



Small-lot fermentation method



Assessing the potential for grapes to produce smoke tainted wine

Research has shown that smoke taint compounds can be bound as non-volatile glycosylated conjugates in grapes and hence may not be detected by aroma assessment of grape juice alone. However, some of these bound smoke taint compounds can be released during fermentation and/or maturation to cause a smoke-tainted wine. Winemakers can use the method below, followed by sensory assessment and chemical analysis of the wine produced, to gauge the potential risk of any smoke taint that might arise in wine made from grapes that have been exposed to smoke.

When to sample

This procedure can be used as soon as grapes have attained sufficient ripeness to be able to be fermented, but it is preferable to conduct

the ferments about two weeks before harvest. The later this procedure is used, the more reliable the indication of smoke exposure. It is best to plan in advance to ensure this procedure is conducted in time to be used to support harvest decisions.

Grape sampling

It is important to ensure that a representative sample is collected from the entire vineyard. It is recommended that a random 30 bunch sample from across the entire vineyard is collected and only one bunch collected per vine. Once all 30 bunches have been collected, strip the berries off each bunch and place into a large container. Mix the berries and from this container, weigh out approximately 2 kg and transfer into a clean open container – for example a stainless steel bucket, stainless steel pot or food grade plastic storage container (e.g. Décor 3L container).



Type of fermentation

The AWRI recommends that when assessing white or red grapes, that the fermentation be treated as a red wine fermentation, that is, the fermentation should be conducted on skins. This ensures that the results can be compared to data obtained by the AWRI study of the levels of smoke taint compounds which are naturally present in grapes and wine. This will allow AWRI helpdesk staff to interpret results consistently.

Fermentation of white grapes on skins is not a typical production scenario, although this does provide an opportunity for maximum extraction of smoke taint compounds, if present. Winemakers may also choose to conduct a white fermentation off skins for sensory assessment only.

Must additions

(Note: the calculations are based on the assumption that approximately 1.3 L of juice is obtained from 2 kg of fruit)

- Measure out approximately 7 mL of the 2% PMS solution (see 'Preparation of solutions for additions' below) into about 40 mL of water contained in a measuring cylinder and then tip the whole lot evenly across the grapes (55 mg/L addition of SO₂).
- Crush the grapes using a potato masher.
- Take a sample for pH measurement.
- If the pH is > 3.4, adjust the must to approximately pH 3.4 with 10% tartaric acid solution, using Table 1 to guide how much to add. If the pH is less than 3.4, do not add any acid.

- Add 3.5 mL of the 10% diammonium phosphate (DAP) solution to the pH-adjusted must and mix (270 mg/L addition of DAP).

Yeast preparation

- To prepare yeast, add 150 mL of water¹ to a clean glass and bring to a temperature of 38°C. Weigh out 7.5 g yeast and sprinkle onto the 38°C water – gentle mixing may be required to ensure all the yeast is properly wetted. Leave for 10 minutes to allow the yeast to rehydrate.
- Make sure the must is at a temperature of at least 20°C (best between 20°C and 25°C) before adding the hydrated yeast.
- Mix the rehydrated yeast and immediately take out 8 mL. Introduce this 8 mL of yeast solution into the must. Mix the must (as described above). This is a yeast addition of 300 mg/L.
- Place fermenter in an area that is between 20 and 25°C (e.g. winery laboratory).
- After two hours, add 0.5 mL of a freshly prepared 10% pectic enzyme solution (40 mg/L addition).

¹ Use chlorine-free water, such as reverse osmosis treated water, distilled water or Milli-Q water.



Fermentation

- Mix the ferment four times per day by stirring with a long wooden spoon handle – try to break up and submerge the cap.
- Check the ferment twice a day for any hydrogen sulfide (H₂S) aroma. If the aroma of H₂S is observed, add 1 mL of 10% DAP solution (75 mg/L of DAP).
- After five days of fermentation, take a sample and test for residual sugar via a *Clinitest*.
- If the *Clinitest* reads <2 g/L sugar, then proceed to decant as described below. If the *Clinitest* reads > 2 g/L sugar, then ferment for an extra day and then proceed to decant.

Decant

- Decant the wine through a sieve into another container.
- Pour (or siphon) the decanted wine into a clean 750 mL wine bottle.
- Add 4.5 mL of 2% potassium metabisulfite (PMS) solution and 1 mL of 0.03% copper sulfate solution to the 750 mL bottle of wine (55 mg/L addition of SO₂ and 0.1 mg/L of copper ions).
- Place wine in refrigerator at 4°C to settle.
- Rack (siphon hose) wine into a clean 750 mL or 375 mL wine bottle, filling as much as possible to decrease headspace.
- Wine can now be assessed for the presence of any smoke taint.

Preparation of solutions for additions

NOTE: Use reverse osmosis (RO) treated water, distilled water or Milli-Q water to prepare the solutions.

10% diammonium phosphate (DAP)

Weigh 25g DAP into a clean bottle.

Add 250 mL (1 cup) of water and mix until all the crystals dissolve. (The solution will keep in refrigerator for up to one month.)

2% potassium metabisulfite (PMS)

Weigh 5 g PMS into a clean bottle.

Add 250 mL (1 cup) water and mix until all the crystals dissolve. (The solution will keep in refrigerator for up to one week.)

10% tartaric acid (H₂T)

Add 10 g of tartaric acid to 80 mL of water contained in a 100 mL volumetric flask or measuring cylinder. Swirl to dissolve, then make up to 100 mL.

Table 1. Amount (mL) of 10% tartaric acid (H₂T) solution to add to decrease the pH to 3.4 (assuming 1.3 L of juice is obtained from 2 kg grapes).

Measured pH	Amount of 10% H ₂ T sol ⁿ to add (mL)
3.4	0.00
3.45	0.65
3.50	1.30
3.55	1.95
3.60	2.60
3.65	3.25
3.70	3.90
3.75	4.55
3.80	5.20
3.85	5.85
3.90	6.50
3.95	7.15
4.00	7.80



10% pectic enzyme

Dissolve 1 g of enzyme in 10 mL of water (0.1 g/mL). Use the preparation as soon as possible after preparation.

3% copper sulfate – STOCK solution

(Do NOT add this to wine): Weigh 3 g copper sulfate into a clean bottle and add 100 mL of water. Mix until all the crystals dissolve (3% copper sulfate).

0.03% Copper sulfate – WORKING solution

Take 1 mL of the stock solution and add to 100 mL of water – this is 0.03% copper sulfate (The solution will keep in refrigerator for up to one month).

Contact

For further information regarding this procedure or assistance with smoke taint please contact:

AWRI helpdesk

Phone 08 8313 6600 **Fax** 08 8313 6601

Email helpdesk@awri.com.au

Website

http://www.awri.com.au/industry_support/

Address Wine Innovation Central Building,
Corner of Hartley Grove & Paratoo Rd,
Urrbrae (Adelaide), SA 5064