



TOKAJ-HEGYALJA
EGYETEM

Publications of the Department of Viticulture and Oenology

LEARNING ABOUT VITICULTURE AND OENOLOGY IN ENGLISH

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Structure of grapevine

3

What are the basic parts of the grapevine?

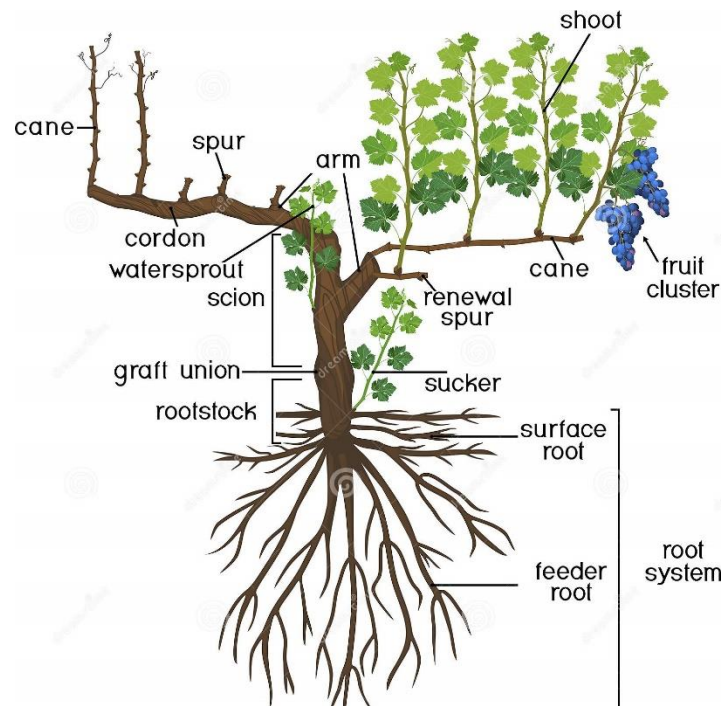


Figure 1. The structure of a grapevine (Source: <https://www.dreamstime.com/>)

Which components can be found in the various parts of a grape berry?

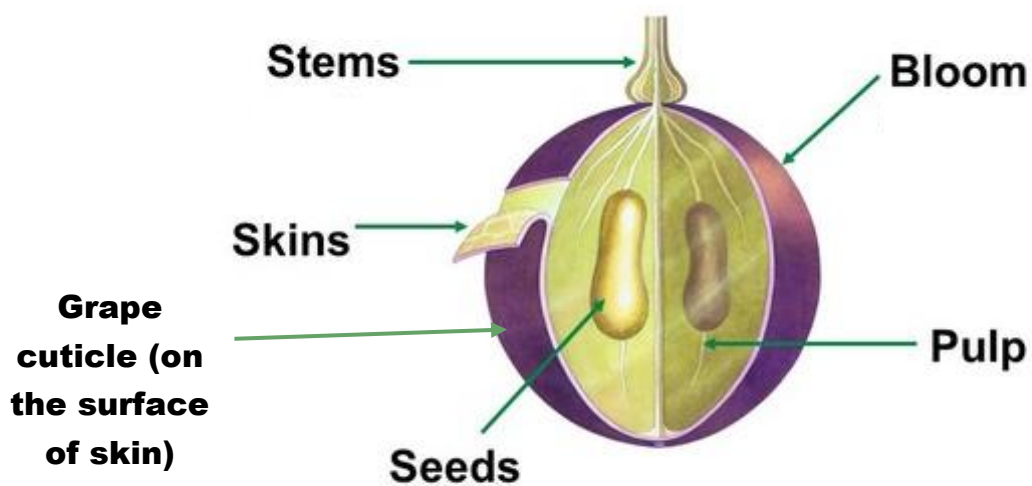


Figure 2. Parts of a grape berry (Source: <https://quizlet.com/hk/256144589/wset-lv-3-section-1-wine-and-consumer-7-common-elements-in-winemaking-and-maturation-flash-cards/>)

1. Seeds and Stems: Contain tannins and bitter flavonoids
2. Skins: Contain high concentration of flavour compounds. Also contain tannins and leucoantocyanins and catechins.
3. Bloom: Contains yeasts (*Saccharomyces cerevisiae*, *Zygosaccharomyces* sp., *Kloeckera* and *Hanseniaspora* sp., *Brettanomyces* and *Dekkera* sp., *Candida* sp., *Pichia* and *Hansenula* sp.)
4. Pulp: Contains water, sugar, acid (tartaric, malic, citric, lactic, succinic acids) and favourable polyphenols.

The winemaking process

What are the basic steps of winemaking?

1. Harvest
2. Sorting, destemming, crushing and pressing
3. Fermentation
4. Clarification (racking, fining and filtration)
5. Bottling

Harvest

It is the most important and exciting period of the year in a winemaker's life. Every vintage has its particularity: different weather conditions, different sugar contents. In a later harvest, grapes have higher sugar content, greater concentration of flavours and alcohol. An early harvest ensures there is less ripeness and alcohol in the wine but more acidity and variety in its aromatic profile.

The method of harvesting the grapes is a very important factor. There are two options: manual and mechanised picking.

If the harvest is mechanised, machinery is employed to shake the vines and collect fallen grapes. This method is less selective as it doesn't differentiate between suitable and unsuitable fruit. It is very useful when you have to bring the grapes to the winery as soon as possible because of rainy weather conditions or are afraid of warm daily temperature. It is a quicker and cheaper way to harvest; the most important factor is the reduction in manual labour.



Figure 3. Machinery harvest (Source: <https://kiskunagro.hu/termek/>)

The other way is manual picking when harvesters pick individual bunches of grapes by hand. This process is time consuming, labour intensive and usually more expensive.

For this reason, hand picking is essential for certain styles of wine which require only grapes picked with the correct or specific level of ripeness. An example where hand picking is the only viable option are wines made from grapes affected by noble rot.

In general, hand picking causes less damage to vines. Unlike machine harvesting, vines are not violently shaken and thus they are less stressed. In addition, the soil is not overly compacted by heavy machinery going up and down the vineyard.



Figure 4. General hand picking (Source: <https://www.studiodan.hu>)

Sorting, destemming, crushing and pressing

Sorting is very important to remove sick bunch parts, immature berries. In the case of Aszú wine types, it is very important method to sort noble rotted berries to avoid including grey-rot berries.



Figure 5. Harvested grape berries (Source: <https://www.studiodan.hu>)

Next, the grapes are destemmed. Destemming is the process that separates bunch stems from the actual grapes. Destemming is an optional step usually done by machinery which crushes the grape at the same time.



Figure 6. Destemming machine (Source: <https://keszenlet.hu/boraszat/termek/118/256,enoveneta-top-5-10-15-25-zuzo-bogyozo-gep.html>)

There are cases when crushing happens together with destemming, and it means to break the skins of the berries. Crushing should be as gentle as possible, to avoid damaging pips or stems. If these are crushed, they may release bitter flavours, damaging the overall wine profile.

After the destemming and crushing processes, the grapes are pressed and then fermented. Pressing means to separate the liquid from the solid constituents: the pips, skin and fibres. There are different types of pressing machines from traditional hand press (Figure 7.) to inflatable rubber membranes or stainless cylinders press (Figure 8.).



Figure 7. The traditional horizontal press (Source: <https://technika.gmgi.hu/>)



Figure 8. Vertical membrane press (Source:

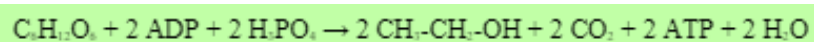
<https://keszenlet.hu/boraszat/termek/119/263,enoveneta-ppa-nyitott-tartalyos-pneumatikus-szolopresek.html>)

The pressure used is a very important factor in the subsequent wine quality. The liquid that comes from the press without adding pressure, “free run juice”, is very precious because it is full of vividity, aromas and less bitter tannins and flavonoids. In the case of other fractions, higher pressure is employed from 0.1 bar to maximum 3 bar. (It is possible to use higher values, up to 8 bar, but these have negative effects on quality.)

Fermentation

In oenological practice, the term fermentation refers to the conversion of the sugar content of must into ethanol and carbon dioxide by wine yeasts.

The concentrations of glucose and fructose are the most considerable of various fermentable sugars contained in the must. Hexoses are converted into alcohol or carbon dioxide during glycolysis, also known as the Embden Meyerhof Parnas (EMP) reaction pathway. Glycolysis and alcoholic fermentation produce 2 molecules of ATP (coenzyme involved in metabolism). The total chemical equation of alcoholic fermentation carried out by wine yeasts is therefore as follows:



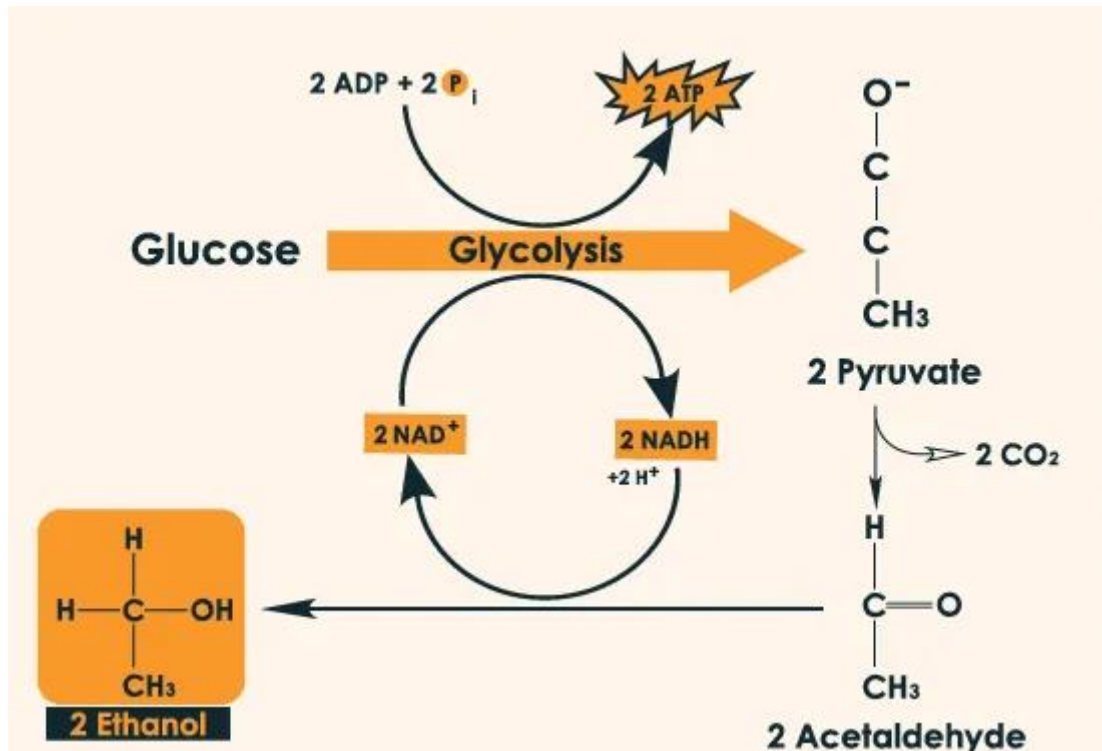


Figure 9. The chemical reaction of alcoholic fermentation (Source: <https://24hoursofbiology.com/what-is-alcoholic-fermentation/>)

The basic fermentation product is ethanol, but there are other secondary compounds produced which have a special role in forming the characteristic features for example lactic acid, glycerol, succinic acid, acetic acid, pyruvic acid, etc.

According to the type of wines, it is possible to affect the alcoholic fermentation process: in the case of dry wine types all the sugar is completely converted into alcohol; in the case of semi-sweet or wines with higher residual sugar, we stop the fermentation at the desired sugar content by adding sulphur dioxide to the fermenting wine accompanied by cooling.

There are two types of yeasts: spontaneous yeast strains from the berries and specified or cultured dry yeasts. In the case of wines, species of yeasts called *Saccharomyces cerevisiae* and *Saccharomyces bayanus* are important. These yeasts are alcohol and sulphur dioxide tolerant, perfectly suited to the job of wine fermentation. The main advantages of using indigenous yeast flora are more aromatic wines with special flavours and greater complexity but lower alcohol content, and there is a very long fermenting period (more than 14 days).

During the fermentation, temperature has an important role. Alcoholic fermentation does not take place if the temperature is below 5 °C or above 35 °C. Lower temperatures during fermentation favour the development of fruity flavours. They also reduce the loss of more volatile aromas such as floral and other subtle notes.

Alcoholic fermentation of the must can take place in different types of **vessels**: oak, concrete, stainless steel tanks.

During fermentation of red wine, the must contains pulp, skin and other solid compounds called the cap. The cap, if left alone, would just float on top of the fermenting liquid. This would lead to a poor extraction of colour and tannins. Various cap management techniques exist all with the aim of improving the contact between the cap and juice. There are different techniques to stir the cap; the Hungarian name is “csömöszölés”, one of them happens with the aid of gas bubbles or a mechanical rotating system (Figure 10.) or a horizontal truncated cone specially designed for rotating shafts.



Figure 10. Stirring the cap (Source: <https://www.winelovers.blog.hu>)

Clarification (racking, fining and filtering)

Clarification means to clean the new wine from troublesome solids. Clarification techniques can be classified into three categories:

- ✓ **Racking:** Thanks to gravity, the insoluble matter gradually settles at the bottom of the container, tank or barrel. The liquid is then pumped into a different vessel, leaving the solid particles behind at the bottom of the original container.

- ✓ **Fining:** During this method, additional agents called bentonite, albumin and gelatin are added to the wine which are able to form higher density compounds with the unnecessary materials in wine.
- ✓ **Filtration:** when all kinds of chemical agents and microbiota are filtered out of the wine to avoid cloudiness in the wine after bottling.

After fermentation, white wines are racked to separate the liquid from the lees (dead yeast cells that remain after fermentation has finished). However, some winemakers favour contact with lees as it gives the wine more body and structure – therefore racking is not carried out at this stage (“sur lie”, battonage technology).

Bottling

Bottling is a complex and delicate step of the winemaking process that requires a lot of professional expertise. The aim of bottling is to protect the wine from oxidation as long as possible.

The main steps of bottling:

- ✓ ***Cleaning the bottle:*** The bottles have to be rinsed with sulphur dioxide-water solution and microfiltered water.

Rinsing removes:

- glass residues,
- the dust that is introduced into the packaging of the bottles,
- and condensation generated during storage.

- ✓ ***Machine sterilization:*** It happens with steam or hydrogen peroxide and peracetic acid solution. The water left in the machine deteriorates rapidly, and so sterilization carried out before use and after work is completed.
- ✓ ***Filling:*** The wine is pumped out of our wine tanks and each bottle is filled with the desired quantity of wine with the aid of valves. There are two filling principles: machines using vacuum filling and those working with back pressure.

- ✓ Vacuum filling is the method for still wines:
 - The neck part of the bottles is attached to the filling head.
 - The immersion depth of this pipe determines the filling height.
 - Charging speed unchanged throughout the process.
- ✓ Back pressure means that the pressure value applied exceeds atmospheric pressure:
 - Only such equipment may be used in the case of wines containing CO₂.
 - Before the wine runs, the bottle is filled using carbon dioxide overpressure.
 - Overpressure gradually decreases during charging.



Figure 11. Filling and closing machine (Source: HARASZTINÉ, 2012)

Bottle closure: The closure will be cork (*parafa*, glass, synthetic), screw cap or crown cap. You have to choose the right machine for the chosen closure type to be able to make the closure (Figure 12.).



Figure 12. Closure techniques (Source: <https://www.thedrinksbusiness.com/2017/02/wine-closures-the-facts/>)

Screw cap closures were first used in the Australian wine industry in the 1970s, but consumers at the time perceived these wines to be of lower quality. Nowadays the use of this technique has gained more popularity, and its price is quite stable (Figure 13.).

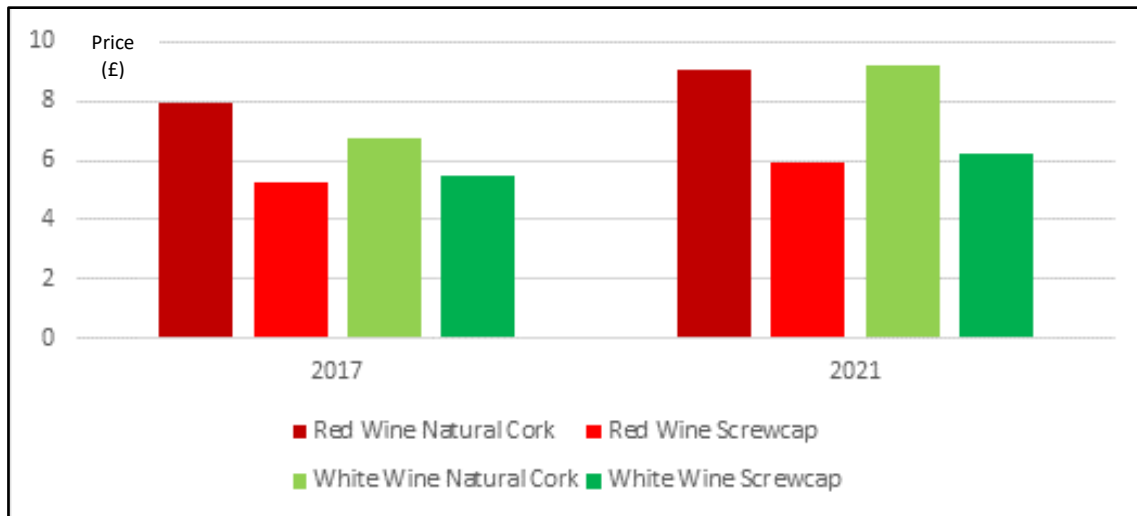


Figure 13. Average price per unit split by colour and closure type 2017 vs 2021 (Source: FEILDEN, 2021)

Wines sealed with natural cork grew in price from an average of £7.05 in 2017 to £9.13 in 2021. In contrast, the average price for bottles with screwcaps is £6.09, up from £5.53 in 2017.

Tokaj Wine Region

The historical Tokaj Wine Region in northeast Hungary (Borsod-Abaúj-Zemplén County) has been an UNESCO World Heritage region since 2002. It is located between the Zemplén Hills and the Great Plain of Hungary, where the rivers Tisza and Bodrog meet (in the town of Tokaj). The wine region itself consists of 27 villages and towns which have had an incredible history and cultural diversity over the centuries. Kings, popes, aristocracy and artists drank Tokaj Aszú that made this region world famous and unique.



Figure 14. Tokaj Hill (Source: Photo by Zelenák)

Terroir

The special soil and geography of the region was created 13 to 15 million years ago as a result of the oldest volcanic activity in the Carpathian Basin. Thanks to this period many important hillsides and currently well-known wine regions in Hungary have a special volcanic soil: like Eger, Tokaj is also one. Hills of the western side of the Tokaj Wine Region (around Tállya) are based mainly on andesite; in the middle we mostly find rhyolite and its different tuff versions (from Mád to Erdőbénye); while around the north-eastern vineyards we can see even more mineral compositions of quartz, jasper, rhyolite mixed with clay, etc. (Tolcsva, Sárospatak). The Tokaj Hill itself (Tarcál, Tokaj) is a rather different terroir: a solid dacite mountain (412 m) covered with a special loess soil (to the depth of 10-20 m) (Figure 15.) that doesn't retain as much as water volcanic soil, but it is warmer and perfect for noble rot.



Figure 15. Special loess soil from Lencsés vineyard, Tokaj (Source: <https://foodandwine.hu/>)

Grape varieties of Tokaj

Only a few people know that historically Tokaj had dozens of grape varieties (red ones too). After Phylloxera (early-20th century) white grapes became widespread: mainly Furmint (65 %) and Hárslevelű (20 %) while the rest is Sárgamuskotály, Kövérszőlő, Zéta (Furmint x Bouvier) and Kabar (Hárslevelű x Bouvier). Only these 6 varieties are allowed to be used for PDO (protected designation of origin Tokaji OEM wines). All of these grapes are capable of noble rot, thanks to their thin skins and the microclimate of the region.

Furmint

Its grapevine is vital, has strong growth, requires relatively little green work and tolerates drought weather conditions well. When overripe, it is extremely rich in flavour compounds. Due to its good noble rot berries and ability to retain its acidity, it has become the main variety of the wine region.



Figure 16. Phenological appearance (Source: HAJDÚ, 2013)

Hárslevelű

The second major grape variety in the wine region. It got its name after its shape which resembles the leaves of the linden tree. Its grapevine is strong growing, but it produces fewer shoots than Furmint. As a result, less green work is required, so less manual effort. Its canes are large, long and often branch out.



Figure 17. Phenological appearance (Source: HAJDÚ, 2013)

Sárgamuskotály

It is a medium-ripening variety, its fruit yields are also considered medium, although in some vintages it is also capable of high yields. It is more demanding in terms of its environment and soil than the two main varieties, so it has not spread over a larger area. Due to its dense grape foliage, it rots easily, which is a disadvantage for a fragrant variety. In exceptional vintages, noble rot berries can also be harvested from it.



Figure 18. Phenological appearance (Source: HAJDÚ, 2013)

Kövérszőlő

It is not currently widely grown in the Tokaj Wine Region, although it is a traditional variety. It is late-ripening, but it is still a week or two ahead of Hárslevelű and Furmint. Noble rot can progress very well, but the vine is sensitive to the location of the plantation; in prolonged humid conditions its fruits deteriorate very quickly. Rot-sensitive grape variety.



Figure 19. Phenological appearance (Source: HAJDÚ, 2013)

Zéta (Furmint x Bouvier)

Its canes are tapered, dense, medium in size. It was brought to the Tokaj Wine Region because of its very good aszú-development capability.



Figure 20. Phenological appearance (Source: HAJDÚ, 2013)

Kabar (Hárslevelű x Bouvier)

Its vines grow few shoots; in this it resembles the Hárslevelű variety. Its leaves have an angry green colour. It ripens at the same time as Zéta but produces fewer fruits, has good sugar-collecting abilities, and due to its thicker berry skin, it is less sensitive to later wetter weather.



Figure 21. Phenological appearance (Source: HAJDÚ, 2013)

The miraculous *Botrytis cinerea*

The two traditional factors that most shaped Tokaji wines are the first vineyard classification (1730 by Matthias Bél) and the tradition of noble sweet wines. Thanks to the special factors explained above (geography, autumn fogs from the river, special grape varieties), a special fungus called *Botrytis cinerea* can infect the berries during the wet and foggy autumn mornings while (along with sunshine) the water content of the fruit is extracted almost completely. It provides the special inner content and final flavours in the wines too (Figure 22.).



Figure 22. The formation of noble rot (Source: <https://www.bor.hu>)

When the partly botrytised clusters are harvested together, local winemakers can make late harvest or Szamorodni wines (both dry and sweet) (Figure 23.).



Figure 23. How a ripe grape berry evolves to an aszú berry? (Source:

<https://disznoko.hu/disznoko-experience/how-a-ripe-grape-berry-evolves-to-an-aszu-berry/>)

In a good vintage for Aszú, the grapes are picked berry by berry in many rounds during harvest time. They are collected in open vats (while sometimes a tap is opened to let Eszencia drop out separately). When the harvest is over, winemakers choose a basic wine (or fermenting juice) to macerate the berries in, then press it gently (almost like the maceration of red wines). From 1 kg of aszú berries winemakers are allowed to make 2.2 litres of Aszú, Eszencia and Fordítás (“secondary Aszú”). The natural residual sugar of Aszú must be at least 120 g/l (5 puttonyos); above 150 g/l sugar content it is called 6 puttonyos. (The puttony was a traditional tool carried on the back for collecting grapes during harvest.) Aszú wines must be aged in oak barrels for at least 18 months and they can be released onto the market from the 3rd year after harvest (1st of January). Eszencia, the free run-juice of the aszú berries, must contain at least 450 g/l sugar, which means fermentation is incredibly slow and often results in alcohol levels under 4% (Figure 24.).

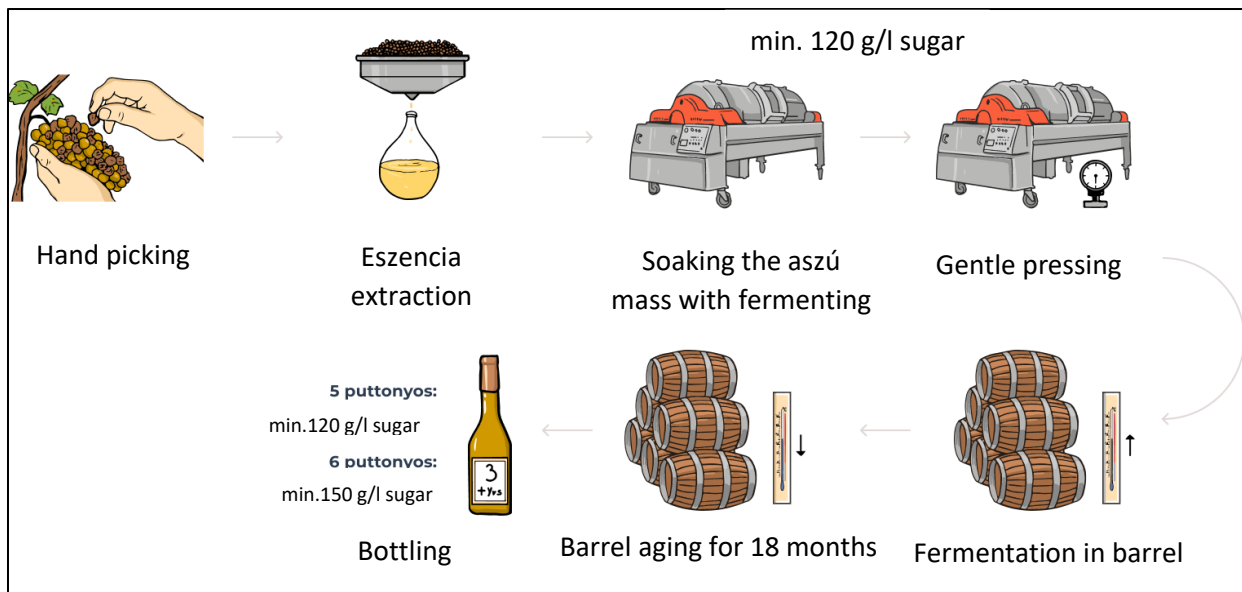


Figure 24. Aszú-making method (Source: <https://www.bor.hu>)

Other important type of wines in Tokaj

For **Fordítás** the pressed aszú berries are macerated a second time in another base wine in order to extract as many flavours as possible, while for **Máslás** the aszú lees in the barrel are topped up with another wine. During and after the 90s several other new wine categories became popular around Tokaj: modern sweet wines like late harvest and even non-botrytised TokajDry wines selected from single grape varieties and often from single vineyards (just like in Burgundy). The more neutral Furmint can broadcast the terroir well and it can be an exciting grape for methode traditionnelle sparkling wines too. These new-wave Tokaji wines can be used more easily in gastronomy and they have also opened new perspectives on the international market.

The noble rot called “botrytization”

Noble rot of the grape by *Botrytis cinerea* is a special overripening process, resulting in a great improvement of the grape quality and making possible the production of sweet botrytized wines. Since noble rot requires specific conditions, there are only a few places where its occurrence is frequent. One of these regions is in the Tokaj Wine Region, where Tokaji Aszú is produced as one of the oldest botrytized wines in the whole world.

Three main circumstances needed to occur at the same time:

1. *Botrytis cinerea* invades the grapes in full maturity
2. Intact and undamaged berries
3. Special climatic conditions: sunny days after the morning mists

Botrytis cinerea

Optional parasitic mould. It is generally a serious nuisance (grey rot) but in special circumstances it causes noble rot. Asexual reproduction takes place with blastoconidia, which are freely arranged at the ends of the conidia in spherical groups which look similar to be a grape bunch (Figure 25.).



Figure 25. Electronmicroscopic view of blastoconidias (Source: BENE, 2004)

The mechanism of *Botrytis* invasion

It was followed by scanning electron microscopy, type TESLA BS-300.

Unable to digest the intact skin, *Botrytis* is able to penetrate into the berry only through micro injuries and fissures of the cuticle (Figure 26.).

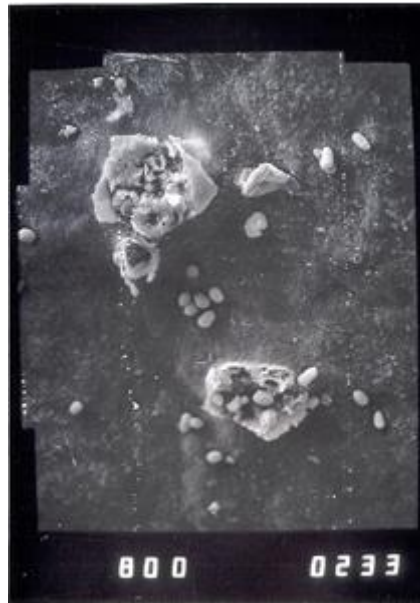


Figure 26. Botrytis cinerea conidia on the berry skin causes micro injuries in the cuticle
(Source: BENE, 2004)

The main sources of inoculum, conidia are transported by the air and develop germ (germination) tubes (Figure 27.).



Figure 27. The mycelia burst through the cuticle and come to the surface (Source: BENE, 2004)

During growth of Botrytis inside the berries (Figure 4.), the berry chemical composition changes, the digested skin turns violet-brown and the water content of the berry evaporates, which results in a strong concentration of the berry juice.



Figure 28. Heavy growth of mycelia and conidia formation on the surface (Source: BENE, 2004)

The digested berry skin supports the growth of saprophytic mycobiota: yeasts, *Pencillium*, *Aspergillus*, *Mucor* species (Figure 5.).

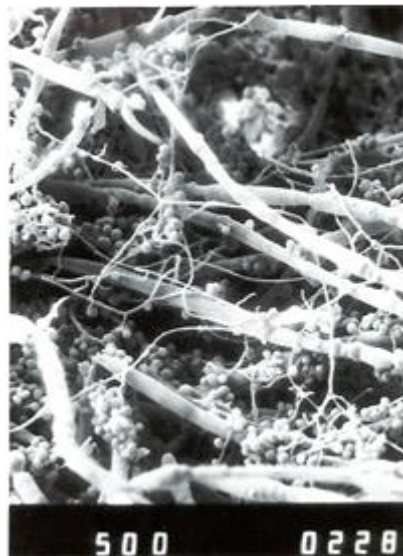


Figure 29. Mycelia and conidia of various moulds growing on the skin (Source: BENE, 2004)

The main chemical changes:

- + the sugar content becomes extremely high, 500-700 g/l
- + glycerol formation
- + organic acids change
- + appearance of special aroma substances

Wine tasting

Tasting is a sensory analysis (“organoleptic“), in which food and drink are analyzed using sight, smell and taste for cognition and evaluation purposes.

What are the rules and techniques for making an appreciation of wine?

There are material and personal conditions for wine tasting:

✓ *Material conditions:*

- choosing the right time for tasting, in the morning hours, sunny, wind-free weather
- simple, clean, well-ventilated tasting area
- odour-free, clean tasting glass
- appropriate service temperature
- white tablecloths, rinsing water, spit cups, napkins

✓ *Personal conditions:*

it is not advisable to eat overly spicy dishes on the day of tasting

it is not advisable to consume anything other than neutral water during tasting

it is best to taste on a semi-empty stomach, so we are neither hungry nor satiated

it is essential to avoid the use of perfumed cosmetics

What are the human senses at the time of tasting?

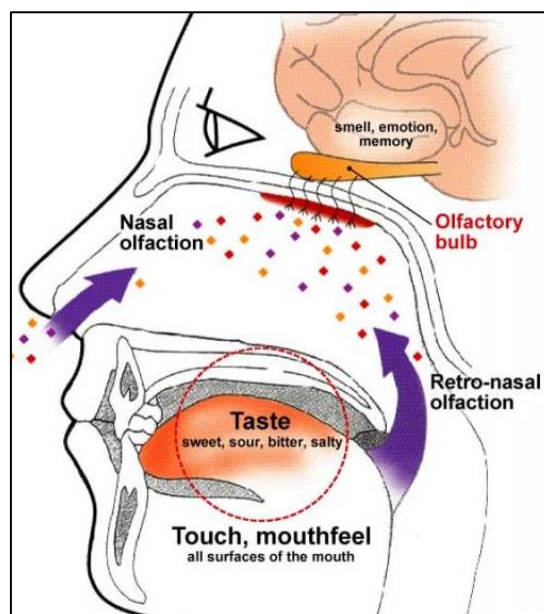


Figure 30. The basic senses for taste (Source:

<https://www.niagaranow.com/entertainment.phtml/2768-its-a-wine-thang-olfactory-bulb>)

What is the order of sensory evaluation?

1. LOOK
2. SMELL
3. TASTE
4. CONCLUSION

LOOK

1. **Hue and intensity:** identify the most prominent colour (Figure 31.)
2. **Tears/legs/church window:** When swirling the wine in the glass, a thin film of wine is left on the surface of the glass. As the alcohol in this mixture evaporates, the leftover water-wine mix collects on the sides of the glass creating droplets that run back into the glass. (It is the Gibbs-Marangoni Effect called by NASA.)

SMELL

Many people believe that 70 % of the information we get about wine is obtained through our sense of smell. Our sense of smell gets tired very easily.

1. **Intensity:** We base our first impression of the wine based on smell.
2. **Aromas:** *fruit:* apple, pear, plum, strawberry; *herb/other:* herbs, flowers, minerals, black pepper, espresso, balsamic, petroleum, beeswax; *oak:* vanilla, coconut, chocolate, cigar; *earth:* loam, forest soil, mushroom, slate, chalk, dried clay, rock (Figure 32.)

TASTE

When you taste a wine, you have to focus on flavours and feel, how the wine feels on your palate, in your mouth.

1. **Sweetness** depends on the residual sugar content of wines: dry, semi-dry, semi-sweet, sweet
2. **Tannin:** is the taste of bitter, astringent
3. **Acidity:** is the level of sourness in wine, it makes your mouth water
4. **Alcohol:** is a warming feeling in your throat
5. **Overall Body:** Among the sensations we include are physicality, the equally important components of which are the content of alcohol and dry extract. If either one is absent, the wine feels thin, flat.



COLOR OF WINE

Visual Inspection

This chart will help you build your mental repertoire for identifying wines by hue and intensity. You will find it useful for blind tasting and assessing quality.

Hue in Red Wine

Pigment in red wine is affected by several factors including pH level. Wines with red-based hues tend to have a lower pH than wines with blue-based hues.



Advice for Viewing Wine

Look at wines under bright, diffused, natural lighting over a white background for best results. Hue is best observed at the point where the wine meets the glass.

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Figure 31. The most prominent colour of wine (Source: <https://winefolly.com/deep-dive/complete-wine-color-chart/>)

CONCLUSION

After tasting the wine, there is a need to think over about our feelings and notes to reflect on the information obtained in combination with the look, smell, taste, flavour and nature of the wine.

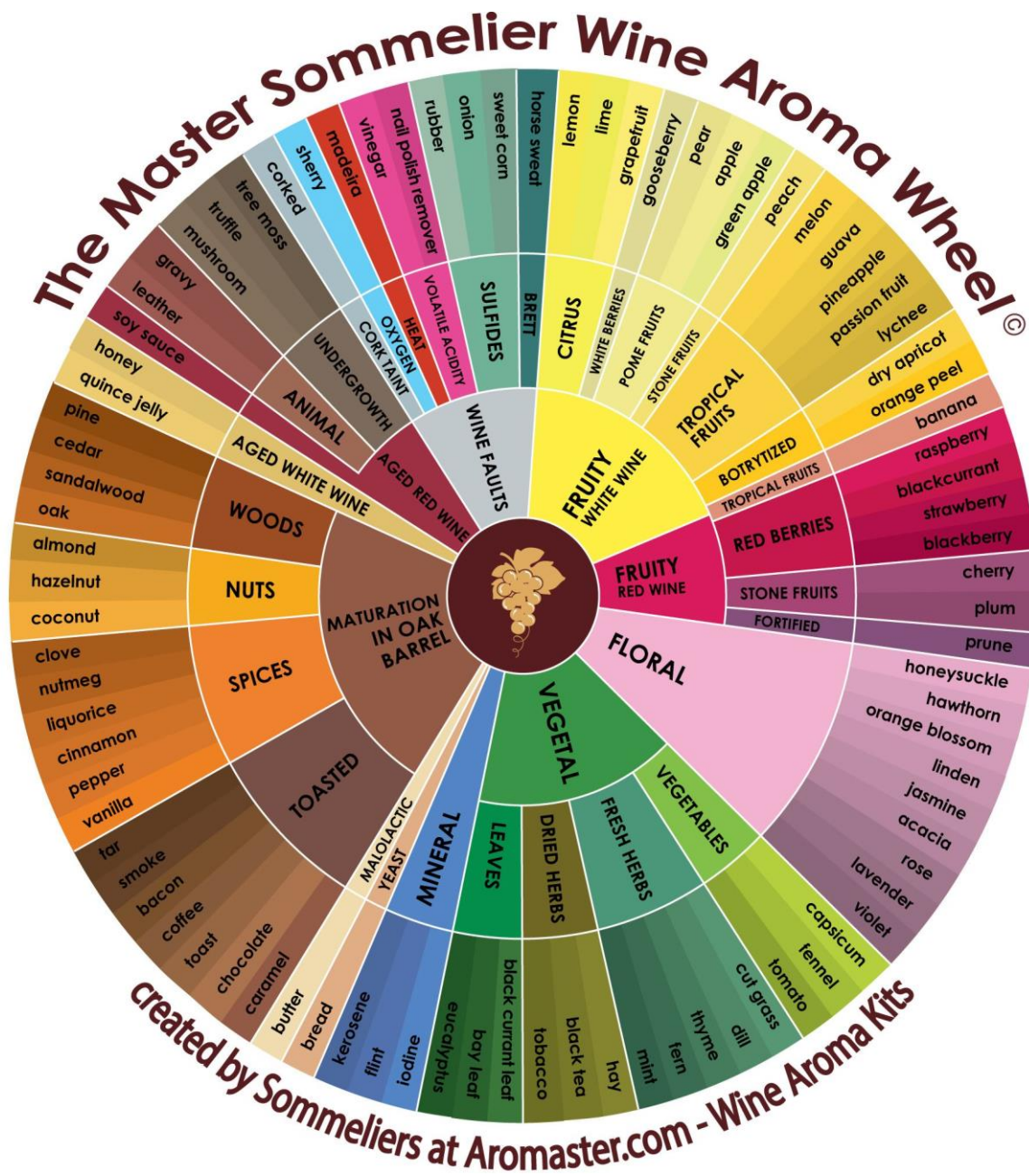


Figure 32. Wine aroma wheel (Source: <https://aromaster.com/product/wine-aroma-wheel/>)

Wine and gastronomy

Hungarian Gastronomic Traditions

The development of Hungarian cuisine is connected with the history of the Hungarian nation. The ancient Hungarian meals covered the five elements: fire, water, soil, wood, and metal; and aimed for harmony of the five tastes: sweet, sour, salty, bitter, and hot (TUSOR, 2005). All the time, the attainment of harmony was standing in the limelight. In the early period, Hungarian people tended to boil rather than fry.

A series of events over many years influenced Hungarian cuisine. One of the most important is the age of Mathias Hunyadi as his Italian wife Beatrice had excellent knowledge of famous Italian cuisine. In this time Hungarian people met spices, onion, garlic and pasta (HORVÁTH, 2009). Over history, Turkish, Asian, Russian and German influences affected the national gastronomy. Hungarians were very proud of their hospitality.

The basic philosophy of Hungarian cuisine is more based on the harmonious levelling of contrasting tastes than in early times, levelling the sweet and sour tastes in harmony. For this purpose, they used fresh plants like tarragon and golden cress and spices like ginger, pepper, and saffron (CEY-BERT, 2000).

Traditional Hungarian cuisine has slowly changed over the centuries. New ingredients appeared (paprika, tomato and potato), and frying and coating methods became the preferred methods of preparing foods.

In the 20th century, the political and economic situation had a negative effect on gastronomy, and this is called standardized monotony.

A few decades ago, the rest of the world started to focus on top quality instead of high quantity, and Hungarian chefs have had to face that we have not got as a good reputation as we thought because our foods are not healthy and have little proper nutritional value. We have good local basic raw ingredients (meat, vegetables, wines) but we do not use them because of the lower price of import from other EU countries.

Nowadays the system is changing. Two areas of gastronomy that can be mentioned: **street food and bistro style**, and **slow food and fine dining**. A lot of Hungarian consumers are not satisfied with this situation because they are slow to react and accept; they believe in the previous practice. Many people have neophobia; they are afraid of new things. The minority, together with the new generation of chefs and the young, are able to use the new kitchen-technical methods, believe in special Hungarian raw ingredients (Mangalica, Balaton, Tisza fish, etc.) and want to follow international culinary trends.

Regarding food-related trends, one of the most important buzzwords nowadays was considered “health” by Törőcsik; the awareness of health during food purchases is becoming more and more important. Consumption of food that complies with this trend is nowadays generating social recognition. Another megatrend is the emergence of morality, environmental awareness and sustainability (TÖRŐCSIK, 2016).

Wine and food pairing

Gastronomic tourism means trips whose primary purpose is to visit the place where the various food and drink varieties are produced, to enjoy a culinary experience when visiting a destination famous for its gastronomy or to participate in a gastronomic festival organized around the gastronomic product (HJALAGER-RICHARDS, 2001). In the case of wine gastronomy, the wine is in the focus in the gastrotourism.

There are six basic tastes both in wine and food:

- ✓ Fat
- ✓ Sweet
- ✓ Acid/Sour
- ✓ Salt
- ✓ Bitter
- ✓ Spice

It is very important to understand how these basic tastes work with each other for example salty food will be in contrast with sugar, fatty foods can be contrasted with acid.

Proper pairing of wine and food:

- ✓ the character/richness of the food should be in line with the body of the wine
- ✓ pay attention to the intensity of the taste of the food and wine
- ✓ avoid pairing oily or very salty dishes with red wines with a high tannin content
- ✓ offer sweet wines as sweet as their basic flavours
- ✓ for tougher, more full-bodied meats, choose high tannin wines
- ✓ choose sweet or high-acid wine for salty food
- ✓ pair fatty or oily foods with high-acidity wine
- ✓ match or contrast the taste characteristics of food and wine (MÉSZÁROS, 2000)

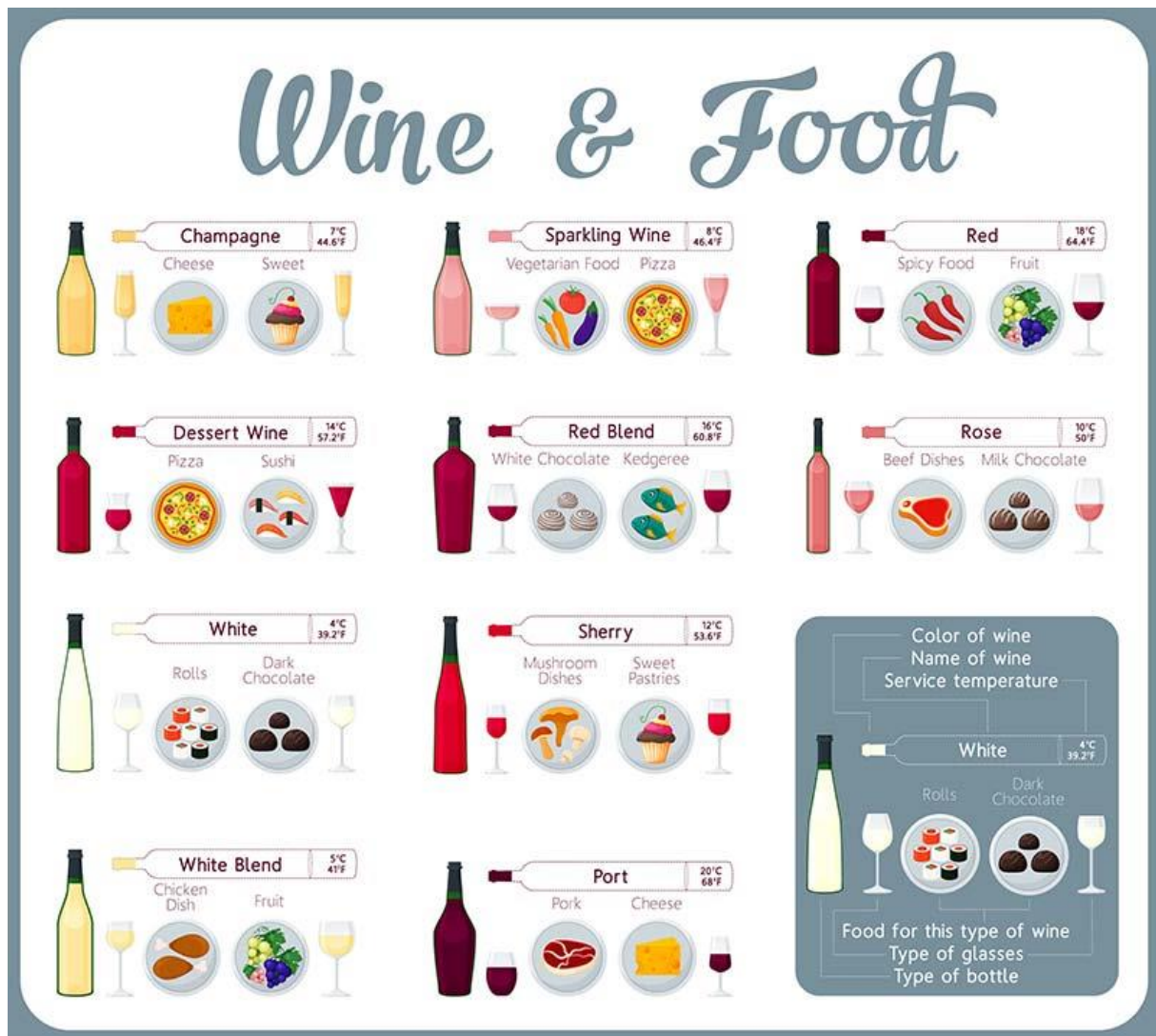


Figure 33. How to pair food and wine? (Source: <https://www.vikingvineyards.com/learn-wine/wine-food-pairings-guide-for-beginners/>)

Wine and cheese pairing

Which wine with which cheese?

There are basic rules too as in the case of wine and food pairs:

- ✓ cheese and wine are equal; we are looking for an escort for each other, that does not suppress the other in intensity
- ✓ cheese and wine will be friends if we are open to hosting a new culinary experience
- ✓ cheese can be chosen not only for red wine
- ✓ preferably from the same region
- ✓ ripened (aged) wines go well with ripened cheeses

- ✓ fresh wines require fresh cheeses
- ✓ the rules of origin protection are important for both cheese and wine (BENE-PAPP, 2017)

According to the type of cheese, the following pairs can be work excellently:

- ✓ **Hard cheese and wine:** for example, Comté, Manchego and Cheddar go well with every type of wine, Chardonnay, Cabernet sauvignon.



Figure 34. A hard type cheese (Source: BECKETT, 2021)

- ✓ **Soft cheese and wine:** spreadable cheese like Philadelphia and semi-soft white rinded cheeses like Brie and Camembert are good pairings with fruity red wines and fresh white wines



Figure 35. Camembert cheese (Source: BECKETT, 2021)

- ✓ **Blue cheese and wine:** Gorgonzola, Stilton and Roquefort form an excellent match with noble sweet wines such as Tokaji, Ports and Sauternes. Famous pairs are Sauternes with Roquefort or Port and Stilton.



Figure 36. Blue cheese (Source: BECKETT, 2021)

- ✓ **Goat cheese and wine:** the classic wine pair is with Sauvignon blanc. It also goes well with fresh fruity rosé or white wines.



Figure 37. Goat cheese (Source: BECKETT, 2021)

- ✓ **Washed rind cheese and wine:** the stinky cheeses, for example Époisse, Reblochon, which are great matched with crisp dry white wines or matured reds.



Figure 38. Washed rind cheese (Source: BECKETT, 2021)

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