

Smoke taint

Winemaking with fruit exposed to smoke

Forest fires and exposure of grapes to smoke has become a major winemaking issue. The key compounds responsible for the aromas are volatile phenols, guaiacol, 4-methyl-guaiacol, and many others, and are found on the outer (cuticle) layer of the grape. The smoke taint compounds exist in juice and grapes in the glycosylated form. Winemaking practices can release the odorous free volatile phenols, as can time and subsequent acid hydrolysis. Unfortunately, juice may taste acceptable, but during fermentation and over time may develop more serious smoke taint issues.

There are a number of winemaking techniques that can be used to reduce the effects of smoke in wines, and these are more valuable when used in combination. The following recommendations are based on current knowledge of how to reduce or mask smoke character, however, there are no known processes to completely remove all smoke compounds from a wine.

1 GENERAL RECOMMENDATIONS

- Take notes on the duration of the smoke exposure in the vineyard and the proximity of the fire. Fresh smoke can cause more damage compared to smoke that has traveled significant distance.
- Smoke analysis on berry samples can give an indication of the potential level of smoke taint, but small batch fermentations are a better way to estimate the level of damage in the vineyard. For a detailed protocol on small lot fermentations specifically for assessing smoke character visit this website: https://www.awri.com.au/wp-content/uploads/small_lot_fermentation_method.pdf
- Wash ash off fruit in the vineyard before harvest when possible.
- Hand harvest is preferred over machine harvest. If machine harvest is the only option, separate the first juice that comes out of the harvest bins or out of the press (white/rose).
- Remove all MOG from fruit during processing. Leaves contain a significant amount of smoke compounds that can be released into the juice during maceration.
- The use of toasted oak during fermentation and aging can increase the guaiacol level in the wine and should be considered if analysis numbers will be used in legal context.

GRAPES	GUAIACOL (ug/kg)	WINE	GUAIACOL (ug/L)
Unlikely	< 0.5	Unlikely	1 - 2
Low to med risk	0.5 - 1.0	Low to med risk	3 - 4
Med risk	1.0 - 2.0	Med risk	5 - 6
High risk	> 2.0	High risk	> 6

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2 TIPS FOR MINIMIZING EXTRACTION IN WHITE WINE GRAPES

- ✓ Keep the fruit and juice as cold as possible.
- ✓ Whole cluster press and use a press cycle with minimal rotations.
- ✓ Keep press fractions separate, as the harder press fractions will have smoke compounds.
- ✓ Use a setting enzyme (pectinase) to clarify the juice:
 - LAFAZYM® 600 XL^{ICE}: dosage 1 – 3 ml/hL.
 - LAFAZYM® CL: dosage 10 – 20 ppm.
- ✓ To increase turbidity after clarification:
 - TURBICEL® (cellulose): dosage 200 – 500 ppm.
 - OENOCELL® (yeast hulls): dosage 200 – 400 ppm.
- ✓ Use a yeast strain that produces high amounts of fermentation esters:
 - ZYMAFLORE® X16 or X5
 - ACTIFLORE® ROSÉ
- ✓ Add an oak alternative treatment during fermentation which can help add fruit character, texture, and mask/integrate the smoke character.
 - NOBILE® CHERRY SPICE Chips: dosage 0.5 – 2 g/L.
 - NOBILE® SWEET GRANULAR: dosage 0.5 – 2 g/L.
- ✓ Add an activated carbon to the fermentation to help bind and remove smoke compounds.
 - GEOSORB®: dosage 250 – 450 ppm.
- ✓ After fermentation, rack clean wine off lees. Send a sample in for smoke compound analysis to get an idea of the level of smoke taint in the wine.
- ✓ Consider a treatment with LAFAZYM® AROM (β-glucosidase) to increase the release of the bound smoke compounds.
- ✓ The use of mannoproteins and oak to build up the wine can help integrate or mask the smoke character in the wine.
 - NOBILE® Oak Alternative Range.
 - MANNOFEEL® and AUTOLEES® – mannoprotein options (conduct bench trials).
- ✓ Allow 6 months for the bound smoke compounds to hydrolyze into free volatile phenols which can be removed with GEOSORB® and reverse osmosis if needed.



3 TIPS FOR MINIMIZING EXTRACTION IN ROSÉ WINE GRAPES

- ✓ Same protocols as white fruit.
- ✓ The challenge is the lack of skin contact time to get the desired color in the rose wine. If the smoke exposure was fresh or heavy, then it is best to avoid any skin contact time and whole cluster press. In this case, it is a safer option to adjust color with a red wine addition after fermentation.

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4 TIPS FOR MINIMIZING EXTRACTION IN RED WINE GRAPES

- ✓ Make a big volume red wine with complex flavors and aromatics. The bigger the wine, the easier the smoke will be integrated or masked:
 - Use a fermentation tannin; **TANIN VR SUPRA®** & **TANIN VR COLOR®**: dosage 200 – 400 ppm.
 - Use an enzyme for fast color and tannin extraction and ease of clarification after pressing; **LAFASE® FRUIT**: dosage 30 – 40 g/TON.
 - Use a yeast strain that produces high amounts of fermentation esters; **ZYMAFLORE® RX60** or **FX10**.
- ✓ Add an oak alternative treatment during fermentation which can help add fruit character, texture, and mask/integrate the smoke character.
 - **NOBILE® CHERRY SPICE** Chips: dosage 2 – 4 g/L.
 - **NOBILE® SWEET GRANULAR**: dosage 2 – 4 g/L.
- ✓ Keep fermentation temperatures cool, 70 - 75°F.
- ✓ Limit maceration programs and shorten time on skins, drain and press as early as 8 - 5° Brix.
- ✓ Add **POWERLEES® ROUGE** during fermentation or after pressing to improve mouthfeel and fruit character in the wine. Dosage: 200 – 400 ppm.
- ✓ After pressing and settling, rack clean wine off lees. Send a sample in for smoke compound analysis to get an idea of the level of smoke taint in the wine.
- ✓ After ML is complete, continue to build up the wine with tannins, oak alternatives, and mannoproteins (dosage determined with bench trials):
 - **TANIN VR SKIN®** or **TAN'COR® GRAND CRU**
 - **NOBILE®** range.
 - **MANNOFEEL®** or **AUTOLEES®**.
- ✓ Consider a treatment with **LAFAZYM® AROM** (β -glucosidase) to increase the release of the bound smoke compounds.
- ✓ Allow 6 months for the bound smoke compounds to hydrolyze into free volatile phenols which can be removed with **GEOSORB®** and reverse osmosis if needed.
 - Run trials with **GEOSORB®**: dosage 250 - 450 ppm.

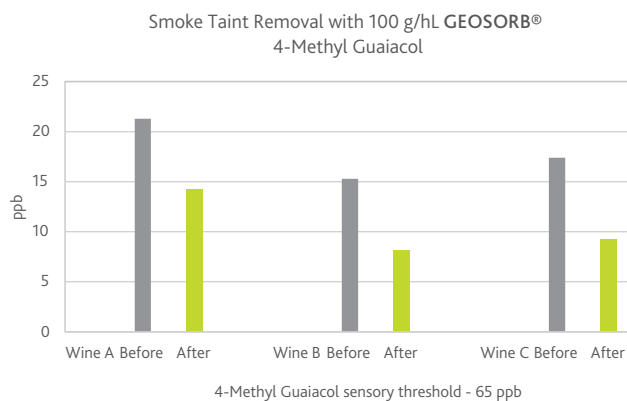


Figure 2: **GEOSORB®** effect on smoke taint (Reference, LAFFORT South Africa, 2016).