

## Smoke taint – practical management options for grapegrowers and winemakers



### Background

The exposure of vineyards and grapes to smoke may result in wines with undesirable sensory characteristics, such as ‘smoky’, ‘burnt’, ‘bacon’, ‘medicinal’ or ‘ash’, usually described as ‘smoke tainted’. Consumers have been shown to respond negatively to smoke tainted wines. The compounds in smoke primarily responsible for the taint are the free volatile phenols (e.g. guaiacol, 4-methylguaiacol, *o*-cresol, *p*-cresol, *m*-cresol, etc.). These compounds are produced and released into the atmosphere when lignin in wood is burnt. When free volatile phenols enter grape berries, glycoside-‘bound’ phenols are formed rapidly by biochemical reactions of the berry. Both volatile phenols and their glycosides can cause unpleasant ‘ashy’ and ‘smoky’ sensory sensations and a lingering aftertaste. This fact sheet aims to summarise the most up-to-date advice on how to manage smoke exposure in the vineyard and minimise extraction in the winery.

### What are the options for managing smoke-exposed fruit?

Following smoke exposure of grapevines, a number of techniques can be employed in both the vineyard and winery to minimise the sensory impact of undesirable smoke-derived aromas, flavours and compounds in wine. These techniques are summarised in the table below and are more effective when used in combination rather than individually. However, it should be noted that while these techniques may help reduce the extraction and expression of smoke taint compounds, they are unlikely to eliminate the problem. Adding extra processing steps can lead to increased production costs, which may not achieve a more saleable wine. Winemakers should decide on a clear course of action in advance if harvesting grapes that are known to be smoke-affected.

**Table 1.** Summary of techniques to reduce smoke-related aromas, flavours and compounds during handling and processing of grapes and wine. Table adapted from Brodison (2013).

Management option	Technical explanation
Hand harvest fruit	Minimise breaking or rupturing of skins and process as quickly as possible.
Exclude leaves and stalks	Leaves and stalks can further enhance the contribution of smoke-related compounds when in contact with juice and in ferments.
Maintain integrity of harvested fruit	Avoid fruit maceration and skin contact with juice as this can lead to higher concentrations of smoke-related compounds.
Keep fruit cool	Fruit processed at 10°C had less extraction of smoke-related compounds than fruit processed at 25°C.
Whole bunch press	Whole bunch pressing has been shown to reduce extraction of smoke-derived compounds, particularly in white grapes.
Separate press fractions	Ferment free run juice and press fractions separately. There is less extraction of phenolic contaminants from smoke in the first 400 L/t fractions, especially when combined with fruit cooling.
Conduct trials with fining agents	Fining with activated carbon can be effective at removing smoke compounds; however different carbon products vary in their performance and sensory effects. It is recommended that carbon treatments be tested on small volumes of wine to determine sensory impacts. Further blending of carbon-treated wine with non-smoke-affected wine is another option to obtain a final wine with suitable sensory characteristics.
Minimise fermentation time on skins	Fermentation that reduces skin contact time can reduce smoke aromas and flavours.
Consider trialling addition of oak chips and tannin	Oak chips can reduce intensity of smoke characteristics through increased wine complexity.
Consider trialling dilution with non-smoke-affected wine of similar style	The level of dilution required to dilute smoke characters will depend on the concentration of smoke compounds in the wine and the sensory properties of the blending wine. It is therefore recommended that blending trials are conducted.
Consider trialling reverse osmosis/nanofiltration of wine	Reverse osmosis/nanofiltration may sometimes be effective in removing smoke compounds; however, recent trials with commercial producers found that in most cases nanofiltration had little impact on the concentrations of targeted smoke compounds.

Package and market wine for quick sale	Keep packaging runs to practical volumes to ensure wines can be rotated into the marketplace quickly and avoid carrying stock. Smoke-related characteristics can evolve in bottle as wine ages.
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## References and further reading

AWRI resources on smoke taint:

[https://www.awri.com.au/industry\\_support/winemaking\\_resources/smoke-taint/](https://www.awri.com.au/industry_support/winemaking_resources/smoke-taint/)

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