Matching vines, grapes and wines — assessing berry characteristics

Berry sensory attributes

The following assessments are carried out by placing about 5 berries (depending on berry size) in your mouth. This process, for some of the assessments, may need to be repeated two to three times to obtain an overall evaluation. This allows a greater number of berries to be assessed. In some cases, if the assessment were carried out once, only a few berries would be assessed and this may not be representative of the whole sample.

● Flesh texture

1. Crush the berries by gently chewing them about six times. Assess the flesh texture according to the following categories.

Descriptions for categorising flesh texture

Category	Description
watery	The berry breaks easily, giving a watery sensation in the mouth. The texture is similar to that of a watermelon.
juicy	The berry breaks easily, giving a juicy sensation in the mouth. The texture is similar to that of an orange.
firm	Some pressure is required to break the berry. The texture is similar to that of a soft pear.
hard	More pressure (than for firm) is required to break the berry. The texture is similar to that of a firm pear or a peach.
raisin	Considerable pressure is required to break the berry. The berry consists mainly of seeds and the skin texture is often leathery.

2. Record as the description for flesh texture the category which best fits the experience while chewing the berries.

● Sugar/acid balance

Continue tasting the same sample as that used for assessing flesh texture and aroma profile.

1. Assess the sugar/acid balance according to the following categories — acidic, balanced or sweet.
2. Also record if the sensation is judged as fresh (ie not flat, not dull and/or not affected by oxidative or unpleasant characters).

● Aroma profile and intensity of aroma

Continue tasting the same sample as that used for assessing flesh texture.

1. For each variety, prepare a list of possible aroma descriptors which (by experimentation or experience) are normally associated with the berries and wine from that particular region. Note that the types of descriptors may vary from year to year. As a recommendation, a minimum of three and a maximum of nine descriptors should be chosen. Examples of varietal descriptors for a range of varieties are given in the 'Sensory evaluation' section.
2. Assess the presence and intensity of each aroma descriptor.
3. Record the intensity of each descriptor by one of the methods below:
   - as low, medium or high;
   - as not perceived, weak, moderately intense, intense or very intense;
   - on a scale of 1 to 5 where 5 is very intense; or
   - on a line intensity scale.

An example of a table to record aroma descriptors and their intensity is shown below. This example relates to Shiraz berries from a vineyard sited in a warm to hot climate.

An example of a table to record descriptors to categorise an aroma as not perceived, weak, moderately intense, intense and very intense. Tick the appropriate boxes.

Descriptor	Intensity				
	not perceived	weak	moderately intense	intense	very intense
herbal					
raspberry					
plum					
chocolate					
raisin					
other					

The pattern of the aroma profile can be summarised in words or by a radar/web diagram (see Sensory evaluation section).

Note:
Sucking the skins before and while chewing them can help to assess aroma.

Fining trials

Laboratory fining trials

● Procedure for a laboratory fining trial

1. Prepare 100 mL of a stock solution of known concentration of the fining agent, eg 10 g/L.
2. Determine the appropriate range of rates of addition to use in the trial, eg 0 to 100 mg/L.
3. Determine the number of rates of addition to be trialled, eg 0, 20, 40, 60, 80 and 100 mg/L.
4. Calculate the volume of stock solution required to achieve each of the rates of addition, based on addition to 100 mL of juice/wine. Set up a table to summarise these rates of addition.
5. Set up six (or as many as required) 100 mL vessels (measuring cylinders or glass bottles) and accurately add 100 mL of juice/wine to each vessel. Label each vessel according to the allocated rate of addition.
6. Accurately add the appropriate volume of stock solution to the juice/wine in each vessel. Cap each vessel and mix the solution thoroughly but gently by inverting the vessel several times. Allow sufficient time for the fining agent to react and then remove the clear solution from the precipitate or deposit. This can be achieved by simply pouring off the clear liquid or (in most cases) by filtering or centrifuging the solution. Pour the clear solution corresponding to each rate of addition into a separate wine glass, labelled according to the respective fining rate. If the sensory evaluation is to be carried out blind, record the details of the rate of addition corresponding to each glass.
7. Assess the juice/wine in each glass by sensory evaluation and/or by chemical analysis.
8. Decide on the appropriate rate of addition based on the results of Step 7.

Notes

The same batch of fining agent that will be used in the cellar should be used in the laboratory trial.

This is often based on experience, references or advice from other winemakers.

Always set up a control where no addition is made so that the effect of the addition can be assessed. Often a larger volume of the control is required as the treated wine from each addition rate will need to be compared with it, perhaps a number of times. Remember to mix the control in the same manner as the other additions to ensure uniformity of handling of each of the samples throughout the trial.

It is important that the laboratory trials are conducted at a temperature as close as possible to that of the juice/wine to be treated in the cellar.

Mix the stock solution thoroughly before addition. Ensure that the small volumes of stock solution are added accurately by adding them slowly and allowing for draining of the pipette, as the suspension/slurry can cling to the inside of the pipette. Wide bore pipettes can be used to add viscous or slurry-like solutions.

Generally, the decision on the appropriate fining rate is based on sensory evaluation. However, spectrophotometric measures at the wavelengths of 420, 520 nm (on undiluted juice/wine) and 280 nm (on diluted juice/wine) can provide additional information on changes in the concentrations of yellow/brown pigments, red pigments and total phenolics, respectively.

After the initial trial a smaller range of addition rates may need to be trialled, eg 0, 10, 20, 30, 40, 50 mg/L. Always take the fining trial beyond the ideal rate.

The general formula for calculating the required addition volume is:

$$\text{volume of stock solution (mL)} = \text{required rate of addition (mg/L)} \times \frac{\text{volume of juice/wine to which the addition is to be made (mL)}}{\text{concentration of the stock solution of fining agent (mg/L)}}$$

An example of a table relating addition volumes to the respective addition rate

Required rate of addition (mg/L)	volume (mL) of 10 g/L (10000 mg/L) stock solution of fining agent to add to 100 mL of juice/wine
0	0
20	0.2
40	0.4
60	0.6
80	0.8
100	1.0

Protein stability

Chemical concepts

A protein stability test is carried out as part of a bentonite fining procedure (see page 82) and prior to bottling.

The presence of unstable proteins in a wine can lead to the development of a haze or deposit. If this occurs after bottling, the wine is unacceptable to the consumer. The haze or deposit is associated with the denaturing of proteins, a process that occurs more rapidly at higher temperatures. Since it is difficult to predict the temperature conditions to which a wine will be exposed during transport and storage, wines should be checked for the presence of unstable proteins prior to bottling. Protein instability is mainly a problem with white wines. In red wines proteins react with tannins and usually precipitate during fermentation and maturation; they do not normally pose a problem in the finished product. However it is advisable to check rosé styles and very light dry red wines for protein stability, as there may be insufficient tannin present to precipitate all the potentially unstable proteins. The haze can be more readily apparent because these wines are light in colour.

Tests for estimating protein stability in wine. These include the 'heat stability' test and the use of test kits such as Bentotest™, Prostab™ and Proteotest™ (see page 82) (Pocock et al. 2008). These all involve denaturing the protein either by heating or by the addition of a chemical agent, with or without heating. These agents are not necessarily specific to proteins, as other compounds, eg tannins and polysaccharides, may influence the degree of haze formed during the test. Nevertheless the tests provide a guide, based on experience, to the severity of any potential protein instability. The most commonly used method to predict if a wine is protein stable is the 'heat stability' test, where a wine is exposed to an elevated temperature for a period of time and, after cooling to room temperature, assessed for haze formation. The recommended set of conditions is 80°C for 6 hours.

Heat stability test

● Procedure for conducting a heat stability test

1. The wine should be brilliantly clear prior to conducting the test. If necessary, initially centrifuge the wine at approximately 3500 rpm for 10 minutes and then filter the wine through a 0.45 µm membrane filter using either a syringe or a vacuum filtration system. A prefilter may also need to be used if the wine is very cloudy. Discard the first few mL of filtrate and then collect about 20 to 30 mL of wine.

2. Fill two test tubes of appropriate size or two turbidity meter tubes with filtered wine. Label one tube 'Control' and the other 'Test'. The volume of wine should be such that there is sufficient air space above the wine to allow for expansion under heating. Cap the tubes. The cap should be sufficiently tight that no volatiles are lost from the wine, thus changing its volume, and that no steam or water (if using a water bath) can enter the tube. Caps for tubes used in this test should be PTFE or silicon lined and provide a water-tight seal.

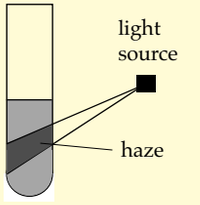
3. Place the 'Test' tube in an 80°C water bath for 6 hours. (If the tube is an appropriate size, an alternative method of heating is to place it into an electric heating block). Allow time for the temperature of the wine to reach 80°C then start recording the time — an extra tube containing wine and a thermometer can be used to determine when 80°C is reached.

4. After 6 hours at 80°C, immediately remove the tube from the water bath or heating block. Note: the tube will be hot and needs to be handled carefully.

5. Mix the contents of the tube by gently inverting it several times. Place the tube on the bench to cool to room temperature. Some operators immediately place the tubes in an ice bath. This action quickly decreases the temperature so that the heating period is standardised to 6 hours. Often the samples are held overnight at 4°C. When it is time to determine if a haze has formed, the samples are left on the bench to attain room temperature. Repeat the mixing procedure when the sample temperature reaches room temperature. Wipe the outside of the tube.

6. Assess the degree of haze formation *visually (7a) and/or by using a turbidity meter (7b).*

7a. *Assessing the presence of a haze visually:* The presence of a haze can be estimated by shining a strong light through the wine and observing the solution at right angles to the light source (as shown in the diagram). Any internal reflection indicates the presence of a haze. A strong narrow beam of light can be obtained by using a pen light torch or a microscope lamp. Samples pass the test if there is no difference between the test samples and the unheated controls.



Observation of the haze.

7b. *Using a turbidity meter to assess the presence of a haze*: The outside of the tube must be clean and dry prior to placing it in the turbidity meter and recording the reading. A wine is considered protein unstable if, for example, there is an increase in turbidity of greater than 2 turbidity units (typically NTU units), in the heated sample compared with the control. Note that this criteria may vary for different wine styles. These values are based on experience and the accepted risk of potential haze formation in the wine during storage. Visual estimation of the haze can be used as a preliminary screening prior to using the turbidity meter. If visually there is an obvious haze, there is no point in applying the turbidity meter test.

Sensory assessment/evaluation — some guidelines

Assessing fining trials

A preliminary assessment is carried out by tasting in the order of the sample treated at the lowest fining level to that treated at the highest fining level. The exception to this rule is for 'off odours'; in this case the tasting order should start at the highest fining level and work backwards in order to avoid adaptation and sensory fatigue.

Generally, the choice of fining level is not based on some complex statistical analysis of the result but rather a judgement based on experience. The response to the fining rates is typically one of 'diminishing effect'. For example, the purpose of the fining trial may be to determine the level of a fining agent which reduces astringency — a value judgement needs to be made between the perception of the reduction of astringency and, for example, the stripping of flavour. In this case, before carrying out the fining trial it is advisable to adjust the acidity of the wine to the desired level, as acid-tannin interactions can affect the perception of astringency.

Assembling a blend

Typically, the winemaker has a number of wine parcels which may contribute to a blend, eg a Cabernet Sauvignon/Merlot blend. If the exercise is to prepare a wine which is similar from year to year, tasting the wine of the previous year helps to focus on the style characteristics required for the current blend. Obviously the wine is a year older than the wines on the bench, but nonetheless it reminds the taster of the fruit-acid-tannin structure.

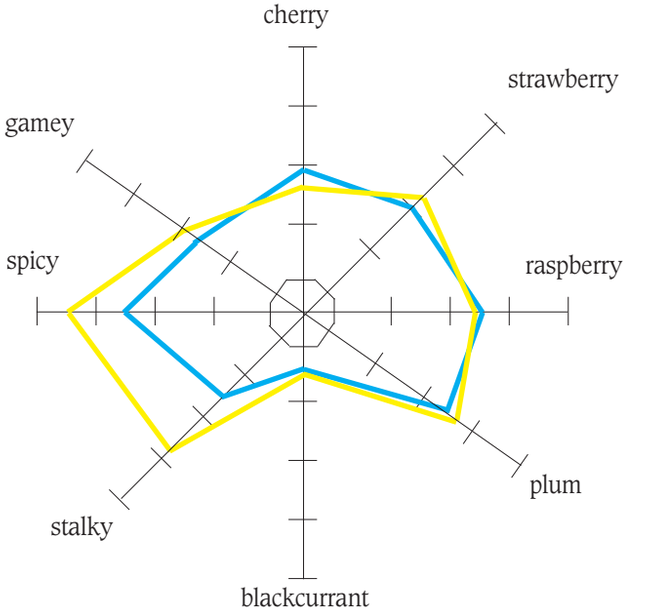
When assembling a blend, it is important to ensure that the final blend complies with the relevant regulations regarding the maximum or minimum allowable percentages of varieties, vintages and regions.

● A general approach to determining the % components in a blend

1. Prepare a blend (Blend 1) consisting of the varietal percentage which was used previously, for example 60% Cabernet Sauvignon and 40% Merlot.
2. Initially prepare a blend by adjusting the components up and down by approximately 10%, for example Blend 2 — 66% Cabernet Sauvignon and 34% Merlot.
3. The Paired preference test can be used to determine a preference between two blends.
4. Continue to prepare and compare blends based on the assessment of the above blends until the preferred blend is achieved.

Presenting data from QDA tests

Data from Quantitative descriptive analysis® (QDA) tests can be visually presented as radar/web diagrams; an example is shown below. The diagram below summarises data from an experiment with Pinot Noir examining the addition of stalks in the ferment; the yellow line represents the wine from the ferment with stalk addition and the blue line the wine without stalk addition. Least significant difference (LSD) values could be added to each ray to indicate significant differences (if any) between indicated attributes for the two wines.



An example of a radar/web diagram.

Helpful hint

Different segments of the web can be allocated totally to wine attributes or berry attributes or the web can represent a combination of wine and berry attributes and/or vine characteristics to visually show relationships between vines, grapes and wines.