SCOTT LABORATORIES

ROT MANAGEMENT IN WHITE & ROSÉ WINES
RECOMMENDATIONS

ROT MANAGEMENT STRATEGY

Rot management is a part of your integrated pest management (IPM) strategy. However, despite your best control strategies, you may still have to harvest fruit compromised by *Botrytis cinerea* or other microorganisms. *Botrytis* grows intracellularly and infects fruit primarily under the grape skin, secreting a damaging and stable enzyme called laccase. In extreme cases, *Botrytis* can cause "slip-skin", making the fruit very difficult to handle.

When *Botrytis* or other rots are present on white grapes or red grapes destined for rosé production, the resulting wine quality can be negatively impacted. Depending on the mold present, as well as secondary bacterial infections, there can be serious enological concerns, such as oxidation and aromatic challenges. Clarification and filtration may also be affected. The goal is to maximize flavor, while minimizing the damage that the molds and bacteria can impart.

The first step in dealing with compromised fruit is to evaluate the mold level (both on the cluster, within the cluster and inside the berries) and to sort the grapes, separating the fruit so that you are dealing with the cleanest fruit available. Afterward, don't forget to clean your picking bins as well as your winery equipment to minimize cross-contamination.

TIPS FOR DEALING WITH INFECTED GRAPES

- Analysis is key!
  - Pre-fermentation analysis (chemical and microbiological) allows you to make good winemaking decisions.
  - Post-fermentation analysis allows you to move forward while determining risk.
- Consider a "reductive" style of winemaking.
- Increase your initial SO_2 addition, and consider using Lysozyme if secondary lactic infections are evident.
- Minimize time between picking and inoculation - fast processing is a key factor.
- Choose a yeast with a short lag phase, low VA production and good aromatic production. Increase your yeast dose to insure a fast start to fermentation.
- Consider co-inoculation with ML to protect your wine earlier, with an emphasis on fruit and freshness.
- Separate juice lees and heavy fermentation lees ASAP, as the lees contain most of the laccase.
- Keep tanks/barrels topped and treated with SO_2.
- Minimize oxygen exposure at all stages and manage pH.
- Do not blend laccase positive and laccase negative wines.
- If heat treatment is available, it is a very good tool to deactivate the laccase.

QUALITATIVE & QUANTITATIVE TESTING

Qualitative and Quantitative tests are available and should be used to determine risk. Adapt an appropriate winemaking strategy to optimize wine quality.

Qualitative Test for Laccase Activity:

- Place three samples (~50ml) of must in clean glasses and cover.
    - Glass one – Control
    - Glass two – Add 60ppm SO_2 and leave at cellar temperature
    - Glass three – Add 60 ppm SO_2 and place in the refrigerator
- After 24 hours access for changes in color or quality. If laccase is present then the control and the glass held at cellar temperature will be browner than the refrigerated sample. You may also have an oily film on the surface.

Quantitative (Laccase Unit) Test Interpretation for WHITE & ROSÉ Wines:

- 1 laccase unit – Exercise caution (Increase SO_2 dose)
- 2-5 laccase units – Pro-active (Increase SO_2, use enological enzymes and tannins- medium dose)
- >5 laccase units – Aggressive intervention (Increase SO_2, use enological enzymes and tannins higher end of dose recommendations)

Juice is very sensitive to damage from laccase, and facility hygiene is key to avoid cross-contamination.

ROT ASSESSMENT

Visual Test

Count the number of infected clusters per vine and determine the % of the fruit infected.

- <1% proceed as normal
- >1 - <5% further sorting
- 5-20% - treat with care as fruit needs special consideration
- >20% extreme measures to save fruit

Sensory Evaluation

Make notes on the taste and smell of the fruit so that you can determine the impact on wine quality.

MANAGING ROT BY STAGE

WINEMAKING STAGE	GOAL	ADDITION	ADDITION RATE	NOTES
Harvest and Transport	Sort in the vineyard to remove as much of the compromised fruit as feasible. Start to protect from oxygen damage and microbial activity.	SO_2 addition. Consider the use of Inodose Granules in the picking bins. Dry ice can also be used to lower temperature of fruit (slowing laccase activity)	This depends on pH and % of compromised fruit; should be adapted accordingly.	In addition to your vineyard analysis, conduct a qualitative and quantitative laccase activity test, as well as a visual rot assessment.
Fruit Reception and Grape Processing	Secondary sorting and fast processing is key. Juice is very sensitive to moldy flavors and the damaging effects of laccase (leading to oxidative browning). Microbial control at this stage is essential to minimize any additional degradation of wine quality. Gall nut tannin additions are highly beneficial at this time. They act as an anti-oxidant thereby helping to minimize the oxidative damage from laccase. Enological clarification enzymes help to break down grape pectin chains. This allows you to treat the fruit gentler and pressing at lower pressure. The enzyme helps to liberate the laccase from under the grape skins so that you can treat early in the process. Heat treatment at the juice stage can inactivate the laccase. If available, this should be considered.	Inodose Granules	As appropriate for the pH and laccase level.	Appropriate SO_2 management offers some protection from oxidative browning.
		Lysovin **or** Lyso-Easy easy to control Lactic acid bacteria (LAB). If MLF is not desired, consider using Bactiless™ for control of LAB and Acetic acid bacteria.	20g/hL	In color sensitive cultivars, then the addition of proteins (Lysozyme) at this stage can cause color-loss.
		FT Blanc™, FT Blanc Soft™ or FT Blanc Citrus™	50-150ppm (dosage depending on required treatment/laccase activity)	For FT Blanc™ and FT Blanc Soft™, add half of the dosage at the crusher and the balance at the start of fermentation. Add FT Blanc Citrus™ at the fermentation stage.
		Scottzyme® Cinn-Free or Scottzyme® Pec5L can be used before pressing	Cinn-Free dosage: 20-30mL/ton Pec5L dosage: 15-20mL/ton	Respect a 6-8 hour time interval between enzyme and tannin addition. Tannins will remove your enzymes.
		Scottzyme KS® can be used post pressing	100-150mL/1000 gallons respectively (dosage depending on required treatment/ laccase activity)	
Pressing	Protect from any oxidative damage by pressing under a CO_2 blanket. Consider segregating the first 10 gallons/ton and treating separately as this juice will be the richest in *Botrytis*-derived metabolites. Pressing to the lowest pressure is critical. Consider whole cluster pressing, or using rice hulls as a pressing aid. Taste your press cuts; evaluate and treat separately. You can include your first 10 gallons/ton to the second or third press fraction. Rack to a clean settling tank under a CO_2 blanket.			

Static Settling/Juice Clarification	The goal is to have a fast, clean and efficient clarification, removing as much as possible of the laccase, oxidized compounds, and moldy aromas/flavors. To optimize fruity flavors, clarify to <100ntu's.			
	GOAL	**ADDITION**	**TRIAL RATE**	**NOTES**
	Clarification	Bentostab	50-100g/hL	Bench trials should be conducted to determine the correct product and dosage. Remember to review the quality and quantity of lees as well as the impact on clarification, oxidation and aromas. Flotation and centrifugation can be used instead of static settling. Protect from oxidative browning irrespective of the method employed.
		Freshprotect	20-100g/hL	
	Clarification & Oxidation Control	Inocolle with Gelocolle	30-60mL/hL of each. Gelocolle is added one hour after Inocolle.	
		Colle Perle with Gelocolle	80-150mL/hL of each. Gelocolle is added one hour after Colle Perle.	
	Removal of Oxidized Compounds and Moldy Aromas	Polycacel	30-70g/hL	
		Caséinate de potassium with Gelocolle	50-100g/hL of each. Gelcolle is added 1 hour after Caséinate de potassium	
		Bentolact S	20-100g/hL	
	Oxidation Control	Polycel	40-80g/hL	
Alcoholic Fermentation	Begin the alcoholic fermentation as soon as possible. Use a yeast strain that will start quickly, while tolerating low nutrient conditions and highly clarified juice. If MLF is desired, co-inoculation with bacteria 24 hours post yeast inoculation is recommended to help maintain fruit flavors.	Lalvin Rhone 4600™, QA23™, Cross Evolution, CVW5, or Anchor's VIN13. If elevated SO_2 is a concern then use the non-SO_2, non-H_2S strains Lalvin ICV Okay™, or ICV Opale™.	25-35g/hL 20-40g/hL	Increase the inoculum to have a good start to fermentation, and enter into the alcoholic phase as soon as possible. Maintain a fermentation temperature from 60 - 72°F. This will promote good fruit flavors, minimize yeast stress and allow fermentation to finish in a timely manner. Mixing the tank at during the last third of fermentation will also aid a strong finish.
	The use of specific inactivated yeast helps minimize oxidation and promotes aromatic freshness due to its bioavailable glutathione content.	OptiMUM White™	20-40g/hL	
	Fermenting on bentonite may help bind laccase.	Bentostab	50-100g/hL	Recommended if bentonite was not used during the clarification process.

Fermentation Nutrition	Make sure that the yeast has the nutrients (macro and micro) available to conduct a rapid and clean fermentation. Nutrients may be deficient due to the microbes, and the clarification.	GoFerm Protect Evolution™ during rehydration	30-45g/hL	This is to protect and stimulate the cells, minimizing the lag phase. It can compensate for nutrient deficiencies caused by molds, and replace the deactivated thiamin from high SO_2 additions (>50ppm). High sterol and unsaturated fatty acids levels in GoFerm Protect Evolution eliminate the need for O_2 additions.
		Fermaid O™ at 2-3 brix sugar drop	10-40g/hL	Promotes fruit-driven wines.
		Fermaid K™ or O™ at 1/3 sugar depletion	10-40g/hL	This replaces the nitrogen used during the yeast growth phase.
	Bind moldy aromas and removal of toxins.	Nutrient Vit End at 2-3 brix drop	30g/hL	
Racking	Let gross lees settle for 24-48 hours and then rack to a clean tank. Keep press fraction fermentations separate for as long as necessary. Do not blend laccase positive and laccase negative wines. It is important to minimize contact with the gross lees. Rack under a CO_2 blanket if needed.			
Malolactic Fermentation	If MLF is desired, make sure you conduct post fermentation analysis so that you use a compatible MLF strain. If you added higher than normal amounts of SO_2, your strain must be able to withstand this higher total SO_2 level. Inoculate as soon as possible, even if wine is slightly sweet, but looks like it is going to complete alcoholic fermentation.	Opti-Malo Blanc™	20g/hL added just after ML inoculation	This will provide the bacteria with essential nutrients so that the MLF can be conducted in a timely manner.
		O-MEGA™ or Alpha™	1g/hL	These strains conduct a fast ML, optimizing fruitiness and balance.
		ML Red Boost™	1g/hL	This will provide the bacteria with essential nutrients so that the MLF can be conducted in a timely manner.

Post Fermentation Management and Aging	Keep running the qualitative laccase assessment. A quantitative analysis may be conducted to determine risk. Protect wine from O_2 until risk is low. Manage topping and SO_2 treating regime. Conduct trials with cellaring tannins due to their structure building and anti-oxidant qualities. If wines are slightly moldy in the nose or mouth, then gelatin trials can be run. For oxidative browning concerns, caseine and PVPP products can be trialed.	Scott'Tan FT Blanc Citrus™, Scott'Tan Estate™, and Scott'Tan Refresh™. **Gelatins:** Colle Perle and Inocolle **Caseins:** Caseinate de potassium and Polycacel, **PVPP:** Polycel	Bench trials can be conducted to determine dose based on wine style and desired outcome.
Filtration	The wine may have filtration issues if complex polysaccharides are present (glucans, pectins, etc). It may be useful to conduct a filterability test. If the filterability test fails and the wine is clean, you may wish to conduct trials with Scottzyme KS® or Lallzyme MMX™. Lallzyme MMX™ may take up to 6 weeks to break down the glucans. For a guide to managing filtration, please see Filter Grade Selection by Measuring Turbidity.		
Packaging	If wine is still susceptible to browning, protect from O_2 throughout the packaging process.		