SCOTT LABORATORIES

ROT MANAGEMENT PROTOCOL

ROT MANAGEMENT

WHITES & ROSÉ

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 micro-organisms. *Botrytis* grows intracellularly and infects fruit primarily under the grape skin, secreting a damaging and stable enzyme called laccase, which leads to oxidative browning. In extreme cases, *Botrytis* can cause "slip-skin" making the fruit very difficult to process.

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 then to sort the grapes, separating the fruit so that you are dealing with the cleanest fruit available. Don't forget to clean your picking bins afterwards, as well as your winery equipment, so that cross-contamination is minimized.

TIPS FOR DEALING WITH INFECTED GRAPES

- Analysis is key:
  - Pre-fermentation analysis (chemical and microbiological) allows for good winemaking decisions
  - Post-fermentation analysis allows for determining risk while still moving forward
- Consider a "reductive" style of winemaking
- Increase initial SO_2 addition and consider using Lysozyme if secondary lactic infections are evident
- Minimize time between picking and inoculation; fast processing is crucial
- Choose a yeast with a short lag phase, low VA production and good aromatic production; increase yeast dose to ensure a quick start to fermentation
- Consider co-inoculation with MLF to get your wine protected earlier with an emphasis on fruit and freshness
- Consider segregating the first 10 gals/ton which contains the dirt and dust from the vineyards, as well as molds and their aromatic signature; keep free run and press fractions separate until you have determined risk
- Separate juice lees and heavy fermentation lees as soon as possible **as the lees contain most of the laccase**
- Keep tanks and 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 available, heat treatment is a good tool to deactivate laccase

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ROT ASSESSMENT

VISUAL TEST

- Count number of infected clusters per vine and determine the percentage of fruit infected
  - < 1% Proceed as normal
  - 1% - 5% Further sorting required
  - 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.

QUALITATIVE & QUANTITATIVE ANALYSIS

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 of must (~50 mL) in clean glasses and cover
  - Glass one Control
  - Glass two Add 60 ppm SO_2 and leave at cellar temperature
  - Glass three Add 60 ppm SO_2 and place in the refrigerator
- After 24 hours assess for changes in color and 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 TEST INTERPRETATION FOR LACCASE ACTIVITY

- 1 laccase unit Exercise caution (increase SO_2 dose)
- 2-5 laccase units Pro-active (increase SO_2, use enzymes and tannins at medium dosage recommendation)
- > 5 laccase units Aggressive intervention (increase SO_2, use enzymes and tannins at the high-end of dosage recommendation)
- Juice is very sensitive to damage from laccase and **facility hygiene is key to avoid cross contamination.**

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WINEMAKING STAGE	GOAL	ADDITION	ADDITION RATE	NOTES
Harvest & 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 the temperature of fruit (slowing laccase activity). Gaia™ can be added to the picked fruit to help out-compete native organisms responsible for VA production.	This is depending on pH and % compromised fruit; should be adapted accordingly. 25 g/hL	In addition to your vineyard analysis, conduct a qualitative and quantitative laccase activity test, as well as a visual rot assessment.
Fruit Reception & 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. They act as an anti-oxidant thereby helping to minimize the oxidative damage from laccase.	Inodose Granules	As appropriate for the pH and laccase level.	Appropriate SO_2 management offers some protection from oxidative browning.
		Lysovin to control lactic acid bacteria.	20 g/hL	Bentonite used at this stage will deactivate and remove the Lysozyme.
		FT Blanc™, FT Blanc Soft™ or FT Blanc Citrus™	50-150 ppm (dosage depending on required treatment/ laccase activity)	Add FT Blanc and Blanc Soft, half of the dosage at the crusher, and the balance at the start of fermentation. Add FT Blanc Citrus at the fermentation stage.
	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.	Scottzyme® Cinn-Free or Scottzyme® Pec5L can be used before pressing Scottzyme® KS can be used post pressing	Cinn-Free 20-30 mL/ton Pec5L 15-20 mL/ton 100-150 mL/1000 gallons respectively (dosage depending on required treatment/laccase activity)	Respect a 6-8 hour time interval between enzyme and tannin addition. Tannins will remove your enzymes.

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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. Add Glutastar™ at 30 g/hL to the press pan or as soon as possible after pressing. Glutastar scavenges quinones – oxidative compounds that can compound the damage done by laccase. The addition of Glutastar will help protect and preserve color and aroma compounds.			
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	GranuBent PORE-TEC	35-75 g/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.
	Clarification & oxidation control	Freshprotect	20-100 g/hL	
	Clarification & removal of moldy aromas	Inocolle with Gelocolle	30-60 mL/hL of each. Gelocolle is added 1 hour after Inocolle	
		Colle Perle with Gelocolle	80-150ml/hL of each. Gelcolle is added 1 hour after Colle Perle	
	Removal of oxidized compounds and moldy aromas	Polycacel	30-70 g/hL	
		Caséinate de Potassium with Gelocolle	50-100 g/hL of each. Gelcolle is added 1 hour after Caséinate de potassium	
		Bentolact S	20-100 g/hL	
	Oxidation control	Polycel	40-80 g/hL	

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Alcoholic fermentation, yeast derivative nutrients & bentonite considerations	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. The use of specific inactivated yeast can help to build volume in the mouth, and further stabilize aromas. Fermenting on bentonite may help bind laccase.	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 2.0™.	25-35 g/hL	Increase the inoculum to have a good start to fermentation. Get 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. Recommended if bentonite was not used during the clarification process.
		Opti-WHITE™	20-50 g/hL	
		FermoBent PORE-TEC	100-200 g/hL	
Fermentation nutrition, yeast derivative nutrients & enzyme considerations	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.	Go-Ferm Protect Evolution™ during rehydration	30-45 g/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 Go-Ferm Protect evolution eliminate the need for O_2 additions.
	Bind moldy aromas and removal of toxins.	Fermaid O™ at 2-3 brix sugar drop	10-40 g/hL	Promote fruit driven wines.
		Fermaid K™, Fermaid O™ or Stimula Chardonnay™ at 1/3 sugar depletion	10-40 g/hL	This replaces the nitrogen used during the yeast growth phase. Stimula Chardonnay is used by the yeast to produce esters.
		Nutrient Vit End™ at 2-3 brix drop or Reskue™ during the last 1/3 of fermentation.	30-40 g/hL	Both products need to be rehydrated before adding.

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Fermentation nutrition, yeast derivative nutrients & enzyme considerations	To start the early break down of glucans.	Lallzyme MMX™	1-3 g/hL	Breaking down glucans takes time, so an early addition of a B-glucanase enzyme (24.250) may be advantageous. However, do not use enzymes at this point if bentonite has been added.
Racking	Let gross lees settle for 24-48 hours and then rack to a clean tank. Do not blend laccase positive and laccase negative wines. It is important to minimize contact with the gross lees. Rack under a CO2 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™	20 g/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™	1 g/hL	These strains conduct a fast ML, optimizing fruitiness and balance.
		Beta™ or PN4™		These strains will enhance the complexity of the wines.
Post fermentation Management & 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 then casein and PVPP products can be trialed. Using a blend of inactivated yeast with bentonite can protect against further oxidation during cold stabilization, racking and transportation by scavenging any dissolved oxygen.	Scott'Tan FT Blanc Citrus™, Estate™ Gelatins: Colle Perle and Inocolle Caseines: Caseinate de Potassium and Polycacel PVPP: Polycel	Bench trials can be conducted to determine dose based on wine style and desired outcome.	
		Pure-Lees Longevity +	20-40 g/hL	Scavenging oxygen during ageing and storage helps protect wine quality.
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 then you may wish to conduct trials with Scottzyme KS®, or Lallzyme MMX™. The MMX may take up to 6 weeks to break down the glucans. For a nice guide to managing filtration please see: our filtration grade selection article.			
Packaging	If wine is still susceptible to browning protect from O_2 throughout the packaging process.			