maintained in the freshest possible condition for fermentation later

Plant for pressing and clarification

when there is demand. The idea is to release wine with the freshest primary fruit flavours throughout the year. Once clarified and chilled, grape must can be kept for up to two years without losing the fresh and fruity aromatics. The second phase is a single fermentation of the warmed-up must when required by demand.

This approach means that large investments are required for presses, flotation tanks, filtration or centrifuge equipment, large heat exchangers and refrigerated storage space. Ongoing energy costs are also high due to the power needed for the machinery and the chilled storage.

Fermentation takes place in pressure-resistant temperature-controlled tanks at low temperatures (16–18°C/61–64°F) to preserve the primary fruit. For the same reason, neutral cultured yeasts are preferred. Malolactic conversion is prevented to preserve acidity.

Asti and Moscato d'Asti are made into sparkling wines through a single fermentation in tanks that can sustain pressure. The CO_2 comes the fermentation of the sugar in the original must, not through later *tirage*. Similarly, the residual sugar present in the final wine comes from stopping the fermentation before dryness, not through dosage.

At the start, the CO_2 produced as part of the fermentation is released through a valve in the tank. The fermenting must will be monitored regularly to check on the falling sugar levels. The amount of sugar required to give the desired pressure (whether frizzante or spumante) and leave the desired final level of residual sugar in the wine is calculated and, once this level is reached, the valve in the tank is closed and the CO_2 from the fermentation is retained. Once the desired residual sugar levels and pressure is obtained, the fermentation is stopped by rapidly chilling the wine and filtering it under pressure to remove the yeast.

The wine is released after a few weeks and intended to be drunk young.

Cold storage of Moscato juice

Large volume pressurised tanks for Asti production

Pressure gauge

ASTI DOCG

For Asti DOCG, the final alcohol traditionally was in the range 6–8% abv, resulting in wines that are sweet (around 100g/L residual sugar). Recent modifications to the Asti DOCG regulations, however, now make the final alcohol level open-ended above a 6% lower limit, thus enabling dryer styles of Asti. Regulations now permit the style of the wine to range from Pas Dosé (Brut Nature) to Dolce (sweet).

Official production methods now also allow for Asti Metodo Classico. This wine must spend a minimum of nine months on the lees in bottle and can range from Pas Dosé to Dolce.

MOSCATO D'ASTI DOCG

For Moscato d'Asti DOCG, the final alcohol has to be 4.5–6.5% abv. This results in wines that are sweeter than Asti DOCG (around 130g/L residual sugar), i.e. Dolce. Moscato d'Asti must not exceed 2.5 atmospheres in pressure; in other words, it is *frizzante* in style.

11.3. Wine Law and Wine Business

The main points of the DOCG have been covered above.

As noted, the production of Asti and Moscato d'Asti requires high levels of equipment and storage space. This adds significantly to the cost of production. It also means that most of the wine is made by very large producers. Four companies, of which Martini & Rossi is the largest, produce more than 60 per cent of all the wine produced. Smaller producers, including very high-quality producers in Barolo and Barbaresco, typically send the Moscato grapes they grow to specialist sparkling wine firms to be made into wine or buy high quality grapes for the wines to be made by a specialist for them and sold under the producer's own label.

Grape reception area, co-operative winery

Co-operatives play a very important role in the region, providing chilled, clarified and filtered juice to the large companies who then carry out the fermentation. For example, Martini & Rossi sources about 35 per cent of their needs from 300 growers who deliver fruit to be pressed at its own pressing/chilling station, while the rest of the juice required comes from a number of suppliers including co-operatives.

For marketing purposes, the Asti DOCG consorzio is now promoting three types of Asti wine: Moscato d'Asti, Asti Secco (i.e. an off-dry style) and Asti, which can also be called Asti Dolce (the traditional sweet wine). The introduction of Asti Secco allows the region to compete in the popular off-dry sector for wines, such as Prosecco, that are less sweet than traditional Asti.

The Asti consortium belongs to the overarching promotional body, Piemonte Land of Perfection that also represents other denominations such as Gavi.

In terms of production, in 2020, Asti (Spumante) accounted for 59 per cent and Moscato d'Asti for 41 per cent. The top three markets for Asti are Russia, USA and UK. The production of Moscato d'Asti rose nearly threefold in the period 2009–2020. This was mainly due to demand in the USA. Nearly 40 per cent of Moscato d'Asti was sold to the USA in 2020[1].

Reference

1 Private communication, Consorzio Asti DOCG (email, November 2021)

Lambrusco

12

Lambrusco is the name of the mainly red, made by the tank method, *spumante* or *frizzante* wines made from the family of Lambrusco varieties principally in Emilia-Romagna in central Italy and situated close to the River Po. The red wines have strawberry, red cherry and red plum fruit, medium to medium (+) tannins, high acidity and, usually, residual sugar. The colour of the wine ranges from pale pink to deep ruby. The quality is mainly acceptable to good with a small number of very good examples and the range in prices is from inexpensive to mid-priced.

Pale and deep coloured Lambrusco

12.1 The Growing Environment and Grape Growing

Lambrusco is mainly grown inland in the former region of Emilia. This area became the western part of the current region, Emilia- Romagna. The region has low hills of around 150 m of altitude. The climate is warm and continental with adequate rainfall (735 mm) for grape growing, though with some threat of rain at harvest time. Irrigation is used to ensure an adequate water supply at critical points.

The soils are alluvial, predominantly clay and silt. They have good water-holding capacity but are prone to compaction. Many vineyards are grassed between rows to allow access by machines in wet periods and to reduce compaction. The high fertility of the soils in combination with the varieties grown lead to very high yields. The most common forms of vine training are cordon trained (e.g. Sylvoz) and Geneva Double Curtain, suitable for high vigour vines and allowing full mechanisation.

Humidity on the river plain makes regular preventative spraying against fungal diseases a necessity, though the amount of spraying has been reduced through sustainable viticulture (better canopy management, close monitoring of weather forecasts to anticipate problems and acting preventatively). Grapevine yellows have posed an increasing threat in recent years. The threat is being tackled by rapid removal of affected plants and by controlling the vectors.

GRAPE VARIETIES AND DOCS

The most important Lambrusco varieties are:

Lambrusco Salamino

This is the most widely planted variety. It produces fragrant, deep coloured, full-bodied wines with high acidity and is mostly blended with other Lambrusco varieties. There is also a DOC called **Lambrusco Salamino di Santa Croce** that requires a minimum of 85 per cent of this variety and allows a maximum yield of 133 hL/ha.

Lambrusco Grasparossa

This variety does best on clay and silt and is the only variety to be grown mainly on the hillsides. It produces deep coloured, full-bodied wine with medium (+) tannins. The DOC for this variety is named **Lambrusco Grasparossa di Castelvetro**. It requires a minimum of 85 per cent of this variety and allows a maximum yield of 126 hL/ha.

Lambrusco di Sorbara

This variety makes pale, lighter bodied wines with high acidity. **Lambrusco di Sorbara DOC** requires a minimum of 60 percentage of this variety and allows a maximum yield of 126 hL/ha.

Lambrusco bunches

Two further DOCs are named after the provinces of Reggio-Emilia and Modena, not after the names of Lambrusco varieties. **Reggiano Lambrusco** or simply **Reggiano DOC** is a DOC made with Lambrusco varieties within a delimited area in the province of Reggio-Emilia. Maximum yields are 126 hL/ha. **Lambrusco di Modena DOC** or simply **Modena DOC** is made with Lambrusco varieties grown in the province of Modena. Regulations permit very high yields (161 hL/ha) that can lead to low levels of fruit concentration.

12.2 Winemaking

Most wines are macerated on the skins for only 1–2 days, as the Lambrusco varieties have high levels of anthocyanins. This short maceration time also restricts the amount of tannin extracted. For more structured, fuller bodied wines, typically from Lambrusco Grasparossa grapes, the musts are kept on the skins for 3–4 days. First fermentation is at low temperatures for red wines of 18–20°C (64– 68°F) to retain primary fruit aromas. Unusually for red wines, malolactic conversion is blocked to preserve high acidity.

The great majority of wines are made by the tank method. Second fermentation at low temperatures (12–15°C/54–59°F) typically takes two weeks for *frizzante* wines and one month for *spumante*. There is no further maturation on the lees as the aim is to preserve the primary fruit character. There is no dosage of dryer styles (zero dosage to Brut), while sweet wines either have the fermentation stopped at the desired sweetness level and/or are sweetened by blending with must or RCGM. The production process enables large volumes of wine to be made and to be ready for release quickly at inexpensive prices.

Some traditional method wines are also made, as are undisgorged bottle-fermented wines (ancestral method).

12.3 Wine Law and Wine Business

The principal DOCs have been covered above. In addition, *spumante* and *frizzante* wines made from Lambrusco varieties can be labelled as IGT Emilia. For *spumante* wines, the DOC wines make up 25–30 per cent of production and the rest is IGT.

The DOCs require a minimum 11% abv for *spumante* and 10.5% abv for *frizzante* wines. However, wines in the *amabile* or *dolce* styles are permitted to have a minimum of only 7% abv. They must have a minimum potential alcohol of 10.5-11% abv.

Labelling terms and sweetness levels are different for *spumante* wines and *frizzante* wines. *Spumante* wines are labelled according to the standard EU categories for sparkling wine. *Frizzante* wines have fewer sweetness categories (secco/asciutto, abboccato, amabile), with each category encompassing a broader range of sweetness.

The average size of properties remains small (less than three ha). However, that average size has more than doubled since 2000 as some growers left the industry and sold their land to others. Most growers take their fruit to be vinified in the co-operatives or larger private wineries.

Lambrusco is sold both in Italy (one-third) and in export markets (two-thirds; 2016 figures).[1] In Italy, sales are principally in supermarkets and in the hospitality sector; a small proportion, typically the higher quality wines, is sold through specialist wine shops.

Some very good quality examples are made with concentrated and well-defined fruit (e.g. by Cleto Chiarli). However, Lambrusco has struggled to throw off the ‘inexpensive, red, frothy

and sweet' tag. This reputation is in part due to poor quality wines being exported in large volumes in the past. Part of the issue is that 'Lambrusco' on its own is not a protected name. (This contrasts with the way that Prosecco protected its name by using the former grape name as the name of a denomination.) As a result, it is still possible to produce and sell inexpensive, low alcohol, wine-related drinks as Lambrusco, which has made it difficult to promote Lambrusco as a high-quality wine.

CANTINE RIUNITE & CIV: CASE STUDY IN CONSOLIDATION IN A SPARKLING WINE COMPANY[2]

This is Italy's largest wine company by value of turnover (2019)[3] that specialises in Lambrusco and Prosecco. Cantine Riunite was created in 1950 by the merger of nine local wine co-operatives in the province of Reggio Emilia. It has since been joined by the CIV co-operatives in the province of Modena and currently has 1,800 members. In 2002, it bought the Prosecco producer Cantine Maschio and further bought the large co-operative Gruppo Italiano Vini (GIV) in 2008. As a result, it has a portfolio of Lambrusco, flavoured wine-based drinks, Prosecco and, since acquiring GIV, wines from across Italy.

The company as a whole sells around half its wine in Italy (predominantly via retailers, rather than the hospitality sector) and half is exported. Historically, it had particular success with Lambrusco Amabile in the USA. The top export markets are the UK, USA, Mexico, Germany and France.

Reference

1 *Lambrusco the revival*, Decanter China, August 2017 (retrieved 23 June 2022)

2 *Facilities*, Cantine Riunite & CIV (retrieved 23 June 2022)

3 *Leading Italian wine producers in 2019, by turnover*, Statistica (retrieved 23 June 2022)

Franciacorta 13

Franciacorta is Italy's largest producing region for traditional method sparkling wine, principally made from Chardonnay and Pinot Noir. It is located in Lombardy in central northern Italy. It has pitched its wines to be 'Italian-made' competition for very good to outstanding quality Champagne, with high standards for viticulture and winemaking required. The wines typically have ripe apple and peach fruit and prominent brioche and/or biscuit-like, autolytic notes, medium alcohol and medium (+) acidity. They are typically very good or outstanding in quality and premium-priced. Still white and red wines made in the same area are labelled as Curtefranca DOC, but they are not considered further here.

13.1. The Growing Environment and Grape Growing

The vineyards are in a compact zone mostly surrounded by low hills, with Lake Iseo at the northern boundary.

CLIMATE

The climate is warm continental with moderating influences. Cool air descends in summer from the Alps that are to the north of the region. Lake Iseo also exercises a moderating effect on daily and seasonal temperature ranges, though spring frost can be an issue in the most difficult years (e.g. 2017). The climate contributes to fruit that ripens regularly while retaining its acidity. Most vineyard land is on gentle slopes.

Vineyards in front of Lake Iseo

The region has adequate rainfall, with nearly half of it falling in autumn and winter. Rain during spring can lead to problems with flowering and fruit set, and during the season in general to the need to combat downy mildew and botrytis. Many growers also have irrigation installed and can use it if necessary. Picking is early (second half of August into September), thereby avoiding autumn rain, but having a shorter ripening period than Trento. Vintage variation is limited – the rainy and cool 2014 being the exception.

SOILS

The soils are mixed owing to their formation through the action of glaciers. Six main soil types have been identified, which give a range of expression in the base wines that are then used for blending to add complexity in the wines. The different soils variously emphasise the floral notes, the dried fruit notes and the spicy and vegetal notes.

GRAPE VARIETIES AND VINEYARD MANAGEMENT

Plantings are dominated by Chardonnay (75 per cent). Pinot Noir is also widely grown, and some Pinot Blanc continues to be grown, though little is being planted. Heavy cropping training systems (e.g. pergola and Geneva Double Curtain) are now prohibited. Since the 1990s, cordon training with spur pruning or head training with replacement-cane pruning (Guyot) have become the norm.

Many estates (about 75 per cent) are organic and the region aspires to be 100 per cent organic. There are very few growers and no co-operatives. As a result, nearly all the grapes are estate-grown. Typically, these estates have the resources and motivation to grow high quality grapes, contributing to the general high quality of the wines.

Rounded stones from glacial action

13.2 Winemaking

Fruit for white wine must be whole bunch pressed (as required by the regulations) to ensure high-quality juice with low phenolic content. (However, the Pinot Noir for rosé wines and for red wines (for blending to make rosé) can be destemmed.) The maximum permitted yield after pressing is limited to 65 hL/ha. Most producers ferment and age wines in stainless steel to preserve primary fruit. For added complexity, especially in *Millesimato* and *Riserva* wines, a proportion of some wines may be fermented and/or aged in old oak. Practice varies with regard to whether or not wines go through malolactic conversion. For smaller producers, the use of reserve wines is rare, though larger producers do use reserve wines for extra complexity and depth of flavour. Most wines are in practice vintage wines, though most will not be labelled as such because of the long time on lees required by wines sold as

Franciacorta Rosé

Millesimato (vintage, see next section). The wines must be made by the traditional method and the minimum time on lees is relatively high (18 months for basic non-vintage wines, see next section). This minimum is often exceeded significantly, meaning that most wines have noticeable brioche and/or biscuit-like autolytic aromas.

WINES STYLES

The following styles are allowed within the DOCG:

Non-vintage – These wines are typically Chardonnay/Pinot Noir blends that may also have up to 50 per cent Pinot Blanco. They must have a minimum of 18 months on lees. As stated, in reality these wines are often made from the fruit of a single vintage.

Satèn – This style can only be made from white grapes (in practice mostly 100 per cent Chardonnay). The wines must have a minimum of 24 months on the lees and be made with slightly less sugar at tirage, resulting in a pressure of not more than five atmospheres. They may only be made in a Brut style.

Rosé – This style must be a minimum of 35 per cent Pinot Noir and most examples are blends of Chardonnay and Pinot Noir. Producers are free to extract colour from Pinot Noir either by direct pressing or by short maceration on the skins. Blending with red wine is also permitted. A minimum of 24 months on the lees is required.

Millesimato – These are wines with the vintage declared. They must be made with a minimum of 85 per cent of fruit from that year and spend a minimum of 30 months on the lees.

Riserva – These are *Millesimato* wines that have spent a minimum of 60 months on the lees.

The standard EU categories for dryness/sweetness apply, including *dosaggio zero* (Brut Nature). It is noticeable that in practice the dosage is frequently at a lower level than would generally be expected for wines labelled at that sweetness (e.g. Brut may be 6g/L or less).

13.3 Wine Law and Wine Business

Franciacorta was among the earliest regions to receive its DOC and was later promoted to DOCG. Since 2003, it has had the right to print simply 'Franciacorta' on the label, on the model of Champagne. The key production features of the DOCG have been covered in grape growing and winemaking above.

The Franciacorta Consorzio is a well-supported body that represents virtually all producers. It has carried out zoning studies to help growers understand the types of soils better with a view to continuing to raise quality.

Production is divided between three large companies who between them produce about one-third of all Franciacorta (the pioneer Guido Berlucchi, Ca' del Bosco and Bellavista) and many medium and small-sized estates. Total production more than doubled in the ten years from 2007 to 2016 (17.5 million bottles sold in 2018). Distribution is 90 per cent in Italy (predominantly in the hospitality sector) and 10 per cent export. The principal export markets are, in this order, Switzerland, Japan, Germany and USA, which account for more than 60 per cent of exports.[1]

Reference

1 *Economic observatory*, Franciacorta consortium (retrieved 23 June 2022)

Trentodoc 14

Trentodoc is the trademarked name for bottle-fermented sparkling wine made from the classic Champagne varieties (especially Chardonnay and Pinot Noir) grown in the Trentino region of northern Italy under the DOC Trento. It is named after Trento, the main town of the region. Giulio Ferrari made traditional method sparkling wine with Chardonnay grapes in Italy from 1902 on having visited the Champagne area. The grapes are grown on hillside sites below high mountains. While many of the wines are 100 per cent Chardonnay, they can also include Pinot Noir, Pinot Blanc and Meunier.

The wines typically have ripe apple fruit and brioche and/or biscuit-like, autolytic notes, and medium alcohol balanced by medium (+) to high acidity. The wines are typically very good to outstanding in quality and are sold for premium and super-premium prices.

14.1. The Growing Environment and Grape Growing

CLIMATE

Located in the north of Italy and in sight of the Alps, Trentino has a warm, continental climate but with marked cooling influences. Daytime summer temperatures can be high because of the mountains offering protection from cold winds coming from the north and heat building up on the valley floor between the high mountains during the growing season. All these factors contribute to higher daytime temperatures than might be expected this far north and with this

Vines on hillside below the mountains

altitude (see Vineyard Management below). However, there is high diurnal range due to cold air descending from the mountains at night. This enables grapes to retain the acidity that is particularly important for sparkling wine.

SOILS

Soils in general are stony and well drained and become poorer in nutrients on the steeper slopes, all contributing to slow steady growth. This results in wines with high flavour intensity.

VINEYARD MANAGEMENT

The vineyards for Trentodoc are typically on slopes above the valley floor in the range of 400–700 m, but with a few vineyards at higher elevations. These elevations (giving a high diurnal range) mean that the fruit takes longer to ripen, building up flavour intensity while retaining acidity, and the harvest is normally two weeks later than in Franciacorta. Working on the hillsides and steep slopes adds considerable extra cost, as most work has to be done by hand.

Vines are trained either to Guyot on sloping vineyards or with the pergola system on the steeper, terraced vineyards, with planting densities around 4,500–6,000 plants per hectare. Chardonnay is planted on cooler sites (for longer, cooler ripening) and Pinot Noir on the warmer south- and south-east facing slopes. The main diseases are the two forms of mildew and botrytis, depending on weather conditions. The lowest slopes and valley floor are susceptible to frost in spring. Winemakers will usually determine a picking date by acidity (e.g. pH 3.2) and the harvest normally starts in early September.

VSP training on the left, pergola on the right

14.2. Winemaking

Yields are limited to 105 hL/ha, but many producers crop at lower levels. First fermentation is normally in stainless steel, and malolactic conversion takes place because acidity is typically higher here than in Franciacorta. The DOC regulations require that the wines must be made by the traditional method. Cultured yeasts are common, including local strains isolated by the oenology school in the region. Some companies use small amounts of reserve wines in their non-vintage blends.

Minimum ageing on the lees is 15 months, but the common practice is for much longer (20–30 months is frequent for more evident toasty notes). Vintage wines must spend a minimum of 24 months on the lees and *Riserva* wines a minimum of 36 months (but in practice 5–10 years is frequent). These longer times on the lees contribute to the cost of production.

With regard to sweetness levels, Trento and Trento Rosato can go from Brut Nature to Dolce (though most are Brut), while Trento *Riserva* (white and Rosato) may be Brut Nature to Brut only.

Trentodoc in the glass

14.3. Wine Law and Wine Business

The features of the DOC have been covered in the winemaking details above. There are 54 producers and numerous small growers. In terms of volumes, four companies produce 95 per cent of the sparkling wine.

- Ferrari is the single biggest and most dominant producer. It makes wine from the fruit of its own 100 hectares and from bought in fruit from 500 hectares of the denomination's 800 hectares

Cavit, Trentino

- Two major co-operatives have important sparkling wine brands: Rotari (for the Mezzocorona co-operative) and Altemasi (for the Cavit co-operative)
- The fourth is Cesarini Sforza, now a part of the La Vis co-operative group.

Sales have increased from 7m bottles in 2010 to 9.3m in 2019.[1] Trentodoc has a long-standing focus on the Italian market that accounts for 80 per cent of sales. An exception is Cavit, which only sells 35 per cent in Italy with most of its wine going to northern Europe. Recent initiatives have begun to promote Trentodoc in export markets. For example, Trentodoc has become a sponsor of the Institute of Masters of Wine with a view to making the name better known in the trade worldwide.

The Trentodoc trademark was created in 2007. The two 'O's in the trademarked name are designed to be reminiscent of the process of riddling.

Reference

1 *L'Italia dello spumante vale 750 milioni di bottiglie, Dossier Spumante 2021*, Il Corriere Vinicolo, Unione Italiana Vini, 3 May 2021 (retrieved 23 June 2022)

Germany 15

Sekt, a German word for sparkling wine, has always been popular in Germany. Sekt production increased significantly after the mid-1950s because inexpensive base wines could be sourced within the European Union. Today, over 90 per cent of the production is inexpensive, high-volume brands. This meets the enormous German demand for inexpensive sparkling wine that, at 3.4 litres,[1] or four and a half bottles, per capita per year, is the highest in the world.

There are several categories of Sekt; carbonation is not permitted as a method of production for any category.

Sekt
These are tank method wines, without mention of grape varieties or vintage, typically made from a range of base wines sourced from inexpensive regions of southern Europe and made sparkling in Germany.

This is by far the largest category, accounting for 90 per cent of wines made. These wines have light intensity fruit and no autolytic notes. They are typically made in the Brut or Extra Dry style, with noticeable residual sugar and medium acidity. They are acceptable to good in quality and inexpensive in terms of price.

Deutscher Sekt
Deutscher Sekt must be made from German-grown fruit. It may be made by the tank method or traditional method, be vintage or non-vintage, and made from one variety (minimum 85 per cent of that variety if it is to be labelled with a single variety) or multiple varieties. The fruit may come from a number of different German regions. The wine cannot state its region of origin on the label.

Deutscher Sekt bA
'bA' is the common abbreviation of *bestimmter Anbaugebiete*, 'of a defined region'.
This is sparkling wine related to the general quality category, *Qualitätswein bestimmter Anbaugebiete*, quality wine from one of the 13 defined wine-growing regions (e.g. Rheingau). The name of the region must appear on the label. It may be made by tank method or traditional method.

Winzersekt
Winzersekt (*Winzer* = winegrower) refers to a sparkling wine which is estate-bottled, uses only grapes grown by the estate, is made by the traditional method and is kept for a minimum of nine months on the lees in the bottle. It is most typically made with Riesling, but a range of other varieties may be used. The vintage, grape variety and producer's name must appear on the bottle. If made from Riesling, these wines combine medium intensity apple and peach fruit with toasty, smoky, autolytic notes. They have high acidity and are typically in the Brut style. They are very good to outstanding in quality and are mid- to premium-priced.

In addition to Sekt, **Perlwein**, more commonly known as Secco, is made either by the tank method or by carbonation from inexpensive base wine. These wines are cheaper in Germany than fully sparkling wine (minimum three atmospheres) as they do not attract tax.

15.1. The Growing Environment and Grape Growing

SEKT

The grapes are grown in high-volume production areas of southern Europe. Low aromatic grape varieties from Italy, Spain and France are typically used, picked early to retain acidity. The grapes are typically crushed in the region of origin and the juice chilled and transported by truck or train to Germany.

Base wine arriving from Italy

DEUTSCHER SEKT, DEUTSCHER SEKT BA AND WINZERSEKT

The cool continental climate in the German wine-growing regions produces grapes with low potential alcohol and high acidity, suitable as base wines for sparkling wine. The grapes are typically picked early for sparkling wine, with under-ripe grapes being removed. This results in wines with high acidity and just-ripe primary fruit. The wines are mainly made from single varieties, though blends based on Chardonnay and Pinot Noir are also made. Riesling makes the most prestigious wines, but a wide range of single varieties is used – Pinot Noir, Pinot Blanc, Pinot Gris, Chardonnay and Silvaner plus aromatic varieties (e.g. Scheurebe, a crossing

of Riesling and an unknown variety). Hand harvesting is used for the higher quality wines, adding to cost and therefore the final price. Variations in climate and soil types are mainly overridden by blending of base wines prior to second fermentation.

15.2. Winemaking

TANK METHOD

First fermentation is carried out at low temperatures to retain the freshness of the fruit. Wines are blended to ensure consistency across batches and within the style of the brand. Second fermentation is conducted in tanks, with the higher quality wines being aged on lees for 3–6 months. The tank method means that large volumes of wine can be made and released after a relatively short production cycle, reducing cost and prices.

Grapes grown in Germany may be made into base wine by the grower and then delivered to large Sekt-producing specialist companies for the second fermentation.

TRADITIONAL METHOD

The traditional method is used with Chardonnay and Pinot Noir, but also with Riesling. In the latter case, base wines typically do not go through malolactic conversion. An issue is the desirability or otherwise of autolytic notes when the base wine is made from Riesling. Some producers prefer to focus on Riesling's distinctive floral, apple and lemon primary notes. As a result, time on the lees may be the minimum required of nine months. Others prefer longer age on lees wines (18 months or longer) to develop an attractive smoky note, rather than the brioche and/or biscuit aromas of Champagne varieties. Mature sweet Riesling may be used for the dosage in premium bottlings to add richness. The traditional method adds cost to the price of Winzersekt.

Some companies use the transfer method for less expensive bottle-fermented wines.

Traditional method ageing on lees

15.3. Wine Law and Wine Business

WINE LAW

The main categories have already been covered. Sekt must be produced through a second fermentation (i.e. it cannot be made by injecting carbon dioxide). It must have an alcohol content of at least 10% abv and a CO_2 pressure of at least 3.5 atmospheres. Wines labelled as Sekt can be made from base wine of grapes grown in any EU country.

Read more about the history and the current state of Sekt production: Romana Echensperger MW, German Sekt: the next big thing.

In addition, wines sold as varietal or vintage wines must be 85 per cent of that variety and/or vintage.

For tank method Sekt wines, the period from tirage to release from the winery for sale must last for a minimum of six months with a minimum of 90 days on the lees. This period on the lees can be reduced to 30 days if the wine is in a tank with stirrers. Traditional method wines must spend a minimum of nine months on the lees and can then be released for sale. Transfer method wines must spend a minimum of three months on the lees and can be released for sale after nine months.

Perlwein can be made from a quality wine from a specified region (*Qualitätsperlwein bA*) or as EU wine (Perlwein). In the production of Perlwein, CO_2 can be injected or produced by fermentation (usually by the tank method). It is semi-sparkling (1–2.5 bar). Perlwein is often sweeter than Sekt. If labelled Trocken (dry), it can have up to 35 g/L of residual sugar; Halbtrocken (off-dry) has between 33 and 50 g/L; and Mild has more than 50 g/L.

See introduction to Germany for the key labelling terms. In addition, the following are produced:

- ***Flaschengärung*** – 'bottle fermented', but may be disgorged by the transfer method
- ***Klassische Flaschengärung*** or similar – 'Classic bottle fermentation', which is second fermentation in this bottle and transfer method not allowed.

WINE BUSINESS

In general, the Sekt market comprises three segments or price categories:

- low-end, price-driven sparkling wines that retail for up to €4.00 – which account for over half of all sales
- standard-quality sparkling wines that retail for up to €8.00
- high-quality sparkling wines, usually at considerably higher prices – a segment that has shown promising development in recent years.

The price of every bottle of Sekt automatically includes a government tax of €1.02 that has been levied since 1902.

The sparkling wine market in Germany is highly competitive, with a number of volume producers aggressively competing to get their brands placed in retail outlets and win customers. Because of this, Germany's largest sparkling wine producers go to great efforts to support their brands with advertising. Big brands that have been on the market for decades are the driving force behind sales. The vast majority of these wines are sold in supermarkets, large and small. Winzersekt, by contrast, is sold from the cellar door, specialist wine retailers and in restaurants.

Sekt production is dominated by a small number of very large companies, Rotkäppchen–Mumm, Henkell & Co and Schloss Wachenheim, each with multiple brands. Between them, they account for around 80 per cent of production. Rotkäppchen is the leading producer of wine and sparkling wine in Germany. Its sparkling wine brands, including Rotkäppchen and Jules Mumm, have mass appeal for Germans due to their relatively high quality at low prices. Unlike many of its main competitors, Rotkäppchen continues to position itself predominantly in the economy segment, which is a lucrative area in the German still wine and sparkling wine categories. Private label products are strong too, especially from the dominant discounters, Aldi and Lidl. Significant producers of Winzersekt include Reichsrat von Buhl and Schloss Vaux.

Most Sekt is consumed in Germany and only a small proportion (a little over 10 per cent) is exported.[2] However, the big companies do have brands in Eastern Europe. These either can be exported from Germany or are subsidiary brands made in Eastern Europe.

Sparkling wine (all categories, including Champagne and other imported wines) are sold predominantly via the retail sector (75 per cent). The wine market in general is extremely price conscious and German consumers, especially if buying a higher quality Sekt, generally prefer to buy via retailers for home consumption, rather than paying restaurant prices.

VDP SEKT

In 2018, the VDP (*Verband deutscher Prädikatsweingüter*), the private association of wine companies committed to high quality, incorporated Sekt into its own statutes. The VDP Sekt classification requires VDP members to make the wine to these standards under the tag line 'good Sekt from the beginning':

- The fruit must be grown on the estate of a VDP member and be produced specifically for Sekt production
- The fruit must be picked early (in order to be appropriate for Sekt production) by hand, whole cluster pressed, and the wine made by the traditional method only

From 2020, a new classification of VDP Sekt was introduced. Non vintage VDP Sekt requires a minimum of 15 months on the lees. By contrast, vintage Sekt requires longer lees ageing: 24 months for VDP Sekt and 36 months for VDP Sekt Prestige®. Each German region can determine its own permissible grapes, typically Riesling or Pinot Blanc/Gris/Noir or varieties that are characteristic of an individual region.

References

1 *Deutscher Wein Statistik 2019–20*, Wines of Germany, p. 33 (retrieved 23 June 2022)

2 Personal communication, Caro Maurer MW and Verband Deutscher Sektkellereien, email, August 2018

16 England and Wales

Modern grape growing in England and Wales started after the Second World War, mainly using German crosses and hybrid varieties. However, traditional Champagne varieties were planted at several estates in the late 1980s (e.g. Nyetimber in 1988) with a view to making traditional method sparkling wine. The finished wines received positive responses. As a result, Chardonnay, Pinot Noir and Meunier now account for 75 per cent of all plantings and production in England and Wales.[1] Sparkling white wines have high acidity, medium alcohol and a light to medium body. Flavours for white wine tend to be apple and lemon along with autolytic notes. This very high acidity and just-ripe fruit are distinctive characteristics. The quality is generally very good with some outstanding examples. Prices are premium to super-premium. Rosé sparkling wine is also made.

16.1. The Growing Environment and Grape Growing

The northerly latitude – all vineyards are located above 50°– results in long daylight hours and a cool climate, a combination highly suitable for growing grapes for traditional method sparkling wine. The South East of England has two thirds of all the UK's vineyards.[2]

CLIMATE

There are vineyards in Wales and other parts of the UK; however, the vineyards of southern England account for 85 per cent of all production.[3] This area has a cool, maritime climate. The average growing season temperature has risen from 13°C (55°F) in the middle of the last century, marginal for successful commercial grape growing, to 14°C (57°F) in this century, still cool but less marginal. Cool temperatures result in slow ripening, slow sugar accumulation, preservation of acidity and the creation of medium intensity fruit characters.

Hambledon Vineyard, Hampshire

The warming of the climate has helped producers to ripen fruit in more years than was previously possible, raising quality. However, a greater number of extreme weather events, for example, heavy rain, has accompanied this. In addition, two factors have increased the risk of frost damage: earlier budding due to warmer springs and the big increase in the planting of the early budding varieties, Chardonnay and Pinot Noir, in contrast to the hardier German and hybrid varieties.

However, the biggest threat to yields is that of prolonged rain. In this maritime climate, rain and cool temperatures in June and July can affect flowering and fruit set and can drastically reduce yields. To take an extreme example, 2012 had the wettest June for 100 years. Some top estates picked no fruit at all in this year and, in general, yields were down. In addition, rain during the harvest month of October can be a threat to quality. Managing the vineyard (e.g. timely spraying against fungal diseases) and managing the financial risks of fluctuations in yields and quality are the highest priorities.

SITE SELECTION

Site selection is of great importance to grow and ripen fruit. The factors to be considered include:

- Grape growing at northern latitudes means that south-facing slopes are best for maximum exposure to sunlight.
- Site selection should concentrate on finding sites with maximum shelter from prevailing winds that are generally from the south-west. Strong winds and rain can hinder flowering and fruit set and disperse heat. Former apple orchards or hop fields with aspects other than south may be preferred if they offer shelter.
- Good drainage is essential to avoid regularly wet soils and root zone; the best sites are either naturally free draining or will need to have drainage installed, which adds to cost.
- Altitude below 125 m above sea level.

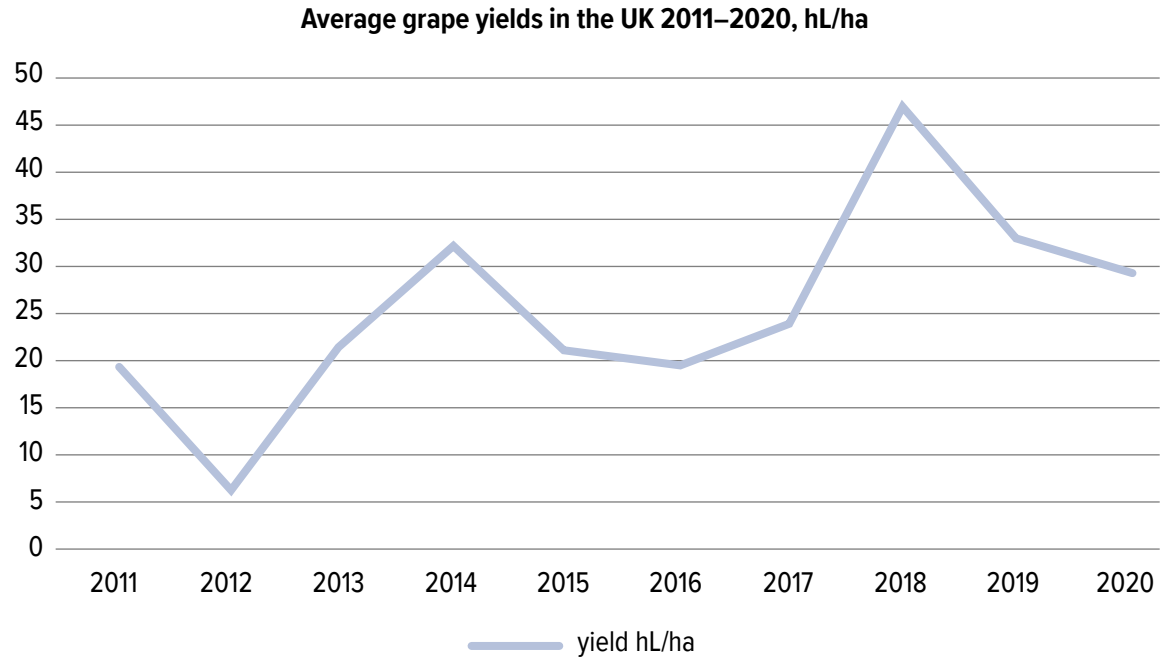
SOILS

Soil types vary across southern England. Clay predominates in Kent and parts of Sussex, with high water-holding capacity and fertility. The soils in Sussex and Hampshire have significant amounts of chalk, often claimed to be a key quality factor as in Champagne. They offer good drainage and lower fertility. However, chalk soils tend to be on slopes at higher elevations, making them more vulnerable to adverse weather. Clay soils give slightly lower acidity and more pronounced fruit; chalk can give more finesse, but with higher acidity and a leaner body.

New vineyards are typically planted at medium density (4,000–5,000 vines per hectare) to increase root competition and contain the vigour of the canopy. As in most cool-climate northern European viticulture, the Guyot system with vertical shoot positioning is often preferred. Narrow rows with canes trained relatively close to the ground helps to retain heat in the fruiting zone. Thin canopies are important to allow air and light to reach buds and the fruit, to reduce disease pressure and to allow sprays to reach the leaves, maintaining healthy grapes and raising quality.

YIELDS

The variable, cool and damp climate results in marked vintage variation and in fluctuating yields. Low average yields are due to the marginal climate and the increased planting of



Source: Source: International Cool Climate Symposium & Wine GB Yields Surveys 2018–20. NB these figures included grapes grown for still wines.[4]

Chardonnay and Pinot Noir that can flower poorly in wet and cool weather. While the overall average yields are a modest 25 hL/ha (in the ten years to 2020; one third to one quarter of that achieved in Champagne), the best vineyards can achieve twice this figure. Some years have seen tiny yields. As a result, production has been highly variable. Due to the low and variable yield, prices are premium and super-premium.

16.2. Winemaking

The majority of sparkling wine production (white and rosé) is made from Chardonnay and Pinot Noir – and some Meunier. A few sparkling wines are made from German crossings and hybrids.

Almost all sparkling wines are made by the traditional method and are predominantly vintage wines. Length of time on the lees varies, but the minimum must be nine months in line with EU regulation for quality sparkling wine with a PDO. Some producers use a portion of oak maturation to add texture, but the majority of base wines are unoaked. Malolactic conversion is widely used to reduce the very high acidity that results from a cold climate. However, producers with the most-sheltered sites and those willing to risk waiting for fuller ripeness can pick at acidity levels ideal for traditional method sparkling wine. Recently, some of the larger producers have moved to non-vintage wines with the use of reserve wines to create a consistent style. (Most producers are only just building up a library of reserve stock to be able to do this.) Having reserve wines is useful in a marginal climate where yields and quality can vary each year, though it also increases costs.

A few producers also make Pet Nat sparkling wines.

16.3. Wine Law and Wine Business

What are the challenges to selling increased volumes of English sparkling wine in the coming decade? Read more here.

For English PDO sparkling wine, only six varieties are allowed: Chardonnay, Pinot Noir, Pinot Noir Précoce (a mutation of Pinot Noir that ripens two weeks earlier than Pinot Noir), Meunier, Pinot Blanc and Pinot Gris. Sussex achieved separate PDO status in June 2022. Sparkling Sussex PDO wines must be made from grapes grown in the region and predominantly from Chardonnay, Pinot Noir and/or Meunier.

Wines must be made by the traditional method. All other varieties, for example, German varieties and hybrids, can be labelled with a protected geographical indication (PGI). The maximum yield for PDO wines is 80 hL/ha, but, as has been seen, this is rarely an issue. Wines are labelled using EU terms for sweetness, most being Brut.

English sparkling wine is at an early stage of development. The plantings are still small by world standards at around 3,800 ha (all varieties), if growing rapidly (it more than doubled between 2012–2020).[5] By comparison with Champagne, agricultural land is much less expensive, a key factor attracting new entrants, including major Champagne houses. Significant producers include Nyetimber and Wiston Estate.

Virtually all English sparkling wine is consumed in England, with only 8 per cent currently being exported. One-third of the wine is sold at the cellar door, with wine also being sold in specialist wine shops, premium supermarkets and the hospitality sector, including by the glass. With prices in the premium and super-premium ranges, the wines compete with very good quality Champagne. Planting is continuing rapidly. For example, 2019 saw double the plantings of 2018.[6]

As previously discussed, a major financial challenge is to deal with fluctuations in yields from year to year, though such fluctuations are becoming easier to deal with as most producers can now work with 4–5 years of stock. This helps producers cope with poor years and good years.

The industry body has recently rebranded itself as WineGB and seeks to act as a point of reference for, and to represent, vineyard owners and producers in technical services, regulation, marketing and education.

Champagne Taittinger has embarked on a joint venture to buy vineyard land and make sparkling wine in Kent. Read more here.

References

1 *Latest industry data*, Wine GB (retrieved 23 June 2022)

2 International Cool Climate Symposium & Wine GB Yields Surveys 2018–20

3 As above

4 *UK vineyard production figures 1975–2016*, WineGB (retrieved 23 June 2022)

5 International Cool Climate Symposium & Wine GB Yields Surveys 2018–20

6 As above

17 United States of America

Sparkling wine production in the USA goes back into the nineteenth century, with companies such as Haraszthy and F. Korbel & Bros. The modern period began, however, in 1965 when Schramsberg produced a Blanc de Blancs Brut sparkling wine that was also the first commercial use of Chardonnay in an American sparkling wine. This was followed in the 1970s with the establishment of a number of companies owned by Champagne and Cava producers that set up to make traditional method sparkling wine, spearheaded by Moët & Chandon (Domain Chandon, 1973).

A range of styles is made: traditional method, tank method and, latterly, a small amount of Pet Nat. Most production is in California, but sparkling wine is made in many states including Oregon and Washington State.

Traditional method Chardonnay and Pinot Noir blends are made with quality levels that are good to outstanding and prices from mid to super-premium. These wines typically offer medium intensity aromas of ripe apple and lemon with brioche and/or biscuit autolytic notes and medium (+) acidity. They are typically made in a Brut style. A few producers also use Meunier, but this grape is much less commonly used here than in Champagne.

In addition, tank method wines with additional fruit flavours (raspberry, peach, etc.) and Pet Nat wines are made. Tank- fermented wines are often in an Extra Dry style, with noticeable residual sugar. They are inexpensive to mid-priced.

Vineyard for Quartet, Roederer, Anderson Valley

17.1. The Growing Environment and Grape Growing

CALIFORNIA

In California, grapes for premium sparkling wines from Chardonnay and Pinot Noir are predominantly grown in the coastal regions cooled by the cold Pacific Ocean. Cool air from the coast is drawn towards the hotter Central Valley, bringing cool breezes and/or fog to areas close to the coast, along river valleys and gaps in the coastal mountains. These cooling influences make these coastal parts of California ideal for growing Chardonnay and Pinot Noir, helping to produce grapes with ripe flavours yet with high levels of acidity and moderate alcohol. These characteristics are well suited to the production of premium sparkling wine.

Note: This map includes the regions mentioned in this chapter that make sparkling wines. Other regions are also shown but you are not expected to know about these other regions within D4.

In addition to Chardonnay and Pinot Noir, a wide range of varieties is used for mainly tank method wines, including Pinot Gris, Pinot Blanc, Sauvignon Blanc, Viognier, Syrah and Tempranillo. Where grapes are grown in warm regions, they are harvested early. The wines may require residual sugar to compensate for under-ripe flavours.

The most important areas for sparkling wines are, especially the first three:

Anderson Valley (Mendocino County)
The north-western part of this AVA is close to the Pacific. Cool ocean breezes and fog are conveyed along the Navarro river valley to moderate temperatures and reduce sunshine hours further up the valley. Wide diurnal temperature ranges are common and enable growers to maintain high levels of acidity in the fruit. This region is home to Roederer Estate (founded by the Champagne house of the same name). Wineries that predominantly make still wines also make small amounts of sparkling wine. In addition, many wineries from outside the region buy Anderson Valley grapes for their sparkling wines.

Russian River Valley (Sonoma County)
Cool breezes and fog provide cooling influences both via the river and through the Petaluma Gap in the coastal mountain range. Russian River Valley is home to the sparkling pioneer, Korbel.

Carneros (Sonoma and Napa counties)
While not on the coast, Carneros gets significant cooling from the San Pablo Bay. It is home to Gloria Ferrer (founded by the Cava producer, Freixenet) and Domaine Carneros (founded by Taittinger).

Napa Valley (Napa County)
While most of Napa is too hot for growing grapes for sparkling wine, important wineries that produce it were founded here, even if they now source their grapes in cooler areas (for example, Schramsberg). Some producers continue to grow or source all their fruit from within the Napa Valley (including Carneros), whereas others choose to blend Napa fruit with that sourced from other regions.

Monterey (Monterey County)
In the 1940s, professors Winkler and Amerine of the University of California, Davis, devised the Heat Summation Scale and identified large portions of Monterey as cool zones 1–2 (suitable for Chardonnay and Pinot Noir). As a result, many new vineyards were developed. The main influence is the wide Salinas valley that is open to the ocean (which is particularly cold due to a deep canyon in the ocean floor near this part of the coast). This creates cool areas in the northern parts of Monterey with high diurnal temperature ranges, creating sites suitable for grapes for sparkling wine.

Edna Valley and Arroyo Grande (San Luis Obispo County)
These two AVAs are in the coolest part of San Luis Obispo, because of their proximity to the coast and the cold ocean.

Santa Maria Valley and Sta. Rita Hills (Santa Barbara County)
Winkler and Amerine also identified large portions of Santa Barbara County as cool zones 1–2. The east–west running Santa Maria Valley and Santa Ynez Valley form channels to allow cool breezes and fog to seep into Santa Barbara County.

Lodi (San Joaquin County)
The Central Valley and Lodi are too warm for grape growing for premium sparkling wine. However, companies such as Weibel produce large volumes of tank method and flavoured sparkling wines here.

Bucking the trend? LVVR Sparkling Cellars specialise in traditional method … but in Lodi and with locally-sourced Chardonnay-dominant blends but also using Viognier and, for Rosé, Alicante Bouschet. Read more here.

WASHINGTON STATE
This is the second largest producer of sparkling wine in the USA,[1] with Chateau Ste. Michelle being by far the largest producer. A northerly latitude and a high diurnal range contribute to grapes with high acidity, suitable for sparkling wine. Blends from Chardonnay, Pinot Noir and Meunier are produced. Styles include Blanc de Blancs and Blanc de Noirs wines. In addition, single varietal wines from other varieties (including Müller Thurgau, Riesling and Gewurztraminer) are made. The wines tend to be mid-priced.

OREGON
Oregon has increasingly added sparkling wine to its offer of Pinot Noir and Chardonnay. The cool climate of the Willamette Valley allows fruit to ripen slowly and to retain naturally high acidity. The pioneer and largest specialist producer is Argyle. For wineries that do not specialise in sparkling wine, the technically demanding processes required for traditional method wines can be supplied by a specialist company such as Radiant Sparkling Wine.

17.2. Winemaking

As elsewhere, premium sparkling wines are typically made by the traditional method, while inexpensive wines are made by the tank method. Premium sparkling wines are often made by blending a range of base wines. For example, a winemaker might blend higher acidity wines with wines with ripe fruit notes but lower acidity. Many wines are made with extended periods on the lees in bottle (e.g. three years). This adds to the intensity of autolytic notes and to the cost of production, and therefore price.

Blanc de Noirs, white wine made from black grapes, typically Pinot Noir, is a more common style in the USA than in other countries. However, unlike in the EU, there are no specific regulations regarding the Blanc de Noirs term. Often, producers use mainly black skinned fruit, but complement it with some small percentage of white grapes. Schramsberg is a good example of this technique, where its Blanc de Noirs includes 10 per cent Chardonnay.

Many wineries are now making small batches of sparkling wines only sold through the tasting room or direct to consumers. For these wineries, it is not financially feasible to invest in the equipment needed to perform riddling, disgorgement and dosage, nor do they necessarily have the expertise. Specialist custom crush facilities provide these services, for example, Rack & Riddle in Sonoma and Brut Custom Crush in Napa.

17.3. Wine Law and Wine Business

Several historical producers label their sparkling wines 'Champagne', and the US government allows the use of the Champagne term on US brands established before 2006 if the geographic origin accompanies the Champagne term on the label (typically California Champagne). New US brands after this date are not allowed to use the Champagne term.

As noted, there are different types of company producing sparkling wine:

- Specialist sparkling wine companies often founded by Champagne and Cava houses. These companies have distribution across the USA and export small qualities of sparkling wine. Examples include Roederer Estate.
- Wine companies that produce small batch, premium sparkling wines. These wines are sold at the cellar door, direct to consumers, in the winery's own restaurant or locally. Examples include Schramsberg.
- Large wine companies that produce inexpensive sparkling wines as part of a larger range, including companies with national and international distribution. Examples include Barefoot and Cupcake.

In 2020, around 12,500,000 cases of sparkling wine were produced in the USA, 83 per cent being produced in California. This supplied 45 per cent of the total shipments of sparkling wine in the USA in that year.[2] While sparkling wine consumption has grown steadily for the last 15 years, Californian sparkling wine has lost significant market share to imported sparkling wine, especially Prosecco. Sparkling wine has been seen as a special occasion-only wine in the past and the large domestic brands have dominated. However, millennials are less bound to American brands and perceive foreign wines as more authentic, offering an open door to foreign sparkling wine.[3]

References

1 Micallef, J. V., 2018, Bubbles along the Willamette, Forbes (retrieved 23 June 2022)

2 *US Sparkling Wine / Champagne Shipments*, The Wine Institute (retrieved 23 June 2022)

3 *Wine in the US*, Euromonitor International, p. 4, July 2019 (subscription only)

Chile 18

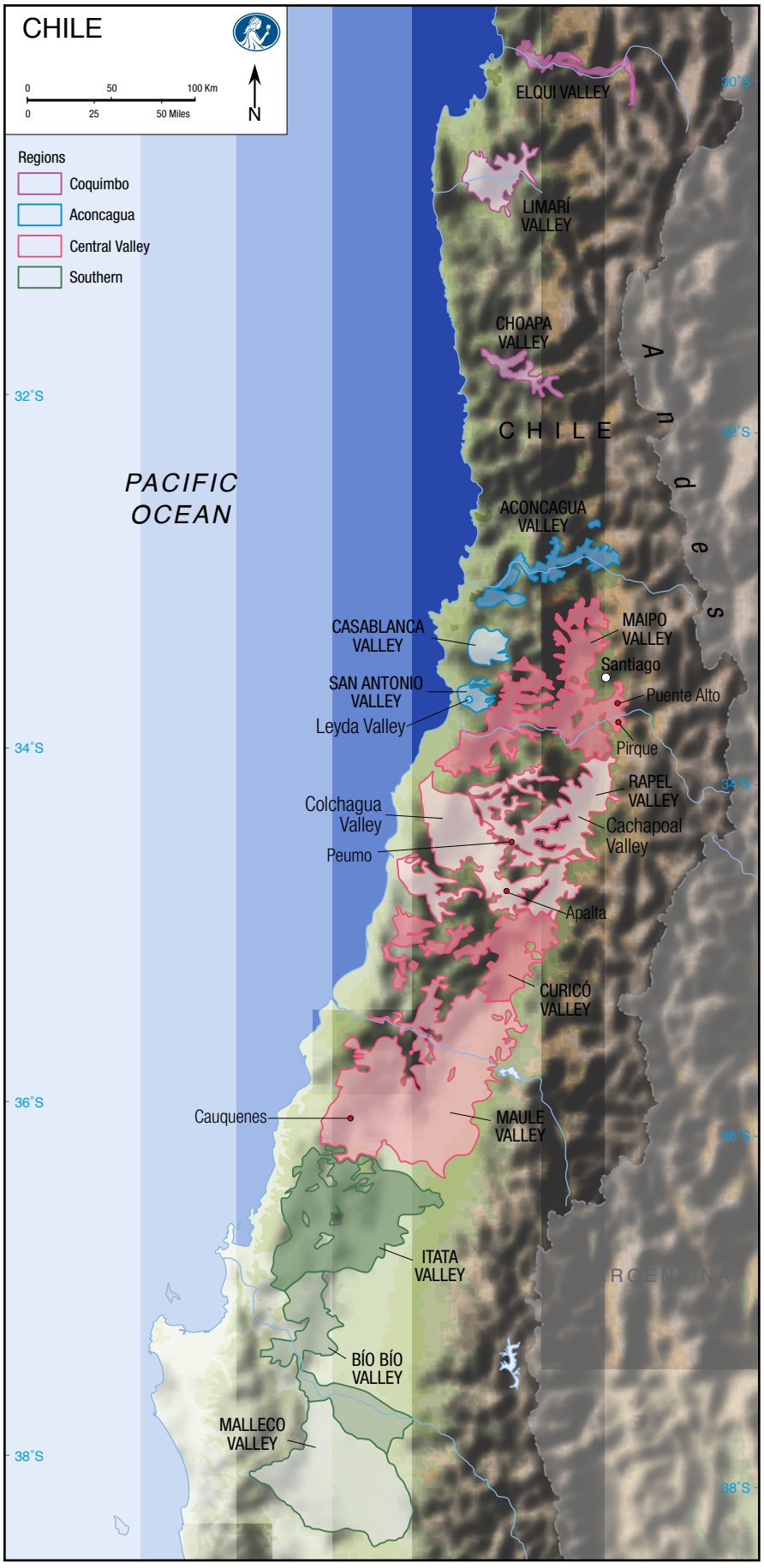
The history of sparkling wine in Chile started in the nineteenth century with Valdivieso. In recent years, the category has grown rapidly though from a small base but it remains a minor proportion of Chile's wine production. Most wines are made by the tank method and are made to be fruity (Brut and slightly sweeter are most common). A small number of traditional method wines are also made. The principal varieties used are Chardonnay, Pinot Noir and Sauvignon Blanc. Most wines are inexpensive, with some, especially in export markets, being mid-priced. The wines range from acceptable to very good in quality.

18.1. The Growing Environment and Grape Growing

Grapes for sparkling wines are generally grown in areas where there is some cooling influence, such as the cooler coastal areas, the Andean foothills or the milder regions in the south. However, fruit for some inexpensive wines is sourced from the warm Central Valley. Grapes grown in the regions with cooling influences (the Pacific Ocean or altitude) have the high acidity suitable for sparkling wines. Harvest time tends to be from early February until the first week in March (zone dependent). This is several weeks earlier than the regular harvest, as expected for sparkling wines.

Most of the cheaper sparkling wines will be blended from different valleys, while premium wines come from specified regions. Casablanca, San Antonio (Leyda) and Limarí (cooled by the Pacific Ocean) are key regions, along with Curicó (some parts are coastal and cooled by the ocean) and Bío Bío (southerly latitude, open to the influence of the ocean). Moscatel (Muscat) and País are produced in Itata and Maule, where these varieties have been grown historically. Vineyards are irrigated in all these areas except for Itata, which has higher rainfall than the other regions.

The cooling coastal influence in Limarí makes it a suitable area for growing grapes for sparkling wines



Note: This map includes the regions mentioned in this chapter that make sparkling wines. Other regions are also shown but you are not expected to know about these other regions within D4.

Large volume sparkling wine production

18.2. Winemaking

The tank method constitutes 90 per cent of sparkling wine production, made with very modern, recently acquired, equipment that has allowed the sparkling sector to grow rapidly. Chardonnay is commonly used in these wines and Sauvignon Blanc tends to be made using this method to maintain its aromatic primary fruit.

Chardonnay and Pinot Noir are also made by the traditional method, as are some País (Blanc de Noirs or rosé) and Moscatel sparkling wines.

18.3. Wine Law and Wine Business

Labelling of styles for residual sugar are as in the EU.

As with Chilean wine in general, a few very large companies dominate the market. The main producers in the sparkling industry are Valdivieso (with over a third of sparkling wine production), Viña Mar and Undurraga.

Domestic sales account for over two-thirds of production and are growing rapidly, especially at the premium end of the market. Exports have grown, with Japan as by far the largest destination, followed by Columbia and Brazil. The Chilean market for sparkling wines is made up almost entirely of domestic products.[1]

Reference

1 Schmitt, P, 2018, *Japan's love of fizz extends to Chilean sparkling wine*, The Drinks Business (retrieved 23 June 2022)

19 Argentina

The initiative to make sparkling wine in Argentina came in 1959 from Moët & Chandon's decision to base its first overseas subsidiary in Mendoza. However, overall production of sparkling wine in the country remained limited until recent years, since when there has been a rapid increase in production as other producers have entered the field. As volumes have grown, so too has the range of styles, varieties used and brands available at different price points.

Note: This map includes the regions mentioned in this chapter that make sparkling wines. Other regions are also shown but you are not expected to know about these other regions within D4.

Most wines are made by the tank method, but carbonation and traditional method are also employed. Many wineries that have never produced sparkling wines before are now investing in this category to extend their product ranges. Today, there are approximately 160 wineries producing sparkling wine, the majority in Mendoza and a few in Neuquén, Rio Negro and San Juan.

Tank method wines are fruity and off-dry to medium-dry and are of acceptable to good quality. Traditional method wines made from Chardonnay and Pinot Noir typically have ripe apple and lemon fruit with light autolytic notes, made in a Brut style. They are good to very good in quality. Prices are mostly inexpensive, but some wines are mid- to premium-priced.

19.1. The Growing Environment and Grape Growing

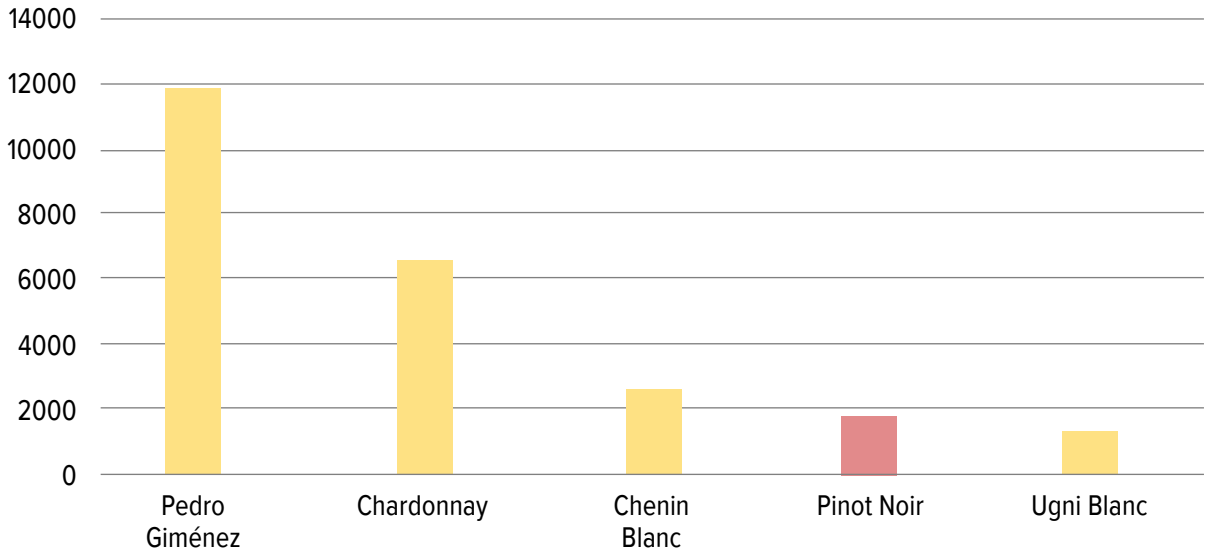
Grapes for inexpensive carbonated or tank method wines may be grown in warm parts of Mendoza alongside grapes for still wines. However, grapes for higher quality sparkling wine are mainly grown in sub-regions such as Luján de Cuyo and Uco Valley.

The extremely high altitude of these regions means that the climate can be cool enough to preserve delicate flavours and acidity in the grapes. New vineyards for sparkling wines have been developed in Neuquén and Rio Negro in Patagonia. The southerly latitude helps to keep temperatures down. A combination of southerly latitude and high diurnal range (due to continentality) means that days and nights are relatively cool.

In all of these areas, grapes for sparkling wines are harvested one or two months before grapes for still wines to avoid high alcohol levels and to preserve the acidity. Blending wines from different vineyard sites with slight differences in climate is often necessary to achieve a suitable base wine for sparkling wines (for example, blending fruit from warmer and cooler sites). Some wineries have their own vineyards, but many also rely on independent grape growers that sell their grapes.

A range of varieties is used. However, the largest plantings continue to be of Pedro Giménez, though this has reduced over the last 10 years. (Pedro Giménez is one of the

Hectares planted of the top varieties for sparkling wine in Argentina



Data for 2021, Observatorio Vitivinícola Argentino e Instituto Nacional de Vitivinicultura. Note that these are the totals for these varieties, for both still and sparkling wine.

Criollas,[1] the group of varieties grown in South America and thought to be descended from European varieties or introduced by Spanish and Portuguese soldiers and explorers. It is not related to the Spanish Pedro Ximénez. The top five varieties are shown in the chart. Chardonnay plantings have grown by more than 30 per cent this century, and Pinot Noir by nearly 80 per cent, but from a low base.

Natural hazards in Argentinian regions include hail and spring frosts in some areas, and nematodes. Relatively little spraying is required against fungal diseases due to the dry climate.

19.2. Winemaking

Inexpensive Argentinian sparkling wines are typically made by carbonation. Most commonly, these are made from Pedro Giménez, Chenin Blanc and Semillon. Carbonation is also used to produce sparkling wines with additional fruit flavourings, typically strawberry. Tank method is used for mid-priced products; they are made with a wide range of varieties, including Chardonnay and Pinot Noir.

Traditional method is reserved for mid-priced and premium wines. They are made from grapes sourced from the best sites that are typically planted with Chardonnay and/or Pinot Noir. The wines may be vintage or non-vintage and the vast majority spend at least 12 months on the lees with many going through extended lees ageing. They usually show ripe apple and lemon fruit, autolytic aromas, medium to medium (+) acidity, medium to medium (+) body and medium alcohol. The great majority are white. A small number of super-premium bottlings have been introduced recently (e.g. Baron B Unique). These wines are made with the selection of the best fruit and are made with slightly longer time on lees than other traditional method wines (e.g. 18 months).

Pressurised tanks

19.3. Wine Law and Wine Business

The sparkling wine sector was given a big boost in the decade after 2005 resulting from an agreement between the government and the national wine trade body to remove a domestic tax of 12 per cent on sales in return for investment in sparkling wine by the industry. This agreement was part of a wider policy to promote Argentinian wine and contributed to the recent growth of sparkling wine production and sales.

The domestic market consumes virtually all Argentinian sparkling wine[2] and, of that, the great majority is bought from retailers for home consumption. The most popular style is Seco (64 per cent),[3] which in Argentina means less than 11g/L and thus is equivalent to the upper end of Brut in the EU.

Leading companies in Argentina include Moët Hennessy (includes Chandon and 'Baron B' brands), Llorente, Mumm (part of Pernod Richard) and Norton. Many large European companies have invested in Argentina to produce still and sparkling wines for the South American market, including Freixenet and Sogrape (Finca Flichman).

References

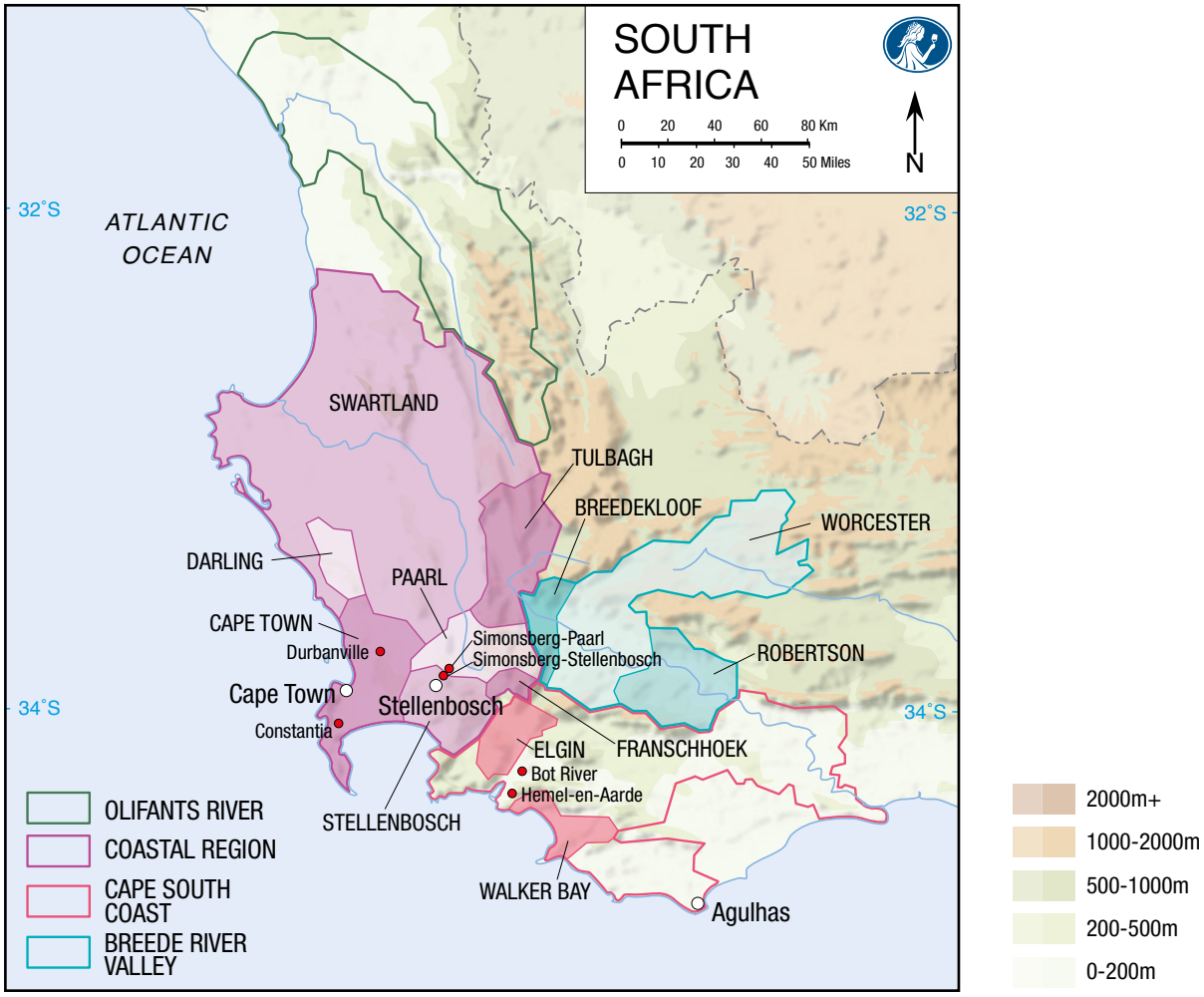
1 'Criollas' is a collective name for grape varieties that have been commonly grown in South America since the arrival of the *conquistadores*. However, Criolla Grande and Criolla Chica are also the names of individual grape varieties. 'Criollas', Robinson, J. and Harding, J, 2015, *The Oxford Companion to Wine*, 4th edition, Oxford

2 Mercado externo de productos vitivinícolas 2020, Instituto nacional de vitivinicultura (INV) (retrieved 29 September 2021)

3 *Informe anual de mercado interno de vinos Año 2020*, INV (retrieved 29 September 2021)

20 South Africa

South Africa produces two main categories of sparkling wine. Inexpensive, carbonated sparkling wine, often sweet, is primarily consumed in the domestic market and exported to the sub-Saharan territories, especially Angola, Mozambique and Nigeria. The wines are of acceptable to good quality. Traditional method sparkling wine, known as Cap Classique, is a rapidly growing market, and is made principally from Chardonnay and Pinot Noir, as well as Chenin Blanc and Pinotage. The wines have medium (+) acidity and medium alcohol with ripe apple and citrus fruit with varying levels of autolytic flavours. They are mid- to premium-priced and quality levels are good to very good.



Note: This map includes the regions mentioned in this chapter that make sparkling wines. Other regions are also shown but you are not expected to know about these other regions within D4.

CARBONATED SPARKLING WINE

Carbonated wine, made with a range of varieties including Sauvignon Blanc, Muscat and Pinotage, continues to be an important product, mainly for domestic and African consumption. These are simple, fruity wines, often off-dry to sweet.

CAP CLASSIQUE

Méthode Cap Classique now rebranded as Cap Classique is both the name of a production method in South Africa (second fermentation in the bottle) and the trademark of an association of growers and producers producing these wines. The association was founded in 1992. Association members are responsible for the production of over 90 per cent of bottle-fermented sparkling wine in South Africa and include the top seven producers.[2] Cap Classique standards are now enshrined in law, requiring:

- the wine to undergo second fermentation in the same bottle that goes to market (i.e. the traditional method)
- a minimum of three bars of pressure post-disgorgement
- a minimum of twelve months on the lees during second fermentation in the bottle.

Pinot Noir on the vine

Picking Pinot Noir

20.1. The Growing Environment and Grape Growing

A wide range of varieties can be used in Cap Classique; however, Chardonnay, Pinot Noir, Chenin Blanc and Pinotage make up at least 95 per cent of the grapes used in this category.

The fruit is grown or sourced from a wide range of regions, principally Robertson, Stellenbosch, Paarl, Darling and Tulbagh. Only Robertson and Bonnievale (in the Breede River Valley) have significant amounts of limestone soils, which some believe produces higher quality wine. These two regions are relatively narrow valleys that makes them slower to warm up in the morning (due to shade from the mountains) and the temperatures drop in the afternoon because of cool breezes from the ocean at Cape Agulhas that run up the Breede River. These cooling influences are important in an otherwise warm climate. Robertson and Bonnievale are the regions with the biggest diurnal shift between day and night temperatures, helping to preserve acidity. Elsewhere, vines are grown on shale, clay and decomposed granite. Many producers choose to source fruit from a number of regions, in part to get more complexity in their wines but also because of the availability of fruit.

Growers aim to wait approximately 90 days after flowering before picking for Cap Classique. This length of hang time is achieved by adapting viticultural practice. Growers leave more growth on the vines to create extra shading, which slows down ripening and retains acidity. Grapes are picked at a potential alcohol of 9.5–11% abv with a view to the final wine being around 12% abv.

20.2. Winemaking

CARBONATED SPARKLING WINE

These wines are typically made by stopping fermentation early to retain residual sugar. They are then carbonated and released for early sale in order to preserve the fruit character. This low-cost process creates inexpensive wines.

CAP CLASSIQUE

The quality-minded growers pick by hand into small baskets and then whole-bunch press. (This is recommended, but not required, for Cap Classique.) Better producers will separate press fractions and use them as needed during blending. Acidification of musts is commonplace. Some ferment a portion of the fruit in old barrels for additional textural richness in premium wines. Whether or not to put the base wine through malolactic conversion is a choice of the producer and there is no general rule (e.g. Villiera does, Graham Beck avoid it). Reserve wines (around 10 per cent) are used by the premium houses to add depth of flavour and ensure consistency. As stated, minimum time on the lees in bottle is twelve months, with many quality producers opting for longer periods. Some Cap Classique producers choose 15–18 months for non-vintage and longer for vintage and prestige cuvée wines. The entire process for traditional method wines adds to costs and therefore the final price.

As elsewhere, rosé wines are made either blending white and red wines in order to control the amount of tannins and colour present prior to second fermentation in the bottle or by the maceration of a black grape variety prior to primary fermentation (the latter being less common).

Whole bunch Pinot Noir being delivered to the winery

20.3. Wine Law and Wine Business

The law regarding Cap Classique has been summarised above. However, the Cap Classique Producers' Association is currently working to introduce an additional higher quality category that would restrict the grape varieties that can be used and would require whole bunch pressing and a longer time on the lees.

As noted, Cap Classique is dominated by seven companies as well as being produced in small volumes by other producers. J. C. Le Roux, one of the seven, also makes carbonated sparkling wine.

Cap Classique is the fastest growing category in South Africa, with sales doubling every five years in recent decades. It increased its share of South African sparkling wine production from 30 to 40 per cent of all production between 2014 and 2018.[1]

Some companies have also been successful in export markets, for example, Graham Beck exports 50 per cent of its production. The domestic market has also seen the arrival of better-quality carbonated wine, especially using Sauvignon Blanc. At the top end of the domestic market, the challenge is to make Cap Classique attractive to those consumers who currently drink top-quality Champagne and to attract the new middle classes who are moving from beer to wine.

In 2020, three million litres of sparkling wine were exported. This was lower than a peak in 2012 because of the vagaries of exchange rates, market fluctuation and Covid 19. The top export markets are Angola, Sweden and UK.[3]

The Cap Classique Producers' Association is funded by a levy according to volume of production. It promotes the wine through public tastings, an annual tasting of base wines for producers and a technical conference every two years. In addition, the wines are promoted through the promotional body Wines of South Africa.

Refeences

1 *South Africa Wine Industry Statistics 2020*, table 7.2.2, with 2014 data from the 2017 version of the report, SA Wine Industry Information and Systems (retrieved 22 June 2022)

2 Cap Classique Association, Methode Cap Classique presentation, PowerPoint presentation, received January 2018

3 *South Africa Wine Industry Statistics 2020*, SAWIS (retrieved 23 June 2022)

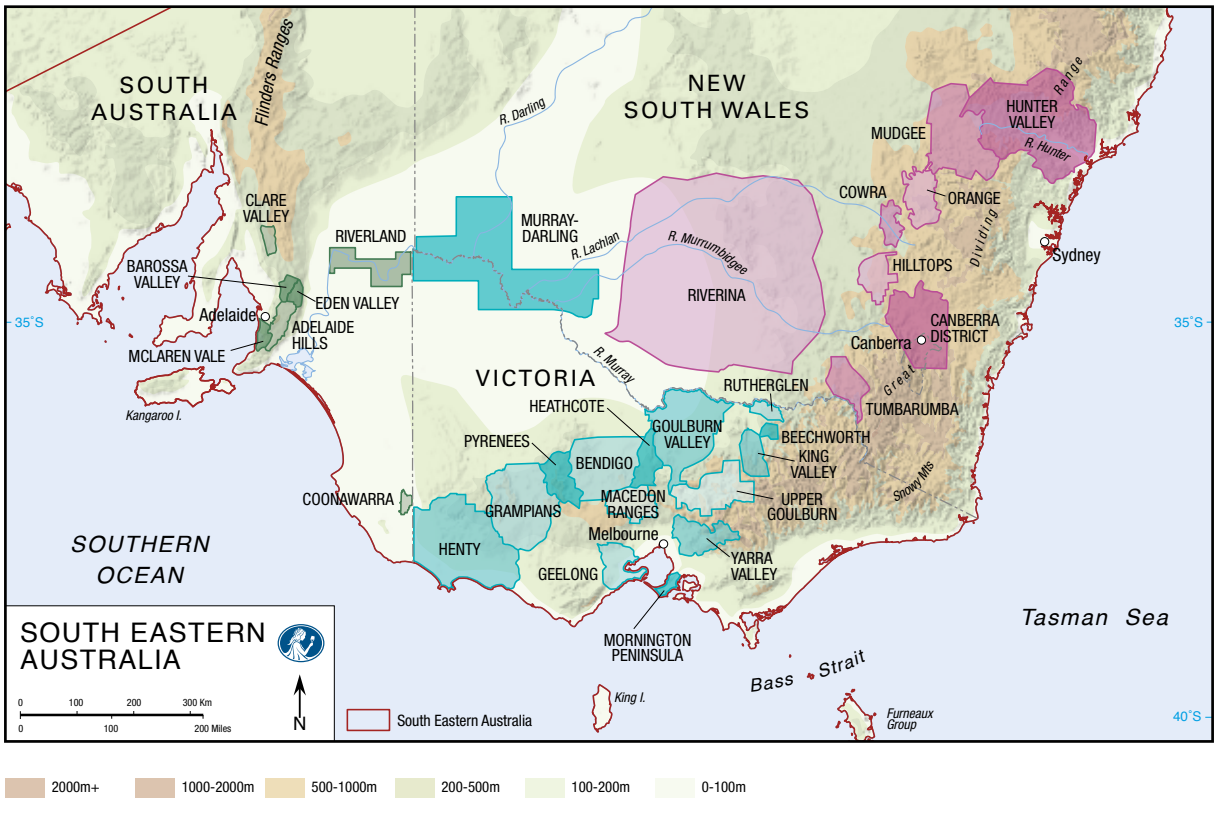
Australia

21

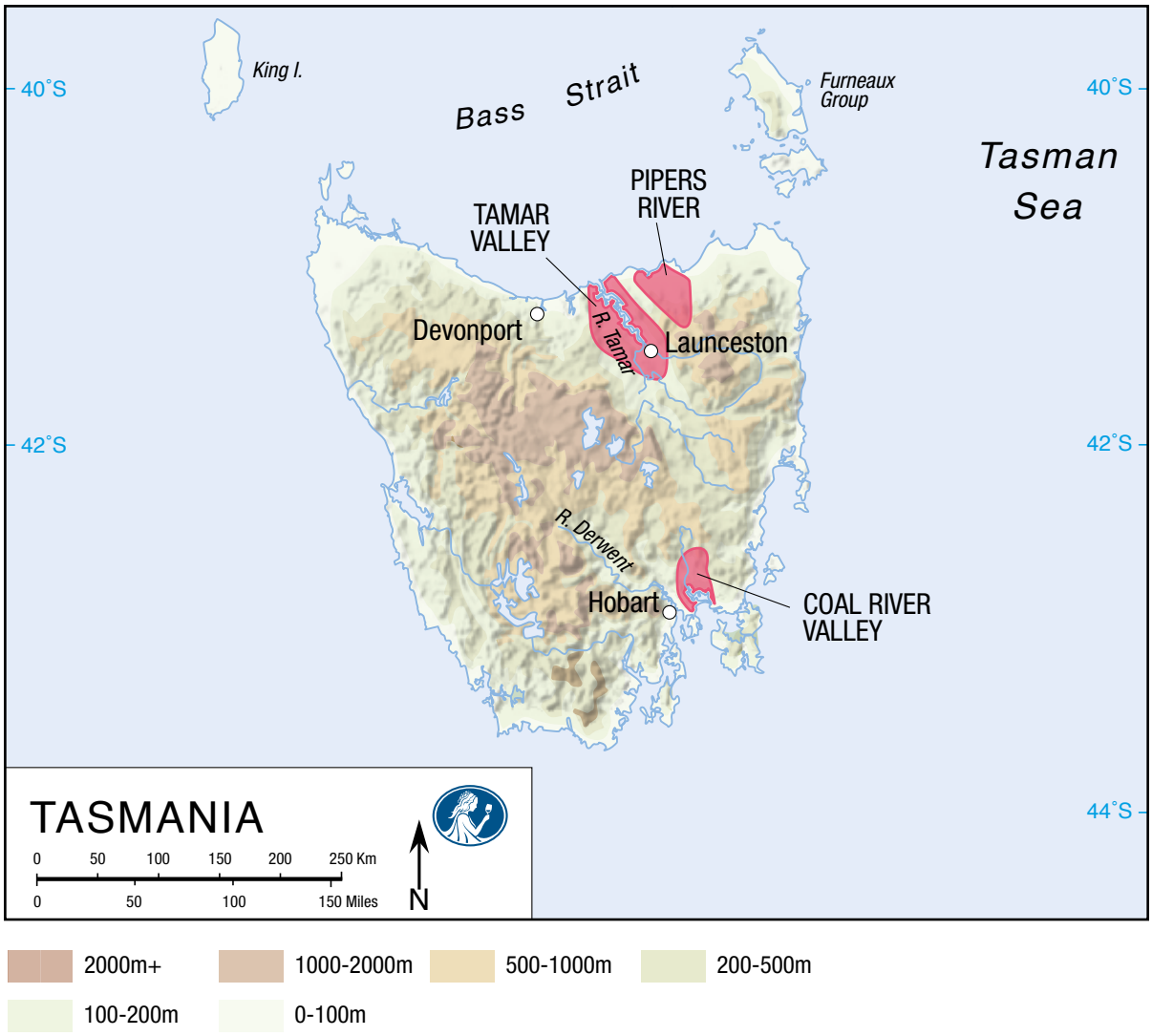
Australia is a significant global wine producer and although the sparkling wine sector represents only a small percentage (less than 6 per cent) of the total wine crush, this translates into annual sparkling wine sales of 66 million litres (2019–20). These sales are split between domestic (89 per cent) and export (11 per cent) markets. Export sales of Australian sparkling wine have risen in recent years, driven by sales of sparkling Moscato, Shiraz and Australian Prosecco, while exports of traditional method wines have declined.[1]

Almost all methods of producing sparkling wines across multiple styles are employed in the Australian sparkling wine sector. These include traditional method, transfer, tank and carbonation. Styles produced include classic Chardonnay, Pinot Noir and Meunier blends made by the traditional method, tank method wines from Glera/Prosecco (see Australian Prosecco in the Winemaking section) and Moscato, sparkling Shiraz and Pet Nat in very small quantities.

21.1. The Growing Environment and Grape Growing



Note: This map includes the regions mentioned in this chapter that make sparkling wines. Other regions are also shown but you are not expected to know about these other regions within D4.



Grapes for traditional method sparkling wines are grown in the cooler regions of Australia, especially in Tasmania, but also in regions such as Yarra Valley (led by Domaine Chandon), Adelaide Hills and the alpine regions of Victoria and New South Wales on higher altitude sites. These areas produce grapes that are highly suitable for quality sparkling wine due to their high acidity, moderate potential alcohol levels (due to slow sugar accumulation) and the creation of ripe but medium intensity fruit characters. Yields are lower than in regions producing high-volume sparkling wines, contributing to higher prices.

Tasmania is the leading region for high-quality traditional method wines, with a history going back to the mid-1980s when a joint venture between the Tasmanian company Heemskerk and Champagne Louis Roederer was launched. The state produces only a small amount of wine but has been very successful in terms of quality. In 2020, 36 per cent of its total wine grape production was made into sparkling wine.[2]

The climate on the island is varied. For example, on the north coast Tamar Valley and Piper's River are close to each other. However, Tamar Valley is much warmer (as it is more sheltered from the cold Southern Ocean) and harvests a fortnight before Piper's River. With the exception of the warm Coal Valley, Southern Tasmania is generally cooler than the warm parts of the north coast. Indeed, the coldest areas are cooler than Champagne but with higher

sunlight intensity due to its latitude. The larger producers source fruit from different locations around the island to gain the volumes necessary, blending grapes from cooler and warmer regions for balanced wines. Growers have discussed creating named sub-zones within Tasmania but are currently content to market their wines as Tasmanian.

Spring frosts and high rainfall are the main challenges for growing grapes for premium sparkling wine. Coulure in the early season and botrytis later on can be problematic.

Fruit for inexpensive sparkling wines is grown in a wide range of regions, including Riverland, Riverina and Murray-Darling, and labelled 'South Eastern Australia'. This accounts for the vast majority of sparkling wine produced in Australia. Here, irrigation is essential and mechanisation standard. In general, fruit is picked early for lower potential alcohol, to retain acidity and to avoid over-ripe fruit notes. Yields here are two to three times as high as in cool areas and prices are around one-quarter of the prices for the fruit that goes into super-premium wines.

Vineyard at Pipers Brook, Tasmania

Fruit for sparkling red wine, particularly Shiraz, is the exception to the general rules about cooler sites and early picking. The fruit is grown in warm-climate regions, especially central Victoria, Barossa Valley and McLaren Vale. The style requires richness and intensity of flavour and therefore the grapes are picked at the same time as for still wines. Yields will range from high for inexpensive wines to moderate for premium and above.

21.2 Winemaking

As noted, the Australian regions produce a wide range of sparkling wine using all methods – traditional, transfer, tank, carbonation and ancestral method.

TRADITIONAL METHOD

Traditional method wines are made in several styles (non-vintage, vintage, prestige cuvée, rosé). Time on lees in bottle varies. Premium producers look to Champagne as an example (without being constrained by its rules) and have similar minimum lees-ageing time. A significant number of the best producers age their wines on the lees for long periods of time as standard (three or more years) and the emerging category of 'late disgorged' wines, with more than six years ageing, is led by producers such as Jansz and Arras.

The geographical position of Tasmania has resulted in most of the large producers pressing the grapes on the island, but then completing the winemaking on the mainland (e.g. Bay of Fires). Refrigerated juice (or the base wine) is transported to their own wineries in mainland Australia, where they have invested in specialised equipment for the second

fermentation stage for sparkling wine. Smaller Tasmanian producers make their wines to completion on the island, as small volume production can be carried out by hand and limited machinery (e.g. gyropalettes).

In general, premium traditional method wines from Australia will have medium (+) to high acidity and medium alcohol. Body and flavour intensity can vary from medium (-) to medium (+) depending on the style and length of lees ageing. The lighter styles will be softly fruity (citrus fruit and apple) whereas the fuller bodied styles typically have prominent autolytic notes. Wines may or may not undergo malolactic conversion, depending on the style wineries wish to make.

TRANSFER, TANK, CARBONATION

Inexpensive and mid-priced sparkling wines are made across a number of cool, moderate and warm climate regions in Australia. Often, these wines will be blends of grapes from multiple regions, but some may have regional designations. Large brands may include some grapes from warmer, irrigated, inland regions such as Riverina.

These wines can be made by transfer method, tank method and carbonation and may be made from a number of different varieties including Chardonnay, Pinot Noir, Moscato and Glera/Prosecco.

In general, these wines will have medium to medium (+) acidity, be anywhere on the scale from dry to medium-sweet, low to medium alcohol and light to medium body. The wines tend to be fruity, some intensely so, with anything from citrus fruits to riper peach and apricot fruits as well as the grapey fruit of Moscato. There is little or no autolytic character (just in some transfer wines). The main brands are Brown Brothers, Jacob's Creek and Yellowglen.

SPARKLING SHIRAZ

Sparkling Shiraz is made like a normal still red wine, including malolactic conversion, and may or may not spend time maturing in oak. Very good and outstanding quality wines are made by the traditional method. Acceptable to good wines are by transfer method, tank or carbonation. Sparkling red wines are also made from other varieties.

Shiraz wines are deep in colour and may vary from ruby to garnet. They tend to have medium (-) to medium acidity, medium to high alcohol, and medium but ripe and soft tannins, balanced by dosage. It is common for wines to have more than 20 g/L of residual sugar to balance the effects of tannins and high alcohol on the palate. They also tend to be medium- to full-bodied with medium to pronounced intensity. Styles can be distinctly fruity or may have more savoury complexity from extended oak maturation prior to second fermentation. Autolytic notes tend not to be overt as they are masked by other flavours. Some late disgorged wines are available with extended lees ageing, but usually sparkling reds are released after one to two years.

MOSCATO

Sparkling Moscato, especially pink Moscato (e.g. Innocent Bystander), is a growing sector in the domestic Australian wine market. It is made from grapes grown in many different regions, though tending to warmer climates. Higher quality, smaller production Moscato is made by the tank method, but most inexpensive to mid-priced Moscato is made by carbonation. Sparkling Moscato is typically low in alcohol with medium acidity and can vary from off-dry to sweet. It

is distinctly fruity in style with classic Moscato grapey flavours. Wines are acceptable to good quality levels.

AUSTRALIAN PROSECCO

Australian Prosecco is a rapidly growing and important segment of the wine market. The main region of production for this style of wine is the King Valley with Prosecco being developed as its new flagship sparkling wine. In Australia it continues to be labelled as Prosecco, the argument being made that the variety was planted in Australia before Italy changed the use of the name from a variety name to the name of a PDO. The first Australian Prosecco was released by Dal Zotto in 2004; Italy changed the use of the word Prosecco from 2009. However, if exported to the EU these wines must be labelled as Glera. The King Valley region is assisting in ongoing legal representation to be able to use the name Prosecco in other markets, e.g. China – arguing that it is a variety, not a region.

Prosecco is made predominantly by the tank method to obtain a lightly fruity style. Typically, the wines have medium (+) acidity, medium alcohol, and light to medium body with delicate white peach flavours. It tends to be off-dry to medium-dry. It is predominantly made by small producers with a focus on quality. The quality is good to very good. Some carbonated wine is also made.

PET NAT

Pet Nat wine is now being made by many small, often natural, winemakers in several regions from several varieties. It is generally made in small quantities and the wines can be white, rosé or red. In general, these wines can be quite cloudy, with varying levels of pressure from slightly sparkling to fully sparkling. They are usually dry with medium (+) acidity and medium alcohol. Body can vary from light to medium (+) and flavour intensity can vary from medium to pronounced. The wines often have yeasty characteristics along with fruit flavours.

21.3 Wine Law and Wine Business

In general, Australian winemakers are not constrained by wine laws related to varieties permitted within geographical indications and hence have been able to introduce new styles, such as sparkling Shiraz.

Australian sparkling wine is made by the full range of producers, from major corporations to small, artisan growers. The success of Tasmanian traditional method sparkling wine has led to significant acquisitions of small wineries by the large producers and to consolidation in the sector. For example, Brown Brothers bought Tamar Ridge, and Accolade owns a range of brands including House of Arras and Bay of Fires.

Australia has a substantial domestic market for sparkling wine that represents 12 per cent of domestic wine sales by volume.[3] Recent developments have seen the rise of Australian Prosecco and Moscato, and a falling back of sparkling Shiraz sales. Australian Prosecco reached sales of over 6.5 million litres on the domestic retail market in 2020–21, while Australian Moscato tripled in production between 2014 and 2017 but has fallen to less than half the sales of Australian Prosecco on the retail market. Australian Prosecco has increased dramatically in recent years with grapes crushed rising from 2,000 to nearly 16,000 tons in the years 2015-21.[4] The reduction in Shiraz sales may be due to the rise of these other sparkling options, a reduced interest in high alcohol wines and a new interest in foreign wines (sparkling

Shiraz being seen as an Australian phenomenon). Alongside these trends, there is increasing interest in Pet Nat via wine bars in the domestic market.

References

1 Wine Australia (private communication, email October 2021)

2 As above

3 Australian wine: Production, sales and inventory 2019-20, Wine Australia, p.3 (retrieved 23 June 2022)

4 Wine Australia, private communication (email, October 2021)

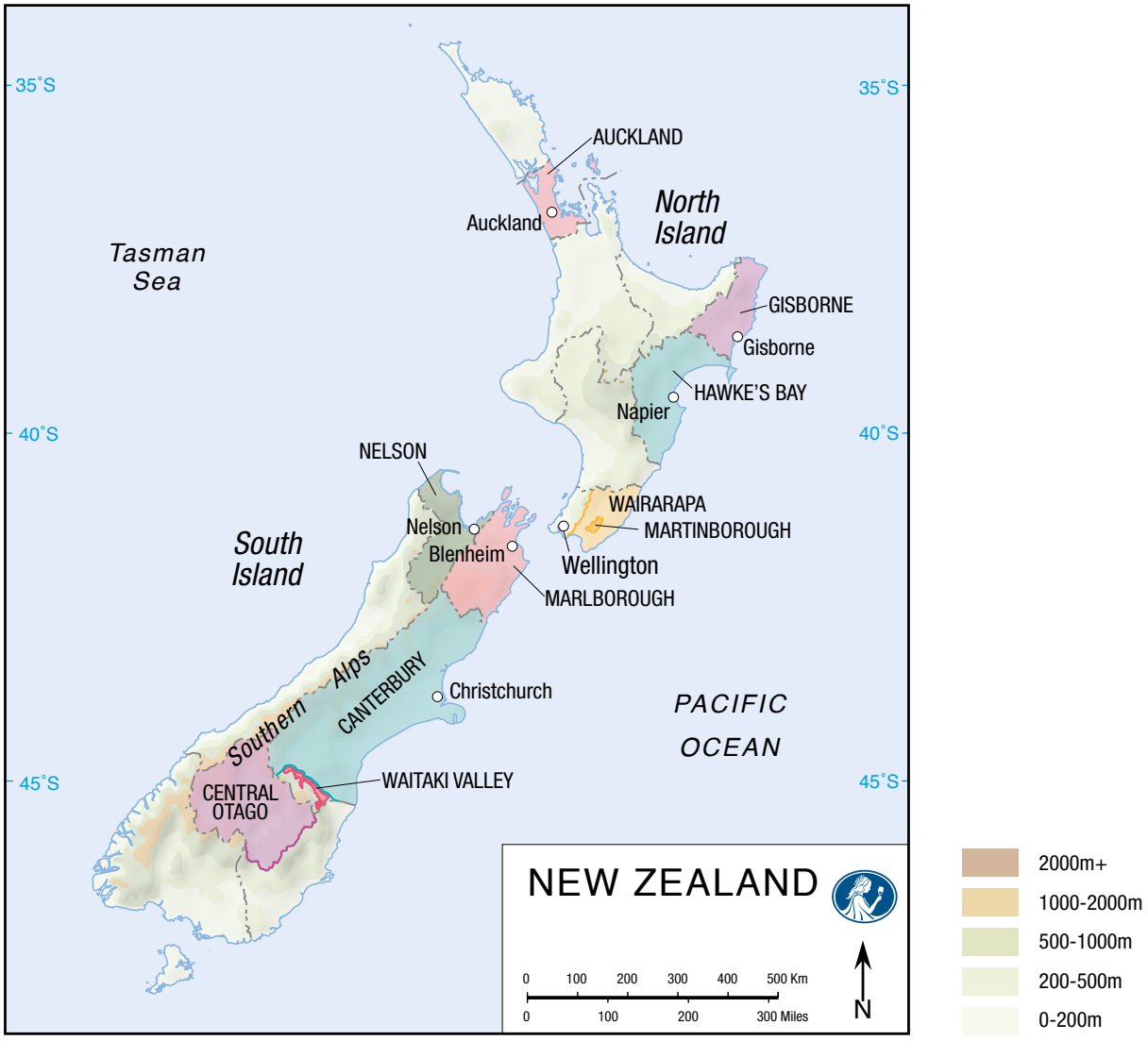
New Zealand

22

With its cool climate and plentiful supply of Chardonnay and Pinot Noir, New Zealand has great potential for making notable sparkling wines. However, the success of its still wines, particularly Sauvignon Blanc, means that sparkling wine has remained a tiny part of its offer.

Traditional method bottle-fermented wines dominate the mid- to premium-priced sector. These wines typically offer medium intensity aromas of apple and lemon fruit with light autolytic notes and high acidity. They are typically made in a Brut style and are good to very good in quality, with some outstanding examples. Some carbonated wines are also made.

22.1. The Growing Environment and Grape Growing



Note: This map includes the regions mentioned in this chapter that make sparkling wines. Other regions are also shown but you are not expected to know about these other regions within D4.

Grapes for sparkling wines are sourced from around the two islands. However, the cooler climes of New Zealand's South Island are better suited to elegant sparkling wine styles with crisp acidity. Marlborough, which accounts for more than two-thirds of the country's vineyards, has the highest production of grapes destined for sparkling wine, while the Pinot Noir-dominant region of Central Otago has a handful of ambitious sparkling wine producers. On the North Island, Gisborne has long been home to large-volume sparkling wine brands, producing fuller bodied styles with lower acidity and less finesse.

Marlborough has many advantages as an area for sparkling wine grapes. There is a low risk of late frost or hailstorms and the prevalent north-west wind helps to remove air moisture quickly after rain, reducing the threat of fungal diseases. While it has moderate rainfall, vineyards have to be irrigated due to the free draining alluvial soil and high levels of transpiration from the land and vines due to the strong north-west wind. There is, however, good access to clean water from a constant underground water table.

The grape harvest for sparkling wine typically begins two weeks before the still wine harvest, which is beneficial because autumn rain and the tail end of tropical cyclones can be a challenge later in the harvest. Grapes are picked at a potential alcohol level of between 10–11% abv.

22.2. Winemaking

Most New Zealand sparkling wine is typically a blend based on Pinot Noir and Chardonnay. The higher quality sparkling wines are produced using the traditional method, but the country's biggest sparkling wine producers also employ the transfer method. Inexpensive sparkling wines tend to be made by carbonation.

Small producers use their own fruit. A handful of larger producers own vineyards but rely also on long-standing contracts with grape growers to fulfil their requirements.

Many wineries do not have the specialised equipment nor expertise needed to make high-quality traditional method sparkling wine and thus send their blended still wine to a contract winemaking facility for the addition of *tirage*. The bottled wine is returned to the producer for second fermentation and ageing. It is then sent away again for disgorging and the addition of dosage.

Producers are free to choose between the many options available with traditional method wines: quality-conscious producers will pick by hand and press whole bunches. Most will use cultured yeast and carry out first fermentation in stainless steel for purity of fruit expression. New Zealand sparkling wines tend to undergo malolactic conversion to reduce the very high acidity levels, also to prevent the reaction occurring inadvertently later in the process when it would be undesirable. However, a small number of producers block malolactic conversion in order to preserve the high acidity.

Traditional or transfer method wines usually spend around 18 months on the lees, though some premium producers have extended ageing on lees to add extra complexity and depth. Some wineries adopt the Champagne model of using reserve wines in non-vintage bottlings, but others do not.

Dosage levels for Brut wines vary from 6 g/L up to 12 g/L, although some zero dosage wines are made. For example, pioneer traditional method company No. 1 Family Estate, founded by the Champagne family Daniel Le Brun, makes its least expensive sparkling wine

with a minimum 18 months on the lees and a final sweetness of 9 g/L, while its finest cuvées spend much longer on the lees and have a lower, or zero, dosage.

Following the record 2008 harvest, which led to an oversupply of Sauvignon Blanc, companies created sparkling Sauvignon Blanc, employing the carbonation method. Despite a brief flurry of success, less than 60,000 litres were exported globally in 2017. This style typically displays medium (+) intensity primary green capsicum and passion fruit notes, no autolytic character, high acidity and medium (–) length. Examples of carbonated Pinot Gris are sold in the domestic market but are rarely exported.

22.3. Wine Law and Wine Business

Sparkling wine is a small proportion of New Zealand's wine production. Producers include large companies such as Oyster Bay, who also make high-volume still wines. There are some specialist firms (e.g. No 1 Family Estate), who make both their own wines and carry out the specialist second fermentation phase for other wineries.

Sparkling wines are a tiny proportion of New Zealand's wine exports, representing 0.8 per cent of exports by volume.[1]

Reference

1 *New Zealand Winegrowers Annual Report 2021*, NZ Wine, p. 29 (retrieved 23 June 2022)

D4 Sparkling Wines: Recommended Further Reading List

23

The Diploma reading provided by the WSET gives students the study materials they need for successful study.

If students wish to extend their studies, the following are recommended but are **not required**. You do not need to buy any additional books. In the case of conflict between the WSET study guide and other sources, students should follow the WSET study guide for the purposes of the examination.

General

Johnson, H. and Robinson, J. 2019, *The World Atlas of Wine*, 8th edition, London: Mitchell Beazley

Robinson, J. and Harding, J, 2015, *The Oxford Companion to Wine,* 4th edition, Oxford: Oxford University Press (5th edition due to be published in September 2023)

Robinson, J., Harding, J. and Vouillamoz, J, 2012, *Wine Grapes: a Complete Guide to 1,368 Vine Varieties, Including their Origins and Flavours*, London: Penguin Books

Sparkling Wine

Stevenson, T and Avellan, E, 2019, *Christie's World Encyclopedia of Champagne and Sparkling Wine*, 4th edition, London: Bloomsbury Absolute

Rose, A., 2022, Fizz! *Champagne and Sparkling Wines of the World*, Oxford: Infinite Ideas

Barrie, S. and Richards, P, 2018, *The Essential Guide to English Wine*, London: International Food and Wine Society

Bailey, P, 2018, *Global Sparkling Wine Market Trends*, Wine Australia

Easton, S., 2012, *New Zealand Sparkling Wine*. Wine Wisdom

Easton, S, 2012, Tasmanian Sparkling Wine, Wine Wisdom

Edwards, E, 2009, *The Finest Wines of Champagne: a Guide to the Best Cuvées, Houses, and Growers*, London: Aurum Press

Hidalgo, J, 2015, *Argentine Bubbles: key to understanding a growing consumer phenomenon*, Decanter

Jefford. A, 2017, *Burgundy's other self*, Decanter

Krebiehl A, 2016, *The story behind Crémant d'Alsace*, Wine Enthusiast

Krebiehl, A, 2017, *Trentodoc: Sparkling Wines of Snow and Sun*, World of Fine Wine, Issue 57, pp. 125–129

Skelton, S. 2019, The Wines of Great Britain, Oxford: Infinite Ideas

Stelzer, T, 2018, *Australian Sparkling Wine report 2018*, Tyson Stelzer

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