

LAFFORT CATALOGUE

North America

VINTAGE 2012 - 2013



LAFFORT

l'œnologie par nature



LAFFORT, *the organic commitment*

Zymaflore®



011  OrganiQ



MANNOSTAB®



DYNASTART®



BIOLEES®



Nutristart®
OrganiQ

BIOAROM®



* Recognized by the USDA for organic production according to the National Organic Program (NOP).

** Fulfilling the conditions for biological yeast production required by the EU regulations 834/2007 and 889/2008.

Laffort USA is concerned about lowering the environmental impact by making "green" business decisions.
Vegetable based ink was used for the printing of our catalog
A certified green business printed our catalog

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HISTORY OF LAFFORT

LAFFORT is a fourth-generation family owned business founded in 1895 by Jean **LAFFORT** who subsequently participated in all the major œnology developments following on from Pasteur's discoveries.

Over the past twenty-five years **LAFFORT** has advanced from predominantly chemistry-based curative œnology research towards a modern proactive role involving biochemistry and biotechnology. This new dynamic approach has stimulated the company's development on an international scale whereby **LAFFORT** now operates a specialized distribution network in over 50 countries. Accordingly, growth in worldwide demand has led to the ongoing development of unique product categories through the expertise and technical innovation of **LAFFORT** research (**SARCO**) and its partnerships. Ultimately, **LAFFORT** has built up considerable expertise utilizing the most advanced technology while working closely with winemakers, thus enabling them to respond to changing consumer preferences for natural high-quality wines.

LAFFORT is proud to offer you the best winemaking products and we hope that this catalogue will help you to select the most suitable tool for your winemaking needs.

Together with **LAFFORT** staff, we wish you a great vintage.

Luc **LAFFORT**



Dear Winemakers,

LAFFORT is known around the world as the leader in oenological products.

The LAFFORT group is proud to dedicate the largest budget among private companies in **Research and Development**, funding PhDs on fundamental research, which will lead to technical applications in years, as well as in more applied fields. Yeast gene regulation and nitrogen uptake, or polyphenols and proteins are two examples of recent completed PhD thesis financed by LAFFORT in Australia and in France.

As a result of this extensive research, LAFFORT possesses many **patents** and regularly launches **innovative products or processes**. Ever since, the use of tannins has become much more user-friendly thanks to the Instant Dissolution Process (IDP) developed by LAFFORT for instance. This year we introduced two ground-breaking products for tartaric stability, replacing cold stabilization: **CELSTAB®**, and **MANNOSTAB®**, coming with more than 10 years of trials and a patent on Yeast Mannoproteins. "**ZYMAFLORE ALPHA®**, a *Torulasporea delbrueckii* yeast strain, has already proven to be a valuable tool for reds and whites, in combination with a variety of *Saccharomyces cerevisiae* strains, to improve mouthfeel and aromatic complexity."

The **Quality** of LAFFORT products is well-known in the community. The LAFFORT corporate office has HACCP and ISO certification, and constantly strives to improve the quality of its processes and services.

LAFFORT is also committed to sustainable practices and the necessity of working for the future, and we are proud to announce that LAFFORT USA was the first winemaking products supplier in the US to be a certified **Green Business**.

See you soon!

Charlotte Gourraud,
LAFFORT USA General Manager



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YEASTS

Strains main characteristics

Yeast	Alcohol Tolerance* (%v/v)	Nitrogen Requirements	Temperature Range (°F)	Fermentation kinetic	Sensory Effect
ZYMAFLORE® YEASTS (<i>Saccharomyces</i>)					
X16	16.5%	Low	55 - 64	Fast	Esters
X5	16%	Medium	60 - 68	Fast	Varietal, Esters
VL3	14%	High	60 - 68	Regular	Varietal, Mouthfeel
VL1	14.5%	High	60 - 68	Regular	Varietal, Mouthfeel
VL2	15.5%	Low	60 - 68	Regular	Varietal
ST	15%	High	60 - 68	Slow	Varietal
Spark	17 %	Low	50 - 86	Fast	Neutral
FX10	16.5%	Low	68 - 95	Regular	Neutral, Mouthfeel
F15	16%	Medium	68 - 86	Regular	Fruit, Mouthfeel
RX60	16.5%	Medium	60 - 90	Fast	Varietal
RB2	16%	Low	68 - 90	Regular	Varietal
F83	16.5%	Low	68 - 90	Regular	Fruit, Mouthfeel
ZYMAFLORE® YEASTS (<i>Non-Saccharomyces</i>)					
Alpha	9-11%	Medium	55 - 65	Slow	Varietal, Mouthfeel
ACTIFLORE® YEASTS (<i>Saccharomyces</i>)					
BO213	>18%	Low	50 - 90	Fast	Neutral
F33	16%	Low	55 - 90	Regular	Varietal
Rosé	15%	Medium	55 - 63	Regular	Esters

* Yeast alcohol tolerance also depends on nutrition, temperature, etc. It is recommended to use **DYNASTART®** and a higher rate of yeast for high Brix grapes (see the article in the Laffort news section on our website: *Stuck ferments: causes and solutions*).

* FAQ: A 500g yeast bag can inoculate 625 gal of must.



YEASTS

Strains suggestions per variety

Varieties	Option 1	Option 2	Option 3	Option 4
Red Bordeaux	Zymaflore FX10	Zymaflore F15	Actiflore F33	Actiflore BO213
Cabernet, Merlot, Petit Verdot, Cabernet Franc	<ul style="list-style-type: none"> • good fermentation kinetics • soft mouthfeel • masks green character 	<ul style="list-style-type: none"> • good aging potential • medium nitrogen requirements • alcohol tolerance up to 15.5% 	<ul style="list-style-type: none"> • wide temperature range • low VA production • preserves varietal expression 	<ul style="list-style-type: none"> • excellent fermentation capacity • low nitrogen requirements • preserves varietal expression
Red Mediterranean	Zymaflore RX60	Zymaflore FX10	Zymaflore F83	Actiflore BO213
Grenache, Syrah, Mourvedre, Carignane, Tempranillo, Sangiovese, Zinfandel	<ul style="list-style-type: none"> • high fruity aromas • low H₂S production • alcohol tolerance up to 16.5% 	<ul style="list-style-type: none"> • preserves varietal character • good fermentation kinetics • alcohol tolerance up to 16.5% 	<ul style="list-style-type: none"> • high production of aromas • low nitrogen requirements • alcohol tolerance up to 16% 	<ul style="list-style-type: none"> • excellent fermentation capacity • low nitrogen requirements • preserves varietal expression
Red Italian	Zymaflore F83	Zymaflore RX60	Zymaflore RB2	
Sangiovese, Nebbiolo, Barbera, Dolcetto	<ul style="list-style-type: none"> • high production of aromas • low nitrogen requirements • alcohol tolerance up to 16% 	<ul style="list-style-type: none"> • high fruity aromas • low H₂S production • alcohol tolerance up to 16.5% 	<ul style="list-style-type: none"> • cherry and current aromas • low coloring matter absorption • alcohol tolerance up to 16% 	
Pinot Noir	Zymaflore RB2	Zymaflore F15	Zymaflore RX60	
	<ul style="list-style-type: none"> • cherry and current aromas • low coloring matter absorption • alcohol tolerance up to 16% 	<ul style="list-style-type: none"> • good aging potential • medium nitrogen requirements • alcohol tolerance up to 15.5% 	<ul style="list-style-type: none"> • high fruity aromas • low H₂S production • alcohol tolerance up to 16.5% 	
Crisp & Aromatic Whites	Zymaflore VL3	Zymaflore X5	Zymaflore X16	Actiflore BO213
Sauvignon Blanc, Semillon, Albarino, Vermentino	<ul style="list-style-type: none"> • mouthfeel expression • varietal aroma expression • alcohol tolerance to 14% 	<ul style="list-style-type: none"> • produces crisp, complex wines • varietal aroma expression • strong fermentation kinetics 	<ul style="list-style-type: none"> • high ester production • high aromatic intensity • strong fermentation kinetics 	<ul style="list-style-type: none"> • clean fermentations • good temperature range • alcohol tolerance to 18%
Chardonnay	Zymaflore VL1	Zymaflore VL2	Zymaflore X16	Actiflore BO213
	<ul style="list-style-type: none"> • clean, elegant aromatic profile • preserves varietal character • high nitrogen requirements 	<ul style="list-style-type: none"> • best for barrel fermentations • clean aromatic profile • alcohol tolerance up to 15% 	<ul style="list-style-type: none"> • high aroma production • New barrel or tank • strong fermentation kinetics 	<ul style="list-style-type: none"> • clean fermentations • good temperature range • alcohol tolerance to 18%
Floral Whites	Zymaflore VL1	Zymaflore X5	Zymaflore VL3	Actiflore BO213
Riesling, Gewurztraminer, Muscat, Gruner Veltliner	<ul style="list-style-type: none"> • floral terpene release • clean, elegant aromatic profile • high nitrogen requirements 	<ul style="list-style-type: none"> • produces crisp, complex wines • varietal aroma expression • strong fermentation kinetics 	<ul style="list-style-type: none"> • mouthfeel expression • varietal aroma expression • alcohol tolerance to 14% 	<ul style="list-style-type: none"> • clean fermentations • good temperature range • alcohol tolerance to 18%
Elegant Whites	Zymaflore X16	Zymaflore VL1	Zymaflore VL2	Actiflore BO213
Pinot Gris, Chenin Blanc, Viognier, Roussanne	<ul style="list-style-type: none"> • high ester production • high aromatic intensity • strong fermentation kinetics 	<ul style="list-style-type: none"> • floral terpene release • clean, elegant aromatic profile • nitrogen requirements 	<ul style="list-style-type: none"> • best for barrel fermentations • clean aromatic profile • alcohol tolerance up to 15% 	<ul style="list-style-type: none"> • clean fermentations • good temperature range • alcohol tolerance to 18%
Rose	Actiflore Rose	Zymaflore X16	Zymaflore X5	
	<ul style="list-style-type: none"> • aromatic Rose wines • strong fermentation kinetics • alcohol tolerance to 15% 	<ul style="list-style-type: none"> • high ester production • high aromatic intensity • strong fermentation kinetics 	<ul style="list-style-type: none"> • produces crisp, complex wines • varietal aroma expression • strong fermentation kinetics 	
Sparkling Wines (secondary fermentation)	Zymaflore Spark	Zymaflore X5	Zymaflore X16	
	<ul style="list-style-type: none"> • long maturation, 7 roundness • low foam and H₂S producer • tolerates high SO₂ levels and alcohol tolerance to 17% 	<ul style="list-style-type: none"> • adds aromatic intensity • fast fermentation kinetics • alcohol tolerance up to 16% 	<ul style="list-style-type: none"> • high ester production • high aromatic intensity • strong fermentation kinetics 	
Dessert / Late Harvest Wines	Zymaflore TD Alpha	Zymaflore ST	Zymaflore VL1	
	<ul style="list-style-type: none"> • non-Saccharomyces strain • very low VA production • aromatic complexity 	<ul style="list-style-type: none"> • isolated in Sauternes • resists to high sugar • easy arrest of fermentation 	<ul style="list-style-type: none"> • floral terpene release • clean, elegant aromatic profile • high nitrogen requirements 	
Stuck Fermentations	Actiflore BO213	Zymaflore Spark		
	<ul style="list-style-type: none"> • excellent fermentation • low nitrogen, low VA • capacity to ferment Fructose 	<ul style="list-style-type: none"> • SO₂ and alcohol tolerance • low foam and H₂S producer • low nitrogen requirements 		



ZYMAFLORE® Alpha^{TD} n. sacch.

... Handcrafting *biodiversity*

Zymaflore - non *Saccharomyces* Pack Size

Zymaflore Alpha^{TD} n.Sacch

- Significantly improves mouthfeel.
- Significantly decreases VA production, up to 50% in late harvest wines.
- Improves aromatic complexity and profile.
- Naturally phenols off flavor negative (pof-).
- Among the *Torulaspora delbrueckii* strains, Alpha has a high resistance to SO₂.
- Contact us for tips and details on the recommended sequential inoculation of Alpha and the *Saccharomyces cerevisiae* strain of your choice.

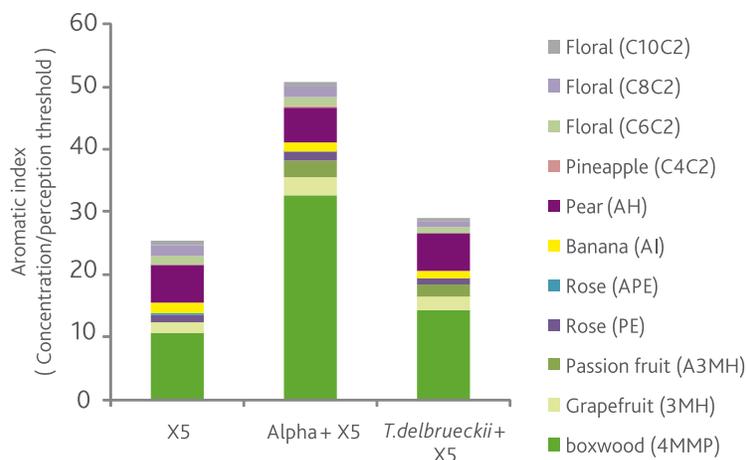


500 g

Zymaflore Alpha can be used on any variety; we saw the best results on late harvests, Pinot Noir, Chardonnay and Sauvignon blanc. It also showed to preserve fruit freshness on over-ripe fruit.

For more details on this strain and its isolation work (PhD completed in 2009), please contact us or read the article published in Practical Winery and Vineyard magazine in the Summer issue 2011.

Zymaflore Alpha will also be presented at the Wineries Unlimited Symposium in Richmond, VA in March 2012.



AROMATIC PROFILES OF SAUVIGNON BLANC WINES AFTER FERMENTATION

Andrew Brooks, Assistant Winemaker, Bouchaine Vineyards, Napa County (California)

We first used TD-Alpha in 2010 on some Botrytized Chardonnay dessert wine. That wine was a perennial VA-producer and TD-Alpha fermented steadily and produced very little VA, requiring little beyond the sequential inoculation of *Saccharomyces* a few hours later to produce a finished wine at ~11% alcohol, 20% RS, and a final VA well under the legal limit. We also trialed it on a small sample of our standard Chardonnay on top of a *Saccharomyces* strain we were familiar with and liked the broadening effect it gave to the mouthfeel enough to use it in more than 25% of our Chardonnay in 2011. It's been an effective and easy-to-use addition to our Chardonnay yeast program and we'll continue to implement it going forwards.





YEASTS

Zymaflore - X-Series for red wines

A new generation of yeasts adapted to "New World" conditions

Developed by LAFFORT using an exclusive non-GMO hybridization process **combining the organoleptic and fermentation strengths** of specific yeast strains.

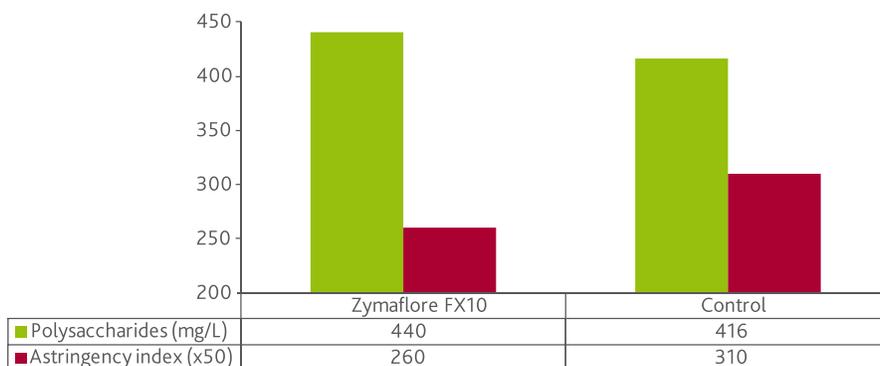
X-series yeasts offer outstanding fermentation abilities with excellent varietal aromas expression and aroma production, even in difficult conditions (high sugar level, low acidity, non optimal phenolic maturity...).

ZYMAFLORE FX10®

Cabernet Sauvignon, Cabernet Franc, Merlot

- Preserves varietal specificity and **terroir** of Bordeaux varieties.
- High polysaccharides production (contributes to **softer mouthfeel**).
- Helps to mask the perception of **green** character.
- Low production of H₂S.
- Good for ageing on lees (healthy lees).
- Recommended for:
 - * Wines showing intense yet elegant and supple tannins.
 - * Wines for ageing.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



Polysaccharides production and astringency index of FX10 and another red yeast

For more information on this research, please go to www.laffort.com and click the "News" link

Susan Lueker, Director of Winemaking, Simi Winery, Sonoma County (California)

We first used the FX10 during the 2010 vintage in Cabernet from our Alexander Valley estate. It fermented cleanly, with excellent fruit expression and less green character, especially compared to other strains in the trial. The mouthfeel was also richer, with broader mid palate and less angular tannin. We continued to see success using the FX10 in our 2011 vintage wines with its' sensory contribution and strong fermentation kinetics.





YEASTS

Zymaflore - X-Series for red wines

Pack
Size

ZYMAFLORE RX60®

Syrah, Sangiovese, Zinfandel, Merlot, Fruit Forward Varietals

- Very high aroma production (fresh currant and berry aromas).
- Low production of H₂S.
- LACTOENOS® SB3 or 450 PreAc® recommended in early co-inoculation to preserve aromatic freshness.
- Recommended for:
 - * Fruity, spicy wine.
 - * Wines requiring a highly aromatic, clean, balanced and round profile.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg

Zymaflore - X-Series for white and rose wines

ZYMAFLORE X5®

Sauvignon Blanc, Pinot Gris, Riesling, Colombard, Gewürztraminer & Rosé

- Expression of volatile thiol-type varietal aromas and fermentation aromas production (esters).
- Crisp and complex style wine.
- Recommended for:
 - * Wines with high aromatic intensity.
 - * Wines with a high varietal and fermentation aroma profile (grapefruit, tropical fruit, citrus, black currant).

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg

ZYMAFLORE X16®

Chardonnay, Viognier, Pinot Gris, Rosé, Chenin Blanc

- Very strong fermentor.
- High aromatic production (esters).
- Pof(-) character [no vinyl phenol formation], generating a delicate, clean wine profile.
- Low production of H₂S.
- Recommended for:
 - * Aromatic wines.
 - * Wines with an intense fermentation aroma profile (peach, apricot, white flower, pineapple).

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg

THIOLS VARIETALS (Sauv. Blc etc)	Zym.VL3	Zym.X5	Zym.X16	CHARDONNAY	Zym.VL1	Zym.VL2	Zym.X16
Fermentation performance	+++	++++	+++++	Fermentation performance	+++	++++	+++++
Optimal Conditions	100-150 NTU 65°F	80-100 NTU 61°F	<50 NTU 57°F	Optimal Conditions	100-150 NTU 65°F	80-100 NTU 61°F	<50 NTU 57°F
Varietal expression (volatile thiols)	+++++	+++++ (especially 4MMP)	++	Varietal expression (volatile thiols)	+++++	++++	+
Production of fermentation esters	-	++(+)	+++++	Production of fermentation esters	-	++(+)	+++++
Aromatic intensity	+++	++++	+++++	Aromatic intensity	+++	++++	+++++
Volume in mouthfeel	+++++	+++	+ (aromas)	Volume in mouthfeel	+++++	+++	+ (aromas)

For technical information about Alcoholic Fermentation Management and Nutrition Management, please consult the technical booklets on www.laffort.com/en/research-and-innovation/technical-booklet.



YEASTS

Pack
Size

Zymaflore - Classical isolated range for red wines

The best of the terroir selection for varietal expression

Ecoselection: selection of the dominant strain of a native fermentation in the best 'terroirs'.

ZYMAFLORE F15®

Merlot, Cabernet Sauvignon, Pinot Noir, Grenache & Zinfandel

- Isolated from one of the best "Chateaux" in Bordeaux.
- High glycerol production.
- Fermentation security, high compatibility with bacteria strains.
- Produces wines suitable for extended ageing.
- Recommended for:
 - * Rounded, full bodied wines.
 - * Fruity wines requiring high varietal expression.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



Ask us about how you can use F15 as well as RB2 for your Pinot Noir!

ZYMAFLORE RB2®

Pinot Noir, Nebbiolo, Merlot

- Strain isolated from the premium estates of Burgundy.
- Low color matter adsorption.
- Very good aptitude for expressing cherry/kirsch-type varietal aromas.
- Recommended for:
 - * Fruity, elegant wines.
 - * Pinot Noir varietal expression.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



Winemaker, Russian River Valley (California)

The combination of fresh red cherry aromatics and silky mouthfeel make the Zymaflore RB2 a valuable addition to our Pinot Noir program. We were also able to take advantage of the RB2's low color adsorption properties to help improve the quality of some of our lighter lots.

ZYMAFLORE F83®

Sangiovese, Tempranillo, Nebbiolo & Grenache

- Strain isolated in Tuscany on Sangiovese.
- High production of red fruit-type fermentation aromas.
- High glycerol production.
- Recommended for:
 - * Supple, fruity and floral wines.
 - * Strong expression of Sangiovese varietal characters and that of other Mediterranean grape varieties.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



For technical information about Alcoholic Fermentation Management and Nutrition Management, please consult the technical booklets on www.laffort.com/en/research-and-innovation/technical-booklet.

500 g
10 kg500 g
10 kg

500 g



YEASTS

Zymaflore - Classical isolated range for white wines

Pack
Size

The best of the terroir selection for varietal expression

ZYMAFLORE VL1®

Chardonnay, Viognier, Riesling, Gewürztraminer, Muscat & Fruit Wines

- Isolated from the best Burgundian estates.
- Pof(-) character [no vinyl phenol formation], generating a delicate, clean wine profile.
- High β -glucosidase enzyme activity for floral terpene release.
- Recommended for:
 - * **Elegant** and refined wines, particularly when aged on lees (Chardonnay).
 - * Terpene aromas.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg

ZYMAFLORE VL2®

Chardonnay, Muscat, Viognier & Late Harvest Wines

- Strain selected in Burgundy.
- Pof(-) character [no vinyl phenol formation], generating a delicate, clean wine profile.
- High polysaccharides production.
- Recommended for:
 - * Excellent mouthfeel.
 - * Barrel fermentation.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg

Central Coast Winemaker, producing approximately 1,000,000 gallons of Chardonnay (California)

In 2010 we added the Zymaflore VL2 to our experimental yeast trials. The VL2 competed against seven other strains known for barrel fermented Chardonnay. We were very pleased with the results. The VL2 exhibited excellent fermentation kinetics, and malolactic acid bacteria compatibility. The barrel fermented Chardonnay with VL2 showed increased palate weight with a rich mouthfeel and clean varietal aromas of peach and pear. In 2011, we not only moved the VL2 into the production program, but it was one of the top three yeasts by volume used in our barrel fermented Chardonnay program. We will continue to use VL2 as a major component of our Chardonnay program.

ZYMAFLORE VL3®

Sauvignon Blanc, Gewürztraminer, Riesling, Pinot Gris

- Isolated from the best Sauvignon blanc vineyards of Bordeaux.
- Good aptitude for expressing **varietal** aromas in Sauvignon blanc from the odorless precursors in the must.
- Mouthfeel: **volume** and roundness.
- Recommended for:
 - * Wines of finesse and elegance.
 - * Wines with a classical varietal aromatic profile.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg



YEASTS

Pack Size Zymaflore - Classical isolated range for white wines

The best of the terroir selection for varietal expression

500 g

ZYMAFLORE ST® (Sauternes)

Late Harvest, Semillon, Riesling, Gewürztraminer & Viognier

- Strain selected in Sauternes.
- Sensitive to SO₂ for easy arrest of fermentation and with low production of SO₂-binding agents.
- Resistance to high sugar concentrations.
- Recommended for:
 - * Late harvest wines.
 - * "Botrytised" grapes.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g

ZYMAFLORE SPARK

White, Sparkling Base, Fruit Wine

- Still white wines fermentation and secondary fermentation of sparkling wines.
- Good fermentation kinetics and temperature range (15–25°C / 60–77°F).
- Moderate VA, low foam and low H₂S producer.
- Tolerates high SO₂ and alcohol levels.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g

Zymaflore 011 OrganiQ®

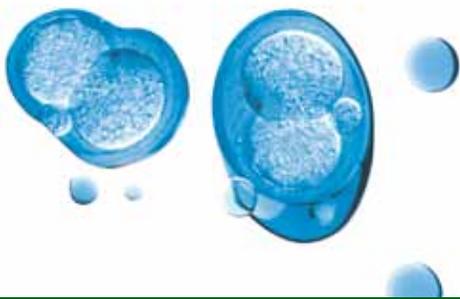
Red and White Wines

- Alcohol tolerance up to 16% vol.
- Average nitrogen requirements.
- Compatibility with malolactic yeast starters.
- No conservatives added, shelf life is limited.

Dosage: 200-300 ppm – 1.6-2.4 lbs/1,000 gal.



New 2012



YEASTS

Actiflore - Technological range

Natural high performance

With ACTIFLORE®, LAFFORT offers a range of efficient yeasts, intended for producing wines from Basic to Popular Premium. These strains are technical tools for addressing specific winemaking issues.

ACTIFLORE® F33

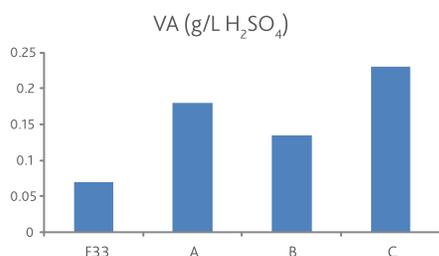
Red and white wines

- Excellent for the production of elegant red wines.
- Superior balance & softness due to high polysaccharide production.
- Excellent fermentation characteristics & kinetics over a wide temperature range.
- Very good alcohol tolerance and low nitrogen demand.
- Very low VA production.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g
10 kg



VA production by 4 major red yeast strains, end of alcoholic fermentation (13.5%v/v, pH 3.6)

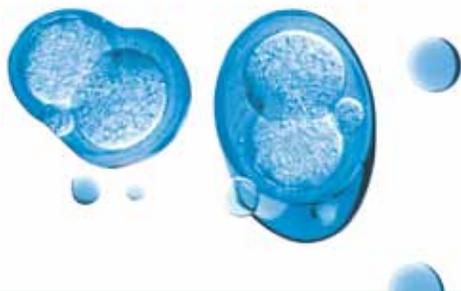
ACTIFLORE® Rosé

- Specifically selected for making premium Rosé wines.
- Strong implantation ability and fermentation rates.
- Produces high levels of fermentation aromas.
- Excellent strain for the production of fruit-driven rosé wines, especially when they are made from grapes of low aromatic potential.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.



500 g



YEASTS

Pack
Size

Actiflore - Technological range

500 g
10 kg

ACTIFLORE® BO213 (ex Actiflore Bayanus)

Restarting stuck fermentations, very high Brix level grapes, white wines

- Very strong ability to restart sluggish or stuck fermentations.
- Excellent capacity to ferment fructose.
- Ferments at low temperatures (10-12°C).
- Tolerates high sugar and **extremely high alcohol** (18% v/v) levels.
- Excellent fermentation characteristics including strong kinetics and bacteria compatibility.
- Suitable for sparkling wine process.
- Very low VA production in both restart and primary fermentations with high brix grapes.

Dosage: 200 ppm - 1.6 lbs/1,000 gal.

300 ppm – 2.4 lbs/1000 gal for restarting stuck fermentations.



Winemaker, Napa Valley (California)

We routinely work with high Brix grapes, and as a result have high risk fermentations. If the grapes are over 27 Brix (after water addition), we will usually use Actiflore BO213. Our strain choice at this point is based on Brix level, and we use it with different varieties.

We have successfully used BO213 (always rehydrated with Dynastart!) to ferment 17%v/v wines. The wines are clean, with no ill side effects, no unusual reduction, and with a very reasonable VA for the alcohol level. Controlling the fermentation temperature is very important though, because this strain is a very strong fermentor and can produce heat. I have recommended it to other high Brix winemakers who had the same successful experience with wines between 16 and 17.5%v/v.

Matt Ridge, Winemaker, Estate Crush, San Joaquin County (California)

I used BO213 on some troubled wines this year, sluggish ferments around 3 brix. I immediately noticed its vibrant activity upon building a starter culture. Within a day, that same vigorous activity began in the wine and continued until the ferment went dry without any ill side effects. BO213 is a clean, consistent fermenter for Lodi Zin. I highly recommend BO213 for restarting stuck or sluggish ferments.



RESTART PROTOCOL

Be aware that many factors impact on yeast, and therefore, restart performance. Please discuss this protocol with LAFFORT staff prior to an attempted restart to explore other potentially inhibiting parameters.

STEP 1: PRELIMINARY OPERATION ON STUCK WINE



1. Rack/centrifuge avoiding air.
2. Adjust wine temperature to 68 °F.
3. Adjust TSO₂ to 10 - 20 ppm.
4. Add: **BIOACTIV®** 400 ppm (white).
BIOCELL® 200-400 ppm (red).



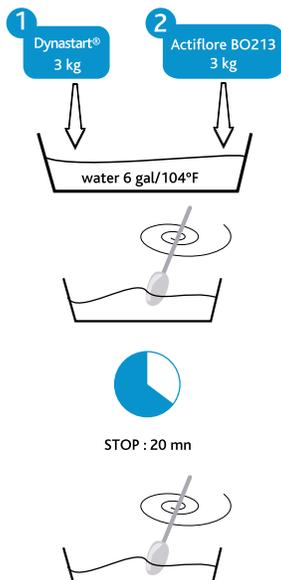
5. Mix wine anaerobically (closed circulation) every 12 hrs, or continuously if possible, for 48h (minimum).

STEP 2: PREPARATION OF THE YEAST INOCULUM



2-1 PREPARATION OF THE WINE FOR THE YEAST INOCULUM

1. Take 5 % of the volume of the treated stuck wine from Step 1.
2. Adjust the alcohol to 8 %, the sugar to 20 g/L or 2% and the temperature to 68 °F.
3. Add 200 ppm of **THIAZOTE® PH** corresponding to 10 % of the total stuck wine volume.



2-2 YEAST PREPARATION

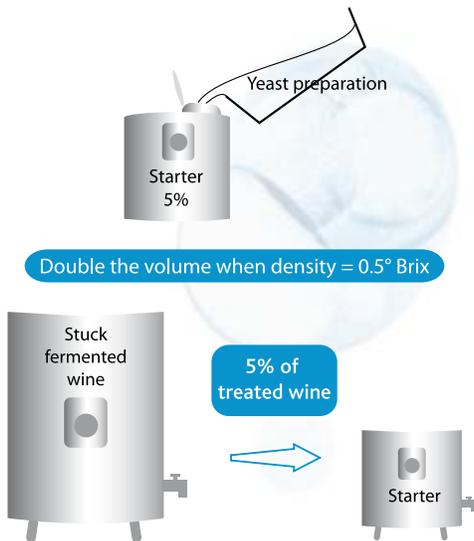
For 1,000 gal of stuck fermented wine:

1. Prepare 6 gal of water at 104°F.
2. Add DYNASTART®: 2.4 lbs (300 ppm), then homogenize.
3. Add ACTIFLORE® B0213: 2.4 lbs (300 ppm).
4. Wait 20 minutes, then homogenize.
5. Add immediately 3 gal of treated stuck wine from Step 1.
6. Wait 10 minutes, let cool to 68°F (not below) and maintain the temperature between 68-77°F.
7. The total time of the yeast rehydration must not exceed 45 minutes.

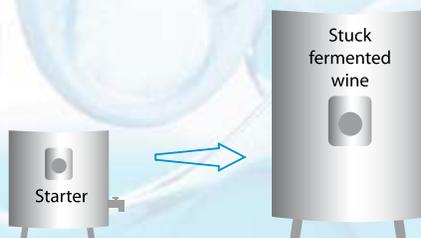


2-3 ACCLIMATIZATION OF THE YEAST PREPARATION

1. Add the yeast preparation (Step 2.2) to the prepared wine for the yeast inoculum (Step 2.1), and maintain the temperature around 68°F.
2. Measure the Brix level and maintain the inoculum at 68°F with aeration until density = 0.5 Brix, then add another 5% volume of stuck wine (Step 1) at 68°F. Avoid the total exhaustion of sugars in the inoculum and a fall in the yeast activity.
3. Measure the density and maintain again the inoculum at 68°F with aeration until density = 0.5 Brix.



STEP 3: INCORPORATION OF YEAST INOCULUM TO THE TANK



1. Add 100 – 200 ppm of THIAZOTE® PH to the main volume of stuck wine.
2. Add the yeast inoculum from Step 2.3 to the main volume of treated stuck wine, maintaining at 68°F.

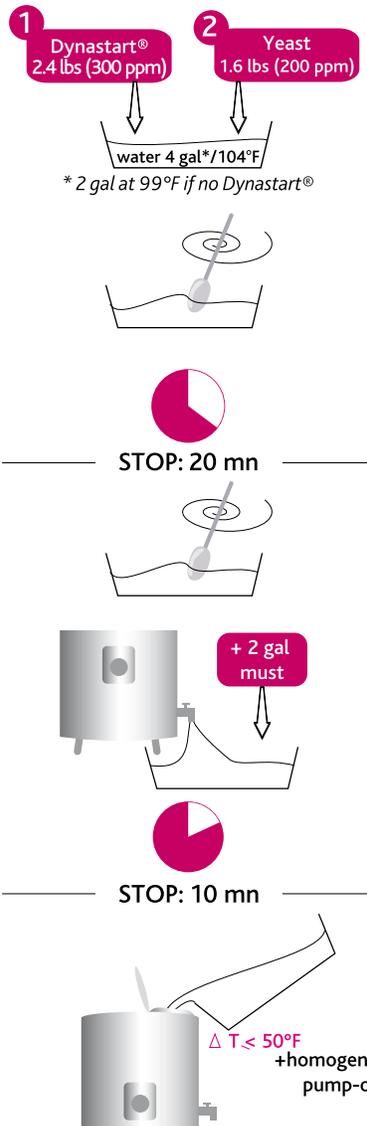


YEASTS

Yeast rehydration protocol

FOR 1,000 GAL

Rehydrate DYNASTART®
in water before adding the
yeasts.



Total preparation time must not
exceed 45 mn



FERMENTATION AIDS

Getting the best of your must and your yeasts

Yeasts must have a complete nutrition to perform the fermentation without stress (that could lead to aroma defects or inhibiting factors for bacteria). Grape nutrition and additions have to be balanced in growth and survival factors for the yeasts.

	Role for the yeast	Issues
GROWTH FACTORS		
AMMONIUM SALTS	Important source of nutrition for cellular growth and renewal of membrane transporters.	Assimilable nitrogen deficiency threshold in the must: 140 mg/L (to be corrected to around 200 mg/L, depending on the sugar level amongst other things). Heavy cover crops, advanced grape maturity, vine age, etc., are often linked with assimilable nitrogen deficiency in the must.
VITAMINS	Regulate growth velocity and the formation of undesirable compounds.	Consumption by yeast in an oxidative environment. Compounds which are sometimes non-bioavailable due to formation of a complex (SO ₂ -Thiamine for example).
MINERAL SALTS	Regulate growth and are fundamental enzymatic co-factors.	Loss of these elements in the case of excessive clarification. Formation of complexes (with tannins for example).
SURVIVAL FACTORS		
FATTY ACIDS	Membrane fluidity. Improved fermentation metabolism.	High consumption rate by indigenous flora. Loss in the case of advanced clarification.
STEROLS	Membrane synthesis and fluidity. Resistance to alcohol	Low concentration in clarified juice and in musts with a nitrogen deficiency. Consumption of phytosterols by indigenous flora. Necessity of yeast sterols for improved cellular viability. No synthesis in the absence of O ₂ .

For an optimized protection and nutrition of your yeasts, Laffort highly recommends to rehydrate yeasts with DYNASTART®, then add NUTRISTART® ORGANIQ and THIAZOTE® PH as needed.

YAN CONTRIBUTION OF NUTRIENTS

	Product	YAN Contribution by 250ppm
Protection	Dynastart®	4 mg N/L (organic nitrogen)
Nutrition	Thiazote® PH	52,5 mg N/L (inorganic nitrogen)
	Nutristart®	31 mg N/L (organic and inorganic nitrogen)
	Nutristart® OrganiQ	13 mg N/L (organic nitrogen)
	Turbicel®	N / A
Detoxification	Bioactiv®	0 mg N/L (organic nitrogen)
	Biocell®	N / A



FERMENTATION AIDS

Yeast rehydration optimization

Pack Size

Patent F 2.736.651. A combination of growth and survival factors, **DYNASTART®** is a yeast preparation for use in active dry yeast (ADY) re-hydration water, for enhanced wine quality (improved aromatics and less aromatic masks) and a strong fermentation finish.

DYNASTART®

DYNASTART® optimizes yeast aromatic potential. Wines are cleaner (less VA, less H₂S and sulphides compounds) and express more varietal and fermentation aromas produced by the selected yeast.

- Provides during yeast rehydration the essential elements (sterols) of the yeast membrane, and guarantees membrane **fluidity**, its **resistance to alcohol** and higher efficiency of the sugar transporters through to the last yeast generation.
- Does not provide assimilable nitrogen. If must (juice) is deficient, a complementary addition of nitrogen (i.e. **Nutriscart OrganiQ** or **Nutriscart**) might be necessary at the end of lag phase.
- To be used especially in the event of high potential alcohol degree, of low juice turbidity, of low fermentation temperature, and in fermentation restart starter cultures.

OMRI Listed for use in organic winemaking.

Dosage: 300 ppm - 2.4 lbs/1,000 gal.

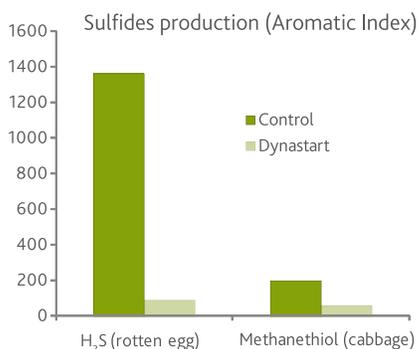
When to use: add to yeast rehydration water.



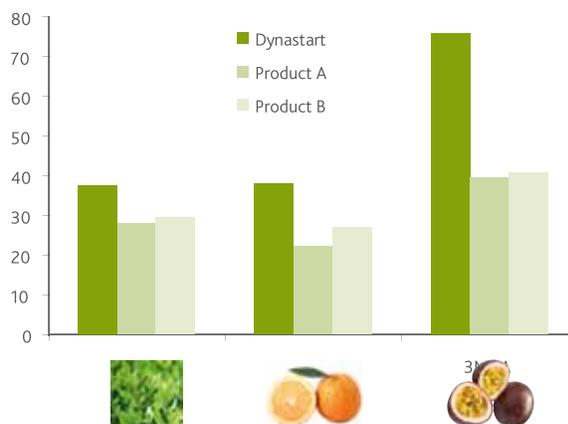
1 kg
5 kg

Ben Howe, Winemaker, King Estate Winery (Oregon)

Dynastart is the obvious choice of King Estate given the large amount of organic fruit that we work with. Not only is it OMRI certified, but it is a much easier product to work with. It's rapidly soluble so we don't have to take the time trying to dissolve sticky clumps the competing products provide. On top of that, it provides higher YAN than other products. We use it exclusively for our rehydration and believe it helps us with cleaner, more consistent fermentations.



H₂S production by a yeast in a red fermentation (Alc. 14.5%v/v, Fermentation at 70°F, Residual Sugar control 2,9 g/L and RS Dynastart® 1,1 g/L, VA control 0.58g/L H₂SO₄ and VA Dynastart® 0.41g/L H₂SO₄).



Aromas produced by Zymaflore X5® on Sauvignon blanc, rehydrated with Dynastart® and two other products. [4MMP: box tree, 3MH: grapefruit, 3MHA: passionfruit]. Average of duplicate. Dynastart® helped in this case to increase the varietal aroma expression by respectively 30%, 55% and 89%.



FERMENTATION AIDS

Alcoholic Fermentation

NUTRISTART® ORGANIQ

100% organic nutrient, naturally rich in vitamins (thiamin, niacin, pantothenic acid, folic acid, ...), minerals and trace elements (magnesium, manganese, zinc, iron, ...) that promotes cellular multiplication. Can be used on all varietal: white, rose or red.

- Ensures regular and complete AF in the case of slight to moderate nutritive element deficiencies (around 120 mg/L of assimilable nitrogen) in the must.
- In the case of large nitrogen deficiencies and/or high potential alcohol, use Nutristart® OrganiQ with a supplementary nitrogen source to guarantee improved nutritional balance in the yeast.
- 30 g/hL (300ppm - 2.4 lbs/1,000 gal) of Nutristart® OrganiQ provides on average 16 mg/L (16 ppm) of assimilable nitrogen.

OMRI Listed for use in organic winemaking.
 Dosage: 300 to 400 ppm - 2.4 to 3.2 lbs/1,000 gal, according to the necessary nitrogen addition.
 When to use: add to the tank in the first 1/3 of fermentation.



Pack Size
1 kg
10 kg

NUTRISTART®

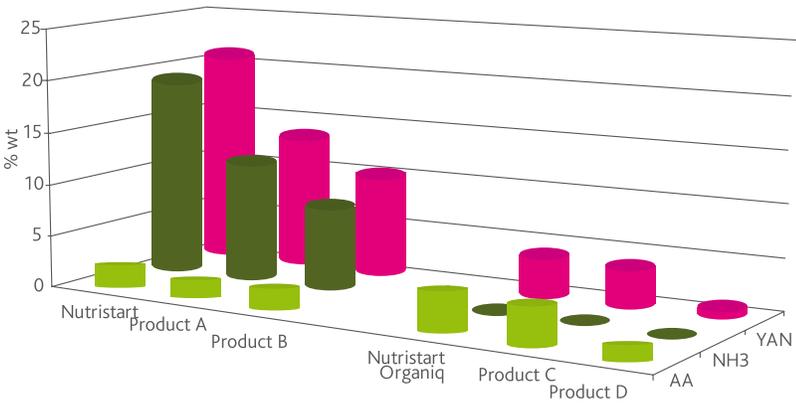
All-round yeast activator combining growth and survival factors and promoting yeast multiplication – contains DAP. Can be used on all varietal: white, rose or red.

- To be used in the case of nutrient deficiency in the must.
- 10 g/hL (100 ppm – 0.8 lbs/1,000 gal) provides about 12 mg/L (12 ppm) assimilable nitrogen.

Dosage: 200 to 400 ppm - 1.6 to 3.2 lbs/1,000 gal, according to the necessary nitrogen addition.
 When to use: add to the tank in the first 1/3 of fermentation.

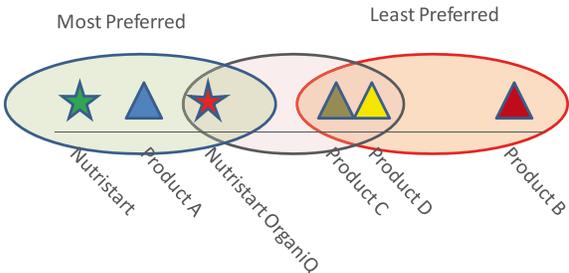


1 kg
5 kg



Nitrogen Content in Yeast Nutrient Products

Amino acid (AA) and Ammonia (NH3) analyses were performed in triplicate by an ISO 17025 certified Laboratory for all samples.



Preference Test Results for Organic and Complex Nutrients

Ovals indicate statistically different groups at a 95% Confidence Interval using Forced Rank Sum Analysis. Position on the line references overall score. n=20

For technical information about Good Management of Nutrition and Fermentation Aids, please consult the technical booklet on www.laffort.com/en/research-and-innovation/technical-booklet.

FERMENTATION AIDS

Alcoholic Fermentation

Pack
Size

BIOACTIV®

A formulation of survival factors, to be used when fermentation slows down or becomes stuck. Does not contain DAP. Can be used on all varietal: white, rose or red

- In the case of slow alcoholic fermentation, **detoxifies the must**, provides survival factors for the yeasts and enables fermentation to be completed.
- Can be used in the vinification of highly clarified must and immediately provides support elements and survival factors, which are essential for membrane stress-resistance. **BIOACTIV® does not provide assimilable nitrogen.**

Dosage: 200 to 400 ppm - 1.6 to 3.2 lbs/1,000 gal.

When to use: add to a sluggish, or to a stuck wine (see restart protocol p15).



1 kg

TURBICEL (formerly named GRANUCEL)

Cellulose powder for over-clarified juice

- Compensates highly clarified white and rosé juice by adding back neutral solids to help keep yeast in suspension.
- **10 g/hL (100 ppm) increases by 20 NTU the juice/must turbidity.**

Dosage: 20 to 50 ppm, according to the turbidity correction - 0.16 to 4.0 lbs/1,000 gal.



5 kg

BIOCELL®

- Yeast walls with high power to detoxify the environment.
- Acts by fixing C8 and C10 fatty acids.
- Inhibitors of alcoholic fermentation and malolactic fermentation.

Dosage:

Preventive use: 200 ppm – 1.6 lbs/1,000 gal. Add in must or wine after the first quarter and before the 2/3 of alcoholic fermentation during a pumping-over.

Curative use: 300 to 400 ppm – 2.4 to 3.2 lbs/1,000 gal. Add in the fermentation tank and mix by a pumping-over.



1 kg

THIAZOTE® PH

Nutrient providing growth factors (diammonium phosphate and thiamine). Can be used on all types of must; white, rosé or red

- 10 g/hL (100 ppm - 0.8 lbs/1,000 gal) provides about 21 mg/L (21 ppm) assimilable nitrogen. With regards to optimal fermentation management, it is important to consider that a regular and complete alcoholic fermentation is an essential factor for the successful onset of malolactic fermentation.

Dosage: to be based on the initial assimilable nitrogen content in the must. As per DAP additions. Maximum THIAZOTE® PH addition: 50g/hL (this dosage reaches the maximum thiamine addition).

1 kg
5 kg



FERMENTATION AIDS

Pack
Size

Aroma preservation

1 kg

BIOAROM®

Yeast bio-product with high protective power (5.3%), for aroma preservation in white and rosé wines

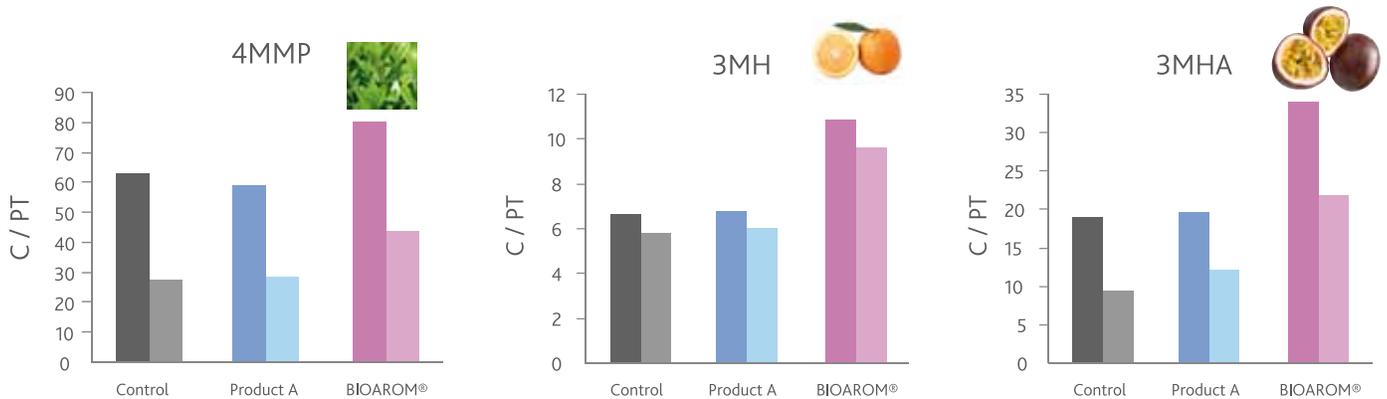
- Glutathione is a potent anti-oxidant (+920mV redox potential), much stronger than SO₂ (+170mV) or ascorbic acid (+282mV).
- Allows the yeast to assimilate **glutathione precursors** (cysteine, N-acetyl cysteine) during AF, and thus synthesize more of this tripeptide.
- Protects from oxidation the aromatic potential developed during the fermentation.

Due to its dual composition, **BIOAROM®** enables the aromatic potential of the wines to be efficiently protected and to significantly delay the appearance of oxidised notes.

OMRI Listed for use in organic winemaking

Dosage: 300 ppm - 2.4 lbs/1,000 gal.

When to use: add to the tank in the last 1/3 of fermentation.



A comparison of two products aimed at wine aroma preservation, Product A and BIOAROM. Fermentation was conducted in Sauvignon blanc juice in 2006, with microvinification in duplicate. The two time-points indicated are at bottling and 3 months later with cellaring at 15 °C. Concentration/Perception Threshold, where a value of ≥ 1 indicates contribution to wine aroma. 4MMP = 4-methoxymercaptopentanone, broom/ boxtree; 3MH = 3-mercaptohexanol, grapefruit; 3MHA = 3-mercaptohexyl acetate, passionfruit.

FERMENTATION AIDS

Malolactic fermentation

Pack
Size

MALOSTART®

A mixture of nutrients for lactic acid bacteria and wine detoxification agents, facilitating malolactic fermentation (MLF) onset, restart and accelerating fermentation kinetics

- Combines nutritive elements (inert yeast, support elements) and detoxification agents (yeast cell walls) and thus:
 - Optimizes lactic acid bacterial **survival** (by adsorbing short or medium-chain fatty acid-type inhibitors).
 - Encourages lactic acid bacterial **activity** (by supplying them with nitrogen compounds which they directly assimilate).
- Can be used on all types of wine: white, rosé or red.
- Composition formulated to optimize the supply of **amino acids essential** to the bacteria (glutamic acid, valine...) while reducing the quantities of **biogenic amine precursors** of amino acids (histidine, tyrosine).
- Also rich in **vitamins** required by the bacteria and in **minerals** (magnesium and manganese) which are essential co-factors for enzymatic function.

Dosage: 300 ppm - 1.6 lbs/1,000 gal.



500 g



MALOLACTIC BACTERIA

Monitoring the Malolactic Fermentation

What are the different techniques of bacteria addition?

Fermentation management typically involves the addition of yeasts, then the addition of bacteria for malolactic fermentation (MLF) following the completion of alcoholic fermentation (AF).

More and more winemakers are choosing yeast/bacteria co-inoculation, where bacteria are added before the primary fermentation is complete. There are different techniques. **Early co-inoculation** is when bacteria are added 24 hours after the beginning of AF. The main goal is to optimize the bacterial survival and settling (close to 100% after inoculation) and to save time. Bacteria can also be added to the wine towards the end of AF, at about 3° Brix, in case of a **late co-inoculation**. The main goal of this technique is to prevent microbial alteration: selected bacteria will take over after yeast, and dominate the ecosystem avoiding spoilage micro-organism growth (*Brettanomyces* yeasts, biogenic amines producing bacteria, etc.). These two co-inoculation techniques are also **economically interesting: the total energy costs are greatly reduced**, since bacteria are added to a warm wine and MLF is faster.

What are the key points and how to perform a co-inoculation?

SO₂ management on the grapes, yeast strain and nutrition, maceration and fermentation temperature, bacteria strain and inoculation are extremely important factors. The alcoholic fermentation has to be steady until completion to make sure the bacteria population will not develop towards an aerobic metabolism (sugar consumption).

You will find more practical details about co-inoculation in the technical booklet on our website: <http://www.laffort.com/en/research-and-innovation/technical-booklet>. Please feel free to contact us to validate your yeast/bacteria compatibility or to make sure the addition time and rate are accurate!

CO-
INOC:
THE GREEN
OPTION!

You will find in the following pages different bacteria strains and different inoculation protocols (pre-acclimatized, direct or standard). In case of co-inoculation, **LAFFORT** recommends the Lactoenos PreAc® bacteria, 450 or 350 depending on your wine conditions. Ask us for the specific co-inoculation protocol!

Strain characteristics

Preparation	Alcohol	pH	Total SO ₂	Temperature	C8 and C10 (Fatty acids) tolerance	Available packaging
450 PreAc®	≤ 17 % vol.	≥ 3.3	≤ 80 mg/L	≥ 16°C ≥ 61°F	≤ 20 mg/L of C8 ≤ 5 mg/L of C10	50 hL / 1320 gal 250 hL / 6605 gal
350 PreAc®	≤ 16 % vol.	≥ 2.9	≤ 80 mg/L	≥ 15°C ≥ 59°F	≤ 60 mg/L of C8 and ≤ 15 mg/L of C10	50 hL / 1320 gal 250 hL / 6605 gal
SB3® Instant	≤ 15 % vol.	≥ 3.3	≤ 50 mg/L	≥ 16°C ≥ 61°F	≤ 20 mg/L of C8 ≤ 5 mg/L of C10	2.5 hL / 66 gal 25 hL / 660 gal 250 hL / 6605 gal
B16 Standard	≤ 16 % vol.	≥ 3.1	≤ 60 mg/L	≥ 16°C ≥ 61°F	≤ 20 mg/L of C8 ≤ 5 mg/L of C10	50 hL / 1320 gal

Choosing the right type of inoculation to implement:

Type of inoculation	Step	Recommended preparation	Objective
Early Co-inoculation	24 h after AF start-up	450 PreAc® - 350 PreAc® SB3® Instant	Saved time and avoids MLF failure Optimised fermentation management.
Late Co-inoculation	3° Brix 1010 density	450 PreAc® - 350 PreAc®	Taking over the ecosystem Secures a traditional vinification process (AF then MKF).
Sequential inoculation	After AF, at pressing	450 PreAc® - 350 PreAc® SB3® Instant	MLF after post AF maceration MLF in barrels
Curative inoculation	Later...	B16 - 350 PreAc® Protocol restarting MLF	Restarting stuck MLF Spring MLF



MALOLACTIC BACTERIA

Lactoenos bacteria

PreAc® Process

This exclusive production process, developed by Laffort, guarantees a better bacterial survival rate and a shorter lag phase. The PreAc® strains include a nutrient, Energizer, for rehydration water.

LACTOENOS 450 PreAc®

Enococcus oeni high performance strain

- Strong implantation capacity in wines at any stage of its inoculation in wine or must.
- Helps limit microbiological contamination ensuring safe MLF.
- Suitable strain for co-inoculation techniques in red wines.
- Resistant to **high alcohol** (up to 17% v/v).

Dosage: refer to packaging.



50hL
1,320gal

250 hL
6,605 gal

Scott Shirley, Winemaker, The Hess Collection Winery, Napa County (California)

I started using the Lactoenos 450 PreAc during Harvest 2010 and will continue using it because of its reliability in finishing ML quickly. The acclimatization step before inoculation is convenient; I get the culture started at the end of the day and then add it the following day to the wine. The PreAc strains are very economical compared to the direct add strains and require minimal labor.



LACTOENOS 350 PreAc®

Enococcus oeni strain with a high malolactic activity at low pH

- Isolated from very acidic (pH = 2.9) and high alcohol content (up to 16% v/v) wines.
- Remarkable **fermentation ability** and **resistance**, confirmed by its **genetic profile** and presence of different genes implied in acidic stress resistance.
- Particularly suitable strain for white wines or when [malic acid] < 1g/L.
- Resistance to high fatty acids concentration.

Dosage: refer to packaging.



50 hL
1,320gal

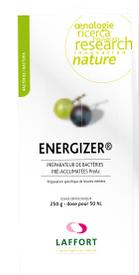
250 hL
6,605 gal

For more information on this genetic work, please read the article in the LAFFORT news section on our website.

ENERGIZER® for PreAc bacteria

A complete MLF nutrient developed by LAFFORT for the PreAc strains

- Incorporated at the pre-acclimatization phase as part of this innovative process.
- Provides the necessary and specific nutrients that the bacteria need during their final stage of acclimatization. This last step is crucial to ensure critical numbers and bacteria survival prior to incorporation into the wine being inoculated.



Part of
Lactoenos
PreAc®
package



MALOLACTIC BACTERIA

Lactoenos bacteria

LACTOENOS SB3® INSTANT

Enococcus oeni direct inoculation strain

- The most widely used strain in Bordeaux!
- Very useful barrel size dose.
- With regards to good AF management and correct yeast nutrition, LACTOENOS SB3® can be inoculated at the start of AF (early co-inoculation) and ensures rapid MLF after AF.
- Reactivates in unchlorinated water at 68°F for 15 minutes before transfer to the tank.

Dosage: refer to packaging.



Pack
Size

2.5 hL
66 gal

25 hL
660 gal

250 hL
6,605 gal

2.5 hL
66 gal

25 hL
660 gal

250 hL
6,605 gal

LACTOENOS® B16 STANDARD

Enococcus oeni strain for all type of wine

- Very resistant strain particularly suited for restarting MLF due to its precise protocol of acclimatization.
- Adaptation is carried out in the cellar (multiple steps protocol, 3 to 5 days long – please refer to package label or product data sheet).

Dosage: refer to packaging.



How do you feed your bacteria?

MALOSTART®

A mixture of nutrients for lactic acid bacteria facilitating malolactic fermentation onset, restart and accelerating fermentation kinetics

- Wine detoxification.
- Specific nutrition (essential amino acids, vitamins and minerals).
- No biogenic amine precursors.

Dosage: 300 ppm – 1.6 to 3.2 lbs/1,000 gal.

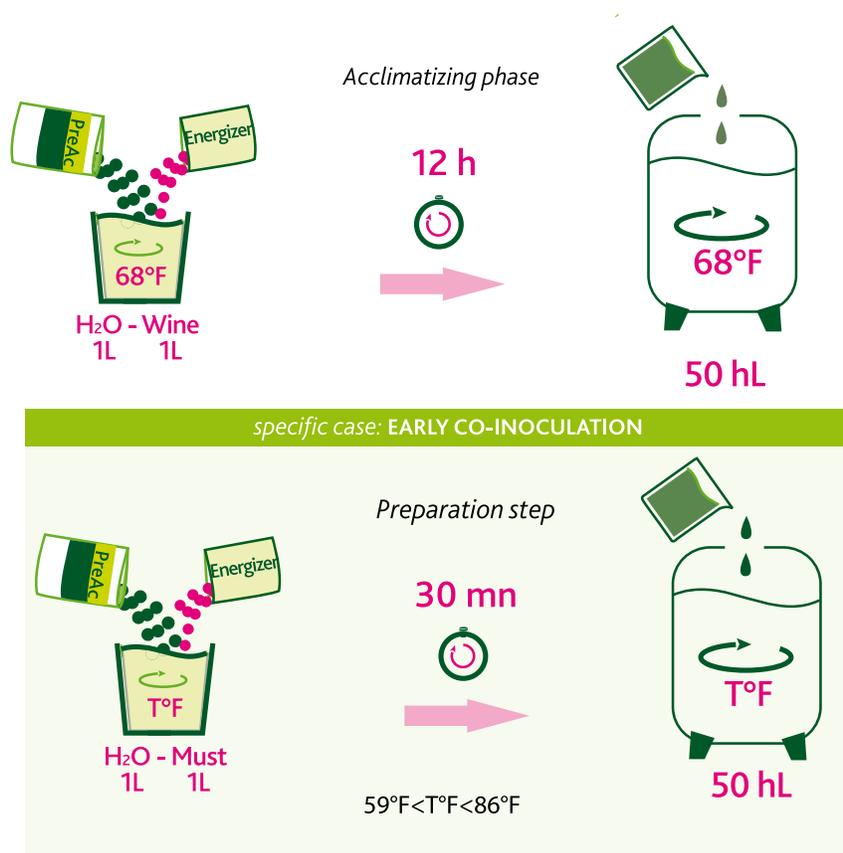


500 g

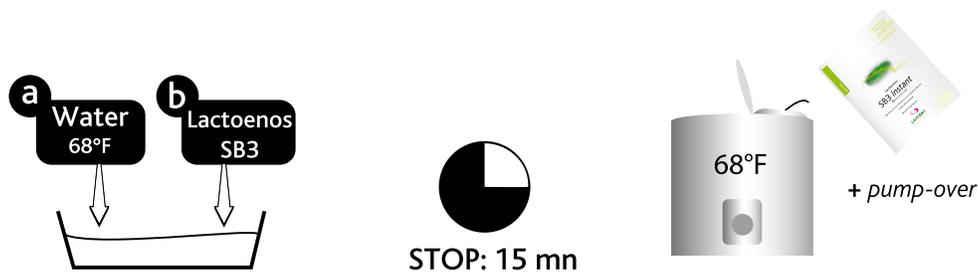
MALOLACTIC BACTERIA

Inoculation protocol

450 and 350 PreAc®



SB3® Instant



MLF RESTART PROTOCOL

Problems regarding malolactic fermentation (MLF) in wine can have different origins:

- Competition from residual yeasts.
- Wine toxicity: the presence of inhibiting compounds (ethanol, SO₂, medium-chain fatty acids).
- Bacterial deficiency.
- Low level of nutrients necessary for the bacteria.

For each of these situations, there is a strategic approach:

1- DECREASE COMPETITION WITH RESIDUAL YEASTS

In order to eliminate the yeasts, there are different techniques like racking, filtration (1 µm) or flash-pasteurization. For *Saccharomyces*, racking is recommended. In the case of *Brettanomyces*, it is better to use a more secure method like filtration or flash-pasteurization. In all cases, once the yeasts are eliminated, it is important to add the selected bacteria soon, in order to rapidly colonize the wine.

2- DETOXIFY THE MEDIUM

To eliminate the molecules inhibiting lactic acid bacteria, yeast hulls (**BIOCELL**® 200 to 400ppm) addition during an anaerobic circulation is the most efficient treatment. This must be done 24 to 48 hours before the bacterial addition, continuously if possible, in order to optimize their survival rate.

3- USE A RELIABLE BACTERIA PREPARATION

Bacterial strains have different levels of resistance to difficult wine conditions depending on their individual genetic profiles. **LACTOENOS 350 PREAC**® is one of the strongest strains available, especially for its resistance to medium-chain fatty acids.

4- ACTIVATE THE BACTERIA

When the wine has a notably low nutrient content, **MALOSTART**® addition is recommended after the bacterial inoculation to provide essential nutrients for increased malolactic activity.



PROTOCOL FOR MLF RESTART

All beforementioned situations are linked: when residual yeasts are active after primary fermentation (*Saccharomyces* or *Brettanomyces*), they tend to consume any remaining nutrients and produce compounds toxic to bacteria. An efficient restart MLF protocol will therefore combine the following strategies:

STEP 1:

Rack/centrifuge anaerobically.

Note: if *Brettanomyces* population is higher than 10^3 cell/mL, filter the wine ($1\ \mu\text{m}$).



STEP 2:

Add BIOCELL® (200 to 400 ppm).

Mix wine anaerobically every 12 hours for 48 hours, or continuously if possible.



STEP 3 (48 hours after BIOCELL® addition):

Inoculate with LACTOENOS 350 PREAC® and homogenize anaerobically. Rehydrate Lactoenos 350 PreAc® in a mix of non-chlorinated water, wine and the ENERGIZER® supplied with the bacteria.



STEP 4 (6 hrs after bacteria addition):

Add MALOSTART® (200 to 400 ppm). Homogenize anaerobically.



Important: maintain a stable temperature, between 18°C and 25°C / 66°F-77°F, during all stages and until the end of MLF.

MLF MANAGEMENT IN WINES WITH A LOW L-MALIC ACID CONCENTRATION (< 1 g/L)

MLF can be complicated in wines with a low L-malic acid content because the bacteria do not have enough substrate, hence they struggle to grow.

L-MALIC ACID CONCENTRATION < 1 g/L

In wines with such a low concentration of malic acid, the malolactic bacteria uses natural “reservoirs” of malolactic enzymes. Each bacterial cell contains a quantity of malolactic enzymes in its cytosol. Even if the cell fails to develop, these enzymes have a residual activity in the wine, and can be put at work.

In a conventional inoculation (1 g/hL of malolactic bacteria in a wine with a concentration of malic acid between 2 and 4 g/L) this enzyme activity is not sufficient to fully complete the MLF. The bacteria must first grow to produce a sufficient quantity of enzymes.

On the contrary, when the concentration of L-malic acid is less than 1 g/L, the enzymatic activity of a malolactic starter is sufficient and proportional to the amount of bacteria used.

It is estimated that 1 g/hL of malolactic bacteria degrades about 0.3 g/L of L-malic acid. By using **MALOSTART®**, which provides essential cofactors for malolactic enzymatic activity (primarily Mg^{2+} and Mn^{2+}) we optimize this rate of conversion.

2 g/hL of a malolactic starter + 20 g/hL of **MALOSTART®** are usually sufficient to degrade L-malic when the initial concentration is below 1 g/L, regardless of proliferation of the bacteria.

This practice is therefore the best solution to ensure completion of MLF in wines with less than 1 g/L L-malic acid.



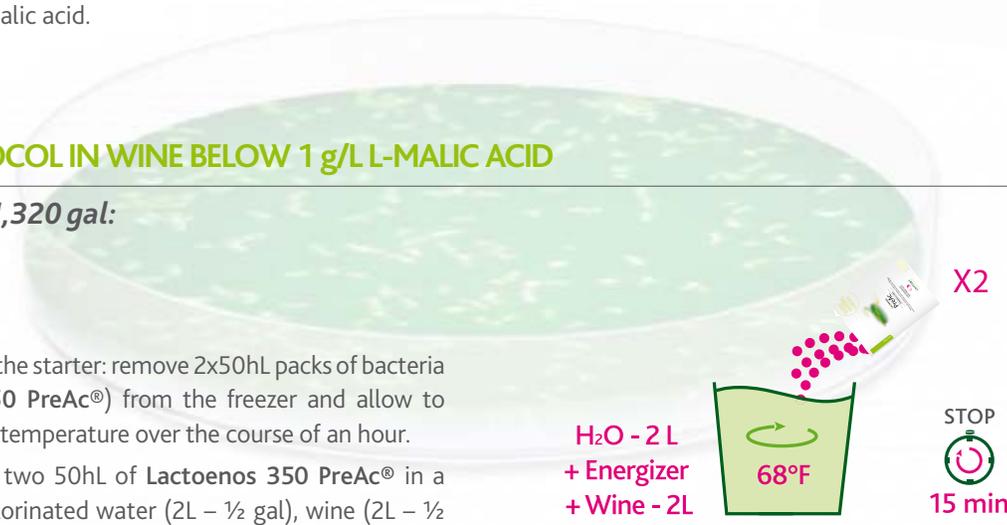
MLF PROTOCOL IN WINE BELOW 1 g/L L-MALIC ACID

For 50 hL / 1,320 gal:

STEP 1:

Preparation of the starter: remove 2x50hL packs of bacteria (**Lactobacillus 350 PreAc®**) from the freezer and allow to warm to room temperature over the course of an hour.

Rehydrate the two 50hL of **Lactobacillus 350 PreAc®** in a mix of non-chlorinated water (2L – ½ gal), wine (2L – ½ gal) and the **ENERGIZER®** supplied with the bacteria. Wait 15 minutes.



STEP 2:

Add the bacteria to the tank and homogenize.

STEP 3:

After 6 hrs add MALOSTART® (20 g/hL - 200 ppm) and homogenize.

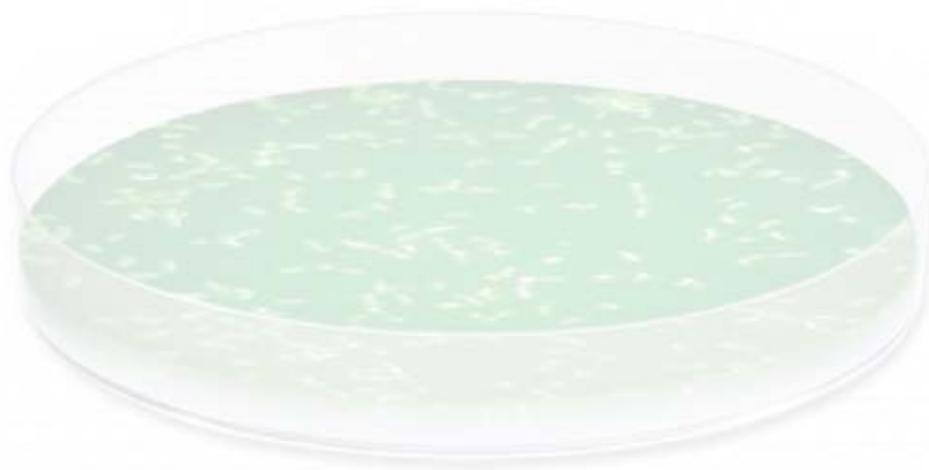
STEP 4:

Maintain the temperature at a constant level between 68°F and 77°F.

NB : *This protocol should be applied in the case of a wine whose initial content of malic acid is low (<1g/L). If MLF stopped, apply the "MLF restart Protocol".*



Add and
homogenize





ENZYMES

Frequently Asked Questions on Oenological Enzymes:

Why granulated and purified enzymes?

Granulated enzymes have a longer shelf life and ensure the stability of the activity over time. Powder enzymes are concentrated and therefore are also more cost effective in terms of shipping!

LAFFORT offers a whole range of granulated and purified (except Lafazym Arom, Optizym and Filtrozym) enzymes. The purification process of Laffort enzymes ensures that the main negative side activities of enzymes are removed: cinnamyl-esterase and β -glucosidase activities. These undesirable activities are responsible for vinyl and ethyl phenol production (medicinal, paint, leather, stable aromas) and for unstable color.

How to rehydrate granulated enzymes?

- 1- Dissolve the enzyme in 10 times its weight in water, must or wine. The product dissolves immediately at room temperature.
- 2- Incorporate using a dosing pump or a drip for improved homogenization. Otherwise, carry out a light homogenization.
- 3- Do not keep a rehydrated granular enzyme solution more than a few hours at room temperature, up to 6 to 8 hours when kept chilled.

I would rather not have to rehydrate my enzymes, to save time!

All winemaking enzymes (powder or liquid) are supposed to be properly rehydrated or diluted. For liquid enzymes, if you are not diluting as per instructions, you may not get the coverage and effectiveness you are expecting!

Key points in enzymes addition in winemaking

Enzymes can be used in white, rosé and red winemaking on juice or in wine. Enzymes are mainly used for maceration, pressing, clarification or aroma release/lees ageing. You will find in the following pages preparations for each of these applications.

- **Bentonite:** enzymes are irreversibly inactivated by bentonite. Any bentonite treatment must always be carried out after the completion of enzyme activity or add the enzyme after the bentonite is eliminated.
- **SO₂:** enzymes are not sensitive to normal SO₂ doses (<300 mg/L) but it is recommended not to put the enzymes and sulphur solutions in direct contact.
- **Temperature and pH:** the preparations are generally active at temperatures from 5°C/40°F to 60°C/140°F and at a wine pH of 2.9 to >4.0.
- **Temperature, time and enzyme:** dosage will balance the enzyme effect in the wine. If you want to use your enzyme at a lower temperature for instance, you may want to increase either the treatment time or the dosage to reach the same effect!



ENZYMES



Lafase – Maceration

Pack Size

LAFASE® HE GRAND CRU

Premium Reds

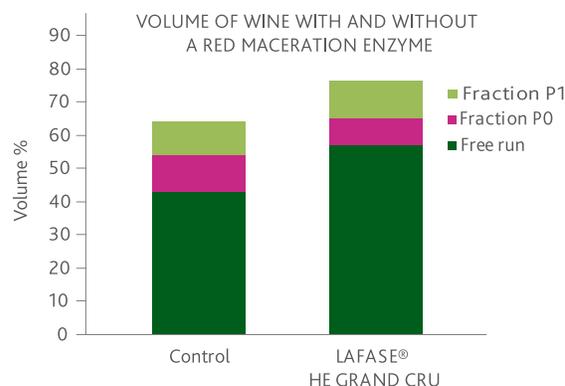
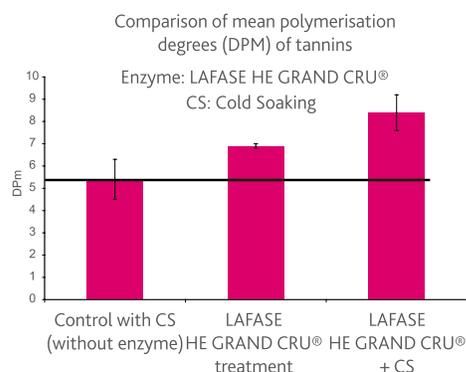
A purified granular pectolytic enzyme for maceration

- Specific for **traditional macerations** (with or without pre-fermentation maceration) for producing structured wines designed for ageing, rich in coloring matter and elegant tannins.
- Encourages gentle extraction of more stable phenolic compounds (more polymerized anthocyanins and tannins) and increases ageing potential.
- Specifically extracts lower size polysaccharides (Rhamnogalacturonan, RGII) and less of larger size polysaccharides (PRAG). This reduction in the molecular size facilitates the free-run juice extraction and the wine clarification. RGII also participates in the wine stabilization and improves the perception of mouthfeel and of lower astringency.

Dosage: 30 to 50 ppm - 30 to 50 g/ton.



100 g
500 g



Effects of use of LAFASE HE GRAND CRU vs control on grape polysaccharides, results after 20 months (average over 3 vintages):

- **Diminution of PRAG by as much as 50% (depending on grape maturity at harvest).**
Increase in RGII by up to 70% (consistent over vintages, less dependent of maturity).
Grape polysaccharides are a vast family, with different molecular weight. In decreasing order: Mannoproteins, PRAG (Polysaccharides rich in ARA and GAL), RGII (Rhamnogalacturonan II), then more simple polysaccharides.
- **Benefits of enzymatic hydrolysis and molecular size reduction:**
 - Viscosity reduction (easier free-run juice liberation)
 - Clarification and ageing (easier lees clarification during ageing, quicker fining, improved filtration)
- **Benefits of RGII liberation in the wine:**
 - Mouthfeel improvement (decrease of astringency, -Ozawa et al., 1987, Carvalho et al., 2006 and roundness, sweetness, Vidal et al., 2003 ; Carvalho et al., 2006).
 - Wine stabilization (RGII help in the tartaric acid precipitation, Gerbaux et al. 1996).

Source: INRA PhD thesis on Polysaccharides



ENZYMES



ENZYME

Pack Size Lafazym – Extraction, Pressing and Aroma expression

250 g

LAFAZYM® EXTRACT

White, Rosé

A purified granular pectinase blend for skin contact

- Specific for skin contact extraction in white wines at low temperatures for facilitating aromatic precursors and varietal aroma extraction.
 - Helps reducing maceration times.
- Dosage: 20 to 30 ppm - 20 to 30 g/ton.



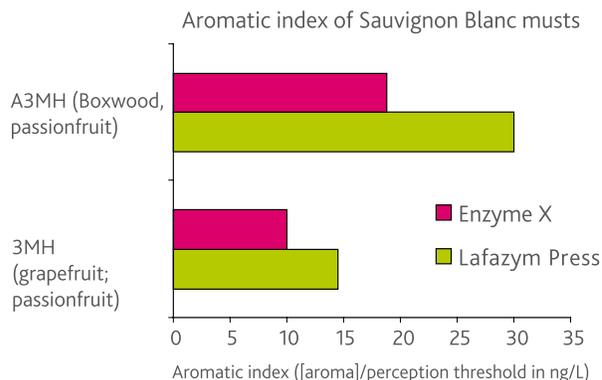
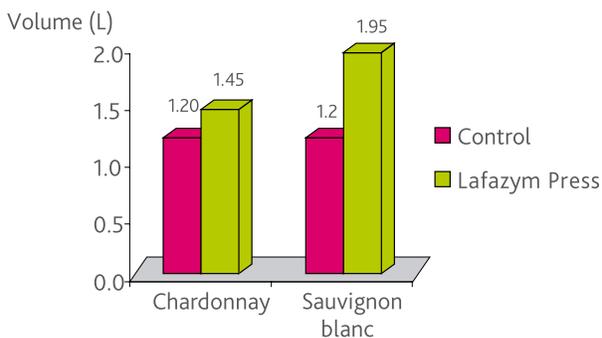
100 g
500 g

LAFAZYM® PRESS

White, Rosé

A purified granular pectinase blend for improving pressing operations

- Optimizes pressing by increasing free-run juice yields (white and rosé) and by decreasing the length of time and the number of pressing cycles.
 - Increases aromas and aroma precursors extraction. Add on the grapes during press filling.
 - Limits the extraction of polyphenolic compounds (bitterness, oxidation reaction...).
- Dosage: 20 to 50 ppm - 20 to 50 g/ton.



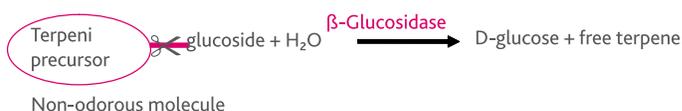
100 g

LAFAZYM® AROM

White

A granular pectinase and β-glucosidase blend for releasing terpene type aroma

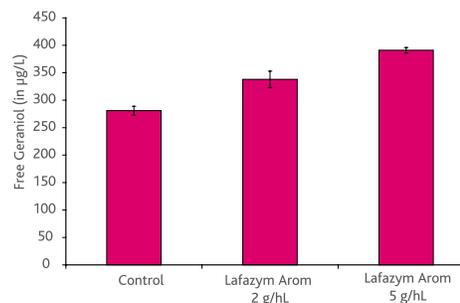
- Pectinase preparation with high β-glucosidase activity, revealing terpene-type aromas for producing aromatic white wines (Muscat, Riesling, Gewürtztraminer, Chenin, etc.).
 - Enzymatic activity inhibited by sugar; **use at the end of alcoholic fermentation.**
- Dosage: 30 to 50 ppm - 0.24 to 0.40 lbs/1,000 gal.



Principal monoterpenes (free terpenes) and their associated descriptors.

- Geraniol: rose
- Linalol: rose
- Nérol: rose
- Citronellol: citronella
- Ho-trienol: linden
- Alpha- terpinéol: Lily of the valley

Enzymatic hydrolysis mechanism of terpenic glucosides



Example of a treated Muscat in comparison with a non-enzymed control (triplicate). Observation: an increase in Geraniol (rose) which has a perception threshold of 130 µg/L in the wines.



ENZYMES



ENZYME

Maceration

LAFASE® FRUIT

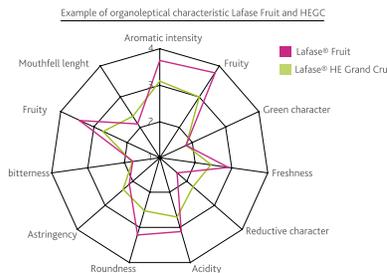
A purified granular pectinase blend for producing fruity wines

- For producing **fruity, colorful and rounded** wines, which are intended for early consumption.
 - Specific for short macerations with or without cold pre-fermentation maceration, enabling gentle extraction of color, aromas and phenolic compounds whilst limiting mechanical actions.
- Dosage: 30 to 50 ppm - 30 to 50 g/ton.

Red, Rosé



Pack Size
100 g
500 g



Clarification

LAFASE® THERMO LIQUIDE

A preparation of enzymes in liquid form, extremely concentrated in polygalacturonase activity, and naturally low in cinnamyl esterase

- Quick and efficient clarification of musts and wines.
 - Large range of pH (2.9-4.0) and temperatures (5°C-65°C / 40°F-150°F).
- Dosage: 2 to 3 mL/100 kg.
Caution: Do not mix with bentonite and avoid contact with sulphurous solution.

Red



0,5 L

LAFAZYM® CL

A purified granular pectinase blend for clarification of juice and wine

- Fast juice **settling** and improved lees settling.
- Wine **clarification**.
- Contributes to aromatic delicacy by limiting vinyl-phenol production.

Dosage: 5 to 20 ppm - 0.04 to 0.16 lbs / 1,000 gal.

White, Red and Rose



100 g
500 g

LAFAZYM® CL LIQUIDE

A purified granular pectinase blend for clarification of juice and wine

- Fast juice **settling** and improved lees settling.
- Wine **clarification**.
- Contributes to aromatic delicacy by limiting vinyl-phenol production.

Dosage: 5 to 10 ppm – 0.04 to 0.08 lbs/1,000 gal on white juices and wines
10 to 20 ppm – 0.08 to 0.16 lbs/1,000 gal on rose and red juices and wines

White, Red and Rose



250 mL

New 2012

New 2012



ENZYMES



Pack Size

Ageing

250 g

EXTRALYSE®

White, Red and Rose

A granular pectinase and β -glucanase blend for improving lees ageing and wine clarification

- Pectinase and β -(1-3;1-6) glucanase preparation for maturation on lees and improvement of filtration in wines with a high colloid content (pectins and glucans).
- Accelerates extraction during yeast autolysis and releases larger quantities of molecules derived from the yeast which provide roundness and suppleness in wines.
- Enables the quantity of microorganisms in suspension to be reduced during maturation.
- Improves the action of fining agents.
- Improves filterability.

Dosage: 60 to 100 ppm - 0.48 to 0.8 lbs / 1,000 gal.



TTB status:

β -glucanases (contained in Extralyse) are now approved for on-going use. Please refer to our website for a draft of an on-going use approval request.

TTB maximum dosage is 300 ppm of pure beta-glucanases.

Other - Basic range

2.5 kg

OPTIZYM

A concentrated pectolytic blend developed for extraction and clarification

White, Rosé winemaking:

- Versatile preparation used in extraction and clarification for large volume vinification. Can be used directly on the juice or in the press.

Red winemaking:

- Versatile preparation used in extraction and clarification for large volume vinification.

Dosage: 20 to 50 ppm - 0.24 to 0.40 lbs / 1,000 gal.



1 kg

LYSOZYM

An Endo-glucosidase enzyme presenting a lytic activity on Gram positive bacteria

White wine:

- Delays the action of lactic bacteria reducing total SO₂ requirement (max 30ppm).
- Allows complete inhibition of the malo-lactic fermentation.
- Reinforces SO₂ action on sweet white wines and increases the microbiological stability.

Red wine:

- Prevents early start of the malo-lactic fermentation before the alcoholic fermentation is finished (in case of sluggish or stuck fermentation).
- Prevents the risks of lactic bacteria deviations when operating carbonic macerations or extracting juices with high pH.
- Allows a delay in malo-lactic fermentation in conjunction with micro-oxygenation.
- Allows safe alcoholic fermentation preventing the competition between yeast and bacteria and the risk of early VA production.

Dosage: 150 to 500 ppm - 1.2 to 4.0 lbs / 1,000 gal.



Filtrozym has been discontinued; please consider Extralyse for clarification issues.



TANNINS

The essential element

LAFFORT has focused its research for over 20 years on identifying and selecting the best natural resources, refining extraction methods for raw materials and understanding and measuring the effects of tannins in winemaking. Thanks to its expertise, LAFFORT guarantees consistent quality formulation. All LAFFORT tannins benefit from the unique formulation Instant Dissolving Process (IDP) allowing tannins to be directly incorporated into the wine and insuring perfect solubility. A revolutionary process for the ease of use!

Why do we use exogenous tannins?

Hydrolyzable tannins (mainly ellagic from oak or chestnut, and gallic from chestnut galls) and condensed tannins (proanthocyanidic from grapes or exotic woods) are used in winemaking for different purposes:

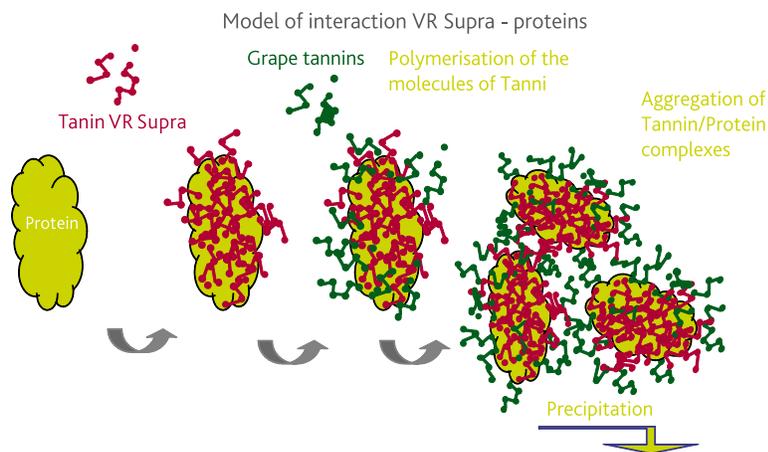
- Protein precipitation (see chart)
- Anti-oxidation
- Laccase inhibition
- Structure enhancement
- Color protection and/or stabilization
- Reductive character minimization

How to use tannins?

The IDP process enables perfect solubility in wine and thus no preliminary dissolution of the tannins in water is required. Homogenous introduction into the bulk of the must or wine is, however, advised. It is recommended to carry out a systematic pump-over or other homogenizing action during the application.

The sacrificial effect of VR Supra

During the first crushing of the fruit, proteins in the must bind with tannins and begin to precipitate. The first tannins available are the skin tannins, which are usually ripe and soft, and the ones that matter most for the future wine structure. Part of VR Supra tannins added on the grapes is readily available to react with the proteins in the must, thus preserving skin tannins from precipitating.



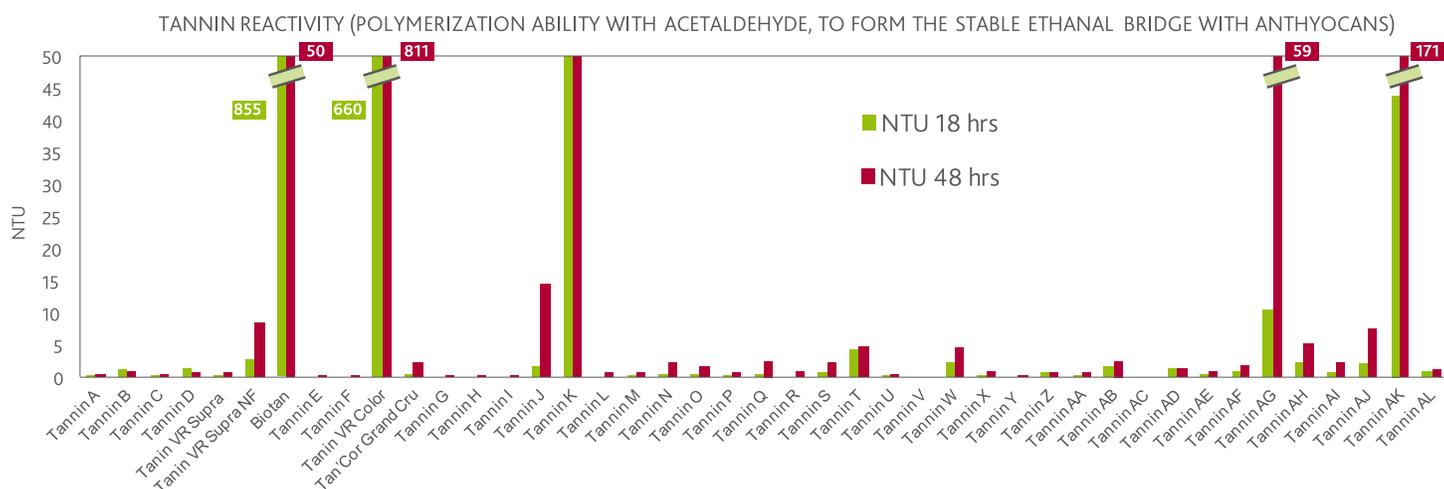


TANNINS

The essential element

Fermentation tannins

Formulation	Varietals	Composition	Purpose	Addition timing	Addition rates
VR SUPRA®	Merlot, Cabernet, Syrah, Zinfandel	Proanthocyanidic and ellagic	Anti-oxidation, precipitation of grape proteins, wine structure,	At crusher	100 - 400 ppm
VR SUPRA® NF	Pinot Noir, Grenache	Proanthocyanidic and ellagic	<i>Botrytis</i>	At crusher	100 - 300 ppm
VR COLOR®	All red varietals	Catechin	Color stabilization, softer mouthfeel	At 1/3 fermentation	200 - 300 ppm
BIOTAN®	All red varietals	Grape tannin	Wine structure	During fermentation	100 - 400 ppm
GALALCOOL®	White	Gallic tannin	Inhibition of <i>Botrytis</i> oxidation enzymes, precipitation of proteins	At crusher	50 - 100 ppm



The tannin reactivity towards color is measured by its ability to polymerize in presence of acetaldehyde. In wine, reactive tannins will form stable bonds with color through acetaldehyde (ethanal).

Some tannins may not be reactive due to their chemical characteristics or to oxidation during the production process: oxidized phenolics lose their reactivity towards ethanal and therefore are less effective for color stabilization.

LAFFORT has recently developed the **Oxyprotect™** process to avoid oxidation of **TANNIN VR COLOR®** during the production and ensure its ability to stabilize color with long term and stable bonds.



TANNINS



TANNIN

Tannins for fermentation

Pack Size

TANIN VR SUPRA®

Instantaneously dissolving (IDP) ellagic and proanthocyanidic tannin preparation

TANIN VR SUPRA® combines the effects of different tannins, which are selected and prepared for optimal technological efficiency, without adding bitterness, to facilitate:

- **Anti-oxidant action** providing protection of the must and the pigmented matter.
- Wine **structure** improvement by supplementation of the midpalate.
- Inhibition of natural oxidation enzymes (laccase, polyphenol oxidase) during harvesting of *Botrytis* affected vintages (more efficiently than SO₂).
- **Sacrificial** effect: preserves the grape tannins from precipitation with the grape proteins, to favor indigenous tannins / anthocyanins reactions.

Dosage: 100 to 400 ppm - 0.8 to 3.2 lbs / 1,000 gal.

Red wine



1 kg
5 kg

Victor Palencia, Director of Winemaking, J&S Crushing LLC & Jones of Washington Winery (Washington)

Aroma, Color, Mouth feel and Finish are what I look for in a great wine. VR SUPRA provides me with a level of performance that is predictable and I can rely on. I found our color depth has increased, early development of the mouth feel is promoted and the overall complexity of the wine enhanced with a great tannin product. I find it equally important to allow the natural beauty of the grape to shine and the neutral nature of VR SUPRA outperforms other suppliers. Breaking the additions throughout the fermentation process has proven greater results.



TANIN VR SUPRA® NF

A similar formulation and use to VR SUPRA® except the ellagic tannins are from oak

- TANIN VR SUPRA® NF is recommended for lighter varieties such as Pinot noir, Gamay, Sangiovese.

Red wine



1 kg
5 kg

TANIN VR COLOR®

Specially formulated to stabilize wine coloring matter. TANIN VR COLOR® has a high content of naturally active catechins (OxyProtect™ production process) that allow the formation of chemically stable covalent bonds with anthocyanins for a superior color stabilization effect

TANIN VR COLOR® is used to improve the active **tannin/anthocyanin** ratio in such cases:

- Grapes harvested at sub-optimal phenolic ripeness.
- Grape varieties with a naturally poor tannin/anthocyanin ratio.
- Varieties that have color management problems (extraction/stabilization).

Dosage: 200 to 300 ppm - 1.6 to 2.4 lbs / 1,000 gal.

Red wine



1 kg
5 kg



TANNINS

POWDERED
TANNINS:
THE GREEN
OPTION!

Pack
Size

Tannins for fermentation

1 kg

TANIN GALALCOOL

White & Rosé wines

Gallic tannins (*fluffy white tannin*) using LAFFORT's instant dissolving process (IDP), to be used for white and rosé juice (Cider, Fruit) / must vinification

TANIN GALALCOOL is a highly pure extract of chestnut gall tannins, with physiochemical properties that are particularly well adapted to white and rosé must vinification, including:

- Inhibition of **natural oxidation** enzymes (laccase, polyphenol oxidase), more efficiently than SO₂.
- Precipitation of some of the **unstable proteins**, as efficiently as bentonite but without aroma loss.

Dosage: 50 to 100 ppm - 0.4 to 0.8 lbs/1,000 gal.

Bottling of sparkling wines: 20 to 40 ppm - 0.16 to 0.32 lbs/1,000 gal.



1 kg

TANIN GALALCOOL SP

White & Rosé wines

A softer version of GALALCOOL to be used preferentially in wine as an ageing tannin



For tips and tools in case of *Botrytis*, please consult our specific protocols

DID YOU
KNOW?

Because Galalcool precipitates with proteins, adding 100 ppm of Galalcool on juice will help you significantly reduce your bentonite requirements later in the process.



TANNINS



TANNIN

Tannins for maturation and ageing

Pack Size

TAN'COR GRAND CRU®

Red wine

Preparation of proanthocyanidic tannins derived from grapes and ellagic tannins from oak, using LAFFORT's instant dissolving process (IDP), to be used during red wine maturation

After the fermentation phase or during maturation, TAN'COR GRAND CRU® is used to:

- Enhance and modify the wine's **structure** and **palate length**.
- Stabilize color by combining the remaining free anthocyanins.
- Regulate oxidation-reduction phenomena.

Dosage: 100 to 300 ppm - 0.8 to 2.4 lbs/1,000 gal.



1 kg

TAN'COR®

Red wine

Proanthocyanidic and ellagic tannins preparation, using LAFFORT's instant dissolving process (IDP), to be used in red wine maturation

TAN'COR® combines the properties of ellagic and proanthocyanidic tannins specially prepared for the treatment of red wines after the fermentation phase or during maturation, and is used to:

- Enhance and modify the structure of the wine and prepare it for maturation.
- Protect of the wine with regards to oxidation phenomena.
- Regulate oxidation-reduction phenomena.

Dosage: 100 to 300 ppm - 0.8 to 2.4 lbs/1,000 gal.



1 kg
5 kg

BIOTAN®

Red wine

Proanthocyanidic tannins extracted from grapes using LAFFORT's instant dissolving process (IDP)

Thanks to the high quality of its extraction, BIOTAN® contains only a negligible quantity of phenolic acids, which are known as *Brettanomyces* substrates.

During the fermentation phase or maturation, BIOTAN® allows:

- Compensation for **natural grape tannins deficiency**.
- Stabilization of color due to the formation of tannin-anthocyanin polymeric pigments.

Dosage: 100 to 400 ppm - 0.8 to 3.2 lbs/1,000 gal.



500 g



TANNINS

POWDERED
TANNINS:
THE GREEN
OPTION!

Pack
Size

Quertanin – tannins for ageing

Stave wood-quality ellagic tannins, extracted from oak heartwood, using LAFFORT's instant dissolving form (IDP). For post-fermentation use in red, rosé and white wines.

Various preparations of oak extract from stave wood quality French oak.

QUERTANIN®

QUERTANIN® is a high quality complex ellagitannin preparation, which:

- Enhances the wines structure and palate length.
- Protects wines with regards to **oxidation**.
- Increases the wines's **aromatic** intensity.
- Eliminates reductive odors.



QUERTANIN® SWEET

- Emphasizes the **aromatic** profile with developing the perception of **sweetness**.

QUERTANIN® INTENSE

- Amplifies mouthfeel together with **toasting** characteristics.

Dosage: 5 to 100 ppm - 0.16 to 1.2 lbs / 1,000 gal.



QUERPLUS (formely TANIN PLUS)

Oak extract from stave wood quality American oak.

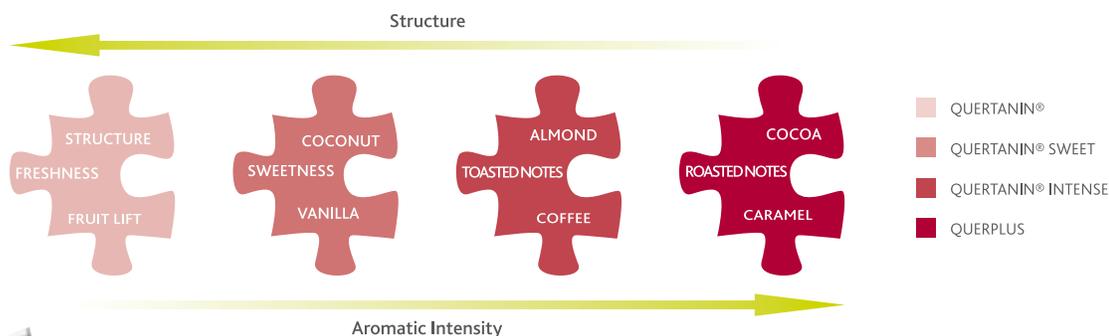
The specific manufacturing process of QUERPLUS allows a unique component profile, which:

- Enhances structure and mouthfeel.
- Increases the wine's aromatic intensity and complexity, enhancing the perception of sweetness.
- Protects wine with regards to oxidation.

Dosage: 100 to 400 ppm - 0.8 to 3.2 lbs / 1,000 gal.



The
balance
between structural
and aromatic influences
varies across the
Quertanin range based
on the production
methods used



IMPACT OF FINING TREATMENTS ON JUICE QUALITY

Paul K. Bowyer¹, Marie-Laure Murat², Virginie Moine-Ledoux³

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INTRODUCTION

In terms of juice handling, international winemaking practices vary significantly from country to country. In Australia, as in many other countries, it is typical to treat the free-run and pressings fractions of juice separately, whilst in India winemakers do not always take a pressings fraction. Since pressings fractions typically have elevated levels of phenolic compounds, a different management strategy is required to achieve similar juice quality to that of free-run fractions. This is the reason, for example, why fruit used in Champagne production is whole-bunch pressed: to minimize phenolic extraction, which would detract from the desired textural structure of the final product.

Studies on the impacts of various fining treatments on juice have been conducted by many of the larger wine companies, but usually only for internal benefit and to streamline their own specific processing regimes. Typically, phenolic extraction is the key focus of such studies, but recently another chemical of grape origin has become quite topical: glutathione (Lavigne et al. 2002). Glutathione is a grape-derived natural antioxidant, which is superior in action to both ascorbic acid and sulphur dioxide. This will be the subject of a future article, and will not be discussed in detail here, yet its function as an antioxidant in white wines and juice is clear: aroma preservation.

In order to gain some understanding of the impact of different typical fining treatments on juice quality, a series of trials were conducted in South Africa and France in 2008 and 2009 on Sauvignon blanc and other grape varieties containing volatile thiols. The results of these investigations were presented at the 2009 SASEV meeting in July, and are reproduced here.

JUICE QUALITY MARKERS

As mentioned, one of the key groups of compounds that is typically analysed when assessing juice quality is that of phenolic acids. The assay for these compounds can be as simple as measuring absorbance at 280 nm, which is where phenolic compounds absorb UV radiation. The data gained from this measurement are somewhat imprecise, however, so in this study HPLC with UV detection methodology was used. The phenolic acids measured are illustrated in figure 1. These phenolic compounds are of interest to winemakers for three main reasons: they can contribute to a sensation of tactile coarseness in wine; they can be metabolised by some organisms to generate volatile phenols, which detract from wine aromatic quality (Smit et al., 2003); and they can be oxidised to produce pinking.

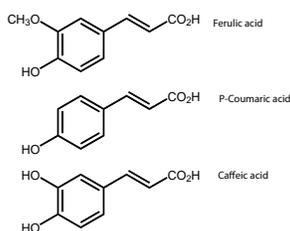


Fig. 1. The structures of the phenolic acids quantified in this study.

Glutathione (GSH) is a relatively newly discovered juice quality marker, and was measured by HPLC with fluorescence detection. It is a tripeptide with a sulphur functionality, and for this reason it, along with other sulphur-containing compounds like cysteine and N-acetyl cysteine (figure 2), is able to act as an antioxidant. Since the thiol group can be oxidised, the molecule is capable of absorbing oxygen, which is an informal definition of an antioxidant.

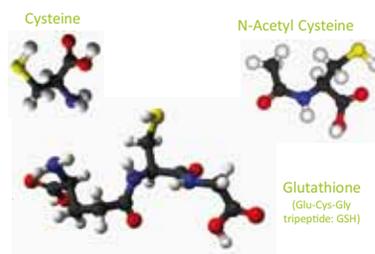


Fig. 2. Structures of redox-active molecules found in juice: cysteine, N-acetyl cysteine and the tripeptide glutathione.

As an adjunct to this study, isobutylmethoxypyrazine (IBMP) levels were measured by SBSE/GCMS. IBMP is found in some grape cultivars (notably the Sauvignons) and is negatively correlated both with the level of ripeness of the fruit with exposure of the fruit to sunlight during ripening. It is responsible for the dusty, capsicum characters sometimes found in wine made from these grapes. IBMP is thus a de facto measure of juice quality, and was included in this study.

The formation of the secondary structure is driven in large part by the hydrophobicity, or "water-fearing" sections of the protein chain. The hydrophobic sections tend to align or overlap in space to minimize contact with water molecules, thus generating shapes such as pleated sheets and helices (figure 1b).

Since proteins are comprised of amino acids, and amino acids are responsive to pH changes (being acids), proteins too can alter their physical shape and chemistry as the pH of the medium changes. This is reflected in their solubility,

which changes according to pH as indicated in figure 2. The pH at which there is zero net charge on the protein is called the protein's isoelectric point (pI) (Bowyer and Moine-Ledoux, 2007), and at this pH the protein is least soluble. Thus, the protein pI indicates its solubility in wine. As the medium pH moves away from the pI, solubility increases in concert with the increasing charge on the molecule, which aids aqueous dissolution.

CASE STUDIES

Case study 1: Durbanville, South Africa – reductive handling of all fractions

Sauvignon blanc grapes were handled thusly: hand harvest; fruit sprayed with 5 % SO₂ solution; pectolytic enzyme addition; fruit chilling to 10 °C; destemmed and crushed; free-run 1 h skin contact under N₂ then cold-settled under N₂ for 24 h; pressings fraction 12 h skin contact under N₂ then pressed and settled



LAFFORT

l'œnologie par nature

for 24 h under N₂. The following treatments were applied to the pressings fraction: bentonite 40 g/hL (MICROCOL® CL, LAFFORT); gelatine 40 mL/hL (GECOLL® SUPRA, LAFFORT); PVPP/casein blend 40 g/hL (POLYLACT®, LAFFORT). Juice chemical parameters are given in table 1.

	FREE-RUN	PRESSINGS FRACTION
Potential alcohol (% Vol.)	12.60	12.60
pH	3,19	3,47
Total Acidity (g/L tartaric acid)	8,12	6,43
Malic Acid (g/L)	3,24	3,06
Tartaric Acid (g/L)	4,83	4,26
YAN (mg/L)	320	360
SO ₂ L (mg/L)	35	34
SO ₂ T (mg/L)	63	71

Table 1: Juice parameters for Case Study 1.

Results

The glutathione content of both free-run and pressings fractions were equivalent, and were undiminished after treatment with the indicated fining agents (figure 3a). The phenolic acid content of the pressings fraction was close to double that of the free-run fraction, and the gelatine showed the greatest reduction in phenolic acid content after fining (figure 3b). IBMP was equally apportioned between the two juice fractions, and was unaffected by fining (figure 3c).

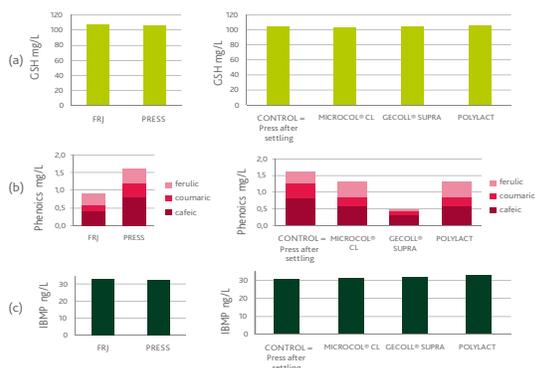


Fig. 3. Case study 1 data: (a) Juice glutathione (GSH) content of free-run (FRJ) and pressings fractions (PRESS; left) and residual juice glutathione content of pressings fraction after treatment with indicated fining agents (right); (b) Juice phenolic acid content of free-run (FRJ) and pressings fractions (PRESS; left) and residual juice phenolic acid content of pressings fraction after treatment with indicated fining agents (right); (c) IBMP content of free-run (FRJ) and pressings fractions (PRESS; left) and residual juice IBMP content of pressings fraction after treatment with indicated fining agents (right).

Discussion

As the juice for this trial was handled reductively, it was not surprising that preservation of glutathione was good. The glutathione content of this juice was found to be very high and is probably linked to the high juice YAN level, which bodes well for aroma preservation in the finished wine. The higher phenolic acid content of the pressings fraction was not unexpected, as more phenolic compounds are liberated from the skins and seeds under increased pressure. The strong impact of the gelatine in the fining of the press fraction was also expected, given that the main function of gelatine fining is to remove phenolics. The bentonite treatment was not expected to remove a large amount of phenolic acids. The PVPP/casein blend removed about the same amount of phenolic acid as the bentonite, which was somewhat unexpected. IBMP remained unaffected by any fining treatment, which suggests that unripe fruit characters in Sauvignon blanc cannot be simply removed from the juice by fining activity, hence viticultural control measures should be investigated.

Case study 2: Stellenbosch, South Africa – reductive handling of all fractions

Sauvignon blanc grapes were handled thusly: hand harvest; SO₂ 30 ppm; destemmed and crushed; fruit chilling to 8 °C; ascorbic acid added 5 g/100 kg; pectolytic enzyme addition (LAFAZYM® EXTRACT, LAFFORT); free-run 4 h skin contact under N₂ (in press) then cold-settled under N₂ for 24 – 48 h; pressings fraction 4 h skin contact under N₂ then pressed and settled for 24 h under N₂ with an addition of 40 ppm SO₂. The following treatments

were applied to the pressings fraction: bentonite 40 g/hL (MICROCOL® CL, LAFFORT); gelatine 40 mL/hL (GECOLL® SUPRA, LAFFORT); PVPP/casein blend 40 g/hL (POLYLACT®, LAFFORT). Juice chemical parameters are given in table 2.

	FREE-RUN	PRESSINGS FRACTION
Potential alcohol (% Vol.)	14.30	14.30
pH	3.35	3,58
Total Acidity (g/L tartaric acid)	6.75	5.86
Malic Acid (g/L)	2.67	2.61
Tartaric Acid (g/L)	5.56	4.98
YAN (mg/L)	320	360
SO ₂ L (mg/L)	11	18
SO ₂ T (mg/L)	32	52

Table 2: Juice parameters for Case Study 2.

Results

Glutathione content of both free-run and pressings fractions was approximately equivalent, of about half the level of the Case Study 1 juice, and was undiminished after treatment with the indicated fining agents (figure 4a). The phenolic acid content of the pressings fraction was about 25 % more than that of the free-run fraction, and all fining treatments showed approximately equal reductions, with the PVPP/casein product performing the best (figure 4b). IBMP was equally apportioned between the two juice fractions, and no significant loss or differences were observed after the fining treatments (figure 4c).

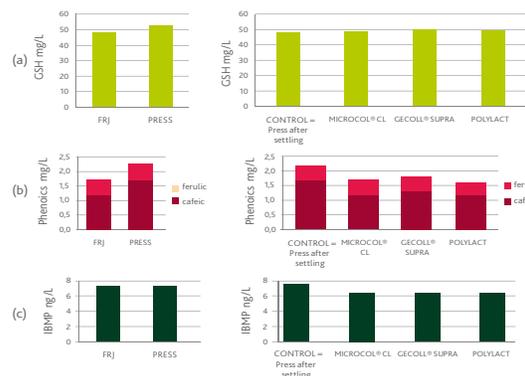


Fig. 4. Case study 2 data: (a) Juice glutathione (GSH) content of free-run (FRJ) and pressings fractions (PRESS; left) and residual juice glutathione content of pressings fraction after treatment with indicated fining agents (right); (b) Juice phenolic acid content of free-run (FRJ) and pressings fractions (PRESS; left) and residual juice phenolic acid content of pressings fraction after treatment with indicated fining agents (right); (c) IBMP content of free-run (FRJ) and pressings fractions (PRESS; left) and residual juice IBMP content of pressings fraction after treatment with indicated fining agents (right).

Discussion

The glutathione concentrations in both juice fractions was less than for the previous trial, yet were still quite high at around 50 ppm, again presumably linked with the high juice YAN value. As with the first trial, glutathione levels were unaffected by fining, which suggests that juice fining does not impair the natural antioxidant capacity of the juice. The phenolic acid content of the press fraction was only slightly higher than that of the free-run, perhaps a result of the fairly light pressing (only 60 L pressings juice was obtained per tonne). Curiously, no coumaric acid was detected in this juice sample. All fining treatments showed similar effectiveness with respect to the removal of phenolics, with marginally better performance observed with the PVPP/casein treatment. No significant decrease in IBMP was observed, again suggesting that pyrazine characters cannot be effectively managed through a fining treatment.

Case study 3: Stellenbosch, South Africa – oxidative handling of press fraction

This trial was conducted at the same winery as Case Study 2, but using the approach of oxidative handling of the pressings fraction whilst in the press. The theory associated with this practise is that exposing the juice of the pressings fraction to oxygen results in oxidation of the more oxidisable components of the juice (phenolics), so that once cleaned up, a juice that is somewhat "stabilised" with respect to oxidation is obtained. In effect, preliminary

oxidation is used as a method of oxidation control, similar to the way in which malolactic fermentation is used to microbiologically stabilise red wines.

Sauvignon blanc grapes were handled thusly: hand harvest; SO₂ 30 ppm; destemmed and crushed; fruit chilling to 8 °C; free-run handled reductively with N₂ cover, then cold-settled under N₂ for 24 – 48 h; pressings fraction 4 h skin contact, then pressed with no N₂ protection and cold settled under N₂ for 24 h. The following treatments were applied to the pressings fraction: bentonite 40 g/hL (MICROCOL® CL, LAFFORT); gelatine 40 mL/hL (GECOLL® SUPRA, LAFFORT); PVPP/casein blend 40 g/hL (POLYLACT®, LAFFORT).

Discussion

Oxidative handling of the press juice had a significant impact on the glutathione content (figure 5a). The press fraction, which was exposed to oxygen in an attempt to oxidise the phenolic acids, suffered a large decrease in the glutathione content. This would have a strong impact on the inherent capacity of the wine made from this juice to age well, given that the natural antioxidant capacity of the wine would be severely reduced.



Fig. 5: Case study 3 data: (a) Juice glutathione (GSH) content of free-run (FRJ) and pressings (PRESS) fractions with oxidative handling in-press. Note the significant loss of GSH with oxidative handling; (b) Juice phenolic acid content of free-run (FRJ) and pressings (PRESS) fractions with oxidative handling.

The phenolic acid content of the press fraction was not decreased to the level of the free-run fraction (figure 5b). The biggest impact appeared to be on caffeic acid, which showed the greatest decline. Given that the phenolic acid content was not reduced to the same level as that of the free-run juice fraction, yet at the great expense of the glutathione content, the practice of handling juice oxidatively as a means of controlling phenolic acid content in juice appears somewhat dubious in terms of resultant potential wine quality.

Case study 4: Bordeaux, France – comparison between reductive and oxidative handling

As a means of illustrating the relative impacts of these different approaches on the level of phenolic acids in juice, a comparative trial was made using Sauvignon blanc in Bordeaux between the reductive handling of the free-run juice, reductive handling of the press fraction, oxidative handling of the press fraction and reductive handling of the press fraction and fining with POLYMUST AF® (LAFFORT), a combination of bentonite, PVPP and isinglass (figure 6).

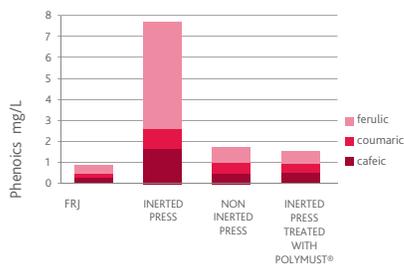


Fig. 6: A comparison of the phenolic acid content of free-run juice (FRJ), pressings juice from an inert press (INERTED PRESS), pressings juice from an oxidatively-handled press (NON INERTED PRESS), and pressings juice from an inert press treated with Polymust (INERTED PRESS TREATED WITH POLYMUST, LAFFORT). Note that the same residual level of phenolic acids can be achieved with both oxidative handling of the juice and treatment with Polymust, except that the oxidative handling destroys much of the glutathione content of the juice (see figure 5) and thus greatly reduces inherent wine antioxidant capacity.

The reductively-handled free-run and pressings juice fractions contained the lowest and highest levels of phenolic acids respectively, as anticipated. Oxidative handling of the same pressings fraction showed good reduction in the level of juice phenolic acids, and treatment of the juice with an appropriate fining agent yielded a slightly lower concentration of juice phenolics again.

Although oxidative handling of the pressings juice fraction lowered the phenolic acid content, this is achieved at a very high price in terms of juice (and therefore wine) quality: the significant loss of glutathione (figure 5a). This in turn has strong ramifications for the ageability of the wine made from oxidatively-handled juice, and is perhaps a factor in the phenomenon of “UTA”, or “untypical ageing off-flavour” (Lavigne et al. 2002; Hoenicke et al., 2003) that has become a problem in parts of the global wine industry in recent years (Kalchschmidt, 2007).

Case study 5: Bordeaux, France – comparison between fining agents with reductive handling

Given that the importance of glutathione retention in juice is now understood and linked with wine quality and ageability, a similar comparison was made between blended proprietary products and gelatine/silica sol applications. This comparison is pertinent given that gelatine is most commonly used for removing phenolics yet it is not an innocuous fining agent (Bowyer, 2008). The trial was conducted using Gros Manseng with reductive handling of all treatments. 600 L/tonne of free-run juice were taken and the pressings fraction (60-70 L/tonne) had 4 h skin contact under N₂. Applied treatments were: PVPP/casein (POLYLACT®, LAFFORT) 40 g/hL; PVPP/bentonite/isinglass (POLYMUST AF®, LAFFORT) 40 g/hL; gelatine/silica sol (Gelarom/Siligel, LAFFORT) each 20 mL/hL; and gelatine/silica sol (GECOLL® SUPRA/Siligel, LAFFORT) each 20 mL/hL. The data are presented in figure 7.

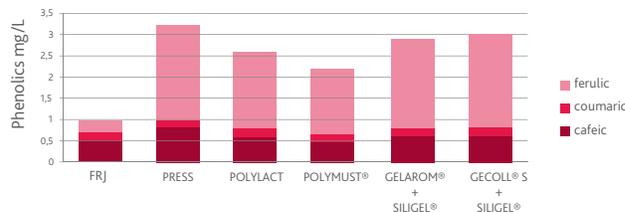


Fig. 7: A comparative analysis of the reduction in phenolic acid content of free-run and pressings juice fractions with various treatments. FRJ = free-run juice; PRESS = pressings juice; POLYLACT = casein/PVPP blend (LAFFORT), POLYMUST = bentonite/PVPP/isinglass blend (LAFFORT); GELAROM = gelatine (LAFFORT); SILIGEL = silica sol solution (LAFFORT); GECOLL S = gelatine (LAFFORT).

In this trial the greatest reduction in phenolic acid content was after treatment with Polymust AF, followed by Poly lact and then the two co-fined gelatine treatments. Comparing these results with those obtained from the preceding trials suggests that different juices respond differently to different fining agents, so it is a matter of trial and error to find the most appropriate treatment for a given juice. In time this could presumably be built up into an historical fining programme for a given parcel of fruit to ensure the best and most consistent results.

Summary

While there are no “right” or “wrong” approaches to juice handling, there are clearly different processing methods available to the winemaker, with correspondingly different outcomes in terms of juice and, ultimately, wine quality. Given the large impact that glutathione has on juice and wine quality, it is pertinent to remember that oxidative handling, while capable of reducing juice phenolic load, is also highly destructive towards this precious antioxidant. In the event that oxidative handling methods are employed, or to maximise juice antioxidant capacity overall, it would appear prudent that glutathione be supplemented. Glutathione management for increased wine quality will be the subject of a future article.

FINING AND CO-FINING AGENTS PREPARATION AND TREATMENT TIME

For more technical information on fining, please read the Technical Booklet *Fining Wines* in the section on our website.

	Form	Bench trial contact time before tasting	Preparation /Addition * (check labels and technical data sheet for more information)	Over fining risk	Use with Silica gel	Treatment contact time** before racking or filtration	Notes
Gelatin	Liquid or solid	2-3 days	Liquid: gradually add during a pump-over, then homogenize carefully Solid: dissolve carefully in hot water (40°C/104°F) at 50g/L and keep in hot water bath during incorporation	✓	✓	7 days – 3 weeks	
Egg Albumin	Liquid	2-3 days	Shake before opening. Mix gently before adding to the wine. Homogenize. Use the open bag immediately.	✓		7 days – 3 weeks	40 ppm of Egg Albumin powder corresponds to 1 fresh egg white.. Refer to local legislation for specific labeling (allergen)
Isinglass	Powder	2-3 days	Dissolve at 10g/L. Let swell for 2 hours, and stir to optimize dispersion. If gelling appears too fast, add more water. Add to the wine and homogenize.		✓	2 -4 weeks	
Casein	Powder	Overnight	In 10 times its weight in water, until dissolution. Add to the wine with a pump-over.	✓		10 days – 3 weeks	
PVPP	Powder	Overnight	In 4 times its weight in water, 1 hour prior use.	✓		10 days – 3 weeks	
Bentonite	Powder	2-3 days	Dissolve in 10 times its weight in water, and keep stirring for 2 hours (Hot water 50°C/ 122°F is recommended). Let it hydrate for 12-24 hours. Mix to obtain an homogenous preparation before incorporation. Homogenize after addition.	✓		5 days – 2 weeks	Can be used on young red wine to eliminate unstable colouring matter.
Biolees®	Powder	1-2 days	Dissolve in 5-10 times its weight in water. Homogenize after addition.			4 – 6 weeks	
Gum Arabic	Liquid	Overnight	Use on clarified and filtered wine. Add to the wine and homogenize carefully.			No racking	
Carbon	Powder	2-3 days	Incorporate directly into the wine			1 day	Creates a lot of dust
Silica gel	Liquid	-	Incorporate directly or dilute with water or wine. Mix thoroughly.			-	Add prior to the fining agent
Tannins	Powder	Overnight	Dissolve in 10 times its weight in water. Homogenize after addition.			No racking	The LAFFORT Instant Dissolution Process (IDP) helps the dissolution in water or in wine.

* Preparation: avoid high temperature during the preparation and application, especially with gelatins. The efficiency of the treatment highly depends on the quality of the preparation.

** Contact time: the settling time will depend on the temperature of the wine, the volume and the shape of the tank, the use of Silica gel, etc. As a general rule, the longer you allow to settle, the better compacted your lees will be.



FINING AND SPECIAL TREATMENTS

Smoothness – Fining of bitterness and astringency – Balance

Pack Size

PATENT n° 04 52803

BIOLEES® contains high concentration of a specific **sapid peptide fraction**, naturally released by yeast during lees ageing, with an exclusively low perception threshold (16 mg/L compared to 3 g/L sugar).

BIOLEES®

Specific nutrient preparation of yeast cell walls with a high sapid peptide content for fining high quality red wines (Patent n° 0452803)

BIOLEES® is the result of the understanding of natural phenomena associated with maturing wine on lees. Its new formulation enhances its **fining capacities**, making it a high-quality natural alternative to egg albumin. Its unique composition consists of:

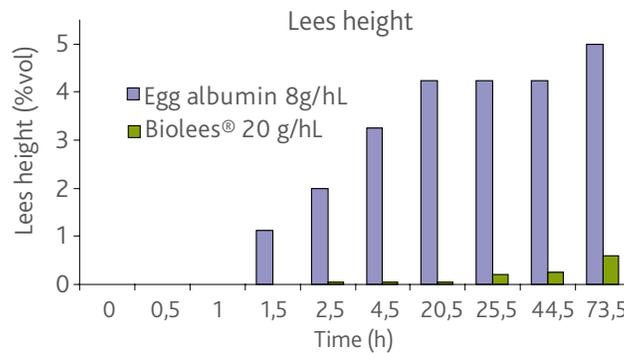
- Yeast cell walls which have been specifically tested and selected for their fining capacities, consequently promoting the elimination of certain polyphenols responsible for bitterness and astringency.
- Confirmed enrichment of a sapid peptide fraction that contributes to increasing **smoothness** and **roundness** sensations.
- Yeast cell walls which provide nutrition to the yeasts.

OMRI Listed for use in organic winemaking

Dosage: 300 to 700 ppm - 2.4 to 5.6 lbs/1,000 gal. Add near the end of the fermentation.



1 kg



TTB status:

All yeast-derived products are authorized during fermentation. For use during ageing, please refer to our website for updated information and a draft of appropriate approval requests.

TTB maximum dosage is 375 ppm – 3 lbs/1,000 gal of yeast hulls. No limitation for autolyzed yeasts.



FINING AND SPECIAL TREATMENTS

Pack Size

Stabilization and Balance

1 kg

New 2012

AUTOLEES®

A preparation of *Saccharomyces cerevisiae* (yeast) cell wall/membrane and Acacia (Gum Arabic)

- **AUTOLEES®** is a blended product containing a specially purified select premium Acacia gum Arabic component coupled with a Yeast cell wall/membrane preparation which includes mannoproteins.
 - **AUTOLEES®** contributes to wine stabilization and balance through its different components and colloidal properties.
- Dosage: 100 to 300 ppm



TTB status: **AUTOLEES®** contains yeast cell wall/membrane preparation including mannoproteins which are currently FDA GRAS approved but require a notification letter (supplied by Laffort USA) to be submitted to the TTB in accordance with 27 C.F.R. § 24.250. Mannoproteins are on on-going approval; only one letter is required for all future applications.

1.1 kg
5.5 kg
22 kg

STABIVIN® SP

STABIVIN® SP is an Gum Arabic solution manufactured from highly purified gums

- Due to its specific manufacturing procedure and the strict selection of the arabic gum used, **STABIVIN® SP** contributes to the **colloidal structure** of the wines (softness and mouthfeel).
 - Very low clogging index.
- Dosage: 100 to 300 mL/hL – 8 to 24 lbs/1,000 gal.

1.1 kg
5.5 kg
22 kg

STABIVIN®

Pure Verek Gum Arabic solution with high grade protection index (>8) for stabilizing unstable coloring matter in red wines

- Hydrophilic colloid which aims to counter hazes and **colloidal** deposits, allowing the wine to retain maximum clarity:
 - **Stabilizes** unstable coloring matter.
 - Increases protection with regard to metallic or protein casses.
 - Ready for incorporation into wine.
- Dosage: 100 to 300 mL/hL - 8 to 24 lbs/1,000 gal



TTB update:

As of 3/1/11, the maximum dosage increased from 2 lbs / 1,000 gal to 16 lbs / 1,000 gal of pure gum Arabic.



FINING AND SPECIAL TREATMENTS

Classical fining

Pack Size

CASEI PLUS

White and rosé must and wine

Potassium caseinate developed for treatment of oxidation phenomena and maderization in musts and wines (rosé and white)

- In the case of **oxidized wines** (browning), CASEI PLUS decolors the wine, contributing to **color refreshment** while also refining gustatory characteristics.
- In the case of botrytised harvests, CASEI PLUS is recommended in the treatment of young white or rosé wines (reds in certain cases) to decrease the oxidized character.
- Clarification agent which contributes to preparing wine for filtration.
- Decreases the iron content in white wines.

Dosage: 50 to 200 ppm - 0.4 to 1.6 lbs/1,000 gal for clarification

200 to 600 ppm - 1.6 to 4.8 lbs/1,000 gal for maderization treatment and color correction.



1 kg
5 kg

OVOCLARYL (formerly egg albumine powder)

Red wine

Egg albumin fining agent which is particularly adapted for reducing and harmonizing excess polyphenolic fractions in red wines

- For red wines with a tannin structure that lacks balance and refinement at the finish, OVOCLARYL rounds-off and **refines the structure**, while preserving the wine aromatic character and specificity.
- For young red wines or those ready for bottling, OVOCLARYL enables **unstable tannins** to be eliminated and facilitates polyphenolic stability.
- Clarification agent which contributes towards preparing wines for filtration.

Dosage: 50 to 100 ppm – 0.4 to 0.8 lbs/1,000 gal.

40 ppm corresponds to 1 fresh egg white.



1 kg

ICHTYOCOLLE

White wine

Fish-based (Isinglass) fining agent adapted to high-grade white and rosé wine fining and clarification. ICHTYOCOLLE restores high organoleptic clarity and remarkable brilliance to treated wines

- For wines with **bitterness**, ICHTYOCOLLE enables the elimination, by flocculation, of the **polyphenols** which are responsible for this character, while maintaining organoleptic qualities.
- In the case of viscous wines (sweet white wine types derived from botrytised harvests), ICHTYOCOLLE improves filterability by acting on gums and mucilages.
- Reduces the risk of wine browning.

Dosage: 10 to 30 ppm - 0.08 lbs to 0.24/1,000 gal.



500 g

VINICLAR® and VINICLAR® P

White juice and wine

Preparation of PVPP for preventive and curative treatment of the oxidation of juices and wines

- Reduces and prevents the risk of maderization, and **pinking** in white wines.
- Removes preferentially the polyphenols responsible for bitterness.
- Viniclar P is pure PVPP, while Viniclar contains a little bit of bentonite for a better clarification and an easier filtration.

Dosage: 150 to 300 ppm - 1.2 to 2.4 lbs/1,000 gal for preventive treatment

300 to 800 ppm - 2.4 to 6.4 lbs/1,000 gal for curative treatment for wine and oxidized juice.



1 kg
25 kg



FINING AND SPECIAL TREATMENTS

Pack Size

Specialty blends

1 kg
10 kg

POLYLACT

White and rosé must and wine

Combination of PVPP and Casein for preventing and treating oxidation in juice and wine (white and rosé)

- Inhibits **browning** and **pinking** while diminishing bitterness.
- Gentle and complete fining action on phenolic compounds.
- Enhances the freshness of the hue (purple) when used in rosé juices and wines.

Dosage: 150 to 300 ppm - 1.2 to 2.4 lbs/1,000 gal for oxidation protection.

300 to 700 ppm - 2.4 to 5.6 lbs/1,000 gal for juice treatment.

1 kg
25 kg

ARGILACT

White and rosé must and wine

Combination of casein and bentonite for treating juice and wine (white and rosé) against oxidation

- Prevents the **oxidation** of white juices (in case of laccase contamination).
- Eliminates substances responsible for **bitterness** and **grassy** taste.

Dosage: 600 to 1200 ppm - 4.8 to 9.6 lbs/1,000 gal.



1 kg

POLYMUST AF®

Must and wine

Combination of PVPP, bentonite and fish-derived fining agents for curative oxidation treatment of musts and wines

- Eliminates **oxidizable** and **oxidized** phenolic compounds (quinones).
- Protects musts and their aromatic precursors in regard to oxidation phenomena.
- Eliminates bitterness in wines.
- Limits free SO₂ binding agents.

Fish is not considered as an allergen in EU, therefore Polymust AF is considered as an Allergen Free product in EU

Dosage: 150 to 700 ppm - 1.2 to 5.6 lbs/1,000 gal.



Activated carbon

5 kg

GEOSORB

Decontaminant for fermenting musts and young wines for reducing geosmin and octenone content

- Activated plant-origin oenological charcoal characterised by a specific porosity which enables **selective adsorption** of geosmin (moist earth, beet) and octenone (mushroom).
- Significant absorption of **volatile phenols and IBMP** (green character or pyrazine) even at low dosage and of vegetal character (at 300 ppm), while having a limited impact on the color and aromas of the wine.
- Corrects the organoleptic character of wines from musts which have been affected by fungi such as rot or powdery mildew.

Dosage: Action on geosmin: 150 to 250 ppm - 1.2 to 2.0 lbs/1,000 gal. / Action on octenone: 350 to 450 ppm - 2.8 to 3.6 lbs/1,000 gal.

Maximum legal dosage: 1000 ppm - 8.0 lbs/1,000 gal.



FINING AND SPECIAL TREATMENTS

Gelatins

Pack Size

GECOLL® SUPRA

Liquid gelatin produced from a selection of exceptionally pure raw materials, exclusively of porcine origin

GECOLL® SUPRA is recommended for treating:

- High quality red wines, young red wines with highly reactive tannins.
- Rosé wines (and dry or sweet white wines).

GECOLL® SUPRA favors clarification of must during settling and contributes to softening of hard press wines.

Dosage: 30-40 mL/hL - 300 to 400 ppm - 2.4 to 3.2 lbs/1,000 gal on juice.

40-100 mL/hL - 400 to 1,000 ppm - 3.2 to 8 lbs/1,000 gal on wine.



1.05 kg
5.25 kg
21 kg

GELAROM®

Liquid gelatin produced from a selection of exceptionally pure raw materials, exclusively of porcine origin

For young closed wines, **fruitiness** and **aroma delicacy** are restored with GELAROM® treatment. GELAROM® is also adapted to clarification in:

- Musts by flotation.
- Juices derived from thermal treatment.

Dosage: 20-30 mL/hL - 200 to 300 ppm - 1.6 to 2.4 lbs/1,000 gal on juice.

30-60 mL/hL - 300 to 600 ppm - 2.4 to 4.8 lbs/1,000 gal on wine.



1.05 kg
21 kg

GELATINE EXTRA N°1

Heat soluble gelatin

- Rapid elimination of undesirable phenolics (**clarification** and **stabilization** effect).
- Improvement of the wines ageing potential (**refinement** of the phenolic composition).
- This highly purified gelatin retains the wine's balance and aromatic finesse.

Dosage: 60 to 70 ppm - 0.48 to 0.8 lbs/1,000.



1 kg

SILIGEL

White and rosé must and all wine

Colloidal silica solution that may be used in combination with all organic fining agents

- Improves **fining efficiency**: **flocculation** and **settling**.
- Prevents over-fining.

Dosage: 300 ppm – 30 mL/hL – 1.14L/1,000 gal.

Add SILIGEL prior to gelatin or fining agent.

Note: use 0.5 to 1.0 mL of Siligel to 1.0mL of gelatin.



1.3 kg
6 kg



FINING AND SPECIAL TREATMENTS

Pack Size

Microcol – Protein stabilization

1 kg
5 kg

MICROCOL® ALPHA

High quality natural sodium microgranular bentonite with a high adsorption capacity, intended for protein stabilization in wines and must over a large pH range

MICROCOL® ALPHA has been selected for its highly specific œnological criteria:

- Stabilizing properties in regard to heat-sensitive proteins.
- Wide stabilizing action spectrum.
- Clarifying capacity and compact lees.
- Aromatic preservation.
- Color preservation.

Dosage: bench trials recommended to determine dosage.



25kg

MICROCOL® CLG

Natural Montmorillonite Calcium-dominant bentonite specifically prepared and formulated by LAFFORT for winemaking purposes. MICROCOL® CLG possesses excellent settling capacity and high protein adsorption power and allows for faster settling with formation of very compact lees or gross lees

- Possesses excellent specific adsorption power reacting efficiently with positively charged macromolecules.
- Preserves aromatic intensity and improves brightness and color.

Dosage: bench trials recommended to determine dosage.



Tip: to settle bentonite faster, add 100ppm of Gecoll Supra + 100ppm of Siligel

The whole text is available on our website in the Research and innovation / Laffort news section.

Fining agents part 1: Proteinaceous fining agents

This is the first in a two-part series of LAFFORT article on fining agents. In Part 1 we focus on proteinaceous fining agents, which are commonly used for the removal of phenolics. Discussions are presented to support the characteristics of each fining agent, including gelatin, isinglass, casein, egg albumin.

Fining agents part 2: Non-proteinaceous fining agents

In Part 2 of this series on fining agents, we analyse the non-proteinaceous fining agents. This includes a discussion of the structures of fining agents and what they are typically used for, including the new egg albumin alternative, BIOLEES®.



STABILIZATION



Potassium bitartrate stabilization

Pack Size

The work on Mannostab was recognized by winning the Gold Innovation Trophy at Vinitech 2006 in Bordeaux. This is the first time the Gold Trophy has been awarded to a manufacturer of oenological products for its contribution to research.

MANNOSTAB®

Mannostab® is the only mannoprotein naturally present in wines with a potassium bitartrate stabilization property. This specific mannoprotein, called MP40™, is enzymatically extracted from yeast cell walls by a patented process which guarantees and preserves the stabilizing capacity of MP40™ regarding potassium bitartrate precipitations

- Provides a natural, simple solution to the stability requirements of filtered or non-filtered wines.
- Perfectly conserves the quality of the wine.
- Involving no waste materials, no energy or water consumption, it is an ecological treatment which complies with new environmental constraints.
- Can be added within a few days of bottling; time saving.
- Can treat red, white and rose wines.

Dosage: between 15 and 30 g/hL, correct dosages for each wine are determined by preliminary stability tests in order to prevent overdosing.

The wine has to meet certain requirements prior to Mannostab® treatment. Please contact us for more details.



500 g

New 2012

Sampling date	27/06	30/06	02/07	04/07	07/07
Control					
Mannostab®					

TTB Status: Mannoproteins are currently FDA GRAS approved but require a notification letter (supplied by Laffort USA) to be submitted to the TTB. Mannoproteins are listed as continual use status by TTB in accordance with 27 C.F.R. § 24.250; only one letter is required for all future applications.

CELSTAB®

Celstab® is a highly purified vegetal-origin cellulose polymer, with a low degree of polymerization and viscosity. Its liquid (10%) formula makes it easy to incorporate into wine

- Intended for wine stabilization in relation to potassium bitartrate precipitations.
- Inhibition of microcrystal nucleation and growth phases.
- Can be added within a few days of bottling; time saving.
- For white wine treatment.

Maximum legal dosage: 10 cL/hL (corresponding to 10 g/hL or 100 ppm).

The wine has to meet certain requirements prior to Celstab® treatment. Please contact us for more details.



1.05 kg
5.25 kg

New 2012

Alan DeWitt, George Guglielmo Winery, Santa Clara County (California)

Celstab has brought to our winery much greater flexibility. No longer do we need to incur the large energy costs, product loss and time commitment associated with traditional cold stabilization nor do we need to coordinate the logistics of electro-dialysis. In addition wines treated with Celstab retain more of their original character.



TTB Status: CMC is currently FDA GRAS approved but requires a notification letter (supplied by Laffort USA) to be submitted to the TTB. CMC is listed as continual use status by TTB in accordance with 27 C.F.R. § 24.250; only one letter is required for all future applications.



PRESERVATIVES & ANTIOXIDANTS

Pack
Size

Sulphur products

OENOSTERYL®

Effervescent tablet of potassium metabisulphite

- The effervescent action of the bicarbonate provides mixing in barrels or small tanks while reducing time and labour needed for stirring.
- Safety equipment not required due to solid odorless tablet form, thus promoting greater workplace safety.
- Used in gondolas or picking bins to inhibit oxidation of grapes and juice affected by *Botrytis*, mold or to inhibit indigenous yeast.
- Used in tanks before fermentation and directly into barrels after MLF.
- Substitute for monthly sulphite barrel additions.
- Available in 2g and 5g tablets. (In a barrel, a 2g equals 8 ppm of SO₂ and a 5g equals 22 ppm of SO₂).



Jessica Tarpy, Assistant Winemaker, Favia Wines, Napa County (California)

The Laffort SO₂ tablets are a welcomed addition to our cellar. They provide great protection of the wine and, at the same time, they make our regular SO₂ additions easier, faster and safer for the cellar team. Simply put, they help us save time and money.



Derek Devries, Winemaker, Michael David Winery, San Joaquin County (California)

We have over 4000 barrels in our cellar and found that using the Oenosteryl SO₂ tablets has saved us significant time and money (labor hours) compared to our previous method, adding liquid KMBS solution to barrels and stirring. The tablets mix the wine, dissolve entirely and the SO₂ numbers show the correct rate of addition in our monthly analysis. The staff really enjoys not having to wear protective gas masks while adding the SO₂ tablets and the aging cellar never smells of sulfur gas when we are topping.



1 kg (box)

SULPHUR® RING

Sulphiting of barrels and wooden vats

- Sulphiting of vat to be filled: burn 2 g of sulphur / hL
- Preservation of empty vats: burn 4 g of sulphur / hL (Repeat every 40 - 50 days).
- Available in 2.5g, 5g and 10g rings



NOBILE[®], THE ŒNOLOGY OF WOOD

Nobile Barrel Refresh, offer a second life to your barrels!

NOBILE[®] Barrel Refresh is specially designed to extend the life of oak barrels. NOBILE[®] Barrel Refresh slowly diffuses over time similar characteristics of our NOBILE[®] staves to enhance integrated oaky notes in wine.

Oak characteristics: High quality French oak, 24 months natural drying.

Dimensions : 7 x 2 (32 x 2,3 x 0,7 cm).

Surface area: 0,273 m2 (2,94 sq ft) .



NOBILE[®] Barrel Refresh *Sensation*



Organoleptic profile:

Aroma: increases vanilla and toasted notes.

Texture: favours sweetness and roundness.



NOBILE[®] Barrel Refresh *Révélation*



Organoleptic profile:

Enriches structure and enhances aromatic complexity.

Mimics traditional barrel aging.



Usage

Dosage: 1 to 5 Barrel Refresh/barrel depending of the level of exhaustion of the barrel and of the desired oak intensity.

Time of contact: 4 to 6 months depending of the product and style of wine.

Rate must be adapted according to the wine characteristics and the desired wine style.

Consequently, the time of contact is ultimately defined by recurrent tasting.

One use only.

The ⊕ Barrel Refresh

- From 20 to 100% new oak equivalent (1 Barrel refresh = ± 20% new oak).
- Choice of the aromatic profile: *Sensation* or *Révélation*.
- Easy and quick installation.
- Benefit of the slow oxidation process of the barrel.
- Preservation of the barrel room.

Packaging

Box of 10 Nobile[®] Barrel Refresh.



NOBILE[®], THE ŒNOLOGY OF WOOD

Nobile staves, imagine a precise maturation

With an ever-present focus on high quality, Nobile[®] enforces the most rigorous standards for its staves.

- Certified origin of the oak.
- Selection made by master "merrandiers".
- Natural seasoning: minimum 24 months.

To obtain barrel-quality staves, Nobile[®] has developed and perfected extremely specific production techniques.

- Management and precise control of toasting protocols.
- Consistency of the organoleptic contribution.

Precise quality control is guaranteed by the SARCO laboratory, which ensures that the aromatic, microbiological and overall quality of Nobile[®] staves is unsurpassed.

Sensation & Révélation: staves for every style of wine.

GUARANTEED HIGH QUALITY FRENCH OAK - QUERCUS PETRAEA

Oak characteristics: "merrain" quality selection, 24 months natural seasoning.

Dimensions: 91 x 5 x 0,7 cm.

Surface area: : 0,104 m² (12.34 sq ft).



Nobile[®] Stave *Sensation*

Color: clear brown, satin.

Organoleptic profile:

Aroma: increases vanilla and toasted notes.

Texture: favours sweetness and roundness.



Nobile[®] Stave *Révélation*

Color: brown, rich soil.

Organoleptic profile:

Enriches structure and enhances aromatic complexity.

Mimics traditional barrel aging.

Packaging

Box of 60 staves. To ease installation, Nobile[®] staves are tied by a food-grade cord in bundles of 20 pieces (hermetic packing)..



NOBILE[®], THE ÆNOLOGY OF WOOD

Nobile

Pack
Size

A range of high quality products combining tradition, expertise, innovation and research.

FRENCH OAK CHIPS

Nobile[®] Fresh

- Supports wine structure, enhances fruit character and preserves phenolic compounds.

Nobile[®] Spice

- Structure and long tannic finish with increased complexity.

Nobile[®] Sweet

- Stronger sensation of sweetness, smoky characters and complexity.

Nobile[®] Intense

- Amplification of complex aromas and sweetness persistence.



15 kg
2 x 7.5 kg*

FRENCH GRANULAR

Nobile[®] Sweet

- Increases the sensation of sweetness, favours the emergence of grilled and woody notes.



15 kg

AMERICAN OAK CHIPS

Nobile[®] American Blend

- Vanilla, coconut, mocha, maple syrup.

15 kg
2x7.5 kg*

AMERICAN GRANULAR

Nobile[®] American Blend

- Increases the sensation of vanilla, coconut...

15 kg

Nobile[®] American Fresh

- Enhances fruit character.

15 kg

**infusion
bags*



NOBILE[®], THE ŒNOLOGY OF WOOD

NOBILE - the œnology of wood

APPLICATION IN WINEMAKING

OAK CHIPS

White wines

- During fermentation: add 1 to 3 g/L (8 - 24 lbs / 1,000 gal) of chips after clarification.
- Addition to wines: add 0.5 to 3 g/L (4 - 24 lbs / 1,000 gal) by submerging Nobile[®] infusion bags directly into the tank.

Red wines

- During tank filling: add 1 to 5 g/L (8 - 40 lbs / 1,000 gal) of chips evenly throughout tank filling.
- Addition to wines after racking: add 1 to 4 g/L (8 - 32 lbs / 1,000 gal) by dipping Nobile[®] infusion bags directly into the tank.

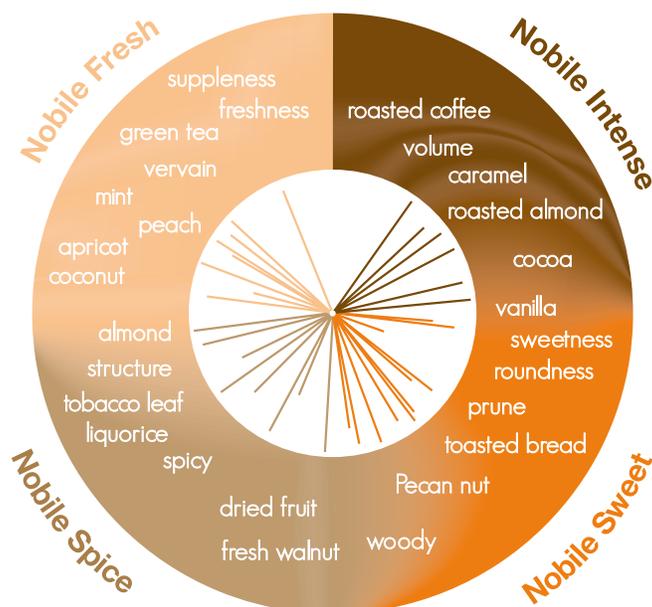
GRANULAR

White wines

- During fermentation: add 0.5 to 2 g/L (4 - 16 lbs / 1,000 gal) of granular after clarification.

Red wines

- During tank filling: add 0.5 to 5 g/L (4 - 40 lbs / 1,000 gal) of chips evenly throughout tank filling.





LAFFORT spark®

... BUBBLES BY NATURE

The production of quality sparkling wines is the result of a series of steps which must be optimized to reach the desired final product.

The sparkling wine market is currently evolving and, as for still wines, new trends are appearing leading to different types of wines, with more character and sometimes different aromas.

To optimize each stage of production, and in order to provide winemakers with new tools, **LAFFORT** has gathered, under the **LAFFORT SPARK** range, the products best suited not only to produce traditional sparkling wines, but also the products enabling the production of wines suitable for the modern consumer.

Please contact us for more details.



CONVERSION CHARTS

Temperature (°F)	0	32	50	59	68	77	86	95
Temperature (°C)	-18	0	10	15	20	25	30	35

$$(^{\circ}\text{F}) = (^{\circ}\text{C} \times 9/5) + 32$$

$$(^{\circ}\text{C}) = (^{\circ}\text{F} - 32) \times 5/9$$

ppm or mg/L	100	200	300	400	500	600	700	800	900	1000
g/hL	10	20	30	40	50	60	70	80	90	100
lbs/1,000gal	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0

1 gal = 3.785 L	1 ha = 2.47 acre
1 L = 1,000 mL	1 case = 2.38 gal
1 hL = 100 L = 26.40 gal	1 barrel = 225 L = 59.40 gal = 25 cases of wine
1 lbs = 453.60 g	1 ton = 165 gal approx.
130 Kg = 100L approx.	1 metric ton = 1,000 Kg = 2,205 lbs
1 US ton = 2,000 lbs = 907 Kg	

1 g/L tartaric acid = 0.6535 g/L H ₂ SO ₄
1 g/L H ₂ SO ₄ = 1.5302 g/L tartaric acid

Calculating Molecular / Active SO₂

The molecular SO₂ level can be calculated by using this formula:

$$\text{Molecular SO}_2 = \text{free SO}_2 \text{ divided by } (1 + 10^{\text{pH}} - 1.8)$$



LIBRARY

Laffort News & Technical booklet

Laffort news: technical articles published by the laffort team worldwide

- *Zymaflore FX10®: Using directed breeding to improve a reference strain unsuited to modern winemaking conditions.*
- *Effects of fermentation temperature and co-fermentation on the wine aromatic composition of Sauvignon Blanc.*
- *Yeast strain and nutritional modulation of aroma intensity, longevity and winemaker preference in Sauvignon Blanc wine.*
- *Optimizing the aromas of wines made from Sauvignon Blanc and other grape varieties with "Sauvignon" aromas: impact of a yeast rehydration nutrient and inoculation with mixed yeasts.*
- *Prefermentation maceration in red winemaking: risk control and alternatives.*
- *Effect of rehydration nutrient on the production of volatile sulfur compounds by active dry wine yeasts.*
- *Assimilation of organic and mineral forms of nitrogen by the yeast during alcoholic fermentation.*
- *Stuck ferments: causes and solutions.*
- *The role of certain residues from phytosanitary treatments in bacteria inhibition during malolactic fermentation in wines.*
- *The Lactoenos 350 PreAc® a new tool to manage malolactic fermentation in white wines.*
- *Techniques for dealing with awkward malolactic fermentations.*
- *Be careful with spontaneous MLF.*
- *Tannins vs. oak chips: what does each contribute to your wine?*
- *Improving red press wines quality.*
- *Fining agents part 1: Proteinaceous fining agents.*
- *Fining agents part 2: Non-proteinaceous fining agents.*



Technical booklets: technical advice on critical winemaking stages

- *Fining wines.*
- *Good management of nutrition and fermentations aids.*
- *Good MLF management.*
- *Vinification of harvests affected by Botrytis cinerea.*
- *Good AF management.*
- *Fermentation management.*

Technical protocols:

- *Dealing with under ripe grapes*
- *Mouthfeel Building tools*
- *Stuck fermentations (AF & MLF)*
- *MLF for low malic acid concentration*
- *Acidification*



BENCH TRIALS SOLUTIONS

For fining bench trial

Powder or granulates form - Preparation of a 5% solution (500 ppm) (exception: Ichtyocolle, preparation of a 1% solution).

	Volume of the sample				
	250 mL	375 mL	500 mL	750 mL	1L
10 ppm	0.05 mL	0.08 mL	0.10 mL	0.15 mL	0.20 mL
20 ppm	0.10 mL	0.15 mL	0.20 mL	0.30 mL	0.40 mL
30 ppm	0.15 mL	0.23 mL	0.30 mL	0.45 mL	0.60 mL
40 ppm	0.20 mL	0.30 mL	0.40 mL	0.60 mL	0.80 mL
50 ppm	0.25 mL	0.42 mL	0.50 mL	0.75 mL	1.00 mL
60 ppm	0.30 mL	0.45 mL	0.60 mL	0.90 mL	1.20 mL
70 ppm	0.35 mL	0.53 mL	0.70 mL	1.05 mL	1.40 mL
80 ppm	0.40 mL	0.60 mL	0.80 mL	1.20 mL	1.60 mL
90 ppm	0.45 mL	0.68 mL	0.90 mL	1.35 mL	1.80 mL
100 ppm	0.50 mL	0.75 mL	1.00 mL	1.50 mL	2.00 mL
120 ppm	0.60 mL	0.90 mL	1.20 mL	1.80 mL	2.40 mL
150 ppm	0.75 mL	1.13 mL	1.50 mL	2.25 mL	3.00 mL
200 ppm	1.00 mL	1.50 mL	2.00 mL	3.00 mL	4.00 mL
250 ppm	1.25 mL	1.88 mL	2.50 mL	3.75 mL	5.00 mL
300 ppm	1.50 mL	2.25 mL	3.00 mL	4.50 mL	6.00 mL
400 ppm	2.00 mL	3.00 mL	4.00 mL	6.00 mL	8.00 mL
500 ppm	2.50 mL	3.75 mL	5.00 mL	7.50 mL	10.00 mL

Final concentration of the treatment



BENCH TRIALS SOLUTIONS

For fining bench trial

For Liquid

Volume of the sample

	250 mL	375 mL	500 mL	750 mL	1L
0.1 mL/L	0.025 mL	0.038 mL	0.050 mL	0.075 mL	0.1 mL
0.2 mL/L	0.050 mL	0.075 mL	0.100 mL	0.150 mL	0.2 mL
0.3 mL/L	0.075 mL	0.113 mL	0.150 mL	0.225 mL	0.3 mL
0.4 mL/L	0.100 mL	0.150 mL	0.200 mL	0.300 mL	0.4 mL
0.5 mL/L	0.125 mL	0.188 mL	0.250 mL	0.375 mL	0.5 mL
0.6 mL/L	0.150 mL	0.225 mL	0.300 mL	0.450 mL	0.6 mL
0.7 mL/L	0.175 mL	0.263 mL	0.350 mL	0.525 mL	0.7 mL
0.8 mL/L	0.200 mL	0.300 mL	0.400 mL	0.600 mL	0.8 mL
0.9 mL/L	0.225 mL	0.338 mL	0.450 mL	0.675 mL	0.9 mL
1.0 mL/L	0.250 mL	0.375 mL	0.500 mL	0.750 mL	1 mL
1.2 mL/L	0.300 mL	0.450 mL	0.600 mL	0.900 mL	1.2 mL
1.5 mL/L	0.375 mL	0.563 mL	0.750 mL	1.125 mL	1.5 mL
2.0 mL/L	0.500 mL	0.750 mL	1.000 mL	1.500 mL	2 mL
2.5 mL/L	0.625 mL	0.940 mL	1.250 mL	1.880 mL	2.5 mL
3.0 mL/L	0.750 mL	1.125 mL	1.500 mL	2.250 mL	3 mL

Final concentration of the treatment



TTB STATUS

TTB Status of LAFFORT products in the US

Product family	Product name	Approved as (use)	Maximal legal dosage (if applicable)	Status: allowed (no TTB application required)	Status: approved for on-going use, send one letter to TTB to have approval for on-going use	Status: authorized, submit a TTB application, approval required	Status: for trial only submit a TTB application	Listed as allergen
Yeasts	Zymaflore, Actiflore ranges (<i>Saccharomyces cerevisiae</i>)	Yeast (anytime)	N/A	Yes				
	Zymaflore Alpha (<i>Torulasporea delbrueckii</i>)	Yeast (anytime)	N/A	Yes				
Bacteria	Lactoenos range (<i>Oenococcus oeni</i>)	Malo-Lactic Bacteria (to stabilize grape wine)	N/A	Yes				
Tannins	VR Supra, VR Supra NF, VR Color, Galalcool, Galalcool SP, Biotan, Tan'Cor, Tan'Cor Grand Cru, Quertanin line, QuerPlus (proanthocyanidic, ellagic, catechic tannins)	Tannins (to clarify or to adjust tannin content of juice or wine)	May not add color. Additions shall not exceed 150 mg/L (in tannic acid). Residual tannins shall not exceed 0.8 g/L (white) and 3 g/L (red) (in gallic acid)	Yes		Yes (if used in greater quantity)		
Enzymes	Lafase and Lafazym ranges, Optizym (derived from <i>Aspergillus niger</i>)	Pectinases (to clarify and to stabilize wine and to facilitate separation of juice from the fruit)	N/A	Yes				
	Filtrozym, Extralyse (derived from <i>Trichoderma harzianum</i> and <i>Aspergillus niger</i>)	Pectinases and Beta-glucanases (to clarify and filter wine)	30 g/hL of pure beta-glucanase		Yes			
	Lysozym	Lysozyme (to stabilize wines from malolactic acid bacterial degradation)	500 mg/L	Yes				
Yeast and bacteria nutrients	Amonium Phosphate (mono- and di-)	Yeast nutrient in wine production and to start secondary fermentation in the production of sparkling wines	Amonium Phosphate: 8 lbs / 1,000 gal.	Yes				
Yeast and bacteria nutrients	Thiamine hydrochloride	Yeast nutrient to facilitate fermentation of wine	Thiamine: 0.005 mg/L 1,000 gal (0.6 mg/L)					
	Yeasts hulls or inerted yeasts	To facilitate fermentation of juice/wine	3 lbs / 1,000 gal of yeast hulls (no limit for autolyzed yeasts)	Yes				
	Nutristart	To facilitate fermentation	3.6 lbs / 1,000 gal (450ppm)	Yes				
	Thiazote PH	To facilitate fermentation	4 lbs / 1,000 gal (500ppm)	Yes				
	Biocell	To facilitate fermentation	8 lbs / 1,000 gal (1000ppm)	Yes				
	Dynastart, Malostart, Bioactiv	To facilitate fermentation	8+ lbs / 1,000 gal (>1000ppm)	Yes				
	Nutristart OgarniQ, Bioarom Turbichel	To facilitate fermentation	N/A	Yes				
Yeast derived products	Biolees	Yeasts hulls / cell walls / membrane (to facilitate fermentation)	3 lbs / 1,000 gal (375 ppm)	Yes (if used during fermentation)				
	Autolees	Mannoproteins and Grum Arabic	> 16 lbs/1,000 gal		Yes			
	Mannostab	Mannoproteins	400 mg/L (400ppm)		Yes			

The information contained in this summary is accurate to the best of our knowledge as of April 1, 2011, and is subject to change. Please contact us or refer to our website, <http://us.laffort.com>, for updated information.



TTB STATUS

TTB Status of LAFFORT products in the US

Product family	Product name	Approved as (use)	Maximal legal dosage (if applicable)	Status: allowed (no TTB application required)	Status: approved for on-going use, send one letter to TTB to have approval for on-going use	Status: authorized, submit a TTB application, approval required	Status: for trial only submit a TTB application	Listed as allergen
Cold stabilization	Celstab	CMC (cellulose gum)	N/A				Yes	
Oak derived products	Nobile granulars, oak chips and staves	Oak chips or particles (to smooth wines)	N/A	Yes (on wine)		Yes (if used during fermentation)		
Sulfur products	Oenosteryl, Sulphur rings	Sulfur dioxide (to sterilize and to preserve wine)	Total SO ₂ content shall not exceed the limitations	Yes				
Gum Arabic	Stabivin, Stabivin SP	Gum Arabic (to clarify and stabilize wine)	16 lbs/1,000 gal of pure gum Arabic since 3/1/11. 21 CFR 184.1330 (GRAS)	Yes (within legal limit)		Yes (if used at a higher dosage rate)		
Fining agents	Argilact, Poly lact, Casei Plus	Casein (to clarify wines) / Milk products (fining agent for wine and/or to remove off-flavors of wine)	Casein: N/A Milk products: 0.2% v/v (fining) and 1% v/v (off-flavors)	Yes				Yes (milk product)
	Polymust AF	PVPP (to clarify and to stabilize wine and to remove color from red or black wine or juice), Isinglass (to clarify wines)	N/A	Yes				Yes (fish product) in US
	Ichtyocolle	Isinglass (to clarify wine)	N/A	Yes				Yes (fish product) in US
Fining agents	Egg Albumin	Albumin (egg white) (for fining)	1.5 g/L. 1000gal	Yes				Yes (egg)
	Microcol Alpha and Microcol CL G	Bentonite (Alumino-silicates, hydrated) (to clarify and to stabilize wine or juice)	N/A	Yes (GRAS)				
	Gecoll Supra, Gelarom and Gelatine Extra No1	Gelatines (food grade) (to clarify juice or wine)	N/A	Yes (GRAS)				
	Viniclair, Viniclair P	PVPP (to clarify and to stabilize wine and to remove color from red or black wine or juice)	60 lbs / 1,000 gal (7.19 g/L). Shall be removed during filtration	Yes				
	Siligel	Silica gel (to clarify wine or juice)	2.4 g/L. Must be removed by filtration	Yes				
	Geosorb and Decoloryl Supra 4	Activated carbon (to clarify and to purify the wine; to remove color in wine and/or juice)	25 lbs/1000 gal.	Yes (within legal limit)		Yes (if used at a higher dosage rate, pursuant to 27 CFR 24.242 (GRAS))		

The information contained in this summary is accurate to the best of our knowledge as of April 1, 2011, and is subject to change. Please contact us or refer to our website, <http://us.laffort.com>, for updated information.



WINEMAKING PROTOCOLS

Red winemaking

This protocol is a general example of how to implement our full set of integrated tools. Winemaking remains under the responsibility of the winemaker.

EXTRACTION

Cold soaking:

- Maceration < 3 days:
temperature: 50°F
SO₂ ≤ 80 ppm



LAFASE® HE GRAND CRU / FRUIT 4-5 g/100 kg



TANIN VR SUPRA® 300 ppm

No cold soaking:

- SO₂: 50 ppm



LAFASE® HE GRAND CRU / FRUIT 4-5 g/100 kg



TANIN VR SUPRA® 200-300 ppm

MANAGEMENT OF THE ALCOHOLIC FERMENTATION

Yeast:

- Re-hydration:
- Dosage: 200 ppm
- Yeast selection for premium wines:



DYNASTART® 300 ppm



Terroir respect: Zymaflore® FX10
Fruity/roundness: Zymaflore® F15 / RX60

- Yeast selection for entry -range wines:



Actiflore® F33

Extra tannin addition to stabilize color.



TANIN VR COLOR® 300 ppm

Monitoring the nutrients:

- Adjusting the the Nitrogen level (necessary wen using Dynastart®):
- Option: Complete nutrient preparation



THIAZOTE® 100-400 ppm



NUTRISTART® 300-500 ppm
NUTRISTART OrganiQ® 300-400 ppm

Recommended temperature of fermentation (74-82 °F)

MALOLACTIC FERMENTATION

- Activator of the Malolactic Fermentation:
- Bacteria:



MALOSTART® 200 ppm



LACTOENOS SB3®
or LACTOENOS 450 Preac®

HANDLING OF THE PRESS WINE

- Clarification
- Phenolic treatment



LAFAZYM® CL 10-20 ppm



POLYMUST AF® 150-700 ppm,
OVOCLARYL® or BIOLEES®

WINE AGEING AND MOUTHFEEL MANAGEMENT

- **Lees treatment:** Accelerate the autolysis of the lees during barrel and/or tank ageing.
- **Wine treatment:** mimic lees ageing. To be added to finished wine after MLF or prior to bottling.
- **Enhancement of the structure:**
 - Structure and color protection
 - Structure



EXTRALYSE® 100 ppm



BIOLEES® (as required)



TAN'COR®/TAN'COR Grand Cru® 100-200 ppm



BIOTAN® 100-200 ppm



WINEMAKING PROTOCOLS

White winemaking

This protocol is a general example of how to implement our full set of integrated tools. Winemaking remains under the responsibility of the winemaker.

EXTRACTION – DIRECT PRESSING

SO₂: 50 ppm

Pressing:

- Enzyme, under the crusher or in the press when filling up the tank press:
- Tannin: when using *Botrytis*-affected grapes



LAFAZYM® PRESS 3-5 g/100 kg



TANIN GALALCOOL 10-20 g/100 kg

JUICE TREATMENT

Clean juices:

- Free-run juice, first pressing
- Last pressings



LAFAZYM® CL 5 ppm



LAFAZYM® CL 10 ppm

Complementary treatment if high tannin extraction (harsh):



GELAROM® (together with *Siligel*) 20-30 mL/hL

Oxidized juice:

- Oxidized juice:
- Very oxidized juice (*botrytis*/rot):



POLYLACT® 100-200 ppm



ARGILACT® 300-600 ppm

MANAGEMENT OF THE ALCOHOLIC FERMENTATION

Yeast:

- Re-hydration of yeast with:
- Yeast dosage: 200 ppm
- Yeast selection for premium wines:



DYNASTART® 300 ppm



Varietal aromas: Zymaflore® VL1, VL3, X5
Fermentation aromas: Zymaflore® X16

- Yeast selection for entry-range wines:



Actiflore® F33

Monitoring the nutrients:

- Option: Complete nutrient preparation
- Aroma protection



NUTRISTART® 300-400 ppm



BIOAROM® 300 ppm

Recommended temperature of fermentation (60-65° F)

MALOLACTIC FERMENTATION

- Activator of the Malolactic Fermentation:
- Bacteria:



MALOSTART® 200 ppm



LACTOENOS 350 PreAc®

MOUTHFEEL ENHANCEMENT

Lees treatment: Accelerate the autolysis of lees during the barrel and the tank ageing.



EXTRALYSE® 50 ppm

Option

Wine treatment: mimic lees ageing. To be added to finished wine after MLF.



AUTOLEES® 100-300 ppm
BIOLEES® 400-800 ppm



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