



WHAT TO DO WITH GRAPES EXPOSED TO SMOKE?

SCOTT LABS' BEST PRACTICES GUIDE TO OPTIMIZING RED GRAPES EXPOSED TO SMOKE

THIS GUIDE IS FOR WINEMAKERS WHO ARE MAKING WINE FROM GRAPES EXPOSED TO SMOKE AND ARE LOOKING FOR STRATEGIES TO MINIMIZE THE DAMAGING EFFECTS OF SMOKE COMPOUNDS ON WINE QUALITY AND STYLE.

Last updated: 9/12/2020

BACKGROUND

Smoke is an aerosol of small solid particles and/or liquid droplets generated from burning material. Smoke composition varies depending on type of material that has burned, extent to which material has burned, and intensity of heat.

Smoke contains many undesirable compounds for winemakers including small volatile phenols that may smell and taste smoky, spicy, plastic-like, fecal and are sometimes likened to cigarette smoke and dirty ashtrays. Once these compounds permeate the grape they can bind with sugars and other compounds found in the grape skins. When smoke compounds are bound to grape components they are often

odorless and tasteless. However, during fermentation and aging, smoke compounds can be released from their bound form resulting in unwanted smoke odors and flavors. This means that grapes and juice may smell clean but the resulting wine could have unwanted smoke aromas and flavors!

Research into the effects of smoke on grapes and wine quality is ongoing and we are not able to answer even some of the most basic questions. The information and best winemaking practices presented here are based on information publicly available from research groups working on smoke exposed fruit within the United States and Australia coupled with Scott Labs' long experience with winemaking processes, products, and know-how. Despite publicly available research and our know-how, there are no guarantees that any particular strategy will reduce, prevent, or ameliorate the impact of smoke on wine quality and style.



HOW TO USE THIS GUIDE

This guide is **organized by winemaking stage** starting with grape harvest and transport and ending with filtration and finishing. For each winemaking stage we have proposed one or more

Best Practices and an explanation for how that practice could positively **effect smoke exposed grapes**. Our Best Practices can be categorized into **four types of strategies**:

Minimize	Remove/Reduce	Counterbalance	Quality Preservation
Practice may minimize smoke compounds from entering the system.	Practice may remove or reduce smoke compounds from the wine system.	Practice may push wine style in a direction to counterbalance the effect of smoke compounds.	Practice prevents microbial spoilage or other flaws which could exacerbate impact of smoke compounds.

TIPS

Run smoke taint marker compound analysis on the fruit and wine (etslabs.com).	Conduct a micro-fermentation pre-harvest to determine risk (https://www.etslabs.com).	Do not cross-contaminate wines in the cellar by blending prematurely.	Assess risk from anhydrous cellar chemicals (bentonite, cleaners, acids, etc.) so that you don't taint clean wines.	Link to other resources: cawg.org/Shared_Content/Resources/Wildfire_Smoke/Wildfire_and_Smoke_Exposure.aspx .
---	---	---	---	---



BEST PRACTICES GUIDE FOR RED GRAPES EXPOSED TO SMOKE

Winemaking Stage	Best Practice	Explanation for Best Practice	Scott Labs' Recommendation (product, dosage, notes)
Harvest and transport	Sort to remove all leaves .	- Minimize - Minimizes risk of smoke compounds on leaves migrating into must.	In addition to traditional vineyard analysis run a smoke taint panel. For further information on smoke taint analysis see the following link: etslabs.com
	Add SO₂ to picking bins.	- Quality Preservation - Minimizes microbial spoilage.	Standard SO ₂ addition to picking bins. <ul style="list-style-type: none"> • Inodose granules • Potassium metabisulfite (KMBS)
Grape reception and fruit processing	Secondary sorting and fast processing.	- Minimize - Minimizes risk of smoke compounds from remaining leaves migrating into must. Quality Preservation - Minimizes microbial spoilage.	Begin active fermentation phase as soon as possible which will suppress the potential impact of native yeast and bacteria producing volatile acidity and volatile sulfur off-odors.
	Add gentle maceration enzymes after destemming and crushing.	- Counterbalance - Maceration enzymes can enhance color and positive aroma extraction. - Quality Preservation - Allows for gentler pressing after fermentation and enhances free run juice quality.	Recommended Enzymes: <ul style="list-style-type: none"> • Lallzyme EX™ 20-30 g/ton • Scottzyme® ColorPro 80-100 mL/ton
	Add fermentation tannins .	- Counterbalance - Tannin additions build structure to potentially counterbalance the effect of smoke compounds. If a smoke compound removal strategy is used later in the process (i.e. carbon addition, reverse osmosis, heavy fining), enhancing wine structure may counterbalance negative stripping effects.	Recommended Tannins: <ul style="list-style-type: none"> • Scott'Tan FT Rouge Soft™ • Scott'Tan FT Rouge Berry™ (enhances fruity notes) • Scott'Tan Uva-Tan™ • Scott'Tan Uva-Tan Soft™ Dosage at 20-60 g/hL depending on tannin choice and goal. Add half of the tannins directly to the crusher, the remainder at first pump-over. If FT Rouge Berry is used add at the onset of fermentation.
	Process with heat (thermovinification or flash détente).	- Counterbalance - Can produce a more structured wine to potentially counterbalance smoke compounds. - Removal - Anecdotally, this treatment may help blow off undesirable smoky compounds (volatile phenols).	Contact a provider of thermovinification or flash détente services: wineindustrynetwork.com/suppliersearch.php?



BEST PRACTICES GUIDE FOR RED GRAPES EXPOSED TO SMOKE -CONTINUED

Winemaking Stage	Best Practice	Explanation for Best Practice	Scott Labs' Recommendation (product, dosage, notes)
Alcoholic fermentation	Use a yeast strain that will start quickly, promote good fruit character and texture while minimizing off flavors .	<p align="center">- Quality Preservation -</p> <p>Starting alcoholic fermentation as soon as possible minimizes opportunity for microbial spoilage.</p> <p>Choosing yeast strains compatible with the wine matrix minimizes risk of stuck and sluggish fermentation and/or production of off-odors (i.e. volatile acidity, sulfur-containing off odors)</p> <p align="center">- Counterbalance -</p> <p>Choosing yeast strains that increase fruit aromas and mouthfeel can potentially counterbalance the effect of smoke compounds.</p>	<p align="center">Recommended Yeast Strains:</p> <ul style="list-style-type: none"> • Alchemy IV • BDX™ • ICV GRE™ • Persy™ • ICV D254™* • CVRP • ICV D21™ <p>*use when pre-fermentation VA is low</p> <p>Dosage at 25-35 g/hL. For high brix fruit increase yeast dose.</p> <p>Begin alcoholic fermentation as soon as possible.</p> <p>Ferment < 80°F to promote good fruit flavors, secure your fermentation and minimize yeast stress.</p>
	Add yeast nutrients .	<p align="center">- Quality Preservation -</p> <p>A complete nutrition strategy minimizes risk of microbial spoilage due to a stuck or sluggish fermentation and minimizes risk of yeast-derived off-odors and flavors.</p> <p align="center">- Counterbalance -</p> <p>Strategic use of nutrients can maximize fruity aromas which can potentially counterbalance the effect of smoke compounds.</p>	<p align="center">Recommended Yeast Nutrients:</p> <ul style="list-style-type: none"> • Go-Ferm Protect Evolution™ at 30-45 g/hL • Fermaid O™ at 20-40 g/hL • Stimula Cabernet™ at 40 g/hL to promotes red and black fruit ester production. Add at 1/3 sugar depletion.
	Add Reskue™ , an inactivated yeast with high bio-sorptive capacity.	<p align="center">- Minimize -</p> <p>Inactivated yeast with high bio-sorptive capacity can sometimes bind smoke compounds.</p>	<p align="center">Recommended Inactive Yeast:</p> <ul style="list-style-type: none"> • Reskue™ at 40 g/hL. Add anytime from mid-fermentation to end of fermentation.
	Add oak chips .	<p align="center">- Counterbalance -</p> <p>Adding oak chips during fermentation can add structure, mid-palate, and minimize green/unripe flavors which may counterbalance effects of smoke compounds.</p>	<p align="center">Recommended Oak Chips:</p> <ul style="list-style-type: none"> • Feelwood! BALANCE & STRUCTURE oak chips at 50-100 g/hL



BEST PRACTICES GUIDE FOR RED GRAPES EXPOSED TO SMOKE -CONTINUED

Winemaking Stage	Best Practice	Explanation for Best Practice	Scott Labs' Recommendation (product, dosage, notes)
Pressing and Racking	Press after a moderate skin contact time . Avoid excessive time on skins. Avoid pre-fermentation cold soak or post-fermentation extended maceration.	<p align="center">- Quality Preservation –</p> <p>Moderate skin contact time produces well-structured wines that minimize the risk of microbial spoilage and aggressive tannins associated with extended contact times.</p> <p align="center">- Counterbalance -</p> <p>Moderate skin contact times produces well-structured wines that many provide a counterbalance to smoke compounds and subsequent smoke removal stripping effects.</p>	<p align="center">Scott Labs' note on skin contact time:</p> <p>Taste throughout the fermentation process to determine skin contact time. There are still debates concerning short skin contact time (pressing early when substantial amounts of sugar remaining) v. traditional skin contact time (pressing at dryness). As we understand it, guaiacol (one of the smoke compounds) is extracted early in maceration/fermentation. Short skin contact regimes (~5 days) will produce a wine that is lighter and less structured, but potentially with the same level of smoke compounds as longer (10+ days) skin contact regimes. If you plan to remove smoke compounds later in processing by fining, membrane technologies (reverse osmosis), or other means, wines with short skin contact may not have enough structure to counterbalance effects caused by removal treatments.</p> <p>Once skin contact length has been determined, drain free run to tank. Taste press fractions and isolate keeping fractions separate. Let gross lees settle for 24-48 hours and then rack to a clean tank. Keep fractions separate for as long as necessary. Additional trials with Reskue™ may help.</p>
Malolactic fermentation	Conduct a rapid malolactic fermentation .	<p align="center">- Quality Preservation –</p> <p>A rapid malolactic fermentation allows wines to be stabilized sooner, thus minimizing risk of microbial spoilage.</p>	<p align="center">Recommended sequential inoculation bacteria strains:</p> <ul style="list-style-type: none"> • Enoferm Alpha™ at 1 g/hL • Lalvin VP41™ at 1 g/hL <p align="center">Recommended co-inoculation* bacteria strain:</p> <ul style="list-style-type: none"> • Enoferm Beta Co-inoc™ at 1 g/hL <p align="center">Recommended nutrient for bacteria:</p> <ul style="list-style-type: none"> • ML Red Boost™ at 20 g/hL <p>*If a rapid sequential malolactic fermentation is difficult to achieve (lack of temperature control, difficult wine conditions, etc.) then a co-inoculation strategy is advised.</p>



BEST PRACTICES GUIDE FOR RED GRAPES EXPOSED TO SMOKE - *CONTINUED*

Winemaking Stage	Best Practice	Explanation for Best Practice	Scott Labs' Recommendation (product, dosage, notes)
Post fermentation management	Ensure microbial stability .	<p>- Quality Preservation -</p> <p>Post fermentation microbial control allows wines to be stabilized sooner, thus minimizing risk of volatile phenol production from <i>Brettanomyces</i>.</p>	<p>Recommended microbial control agents:</p> <ul style="list-style-type: none"> • No Brett Inside™ at 4-8 g/hL • Bactiless™ at 20-50 g/hL • Inodose tablets to maintain MSO₂ according to pH
	<p>Trial fining agents and tannins to reduce smoky compounds and build structure.</p>	<p>- Remove/Reduce -</p> <p>Fining agents may be able to remove some of the smoke compounds.</p> <p>- Counterbalance -</p> <p>Tannins and fining agents can add structure, mid-palate, and impact aromas and flavors which may counterbalance effects of smoke compounds.</p>	<p>Recommended removal agents:</p> <ul style="list-style-type: none"> • Granucol GE (carbon) • Polycacel (PVPP-Casein blend) • Colle Perle (Gelatin) • Bentolact S (Bentonite-Casein blend) • Redules (Bentonite-Inactivated yeast blend) • GranuBent PORE-TEC (bentonite) <p>Bench trials must be conducted to determine dose. The dosage for smoke compound removal/reduction will be much higher than traditional dosage recommendations.</p> <p>Recommended tannins and counterbalancing agents:</p> <p>Tannins:</p> <ul style="list-style-type: none"> • Scott'Tan™ Estate • Scott'Tan™ FT Rouge Berry • Scott'Tan™ Onyx • Scott'Tan™ Royal • Scott'Tan™ Riche • Scott'Tan™ Riche Extra <p>The Oak Lab™ Thermic oak infusion products</p> <ul style="list-style-type: none"> • Profiles 1-5 <p>Inactivated yeast blends</p> <ul style="list-style-type: none"> • Noblesse™ (may need TTB approval for post-fermentation use) • Redules™



BEST PRACTICES GUIDE FOR RED GRAPES EXPOSED TO SMOKE -CONTINUED

Winemaking Stage	Best Practice	Explanation for Best Practice	Scott Labs' Recommendation (product, dosage, notes)
<p>Filtration</p>	<p>Release bound up smoke compounds and remove.</p>	<p>- Remove/Reduce -</p> <p>Beta-glycosidase enzymes can cleave the bound non-odiferous aroma compounds increasing the level of free smoke compounds allowing higher levels to be removed via reverse osmosis. If not treating wines with reverse osmosis DO NOT use these enzymes. Allow minimum of 2 weeks contact time with enzyme before R.O. and deactivate enzyme with 3g/hL bentonite.</p> <p>Filtration through carbon filters may remove some of the smoke compounds.</p>	<p>Recommended enzymes:</p> <ul style="list-style-type: none"> • Rapidase® Revelation Aroma at 2-4 g/hL • Scott'zyme® BG at 3-6 g/hL <p>Bench trials must be conducted using enzymes to determine dose and contact time. The dosage for smoke compound cleavage may be much higher than traditional dosage recommendations.</p> <p>Recommended carbon filters:</p> <ul style="list-style-type: none"> • Sheet filters- Seitz AKS4 • Lenticular modules- SDI AKS4 • Cartridges-ScottCART Carbon <p>For reverse osmosis providers see links here: wineindustrynetwork.com/suppliersearch.php?</p>
<p>Finishing</p>	<p>Conduct trials to optimize structure, body and aromas</p>	<p>- Counterbalance -</p> <p>Some finishing products can produce a more structured, aromatically pleasing and fuller wine to potentially counterbalance smoke compounds.</p>	<p>Recommended finishing products*:</p> <p>Fining agents:</p> <ul style="list-style-type: none"> • Flashgum R Liquide at 40-120 ml/hL • UltiMA Soft at 15-30 g/hL <p>Tannins:</p> <ul style="list-style-type: none"> • Scott'Tan™ Royal • Scott'Tan™ Radiance • Scott'Tan™ Onyx • Scott'Tan™ Riche • Scott'Tan™ Riche Extra <p>Bench trials must be conducted to determine dose. The dosage for counterbalancing may be much higher than traditional dosage recommendations.</p> <p>*Consider using Scott Labs' Finishing Kit for Bench Trials.</p>