SCOTT LABORATORIES

ROT MANAGEMENT PROTOCOL

ROT MANAGEMENT

REDS

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. In extreme cases *Botrytis* can cause “slip-skin”, making the fruit very difficult to handle.

When *Botrytis* or other rots are present on red grapes the resulting wine quality can be negatively impacted. Depending on the mold and bacteria present, there are serious enological concerns, such as oxidative browning, degradation of color and aromatic compounds, as well as clarification and possibly filtration challenges.

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. Afterwards, 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 for good winemaking decisions
  - Post-fermentation analysis allows for determining risk while still moving forward
- Must is very sensitive to damage from laccase.
- Increase your initial SO_2 addition and consider using Lysozyme if secondary lactic infections are evident.
- Minimize time between picking and inoculation (no- cold soak).
- Choose a yeast with a short lag phase, low VA production and good mouthfeel. Increase your yeast dose to insure a fast start to fermentation.
- If a late Sulfur spray was done in the vineyard, you may wish to consider using a non-SO_2/ H_2S producing wine strain.
- Consider co-inoculation with ML to get your wine protected earlier.
- Keep free run and press fractions separate until you have determined risk.
- Separate heavy fermentation lees asap, as the lees contain most of the laccase.
- Keep tanks/barrels topped and treated.
- Minimize oxygen exposure, consider the use of gas, dry ice or a sparging stone.
- Do not blend laccase positive and laccase negative wines.
- If heat treatment is available, that is a very good tool to deactivate the 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)
- 2-15 laccase units Pro-active (increase SO_2, use enzymes and tannins at medium dosage recommendation)
- > 15 laccase units Aggressive intervention (increase SO_2, use enzymes and tannins at the high-end of dosage recommendation)

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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. Gaia™ non Saccharomyces yeast can be added directly to the picked fruit as a bio protectant against spoilage organisms and native microflora	This is depending on pH and % compromised fruit. But 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	Sorting and fast processing is key, as juice/must is very sensitive to the damaging effects of laccase (oxidative browning), and moldy flavors. If Lactic acid bacteria are present, consider the use of Lyzozyme. Tannin additions are highly beneficial at this time as they act as an anti-oxidant and help minimize the damage from laccase. Enological enzymes help to liberate the laccase from under the grape skins. They also assist with the extraction of positive compounds so that you can treat the fruit gently throughout the early stages of the process. Begin the alcoholic fermentation as soon as possible (No pre-fermentation cold soak).	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	In color sensitive cultivars then the addition of proteins (Lysovin) at this stage can cause color-loss.
		FT Rouge™, FT Rouge Soft™ or FT Rouge Berry™	30-60 g/hL (dosage depending on required treatment/ laccase activity)	Add half of the dosage at the crusher, and the balance at the start of fermentation.
		Lallzyme EX™, Lallzyme EX-V™ or Scottzyme® ColorPro	20-30 g/ton, 15- 20 g/ton 80-100 mL/ton respectively (dosage depending on required treatment/ laccase activity)	Respect a 6-8 hour time interval between enzyme and tannin addition.
Alcoholic Fermentation	You want a secure alcoholic fermentation. Use a yeast strain that will start quickly, promote good fruit character and texture while minimizing off flavors (VA, sulfides, and SO_2). If MLF is desired, you can consider a co-inoculation 24 hours post inoculation.	Lalvin T73™, ICV D21®, ICV GRE™, or Enoferm CSM™. If VA is not elevated in the fruit then D254™, or CVRP™ are good choices. If elevated SO_2 is a concern, then use ICV Okay™ or Persy™.	25-35 g/hL	Increase the inoculum to have a good start to fermentation and enter into the alcoholic phase as soon as possible. Ferment no hotter than 80°F, this to promote good fruit flavors and minimize yeast stress.

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Fermentation nutrition, yeast derivative nutrients & enzyme considerations	Ensure that the yeast has the nutrients (macro and micro) available to conduct a rapid and clean fermentation. To bind any potential pesticides, or moldy aromas.	Go-Ferm Protect Evolution™ during rehydration Nutrient Vit End™ or ResKue™ OptiMUM Red™	30-45 g/hL 30-40 g/hL 20 g/hL	Go-Ferm Protect Evolution protects and stimulates the cells, minimizes lag phase, and compensates for nutrient deficiencies caused by molds. It replaces the thiamin has been deactivated if you used >50ppm SO_2.
	To stabilize color and build a balanced palate.	Fermaid O™ at 2-3° Brix sugar drop	10-40 g/hL	This is to nourish the cells minimizing heat spikes, yeast stress while promoting good aromatics.
	To start the early break down of glucans.	Fermaid K™ or Fermaid O™ at 1/3 sugar depletion	10-40 g/hL	This replaces nitrogen used during the yeast growth phase.
		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.
Pressing and Racking	Taste throughout the fermentation process to determine skin contact length. In the most challenging situations, you may have to shorten your time on skins. Run a quick laccase activity test to determine browning risk. Drain free run to a tank, taste press fractions and isolate and keep fractions separate if necessary. Let gross lees settle for 24-48 hours and then rack to a clean tank. Keep fractions separate for as long as necessary. Rack under a CO_2 blanket if needed.			
Malolactic fermentation	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.	VP41™ or PN4™	1 g/hL	Use strains that conduct a fast MLF and produce texture-building polysaccharides.
		ML Red Boost™	20 g/hL	This will provide the bacteria with essential nutrients so that the ML can be conducted in a timely manner.

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WINEMAKING STAGE	GOAL	ADDITION	ADDITION RATE	NOTES
Post fermentation management, aging and fining	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 your topping and SO_2 regime. Conduct trials with cellaring tannins due to their structure building and anti-oxidant qualities. If wine is slightly moldy in the nose or mouth then gelatin trials can be run, and if oxidative browning is causing challenges then casein or PVPP can be trialed.	Scott'Tan Tannin Estate™ Gelatins: Colle Perle and Inocolle Caseins: Caseinate de Potassium and Polycacel, Polycel	Bench trials can be conducted to determine dose based on wine style and desired outcome.	Protein fining may de-stabilize color.
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™. MMX may take up to 6 weeks to break down the glucans. For a nice guide to managing filtration please see: http://www.scottlab.com/uploads/documents/Filter%20Grade%20Selection%20Article.pdf			
Packaging	Scott-Tan Royal™, Radiance™ and Onyx™ are designed to bring out elegance, complexity and balance. Due to their production process they can be used up to 48 hours before bottling. Remember to protect your aromas from oxidation throughout the packaging process.			

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