





Dear winemakers,

LAFFORT® has always been driven by the taste for excellence. This is made possible through the precision and rigour of our Research & Development unit and our prestigious scientific partners. Inspired by nature, respectful of the unique nature of each terroir and the typical character of each grape variety, our innovations guarantee [precision oenology](#).

Progress has naturally focused on tools inspired by our vineyards, allowing [BIOProtection](#), for example, to become more firmly rooted in modern winemaking practice.

In this 2022 edition, you will discover the latest innovations that have expanded our ever-more comprehensive ranges, in particular a new strain of yeast intended for [BIOAcidification](#): ZYMAFLORE® OMEGA^{4T}.

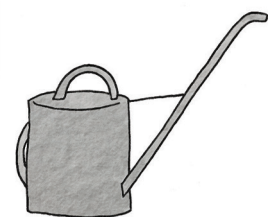
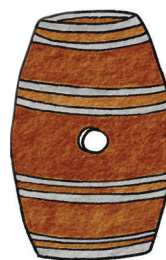
Providing the answers to current issues using high-quality, preventive and natural solutions constitutes the essence of LAFFORT®: [oenology by nature](#).

In keeping with our motto, we are constantly committed to incorporating the wine sector's social, societal and environmental issues into the heart of our activities. As a result, implementing a Corporate Social Responsibility (CSR) approach was the natural choice for us. Today, we are extremely proud to announce that we have obtained CSR certification at Committed level (AFNOR ISO 26000). LAFFORT® is the first producer of oenological products to obtain this certification! This achievement is far from being a culmination, however, but a simple step towards our goal of serving oenology, which is our driving force.

We thank you for the trust you have placed in LAFFORT® and all its teams and employees and wish you all the best for this 2022 vintage.

Philippe GUILLOMET
General Manager

A handwritten signature in black ink, reading 'Philippe Guillomet'.

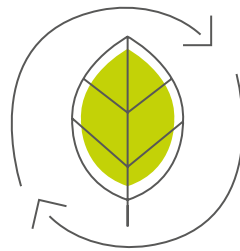


ISO 26000



LAFFORT® certified as Committed to CSR according to standard ISO 26000

LAFFORT® had already paved the way in 1999, by being the first producer of oenological products to be ISO 9001 certified for its quality management system. We are therefore proud today to be the first company in the sector to receive the Committed to CSR label (Confirmed level) according to the ISO 26000 standard.



ZYMAFLORE® XarOm

Saccharomyces cerevisiae yeast selected for its ability to produce high-intensity fermentation and amyl aromas.

ZYMAFLORE® XarOm is recommended for the production of aromatic wines, to boost the potential of the grapes or serve as a base for blending. This strain has the genetic ability to preserve malic acid during the alcoholic fermentation. Its low production of volatile acidity and its POF(-) character allow for production of wines with a clean, precise and intense aromatic profile.



ZYMAFLORE® OMEGA^{LT}

Non-Saccharomyces yeast of the species *Lachancea thermotolerans* for the BIOAcidification of wines (red, white and rosé).

Selected for its high capacity to produce L-lactic acid from fermentable sugars, ZYMAFLORE® OMEGA^{LT} brings freshness and restores balance to wines. Its unique metabolism leads to a decrease in the pH and increase in the total acidity of wines accompanied by a slight reduction in alcohol content. Enhances the perception of acidity by favouring fresher organoleptic profiles, while facilitating microbiological stabilisation during ageing. To be used in co-inoculation (simultaneous yeast additions) or in sequential inoculation with a *Saccharomyces cerevisiae* strain to complete the alcoholic fermentation.



FUMARIC^{trl}

Pure fumaric acid for controlling the growth and activity of the lactic acid bacteria responsible for malolactic fermentation in wine.

Changes in the regulations and the authorisation of fumaric acid in winemaking now provide a new possibility for the control of lactic acid bacteria during post-fermentation phases. Use of FUMARIC^{trl} on wine makes it possible to block the malolactic fermentation. It is also possible to stop an MLF in progress. The result of this practice is the preservation of malic acid as well as increased effectiveness of the SO₂. Its ability to block MLF makes it an interesting ally in winemaking processes without added sulphites when MLF is not desired.

MannOsweet®

PURE FINESSE

100% natural preparation of pure mannoproteins and vegetal polysaccharides specifically selected for colloid stabilisation of wines and to add finesse. Suitable for organic winemaking.

Thanks to a specific purification process, the mannoproteins extracted from yeast cell walls retain their stabilisation properties. The association with vegetal polysaccharides improves their effectiveness, and helps preserve the organoleptic balance of the wine.





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BIOPROTECTION

non-*Saccharomyces* yeasts



ZYMAFLORE® KHIO^{MP}

Non-*Saccharomyces* yeast of the species *Metschnikowia pulcherrima* for BIOProtection of white and rosé musts and grapes under low-temperature conditions during long pre-fermentation phases.

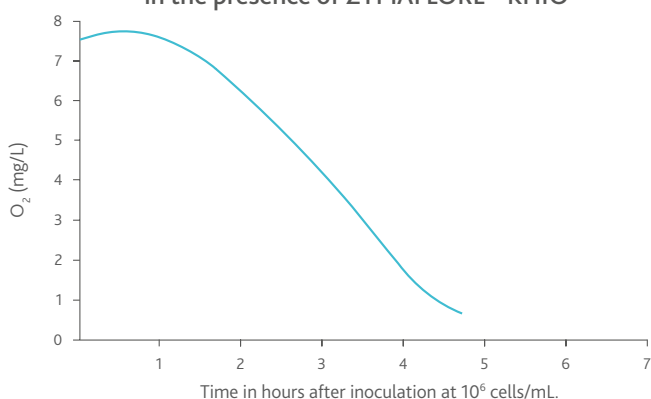
- Colonisation of the medium and maintenance of the population at very low temperature (0°C - 32°F).
- Protection of the must against oxidation due to its strong capacity to consume dissolved oxygen.
- Limits the predominance of potentially undesirable indigenous microorganisms.
- Limits the growth of indigenous flora to avoid the onset of alcoholic fermentation.
- Good compatibility with the strain of *Saccharomyces cerevisiae* selected for the AF.

Dosage: 2 - 5 g/hL (20 - 50 ppm) of ZYMAFLORE® KHIO^{MP} directly on grapes or must (healthy harvest); in suspension or not. Then inoculate with *Saccharomyces cerevisiae* at 20 g/hL for the alcoholic fermentation.



500 g

Change in dissolved oxygen in a must
in the presence of ZYMAFLORE® KHIO^{MP}



ZYMAFLORE® KHIO^{MP} helps to protect against oxidation by quickly consuming all the dissolved oxygen in the must.

MORE BIOPROTECT project, 2021 - Windholtz, S., Masneuf-Pomarède, I., Nioi, C.

DID YOU KNOW ?

In Greek mythology, Chione or Khione was a goddess, daughter of Boreas (god of the north wind) and Orithyia (an Athenian princess). She is associated with winter, making her the goddess of cold, snow and ice.



ZYMAFLORE® ÉGIDE^{TDMP}

A formulation of two strains (*Torulaspora delbrueckii* and *Metschnikowia pulcherrima*) in harvest BIOProtection, grapes and musts, as an SO₂ reduction strategy.

- Colonisation of the medium without any detected fermentation activity (no assimilation of sugars or nitrogen, no difference in turbidity levels at the end of the settling process).
- Restriction of the growth of indigenous flora.
- Establishment of the *Saccharomyces cerevisiae* strain selected for the AF is facilitated.
- BIOProtection of the medium in a wide variety of situations.

Dosage: 2 - 5 g/hL (20 - 50 ppm) of ZYMAFLORE® ÉGIDE^{TDMP} directly, rehydrated or non-rehydrated, on grapes or must (healthy grapes); in suspension or not. Then inoculate with *Saccharomyces cerevisiae* at 20 g/hL for the alcoholic fermentation.

500 g



See Focus P. 5 for the application of ZYMAFLORE® ÉGIDE^{TDMP} to equipment.

ZYMAFLORE® ÉGIDE^{TDMP} BIOPROTECTION OF EQUIPMENT

WHY BIOPROTECTION OF EQUIPMENT?

- To limit the predominance of undesirable microorganisms on the surface of equipment in contact with grapes.
- To avoid (microbiological) spoilage linked to the contamination of grapes.

ZYMAFLORE® ÉGIDE^{TDMP} is a formulation based on two strains of the species *T. delbrueckii* and *M. pulcherrima* suitable for many oenological BIOProtection applications.

BIOPROTECTION OF WHAT TYPE OF EQUIPMENT?

- Harvesting machine.
- Grape trailer.
- Grape reception equipment.
- Must transport tanker.
- Harvesting crate.

PREPARATION OF THE ZYMAFLORE® ÉGIDE^{TDMP} SPRAY SOLUTION:

Step 1



Add a measured volume of water to the sprayer
5 -10 L food-grade sprayer. Nozzles for wide spraying without filter.

Step 2



Weigh ZYMAFLORE® ÉGIDE^{TDMP}.

Step 3



Add ZYMAFLORE® ÉGIDE^{TDMP} to the sprayer.

Step 4



Shake the sprayer by inverting it.

CONCENTRATION OF ZYMAFLORE® ÉGIDE^{TDMP} IN THE SPRAYER: 50 g/L

Equivalent ZYMAFLORE® ÉGIDE^{TDMP} on the grape: 5 g/100 kg.

Spray on all parts in contact with the grapes.

Spray volume and time:

- Grape trailer: 1 - 1,5 L of solution - 3 mn.
- Harvesting machine: 2 - 3 L of solution - 4 to 5 mn.

ZYMAFLORE® ÉGIDE^{TDMP} solution can be stored for 5 - 6 hours at 25°C (77°F).

SPRAYING ZYMAFLORE® ÉGIDE^{TDMP} ON EQUIPMENT: IMPACT ON THE GRAPES.

Microbiological analyses of grapes in the cellar, with and without prior application of ZYMAFLORE® ÉGIDE^{TDMP} (BIOProtection agent) on the harvesting machine and grape trailer, show the following results.

Count of grape microflora on "total yeast" culture medium:



Without BIOProtection: significant presence of moulds and potentially undesirable microorganisms on grapes at the end of the day of picking.



BIOProtection with ZYMAFLORE® ÉGIDE^{TDMP}: exclusive and progressive colonisation of the grapes by ZYMAFLORE® ÉGIDE^{TDMP} during the day of picking and absence of moulds.

A *q-PCR MPTD analysis reveals population levels of ZYMAFLORE® ÉGIDE^{TDMP} of 9.6×10^6 cells/mL, confirming its significant presence for optimum bioprotection of the grapes.

*q-PCR MPTD: specific for the two species *M. pulcherrima* *T. delbrueckii*.

ZYMAFLORE® ÉGIDE^{TDMP} ON EQUIPMENT ALLOWS:

- Colonisation of equipment and grapes throughout the day.
- BIOProtection through limiting the growth of microorganisms and moulds potentially detrimental to the final quality of the wine.

FOCUS

BIOPROTECTION

BIOPROTECTION, HOW AND WHY?

- **BIOProtection** consists in the addition of a living organism to occupy the ecological niche and thus limit the predominance of potentially undesirable indigenous microorganisms.
- In practical winemaking terms, it means applying selected microorganisms to the grapes or must to limit the occurrence of changes harmful to wine quality.

PREREQUISITES

- Microorganisms selected from the grape and/or must microflora, to guarantee their oenological origin.
- Microorganisms with low fermentation activity at the inoculated dose and able to colonise the medium.
- Selection of high-quality strains from among recognised species.

TWO BIOPROTECTION SOLUTIONS FROM LAFFORT®

Characteristics of the two **BIOProtection** solutions from LAFFORT®:

ZYMAFLORE® ÉGIDE ^{TDMP}	ZYMAFLORE® KHIO ^{MP}
Mixture of 2 strains of the species <i>Torulasporea delbrueckii</i> and <i>Metschnikowia pulcherrima</i>	Specific strain of the species <i>Metschnikowia pulcherrima</i>
Ability to become established under diverse conditions (musts and grapes).	Suitable for pre-fermentation phases at low temperature (resistance to cold).
Application to harvesting equipment.	High capacity to consume dissolved oxygen in musts.
Low fermentation activity.	Very low fermentation activity.
Robustness to non-rehydration.	Robustness to non-rehydration.



IMPACTS OF SO₂ REDUCTION ON THE MICROBIAL POPULATION

When SO₂ is reduced, the microbiological pressure on the must is increased. Indigenous populations are larger than after conventional sulphite addition. Depending on the oenological context, the effect can be variable, as shown below.

The reduction in the dose of SO₂ changes the microbial balance in the musts.

	SO ₂ -	SO ₂ +
<i>Saccharomyces cerevisiae</i>	↘	↗
<i>Starmmerella bacillaris</i>	→	→
<i>Hanseniaspora uvarum</i>	↗	↘
<i>Torulasporea delbrueckii</i>	↘	↗

PREFERMENT project - Albertin et al., 2014.

Not all yeast species present react in the same way to variations in SO₂ levels. An undesirable species, *Hanseniaspora uvarum* (VA production), seems particularly favoured when SO₂ doses are low or if no sulphites are added.

At low or zero SO₂, the microbiological pressure leads to undesirable effects that can be avoided through **BIOProtection**.

In the case of grapes without sulphite only, the microbiological pressure of the must is such that it limits establishment of the inoculated *S. cerevisiae* yeast. Consequently, the concentration of undesirable compounds (ethyl acetate and VA) and compounds that bind with SO₂ is greater than in grapes without sulphite but with bioprotection.

		No sulphite	No sulphite + ZYMAFLORE® ÉGIDE ^{TDMP}
Analysis during AF	Establishment of the <i>S. cerevisiae</i> strain	Negativ	Positiv
Analysis at end of AF	TL35 (mg/L)	74	61
	Ethyl acetate (mg/L)	86	61
	VA (g/L H ₂ SO ₄)	0.22	0.13

*Impact of using ZYMAFLORE® ÉGIDE^{TDMP} (5 g/hL) during vinification with no sulphite added. Musts inoculated with a *S. cerevisiae* strain at 20 g/hL after a 48 h pre-fermentation period at 12°C (53°F).*



BIOPROTECTION & OXYGEN CONSUMPTION

ZYMAFLORE® KHIO^{MP}

The LAFFORT® solution for the BIOProtection of grapes and musts at low temperatures.

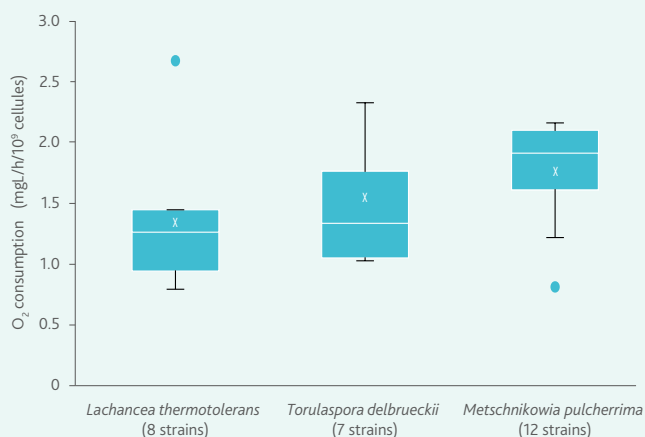
Selected strain of the species *Metschnikowia pulcherrima* with a high capacity to consume dissolved oxygen in musts while limiting the development of potentially undesirable indigenous flora.

Suitable for particularly long pre-fermentation phases at low temperature:

- On white and rosé musts (stabilisation).
- On grapes when filling the tank, for cold soaking before fermentation.

The concentration of dissolved oxygen in musts varies according to the temperature. It is more soluble at low temperature. Applied early, ZYMAFLORE® KHIO^{MP} thus ensures adequate antioxidant activity due to its ability to become established at low temperature.

Strains of the species *Metschnikowia pulcherrima* consume more dissolved oxygen than other non-*Saccharomyces* yeast strains.



Oxygen consumption of several non-*Saccharomyces* yeast species.
 MORE BIOPROTECT project, 2021 - Windholtz, S.,
 Masneuf-Pomarède, I., Nioi, C.



FOCUS

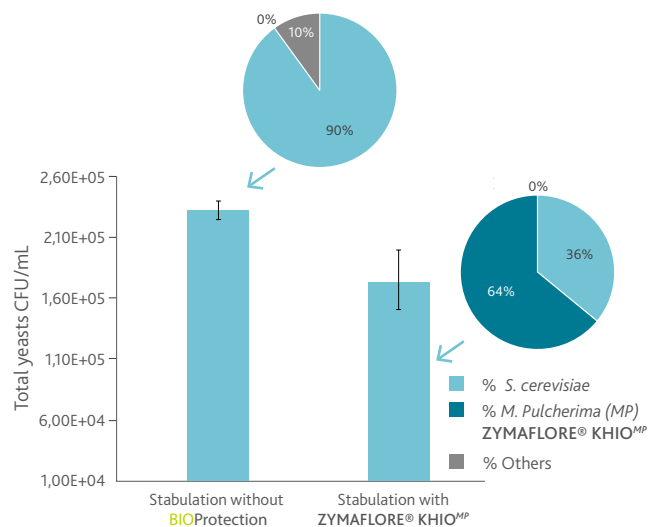
BIOPROTECTION & CONTROL OF THE MICROBIAL POPULATION

During long pre-fermentation phases, the presence of nutrient-rich solids can encourage the growth of indigenous microflora.

The latter can lead to spontaneous alcoholic fermentation, making must clarification more difficult and impacting the final quality of the wine. This makes it more difficult to establish a selected *S. cerevisiae* yeast for a quality alcoholic fermentation.

ZYMAFLORE® KHIO^{MP} allows to limit the development of indigenous microflora.

Distribution of the different yeast populations in the must at the end of stabilisation (counting on specific medium).



Stabilisation for 10 days at 4°C (39°F).
 At the start of stabilisation Inoculation with ZYMAFLORE® KHIO^{MP} at 5 g/hL.

Control tank: more than 90% of the microflora present at the end of stabilisation are indigenous *S. cerevisiae* yeasts.

With inoculation: significant colonisation of ZYMAFLORE® KHIO^{MP}, limiting the development of indigenous *S. cerevisiae* yeasts (only 36% of total yeasts). BIOProtection limits the risk of fermentation starting spontaneously during stabilisation.

BIOACIDIFICATION AROMATIC COMPLEXITY

Yeast excellence



ZYMAFLORE® ALPHA^{TDN.SACCH}

500 g

Non-*Saccharomyces* yeast (*Torulaspora delbrueckii*) for a complex aromatic profile and increased mouthfeel. All grape varieties.

- POF(-) character [no formation of vinyl phenols]: fine and clean profile.
- Increases aromatic complexity of both varietal and fermentation aromas.
- Increases mouthfeel volume through high polysaccharides production.
- Low volatile acidity production in high sugar and *Botrytis* infected musts.
- Control of indigeneous populations as part of a strategy to reduce SO₂ doses.
- Inoculate with a strain of *Saccharomyces cerevisiae* of your choice 24 to 72 hours after the addition of ZYMAFLORE® ALPHA^{TDN.SACCH} to secure the completion of the alcoholic fermentation and to benefit from the sensory impact of ZYMAFLORE® ALPHA^{TDN.SACCH}.

Dosage: 30 g/hL (300 ppm) for dry wines; 40 g/hL (400 ppm) for desert wines.

NEW IN 2022



ZYMAFLORE® OMEGA^{LT}

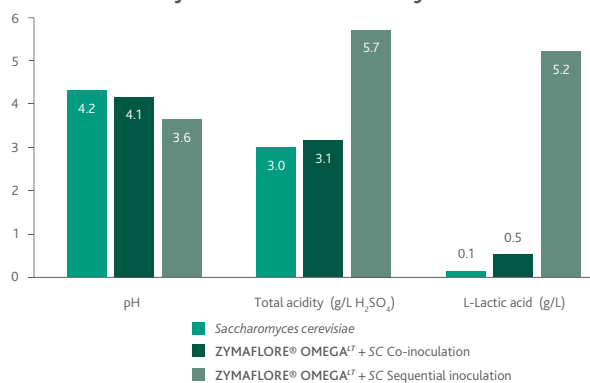
500 g

Non-*Saccharomyces* yeast of the species *Lachancea thermotolerans* for the BIOAcidification of wines (red, white and rosé). Allows adjustment of the acid balance and favours a fresh organoleptic profile.

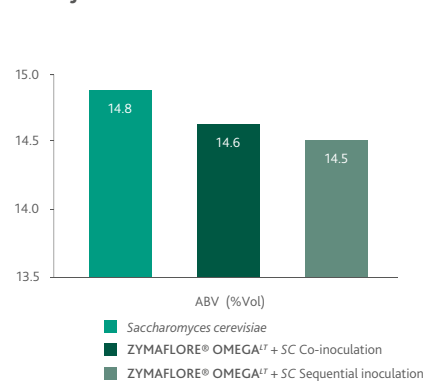
- Selected for its strong ability to produce L-lactic acid from fermentable sugars.
- Decrease in the pH and increase in the total acidity of wines accompanied by a slight reduction in alcohol content.
- Recommended for healthy and lightly sulphited harvests (less than 4 g/hL).
- To be used in co-inoculation (simultaneous yeast additions) or in sequential inoculation with the *Saccharomyces cerevisiae* strain of your choice to complete the alcoholic fermentation. Sequential inoculation of *Saccharomyces cerevisiae* favours the expression of ZYMAFLORE® OMEGA^{LT}.

Dosage: 20 - 40 g/hL (200 - 400 ppm).

Adjustment of the acidity



Adjustment of the alcohol level



Adjustment of acidity and alcohol level in wines resulting from co-inoculation (simultaneous yeast additions) or sequential inoculation with ZYMAFLORE® OMEGA^{LT} and a strain of *Saccharomyces cerevisiae*

Conditions: Viognier, Australia, 2019; AF temperature 18 °C (64°F), pH 3.9 (Hranilovic et al. 2022).

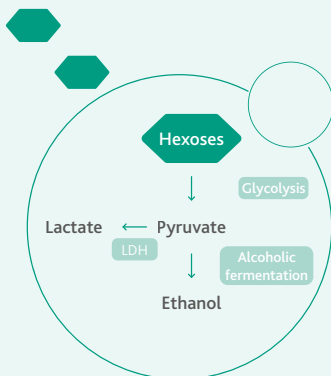
FOCUS

BIOACIDIFICATION

BIOACIDIFICATION BY *LACHANCEA THERMOTOLERANS*

Lachancea thermotolerans is a yeast that forms part of the indigenous flora of grapes. It can transform part of the fermentable sugars (glucose + fructose) into L-lactic acid rather than ethanol during the alcoholic fermentation (Figure 1).

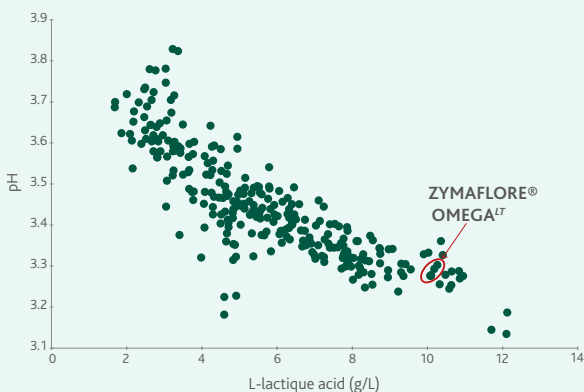
Mechanisms for BIOAcidification by *Lachancea thermotolerans*



Production of L-lactic acid by *Lachancea thermotolerans* through the enzymatic activity of lactate dehydrogenase (LDH; Hranilovic et al., 2018).

This capacity for BIOAcidification varies from one strain of *Lachancea thermotolerans* to another. Some strains produce very little L-lactic acid, while other strains produce high levels.

Effects of different *Lachancea thermotolerans* strains on wine pH



Production of L-lactic acid by 94 strains of *Lachancea thermotolerans* (in triplicate) and their effects on wine pH (Chardonnay ~240 g/L sugar; initial pH 3.6; must without added sulphite; Hranilovic et al., 2018).

LAFFORT® SOLUTION



ZYMAFLORE® OMEGA^{LT}
The LAFFORT® Solution to promote freshness and restore the balance of wines.



Selected from more than 100 strains of *Lachancea thermotolerans* for its high capacity to produce L-lactic acid, ZYMAFLORE® OMEGA^{LT} brings freshness and restores balance to wines.

The level of BIOAcidification provided by ZYMAFLORE® OMEGA^{LT} can be adapted to the technical goal and the vinification conditions, in particular according to the temperature of AF and the timing of inoculation with *Saccharomyces cerevisiae*.

Its metabolic activity is greater at high temperature (>20°C/68°F) and in the absence of *Saccharomyces cerevisiae* (sequential inoculation).

Refer to the product data sheet for the different application methods.

ANALYTICAL & SENSORY IMPACTS

- Enhanced perception of acidity in wines from warm climates/vintages by favouring fresher organoleptic profiles.
- Decrease in pH and increase in total acidity of the wine, accompanied by a slight decrease in alcohol.
- Allows the production of more acidic batches as part of a blending strategy.
- Colour stabilisation and increased ageing capacity.
- Alternative to traditional acidification by adding organic acids.

BIOACIDIFICATION & SO₂ REDUCTION

- Microbiological stabilisation is facilitated during ageing due to the drop in pH increasing the proportion of active SO₂.
- BIOControl of lactic acid bacteria. Inhibition of MLF in the case of high production of L-lactic acid (greater than 3 - 4 g/L).

ZYMAFLORE®

Yeast excellence

Grape variety	Yeast	Alcohol Resistance* (%v/v)	Nitrogen Requirements	Optimal Fermentation Temperature	Fermentation Kinetics	Sensory Impact
Merlot, Cabernet Sauvignon, Cabernet Franc, Pinot noir...	F15	16%	Medium	20 - 32°C 68 - 90°F	Rapid	Fruit Volume
Grenache, Carignan, Sangiovese, Mourvedre, Syrah, Merlot...	F83	16.5%	Medium	20 - 30°C 68 - 86°F	Regular	Fruit Volume
Cabernet Sauvignon, Petit Verdot, Malbec...	FX10	16%	Low	20 - 35°C 68 - 95°F	Regular	Neutral Volume
Pinot noir, Merlot, Gamay...	RB2	15%	Low	20 - 32°C 68 - 90°F	Regular	Varietal
Aromatic wines, "primeur" style...	RB4	15%	Low	20 - 30°C 68 - 86°F	Rapid	Fruity Primeur
Syrah, Grenache, Tempranillo...	RX60	16.5%	High	20 - 30°C 68 - 86°F	Regular	Varietal
Terroir highlight	XPURE	16%	Medium	15 - 30°C 59 - 86°F	Regular	Fruit Volume
Aromatic intensity all grape varieties	XAROM	15	High	14 - 22°C 57 - 72°F	Regular	Esters - Amyl Intensity
Pinot Gris, Riesling, Pinot Blanc, Melon de Bourgogne, Sylvaner, Müller Thurgau...	XORIGIN	15.5%	Low	14 - 22°C 57 - 72°F	Rapid	Volume Fruity Varietal
Chardonnay	CX9	16%	Low	14 - 22°C 57 - 72°F	Regular	Varietal Volume
Riesling, Pinot Gris, Viognier, Chenin, Vermentino, Gewurztraminer, Sauvignon Blanc	DELTA	14.5%	High	14 - 22°C 57 - 72°F	Regular	Varietal
Secondary fermentation (sparkling wines)	SPARK	17%	Low	10 - 32°C 50 - 90°F	Rapid	Neutral
Sweet wines	ST	15%	High	14 - 20°C 57 - 68°F	Regular	Varietal
Chardonnay, Semillon, Riesling, Gewurztraminer, Chenin, Muscat...	VL1	14.5%	High	16 - 20°C 61 - 68°F	Regular	Varietal
Chardonnay Semillon, Viognier	VL2	15.5%	Medium	14 - 20°C 57 - 68°F	Regular	Varietal Volume
Sauvignon blanc, Colombard...	VL3	14.5%	High	15 - 21°C 59 - 70°F	Regular	Varietal Volume
Sauvignon Blanc, Colombard, Rolle, Manseng, Riesling...	X5	16%	High	13 - 20°C 55 - 68°F	Rapid	Varietal Esters
Chenin, Chardonnay, Ugni Blanc, Colombard...	X16	16.5%	Medium	12 - 18°C 54 - 64°F	Rapid	Esters
All grapes	011 BIO	16%	Low	14 - 26°C 57 - 79°F	Rapid	Neutral

RED WINE



WHITE & ROSÉ WINE



ORGANIC

* Yeast alcohol tolerance depends on nutrition, temperature, etc. It is recommended to use **SUPERSTART® ROUGE** (for red wines) or **SUPERSTART® BLANC** (for white and rosé wines) and a higher yeast dose rate for wines with high alcohol potential.

ZYMAFLORE® - ALL TYPES OF WINES

Yeast excellence

NEW IN 2022



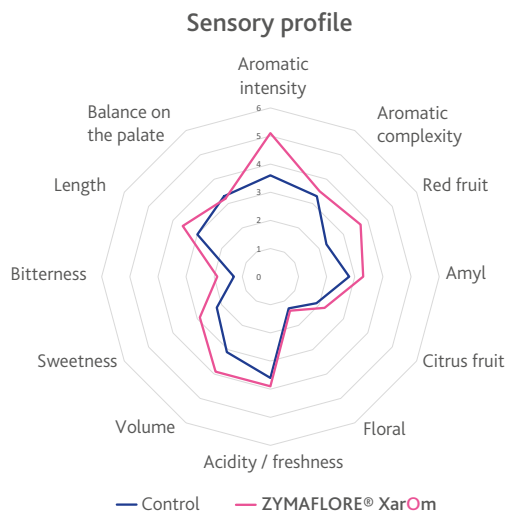
ZYMAFLORE® XarOm

500 g

Yeast allowing intense production of fermentation aromas, amyl aromas (boiled sweets, yellow fruit, strawberry, pineapple, etc.).

- Ability to produce wines with very great aromatic intensity.
- Suitable for vinification of neutral grape varieties or as part of a blending strategy.
- Genetic ability to preserve malic acid during AF.
- POF(-) character [no formation of vinyl phenols]: **fine and clean aromatic profile.**
- Very low production of volatile acidity.
- Fermentation temperature (optimum): 14 - 24°C (57 - 75°F).

Dosage: 20 - 30 g/hL (200 - 300 ppm).



Wine vinified with ZYMAFLORE® XarOm presents a more intense sensory profile. Tasting results by a panel of trained tasters. (Rosé - Languedoc-Roussillon, 2021)



CERTIFIED ORGANIC YEAST



ZYMAFLORE® 011 BIO

500 g

Organic certified yeast according to European organic production regulations (EU) 848/2018 and compliant with U.S. National Organic Program (NOP) for organic production.

This *Saccharomyces cerevisiae* strain has been selected for its remarkable fermentation capabilities, its high alcohol tolerance, its respect for varietal typicity, and its low production of medium-chain fatty acid compounds inhibiting lactic acid bacteria.

Its alcohol tolerance makes ZYMAFLORE® 011 BIO well adapted to restarting stuck fermentations or inoculation in case of sluggish spontaneous fermentations to ensure a healthy completion of fermentation.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

30 - 50 g/hL (300 - 500 ppm) in case of stuck fermentation.

RED WINES

Yeast excellence



ZYMAFLORE® XPURE

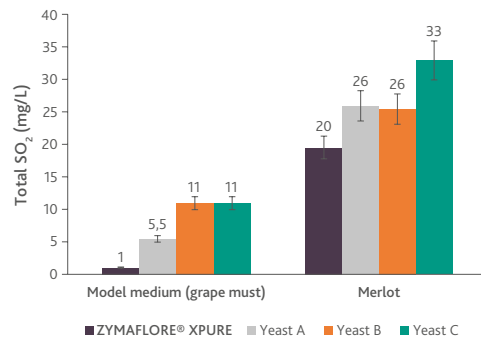
Yeast for varietal red wines. Enhances aromatic purity.

- Suitable for vinification with reduced doses of sulphites for a low total SO₂.
- Low production of volatile acidity.
- ZYMAFLORE® XPURE is suited to the production of red wines for full expression of the **aromatic finesse** and potential of the grapes.
- Reduces the perception of vegetal characters.
- Promotes the expression of **dark fruit** and **aromatic freshness**.
- Allows the production of wines with **great suppleness** in the mouth and **sweetness** on the palate.
- Excellent fermentation ability.

Dosage: 15 - 30 g/hL (150 - 300 ppm).



500 g
10 kg



Total SO₂ – end of alcoholic fermentation

Trial on must: Merlot, ABV: 15% vol., total SO₂: 40 mg/L (40 ppm).

Trial in model medium: synthetic must, ABV: 13% vol., total SO₂: 20 mg/L (20 ppm).

ZYMAFLORE® XPURE allows for lower concentrations of total SO₂ at the end of the alcoholic fermentation.



ZYMAFLORE® FX10

Yeast for wines showing structured and silky tannins. Cabernet Sauvignon, Cabernet Franc, Merlot...

- Fructophilic character.
- Improved cell viability at high fermentation temperatures.
- **Preserves varietal specificity and terroir** (very low production of fermentation aromas).
- Good for ageing on lees (liberation of Hsp12 protein gives perception of **sweetness**).
- High polysaccharide release (contributes to **softening tannins**).
- Helps to mask the perception of green characters.

Dosage: 15 - 30 g/hL (150 - 300 ppm).



500 g
10 kg



ZYMAFLORE® RX60

Yeast for fruity, spicy red wines. Syrah, Grenache, Tempranillo and fruit forward wines...

- Very high aroma production (**fresh currant and berry aromas**).
- Low production of H₂S.
- LACTOENOS® 450 PREAC recommended in early co-inoculation to preserve aromatic freshness.

Dosage: 15 - 30 g/hL (150 - 300 ppm).



500 g
10 kg



Consider SUPERSTART® ROUGE to optimise yeast viability in juice and must with high sugar concentration. See P. 22

RED WINES

Yeast excellence



ZYMAFLORE® F15

Yeast for rounded, full bodied wines. Merlot, Cabernet Sauvignon, Pinot Noir...

- Isolated from one of the best terroirs in Bordeaux.
- Broad aromatic spectrum.
- **Fermentation security**, high compatibility with bacteria strains.
- Produces wines suitable for extended ageing.

Dosage: 15 - 30 g/hL (150 - 300 ppm).

500 g
10 kg



ZYMAFLORE® RB2

Yeast for fruity and elegant red wines. Pinot Noir, Nebbiolo, Merlot...

- Strain isolated from a premium estate in Burgundy.
- Low colour **matter adsorbtion**.
- Good aptitude for expressing **typical aromas** like cherry/kirsch.

Dosage: 15 - 30 g/hL (150 - 300 ppm).

500 g



ZYMAFLORE® F83

Yeast for supple, fruity and floral red wines. Grenache, Nebbiolo, Sangiovese, Tempranillo, Syrah...

- Strain isolated in Tuscany from Sangiovese.
- High production of **red fruit** aromas.
- Respects the typicity of mediterranean grape varieties.

Dosage: 15 - 30 g/hL (150 - 300 ppm).

500 g



ZYMAFLORE® RB4

Yeast for aromatic wines, "primeur" style.

- Strain selected in Beaujolais.
- Important production of fermentation aromas such as **red fruits**.
- Ideal strain for rapid initiation of MLF.
- Aromatic and fruity wines, **long finish**.

Dosage: 15 - 30 g/hL (150 - 300 ppm).

500 g



THINK NOBILE® !

Supplementing the natural supply of ellagic tannins and polysaccharides, adding **NOBILE® FRESH GRANULAR 24M** (untoasted oak) during alcoholic fermentation can prepare your wine ageing while raising its aromatic potential and fruit expression.

Dosage: 2 to 4 g/L.

See P. 79

WHITE & ROSÉS WINES

Yeast excellence



ZYMAFLORE® X5

Yeast for aromatic white wines with excellent thiol expression. Sauvignon blanc, Pinot Gris, Riesling, Gewürztraminer & rosé...

- Strong expression of **volatile thiols** (boxwood, tropical fruits) and production of **fermentation aromas**.
- **Fresh and complex** wines.

Dosage: 20 - 30 g/hL (200 - 300 ppm).



500 g
10 kg

SELECTING YOUR YEAST STRAIN FOR HIGH-THIOL WINE VARIETIES

	ZYMAFLORE® DELTA	ZYMAFLORE® X5	ZYMAFLORE® VL3
Varietal expression	••••• (grapefruit / 3SH)	•••••	•••••
Production of fermentation esters	-	••	-
Aromatic intensity	••••	•••••	•••
Volume and sweetness on the palate	••••	••	•••••
Fermentative capability	••	•••••	••••
Optimal conditions	150 - 250 NTU 18 - 20°C (64 - 68°F)	80 - 150 NTU 16 - 20°C (60 - 68°F)	100 - 150 NTU 18 - 20°C (64 - 68°F)



To increase the thiol concentration in your wines, think about **LAFAZYM THIOLS⁺**. See our focus on aromas P. 38.



ZYMAFLORE® DELTA

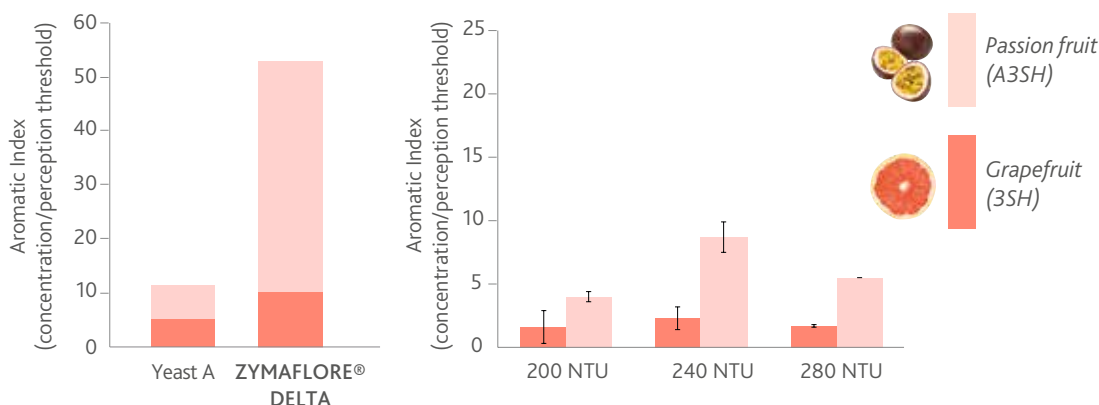
Yeast for aromatic white and rosé wines. Sauvignon Blanc, Viognier, Chenin Blanc, Gewürztraminer, Riesling, Pinot Gris...

- **Complex and elegant** wines, clean aromatic profile.
- High expression of **citrus notes**, especially **grapefruit**.
- Optimal conditions for fermentation: 150 - 250 NTU turbidity.
- Very low formation of negative sulfur-containing compounds even at high turbidities.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g

Aromatic index of volatile thiol



Sauvignon Blanc, Bordeaux. Fermentation temperature 16 - 22°C (61 - 72°F). Check on yeast establishment: positive.

Analyses carried out at the end of alcoholic fermentation.

WHITE & ROSÉS WINES

Yeast excellence



ZYMAFLORE® XORIGIN

Production of well-balanced fine white wines, respecting the typical character of grape varieties and terroirs.

- Revelation of the aromatic potential of the grape variety: fine and elegant aromas of white- and yellow-flashed fruit, delicate flowers.
- Adds mouthfeel.
- Suitable for vinification with reduced doses of sulphites for a low total SO₂.
- Low production of volatile acidity.
- Very good fermentation capacities.
- POF(-) character [no formation of vinyl phenols]: fine and clean aromatic profile.

Dosage: 20 - 30 g/hL (200 - 300 ppm).



500 g



ZYMAFLORE® CX9

Yeast resulting from selection from a great Burgundy vineyard and breeding technology. Chardonnay...

- Develops notes of lemon, fresh hazelnut, almond and toast.
- Contributes to the balance between smoothness, tautness and mouthfeel.
- Very good fermentation ability.
- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- Particularly suited to Chardonnay vinification.

Dosage: 20 - 30 g/hL (200 - 300 ppm).



TYPICAL #CHARDONNAY

Consider the combined use of ZYMAFLORE® CX9 and NOBILE® STAVE 18- DIVINE.

500 g
10 kg



ZYMAFLORE® X16

Yeast for modern and aromatic style white and rosé wines. Viognier, Pinot Gris, Chenin Blanc, Colombard, Chardonnay...

- Very strong fermenter.
- High aromatic production (peach, white flowers, stone fruits).
- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- Low production of H₂S.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g
10 kg

SELECTING YOUR YEAST STRAIN FOR CHARDONNAY WINES

	ZYMAFLORE® CX9	ZYMAFLORE® VL1	ZYMAFLORE® VL2	ZYMAFLORE® X16
Varietal expression	..... (Lemon, hazelnut, almond and toasted bread)	..... (minerality, exotic fruits)	...	.
Production of fermentation esters	-	-	..(+)	.....
Aromatic intensity	.....	...	.....	.....
Volume on the palate	.....	.....	...	-
Fermentative capability	.....	...	...	.....

WHITE & ROSÉS WINES

Yeast excellence



ZYMAFLORE® VL1

Yeast for elegant and refined white wines. *Sémillon*, *Chardonnay*, *Riesling*, *Gewürztraminer*, *Chenin*, *Muscat*...

- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- High β -glucosidase enzymatic activity.
- Expression of floral **terpene varietal aromas**.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g
10 kg



ZYMAFLORE® VL2

Yeast for delicate and clean barrel fermented wines. *Sémillon*, *Chardonnay*, *Viognier*...

- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- High polysaccharides production.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g



ZYMAFLORE® VL3

Yeast for wines of elegance and finesse with high expression of volatile thiols. *Sauvignon Blanc*, *Gewürztraminer*, *Riesling*, *Colombard* & *Pinot Gris*.

- Isolated from one of the best *Sauvignon Blanc* vineyards in Bordeaux.
- Good aptitude for expressing the **varietal aromas** such as volatils thiols from the odourless precursors in the must.
- **Volume** and **roundness** in the mouth.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g
10 kg



ZYMAFLORE® ST

Yeast for sweet wines from *Botrytised grapes*. *Late Harvest*, *Semillon*, *Riesling*...

- Strain selected in Sauternes.
- Sensitive to SO_2 for arresting fermentation easily and **low production** of SO_2 binding compounds.
- Resistance to high sugar concentration.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g



THINK NOBILE® !

Supplementing the natural supply of ellagic tannins and polysaccharides, adding **NOBILE® FRESH GRANULAR 24M** (untoasted oak) during alcoholic fermentation can prepare your wine ageing while raising its aromatic potential and fruit expression.

Dosage: 0.5 - 2 g/L.

See P. 79

SPARKLING WINES

Yeast excellence



ZYMAFLORE® SPARK

Secondary fermentation and tough conditions.

- Still wine fermentation and secondary fermentation of sparkling wines.
- Resistant to difficult fermentation conditions (potential alcohol, turbidity, temperature).
- Tolerates high SO₂ and alcohol levels.

Dosage: 20 - 30 g/hL (200 - 300 ppm).



500 g

Tested and validated by the laboratory for microbiological technique at the Comité Interprofessionnel du Vin de Champagne (CIVC).



For the complete range of products for sparkling wines and LAFFORT® recommendations.

See P. 89



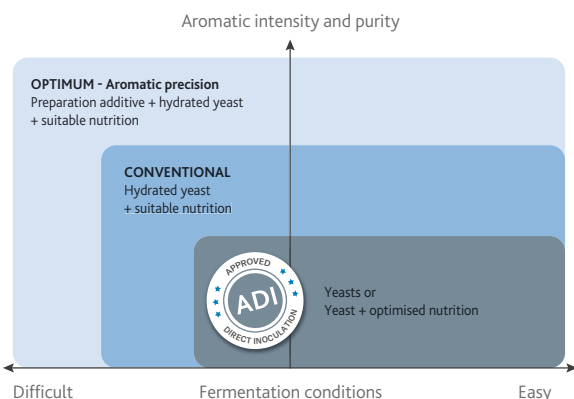
ADI - YEASTS APPROVED FOR DIRECT INOCULATION



In 2022, LAFFORT® is offering a selection of strains for direct inoculation.

Several years of qualification, based on discriminating criteria such as cell viability after inoculation or the resumption of cell activity, have made it possible to approve strains from our collection for easier application while preserving their intrinsic characteristics.

ZYMAFLORE® RX60, ZYMAFLORE® X5, ACTIFLORE® BO213, ACTIFLORE® F33 et ACTIFLORE® D.ONE are now offered for inoculation without rehydration.



The ADI concept forms part of the overall and controlled management of the alcoholic fermentation, to preserve wine quality whatever the fermentation conditions.

Extreme fermentation conditions (temperature, high fermentable sugar, strong pressure from indigenous microflora) or the quest for intense and precise aromatic profiles must be taken into account when choosing the most appropriate inoculation strategy. A controlled fermentation is a guarantee of good winemaking practice for the production of quality wines.




Find out more: Discover our **YEAST REHYDRATION** video on our website, at **LAFFORT & YOU** section.

ACTIFLORE®

Natural performance

Inoculation with a selected yeast strain is part of the control of the alcoholic fermentation. Leaving the alcoholic fermentation to wild yeasts means taking a risk with both the **fermentation** (stuck ferment, increased VA, increased formation of SO₂-binding compounds...) and with the **aromas** (many potential off-flavours).

While the choice of yeast strain is essential, its establishment in the medium, its protection and its nutrition, to guarantee a smooth alcoholic fermentation up to completion, are also important. **Following the yeast addition procedure** is essential, to avoid population loss and to ensure it is properly established. ACTIFLORE® yeasts are **technical tools** for ensuring complete fermentation, without sensory fault, even under difficult conditions.

YEAST	ALCOHOL RESISTANCE (% VOL)	NITROGEN REQUIREMENTS	OPTIMAL FERMENTATION TEMPERATURE (°C)	FERMENTATION KINETICS	AROMATIC IMPACT
 ACTIFLORE® BO213	18	Low	10 - 32°C (50 - 90°F)	Rapid	Neutral
 ACTIFLORE® F33	16	Low	13 - 30°C (55 - 86°F)	Regular	Fruity
ACTIFLORE® RMS2	17	Low	10 - 30°C (50 - 86°F)	Rapid	Neutral
ACTIFLORE® ROSÉ	15	Medium	13 - 18°C (55 - 64°F)	Regular	Esters
ACTIFLORE® F5	15	Medium	13 - 25°C (55 - 77°F)	Regular	Neutral
ACTIFLORE® CEREVISIAE	13,5	Low	20 - 30°C (68 - 86°F)	Rapid	Fruity
 ACTIFLORE® D.ONE	16	Low	12 - 32°C (54 - 90°F)	Regular	Neutral

* Yeast alcohol tolerance depends on nutrition, temperature, etc. It is recommended to use **SUPERSTART®** and a higher yeast dose rate for wines with high alcohol potential.

ACTIFLORE® ROSÉ

Spicy and fruity notes.

- Excellent strain for the production of fruit-driven rosé wines, especially when they are made from grapes of low aromatic potential.
- POF(-) character (no vinyl phenol formation), resulting in a fine and **clean aromatic profile**.
- Strong implantation ability and fermentation rates.
- Produces high levels of **fermentation aromas**.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g
10 kg

Find out more: Discover our **FERMENTATION RESTART PROTOCOL** on our website, at **LAFFORT & YOU** section.

ACTIFLORE®

Natural performance



ACTIFLORE® BO213

Fermentation restart and clean aromatic profile.

- Very strong ability to restart sluggish or stuck fermentations.
- Excellent fermentation capacity.
- Ferments at low temperatures (10 - 12°C / 50 - 54°F).
- Tolerates extremely high alcohol (18 % vol.) levels.

Dosage: 20 - 30 g/hL (200 - 300 ppm).
 30 - 50 g/hL (300 - 500 ppm) for stuck fermentations. *Restarting stuck ferments - See P. 100.*

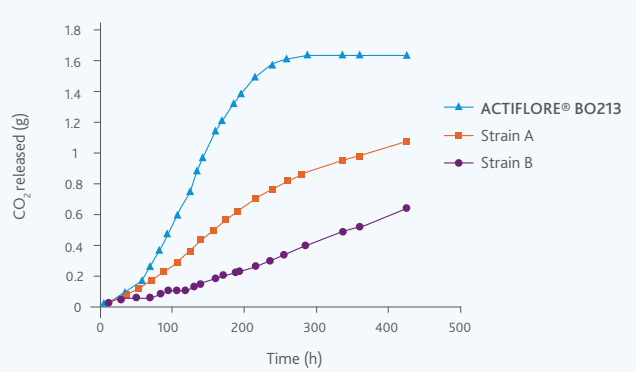
500 g
10 kg



FRUCTOPHILIC CHARACTER

S. cerevisiae metabolises glucose more easily than fructose, which results in higher fructose concentrations in wines at the end of fermentation. In addition, the accumulation of ethanol increases fermentation difficulties for the yeast at the end of AF.

Synthetic medium representative of a wine with stuck fermentation



ACTIFLORE® BO213 has two copies of a particular genetic form of the HXT3 gene (Guillaume et al., 2007). This gene codes for a protein responsible for sugar transport, allowing ACTIFLORE® BO213 to assimilate fructose better than most other winemaking strains. Composition of the medium: 16 g/L fructose, no glucose and 13.5% vol. ethanol.



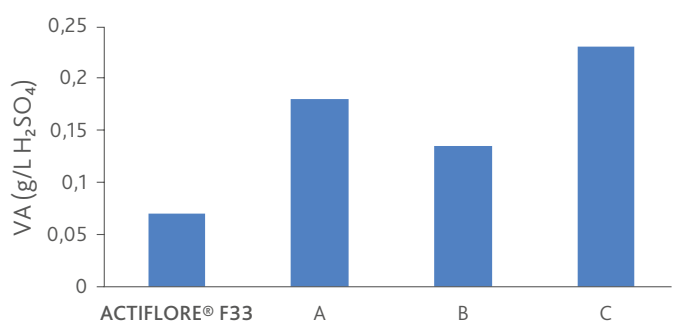
ACTIFLORE® F33

Low VA, high polysaccharide release, fermentation security.

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

Dosage: 15 - 30 g/hL (150 - 300 ppm).

500 g
10 kg



Volatile acidity at the end of AF

Comparison of VA production by 4 different strains of yeasts, at end of alcoholic fermentation (13.5% vol, pH: 3.6). Cabernet Sauvignon.

ACTIFLORE®

Natural performance

ACTIFLORE® F5

Yeast for base wines intended for distillation.

- Yeast selected for its ability to easily establish itself in the medium.
- Excellent fermentation capacities, short lag phase.
- Low production of SO₂.
- Low production of higher alcohols, ethanal, ethyl acetate.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g

ACTIFLORE® CEREVISIAE

Starter yeast.

- Selected for a rapid start to fermentation.
- Does not modify the varietal character of wines.

Dosage: 15 - 30 g/hL (150 - 300 ppm).

500 g
10 kg

ACTIFLORE® RMS2

Difficult conditions, low production of reduction compounds.

- Yeast selected for its superb white wine fermentation capabilities.
- Adapted to extreme white winemaking conditions (high volume, low turbidity, low temperature, anaerobic conditions).
- Very low production of H₂S.
- Also recommended for secondary fermentation of sparkling wines.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

500 g
10 kg



ACTIFLORE® D.ONE

Yeast-based preparation associated with an activator - Direct inoculation.

All types of wine.

- Easy to use in the winery; direct inoculation.
- Very robust *Saccharomyces cerevisiae* yeast with an activation supplement based on yeast derivatives, specific for effective direct inoculation.
- Neutral strain (respects the typical character of grape varieties).

Dosage: 30 - 40 g/hL (300 - 400 ppm) (depending on the potential alcohol); 50 g/hL (50 ppm) in case of late inoculation.

5 kg

NUTRIENTS

The best for your yeasts

A stressful fermentation results in aroma defects and production of factors inhibiting bacteria. Yeast must have complete nutrition for a stress-free fermentation. Grape nutrition and nutrient additions need to be balanced in both growth and survival factors for the yeast to ensure a clean and strong fermentation finish.

OENOLOGICAL CONCERN	YEAST METABOLISM FACTOR	RECOMMENDATION
Regular fermentation Avoid rapid fermentation or heat spikes.	Nutritional balance between mineral and organic nitrogen.	Partially or completely correct with organic nitrogen (not only with ammonium salts). Make two additions during the first third of fermentation.
Healthy fermentation completion.	Yeast viability and vitality. Cell membrane resistant to acid and alcohol stresses.	Use yeast rehydration products during the rehydration phase to add sterols and long-chain fatty acids to strengthen the cell membrane.
Clean aromatic profile Low H ₂ S and sulfur compound production, low VA, low masking of aromas.	Stress minimisation and good cell membrane permeability.	Rehydrate the yeast with specific rehydration nutrients. Add nutrients before midfermentation. Incorporate pantothenic acid (vitamin B5) from yeast nutrients to regulate and minimise H ₂ S production.
Aromatic optimisation Expression of varietal aromas and/or production of fermentation aromas.	Cell membrane permeability. Vitamins, minerals and precursors of fermentation esters (amino acids).	Use yeast rehydration nutrients to add sterols during rehydration for good fluidity and membrane transport. Nutrition quality and quantity to be determined in relation to desired aromatic profile.

For optimal nutrition and protection of yeast, LAFFORT® highly recommends rehydration with SUPERSTART®. Then add NUTRISTART® ORG, NUTRISTART® AROM or NUTRISTART® as required.

ASSIMILABLE NITROGEN CONTRIBUTION BY NUTRIENT

PRODUCT	EQUIVALENCE	BALANCE AND COMPOSITION			
	YAN CONTRIBUTION FROM 10 g/hL (100 ppm)	ORGANIC AVAILABLE NITROGEN	MINERAL AVAILABLE NITROGEN	VITAMINS AND MINERALS	NUTRITIONAL BALANCE
NUTRISTART® ORG	10 mg/L (10 ppm)	••••		••••	•••
NUTRISTART® AROM	14 mg/L (14 ppm)	•••	•	•••	••••
NUTRISTART®	15 mg/L (15 ppm)	•	•••	••	••
THIAZOTE®	21 mg/L (21 ppm)		••••	••	•

YEAST PERFORMANCE OPTIMISATION

The best for your yeasts

SUPERSTART® RANGE

SUPERSTART® products are for use at the active dry yeast rehydration step. SUPERSTART® use ensures optimal aromatic performance and a healthy and complete fermentation. Patent FR 2736651. These products:

1 kg
5 kg

- Provide the essential building blocks for yeast membranes (mainly long chain fatty acids and ergosterols).
- Guarantee fluidity of the membrane, its alcohol tolerance, and the correct conformation of transporters for better assimilation of sugars and nutrients (amino acids, etc.).
- Significantly **reduce production** of VA and H₂S.
- Promote onset of MLF (the yeast will produce fewer compounds inhibiting malolactic bacteria due to a less stressful).
- Primary fermentation.
- In nitrogen deficient juice and must, an additional supply of ammonium salts or organic nitrogen (NUTRISTART® AROM or NUTRISTART®) remains essential.
- To be used most particularly in the cases of high potential alcohol, low turbidity white juice, low fermentation temperature or yeast restart cultures.
- To be added into yeast rehydration water.

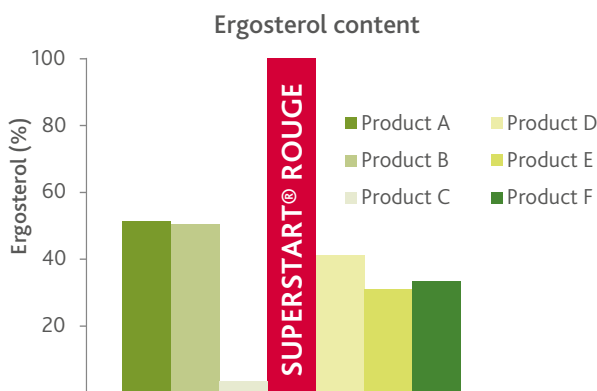
Dosage: 20 - 30 g/hL (200 - 300 ppm) (increase the dosage for potentially high alcohol juice and must).

SUPERSTART® *Rouge*

Due to its high ergosterol content, SUPERSTART® ROUGE improves yeast cell longevity under stressful conditions and increases yeast tolerance to high temperatures and alcohol.

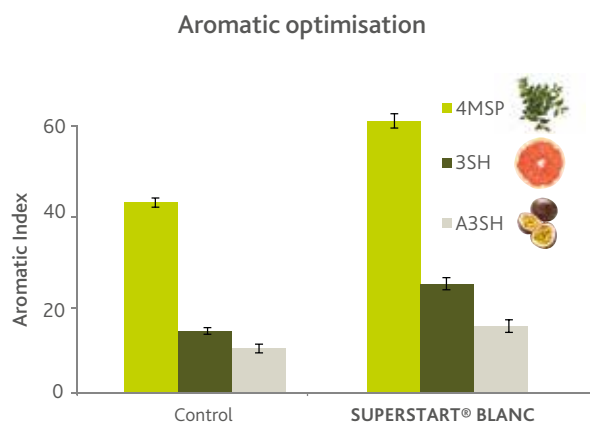
SUPERSTART® *Blanc* (white and rosé wines)

Due to its specific formulation, particularly rich in certain vitamins and mineral salts, SUPERSTART® BLANC optimises the production and aromatic revelation by yeasts guaranteeing stronger fermentation completion.



Comparison of ergosterol* contents (%) in different equivalent application products, standardised against the product with the highest concentration (100%), in this case, SUPERSTART® ROUGE.

*This sterol gives yeast a higher resistance to ethanol.



Sauvignon Blanc. ABV 12.5% vol. ZYMAFLORE® X5.

By improving the general assimilation of must compounds, SUPERSTART® BLANC optimises the yeast metabolism to give more aromatic wines.



Use SUPERSTART® SPARK for secondary fermentation and starters for stuck fermentation. See P. 91 & 92.

YEAST NUTRITION

The best for your yeasts



NUTRISTART® AROM

Complete nutrient (inactivated yeast, yeast cell fragments rich in glutathione and diammonium phosphate) enhancing the aromatic complexity of wines.

- **Balanced nitrogen sources** (organic and mineral) highlighting wine sensory complexity.
- Glutathione-rich formula useful during vinification of white and rosé wines to preserve the aromatic potential of wines.
- 10 g/hL (100 ppm) of NUTRISTART® AROM brings the equivalent of 14 mg/L (14 ppm) of assimilable nitrogen.

Dosage: 20 - 60 g/hL (200 - 600 ppm) depending on nitrogen deficiency levels.



1 kg
5 kg

NUTRISTART® ORG

100% organic nutrient from inactivated yeast (yeast autolysates), rich in amino acids, vitamins (thiamine, niacin, pantothenic acid, folic acid...), minerals and micro-nutrients (magnesium, manganese, zinc, iron...) favouring cell multiplication.

- Ensures regular and complete alcoholic fermentation in the case of slight to moderate nutritional deficiencies.
- Results in more aromatic wines and limits the formation of undesirable compounds (compounds that combine with SO₂, H₂S, etc.).
- In the case of large nitrogen deficiencies and/or high potential alcohol, use NUTRISTART® ORG with a supplementary nitrogen source to guarantee improved nutritional balance in the yeast.
- 10 g/hL (100 ppm) of NUTRISTART® ORG brings the equivalent of 10 mg/L (10 ppm) of assimilable nitrogen.

Dosage: 30 - 60 g/hL (300 - 600 ppm) according to the necessary nitrogen addition.



1 kg
5 kg

NUTRISTART®

All-round yeast activator combining growth and survival factors and promoting yeast multiplication (inactivated yeasts, yeast autolysates, diammonium phosphate, thiamine).

- To be used in the case of nutrient deficiency in the must.
- 10 g/hL (100 ppm) provides about 15 mg/L (15 ppm) assimilable nitrogen.

Dosage: 20 - 60 g/hL (200 - 600 ppm) depending on nitrogen requirement.



1 kg
5 kg
20 kg

Yeast nutrition: nitrogen adjustment

Calculate organic and/or inorganic nitrogen additions to allow complete alcoholic fermentations, expressing the character of the harvest.

Find out more: See our **DMT YEAST NUTRITION** on our website, at **LAFFORT & YOU** section.

FOCUS



YEAST NITROGEN NUTRITION

THE DEMAND FOR YEAST NITROGEN

The nitrogen sources that can be used by *Saccharomyces cerevisiae* are ammonium (NH_4^+) and amino acids (organic nitrogen). They both represent assimilable nitrogen and are present in must at varying concentrations, sometimes not in sufficient quantities to meet the requirements of the yeast. The three following factors must be taken into consideration:

- **Below 150 mg N/L, must is deficient.** It is therefore important to supplement it with nitrogen elements.
- **Yeast nitrogen requirements depend on sugar concentration.** The higher this concentration, the greater the amount of yeast biomass needed to successfully achieve a thorough breakdown of the sugars during alcoholic fermentation. Although, the yeast biomass must not be too excessive to avoid an induced nitrogen deficiency.
- **The nitrogen initially present in must is rapidly assimilated** during the first third of the alcoholic fermentation (d-30), at the point when the biomass is at its highest density. Consequently, irrespective of the initial nitrogen content, its addition at one-third alcoholic fermentation allows preservation of the biomass formed, which is dependent on the yeast strain and proportional to the initial nitrogen concentration.

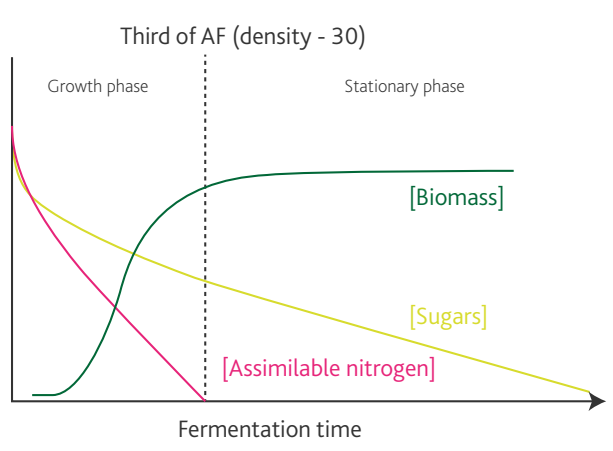
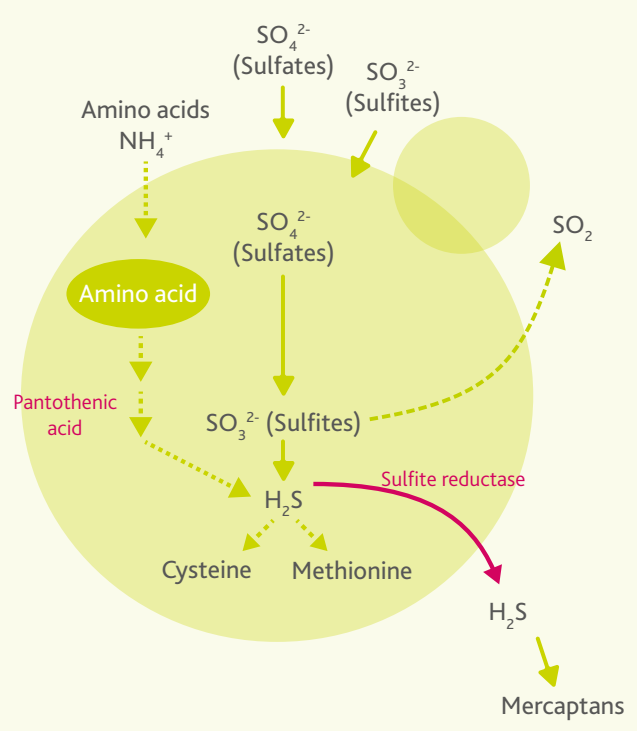


Figure 1: Assimilation of nitrogen and production of biomass during alcoholic fermentation.

DID YOU KNOW ?

The key enzyme in the production of H_2S is sulfite reductase. When the H_2S and amino acids pathways meet the sulfur amino acids (cysteine and methionine) are produced. Where there is an imbalance between these two pathways and a nitrogen deficiency, the precursors of these sulfur amino acids are limiting, leading to an accumulation of H_2S .



WHY ORGANIC NUTRITION ?

Organic nitrogen is supplied by adding yeast derivatives (usually autolysed yeast). In addition to amino acids, these yeast derivatives include lipids, vitamins and minerals which also contribute to the efficient performance of the yeast.

Yeast has the ability to simultaneously assimilate organic nitrogen and mineral nitrogen from the beginning of the alcoholic fermentation.

Organic nitrogen must be present in order to:

- Limit the production of SO₂ and sulfur compounds (H₂S and mercaptans).
- Produce healthy, but not excessive, biomass.
- Limit the risk of stuck or sluggish fermentation.

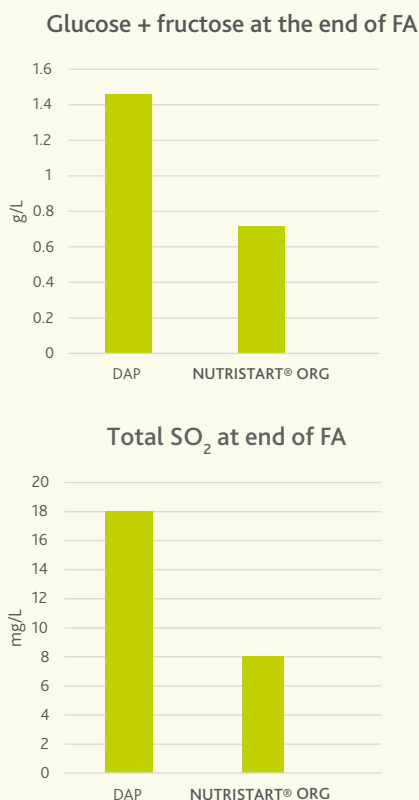


Figure 2: Concentrations of glucose + fructose and total SO₂ at the end of alcoholic fermentation. Must derived from Sauvignon Blanc (TAP vol. 13.9%, initial Nass: 125 mg N/L), 2016. At the one-third point of alcoholic fermentation, 35 mg N/L were added with DAP or NUTRISTART® ORG, deliberately making yeast conditions difficult.

ORGANOLEPTIC EFFECTS OF ORGANIC NUTRITION

Numerous experiments show that improved outcomes of alcoholic fermentation can be achieved with the use of organic nitrogen (figure 2). Even in the case of wines considered dry (glucose + fructose < 2 g/L), small amounts of fermentable sugars can be used by degrading microorganisms and can have an adverse effect on the quality of the wines.

Besides its effects on fermentation kinetics, the addition of organic nitrogen can increase the fruitiness of wines and limit the aromatic mask linked to the production of sulfur compounds during the alcoholic fermentation. Except for the source of the nitrogen added, a comparison of wines produced under the same conditions reveals significant preferences for wines derived from musts supplemented with NUTRISTART® ORG (table 1).

The wines are considered fruitier, fresher, less vegetal and subject to less reduction than those supplemented with mineral nitrogen alone.


MINERAL / ORGANIC COMPARISON	
Number of tasters	20
Number of correctly detected differences	13
Results	99% significant difference
Preference	Organic: 13/13

Table 1: Triangular tasting tests (ISO 4120-2004) of red wines. Comparison of two vinified Merlot wines with 65 mg N/L nitrogen added in the form of THIAZOTE® or NUTRISTART® ORG.

YEAST NUTRITION

The best for your yeasts

YEAST NUTRITION - OTHERS

	PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
NUTRITION	THIAZOTE®	Alcoholic fermentation activator (ammonium sulfate and thiamine). 10 g/hL (100 ppm) of THIAZOTE® provides 21 mg/L (21 ppm) assimilable nitrogen.	To be determined according to fermentation conditions (Initial YAN, potential alcohol...).	1 kg 5 kg 25 kg
	THIAZOTE® SP	Alcoholic fermentation activator (blend of ammonium phosphate, ammonium sulfate and thiamine). 10 g/hL (100 ppm) of THIAZOTE® SP provides 21 mg/L (21 ppm) assimilable nitrogen.	To be determined according to fermentation conditions (Initial YAN, probable alcohol...).	1 kg 5 kg 25 kg
	THIAZOTE® PH	Alcoholic fermentation activator (diammonium phosphate and thiamine). Suitable for organic according to Commission Regulation (EU) 848/2018. 10 g/hL (100 ppm) of THIAZOTE® PH provides 21 mg/L (21 ppm) assimilable nitrogen.	To be determined according to fermentation conditions (Initial YAN, probable alcohol...).	1 kg 5 kg 25 kg
DETOXIFICATION	BI-ACTIV®	A formulation of survival factors, yeast cell walls, inactivated yeast, and inert supporting elements. To be used when fermentation slows down or becomes stuck. Does not contain DAP.	30 - 60 g/hL (300 - 600 ppm).	1 kg 10 kg
	OENOCCELL®	Highly purified yeast cell walls. Stimulate and activate alcoholic fermentation.	20 - 40 g/hL (200 - 400 ppm), depending on the type of treatment.	1 kg
	OENOCCELL® BIO 	Yeast cell walls certified organic according to organic production methods in European regulation (EU) 848/2018, and complies with American regulations (NOP) on organic production.	20 - 40 g/hL (200 - 400 ppm), depending on the type of treatment.	1 kg
SUPPORT	TURBICEL®	Cellulose powder for over-clarified juice. 10 g/hL (100 ppm) increases the juice/must turbidity by 20 NTU.	20 - 50 g/hL (200 - 500 ppm), depending on the turbidity correction to be made.	5 kg

YEAST PRODUCTS

Innovations born from nature

AROMATIC PRESERVATION



FRESHAROM®

Specific preparation of inactivated yeasts with strong reducing power.

- Rich in reducing metabolites, FRESHAROM® has a much greater anti-oxidant potential than SO₂ or ascorbic acid.
- Promotes the assimilation of glutathione precursors (cysteine, N-acetylcysteine...) by the yeast during AF and thus increases the synthesis of this tripeptide.
- Effectively protects the aromatic potential of the wine and significantly delays the appearance of oxidised notes/ for more aromatic wines with better ageing potential.
- Inhibits wine browning mechanisms.

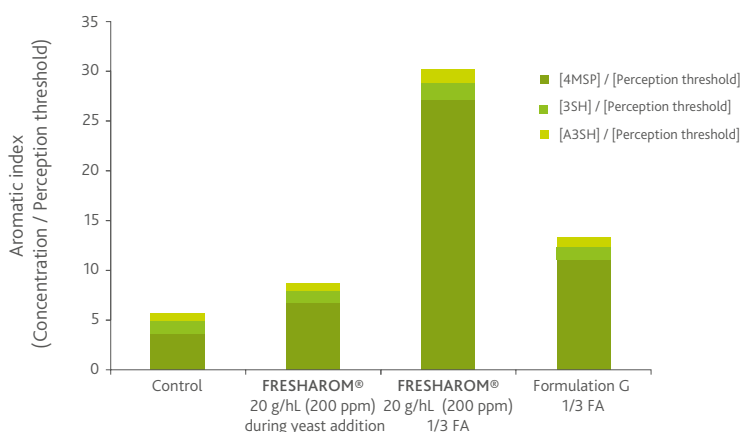
Dosage: 20 - 30 g/hL (200 - 300 ppm).

Incorporate to the tank during the first 1/3 of alcoholic fermentation.



1 kg
5 kg

Preservation and aromatic revelation with FRESHAROM®



Comparison of the concentration of aromatic molecules at the end of alcoholic fermentation.

The addition of FRESHAROM® promotes a higher concentration of volatile thiols and their preservation. The time of addition is important. To be programmed during a nutritional addition or aeration, a third of the way through alcoholic fermentation.

Study on Sauvignon Blanc must inoculated with ZYMAFLORE® X5.

AGEING ON LEES



OENOLEES® is an oenological product derived from natural constituents found in wine and obtained using innovative and patented production processes. It is paving the way for a new type of oenology: more natural, more specific while enhancing and preserving the integrity of wine.

OENOLEES®

Specific preparation based on yeast cell walls and inactivated yeasts with a high sapid peptide content (Patent EP 1850682).

OENOLEES®, the result of LAFFORT®'s research on the properties of yeast lees and their importance in wine, contributes towards improving the sensory quality in wine by:

- **Reducing aggressive sensations:** the cellular envelopes have a refining action that promotes elimination of certain polyphenols responsible for bitterness and astringency.
- **Increasing sweet sensations:** OENOLEES® has a high content of a specific peptide fraction that is released naturally by yeasts during autolysis and has an excessively low perception threshold (only 16 mg/L (16 ppm) compared to 3 g/L (3000 ppm) for sucrose).

Dosage: 20 - 40 g/hL (200 - 400 ppm).



1 kg
5 kg

YEAST PRODUCTS

Innovations born from nature

EARLY MATURITY



POWERLEES® *Rouge*

Formula based on inactivated yeast and β -glucanase, for fining during fermentation.

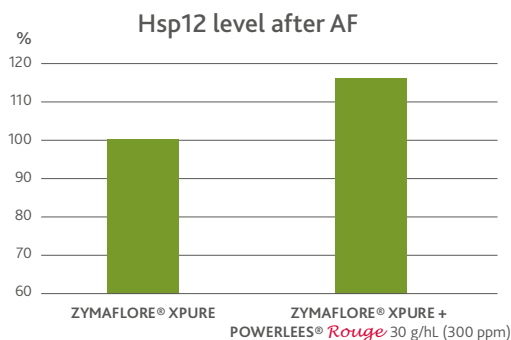
Developed by LAFFORT®, POWERLEES® *Rouge* carries inherent cell components that **soften the wine** from the beginning of the alcoholic fermentation.

- The enzyme action accelerates the sensory fining.
- Extraction of components with high sensory potential (sapid peptides from Hsp12 protein): β -glucanase helps the fast extraction of peptides present at the cell envelopes of the inactivated yeast and from yeast autolysis fragments.
- Contributes to wine stabilisation through fining and the diffusion of mannoprotein fragments from yeast.
- Allows the winemaker to rebuild lees in wines racked after fermentation.
- Specially adapted to quick-to-market wines.

Dosage: 15 - 40 g/hL (150 - 400 ppm).

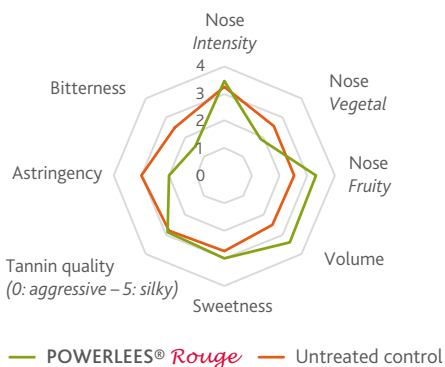


1 kg



POWERLEES® Rouge allows, from the end of AF, efficient liberation of larger fractions Hsp12 sapid peptides. Fermentation under synthetic media at 25°C (77°F). Inoculation with ZYMAFLORE® XPURE at 20 g/hL (200 ppm) Hsp12 measurement via HPLC, C18. Addition of *POWERLEES® Rouge* at start of AF.

Tasting profile after treatment with POWERLEES® *Rouge*



Tasting profile of wines treated with POWERLEES® Rouge
Averages of 8 trials on red wines, treatment in AF or on finished wine.

POWERLEES® Rouge (20 - 30 g/hL / 200 - 300 ppm) allows for a reduction in the perception of bitter and astringent notes. The aromatic intensity of the wines is not changed but the treated wines are perceived as more fruity and less vegetal. The perception of mouthfeel is clearly improved.

BACTERIA

Controlling 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:** bacteria are added 24 hours after the beginning of AF. The main goal is to optimise the bacterial acclimatisation and survival (close to 100% after inoculation) and to save time.
- **Late co-inoculation:** bacteria can also be added to the wine towards the end of AF, at about 3° Brix. The main goal of this technique is to prevent microbial alteration: selected bacteria will take over after yeast, and colonise the ecosystem avoiding spoilage micro-organism growth (*Brettanomyces* yeasts, biogenic amine-producing bacteria...).

These two co-inoculation techniques are also **economically significant**: the total energy costs are greatly reduced, since bacteria are added to a warm wine and MLF is faster. In addition, both techniques facilitate quick completion of the MLF, allowing the wine to be stabilised as soon as possible.

WHAT ARE THE KEY POINTS AND HOW TO PERFORM A CO-INOCULATION?

SO₂ management on the grapes, pH, yeast strain and nutrition, maceration and fermentation temperature, bacteria strain and inoculation are extremely important factors.

In case of co-inoculation, LAFFORT® recommends the LACTOENOS® B7 DIRECT, SB3 DIRECT or 450 PREAC® bacteria, depending on your wine conditions. Ask your LAFFORT® representative for the specific co-inoculation protocol.

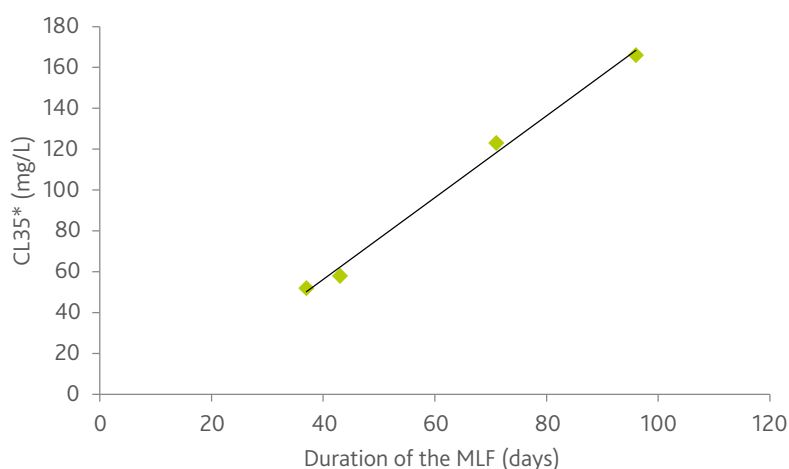


After completion of the alcoholic fermentation, malolactic fermentation is an excellent tool to limit the production of compounds that combine with SO₂ in the wine.

The bacteria are able to decompose compounds formed during the alcoholic fermentation that combine with SO₂. Thus, if started as soon as the AF is complete and carried out quickly, MLF provides a reduction in the wine's SO₂ combination rate, which is directly proportional to the length of the MLF (see figure opposite).

* CL35: dose of total SO₂ required to obtain 35 mg/L free SO₂. The higher the value, the higher the content of SO₂-binding components in the wine.

SO₂-Binding rate and MLF duration



Source: Coulon J. & al, RDO No. 151, April 2014, p.44 - 46. Sulfitage management
How to maximise the impact of SO₂ while controlling its intake.

LACTOENOS® RANGE

Managing MLF differently

CHOOSING THE RIGHT TYPE OF INOCULATION

INOCULATION TYPE	STAGE	RECOMMENDED LACTOENOS® PREPARATION	OBJECTIVES
Early Co-inoculation*	24 to 48 hours after the start of alcoholic fermentation.	450 PREAC B7 DIRECT B3 DIRECT	Save time and prevent degradation. Optimise management of the fermentation processes. Reduce the production of diacetyl. Aromatic freshness.
Late Co-inoculation	1010 density. At 1.7° Baume.	450 PREAC SB3 DIRECT B7 DIRECT	Monopolistic control of the ecosystem. Safeguarding a conventional vinification sequence (AF followed by MLF). Aromatic freshness.
Sequential Inoculation	At dryness and post pressing.	B7 DIRECT SB3 DIRECT 450 PREAC	Red wine MLF post pressing. MLF in barrel. Thermo-vinification. Reduce the potential of SO ₂ to combine with wine compounds.
Curative Inoculation	To restart a stuck MLF.	B7 DIRECT 450 PREAC	Restarting stuck MLF. Spring MLF.
Preparation of a starter	Must or wine	B16 STANDARD	Sparkling base wine / low pH

* During the first few days of AF, must pH drops by up to 0.2 units. This parameter is to be taken into account when selecting the strain.
Do not hesitate to contact your LAFFORT® representative to check on the inoculation time and quantity to incorporate.

STRAIN SPECIFICATIONS

PREPARATION	ALCOHOL	pH	SO ₂ TOTAL	TEMPERATURE
LACTOENOS® B7 DIRECT	≤ 16% vol.	≥ 3.2	≤ 60 mg/L (60 ppm)	≥ 16°C (61°F)
LACTOENOS® SB3 DIRECT	≤ 15% vol.	≥ 3.3	≤ 40 mg/L (40 ppm)	≥ 18°C (64°F)
LACTOENOS® 450 PREAC	≤ 17% vol.	≥ 3.3	≤ 60 mg/L (60 ppm)	≥ 16°C (61°F)
LACTOENOS® B16 STANDARD	≤ 14% vol.	≥ 2.9	≤ 60 mg/L (60 ppm)	≥ 16°C (61°F)

In the event of difficult or sluggish alcoholic fermentation, it is recommended to carry out a prior treatment with yeast hulls (OENOCCELL®, OENOCCELL® BIO) to reduce the fatty acid load and encourage the MLF.

LACTOENOS® RANGE

Managing MLF differently



LACTOENOS® B7 DIRECT

Direct inoculation bacteria.

- A strain that performs reliably in wide-ranging conditions of pH, alcohol, SO₂, temperature and tannic structure, in red, white and rosé wines.
- The direct process allows inoculation of LACTOENOS® B7 DIRECT directly into the wine.
- With well-managed MLF the fruitiness of the wine can be retained (low VA, no biogenic amines) and the combination rate in the wine (ethanal and other molecules combining SO₂) can be minimised, to achieve an increase in active SO₂.
- LACTOENOS® B7 DIRECT is particularly suitable for co-inoculation on must with a pH of > 3.4 (during the first few days of AF, the pH can drop by up to 0.20 units).

Dosage: refer to the packaging.



2.5 hL
25 hL
250 hL



LACTOENOS® SB3 DIRECT

Direct inoculation bacteria.

- The direct process allows inoculation of LACTOENOS® SB3 DIRECT directly into wines.
- In association with good fermentation management and correct yeast nutrition, LACTOENOS® SB3 DIRECT can be inoculated at the start of alcoholic fermentation (early co-inoculation) and ensures rapid MLF immediately afterwards.

Dosage: refer to the packaging.



2.5 hL
250 hL

LACTOENOS® 450 PREAC

A pre-acclimatised bacteria distinguished by its high malolactic activity.

- Strong implantation capacity in wines at any stage of its inoculation in wine or must (pH, fatty acids...).
- Especially selected for its resistance to **high alcohol** (up to 17% vol).
- An exclusive production process, developed by LAFFORT®, that ensures a higher bacterial survival rate and a shortened lag phase. ENERGIZER® starter supplied with the bacterium.

Dosage: refer to packaging.



50 hL
250 hL

LACTOENOS® B16 STANDARD

Bacteria to be reactivated in the form of a starter.

- Strain selected on a low-pH base wine, particularly suitable for the production of sparkling wines and wines at low pH.
- The adaptation is made by *pie de cuve* (multiple step protocol, 3 to 5 days duration, please refer to package label or product data sheet). The activator is supplied with the bacterium.

Dosage: refer to packaging.



50 hL
250 hL



In instances where the wine displays limiting characteristics (low pH, high level of clarification, high TA or SO₂ levels, nutritional deficiencies, problematic AF...), the addition of an MLF nutrient is essential for the activation and progress of MLF.

MALOBOOST®, nutrient specific for bacteria.

See P. 33

FOCUS



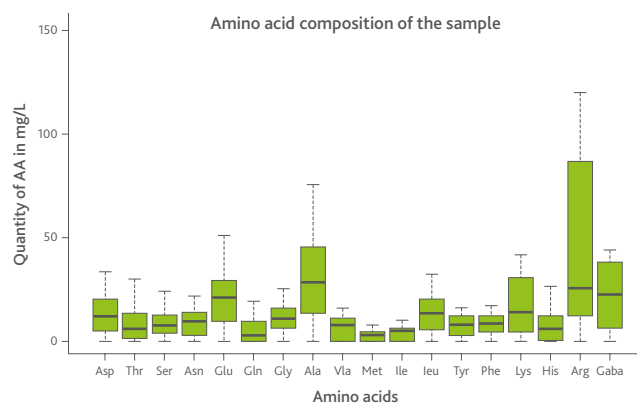
LACTIC ACID BACTERIA NUTRITION

Bacteria have specific nutritional needs that cannot be compared to those of *Saccharomyces cerevisiae* yeasts, which essentially require mineral and organic nitrogen in its free form.

NUTRITIONAL NEEDS OF *OENOCCOCUS OENI*

Unlike *Saccharomyces cerevisiae*, *Oenococcus oeni* is not able to use the nitrogen contained in the NH_4^+ ion (known as "mineral nitrogen"). They can however use other sources of nitrogen such as amino acids. The nature and number of these essential amino acids vary according to the strain, but there is agreement that some are indispensable to ensure growth of *Oenococcus oeni* (e.g. arginine, cysteine, glutamic acid, isoleucine, methionine, tryptophan...).

Research has also shown that only a minimal concentration of amino acids is required: as low as 2 mg/L (2 ppm) is sufficient for each amino acid under laboratory conditions. A review carried out on many wines prior to MLF enabled us to demonstrate that available concentrations of amino acids routinely are found at levels above 2 mg/L (2 ppm).



Amino acid content of wines at the end of alcoholic fermentation (data taken from the bibliography and assays on wines at the end of AF, 144 wines were examined in total - Maisonnave, personal communication).

AMINO ACIDS ARE NOT THE ONLY REQUIRED NUTRIENT...

Free amino acids are not the only source of nitrogen that *Oenococcus oeni* can use, and the species seems to favour more complex sources, which it can use thanks to proteolytic enzyme activities. Studies have highlighted the positive impact of the presence of small peptides (0.5 - 10 kDa) in the medium for the growth of *Oenococcus oeni*. These peptides are found in certain yeast derivatives which can then serve as a source of bacterial nutrition.

	GROWTH / MLF ACTIVITY	PERCENTAGE OF FREE AMINO ACIDS IN THE TOTAL ORGANIC NITROGEN
Derivative A	+	71%
Derivative B	++	65%

	PERCENTAGE OF PEPTIDES IN THE TOTAL ORGANIC NITROGEN		
	< 0.5 kDa	< 0.5 - 10 kDa	> 10 kDa
Derivative A	24%	< 10%	< 5%
Derivative B	< 5%	35%	< 5%

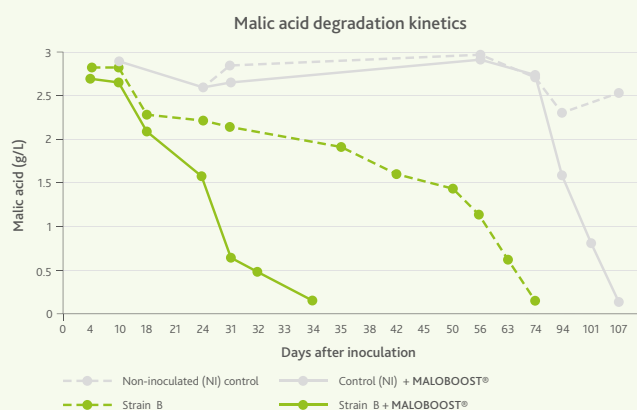
Link between the capacity for growth of a model *Oenococcus oeni* strain and the peptide content of the yeast derivative used in the culture medium (after Remize et al., 2005).

With a comparable free amino acid content, the growth of *Oenococcus oeni* is favoured in the medium enriched with yeast derivative B, containing the highest percentage of medium-sized peptides (between 0.5 and 10 kDa).



FOCUS

Work carried out by LAFFORT® and by teams of independent researchers enabled us to rely on robust data in order to select specific yeast derivatives for the formulation of MALOBOOST®.

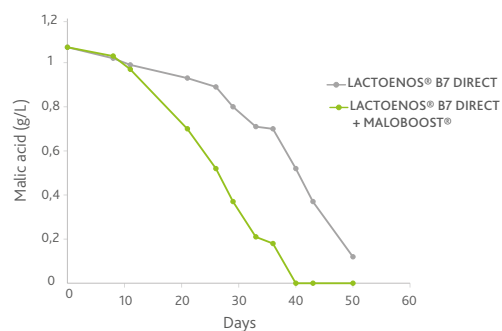


Study of a Cabernet Sauvignon wine reluctant to go through MLF (ABV: 14.04% vol.; pH: 3.62; L-malic acid: 3.34 g/L). Comparison of MLF carried out with and without inoculation with selected lactic acid bacteria at 1 g/hL (10 ppm).

Addition of MALOBOOST® (30 g/hL / 300ppm) 24 hours before adding bacteria for the inoculated wine and at the same time for the non-inoculated wine. Temperature of the trial: 18°C (64°F).

MALOBOOST® significantly improves the MLF kinetics in wine inoculated with MLB, and allows the initiation and completion of MLF in wine uninoculated with MLB.

MLF: utility of MALOBOOST® in difficult conditions



During inoculation with bacteria, the addition of a nutrient such as MALOBOOST® allows for full completion of the MLF in a shorter time

Chemical analysis of the wine at the end of AF

Merlot: ABV: 14.6% vol. | pH 3.43 | L-malic acid 1.07 g/L | MLF temperature: 20°C (68°F). Population of indigenous lactic acid bacteria detected by Epifluorescence: 10⁵ cell/mL.

MALOBOOST® dose: 30 g/hL (300 ppm)



MALOBOOST®

Nutrient adapted to the specific nutritional needs of lactic acid bacteria (*Oenococcus oeni*). Promotes a rapid start to the malolactic fermentation and optimal kinetics.

Facilitating all MLFs, MALOBOOST® is used to:

- Start and complete MLF more quickly.
- Help to restart stuck or sluggish MLFs.
- Encourage MLF under difficult conditions (Low temperature and pH, high alcohol).

Dosage: 20 - 40 g/hL (200 - 400 ppm).

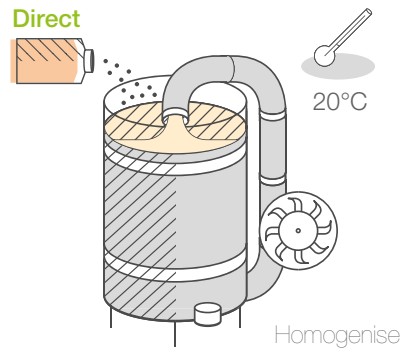


LACTOENOS® RANGE

Managing MLF differently

LACTOENOS® DIRECT

DIRECT INOCULATION

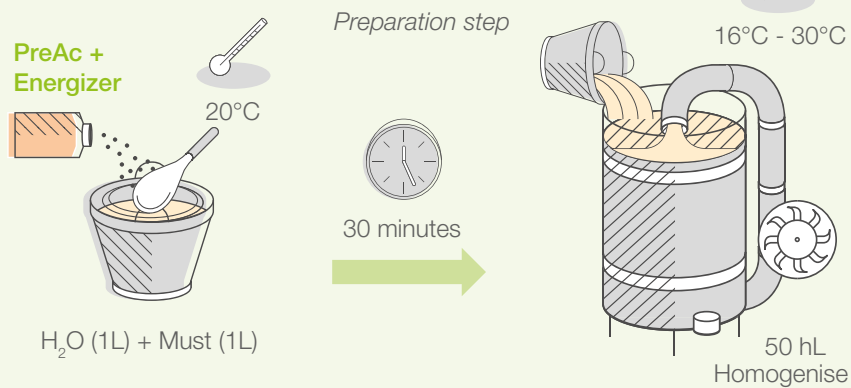


- Early co-inoculation
24 - 48 h after start of AF.
(16 - 30°C / 60 - 86°F).
- Late co-inoculation
1.010 density (<26°C / <78°F).
- Sequential inoculation
After AF, on running off
(20°C - 22°C / 68 - 71°F).
- Curative inoculation
(20°C - 22°C / 68 - 71°F).

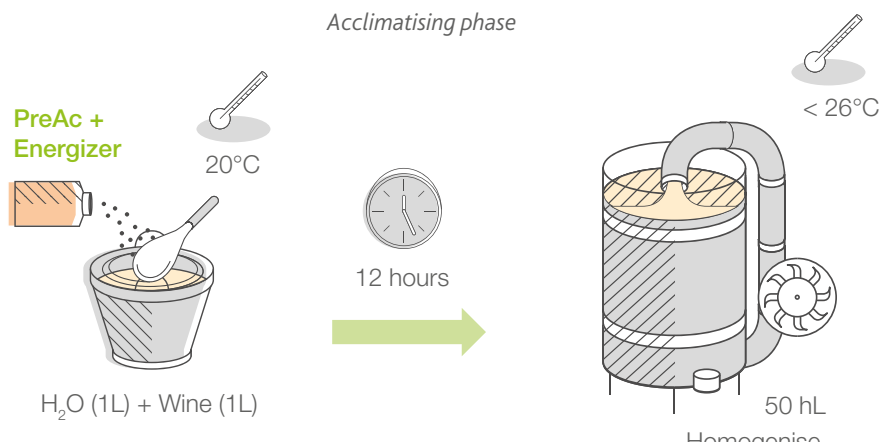
INOCULATION WITH ACCLIMATISATION

LACTOENOS® PREAC

EARLY CO-INOCULATION



LATE CO-INOCULATION or SEQUENTIAL INOCULATION



Find out more: Discover our **MALOLACTIC FERMENTATION RESTART PROTOCOL** on our website, at **LAFFORT & YOU** section.

ENZYMES

Natural accelerators

USE OF ENZYMES IN OENOLOGY

Although enzymes are naturally occurring in grape berries and wine microorganisms, they are found in varying concentrations.

- Their addition during vinification promotes clarification and the extraction of skin compounds of interest and optimises pressing.
- Mastery of the use of enzymes allows for a reduction in the use of other inputs.

ENZYMOLGY AND BIOCHEMISTRY: BEHIND THE SCENES OF ENZYME FORMULATION.

Enzymes are highly-specific complex catalytic proteins. In the wine industry, the most common principal activities are the pectinases (polygalacturonase [PG], pectin methyl esterase [PME], pectin lyase [PL], arabinanase, rhamnogalacturonase and galactanase). In addition, there are some glucanases and glycosidases complemented with many naturally occurring side activities such as hemicellulases, cellulases, and proteases.

IMPORTANCE OF THE SECONDARY ACTIVITIES OF ENZYME PREPARATIONS

Each enzyme preparation is a unique cocktail of activities that depend on the strain of fungus, such as *Aspergillus niger*, *Aspergillus aculeatus*, and *Trichoderma harzianum*. Each of them produces specific enzymes to grow and to best adapt to its own environment. The diversity of natural environments leads to very enzyme spectra for each strain. Significant expertise is required for the selection of strains as well as their industrial and secure production.

WHY DIFFERENT FORMS?

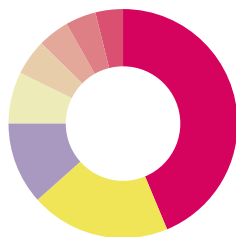
- **Microgranulate** offers easy room temperature storage and best stability. Their activity remains stable and are at no risk of microbial contamination even after opening.
- **Liquid** enzymes are the most convenient to handle and dose but require cold storage. These enzymes require dilution for even distribution into grape must and wines. They should be stored in a cool place they have a shorter shelf life as their micro biological stability is harder to guarantee.

P Purified enzymes are identified by this logo in our catalog.

EXAMPLE OF TWO DIFFERENT ENZYMATIC SPECTRA FOR THE SAME STRAIN OF *ASPERGILLUS ACULEATUS*:

distribution of activities from a quantitative and qualitative point of view.

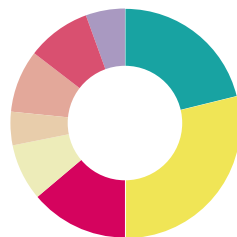
Strain n° 1 - *Aspergillus aculeatus*



Top 8 activities > 75 %
Rest of activities < 25 %

- Cellobiohydrolase (cellulase)
- β-mannosidase (β D Mannanase)
- Pectin Methyl esterase (PME)
- Endo-β-1,4-glucanase (Cel)
- Pectin lyase (PL)

Strain n° 2 - *Aspergillus aculeatus*



Top 8 activities > 70 %
Rest of activities < 30 %

- Rhamnogalacturonase (Rgases)
- Endo-β-1,4-Mannanase
- Endo-polygalacturonase (Endo-PG)
- Exo-polygalacturonase (Exo-PG)

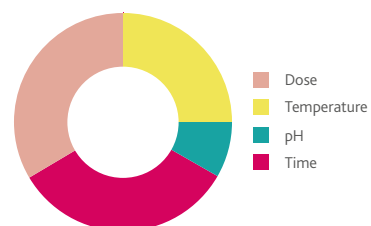
Each enzyme preparation is selected for its robustness, its performance but also for its very specific technical applications.

MANAGEMENT OF ENZYME ACTIVITY FOR OPTIMAL PERFORMANCE:

The four criteria – dose, must or wine temperature, pH, and time – have a major impact on enzyme performance and they are interrelated. Each parameter can be modified according to the application and the winemaker's technical constraints.

The choice of enzyme preparation and dose is made based on:

- **The technical objective:** clarification, extraction, pressing, filtration...
- **The matrix:** must, grapes, wine, colour, grape variety.
- **The time of action possible:** related to the winery's procedures.



ENZYMES

Natural accelerators

Process

	LAFASE® HE GRAND CRU	LAFASE® FRUIT	LAFAZYM® CL	LAFAZYM® PRESS	LAFAZYM® EXTRACT	EXTRALYSE®	OPTIZYM®	LAFAZYM® AROM	LAFAZYM® THIOLS ^{HI}	LAFASE® BOOST	LAFASE® 600 XL ^{ICE}	LAFASE® XL PRESS	LAFASE® XL CLARIFICATION	LAFASE® XL EXTRACTION ROUGE	LAFASE® THERMO LIQUIDE	LAFASE® XL FLOT
Form	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼	☼
FCE Purified preparation	✓	✓	✓	✓	✓	✓	**	*	**	**	✓	✓	**	**	**	**
Pre-fermentation maceration	●	●			●						●		●			
Conventional red wine maceration	●	●					●							●		
Pressing				●							●					
Enhances the thiols revelation in wines***								●								
Clarification of white and rosé musts			●			●		●	●		●					
Clarification at low temperature (≤ 5°C)									●							
Flotation		●						●	●		●				●	●
Clarification of red grape musts treated by thermo-vinification									●		●			●		
Clarification of wines (free-run and/or press)		●			●	●		●	●		●					
Lees ageing					●	●										
Filtration and/or botrytised harvests					●	●										
Aroma release							●									

✓ = Purified in order to optimise the required actions.

* CE is inhibited by 3% ethanol; purified preparations are not necessary during use of these enzymes.

** Enzymes produced by means of technology maintain unwanted activity at non-significant levels.

*** Acts in synergy with specialty yeast with thiol production abilities (ZYMAFLORE® X5, DELTA, VL3...).

Legend

☼ Microgranulate

● Liquid

● Red

● White

● Rosé

PRESSING AND SKIN CONTACT FOR WHITE AND ROSÉ WINES

Natural accelerators

USING ENZYME PREPARATIONS ON GRAPES:

- **Optimise press cycles:** filling the press (facilitate juice draining). Improve yields by facilitating juice extraction at lower pressure and limiting mechanical action. Reduce the length and number of press cycles.
- **Improve the clarification and filterability of press juice.**

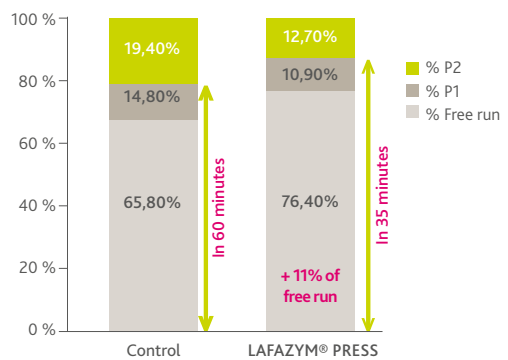
LAFAZYM® PRESS

Pulp extraction 
 Secondary activities 

Specific to pressing white harvests and red grapes for the production of rosé and sparkling wine, to optimise volumes of quality juice.

- Purified microgranulated preparation of pectolytic enzymes rich in secondary activities.
- Purified from CE; low PME in order to preserve aromatic finesse.
- Improves free run juice and first pressing yields (white and rosé).

Dosage: 2 - 5 g/100 kg of grapes.



The use of LAFAZYM® PRESS, compared to no allowed not only a significant process time saving, an increase in quality free run juice, and decrease in lower quality press juice yeild.

LAFASE® XL PRESS

Pulp extraction 
 Secondary activities 

Designed for pressing red and white grapes to optimise quality juice volumes in white and rosé wines production.

- Purified liquid preparation of pectolytic enzymes with secondary activities.
- Increases high-quality juice yields.
- Protects musts from oxidation.



Dosage: 1 - 4 mL/100 kg of grapes.

PROCESS



SPECIFIC OBJECTIVE: PRE-FERMENTATION SKIN CONTACT

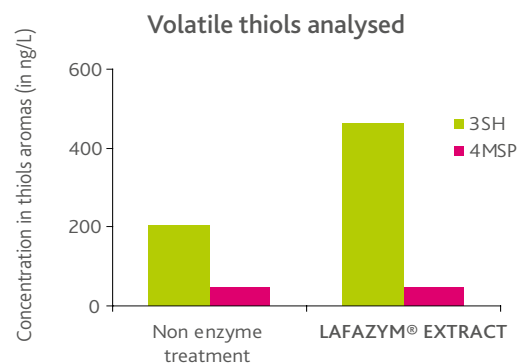
LAFAZYM® EXTRACT

Pulp extraction 
 Secondary activities 

Designed for pre-ferment skin contact at low temperatures.

- Microgranulated preparation of pectolytic enzymes with secondary activities.
- Helps reduce maceration duration.
- Allows for varietal aroma and precursor extraction, increases the aromatic potentials of must.
- Purified from CE to help preserve aromatic finesse of wines.
- Improves drain or free run juices yields and clarification.

Dosage: 2 - 3 g/100 kg of grapes.



3SH: 3-sulfanylhhexanol (grapefruit and passion fruit).
 4MSP: 4-methyl-4-sulfanylpentan-2-one (boxwood and broom).



AROMATIC EXTRACTION

Natural accelerators

LAFAZYM® THIOLS^[+]

Specific for bringing out aromas in grape varieties with volatile thiol characters.

- Micro-granulated preparation of pectolytic enzymes with secondary activities.
- Acts in synergy with yeasts to bring out volatile thiols.
- Can be used on juice and added up to the first third of the alcoholic fermentation, to increase the aromatic potential of wines.

Dose: 3 - 6 g/hL (30 - 60 ppm).

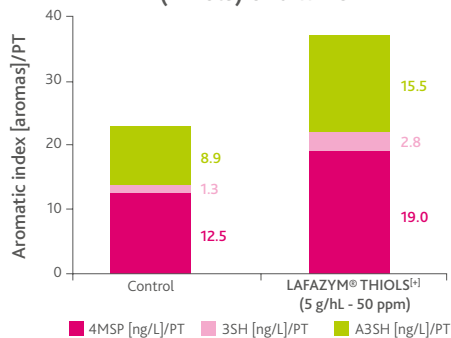
LAFAZYM® AROM

Specific to aromatic wines made from grape varieties with terpene precursors.

- Micro-granulated preparation of pectolytic and β-glucosidase enzymes.
- Increases the aromatic intensity of wines made from grape varieties with glycosylated terpene and norisoprenoid precursors.

Dose: 2 - 4 g/hL (20 - 40 ppm).

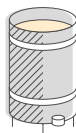
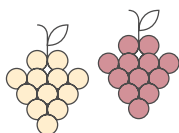
Increase in the aromatic potential (Thiols) of a wine



Experimental cellar trial - Sauvignon Blanc
4MSP: Boxwood - 3SH: Grapefruit - A3SH: Passion fruit - PT: perception threshold



MECHANISMS FOR BIOTRANSFORMATION OF THIOL PRECURSORS BY YEAST



Red and white grape varieties*

Family of glutathionylated thiol precursors.

Must

Enzymatic hydrolysis of intermediate precursors.

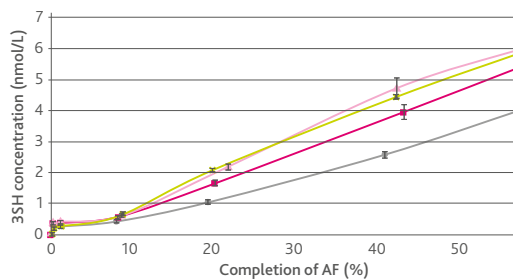
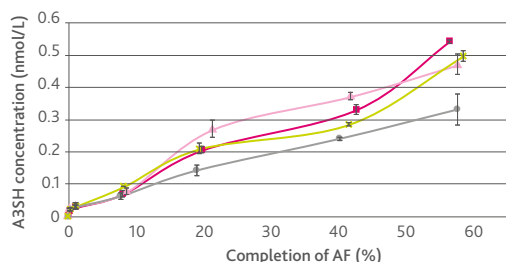
Alcoholic fermentation (*Saccharomyces cerevisiae*)

Biotransformation of intermediate precursors into volatile thiols.

* Present in many red and white grape varieties: Sauvignon Blanc, Colombard, Petit Manseng, Sémillon, Muscadet, Pinot Gris, Pinot Blanc, Melon Bourgogne, Macabeo, Syrah, Malbec, Pinot Noir, Grenache, Gewürztraminer, Cabernet Sauvignon, Chardonnay, Negrette, Verdejo, Merlot (red & rosé), Chenin and Muscat.

Tominaga & al., 2000; Murat & al., 2001; Blanchard & al., 2004; Sarrazin & al., 2007.

INCREASING THE BIOTRANSFORMATION OF VOLATILE THIOLS (3SH AND A3SH) THROUGH THE ADDITION OF ENZYME PREPARATIONS



Enzyme preparations at 5 g/hL (50 ppm) compared with a control with no enzyme addition - A3SH: Passion fruit - 3SH: Grapefruit

A. Minot 2016
BIOLAFFORT

HOW TO OPTIMISE THE BIOTRANSFORMATION OF THIOLS DURING ALCOHOLIC FERMENTATION?

- By using a yeast with the ability to release and convert volatile thiols: ZYMAFLORE® X5, DELTA and VL3.
- By adding an enzyme preparation capable of promoting release of thiols by the yeast LAFAZYM® THIOLS^[+].

WHITE & ROSÉ WINE CLARIFICATION

Natural accelerators

USING ENZYMES TO CLARIFY JUICE AND MUST:

Qualitative and quantitative optimisation of clarification:

- Rapid depectinisation for optimised flocculation and clarification.
- Improve compaction of solids and facilitate degradation of the pectin chain.
- Increase the proportion of clear juice: contribute to the aromatic finesse of the wine.

LAFAZYM® CL

Lees compaction	●●●●●
Depectinisation	●●●●●
Secondary activities	●●●●●

Designed for juice clarification maximising grape potential with respect for terroir of juice for the production of superior white wines.

- Microgranulated preparation of pectolytic enzymes rich in secondary activities.
- Improves lees settling and compaction.
- Increases the volume of clear juice.
- Purified from CE to help preserve aromatic finesse of wines.

Must dosage: 0.5 - 2 g/hL (5 - 20 ppm).



100 g
500 g

LAFASE® XL CLARIFICATION

Lees compaction	●●●●○
Depectinisation	●●●●○
Secondary activities	●●●●○

Designed for enhanced clarification of grape must and wines.

- Liquid pectolytic enzymes with secondary activities.
- Well adapted for fast depectinisation prior to flotation.
- Allows the clarification of must from heat treatment or flash detente.
- Perfectly suited to static and dynamic clarification.

Dosage: 1 - 3 mL/hL.



1 L
10 L

PROCESS

SPECIFIC OBJECTIVE: EXTREME CONDITIONS

LAFAZYM® 600 XL^{ICE}

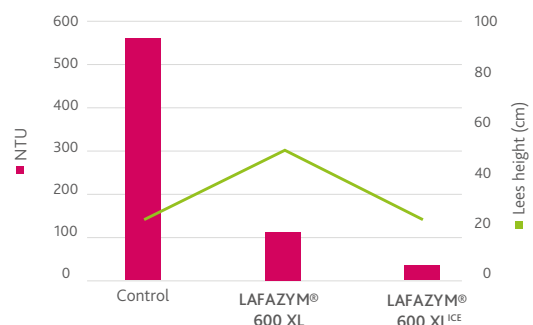
Lees compaction	●●●●●
Depectinisation	●●●●●
Secondary activities	●●●●●

Specific to the rapid and effective clarification of musts over a wide range of pH (2.9 - 4.0) and temperature for the production of high-quality wines.

- Micro-granulated preparation of pectolytic enzymes with secondary activities.
- Allows rapid depectinisation even at low temperature (effective from 5°C - 41°F).
- Reduces settling time and improves compaction of solids.

Dosage: 0.5 - 2 mL/hL.

Lees height and turbidity after static settling



Comparative trial with the formulation of LAFAZYM® 600 XL^{ICE}. In static settling, improvement of lees compaction and juice clarification after one night at 5°C (41°F) (trial in 250 mL Imhof cones).



250 mL
10 L



RED EXTRACTION

Natural accelerators

USING ENZYME PREPARATIONS IN RED VINIFICATION:

- Improve yield of free-run wine through an increase in pulp and skin extraction (compounds of interest).
- Promote depectinisation of wines at the end of alcoholic fermentation, optimise clarification of wines to facilitate their preparation for bottling.

LAFASE® HE GRAND CRU

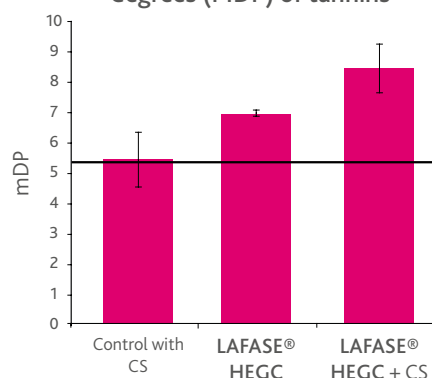
Cell compound extraction 
 Secondary activities 

Designed for traditional macerations. Produces structured wines rich in colour and elegant tannins.

- Microgranulated preparation of pectolytic enzymes with secondary activities.
- Purified from CE to help preserve aromatic finesse of wines.
- **Increases the storage potential of wines** by promoting the extraction of stable phenolic compounds and polysaccharides.
- Increases the sensation of sweetness and decreases the astringency in wines by the targeted extraction of smaller size polysaccharides (RGII) and less larger size polysaccharides (PRAG).

Dosage: 3 - 5 g/100 kg of grapes.

Comparison of mean polymerisation degrees (MDP) of tannins



Enzyme: LAFASE® HE GRAND CRU with and without Cold Soaking (CS). Cabernet Sauvignon.



100 g
500 g



LAFASE® FRUIT

Cell compound extraction 
 Secondary activities 

Designed for short macerations with or without pre-fermentation cold soaking.


- Microgranulated preparation of pectolytic enzymes rich in secondary activities.
- Optimises the **fruit potential of wines** by promoting gentle extraction of phenolic compounds and aromas from the grape skin while minimizing the need for physical extraction.

Dosage: 3 - 5 g/100 kg of grapes.



250 g

LAFASE® XL EXTRACTION ROUGE

Cell compound extraction 
 Secondary activities 

Designed for maceration of red and white grapes to optimise quality juice volumes.

- Liquid pectolytic enzymes with secondary activities.
- Increases free run juice or wine yields.
- Improves grape skin compound release.
- Limits the need for physical extraction by pumping.

Dosage: 2 - 4 mL/100 kg of grapes.



1 L
10 L

RED WINE CLARIFICATION

Natural accelerators

LAFAZYM® CL

Microgranulated formulation of pectolytic enzymes rich in secondary activity for clarification, reduction in lees volume and better compaction.

- Improves filterability and facilitates the preparation of wines for bottling.
- Optimises fining doses.

Dosage: 2 - 4 g/hL (20 - 40 ppm).



100 g
500 g

LAFASE® XL CLARIFICATION

Liquid formulation of pectolytic enzymes for must clarification.

Dosage: 1 - 5 mL/hL.



1 L
10 L

SPECIFIC OBJECTIVES: OPTIMISATION OF MICROBIOLOGICAL STABILISATION AND FILTERABILITY OF WINES

EXTRALYSE®

Enhances clarification and filtration of wines.

- Micro-granulated preparation of pectolytic enzymes with secondary activities.
- Accelerates all biological mechanisms linked to ageing on lees and especially yeast autolysis.
- **Improves clarification and filterability**, particularly in wines from *botrytis*-affected grapes.
- Promotes the hydrolysis of long chains of colloids, which cause filter clogging (consult product data sheet).

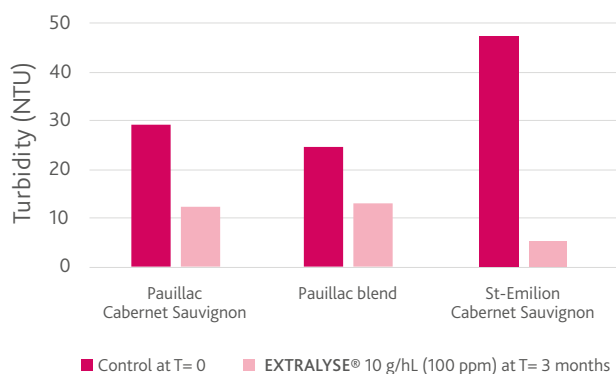
Dose depending on the application and the type of wine 5-10 g/hL (50 - 100 ppm): refer to the product sheet.



250 g

Improvement of clarification

Turbidity values after treatment with EXTRALYSE® at 10 g/hL.



TREATMENT OF RED PRESS WINES

Red press wines contain very high level of solids, and contain many macromolecules that hinder clarification before blending and bottling. These large molecules, mainly polysaccharides, originate from grapes (homogalacturonans, rhamno galacturonans RGI and RGII, PRAGS...), fermentation yeasts or contaminating fungi such as *Botrytis cinerea* (mannoproteins and glucan).

It is recommended to add the enzymes as early as possible, as soon as the wine comes off the press, for more effective treatment. Enzymatic preparations allow efficient clarification and facilitate filtration of press wines. The benefits of a well conducted enzyme addition are proven both from a technical stand point (lower filter clogging index, optimum sedimentation, reduced turbidity and more compact lees), as well as from a quality stand point (reduced oxidation, increased aroma protection) or even an economic stand point (labor and time management...).

CONSIDER THE USE OF POLYMUST® PRESS IN COMBINATION WITH EXTRALYSE® FOR REFINING PRESS WINES. SEE P. 49

SPECIFIC APPLICATIONS

Natural accelerators

PROCESS

FLOTATION

LAFASE® XL FLOT

Lees compaction	●●●●○
Depectinisation	●●●●●
Secondary activities	●●●●○

Specific for the rapid depectinisation of flotation musts.

- Liquid preparation of pectolytic enzymes with secondary activities.
- Low cinnamoyl esterase activity to preserve juice quality.
- Rapid flocculation for optimised clarification.

Dosage: 1 - 4 mL/hL.

THERMAL TREATMENT OF RED GRAPES

LAFASE® THERMO LIQUIDE

Lees compaction	●●●●○
Depectinisation	●●●●●
Secondary activities	●●●●●

Designed for thermo-treated juices to promote better clarification and pressing.

- Liquid pectolytic enzymes with secondary activities.
- Quick and efficient depectinisation over a large spectrum of temperatures (< 55°C - 131°F).
- Eases pressing and increases pressing yields.
- Decreases viscosity of musts.

Dosage: 3 - 5 mL/100 kg of grapes.



FLOTATION
use in association
with VEGEFLOT®.
See P. 43



10 L



1 L

WINE FILTRATION

EXTRALYSE®

Specific for ageing on lees and post-fermentation clarification steps.

- Microgranulated preparation of pectolytic enzymes rich in β -(1-3 ; 1-6) glucanase.
- Improves wines filterability and clarification especially in the case of wines affected by *Botrytis cinerea*.

Dosage: 6 - 10 g/hL (60 - 100 ppm).

DIFFICULT CLARIFICATION

LAFASE® BOOST

Designed to complement usual pectinases in essential side activities to unlock or accelerate depectinisation.

- Liquid preparation of pectolytic enzymes rich in essential side activities.
- Acts in synergy with usual clarification pectinases to allow timely and complete depectinisation.
- Allows to decrease the time necessary to obtain a negative pectin test and fit into winery time constraints.

Dosage: 1 - 1.5 mL/hL (in addition to the manufacturer recommended dose of usual pectinase).

MULTIPLE ACTIONS

OPTIZYM®

Concentrated preparation of pectolytic enzymes for extraction and clarification of musts and wines.

- Improves the yield of free-run juice and wine from red grape maceration.
- Clarification of musts and finished wines.

Dosage: Maceration: 2 to 5 g/100 kg of grapes. Clarification: 2 to 3 g/hL (20 - 30 ppm). Thermo-treatment: 3 to 5 g/hL (30 - 50 ppm) on cooled musts (temperature < 55°C - 131°F).



250 g



250 mL



2,5 kg



FOCUS

FLOTATION



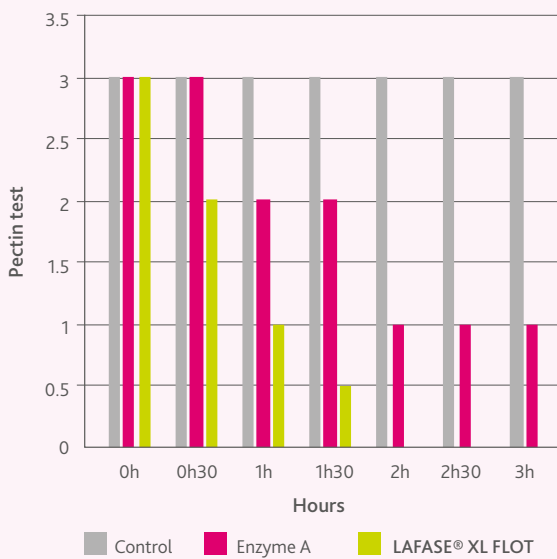
TIME OPTIMISATION

LAFASE® XL FLOT

Robust, effective and fast formulation for depectinisation of juices before flotation.

Monitoring the depectinisation of a Chardonnay juice (Australia) with high turbidity (> 1.000 NTU).

Depectinisation kinetics at 20°C



Pectin test scale (3 = positive; 0 = negative).
A negative pectin test indicates total depectinisation.
Enzyme doses: 2 mL/hL.

LAFASE® XL FLOT completes the depectinisation in less than 2 hours.



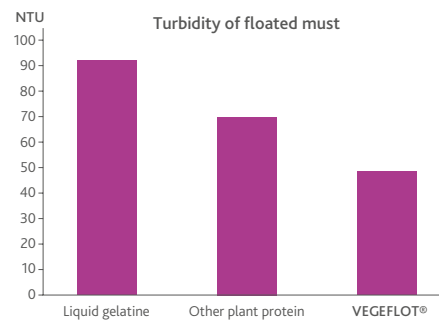
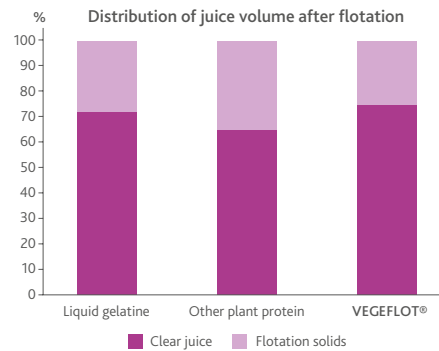
- Liquid enzyme for very rapid depectinisation compatible with flotation.
- Low cinnamoyl esterase activity to preserve juice quality.
- Dose: 1 - 4 mL/hL.

FLOCCULATION OPTIMISATION

VEGEFLOT®

Improvement of flocculation and action on phenolic compounds.

Better juice yield and high clarification power in the liquid phase.



Flotation of an Airén must - Pressure: 5 bar.
Fining agent doses: 15 g/hL (150 ppm) - Time: 150 min.



- Non-allergenic vegetable formulation.
- Rapid flocculation.
- Broad spectrum of action on phenolic compounds.
- Dose: 10 - 20 g/hL (100 - 200 ppm).



RED EXTRACTION ENZYMES

THE COMPLEXITY OF PECTIN STRUCTURE AS A FUNCTION OF THE LOCATION OF THE GRAPE BERRY CELLS.

PULP CELLS

Pectin structure: mainly composed of galacturonic acid, with little branching. This constitutes the **main, linear chain of the pectin**.

Technical objectives of the enzyme:

- Optimisation of pulp extraction while pressing.
- Optimised depectinisation and clarification of juices.

For this application, a suitable enzymatic formulation must mainly be **composed of pectinases (PL, PG and PME*)**.

PULP - SKIN CELLS

Pectin structure made up of linear parts (main chain) and branched portions (secondary chains).

Technical objectives of the enzyme:

- Extraction of compounds of interest.
- Increase in juice extraction yield.
- Depectinisation and clarification of juices and wines.

For this application, the enzyme formulation must combine the main activities (PL, PG and PME) **and secondary activities** that promote the degradation of the branched portions and give the pectinases access to the main chain.

SKIN CELLS

Pectin structure made up of linear parts (main chain) and many branched and complex portions (secondary chains).

Technical objectives of the enzyme:

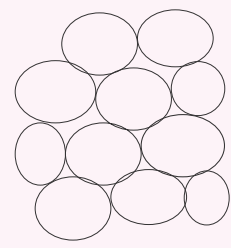
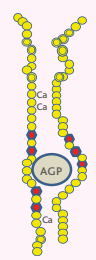
- Extraction of compounds responsible for improved mouthfeel or softening tannins, e.g. Rhamnogalacturonan II.
- Increase in juice extraction yield.
- Depectinisation and clarification of wines.

For this application, the enzyme formulation must combine the main activities (PL, PG and PME) **and specific secondary activities such as Rhamnogalacturonase II** for the extraction of positive compounds of interest.

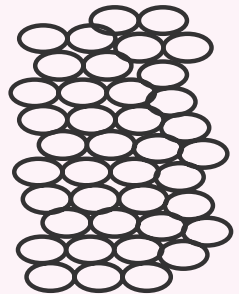
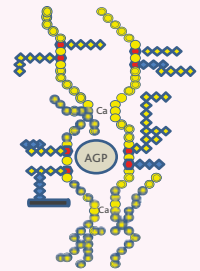


Research programme (2013-2016) - BIOLAFFORT® in collaboration with John P. Moore's team (University of Stellenbosch).

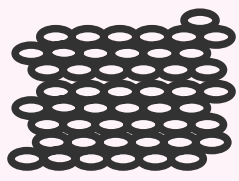
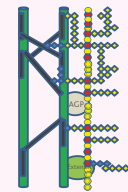
SCHEMATIC DIAGRAMS INSPIRED BY "HYPOTHETICAL MODEL OF THE GRAPE WALL", YU GAO, 2016.



PULP



PULP - SKIN



SKIN

Schematic representation of grape berry cells.

* PL: Pectine Lyase / PG: Polygalacturonase / PME: Pectine Methyl Esterase.

OBJECTIVES OF THIS RESEARCH PROGRAMME:

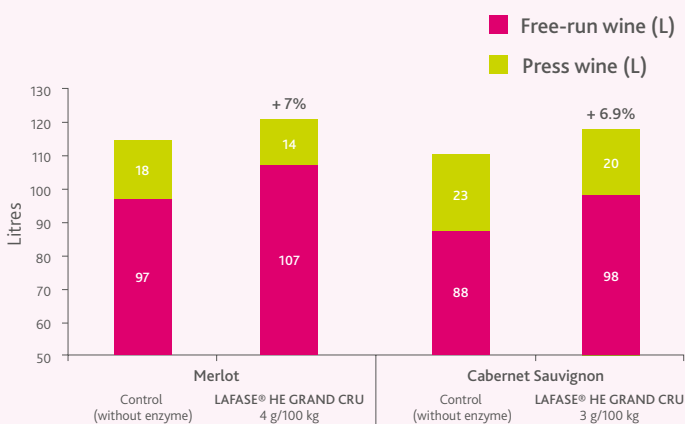
- To study the impact of enzymes during the maceration of red grapes.
 - To understand the extraction mechanisms of cellular compounds under winemaking conditions for the differentiation of LAFFORT® maceration enzymes.
- For more details, see our article "Structure de la paroi cellulaire du raisin rouge" RDO no. 172 - July 2019.

IMPACT OF RED EXTRACTION ENZYMES ON FINISHED WINES

Actions common to all LAFFORT® red extraction enzymes.

→ QUANTITATIVE OPTIMISATION:

Increasing the overall yield, especially free-run wine in relation to the total volume.



Wine volumes when pressing: free-run and press wine
Pilot-scale study carried out at the LAFFORT® experimental cellar.

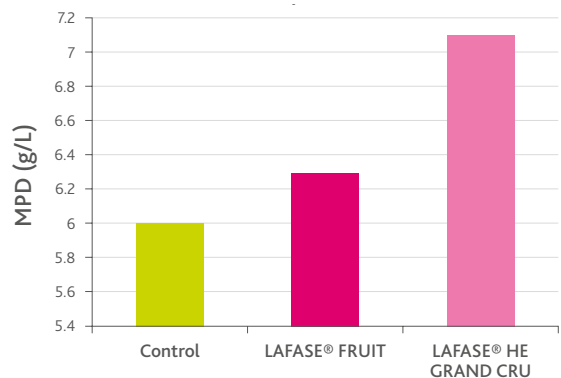
→ QUALITATIVE OPTIMISATION:

Improving the release of compounds of interest and facilitating clarification steps for the preparation of wines for bottling.

- Promoting the release of phenolic compounds such as anthocyanins and tannins.
- Improving colour stability by extracting phenolic compounds that are more stable over time.
- Contributing to the sensory quality of wines: extraction of Rhamnolacturonan II and similar compounds which combine with tannins, leading to a reduction in astringency (Vidal 2004).
- Respecting the fruit profiles of wines through selective extraction by specific secondary enzymatic activities.
- Depectinisation of wines: facilitating the filtration and clarification of wines for bottling.

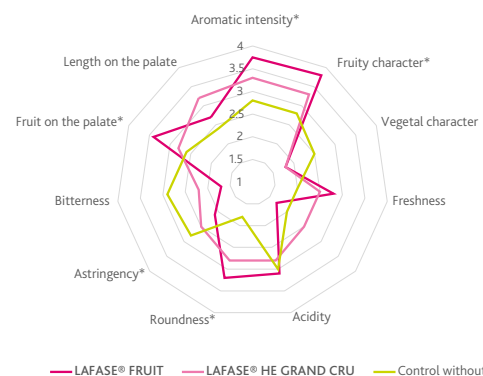
This study here under illustrates the capacity of LAFASE® FRUIT and LAFASE® HE GRAND CRU to extract cellular compounds of interest by the selectivity of their enzymatic spectrum of action.

Average degrees of polymerisation - Merlot



Study carried out at the LAFFORT® experimental cellar (2 hL tank, enzyme doses of 3.5 g/100 kg of grapes). MPD is a marker for the extraction of skin tannins. A higher value corresponds to more supple tannins.

Descriptive sensory analysis - Merlot



*This tasting was carried out by 19 trained tasters on a Merlot wine after malolactic fermentation. The wine-making conditions were identical. Enzyme doses of 3.5 g/100 kg of grapes. - *Statistically significant.*

VEGETABLE PROTEIN

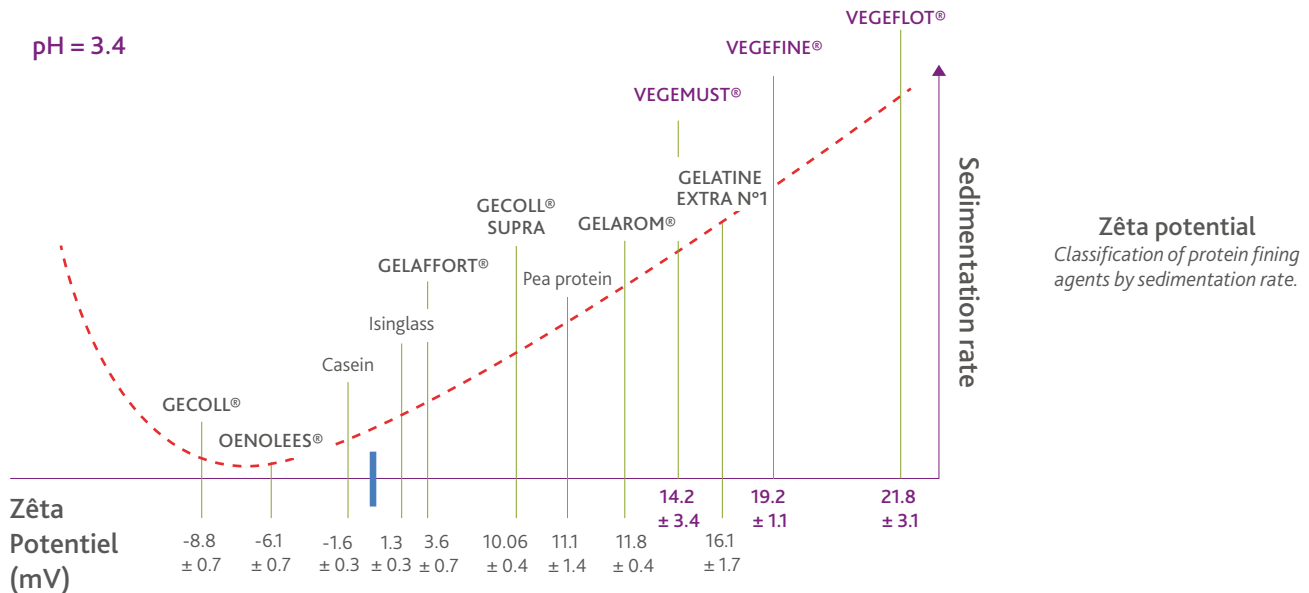
Patatin & Pea

FINING AND ZËTA POTENTIAL

The addition of a protein fining agent to must or wine causes flocculation. The formation of flocs, and their sedimentation over time, leads to clarification.

Flocculation results from the interaction of the fining agent proteins with polyphenols in musts and wines. Polyphenols group together under hydrophobic forces and are made unstable through attractive interactions with proteins. The flocs thus formed tend to grow, group together and precipitate. Their precipitation leads to the sedimentation of suspended particles and clarification of the wine. Not all plant proteins have the same ability to develop these interactions.

The Zêta potential is a measure of this capacity for attractive interactions. The speed of clarification depends on its value and the size of the particles (Iturmendi et al., 2012). For faster clarification the Zeta potential values should be high (positive and negative).



ZËTA POTENTIAL OF PROTEIN FINING AGENTS AS A FUNCTION OF PH.

Typically, most proteins lose some of their effectiveness at higher pH.

		ZËTA POTENTIAL (MV)	
		pH 3.4	pH 3.8
Animal origin	Food-grade gelatines of animal origin	-8 to 16	-8 to 10
	Egg albumin	15	11
	Isinglass	1.3	2.8
	Casein	0.5	≈0
Vegetable origin	Pea protein	11	-3
	VEGEFINE®	19.2	11.47
	VEGEMUST®	14.2	9.5
	VEGEFLOT®	21.8	11.2



Thanks to their patatin fractions, VEGEFINE®, VEGEMUST® and VEGEFLOT® retain strong activity over a broad spectrum of pH.

VEGETABLE PROTEIN

Juice Fining



FINING

VEGEFINE®

Vegetable proteins (patatins), for the clarification of musts and wines.

- Non-allergenic, non-animal, non-GMO protein.
- Strongly reactive with phenolic compounds.
- Low quantity of lees after sedimentation.
- No risk of over-fining.
- Preservation of aromas.

Dosage:

- *Fining free-run white and rosé juices for preventive and curative treatment of oxidation: 5 - 30 g/hL (50 - 300 ppm).
- *Fining press juices (low pressure) to eliminate oxidised phenolic compounds: 10 - 50 g/hL (100 - 500 ppm).



VEGEMUST®

Specific combination of vegetable proteins (patatins & pea) with a high flocculation capacity, suitable for static cold settling and fining in fermentation.

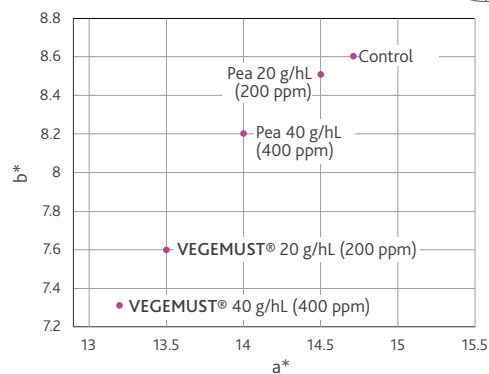
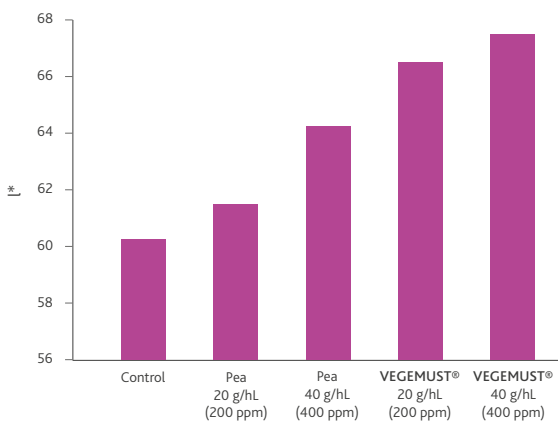
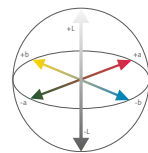
- High zêta potential, synergistic effect of the proteins.
- High sedimentation rate.
- The presence of patatins helps to reduce the risks of wine oxidation at an early stage.
- Better juice yield (low percentage of solids).
- Flocculation capacity retained, even at high pH.
- Non-allergenic, non-animal, non-GMO protein.
- No risk of over-fining.

Dosage: White and rosé musts: 10 - 40 g/hL (100 - 400 ppm).

VEGEMUST® is available in liquid form (production to order during the harvest - 20 L jerry can).



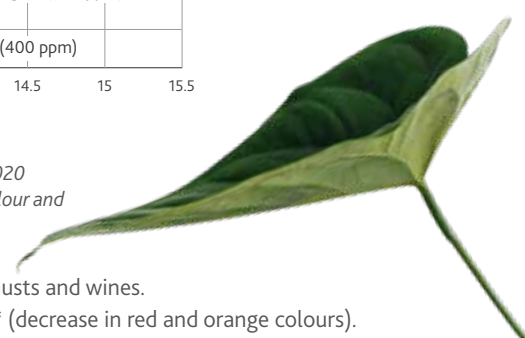
CIELAB - The L*a*b* colour space



*Addition of fining products a third of the way through fermentation, Grenache rosé, 2020
Greater effectiveness of VEGEMUST® compared with a pea protein, for the decrease in colour and the increase in clarity.*

CIELAB colour space: colour space used to characterise the colours of musts and wines.

For fining white or rosé musts and wines, the aim is to $\nearrow L^*$ (increased clarity) and $\searrow a^*$ and b^* (decrease in red and orange colours).



VEGEFLOT®

Juice fining

VEGEFLOT®

Combination of vegetable proteins (patatin & pea) with high flocculation capacity, suitable for flotation. Optimised balance between plant protein sources.

- Rapid flotation, highest Zêta potential.
- The presence of patatin contributes to the early reduction of oxidation risks.
- Stable flotation foams.
- Better juice yield (low percentage of lees).
- Flocculation capacity retained, even at high pH.
- Non-allergenic, non-animal, non-GMO protein.
- No risk of over-fining.

Dosage: Flotation: 10 - 20 g/hL (100 - 200 ppm) - White and rosé musts: 10 - 40 g/hL (100 - 400 ppm).

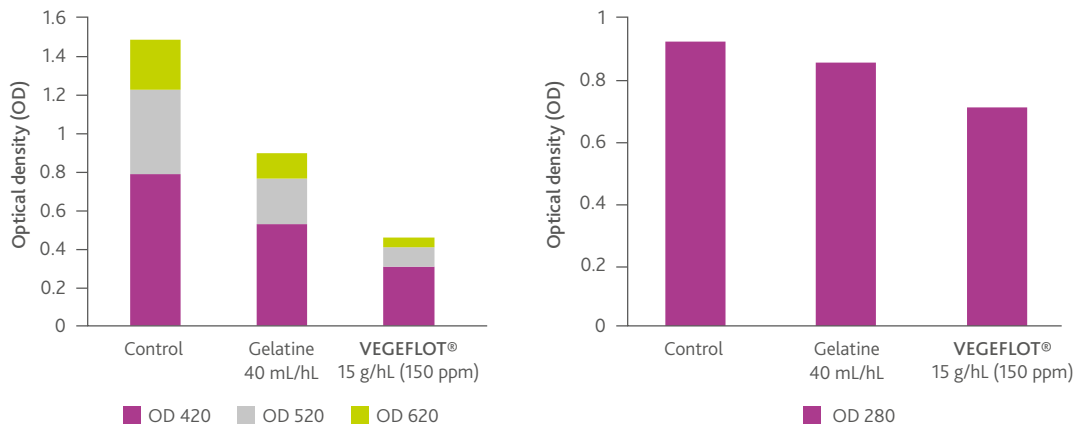
VEGEFLOT® is available in liquid form (produced to order during the harvest - 20 L jerrycan).

Use in association with LAFASE® XL FLOT - See FOCUS FLOTATION P. 43.



1 kg
10 kg

Flotation of a Pinot Gris must, South Africa, 2020



VEGEFLOT® more effective than a gelatine for reduction of colour and total polyphenols.

Find out more: watch our FLOTATION video on our website, LAFFORT & YOU section.

POLYMUST® RANGE

Juice Fining



POLYMUST® ROSÉ

Association of PVPP with vegetable protein (patatin) for the fining of white and rosé musts and wines.

- Elimination of phenolic acids.
- Stabilisation of the colour of rosé musts and wines in fermentation.

Dosage: 30 - 80 g/hL (300 - 800 ppm).



POLYMUST® BLANC

Association of vegetable protein (pea) with PVPP for the preventive treatment of oxidation in white and rosé musts.

- Prevention of oxidation.
- Elimination of oxidisable phenolic compounds liable to trap aromas and distort the colour.
- Compatible with flotation and for treatment of wines.

Dosage: 30 - 80 g/hL (300 - 800 ppm).



POLYMUST® PRESS

Association of PVPP, calcium bentonite and vegetable protein (patatin, potato protein isolate) for the preventive fining of press wines and the reduction of oxidised character.

- Preventive treatment of oxidation in white and rosé juices: elimination of oxidisable and oxidised phenolic compounds, preservation of glutathione content and limitation of browning and pinking phenomena.
- Refining red press wines: clarification, stabilisation of the colouring matter, reduction of astringency and green and metallic notes, microbiological stabilisation.
- Colour correction and organoleptic refinement of white and rosé wines.

Dosage: 15 - 50 g/hL (150 - 500 ppm) on red press wine - 40 - 100 g/hL (400 - 1000 ppm) on white and rosé press wines.



POLYMUST® NATURE

Combination of vegetable protein (pea), sodium bentonite and calcium bentonite for fining musts.

- Remarkable clarification effect.
- Preventive and curative treatment of polyphenol oxidation in white and rosé wines.
- Contributes to protein stabilisation as from the fermentation phase.

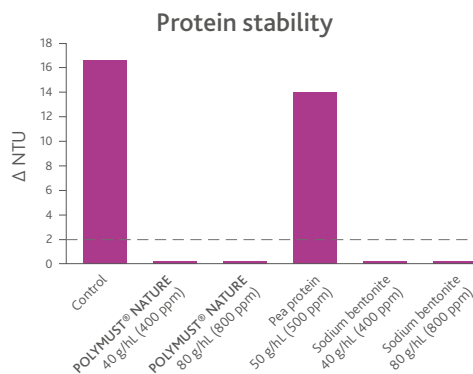
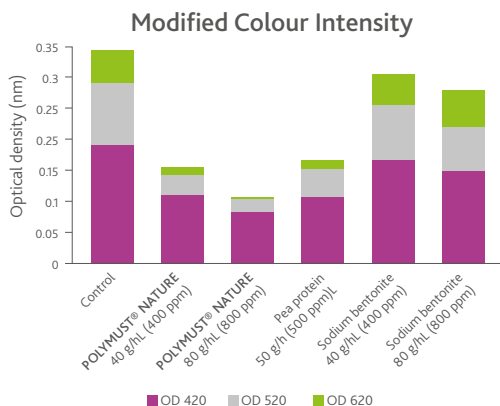
Dosage: 20 - 100 g/hL (200 - 1000 ppm) white and rosé musts.

Compatible with European regulations for organic vinification, Regulation (EU) 848/2018.



*sur commande

Fining trial during fermentation of a 2019 Sauvignon Blanc must. ABV 12% vol., pH: 3.57, TA: 3.86 expressed as H₂SO₄.



A delta NTU < 2 represents acquired protein stability according to the heat test method (reference test).

POLYMUST® NATURE provides a strong reduction in the MCI thanks to its strong reactivity with phenolic compounds. The presence of bentonite in the formulation promotes early protein stabilisation as from the alcoholic fermentation.

JUICE FINING

PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
CASEI PLUS	Potassium caseinate. Treatment of oxidation phenomena and maderisation in juice (white and rosé).	5 - 20 g/hL (50 - 200 ppm) for clarification. 20 - 60 g/hL (200 - 600 ppm) for maderisation treatment and colour correction.	1 kg 5 kg 20 kg
POLYLACT®	Combination of PVPP and casein. Preventing and treating oxidation in juice (white and rosé).	Preventative treatment: 20 - 40 g/hL (200 - 400 ppm). Curative treatment: 40 - 100 g/hL (400 - 1000 ppm).	1 kg 10 kg
MICROCOL® ALPHA	High quality natural sodium microgranular bentonite with a high adsorption capacity. Protein stabilisation in juice over a large range of pH.	10 - 80 g/hL (100 - 800 ppm).	1 kg 5 kg 25 kg
GECOLL® SUPRA	Liquid gelatine produced from a selection of exceptionally pure raw materials, exclusively of porcine origin. Juice clarification.	40 - 100 mL/hL.	1,05 kg 5,25 kg 21 kg
GECOLL® FLOTTATION	Liquid gelatine highly reactive. Flotation.	30 - 70 mL/hL (depending on the type of must, pH and condition).	10.5 kg
VINICLAR®	Microgranulated preparation of PVPP for preventive and curative treatment of the oxidation of juice . <i>(VINICLAR® contains a small fraction of cellulose favouring the clarification and filterability of lees).</i>	Preventive treatment: 15 - 30 g/hL (150 - 300 ppm). Curative treatment of oxidised wine or must: 30 - 80 g/hL (300 - 800 ppm).	1 kg 25 kg
VINICLAR® P	Microgranulated preparation of PVPP . Preventive and curative treatment of the oxidation of juice.	20 - 50 g/hL (200 - 500 ppm).	1 kg 22.7 kg
VINICLAR® GR	Microgranulated preparation of PVPP . Preventive and curative treatment of the oxidation of juice.	Preventive treatment: 15 - 30 g/hL (150 - 300 ppm). Curative treatment of oxidised wine or must: 30 - 80 g/hL (300 - 800 ppm).	1 kg 19.96 kg

Find out more: Discover our **MICROCOL® ALPHA** video on our website at **LAFFORT & YOU** section.

TANNINS

The essential element

For over 20 years, LAFFORT® has been investing in research to:


- ✓ Identify and select the best vegetal tannin sources that complement the phenolic structure of wine.
- ✓ Constantly improve production and purification methods for raw materials.
- ✓ Build a greater understanding of the oenological implications of tannin usage.
- ✓ Develop the methods of tannin application in accordance with implemented oenological practices.

Thanks to its expertise, LAFFORT® guarantees consistent quality formulation.

THE PURPOSE OF TANNINS IN WINEMAKING

Hydrolysable 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:

- ✓ Unstable protein precipitation.
- ✓ Protection and stabilisation of colour.
- ✓ Protection against oxidation.
- ✓ Reductive character minimisation.
- ✓ Structure enhancement.
- ✓ Improves clarification.
- ✓ Regulates redox phenomena.



THE IDP PROCESS

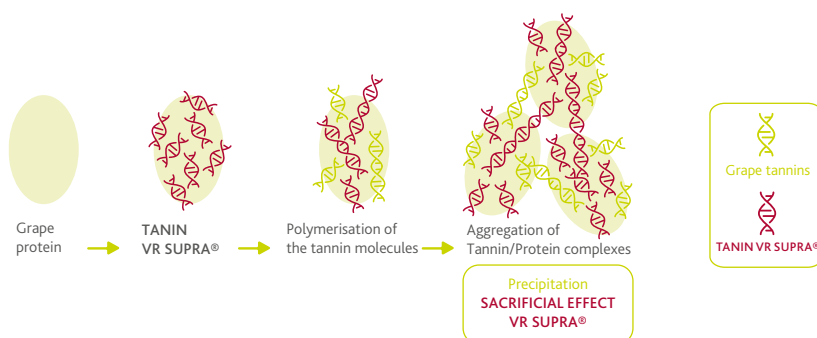
All LAFFORT® tannins benefit from the unique formulation Instant Dissolving Process (IDP); a revolutionary process for ease of use! IDP enables perfect solubility in wine and thus no preliminary dissolution of the tannins in water is required. Homogenous mixing into the bulk of the must or wine is, however, advised. It is recommended to carry out a systematic pump-over or other homogenising action during the application.



THE SACRIFICIAL EFFECT OF TANIN VR SUPRA® !







When grapes are crushed, the proteins in the must bind to the tannins and start to precipitate. The first tannins available are skin tannins, which are generally silkier and softer than seed tannins which are extracted later, and they are also the most important for the structure of the wine. By adding TANIN VR SUPRA® directly to grapes, the proteins in the must interact with it, thus preserving the skin tannins.

Model of interaction TANIN VR SUPRA® - Proteins



VINIFICATION

The essential element

OBJECTIVE	GRAPE OR MUST TYPE	TANNIN	DOSAGE	NOTE
Botrytised grapes, anti-oxidant action, laccase inhibition.		TANIN VR SUPRA® TANIN VR SUPRA® ÉLÉGANCE	10 - 80 g/hL (100 - 800 ppm), according to the health of the grapes.	Add as soon as possible to grapes, even before arrival in the winery. Perform laccase test in case of <i>Botrytis</i> .
		TANIN GALALCOOL®	5 - 20 g/hL (50 - 200 ppm), according to the health of the grapes.	
Protein precipitation and skin tannin preservation.		TANIN VR SUPRA® TANIN VR SUPRA® ÉLÉGANCE	10 - 50 g/hL (100 - 500 ppm)	Sacrificial effect. Add as soon as possible to grapes.
Protein precipitation.		TANIN GALALCOOL®	5 - 20 g/hL (50 - 200 ppm)	
Colour stabilisation.		TANIN VR COLOR® TANIN VR GRAPE®	15 - 80 g/hL (150 - 800 ppm)	Add during the first third of fermentation.
Structure contribution. Compensation for tannin deficiency.		TANIN VR GRAPE® TANIN VR SUPRA® TANIN VR SUPRA® ÉLÉGANCE	10 - 40 g/hL (100 - 400 ppm) 10 - 80 g/hL (100 - 800 ppm) 10 - 80 g/hL (100 - 800 ppm)	

TANIN VR SUPRA®

Instantly dissolving (IDP) ellagic and proanthocyanidic tannin preparation.

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

- **Anti-oxidant** action providing protection of the must and the colour.
- 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 favour indigenous tannin/anthocyanin reactions.

Dosage: 10 - 80 g/hL (100 - 800 ppm).



1 kg
5 kg

TANIN VR SUPRA® ÉLÉGANCE

An instantly dissolving (IDP) formulation of proanthocyanin and ellagic tannins.

TANIN VR SUPRA® ÉLÉGANCE has been formulated to limit the astringency effect when tannin is added during fermentation. It allows for more precise management of extraction and maceration, mainly for the most delicate grape varieties (such as Pinot Noir) or when making red wines in a fruitier or lighter style. It is used under the same conditions as TANIN VR SUPRA®.

Dosage: 10 - 80 g/hL (100 - 800 ppm).



1 kg
5 kg

VINIFICATION

The essential element

TANIN VR COLOR®

Instantly dissolving (IDP) catechin tannin preparation. Specially formulated to stabilise wine colour.

TANIN VR COLOR® is a non-astringent tannin which can be integrated into all profiles of wine colour.

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 **colour management** problems (extraction/stabilisation).

Dosage: 10 - 80 g/hL (100 - 800 ppm).



1 kg
5 kg

TANIN GALALCOOL®

Granulated gallic tannin preparation, to be used for white and rosé juice/must.

TANIN GALALCOOL® is a highly purified extract of chestnut gall tannins, with physio-chemical properties that are particularly well adapted to white and rose 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.
- Facilitates clarification.

Dosage: 5 - 20 g/hL (50 - 200 ppm).

OPTION TANIN GALALCOOL® SP - See P. 63.



500 g

TANIN VR GRAPE®

Instantly dissolving (IDP) grape proanthocyanidic tannin preparation.

During the fermentation phase, TANIN VR GRAPE® allows:

- Compensation for **natural grape tannin deficiency**.
- Stabilisation of colour due to the formation of **tannin-anthocyanin** polymeric pigments.
- Thanks to the very high quality of its extraction, TANIN VR GRAPE® contains only a negligible quantity of phenolic acids (*Brettanomyces* substrates).

Dosage: 10 - 40 g/hL (100 - 400 ppm).

OPTION TANIN VR SKIN® - See P. 62.



1 kg

TANIN OENOLOGIQUE

Ellagic tannins, intended for the vinification of red, white and rosé musts.

TANIN OENOLOGIQUE is an extract of ellagic chestnut tannins, particularly suited to the protection of musts from oxidation by:

- **Inhibiting natural oxidation enzymes** (laccase, tyrosinase) in association with SO₂.
- Protecting against oxygen.
- Precipitating some of the **unstable proteins**, in association with bentonite.
- Facilitating clarification.

Dosage: 8 - 15 g/hL (80 - 150 ppm).



5 kg

Find Out More: Discover our **IDP** video on our website, at **LAFFORT & YOU** section.

FOCUS



TANIN VR SUPRA® & TANIN VR COLOR®: THE WINNING TEAM

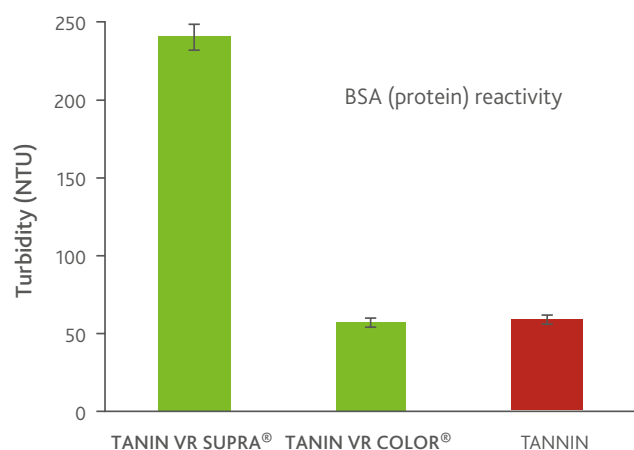
TANNINS IN WINEMAKING HAVE 4 POINTS OF INTEREST:

- ✓ The "sacrificial" effect.
- ✓ The anti-oxidant effect.
- ✓ The co-pigmentation effect in the presence of colour components.
- ✓ The effect of stabilisation in the presence of acetaldehyde.

PRECIPITATION OF PROTEINS OR "SACRIFICIAL" EFFECT

Grape proteins combine and precipitate with phenolic compounds. This precipitation reduces the natural amount of grape tannins and can be limited due to the "sacrificial" effect: by using extra tannins that will combine specifically to the proteins. This "sacrificial" effect can be evaluated in the laboratory by measuring the tannins reactivity with a reference protein such as BSA.

TANIN VR SUPRA® provides a **strong protective effect** for natural grape phenolic compounds. Its **reactivity is 5 times superior** than other vinification tannins.



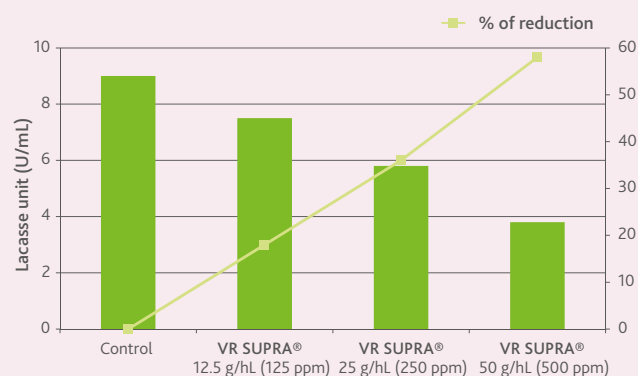
THE ANTIOXIDANT EFFECT

The use of tannins has always been linked to their ability to moderate the effects of oxygen. They have antioxidant properties and protect the oxidisable compounds. It has been proven that 30 g/hL (300 ppm) of TANIN VR SUPRA® added in increments during fermentation reduces the amount of dissolved O₂ three-fold in must at the beginning of the fermentation which limits the oxidation risk of easily oxidisable compounds.



THE INHIBITION OF LACCASE ACTIVITY

The presence of *Botrytis* is most often accompanied by a polyphenol oxidase (laccase), which is highly damaging. Due to the precipitation of proteins (the sacrificial effect) and the rapid consumption of O₂ by the tannins (antioxidant effect), TANIN VR SUPRA® ensures an effective reduction of these harmful oxidase activities.



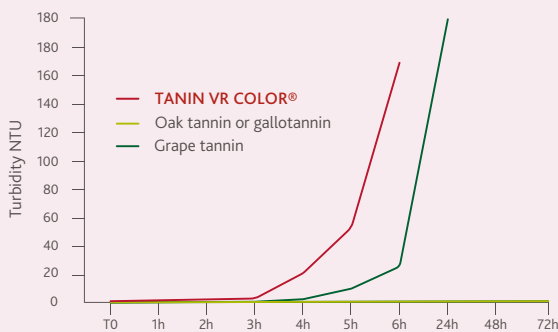
THE CO-PIGMENTATION EFFECT

The phenomenon of co-pigmentation results from the molecular association of coloured pigments such as anthocyanins with other more or less coloured pigments (tannins, phenolic acids...) leading to complexes (co-pigments) having a colour intensity greater than that of the coloured pigment alone. Co-pigmentation seems to play an important role in the colour of young wines. Red wines that are the richest in co-pigments present a more intense colour from the earliest stages of winemaking and it also seems more durable over time. **TANIN VR SUPRA®** and **TANIN VR COLOR®** are two tannins with good co-pigmentation ability.

CONDENSATION EFFECT (STABILISATION OF COLOUR)

Acetaldehyde molecules are involved in stabilising simple coloured phenolic structures through reactions leading to more complex molecules. The efficiency of the tannin/anthocyanin bond via an acetaldehyde bridge can be simply demonstrated by saturating a tannin solution with acetaldehyde and then observing the evolution of turbidity over time. A benchmarking study has been done with many tannins available on the market using this method: **TANIN VR COLOR®** was more than 100 times more reactive than the closest competitor product.

Change in turbidity



Results of ethanal test with 4 products of the market. **TANIN VR COLOR®** is the most reactive to acetaldehyde (ethanal), key step in the colour stabilisation and formation of tannin-anthocyanin complexes."

SPECIFIC CASE: LACK OF PHENOLIC MATURITY

When harvest is not at optimal phenolic ripeness, the qualities of **TANIN VR SUPRA®** and **TANIN VR COLOR®** are complementary.

Thanks to its remarkable "sacrificial" effect, **TANIN VR SUPRA®** helps protect the natural extractable grape tannins from precipitating with naturally occurring proteins, while **TANIN VR COLOR®** brings balance to the tannin/anthocyanin ratio and promotes the production of stable coloured compounds.

Whenever the vintage looks like a difficult one with challenges for grapes with optimal phenolic ripeness, the use of proper tannins, for example, **TANIN VR SUPRA®** and **TANIN VR COLOR®** will be a key point to successful vinifications.

	TANIN VR SUPRA®	TANIN VR COLOR®
"Sacrificial" effect	*****	*
Anti-laccase reaction	*****	**
Antioxidant effect	****	***
Co-pigmentation effect	***	****
Condensation effect (Colour stabilisation)	*	*****

TANIN VR SUPRA® is added to the must after the crusher or during the first pump over (if no evidence of *Botrytis*) (20 - 80 g/hL / 200 - 800 ppm according to the sanitary state of the harvest). **TANIN VR COLOR®** is added during the first third of the alcoholic fermentation during the colour extraction phase at 10 to 30 g/hL (100 - 300 ppm).



SPECIFIC TREATMENTS

PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
CHARBON ACTIF LIQUIDE HP	Liquid activated carbon in stabilised aqueous solution. High stain removal and decolorisation capacity.	120 - 400 mL/hL.	10.5 kg
CHARBON ACTIF SUPRA 4	Activated carbon in powder. Stain removal and decolorisation.	20 - 100 g/hL (200 - 1000 ppm).	5 kg 15 kg
CHARBON ACTIF PLUS GR	Granulated activated carbon. Stain removal removal and decolorisation.	20 - 100 g/hL (200 - 1000 ppm).	5 kg
GEOSORB® GR	Granulated activated carbon. Decontaminant for fermenting musts and new wines. Reduction in geosmin and octenone content.	Action on geosmin: 15 - 25 g/hL (150 - 250 ppm). Action on octenone: 35 - 45 g/hL (350 - 450 ppm).	5 kg 15 kg



OPTIMISED DECOLORISATION

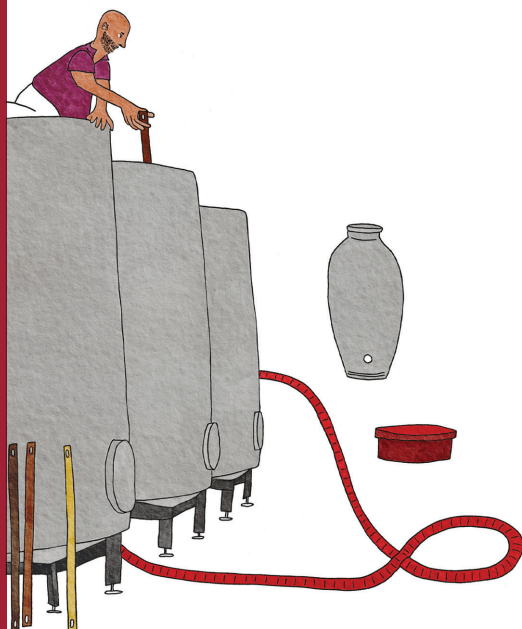
In AF, consider the combined use of POLYMUST® NATURE and CHARBON ACTIF LIQUIDE HP.

- Combination compatible with European regulation for organic winemaking, Regulation (EU) 848/2018.
- Colour stabilisation and removal of oxidised compounds.
- Selective adsorption of unstable proteins from wine, to initiate protein stabilisation.

OTHER

PRODUIT	DESCRIPTION / APPLICATION	DOSE	PACKAGING
SUPRAROM®	Preparation containing condensed tannins, potassium metabisulfite and ascorbic acid. Preventive and curative treatment for must oxidation.	10 - 25 g/ton.	1 kg





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YEAST PRODUCTS

Innovation born from nature



POWERLEES® LIFE

Formulation of inactivated yeasts rich in reducing compounds including reduced glutathione, to conserve and refresh wines during ageing.

POWERLEES® LIFE was selected during a research programme to study alternatives to sulphites for the protection of wines during their conservation. The specific inactivated yeasts that go into the composition make it possible to:

- Protects wines from premature oxidation during ageing, with or without added sulphites.
- Significantly slow down the oxygen consumption by oxidisable compounds in the wine.
- Preserve wine colour.
- Refresh the aromatic profile of already oxidised wines.

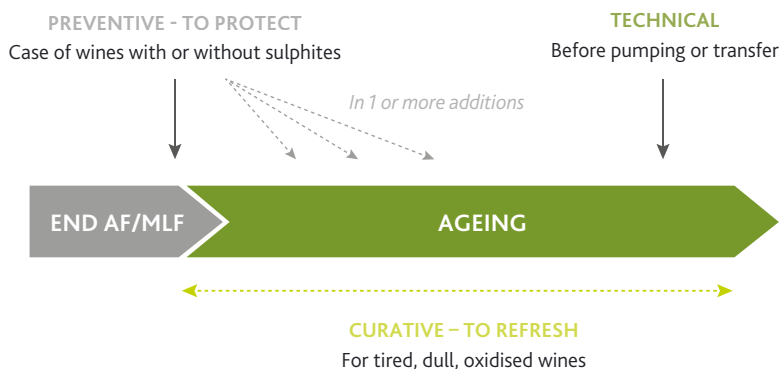
POWERLEES® LIFE can be added once or several times as from the end of fermentation and throughout the ageing period. It is a complementary solution to SO₂ in a strategy of reducing the doses of sulphur used.

Dosage: 10 - 40 g/hL (100 - 400 ppm).



1 kg
5 kg

POWERLEES® LIFE - Possible uses



Preventive and curative use cases for all types of wine.



POWERLEES® Rouge

Specific preparation of inactivated yeasts and β-glucanases, for fining wines.

Developed by LAFFORT®, POWERLEES® Rouge provides yeasts constituents that help soften wines during fermentation and ageing.

- The enzyme action accelerates the sensory fining.
- Extraction of components with high sensory potential (sapid peptides from Hsp12 protein): β-glucanase helps the fast extraction of peptides present at the cell envelopes of the inactivated yeast and from yeast autolysis fragments.
- Contributes to wine stabilisation through fining and the diffusion of mannoprotein fragments from yeast.
- Allows the winemaker to rebuild lees in wines racked after fermentation.
- Specially adapted to wines for early release.

Dosage: 15 - 40 g/hL (150 - 400 ppm).



1 kg

YEAST PRODUCTS

Innovation born from nature

NEW IN 2022

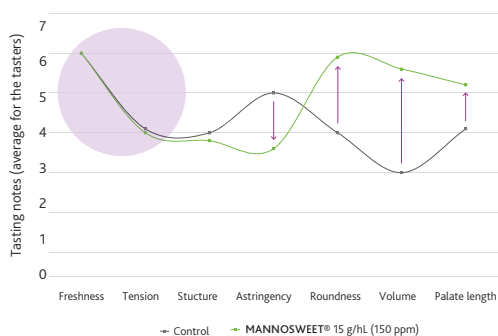
MannOsweet®

PURE FINESSE

100% natural preparation of specific pure mannoproteins and vegetable polysaccharides for colloidal and tartaric stabilisation while preserving the sensation of volume and roundness on the palate.

- Contributes to stabilisation of colouring matter as from a dose of 5 g/hL (50 ppm).
- Respects the aromatic profile of the wine.
- Excellent filterability: **MANNOSWEET®** does not affect the initial filterability of the wine.
- Addition of **MANNOSWEET®** as a finishing treatment before bottling.

Dosage: 5 - 40 g/hL (50 - 400 ppm).



Tasting results

Blend of Grenache / Syrah / Mourvèdre treated with 15 g/hL (150 ppm) **MANNOSWEET®** after 9 months' ageing. In addition to contributing to stabilisation of colouring matter, the wine is perceived as less astringent, rounder, with more volume and length on the palate while retaining aromatic freshness. Tasting carried out by a trained panel.

Mann(feel)®

PURE MANNOPROTEINS

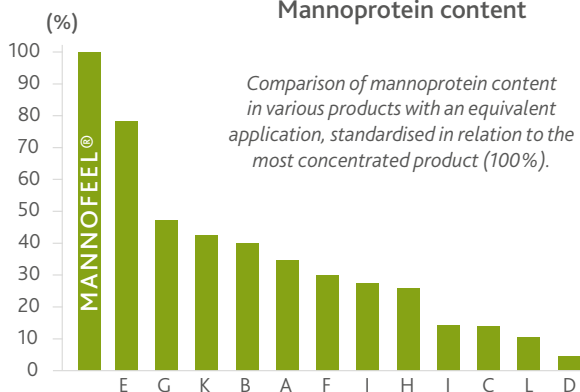
MANNOFEEEL® is the result of global research by LAFFORT® on mannoproteins to identify and understand the mechanism of action and production. The selected mannoproteins in **MANNOFEEEL®** significantly increase the perception of volume, roundness and length on the palate while aiding tartrate stability.

- Pure product, 100% mannoproteins. Natural compound present in wine.
- Respects the freshness and fruit in wine.
- 100% soluble with an immediate impact.
- Participates in colloidal and tartaric stabilisation of wine.

Dosage: 25 - 150 mL/hL.



Mannoprotein content



MANNOFEEEL® does not alter wine filterability

		Control	MANNOFEEEL®		
			25 mL/hL	50 mL/hL	100 mL/hL
Clogging index at 1h	IC	40	40	33	38
	IVIC - 1h	1	1	1	1
Clogging index at 4h	IC	40	38	40	37
	IVIC - 4h	1	1	1	1

YEAST PRODUCTS

Innovation born from nature



OENOLEES® and **OENOLEES® MP** are oenological products derived from natural constituents found in wine and obtained using innovative and patented production processes. These products are paving the way for a new type of oenology: more natural, more specific while enhancing and preserving the integrity of wine.

OENOLEES® MP

Specific preparation of an extract or yeast cell walls (mannoproteins) rich in sapid peptides (Patent EP 1850682) and polysaccharides.

- Contributes to increasing the **sweetness** sensation in wines.
- Allows the winemaker to better **counter-balance acidity and bitterness**.
- Can be used just prior to bottling.

Dosage: 10 - 30 g/hL (100 - 300 ppm).



1 kg

OENOLEES®

Specific preparation of yeast cell walls with a high sapid peptide content for premium red wine fining (Patent EP 1850682).

OENOLEES® contributes to improving the organoleptic quality of wine by:

- **Reducing aggressive sensations:** the cellular envelopes have a refining action that promotes elimination of certain polyphenols responsible for bitterness and astringency.
- **Increasing sweet sensations:** **OENOLEES®** has a high content of a specific peptide fraction that is released naturally by yeasts during autolysis and has an excessively low perception threshold (only 16 mg/L (16 ppm) compared to 3 g/L for sucrose).

Dosage: 20 - 40 g/hL (200 - 400 ppm).



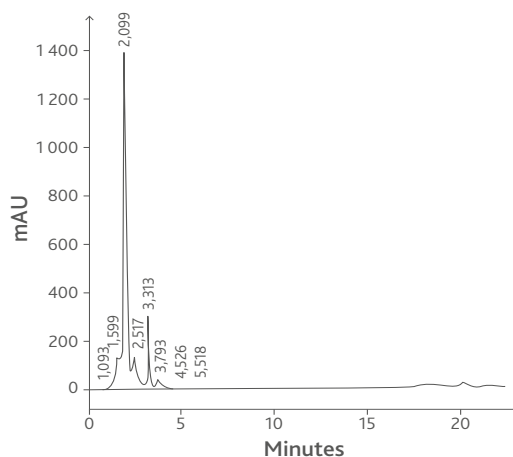
1 kg
5 kg



Hsp12 - PATENT EP 1850682

A large amount of R&D work (A. Humbert's thesis, 2005; Patent EP1850682, 2006; Marchal et al., J. Agric. Food Chem. 2011) have made it possible to understand the origin of the sapid fraction derived from yeast during its autolysis. These discoveries have now been used to select specific yeast derivatives, rich in sapid peptides derived from the protein Hsp12 (Heat Shock Protein, 12 kDa), for the efficient formulation of preparations such as **OENOLEES®** and **OENOLEES® MP**.

Figure: Detection by HPLC C18 RP of the peptides derived from the Hsp12 membrane protein in a fraction of derivatives from selected yeasts.



WINE CLARIFICATION

Natural accelerators

UTILITY OF ENZYME PREPARATIONS FOR WINE STABILISATION AND PREPARATION:

Early enzyme treatment during ageing secures several practical aspects of wine management:

- Clarification of finished wines: facilitates microbial management.
- Depectinisation: optimises the preparation of wines for bottling (fining, filtration).

Two formats are available:

- Microgranulated formulation: **LAFAZYM® CL** - dosage: 2 - 4 g/hL (20 - 40 ppm).
- Liquid formulation: **LAFAZYM® 600 XL^{ICE}** - dosage: 1 - 4 mL/hL.

EXTRALYSE®

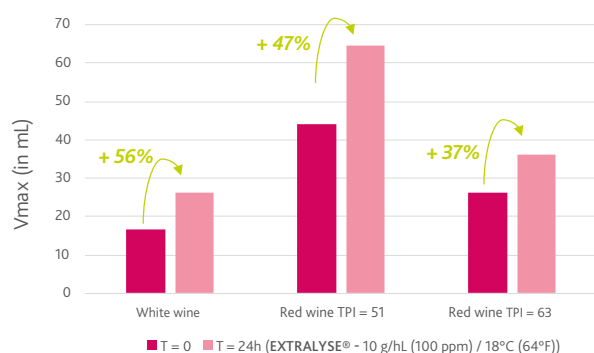
Specific to post-fermentation clarification and ageing on lees, for the production of rounded wines.

- Micro-granulated preparation of pectolytic enzymes and β -(1-3; 1-6) glucanases with secondary activities.
- Brings roundness and softness to the wine by releasing larger quantities of yeast-derived molecules.
- Improves the filterability and clarification of wines especially in case of wines affected by *Botrytis cinerea*.

Dosage: 6 - 10 g/hL (60 - 100 ppm).



Improves filterability



Improvement in the filterability of wines treated with **EXTRALYSE®**.

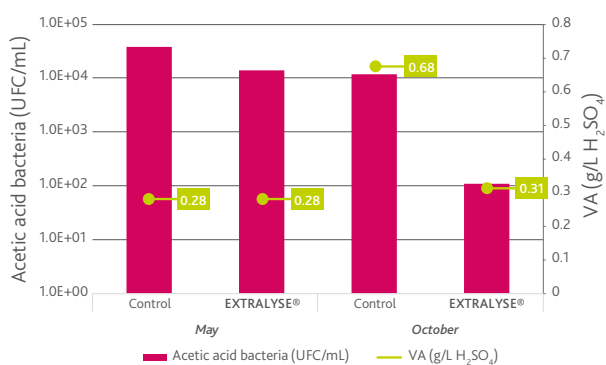
Dose: 10 g/hL (100 ppm). Contact time: 24h at 18°C (64°F).

Vmax = maximum volume at clogging.

Makes it possible to assess wine filterability.

Use of **EXTRALYSE®** favours hydrolysis of long-chain colloids, responsible for clogging filters. The Vmax index shows a remarkable improvement in filterability for the wines treated with **EXTRALYSE®**.

Reduces the microbial load



Impact of treatment with **EXTRALYSE®** on the acetic acid bacteria population and VA of a wine during ageing.

EXTRALYSE® decreases the microbial load in wines by promoting the sedimentation of suspended particles containing microorganisms.

LYSOZYM

Designed for microbial management of Gram-positive bacteria.





- Micro-granulated muramidase enzyme preparation. Degrades Gram+ lactic acid bacteria cell wall.
- Delays the action of lactic acid bacteria, reducing the need for SO₂.
- Strengthens the action of SO₂ on the sweet white wines and improves microbiological stability.
- In red winemaking, avoids premature start of MLF.

Dosage: 10 - 50 g/hL (100 - 500 ppm).



AGEING TANNINS

The essential element

OBJECTIVE	WINE TYPE	TANNIN	DOSAGE
Balance or wine structure improvement.		TANFRESH® TANIN GALALCOOL® SP TANIN VR SKIN®	0.5 - 6 g/hL (5 - 60 ppm) 2 - 5 g/hL (20 - 50 ppm) 2 - 10 g/hL (20 - 100 ppm)
		TANIN VR SKIN® TAN'COR® TAN'COR GRAND CRU® QUERTANIN® RANGE	2 - 10 g/hL (20 - 100 ppm) 10 - 30 g/hL (100 - 300 ppm) 5 - 30 g/hL (50 - 300 ppm) 0.5 - 20 g/hL (5 - 200 ppm)
Regulation of oxidation reduction phenomena.		TANFRESH® TANIN GALALCOOL® SP	0.5 - 6 g/hL (5 - 60 ppm) 2 - 5 g/hL (20 - 50 ppm)
		QUERTANIN® RANGE TAN'COR GRAND CRU®	0.5 - 20 g/hL (5 - 200 ppm) 10 - 20 g/hL (100 - 200 ppm)
Stabilisation of colour.		TANIN VR SKIN® TAN'COR GRAND CRU®	20 - 40 g/hL (200 - 400 ppm) 5 - 30 g/hL (50 - 300 ppm)

TANIN VR SKIN®

New preparation of proanthocyanidic tannins from grape skins.

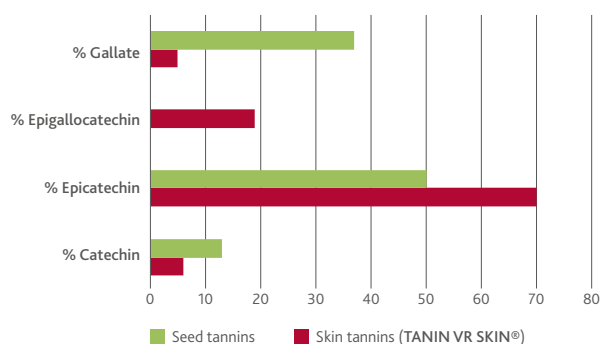
Due to its specific nature (grape skin tannin) TANIN VR SKIN® allows:

- Compensation for natural grape tannin deficiency (lack of phenolic maturity or adverse tannin-anthocyanin ratio).
- Stabilisation of colour due to the formation of tannin-anthocyanin combinations.
- Improved clarification.
- Refinement of wine structure and palate length.

Dosage: 5 - 40 g/hL (50 - 400 ppm).

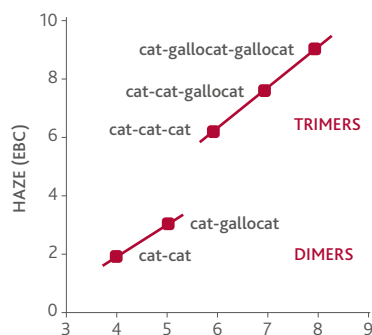


Distribution of procyanidins in seed and skin tannins



Seed tannins have a much higher proportion of gallate substituents (37%) than skin tannins (5%), and it is these compounds that react with proteins. TANIN VR SKIN® is a preparation naturally low in gallate compounds, present mainly in the grape seed.

Reactivity of procyanidins with proteins



The reactivity of tannins with proteins increases with the degree of polymerisation but also according to the gallate content. A catechin dimer will therefore be less reactive with proteins than this same dimer bound to a gallate radical.

TANIN VR SKIN® is structurally less reactive with proteins and therefore less astringent.

Find out more: watch our IDP video on our website, LAFFORT & YOU section.

AGEING TANNINS

The essential element

TAN'COR GRAND CRU®

Preparation of proanthocyanidic tannins derived from grapes and ellagic tannins from oak. Utilises LAFFORT®'s Instant Dissolving Process (IDP). For use 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.
- Stabilise colour by combining the remaining free anthocyanins.
- Regulate oxidation-reduction phenomena.

Dosage: 5 - 30 g/hL (50 - 300 ppm).



1 kg

TAN'COR®

Proanthocyanidic and ellagic tannin preparation. Utilises LAFFORT®'s Instant Dissolving Process (IDP). For use 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 the wine with regards to oxidation phenomena.
- Regulate oxidation-reduction phenomena.

Dosage: 10 - 30 g/hL (100 - 300 ppm).



1 kg
5 kg

TANFRESH®

Instantly dissolving (IDP) ellagic and proanthocyanidic tannin preparation based on grape tannins.

- To refresh white and rosé wines (against oxidation, atypical ageing).
- To boost structure and mouthfeel.
- To help eliminate reductive odours.

Dosage: 0.5 - 6 g/hL (5 - 60 ppm).



250 g

TANIN GALALCOOL® SP

Preparation of pure gallic tannins.

TANIN GALALCOOL® SP has a specially adapted formulation that respects the sensory balance of wines on the palate while maintaining the same oenological properties as TANIN GALALCOOL® (See P. 53).

Dosage: 2 - 5 g/hL (20 - 50 ppm).



1 kg



QUERTANIN® RANGE

The essential element

QUERTANIN® RANGE

A variety of preparations of "stave wood"- quality ellagic tannins, extracted from oak heartwood, or ellagic tannins sourced from oak heartwood and gallic tannins in instant-dissolving form (IDP), for the maturation of white, rosé and red wines.

- Regulates oxidation-reduction phenomena during maturation in barrels or during micro-oxygenation.
- With used barrels, the QUERTANIN® range allows the recreation of a medium rich in ellagic tannins similar to a new barrel.
- After the addition, it is recommended to carry out normal rackings until fining or bottling preparation.

DOSAGE

It is specified in the Oenological Codex that tannins "must not change the olfactory properties and the colour of wine". The dosage rates will therefore vary in function of the wine matrix, and shall be determined after trials.



500 g



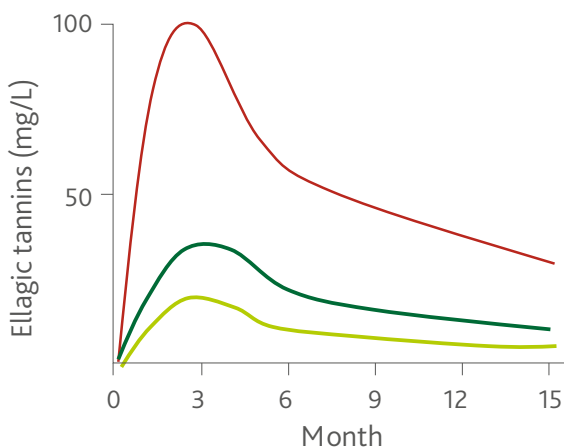
QUERTANIN® Q2

Stave-grade ellagitannins extracted from the heartwood of American oak for the ageing of white, red and rosé wines.

QUERTANIN® Q2 acts on the tannic structure and contributes to the balance of wines.



250 g



- New barrel (limousin)
- Used barrel - 1 wine (limousin)
- Used barrel - 2 wines (limousin)

Tannin content extracted from the oak is lower in used barrels. The ellagic tannin protective effect is decreased and the wine becomes subject to premature oxidation. Adding QUERTANIN® allows recreation of the buffering qualities provided by tannins extracted from new barrels thus protecting the wine from the oxidation phenomena.

SENSORY REFINEMENT

Based on vegetable proteins



VEGEFINE®

Vegetable proteins (patatins) for wine clarification.

- Allergen-free, non-animal, non-GMO.
- Strongly reactive with phenolic compounds.
- Small quantity of lees after sedimentation.
- Rapid clarification.
- No risk of over-fining.

Dosage: Fining red wines: 2 - 8 g/hL (20 - 80 ppm), Fining red press wines: 5 - 15 g/hL (50 - 150 ppm),
Fining white and rosé wines: 2 - 15 g/hL (20 - 150 ppm).

Compatible with European regulations for organic vinification, Regulation (EU) 848/2018 and its amendments.



POLYMUST® BLANC

Association of vegetable protein (pea) with PVPP for the preventive treatment of oxidation in white and rosé wines.

- Prevention of oxidation.
- Elimination of oxidisable phenolic compounds liable to trap aromas and distort the colour.

Dosage: 30 - 80 g/hL (300 - 800 ppm).



POLYMUST® ROSÉ

Association of PVPP with vegetable protein (Patatine) for the fining of white and rosé wines.

- Stabilisation of the colour and elimination of oxidised compounds.
- When used on finished wine, it is best to rack within 5 days following treatment.

Dosage: 5 - 20 g/hL (50 - 200 ppm).



POLYMUST® PRESS

Association of PVPP, calcium bentonite and vegetable protein (Patatin) for the preventive fining of press wines and the reduction of oxidised character.

- Refining red press wines: clarification, stabilisation of the colouring matter, reduction of astringency, greenness and metallic notes, microbiological stabilisation.

Dosage: 15 - 50 g/hL (150 - 500 ppm) for red press wines.



POLYMUST® NATURE

Combination of vegetable protein (pea) and bentonite (sodium and calcium) suitable for fining wine.

- Remarkable clarification effect.
- Preventive and curative treatment of polyphenol oxidation in white and rosé wines.
- Contributes to the stabilisation of colouring matter in red wines.
- Contributes to protein stabilisation.

Dosage: White and rosé wines: 20 - 80 g/hL (200 - 800 ppm), Red wines: 10 - 15 g/hL (100 - 150 ppm), Red press wines: 10 - 20 g/hL (100 - 200 ppm).

Compatible with European regulations for organic vinification, Regulation (EU) 848/2018 and its amendments.



SENSORY REFINEMENT

GELATINS

All our gelatines are of porcine origin and systematically developed according to their winemaking application.

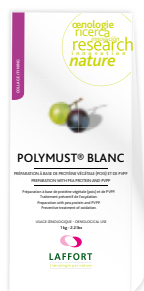
PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
GECOLL® SUPRA	Eliminates astringent tannins.	40 - 100 mL/hL	1 L 5 L 20 L
GELAROM®	Intended to bring out the organoleptic potential of the wine.	30 - 60 mL/hL	1 L 5 L 20 L
GELAFFORT®	Wine clarification agent.	10 - 30 mL/hL	20 L
GECOLL®	Cold-soluble powdered gelatine. Wine clarification agent.	8 - 10 g/hL (80 - 100 ppm)	1 kg 20 kg
GÉLATINE EXTRA N°1	Highly purified heat soluble gelatin. Fining of red wines for ageing.	6 - 10 g/hL (60 - 100 ppm)	1 kg

OTHER PRODUCTS FOR STABILISATION AND SENSORY FINE TUNING

PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
ALBUCOLL®	Liquid preparation of egg white. Fining and clarification of red wines.	30 - 80 mL/hL. 30 mL ALBUCOLL® is equivalent to 1 fresh egg white.	1 kg 5 kg
OVOCLARYL	Powdered egg albumin. Fining and clarification of red wines.	6 - 10 g/hL (60 - 100 ppm). 4 g of OVOCLARYL corresponds to 1 fresh egg white.	1 kg
ICHTYOCOLLE	Fish-based (isinglass) fining agent suitable for fining fine white and rosé wines. Restores high sensory clarity and remarkable brilliance to treated wines.	0.5 - 1.5 g/hL (5 - 15 ppm).	250 g 500 g
SILIGEL®	Colloidal silica solution that may be used in combination with all organic fining agents.	20 - 100 mL/hL. Use 0.5 to 1 mL of SILIGEL® for 1 mL of gelatin. Add SILIGEL® prior to gelatin.	1 L 5 L 20 L

OXIDATION TREATMENT

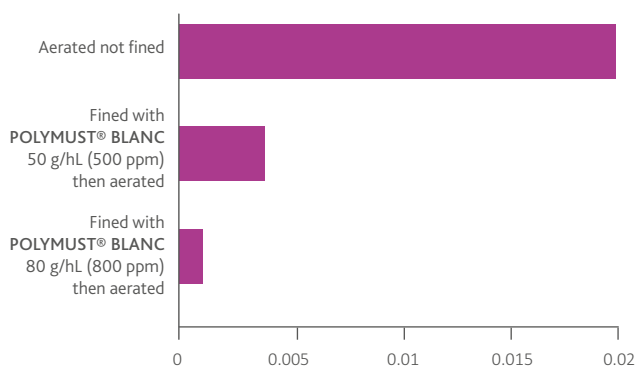
PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
POLYMUST® BLANC	Blend of vegetal protein (pea) and PVPP. Preventive treatment of oxidation of white and rosé wines.	30 - 80 g/hL (300 - 800 ppm)	1 kg 10 kg
CASEI PLUS	Potassium caseinate. Treatment of oxidation phenomena and maderisation in wines.	20 - 60 g/hL (200 - 600 ppm)	1 kg 20 kg
POLYLACT®	Combination of PVPP and casein. Preventive and curative treatment of the oxidation of wines (white and rosé).	15 - 90 g/hL (150 - 900 ppm)	1 kg 10 kg
ARGILACT®	Combination of casein and bentonite. Treating wines (white and rosé) against oxidation.	40 - 100 g/hL (400 - 1000 ppm)	1 kg 25 kg
VINICLAR®	Granulated preparation of PVPP. Preventive and curative treatment of the oxidation of wines (VINICLAR® contains a small amount of cellulose for a better clarification and easier filtration).	Preventive treatment: 15 - 30 g/hL (150 - 300 ppm). Curative treatment: 30 - 80 g/hL (300 - 800 ppm).	25 kg
VINICLAR® P	Granulated preparation of PVPP. Preventive and curative treatment of the oxidation of wines.	20 - 50 g/hL (200 - 500 ppm)	1 kg 22.68 kg
VINICLAR® GR	Granulated preparation of PVPP. Preventive and curative treatment of the oxidation of wines.	Preventive treatment: 15 - 30 g/hL (150 - 300 ppm). Curative treatment of oxidized wines: 30 - 80 g/hL (300 - 800 ppm).	1 kg 19.96 kg



POLYMUST® BLANC

Prevention of oxidation of a white wine (Colombard, Gers).

In laboratory, the rating of MCI ICM (OD420 + OD520 + OD620) before and after aeration allows to evaluate the sensitivity of a wine to oxidise. A preventive treatment with POLYMUST® BLANC can help stabilise the MCI.



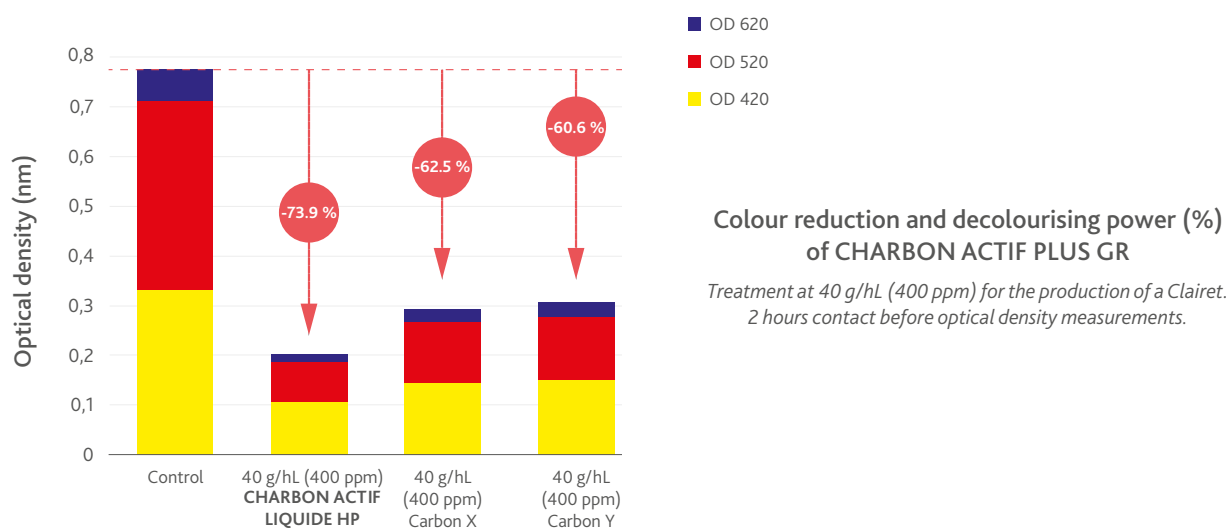
SPECIFIC TREATMENTS

PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
FLOWPURE®	Selective vegetable fibres. Reduction of pesticide residues and ochratoxin A levels in the wine.	Consult the product data sheet.	5 kg
REDOXY PLUS	Preparation containing potassium metabisulfite, citric acid and ascorbic acid. Preventive treatment for wine oxidation.	5 - 15 g/hL (50 - 150 ppm)	1 kg
SULFIREDOX	Copper sulfate solution dissolved in water at 25 g/L. For the elimination of reduced character in wines.	2 - 10 mL/hL	1 L 5 L

ACTIVATED CARBON*

PRODUCT	DESCRIPTION / APPLICATION	DOSAGE	PACKAGING
CHARBON ACTIF LIQUIDE HP	Activated carbon in a stabilised aqueous solution. High stain removal and decolorisation capacity.	120 - 400 mL/hL	10 L
CHARBON ACTIF SUPRA 4	Powdered activated carbon for tint removal and decolorisation.	20 - 100 g/hL (200 - 1000 ppm)	15 kg
CHARBON ACTIF PLUS GR	Granulated activated carbon for tint removal and decolorisation.	10 - 100 g/hL (100 - 1000 ppm)	5 kg

* The usage of active carbon is regulated, please check the current regulations. All treatments must be recorded in a handling register and a holding register.



MICROBIOLOGICAL STABILISATION

OENOBRETT®

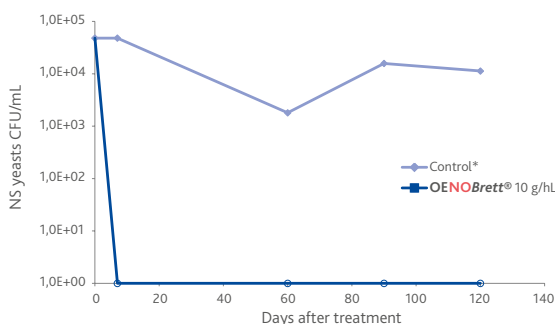
Preparation based on chitosan of fungal origin and enzymes, to combat *Brettanomyces* yeasts.

- Disruption of the membrane and the cell space by chitosan.
- The synergistic effect of enzymes accelerate the settling of lysed cells. The decrease of the *Brettanomyces* population is significant and thus prevents spoilage.
- The antimicrobial action of OENOBRETT® is an essential tool within a SO₂ reduction strategy.

Dosage: 10 g/hL (100 ppm).

23 g
(barrel
dose)
250 g
2,5 kg

Effectiveness of OENOBRETT® on wine contaminated with *Brettanomyces*



Example of the effectiveness of treatment with 10 g/hL (100 ppm) of OENOBRETT® on a wine naturally contaminated with *Brettanomyces*. The concentration of E4P+E4G in the wine at the time of treatment was 332 µg/L. 4 months after treatment, the untreated wine reached a volatile phenol concentration of 2252 µg/L while the treated wine remained at the initial concentration.



OENOBRETT® ORG

Preparation based on chitosan of fungal origin to combat *Brettanomyces* yeasts.

- Disruption of the membrane and the cell space by chitosan.
- The antimicrobial action of OENOBRETT® ORG is an essential tool within a SO₂ reduction strategy.

Dosage: 4 - 10 g/hL (40 - 100 ppm).

Suitable for organic according to the Regulation (EU) 848/2018.

100 g

FLORACONTROL®

Formulation of chitosan and inactivated yeasts for the protection of wines against certain spoilage microorganisms. Biocontrol product.

- Reduction of the overall microbial load (yeasts & bacteria).
- Tool for winemaking and ageing with reduced SO₂ or without sulfites.
- The inactivated yeast fraction provides a natural reducing component that helps protect wines against oxidation during ageing.
- Contributes to wine clarification.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

1 kg

MICROBIOLOGICAL STABILISATION

NEW IN 2022

FUMARIC^{ctrl}

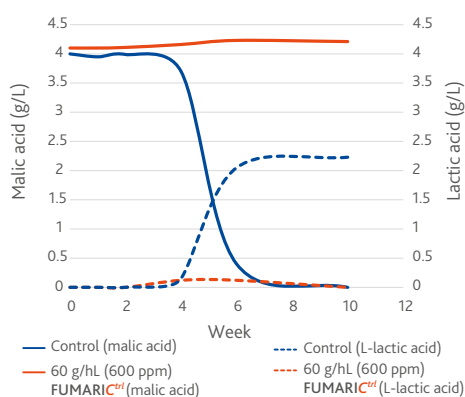
Pure fumaric acid for controlling the growth and activity of the lactic acid bacteria responsible for malolactic fermentation in wine.

2,5 kg
25 kg

- Avoids the onset of MLF.
- Can stop MLF while in progress.
- Preservation of malic acid in wines.
- Tool for making wines with reduced SO₂ or with no sulphite added.

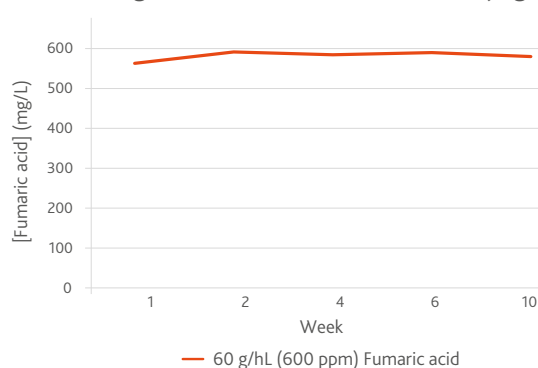
Dosage: 30 - 60 g/hL (300 - 600 ppm).

Evolution of malolactic fermentation



Experimental result demonstrating the ability of fumaric acid to block malolactic fermentation. L-lactic acid is still not detected 10 weeks after treatment while MLF is completed in the control.

Monitoring of fumaric acid concentration (mg/L)



The preservation of the fumaric acid concentration shows its stability over time (10 weeks) in a study on wine with no *S. cerevisiae* fermentation activity.



MICROCONTROL®

Formula made from chitosan and inactivated yeast for reducing the microbial load (unfavourable microorganisms). Biocontrol product.

250 g

- Reduction of the overall microbial load (non-*Saccharomyces* yeasts, yeast, bacteria*).
- A wine vinification tool for use in a SO₂ reduction sequence.
- Improvement in the clarification of wines.

Dosage: 5 g/hL (50 ppm).

*Reduction in microbial populations by binding.

BACTICONTROL®

Formula made from chitosan, LYSOZYM and enzymes for protecting wines against certain microorganisms and particularly lactic bacteria. Biocontrol product.

500 g

- Microbiological protection of white, red and rosé wines after fermentation.
- A wine vinification tool for use in a SO₂ reduction sequence.
- Makes it possible to slow down or even stop a MLF in progress or avoid its onset (treatment is possible before or after AF).
- Synergistic action by β-glucanases and LYSOZYM on lactic acid bacteria, particularly *ropy pediococcus* (as enzymatic action on polysaccharides can create a widespread barrier around the bacteria and interfere with the action of LYSOZYM).

Dosage: 15 - 20 g/hL (150 - 200 ppm).

COLLOIDAL STABILISATION

STABIVIN®

Pure Verek arabic gum solution with high grade protection index for stabilising colouring matter in red wines.

Hydrophilic colloid which aims to counter hazes and colloidal deposits, allowing the wine to retain maximum clarity:

- Stabilises colouring matter.
- Increases protection with regard to metallic or protein casses.

Dosage: 70 - 150 mL/hL.

1 L
5 L
20 L

STABIVIN® SP

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 stabilisation and structure of the wines (softness and mouthfeel).
- Very low clogging index.
- Softening of wines by "coating" tannins.
- **STABIVIN® SP** is an arabic gum solution with low SO₂ concentration (2 g/L - 2 000 ppm).

Dosage: 100 - 300 mL/hL.



Gum arabic is obtained from the sap of a specific variety of acacia (Acacia verek) from selected African forests.

1 L
5 L
20 L

STABIFIX®

Solution of selected and purified gum arabic.

- Stabilises otherwise unstable colouring matter.
- Increases protection against metallic casse.

Dosage: 70 - 150 mL/hL.

5 L
20 L



OENOGOM® INSTANT

Pure gum arabic in rapid dissolving micro-granular form (IDP process).

- Stabilisation of the colouring matter of red wines.
- Softening of wines by "coating" the tannins.
- Recommended for the production of wines without SO₂.

Dosage: 20 - 100 g/hL (200 - 1000 ppm).

2,5 kg
25 kg



OENOGOM® BIO



Pure gum arabic in rapid dissolving micro-granular form (100% verek).

- Stabilisation of the colouring matter of red wines.
- Increase protection towards metallic hazes.
- Recommended for the production of wines without SO₂.

Dosage: 20 - 30 g/hL (200 - 300 ppm).

2,5 kg

PROTEIN STABILISATION

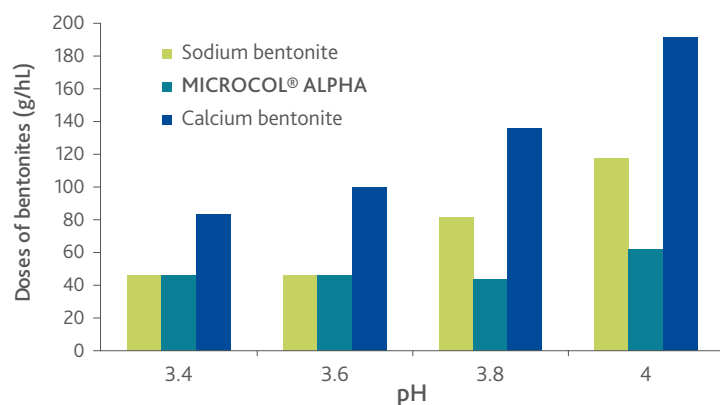
MICROCOL® ALPHA

High quality natural sodium microgranular bentonite with a high adsorption capacity. Intended for protein stabilisation in wines over a large pH range.

1 kg
5 kg
25 kg

- Stabilising properties in regard to heat-sensitive proteins.
- Wide stabilising action spectrum.
- High clarifying capacity and compact lees.
- Aromatic preservation.
- Helps colour stabilisation.
- Improves wine brightness.

Dosage: 10 - 80 g/hL (100 - 800 ppm).



Deproteinisation and wine pH

MICROCOL® ALPHA provides a stabilising action with respect to proteins, even when the wine pH is high.

MICROCOL® FT

Natural sodium-calcium bentonite for protein stabilisation of wines during cross-flow filtration.

15 kg

- Due to its high purity, MICROCOL® FT contains very little crystalline silica, which is responsible for the abrasion of membranes.
- The particle size is controlled, which avoids clogging the filters or having residues of micro-particles after filtration.

Dosage: 30 - 80 g/hL (300 - 800 ppm).

MICROCOL® CL G

Natural calcium bentonite, possessing excellent settling capacity and high protein adsorption power and allows for faster settling with formation of very compact lees.

15 kg

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

Dosage: 20 - 100 g/hL (200 - 1000 ppm).

Find Out More: Watch our **MICROCOL® ALPHA** video on our website, at **LAFFORT & YOU** (Video) section.

TARTARIC STABILISATION

MANNOSTAB® LIQUIDE 200

Contains the only mannoprotein naturally present in wines with the ability for potassium tartrate stabilisation: MP40.

It is enzymatically extracted from the yeast cell wall according to a patented process (Patent N° 2726284) which preserves and ensures the tartaric stabilisation capacity of MP40.

- Inhibition of potassium bitartrate salts crystallisation.
- Neutral sensory impact to the wine.
- Natural compound already present in the wines.
- Stabilises white, rosé and red wines ; still and sparkling wines ; filtered and unfiltered wines.
- No waste, no water or energy consumption.

Dosage: 50 - 150 mL/hL.

Sampling date	27/06	30/06	02/07	04/07	07/07
Control					
MANNOSTAB® LIQUIDE 200					

Microscopic observation of potassium bitartrate crystals evolution at -4°C (25°F) in solutions with and without MANNOSTAB® LIQUIDE 200.

Available in powder form on request, for the production of wines without sulfites.



1 L
10 L

CELSTAB®

CELSTAB® is a solution of cellulose gum, a highly purified polymer of vegetable origin (from wood) with a low degree of polymerisation and lower viscosity. Its liquid formulation at a concentration of 100 g/L facilitates its incorporation in wine.

- Intended for wine stabilisation in relation to potassium bitartrate crystallisation.
- CELSTAB® is a highly purified cellulose gum. Its composition is uniform (only one peak - HPLC).
- Inhibits microcrystal nucleation and growth phases (through disruption of surfaces responsible for the formation of crystals).
- CELSTAB® has a very high inhibitory power (by optimal degree of substitution), and allows stabilisation of highly tartaric-unstable wines.
- CELSTAB® is the liquid CMC with the lowest SO₂ concentration on the market.

Dosage: 100 - 200 mL/hL.

Delegated Regulation (EU) 2022/68 published on 19/01/2022 amended European Regulation (EU) 2019/934 by incorporating / adding the possibility of using carboxymethylcellulose (CMC) for the stabilisation of rosés as from 08/02/2022.



1 L
5 L
20 L

POLYTARTRYL®

Metatartaric acid under vacuum.

- Crystallisation inhibitor of potassium bitartrate salts.

POLYTARTRYL®: Index 40. To be incorporated few hours before the final filtration and bottling.

SUPER POLYTARTRYL®: Index 40/42. The strongest index of esterification.

Dosage: 10 g/hL (100 ppm).

1 kg
5 kg

TARTARIC STABILISATION

PRACTICAL APPROACH TO TARTARIC STABILISATION

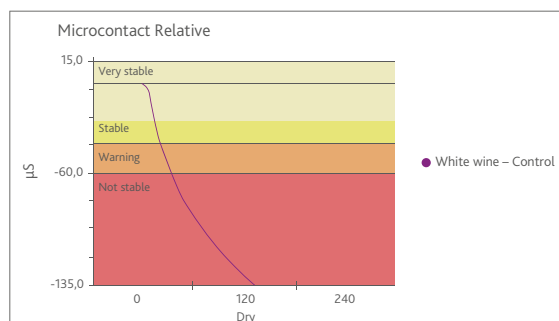
Thanks to its expertise on colloidal stabilisation of potassium bitartrate, LAFFORT® offers a solution adapted to each quality and category of wine to optimise treatment.

DIT VALUE (%)	> 20	> 20	< 20
Category of wine	Quick to Market.	Quick to Market.	Premium - ageing wines. (6 months minimum)
Calcium (mg/L)	< 60	< 60	< 60
Recommended treatment	POLYTARTRYL®	CELSTAB®	MANNOSTAB® LIQUIDE 200
Treatment dose	10 g/hL (100 ppm)	100 - 200 mL/hL	50 - 150 mL/hL
White and rosé wines	Direct treatment	Direct treatment	Natural stabilisation
Red and rosé wines	Direct treatment	-	Natural stabilisation

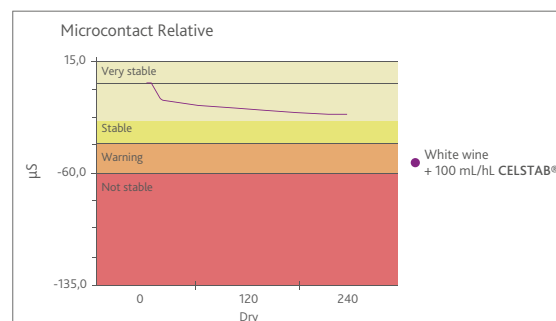
DEGREE OF TARTARIC INSTABILITY: DIT (%)

Stability threshold (white, red, rosé wines): < 5% (under measurement conditions in our laboratory).

Tartaric stabilisation of a wine by CELSTAB®



Project : test sample:
White wine - Control
05/02/2020 10:12:35
Initial conductivity (µS) 1718.5 Final conductivity (µS) 1550.2



Project : test sample:
White wine + 100 mL/hL CELSTAB®
05/02/2020 10:09:04
Initial conductivity (µS) 1732.5 Final conductivity (µS) 1711.7

Stabilisation check after treatment with CELSTAB® at 100 mL/hL on a white wine. Analysis by MINI CONTACT test (CHECKSTAB method).
The drop in conductivity indicates that the wine treated with CMC is considered "very stable" after treatment.

PRESERVATIVES

REFER TO THE LOCAL LEGISLATION IN FORCE FOR THE MAXIMUM SULFUR DIOXIDE LEVEL IN THE WINE.

PRODUCT	DESCRIPTION	DOSAGE	PACKAGING
BISULFITE 15	Aqueous solution of potassium bisulfite.	10 mL releases 1.5 g of SO ₂ .	1L 5 L 20 L
BISULFITE 18	Potassium bisulfite and sulfur dioxide in aqueous solution.	10 mL releases 1.8 g of SO ₂ .	5 L 20 L
BISULFITE NH ₄ 150*	Aqueous solution of ammonium bisulfite.	10 mL releases 1.5 g of SO ₂ and 0.4 g of diammonium.	20L
BISULFITE NH ₄ 200*	Aqueous solution of ammonium bisulfite.	10 mL releases 2 g of SO ₂ and 0.5 g of diammonium.	10 L
BISULFITE NH ₄ 400*	Aqueous solution of ammonium bisulfite.	10 mL releases 4 g of SO ₂ and 1.07 g of diammonium.	20 L
SOLUTION 6	Pure sulfur dioxide dissolved in water.	10 mL releases 0.6 g of SO ₂ .	10 L 20 L
SOLUTION 10	Neutralised aqueous solution of sulfur dioxide	10 mL releases 1 g of SO ₂ .	5 L 10 L 20 L
POTASSIUM METABISULFITE	Pure potassium bisulfite in powder.	1 g of potassium metabisulfite releases 0.5 g of SO ₂ .	1 kg - 25 kg
OENOSTERYL® 2	Effervescent tablets of potassium bisulfite.	Each tablet releases 2 g of SO ₂ .	Box of 48 tablets
OENOSTERYL® 5	Effervescent tablets of potassium bisulfite.	Each tablet releases 5 g of SO ₂ .	Box of 42 tablets
SOUFRE PASTILLES** 2,5 g - 5 g - 10 g	Burnable sulfur tablets.	Conservation of empty barrels: burn between 2 - 4 g/hL (20 - 40 ppm) of sulfur (repeat the operation regularly according to the storage conditions). Sulfuring after barrel cleaning: burn between 1 - 3 g/hL (10 - 30 ppm) once the barrels are drained.	Box of 1 kg

*Authorised on musts and wines still in fermentation at a maximum dose of 20 g/hL (200 ppm).

**The production of SO₂ can vary depending on how damp the barrels are.

Find Out More: Watch our **OENOSTERYL®** video on our website, at **LAFFORT & YOU** section.

LAFFORT®

THE ORGANIC COMMITMENT

Organic certifications and wine

The products and product ranges that are usable in Organic winemaking are framed by the regulation EU 848/2018 and NOP (National Organic Program) of USDA (United States Department of Agriculture).

Certifications

The list of the LAFFORT® products authorized within the framework of the European Organic legislation and/or NOP is available on our website (direct access if you scan the QR code below).

We have chosen to entrust certification to the external inspection body Ecocert: 3 of our products are certified in accordance with Regulation (EU) 2018/848.



Our certificates & listed products:



ZYMAFLORE® 011 **BIO**
OENOCELL® **BIO**
OENOGOM® **BIO**

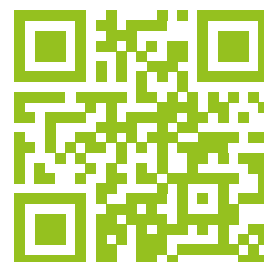
BiO

More than 137 products or range are listed on the website www.intrants.bio as authorised within the framework of the European Organic legislation.

Where to find our certificate?

Go to www.laffort.com, «Downloads» section, «Certificates» category.

www.laffort.com/downloads/certificates





NOBILE®

L'œnologie du bois

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NOBILE®

The oenology of wood

LAFFORT's oenological oak brand, NOBILE® offers practical and innovative solutions that reveal the full expression of your wines.

MATERIAL SELECTED

Carefully selected for their enological quality, all oak lots are "barrel quality" and are subject to strict traceability standards. Thanks to our knowledge of the aromatic potential of oak from different origins (*Quercus Petraea*, *Quercus Robur*, *Quercus alba*), we can select and assemble the wood in order to limit the natural variability and ensure reproducibility.

The oak is seasoned for a minimum period of **24 months** in the open air. NOBILE® controls the maturation by monitoring the evolution of wood compounds responsible for the enological potential of each product.

PRECISION TECHNOLOGY

As a producer of wood for use in oenology, NOBILE® boasts technologically advanced production equipment.

Extremely delicate, the heating operations are carried out by hot air convection, providing homogeneously heated products from the surface through to the center, or by other specific methods for reproducing heated gradients comparable to barrel toasting. Experience and control of the release of volatile compounds from the wood, and experience and control of heating techniques can ensure aromatic and tannic reproducibility for elaborate flavor profiles.

DOSAGE & CONTACT TIME

The dosage or quantity, depending on the alternative used, must be considered and will be based on the characteristics of the wine's style. Contact time is defined by tasting throughout ageing. For more usage tips, consult the NOBILE® team, specialising in the oenology of wood.

REGULATIONS

The use of oak wood chips is subject to regulation. Refer to the legislation.



CHIPS & GRANULARS

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

COMPLEX TOAST



**NOBILE®
BASE
Chips**

- ▶ Volume & roundness.
Without toasted notes.



**NOBILE®
SWEET VANILLA
Chips**

- ▶ Lush vanilla
& marshmallow flavours.



**NOBILE®
CHERRY SPICE
Chips**

- ▶ Sweet entry,
black fruits & spicy.



**NOBILE®
DARK ALMOND
Chips**

- ▶ Roasted complexity
& dark chocolate.



CLASSIC TOAST



**NOBILE®
FRESH THERMO TRAITÉ
Chips & Granulars**

- ▶ Freshness, fruit
& structure.



**NOBILE®
SWEET
Chips & Granulars**

- ▶ Vanilla & toasted.



**NOBILE®
INTENSE
Chips**

- ▶ Volume & coffee.



**NOBILE®
AMERICAN BLEND
Chips & Granulars**

- ▶ Caramel & smoky.

UNTOASTED OAK



**NOBILE® FRESH
GRANULAR 24M
Granulars**




- ▶ Antioxydant & structure.



**NOBILE® AMERICAN
FRESH GRANULAR
Granulars**

- ▶ Fruit & lactones.

AGEING OBJECTIVES

	STAVES 7 MM	STAVES 12 MM	STAVES 18 MM
 <p>RESPECTS THE FRUIT WITHOUT TOASTED NOTES</p>	<p>FRESH Structure & fruit</p>		<p>18 - XBASE Volume & sweetness</p>
 <p>AROMATIC</p>	<p>SENSATION Vanilla & toasted notes</p> <p>INTENSE Chocolate & roasted notes</p>	<p>DULCE Sweet, Dulce de leche & caramel</p>	<p>18 - XTREME Roasted coffee & mocha</p>
 <p>COMPLEXITY SIMILAR TO BARREL AGEING</p>	<p>RÉVÉLATION Structure & fruit</p>	<p>ELITE Complex & traditional</p>	<p>18 - DIVINE Burgundy barrel style</p>

THE NOBILE® TOASTING PROCESSES

HOMOGENEOUS TOASTING

Toasting program dedicated to reproducing complex aromatic expression.

HOMOGENEOUS
TOASTING

GRADIENT TOASTING

Surface heating process which creates a heating gradient identical to a traditional barrel.

GRADIENT
TOASTING

DOUBLE TOASTING

The precise selection of oak combined with double toasting achieves a good balance between the ellagitannins and polysaccharides naturally present in oak, developing an aromatic complexity similar to barrel ageing.

DOUBLE
TOASTING

SOFT OAK

Exclusive to the NOBILE® 18 mm range, the "Soft Oak" method is used to optimise the toasting process of the Staves. This pre-heating program contributes to the creation of unique characteristics.

SOFT
OAK
PROCESS



STAVES & BLOCKS

Character and complexity whilst respecting the fruit

STAVES
18
MM

HOMOGENEOUS TOASTING



18 - XBASE

▶ Intensity and palate weight.
Fruity, without overt oak characters.



18 - XTREME

▶ Expression of ripe fruit.
Sweetness with mocha notes and roasted coffee.

GRADIENT TOASTING



18 - DIVINE

▶ Gives texture. Extends the fruit to a complex finish (such as the elegance of Burgundian barrels).

STAVES
12
MM

DOUBLE TOASTING



ELITE

▶ Toasted nuances.
Volume. Similar to traditional barrel ageing.

HOMOGENEOUS TOASTING



DULCE

▶ Roundness & sweetness.
Dulce de leche & caramel.

STAVES
7
MM

HOMOGENEOUS TOASTING



FRESH

▶ Freshness, fruit & structure.



SENSATION

▶ Sweetness, vanilla & toasted.



INTENSE

▶ Volume, roasted coffee & chocolate.

GRADIENT TOASTING



RÉVÉLATION

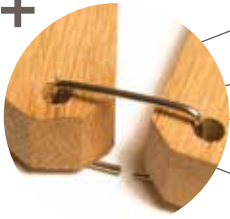
▶ Structure & aromatic complexity.



AMERICAN
RÉVÉLATION

▶ Sweetness, spice bread & lactone.

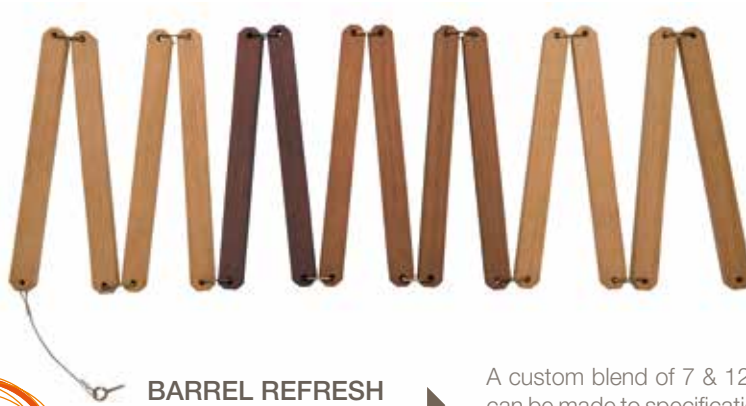
OENOLOGICAL +



- Innovative attachment system for ultra-easy implementation.
- 20 to 100% new oak equivalent (1 **NOBILE®** **BARREL REFRESH** = ± 20% new oak).
- Maximizes the beneficial oxygen from barrels.
- Barrel preservation.



CUSTOM MADE



BARREL REFRESH SPECIAL



A custom blend of 7 & 12 mm profiles can be made to specification to achieve particular characteristics and style.

BARREL REFRESH SPECIAL 18



A custom blend of 7, 12 & 18 mm profiles can be made to specification to achieve particular characteristics and style.

Profiles available (refer to the Staves range): **FRESH, SENSATION, INTENSE, RÉVÉLATION, AMERICAN RÉVÉLATION, ELITE, DULCE, 18-XBASE, 18-XTREME, 18-DIVINE.**

OXYGEN AND OAK

During ageing, the wine needs oxygen to evolve.

Oxygen contributes to the stabilisation of colour, the softening of tannins and the integration of wood compounds. The quantity of oxygen in contact with the wine must be controlled throughout ageing, adapted to the quality of the wine, the cellaring potential or the desired consumption time after purchase.



BARREL REFRESH

Give new life to your barrels

BARREL REFRESH
18
MM

HOMOGENEOUS TOASTING



BARREL REFRESH
18 - XBASE

▶ Intensity and palate weight.
Fruity, without overt oak characters.



BARREL REFRESH
18 - XTREME

▶ Expression of ripe fruit.
Sweetness with mocha notes
and roasted coffee.

GRADIENT TOASTING



BARREL REFRESH
18 - DIVINE

▶ Gives texture. Extends the fruit
to a complex finish (such as the
elegance of Burgundian barrels).

STAVES
7
MM

HOMOGENEOUS TOASTING



BARREL REFRESH
SENSATION

▶ Sweetness, vanilla &
toasted.

GRADIENT TOASTING



BARREL REFRESH
RÉVÉLATION

▶ Structure & aromatic complexity.

Find out more: watch our **BARREL REFRESH** video on our website,
at **LAFFORT & YOU** (video).

NOBISPARK



Aromatic persistence and smooth effervescence

CONCEPT

The search for the finest balance between the natural compounds of oak and sparkling wines during alcoholic fermentation has led us to develop **NOBISPARK**. This oenological bidule is the result of a project to develop the use of oak during the second fermentation.

Used in the same way as a classic bidule, **NOBISPARK** does not require any specific equipment when it is inserted after filling the bottle.



NOBISPARK RANGE

Improves the aromatic persistence of wines on the palate and reinforces the smoothness of the effervescence.



**NOBISPARK
FRESH**



Brings a sensation of sweetness and volume while preserving the integrity, freshness and fruit of the initial blend. No toast flavours.



**NOBISPARK
SENSATION**



Brings complexity and toast flavours, perfectly integrated by the 2nd fermentation and keeping the fruit intact.



DISCOVER OUR WEBSITE ENTIRELY DEDICATED TO OAK FOR WINEMAKING

A complete website to find all the products we offer and our decision-making tools to help you create the best oak-wine balance.

With our **calculator**, easily estimate your need in Staves (and its equivalent in Blocks) depending on the volume of wine to be treated and the required level of oaking and complexity.



Seriously rosé

LAFFORT® is keenly aware of the highly technical nature of producing rosé wines with numerous complex hues and aromas. Via our experimental centre and a team of dedicated staff from different specialist fields, we have expanded our expertise to offer a range of targeted products adapted for producing superior rosé wines.



KEYS STEPS DURING ROSÉ WINEMAKING

Protection against oxidation

To avoid the formation of quinones and preserve the aromas, it is essential to implement all available techniques: **evaluate good practice in the winery** (avoid air intake, check gaskets, fittings, etc.), **apply rigorous processes and use inert gases**.

Refrigeration and cooling capacity

Cold conditions limit enzyme activity in terms of colour extraction and oxidation by polyphenol oxidases. It is therefore essential to **work on these pre-fermentation phases as quickly as possible at low temperature**.

Pressing

The objective for rosé wines that are pressed directly is **fast, qualitative release of juices** to obtain the best aromas without extracting colour. It is strongly recommended to use enzymes during the filling of the press.

Fermentation

The choice of yeast strain and nutrition both help direct and optimise the aromatic profile of a wine according to the required style.

Fining

Early fining of rosé wines, on must or during alcoholic fermentation, helps **act on the phenolic compounds that trap aromas**, and allows wine colour to develop and wine structure to be modified. Appropriate fining will help produce high quality rosé wines.

Stabilisation

At the end of the process, certain choices can alter the aromatic profile or colour of wines; stabilisation options are available that respect the quality and style of the wine.



The **LAFFORT®** team is available for any further information or advice.
Do not hesitate to contact us!



LAFFORT

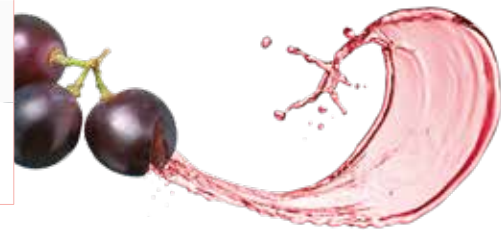
L'œnologie par nature



Our seriously rosé selection...

PROCESS OPTIMISATION	Pressing	LAFAZYM® PRESS * LAFASE® XL PRESS *
	Clarification	LAFAZYM® CL * LAFAZYM® 600 XL ^{ICE} * LAFASE® XL CLARIFICATION
AROMATIC OPTIMISATION	Aromatic thiols revelation	LAFAZYM® THIOLS ^[+] * (must and wines in fermentation)
	Terpene aroma revelation	LAFAZYM® AROM (end of AF and finished wines)

* Purified enzymes



BIOPROTECTION

ZYMAFLORE® KHIO^{MP}
BIOProtection at low temperatures, suitable for stabulation. Strong capacity to consume oxygen in musts.

ZYMAFLORE® EGIDE^{TDMP}
BIOProtection on grapes and harvest reception equipment.



YEAST

ZYMAFLORE® XAROM 

ZYMAFLORE® X16

ACTIFLORE® ROSÉ

ZYMAFLORE® X5

ZYMAFLORE® DELTA

ZYMAFLORE® XORIGIN

ZYMAFLORE® VL1

↑
AROMATIC STRENGTH
 ↓
AROMATIC ELEGANCE







YEAST PREPARATION ADDITIVE	SUPERSTART® <i>Blanc & Rosé</i>	To be used when rehydrating the yeast. Yeast rehydration product with a high vitamin and mineral content for optimising yeast metabolism throughout fermentation.
NUTRIENT	NUTRISTART® ORG, NUTRISTART® AROM & THIAZOTE®	Total nutrition – mixed, 100% organic or mineral – to correct nitrogen deficiencies in musts.
AROMATIC PROTECTION	FRESHAROM®	To be used $\frac{1}{3}$ of the way through AF. Formulation rich in reductive metabolites promoting the assimilation of glutathione precursors, for the aromatic preservation of wines.



To each rosé a specific fining...

Our expertise in the field of fining products has allowed us to select a range of products adapted to each situation, allowing you to create great rosé wines. The products can have a broader spectrum of action than those proposed below based on the matrix of the wines to be treated. For further advice please contact your LAFFORT® supplier or agent.

FINING	OBJECTIVE	RECOMMENDATIONS	
	Controlling colour intensity and refining the wine	<p>VEGEMUST® Vegetable proteins (patatins, pea). Effective clarification. Reduction of the phenolic content.</p> <p>POLYMUST® BLANC Vegetable protein (pea), PVPP. Eliminates oxidisable phenolic compounds.</p> <p>VEGEMUST® + CHARBON ACTIF LIQUIDE HP Vegetable proteins (patatins, pea) + activated carbon. Colour reduction. Colour stabilisation.</p> <p>POLYMUST® ROSÉ PVPP, plant protein (patatin, potato protein isolate). Stabilises hue, reduces phenol acids.</p> <p>VEGEFINE® Vegetable proteins (patatins). Significant action on oxidisable polyphenol.</p>	   
	Controlling oxidation	<p>POLYLACT® (PVPP, potassium caseinate). Inhibits browning.</p>	

PROTEIN STABILISATION	MICROCOL® ALPHA	Natural sodium bentonite respecting colour and aromas while also having good protein removal capacity.
	MICROCOL® FT	Natural calcium-sodium bentonite, intended for protein stabilisation of wines during tangential filtration.
TARTARIC STABILISATION	CELSTAB®	CMC for tartaric stabilisation to be used after a laboratory trial.
	POLYTARTRYL®	Metatartaric acid - Inhibits crystallisation of potassium bitartrate.
	MANNOSTAB® LIQUIDE 200	Natural mannoprotein for tartaric stabilisation of potassium bitartrate salts.



LAFFORT spark®

...BUBBLES BY NATURE

The production of quality sparkling wine follows a sequence of stages that must be optimised to achieve the final desired product. For each stage 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 sparkling wines using the **Charmat method**.

For each base wine, a specific strategy



BIOProtection, SO₂ reduction and O₂ consumption.
ZYMAFLORE® EGIDE^{TDMP} AND ZYMAFLORE® KHIO^{MP}

Non-Saccharomyces yeasts for BIOProtection of the harvest.

- Allows the medium to be colonised without fermentation activity, to limit predominance of the indigenous flora.
- Particularly suited to the strategy of reduced sulphite additions to musts, as well as the strategy of delayed sulphite additions to red musts.
- Protection of musts during transport in tanker.
- **ZYMAFLORE® KHIO^{MP}**: Strong ability to consume oxygen in musts.

Juice clarification

LAFAZYM® CL & LAFAZYM® 600 XL^{CE}

Purified pectolytic enzymes for quick must settling.

- Quick and complete depectinisation.

Fining & colour of musts

● Cuvée / Free run juice



VEGEFINE®

100% patatins - Elimination of phenolic compounds.

POLYMUST® PRESS

Removes the oxidisable and oxidized phenolics.

● Taille / Press juice

CHARBON ACTIF PLUS GR

Selected activated carbon to decolourise tinted juice.

Malolactic fermentation strategy

LACTOENOS® B16 STANDARD

Oenococcus oeni strain selected for low pH base wines.

- Very resistant strain particularly adapted to low pH levels found in base wines. Pre-acclimatisation is achieved in the cellar (Step by step protocol. See technical tools).

TECHNICAL TOOLS



- Implementation of MLF starter.
- Implementation of yeast starter for secondary fermentation.
- Preparation of tirage mixture.



Fermentation of base wines: a question of style...

CLASSIC



ZYMAFLORE® SPARK

Strain isolated in Champagne, tested, validated and recommended by the microbiology laboratory of the CIVC technical centre.



ZYMAFLORE® 011 BIO



Strain isolated in Champagne. Selected for its remarkable fermentation performance. (Certified Organic).



ZYMAFLORE® CX9

Expresses notes of lemon zest, toasted almond and fresh hazelnut. Particularly recommended to reinforce the richness of wines in the event of a non-MLF strategy.

AROMATIC AND VARIETAL EXPRESSION



ZYMAFLORE® X5



ZYMAFLORE® VL3



ZYMAFLORE® X16



ZYMAFLORE® VL1

Tartaric stabilisation

MANNOSTAB® LIQUIDE 200

Liquid formulation of a specific mannoprotein (MP40 – Patent No. 2726284), naturally present in wine, with the property of inhibiting crystallisation of potassium bitartrate.

- Inhibits the crystallisation of potassium bitartrate salts.
- Stabilises white, red and rosé sparkling wines; filtered or unfiltered.

With the traditional method, addition is made before bottling to prevent tartrate precipitation during ageing on lees. It is also possible to make an addition on disgorging.

CELSTAB®

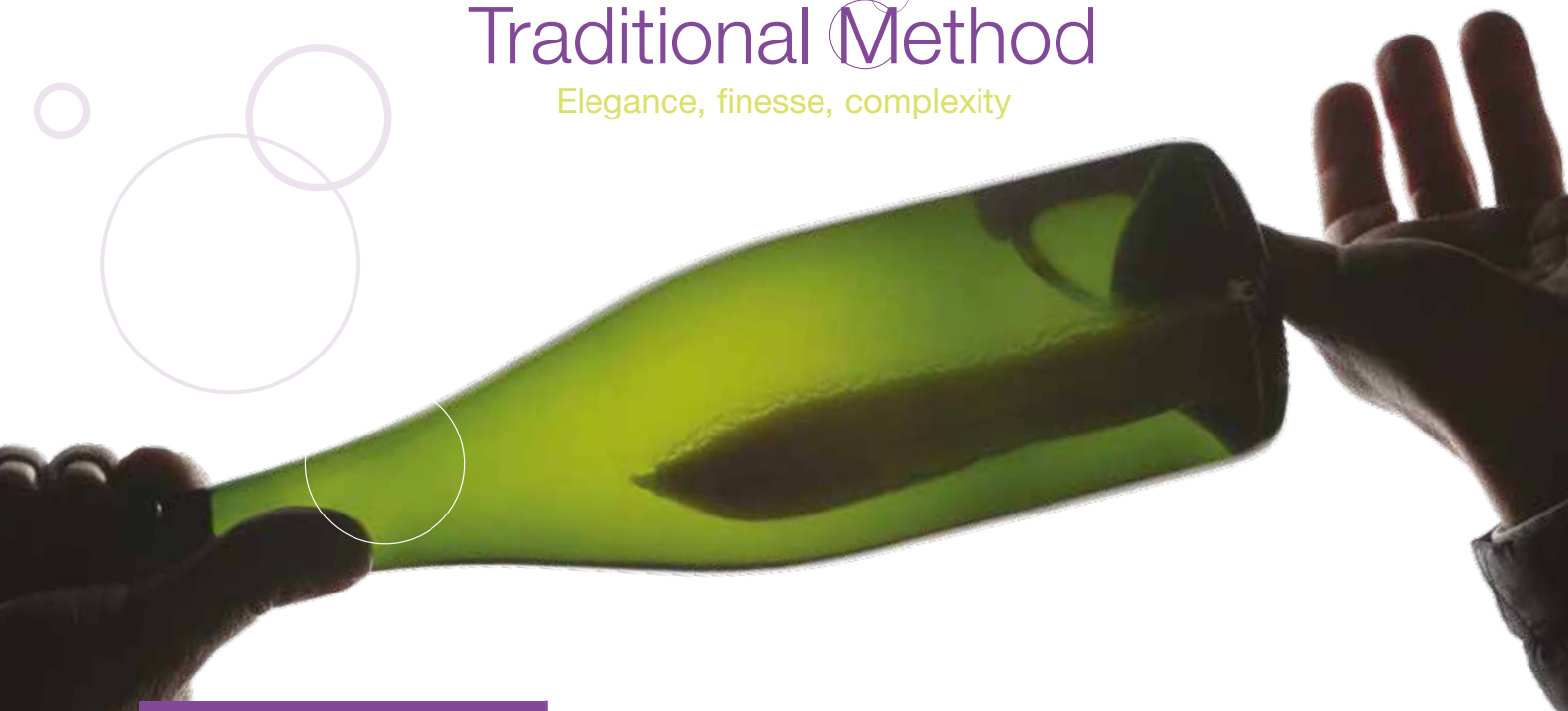
Solution of cellulose gum. **CELSTAB®** is a highly purified cellulose polymer of vegetal origin, with a low degree of polymerisation and viscosity.

- The liquid (10% solution) formula makes it easy to incorporate into the base wine.

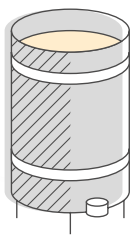
Under traditional method, the addition is made entirely before tirage.

Traditional Method

Elegance, finesse, complexity



Secondary fermentation



CLEANS^{spark} effect



SUPERSTART[®] spark

Yeast rehydration preparation adapted to sparkling wine conditions (Patent FR2736651).

- Combination of growth and survival factors to ensure a complete "prise de mousse".



ZYMAFLORE[®] spark

Yeast recommended for fine, elegant and full sparkling wines.

- Develops tertiary aromas for fine, complex and elegant sparkling wines.

Tested and validated by the microbiological laboratory of the CIVC (Comité interprofessionnel du vin de Champagne).



CLEANS^{spark}

Riddling adjuvant (bentonite/alginate).

- Quick and complete removal of particles and sediments in bottles after ageing "sur lattes" (on lees).



TAN^{spark}

Combination of gallic and ellagic tannins in liquid form.

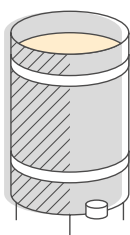
- Rebalances redox potential of the base wine, reinforces its structure and confers shininess to the finished sparkling wine.



Charmat Method

Freshness, simplicity, sophistication

Secondary fermentation



SUPERSTART® spark

Yeast rehydration nutrient designed to adapt the active dry yeast to sparkling wines conditions (Patent FR2736651).

- Combination of growth and survival factors to ensure a complete “prise de mousse”.



ZYMAFLORE® X5

Yeast selected for fresh and aromatic wines

- High production of varietal and secondary aromas (boxwood, grapefruit, exotic fruits).



OR

ZYMAFLORE® X16

Yeast for aromatic and modern sparkling wines.

- High production of secondary aromas (white peach, white flowers, yellow fruits).



FRESHAROM®

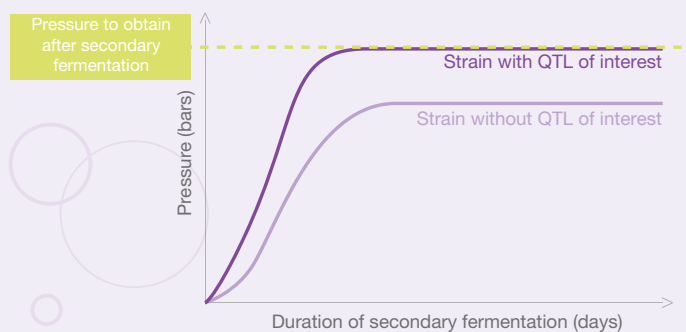
Specific preparation of inactivated yeast with high protective power (5.3%).

- Allows for increased aromatics, as well a better ageing potential in sparkling wines.
- Participates actively to the bubble finesse and foam persistence. Addition at tirage.



Yeasts selected for their ability to achieve secondary fermentation

The robustness of certain yeasts to “prise de mousse” used to be based on empirical criteria. However, this is now explained by the presence of several genetical markers (QTL) that determine their resistance to low pH (< 2.8) and high pressures (Marti-Raga, 2017).

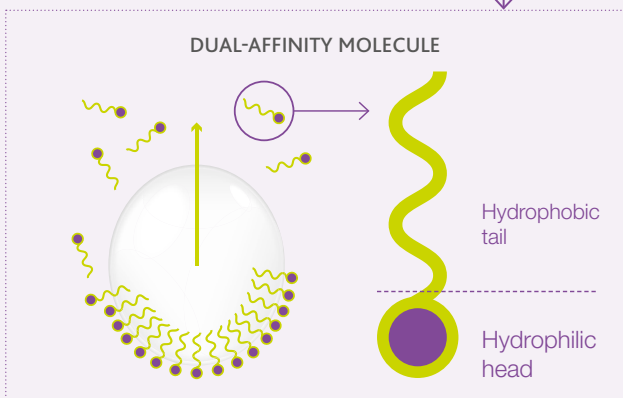
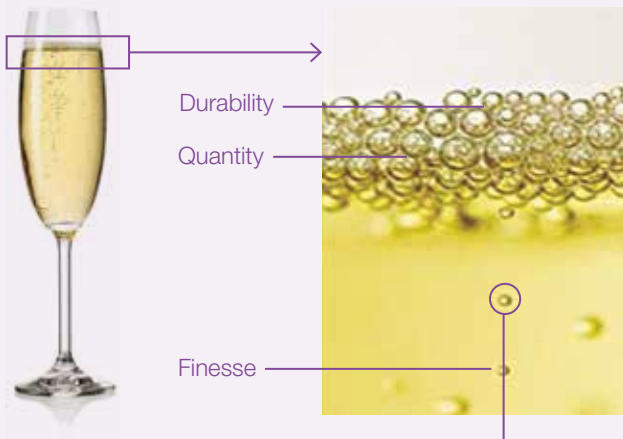


LAFFORT® takes these genetic criteria into consideration when recommending yeasts suitable for the secondary fermentation.



MANNOSPARK® , THE AESTHETICS OF EFFERVESCENCE

MECHANISM AND INTERACTIONS IN THE BUBBLE-FORMING PROCESS



Sparkling wines contain greater or lesser quantities of surfactant macromolecules from grapes and yeasts. They play a fundamental role in the lifespan and quality of the bubbles in a glass.

From its birth, the bubble is charged with CO₂, its growth is directly linked to the concentration of dissolved CO₂ in the wine. Then it detaches from its nucleation site and rises to the surface. During its journey, it captures the surfactant molecules in the wine, including mannoproteins.

When the bubbles reach the wine's surface, the surfactant macromolecules play their **protective role** by prolonging their lifespan and thus promoting the formation of the collar.

In terms of the aesthetics of effervescence in wine, the "pinnacle" for tasters is to observe **fine, elegant and persistent bubbles** in the glass regularly supplying a **generous and stable collar** (rim of foam) to form a harmonious foam.

ROLE OF MANNOPROTEINS IN BUBBLE AESTHETICS

The research programme (SPUM) on the aesthetics of effervescence, launched by LAFFORT® in 2014 in collaboration with Pr. Gérard Liger-Belair's team at the University of Reims Champagne Ardenne, allowed us to study the effect of the different mannoprotein fractions of yeast, then to demonstrate their impact on the quality and stability of the wine foam.

MANNOSPARK® is a specific formulation resulting from this study, for improvement in the size of the bubbles, and the thickness and stability of the collar, in order to obtain a harmonious and persistent foam in sparkling wines.



Comparison of bubble collar and size under standardised serving conditions for a Crémant rosé (bottle fermented, 12 months on lees). Photo taken 1 min, then 10 min after pouring. The wine treated with MANNOSPARK® shows a more generous collar of bubbles, which is more stable over time.

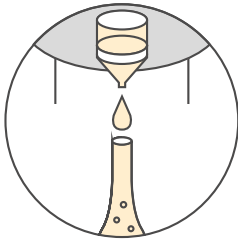


Molecular and Atmospheric Spectrometry Group (GSMA), a joint research unit between CNRS and the University of Reims Champagne Ardenne (URCA). Bubble Physics Laboratory, Pr. Gérard Liger-Belair.

Quality of bubbles

The quality of the foam is essential for customer satisfaction

At tirage



OENOLEES®

Specific preparation of yeast cell wall extract. (Patent EP 1850682).

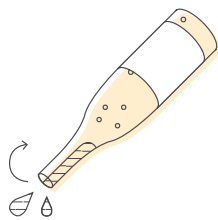
- Accelerates the development of “on lees” ageing characters.
- Optimises foam finesse and persistence.



MANNOSPARK®

Specific yeast cell wall mannoproteins (Patent 2726284).

- Reinforces tartaric and colloidal stabilisation.
- Restores the foaming properties of wines.
- Refines the size of bubbles to ensure their elegance.
- Promotes persistence of foam at the surface of the glass.
- Allows the formation of a more generous rim of foam, that is more stable over time.



At disgorging

OENOLEES® MP

Specific preparation of yeast cell wall extract (Mannoproteins), rich in sapid peptide content and polysaccharides (Patent EP 1850682).

- Enables to significantly lower the quantity of liqueur.
- Allows the winemaker to delicately balance both acidity and bitterness.
- Actively participates in restitution of the foaming properties of the sparkling wines.



NOBISPARK

The search for the finest balance between the natural compounds of oak and sparkling wines during alcoholic fermentation has led us to develop NOBISPARK. This oenological bidule enables the second fermentation under oak, for more complex and more elegant Traditional Method wines.



96 FILTRATION
|
98 CLEANING PRODUCTS



OTHER

FILTRATION

Pre-coats and diatomaceous earths

PRE-COATS

CLAIRULOSE

- Based on pure cellulose, allows complete retention of the finest particles for greater brilliance and finer clarification.
- Promotes the retention of microorganisms.

For horizontal plate earth filters, to facilitate discharge, it is recommended to insert a coat of white earth (200 - 300 g/m²) between the plates and the cellulose pre-coat.

DIATOMYL® R & DIATOMYL® B

Pre-coat filtration products specially formulated to improve the filtration yields of food liquids, composed of:

DIATOMYL® B and DIATOMYL® R are totally chemically inert with respect to musts and wines.

DIATOMYL® B and DIATOMYL® R provide better stability of the pre-coat throughout the filtration cycle. They maintain the integrity of the pre-coat, avoiding any deterioration due to pressure variations.

REFERENCE	COLOUR	PERMEABILITY	PACKAGING
DIATOMYL® R	White, Pink	0.25	15 kg
DIATOMYL® B	White	0.85	15 kg

DIATOMACEOUS EARTHS (KIESELGUHR)

Diatomaceous earths are sedimentary rocks composed of skeletal remains of single-celled aquatic plants rich in silica. DIATOMYL® products are widely used in the food industry (beer, edible oils, ciders, fruit juices).

REFERENCE	COLOUR	WET DENSITY (g/L)	APPLICATIONS
DIATOMYL® P00	White	478	New wines, press wines. Filtration of musts, solids or lees on rotary drum vacuum or press filter. Can be used as a pre-coat.
DIATOMYL® P0	White	440	New wines, press wines. Filtration of musts, solids or lees on rotary drum vacuum or press filter. Can be used as a pre-coat.
DIATOMYL® P2	White	440	Clarifying filtration of wines. Can be used as a pre-coat as a mechanical protection of the media.
DIATOMYL® P4	Pink	475	Polishing filtration. Wines, ciders and fruit juices.
DIATOMYL® P5	Pink	428	Polishing filtration. Preparation of wines with low microbial load for filtration.

FILTRATION

Perlites and filter sheets

PERLITES

Volcanic rocks of the rhyolite group. PERL products are used in the food industry (wines, ciders, fruit juices, brines...).

REFERENCE	PERMEABILITY (DARCY)	APPLICATIONS
PERL 10	2.5 - 3	Musts, solids and lees on rotary drum vacuum or press filter.
PERL 8	1.2 - 1.8	Enzyme-treated musts, new wines on earth or press filters. For optimal results, use of a cellulose-based pre-coat (DIATOMYL® B) is recommended.
PERL 6	0.5 - 0.8	Fine clarifying filtration of wines on earth or press filters. For optimal results, use of a cellulose-based pre-coat (DIATOMYL® B) is recommended.

L SERIES FILTER SHEETS

Sheet filters made of pure cellulose, diatomaceous earth or perlite, intended for wine filtration. L series filter sheets are suited to various technical objectives:

REFERENCE	RETENTION THRESHOLD (µm)	USES
L 60	0.35	Filtration for "sterile" bottling of at-risk wines (high pH, residual sugar). To limit bacterial risks. Filtration before membrane (0.45 - 0.65 µm).
L 40	0.45	Sterile filtration. Filtration before membrane (0.45 - 0.65 µm).
L 15	0.60	Yeast sterile filtration. Filtration before membrane (0.65 µm).
L 12	1	Fine filtration with significant reduction of microbes (yeasts).
L 7	1.5	Clarifying filtration.
L 5	2	Refining filtration.
L 3	2 - 3	Filtration with strong haze retention power.

CLEANING PRODUCTS

The proper meaning of hygiene

HYGIENE AND OENOLOGY

Wine is a food product that must comply with specific hygiene rules. It is a medium conducive to the growth of many microorganisms which, without being dangerous to health, can harm wine quality.

The surfaces of containers in contact with must and wine must be completely free of spoilage microorganisms and deposits that can harbour them (tartrate...).

LAFFORT® offers a full range of hygiene products for cleaning and disinfecting all equipment (stainless-steel tanks, concrete tanks, pumps, hoses, filters, bottling lines...) and winery surfaces (floors, walls...).

A FULL RANGE OF HYGIENE PRODUCTS FOR THE WINE SECTOR

PRODUCT	ACTIVE INGREDIENT	ACTIONS	PACKAGING
DECATARTRE LIQUIDE	Liquid alkali	Detergent and tartrate removal	20 L
DECAPOL® CHLORÉ	Chlorinated alkali	Detergent and decontaminant	20 L
DECAPOL® ACTIF	Hydrogen peroxide	Decontaminant, detergent activator	20 L
DECAPOL® H	Phosphoric and nitric acids	Acidic tartrate removal	20 L
DECAPOXY® 5	Peracetic acid	Disinfectant	20 L
P3-ALCODES	Ethanol and glutaraldehyde	No-rinse disinfectant	1 L (spray) / 19 L
P3 VINO MFC	Liquid alkali	Detergent for membrane systems	20 L

Instructions for use / dose: consult the product data sheet.

REGENERATION AND UNCLOGGING OF FILTER MEMBRANE UNITS

Aiming to support our partners during all steps of winemaking, LAFFORT® offers a new range of cleaning products, specially developed to regenerate and unclog the filter membrane units. Based on an enzymatic technology, it allows a more efficient cleaning of tangential filters and filter cartridges.



DECAPOL® EXTRA Life

Enzymatic detergent created to decompose organic residues in filtering systems (tangential filters and filter cartridges).

5 kg

- Free of phosphate and surfactants (can be directly applied to filter cartridges).
- Strong oxydiser.
- Proper for everyday use or for unclogging programs.
- Used in a closed circuit or CIP.

Instructions for use / dose: consult product packaging.



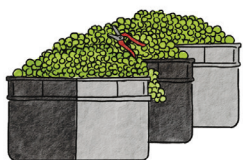
DECAPOL® DEEP Clean

Enzymatic detergent created to decompose organic residues in filtering systems (tangential filters).

5 kg

- Moderate oxydiser.
- Proper for everyday use or for unclogging programs.
- Specific for cleaning tangential filters.
- Used in a closed circuit or CIP.

Instructions for use / dose: consult product packaging.



100 FERMENTATION RESTART PROTOCOL

102 FLOTATION PROTOCOL WITH VEGEFLOT®

104 TOOLS FOR ACIDIFICATION OF MUSTS AND WINES



Audrey Bakx

Fermentation restart protocol

Alcoholic fermentation

For 100 hL of wine in stuck AF

1 PRELIMINARY OPERATION ON STUCK WINE

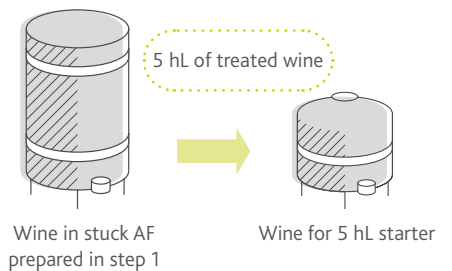
- Rack/centrifuge avoiding air.
- Adjust wine temperature to 20°C (68°F).
- Adjust SO₂ at 1 - 2 g/hL (10 - 20 ppm).
- Add:
 - For white wines: **BI-ACTIV**®: 40 g/hL (400 ppm).
 - For red wines: **OENOCELL**®: 40 g/hL (400 ppm).
- Mix wine anaerobically every 12 hours for 24 hours.
- Move on to step 2.



2 PREPARATION OF THE YEAST INOCULUM

2.1. Preparation of the wine for the yeast inoculum

- Take 5 hL of the volume of the treated stuck wine from step 1.
- Adjust the alcohol to 8%, the sugar content to 20 g/L and the temperature to 20°C (68°F).
- Add **THIAZOTE**® PH: 20 g/hL (200 ppm) to this volume of wine and mix thoroughly.

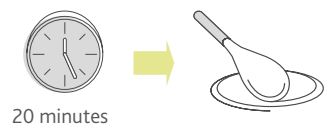


2.2. Yeast preparation

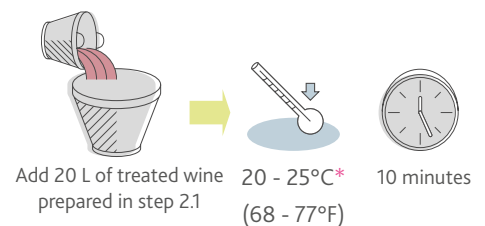
- Prepare 60 L of water at 40°C (104°F).
- Add the yeast rehydration nutrient **SUPERSTART**® SPARK or **SUPERSTART**® ROUGE: 30 g/hL (300 ppm) of the volume of wine to be treated, then homogenise.
- Add **ACTIFLORE**® B0213: 30 g/hL (300 ppm) of the volume of wine to be treated, then homogenise.



- Wait 20 minutes, then homogenise.



- Add immediately 20 L of treated wine from step 2-1.
- Wait 10 minutes, let cool to 20°C (68°F) and maintain the temperature between 20 - 25°C (68 - 77°F).
- The total time of the yeast rehydration must not exceed 45 minutes.



*Check with a thermometer.

Fermentation restart protocol

Alcoholic fermentation

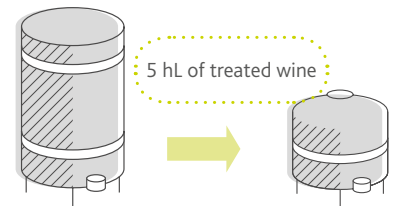
2.3. Acclimatation of the yeast preparation

- Add the yeast preparation (Step 2.2) to the prepared wine for the yeast inoculum (step 2.1).
- Measure the Brix and maintain the inoculum at 20°C (68°F) with aeration until 0.5°Brix (avoid the total exhaustion of sugars in the inoculum and a fall in the yeast activity). Aerate as soon as AF starts.
- Double the volume with treated wine (step 1) at 20°C (68°F).
- Measure the Brix and maintain again the inoculum at 20°C (68°F) until 0.5°Brix. Aerate again when fermentation becomes active.



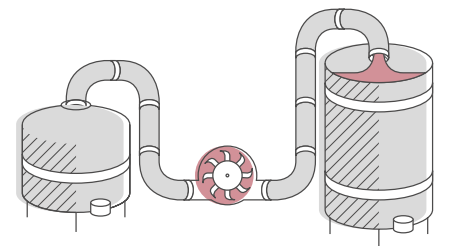
Starter 5 hL prepared in step 2.1

Double the volume when density = 0.5° Brix



Stuck fermented wine prepared in step 1

Starter 10 hL



Starter 10 hL prepared in step 2.3

Stuck fermented wine prepared in step 1

3 INCORPORATION OF YEAST INOCULUM IN THE TANK

- Add the yeast inoculum to the treated wine (step 1), maintain at 20°C (68°F).
- Add 30 g/hL (300 ppm) of **NUTRISTART® ORG** to the total volume of the tank to the treated wine (Step 1).

Find out more: discover our **RESTARTING FERMENTATION (AF) DMT** on our website, in the **LAFFORT & YOU** section.

Flotation protocol with VEGEFLOT®

Many factors influence the flotation process and hence its success. The parameters of the protocol have been specially adapted for an easy flotation. Do not hesitate to contact **LAFFORT®**'s team before your flotation trials in order to explore the potentially inhibiting parameters and find the appropriate solutions.

1 PREPARING OF THE JUICE

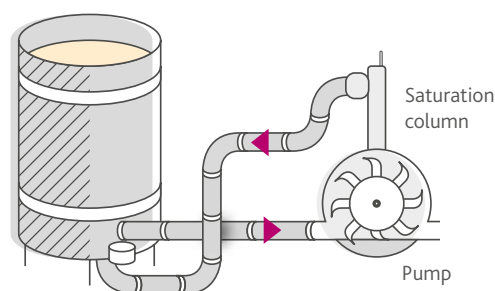
- Clarification by flotation involves migration of the particles of the must to the surface of the tank. This migration is prevented in the presence of pectins. The addition of pectolytic enzyme directly after grape pressing is necessary to accelerate the process.
 - **LAFASE® XL FLOT**: 1 - 4 mL/hL.
 - **LAFAZYM® 600XL^{ICE}** (allows complete depectinisation at low temperatures): 1 - 2 mL/hL.
- In the case of must particularly difficult to clarify (variety, maturity...) or to accelerate the depectinisation the use of **LAFASE® BOOST** at 1 mL/hL is recommended.
- Check the completion of the depectinisation before starting the flotation. Use our **PECTIN TEST**, easy and fast.



2 CONNECTING THE FLOTATION PUMP

- For an easy flotation, the filling of the tank should not exceed 85 to 90% of the total volume.
- The temperature of the must should be between 15 - 18°C (59 - 64°F). **The colder the must, the higher the viscosity, the more difficult the flotation process.**
- Connect the pump inflow to racking valve, and the pump outflow to lees valve.
- For the best results, pipes should not exceed 3 m (inflow and outflow).
- Make sure all the air is out of the saturation column before closing the tap.

MUST FOR CLARIFICATION

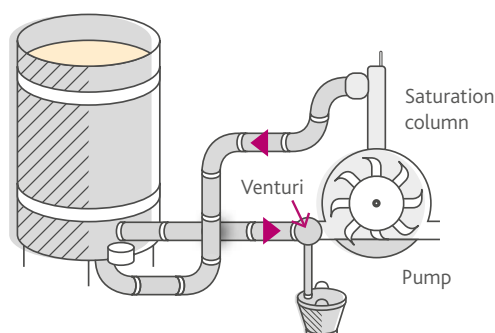


3 ADDING THE VEGEFLOT®

- Start the pump without gas injection.
- Check that the saturation pressure is between 2 and 3 bar (the size of the tank does not matter).
- Prepare **VEGEFLOT®** in a clean, inert container following **LAFFORT®** recommendations.
- The recommended dose of **VEGEFLOT®** is usually 15 g/hL (150 ppm) (the dose can be adjusted according to the characteristics of the must).
- Place into the **VEGEFLOT®** preparation, the pipe dedicated to the venturi section provided on the flotation system.
- **Inject VEGEFLOT® as slowly as possible.**
- Mix the tank for 20 to 25 minutes at a saturation pressure of 2 to 3 bar, without addition of gas.



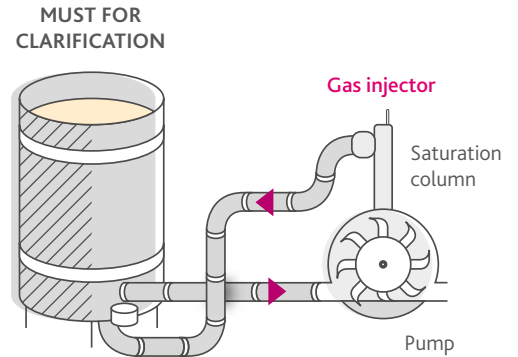
MUST FOR CLARIFICATION



Flotation protocol with VEGEFLOT®

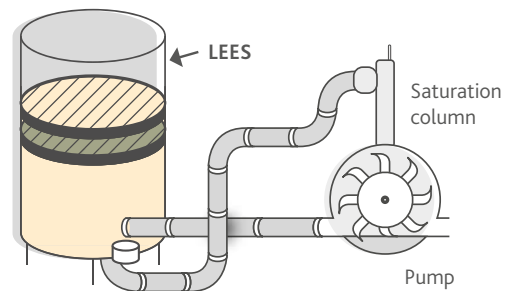
4 STARTING THE FLOTATION PROCESS

- Once the tank is homogenised, open the gas injection valve.
- The nitrogen inlet pressure should be between 5 and 7 bar.
- The gas flow rate must be between 25 - 60 L/min (depending on flotation setup). The saturation pressure must be adjusted to 5 bar.
- Check the quality of the flotation. To do this, take a sample at the tap of the saturation column.
- Remember to readjust the saturation pressure between 5 and 7 bar after sampling.
- The circulation time for flotation is between 60 - 150 min. Depending on the volume of the tank.
- Pump the equivalent of 1 to 2 volumes of the tank - 1.5 times is usually enough.



5 COMPLETION OF FLOTATION PROCESS AND WAITING TIME

- Once the flotation process is complete, stop the pump.
- Close the gas.
- Close all the valves in the tank.
- Leave the tank for 60 to 120 minutes so that lees can rise to the surface.
- **Do not leave the tank longer than 240 minutes. Gravitational force can cause lees separation and resuspension of the lees if the waiting time is too long.**
- Check the turbidity of the clarified batch.



Find Out More: Discover our **FLOTTATION** video on our website, at **LAFFORT & YOU** section.

Tools for acidification in musts and wines

Three acids are authorised for acidifying musts and wines:

- Tartaric acid (L(+) tartaric).
- Malic acid (L-Malic – D,L-Malic).
- Lactic acid (DL-Lactic).

These acids are naturally present in grapes. They differ in structure, acidification capacity and organoleptic impact.

Operations can consist of a mix of additions of different acids (especially appropriate on wines for organoleptic purposes).

The goals pursued must be the object of prior testing. Variations in pH and total acidity for the same treatment are not the same, the ionic strength and the buffering capacities can have a significant influence from one must or wine to another.

REGULATORY STANDPOINT

(UE) regulation 2019/934 allows the possibility of using tartaric acid, malic acid and lactic acid for acidification purpose in musts and wines.

Acidification of musts and new wines in fermentation:

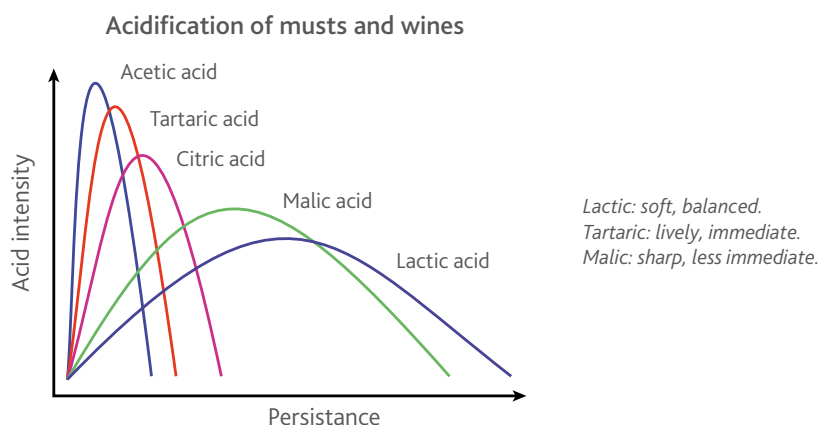
Maximum dosage 1.5 g/L expressed in tartaric acid i.e. 20 meq/L (1.0 g/L expressed in H_2SO_4). Treatment in one single operation.

Acidification of wines:

Maximum dosage 2.5 g/L expressed in tartaric acid i.e. 33.3 meq/L (1.6 g/L expressed in H_2SO_4). Treatment in several operations within the legal limit, solely on the site of the vinification company and in the wine growing zone where the grapes involved in making the wine in question have been harvested.

All treatments will be entered into a handling register and a custody register.

Acidification and enrichment (or chaptalisation) of one and the same product are mutually exclusive processes (for example a must or new wine still in fermentation can be enriched or chaptalised and the wine from the fermentation can be acidified), except by way of derogation ((CE) 1308/2013, appendix 8, part1, section C and D).



SUMMARY OF THE COMMERCIAL PRODUCTS AVAILABLE AND THEIR PRINCIPAL OENOLOGICAL CHARACTERISTICS.

	TARTARIC ACID	MALIC ACID	LACTIC ACID	COMMENTS
Chemical formula.	C ₄ H ₆ O ₆ E334 L	C ₄ H ₆ O ₅ E296 DL	C ₃ H ₆ O ₃ E270 DL	Malic and lactic acids are achiral molecules. They exist in the form of two enantiomers: L and D form. Only the L form of malic acid exists naturally in grapes. Lactic acid is a natural result of lactic bacteria metabolism produced by the latter only in the L form.
pKa	3.05 / 4.2 Di-acid	3.4 / 5.1 Di-acid	3.85 Mono-acid	The acids are classified according to their pKa (acidity constant). The higher the pKa, the weaker the acid.
Correspondence 1 Eq	75 g	67 g	90 g	
Recommended targets	Red - Rosé - White	Rosé - White	Red - Rosé - White	
Treatment on must (at 20 meq/L*)	1.50 g/L	1.34 g/L	1.80 g/L	
Treatment on wine (at 33 meq/L*)	2.5 g/L	2.23 g/L	3.00 g/L	
Effect on pH	+++	++	+	Tartaric acid remains the most effective on pH. To avoid an excessive precipitation of salts, it is recommended to use it during fermentation on must.
Effect on total acidity	++	+++	+++	
Chemical stability	- (potassium Bitartrate precipitation)	+++	+++	Potassium or calcium salts from malic and lactic acids are significantly more soluble than tartaric acid salts, the risk of precipitation is thus lower.
Microbiological stability	+ Only risk is acetic acid degradation (tourne disease) by certain lactic bacteria.	+++	++	
Organoleptic impact	Lively. Immediate. Dryness. Hardness.	Freshness. Greenness (green apple).	Soft and tart acidity.	
Formulation	Powder	Powder	Liquid	Lactic acid is in liquid form, powder formulations contain unauthorised lactates. Powders can be directly dissolved into the wine.

* Maximum dose – Consult the LAFFORT® technical department for more information on the dose to use.

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LAFFORT® QUALITY COMMITMENT

As part of our global quality management policy, we continuously strive to meet your needs to the best of our ability. Certificates are available on the LAFFORT® website, confirming the quality of LAFFORT® products in regards to the following points.

- ISO 22000 certificate.
- Ecocert certificate for certified organic products according to European Regulation (EU) 848/2018 and its amendments.
- List of LAFFORT® products available for use in organic winemaking and/or the US National Organic, Program's (NOP) winemaking regulations.
- General attestation.
- List of allergenic products.
- Statement on animal welfare.
- Packaging: suitability for contact with foodstuffs and environmental.
- Vegan certificates.



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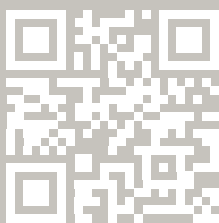
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NEW AT LAFFORT®



WEBSITE



LAFFORT.COM

Advanced search filters.

Optimised access to documentation.

Identification of products that can be used in specific winemaking applications (EU/NOP organic, allergen-free, vegan, etc.).



LAFFORT

l'œnologie par nature



L'AFFORT

l'œnologie par nature



The cover of the 2022 catalogue is an opportunity to showcase an artist from our region, who also draws inspiration from wine. Bordeaux artist Audrey Bakx created this triptych for L'AFFORT®, illustrating the daily life of the men and women who work to produce wine.

Audrey Bakx