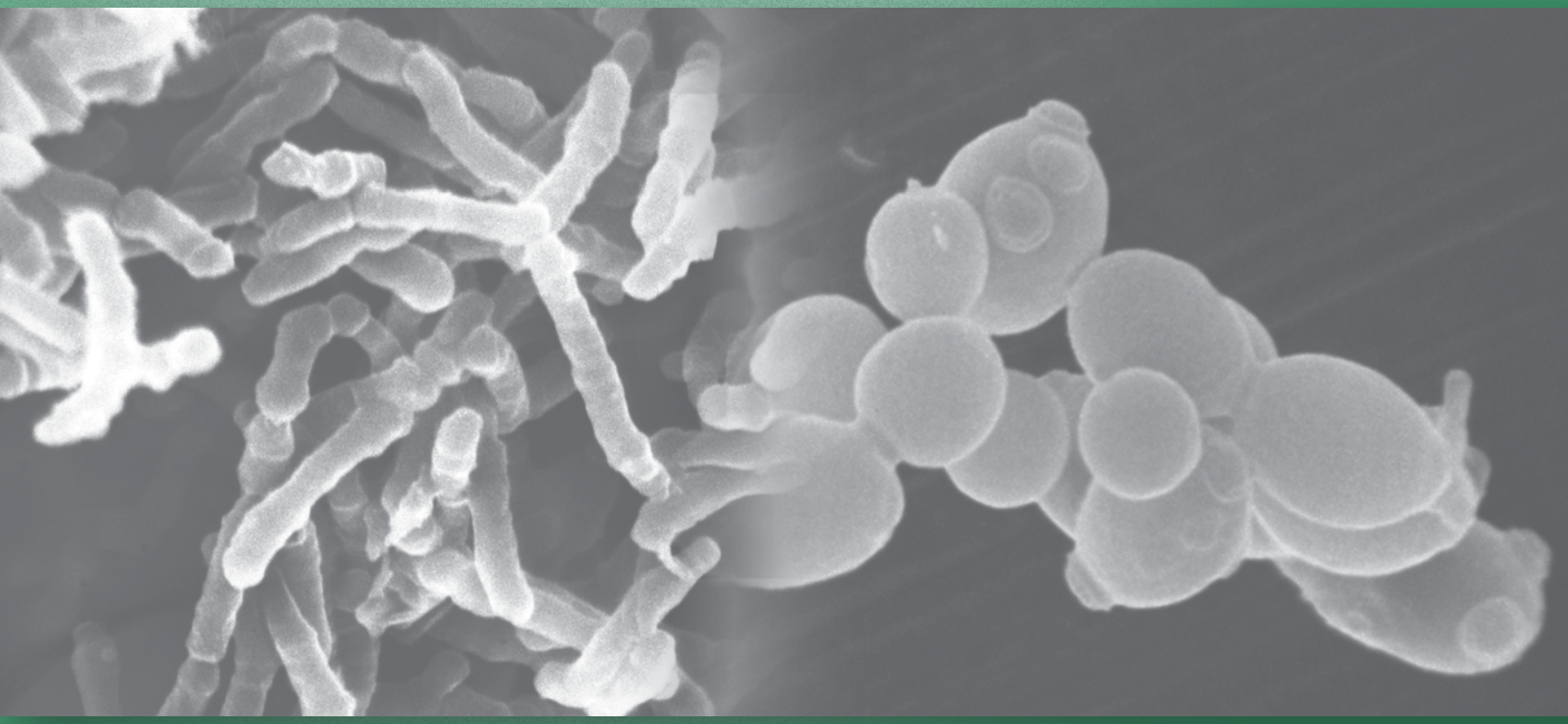
Fermentation Product Catalog

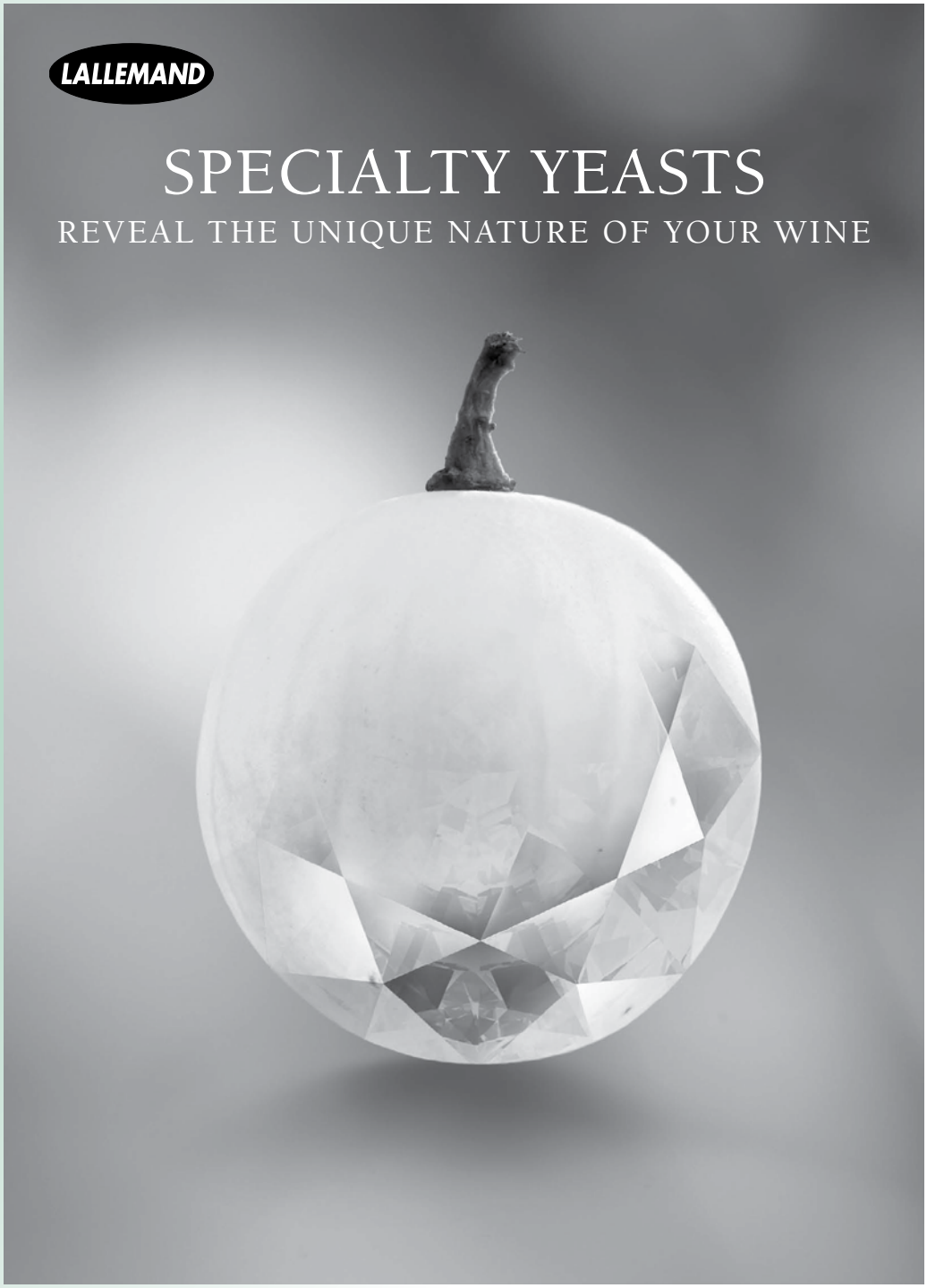
2013 EDITION



Enological
Yeasts
Bacteria
Nutrients
Specific Inactivated Yeasts
and Other Innovative
Fermentation Products

LALLEMAND

Table of Contents


LALLEMAND
SPECIALTY YEASTS
REVEAL THE UNIQUE NATURE OF YOUR WINE

ENOFERM® LALVIN® Levuline® uvaferm Vitilevure®

Lallemand offers over 100 enological yeasts throughout the winemaking world. We have selected over 40 of the more successful yeasts to meet your creative needs while working within your viticulture and winemaking practices. In North America, Lallemand's winemaking yeasts are offered under the brand names Enoferm®, Lalvin®, Levuline®, Uvaferm® and Vitilevure. The following brief descriptions will provide general information on each yeast and explain what sets it apart. The Yeast Chart on pages 12 and 13, and the Grape and Yeast Pairing Guide on pages 14 to 20, will help you select the right yeast to complement your grapes, fermentation conditions and stylistic goals.

Cross Evolution®

Natural cross hybrid for aromatic whites and rosés

Cross Evolution® is a strong fermenting yeast, from the Institute for Wine Biotechnology at the University of Stellenbosch in South Africa, that is ideal for aromatic white and rosé wines with high alcohol potential, low fermentation temperatures, and low nitrogen levels. Cross Evolution is not a genetically modified yeast but a result of a unique breeding program resulting in hybrids. Cross Evolution® also contributes an increased mouthfeel component resulting in aromatic wines with balanced mouthfeel. Cross Evolution® is recommended for Chardonnay, Chenin blanc, Gewürztraminer, Pinot blanc, Pinot gris, Riesling, Roussanne, Sauvignon blanc and Viognier. Low vinyl phenols production (POF-).

YSEO PROCESS

CROSS EVOLUTION™

Enoferm AMH™ Assmanshausen

Allows expression of indigenous flora

Originating from the Geisenheim Research Institute, Enoferm AMH™ is a favorite for making Riesling, Pinot noir and Zinfandel. It is considered a color-friendly yeast that enhances spicy (clove, nutmeg) and fruit flavors and aromas while adding positive, smooth mouthfeel to the overall complexity. AMH™ has a long lag phase and a slow to medium fermentation rate. Therefore, a well-managed nutrient program during rehydration and fermentation is essential. Good ferment domination is obtained with AMH™ if the culture is allowed to develop in about 10% of the total must volume for 8 hours before final inoculation. Very malolactic bacteria compatible. It is cassified as a *Saccharomyces kudriavzevii*

Enoferm BGY™

It's Burgundy

Enoferm BGY™ was isolated in the Burgundy region of France and is maintained at UC Davis as UCD-51. It is used in reds, particularly Pinot noir. BGY™ is not easy to use but can give good results when carefully rehydrated using Go-Ferm® or a GO-FERM PROTECT® product and inoculated into must with balanced nutrients.

Enoferm CSM™

To reduce herbaceous character in under-ripe fruit

Enoferm CSM™ was isolated from Bordeaux for Cabernet sauvignon, Cabernet franc and Merlot. It does not tolerate alcohols above 14% and benefits from high and balanced nutrient additions under good fermentation practices. It favors color and phenolic extraction, is red fruit-driven, reduces vegetal aromas and adds complexity along with balanced, round mouthfeel. CSM™ will encourage malolactic fermentation. Low vinyl phenols production (POF-).

YSEO PROCESS

YEASTS

Enoferm M1™

For sweet-style aromatic whites and rosés

Enoferm M1™ is from the culture collection at Massey University, New Zealand. It is used to produce aromatic rosé and white wines, especially wines with residual sugar. Due to the high production of esters, typical descriptors include "fruit punch," especially when fermented at lower temperatures and provided with adequate balanced nutrients. The production of esters is limited at temperatures above 20°C. The yeast flocculates and settles to give compact lees. Not malolactic bacteria compatible. The Enoferm M1™ does not produce any H_2S.

Enoferm M2™

The all-purpose yeast

Enoferm M2™ was isolated in Stellenbosch, South Africa and is selected from the Massey University culture collection. It is a neutral to low ester-producing yeast and needs a high level of balanced nutrients for a strong fermentation finish. In reds and whites it can be distinguished by its expression of citrus and blossom notes, and is valued for accentuating volume in the mouth. Steady fermentation rate makes it ideal for fermentations lacking temperature control.

Enoferm RP15™

Rockpile selection for concentrated reds

Enoferm RP15™ was isolated and selected from spontaneous Rockpile Syrah fermentations. This California isolate is used in concentrated reds, particularly Syrah, Zinfandel, Cabernet sauvignon and Merlot where a moderate fermentation rate is desired for rich, lush, balanced mouthfeel and full bodied wines. RP15™ has a moderate nitrogen demand, and will allow good results with varietal flavor, and red fruit and mineral aromatic note development, when carefully rehydrated using GO-FERM PROTECT® before inoculation into musts.

Enoferm SIMI WHITE™

Fruity foamer for whites and rosés

Enoferm SIMI WHITE™ is a popular choice for fruity white and rosé style wines. It is prized for its aroma and flavor contribution to Chardonnay, and has been described as contributing creamy fruit. It is highly affected by nutrient composition and juice handling procedures, and has a tendency to produce a lot of foam.

Enoferm SYRAH™

For classical Syrah aromas

Enoferm SYRAH™ is a Côtes du Rhône isolate used for Syrah, Merlot and Carignan. It is a high glycerol producer and offers good mouthfeel and stable color extraction. It requires high nutrient levels and shows the best sensory results when a proper nutrition strategy is followed. Typical aromas include violets, raspberries, cassis, strawberries, black pepper and grilled meat.

Enoferm T306®

For elegant aromatic whites

Enoferm T306® was isolated from indigenous fermentations of Pinot noir at Tyrrell's Vineyards, Pokolbin, in the Hunter Valley, NSW Australia. It is used mainly for fruit-focused Pinot gris, Chardonnay, Semillon and Chenin blanc for imparting aroma characters of exotic tropical fruit and pineapple. In barrel-fermented Chardonnay, it contributes elegant white fruit and mouthfeel, particularly with lees contact time.

Lalvin 71B®

For nouveau wines

Lalvin 71B® was isolated by the INRA (National Agricultural Research Institute) in Narbonne, France. 71B® is known for making blush and semi-sweet wines with a tropical fruit character. Long-lived aromas are due to its production of relatively stable esters and higher alcohol levels; 71B® also softens high-acid musts by partially metabolizing malic acid. Very malolactic bacteria compatible.

Lalvin BA11™

Secure yeast for white wine mouthfeel

Lalvin BA11™ was selected in 1997 near Estação Vitivinicola de Barraida in Portugal. It has excellent fermentation kinetics, even at low temperatures. It promotes fresh aromatic characteristics and intensifies mouthfeel and lingering flavors in whites, such as Pinot gris. In relatively neutral white varieties, BA11™ encourages the fresh fruit aromas of orange blossom, pineapple and apricot.

Lalvin BM45™

The big movement in winemaking

Lalvin BM45™ was isolated in the early 1990s in collaboration with the Consorzio del Vino Brunello de Montalcino and the University of Siena. BM45™ is a relatively slow starter and is well suited for long maceration programs. It has high nitrogen requirements and can produce sulfides if nutrient starved. When used in whites, BM45™ benefits greatly from rehydration with proper nutrition. During fermentation, BM45™ produces high levels of polyphenol-reactive polysaccharides, resulting in wines with great mouthfeel and improved color stability. BM45™ is used on red varieties to contribute jam, spice and earthy elements. It is also used to minimize vegetal characteristics. Some winemakers use BM45™ on Chardonnay as a blending component to increase mouthfeel. Not malolactic bacteria compatible.

Lalvin BM 4X4®

The attributes of Lalvin BM45 with optimized fermentation capacity

Lalvin BM 4X4® is a blend of Lalvin BM45™ and another yeast known for its fermentation reliability. BM45™ is known and appreciated around the world for its round mouthfeel and stable color (see above description for BM45). However, BM45™ is a slow fermenter and can require substantial nutrients to complete fermentation successfully and without the production of sulfides. While BM45™ has a very strong following among winemakers who enjoy its slow fermentation and its suitability for long maceration programs, there are others who desire the attributes of BM45™ but with a more timely and secure fermentation. BM 4X4® achieves this goal.

The "Dynamic Synergy" Yeast

During the yeast growth phase, BM 4X4® has the unusual capacity of releasing a significant quantity of polyphenol-reactive polysaccharides into the fermenting must. The quantity and the quality of the polysaccharides released during fermentation facilitate the production of red wines with great mouthfeel and improved color stability, with dependable fermentation kinetics under difficult fermentation conditions. In whites, BM 4X4® releases a high level of esters responsible for fruit aromas and also brings roundness to the mouthfeel.

Lalvin BRL97™

For long aging, color stability and structure

Lalvin BRL97™ was selected as a result of a four-year study by the University of Torino from over 600 isolates taken from 31 wineries in the Barolo region. The goal was to find a selected natural yeast from Nebbiolo that is able to retain both the color and the varietal character of this grape. BRL97™ has received good feedback from North American winemakers for its color stabilization and sensory contributions in heavier structured reds, such as Zinfandel, Barbera, Merlot and Nebbiolo, with long aging potential.

Lalvin Clos®

For ultra-premium red wines

Lalvin Clos® was selected by the University of Rovira i Virgili in Spain from the Priorat region, situated in the province of Tarragona. Vinification trials show Lalvin Clos® has a very good implantation rate under difficult conditions, such as low nitrogen content over a wide range of temperatures. The results of experimental and winery trials with Carignan, Grenache, Syrah, Zinfandel and Tempranillo grapes confirm this yeast's potential as an excellent tool to enhance aromatic complexity, structure and mouthfeel.

Lalvin CY3079 (Bourgoblanc)®

For classic white Burgundy

Lalvin CY3079® was selected by the BIVB with the objective of finding a yeast that would complement typical white Burgundy styles. CY3079® is a steady, average fermenter, especially at cold temperatures (13°C). Its fermentation finish is slow due to an early autolysis resulting in roundness. This yeast greatly benefits from using rehydration nutrients and complex yeast nutrients designed for use during fermentation. When properly fed, CY3079® has good alcohol tolerance (up to 15%) and is a low producer of VA and sulfides. It is recommended for barrel-fermented Chardonnay and *sur lie* aging. Chardonnays produced with CY3079® have rich, full mouthfeel and are characterized by aromas of fresh butter, almond, honey, white flowers and pineapple.

Lalvin DV10™

Epernay selection for primary and secondary fermentation

Lalvin DV10™ was selected in the Epernay region and is approved by the CIVC in Epernay. DV10™ has strong fermentation kinetics over a wide temperature range and relatively low nitrogen demands. DV10™ is famous for its ability to ferment under stressful conditions of low pH, high total SO_2 and low temperature. Low foaming and low VA production characterize it. DV10™ is considered a clean fermenter that respects varietal character and avoids the harsh sensory contributions of other one-dimensional "workhorse" yeasts, such as Prise de Mousse. It is classified as a *Saccharomyces cerevisiae bayanus*.

Lalvin EC1118™ (Prise de Mousse)

The original Prise de Mousse

Lalvin EC1118™ is the original and is good for barrel fermentations. It ferments well at low temperatures and flocculates well with very compact lees. Under low nutrient conditions, EC1118™ produces a lot of SO_2 (up to 30 ppm) and as a result can inhibit malolactic fermentation. It is classified as a *Saccharomyces cerevisiae bayanus*.

Lalvin ICV D21®

The "terroir" yeast

Lalvin ICV D21® was isolated in 1999 from the Pic Saint Loup Languedoc "terroir" during a special regional program run by the Institut Coopératif du Vin (ICV) Natural Micro-Flora Observatory and Conservatory. ICV D21® was selected for fermenting red wines with stable color, intense fore-mouth, mid-palate tannin structure, and fresh aftertaste. Unlike most wine yeasts, ICV D21® contributes both higher acidity perception and positive polyphenol-reactive polysaccharides. Strong interactions of the polysaccharides with the floral and fruity volatile compounds contribute to a more stable aromatic profile in the mouth. These attributes avoid the development of cooked jam and burning-alcohol sensations in highly mature and concentrated Cabernet sauvignon, Merlot and Syrah. During fermentation, ICV D21® produces very few sulfides, and it is also noted for its good fermentation performance, even under high temperature and low nutrient conditions. It allows for the expression of fruit from the grapes while reducing the potential for herbaceous characters in Cabernet sauvignon. When blended with wines fermented with Lalvin ICV D254® and ICV D80®, ICV D21® brings fresher, sustained intense fruit and lively sensations beginning in the fore-mouth and carrying through to the aftertaste. ICV D21® is also used in very ripe white grapes, barrel fermented to develop fresh fruit aromas, volume and acidity that complement wines fermented with Lalvin ICV D47™ in blends. Rosé wines fermented with ICV D21® have enhanced red fruit, fore-mouth volume and balance, making it the perfect blending complement to rosé wines fermented with Lalvin ICV GRE™.

Lalvin ICV D47™

For complex whites with citrus and floral notes

Lalvin ICV D47™ is a Côtes du Rhône isolate from Suze-la-Rousse for the production of full-bodied barrel fermented Chardonnay and other white varietals. When left on lees, ripe spicy aromas with tropical and citrus notes are developed. ICV D47™ is a high polysaccharide producer known for its accentuated fruit and great volume.

On most white grape varieties, this yeast elaborates wines with ripe stable fruits or jam-like aromas. Thanks to these aromas, the cuvées fermented with the ICV D47™ are a good source of complexity in the blends. Moreover, ICV D47™ contributes to the wine's silkiness and persistence. Excellent results are obtained for the production of top-of-the-range Chardonnay fermented in barrels, especially when blended with Lalvin ICV D21® fermented Chardonnays.

Lalvin ICV D80®

To enhance tannin structure

Lalvin ICV D80® was isolated by Dominique Delteil of the ICV in 1992 from the Côte Rôtie area of the Rhône Valley for its ability to ferment musts high in sugar and polyphenols. With proper nutrition, aeration and fermentation temperatures below 28°C, ICV D80® will ferment up to 16% alcohol. ICV D80® brings high fore-mouth volume, big mid-palate mouthfeel and intense fine grain tannin to reds. It is one of the best strains for contributing big tannin volume and is characterized by ripe fruit, smoke and a licorice finish. When blended with wines fermented with Lalvin ICV D254® or Syrah, wines fermented with ICV D80® bring more tannin intensity to the blend.

Lalvin ICV D254®

For mouthfeel in Mediterranean-style reds

Lalvin ICV D254® was selected by the ICV in 1998 from Syrah fermentations in Gallician, south of the Rhône Valley. In red wines, ICV D254® promises high fore-mouth volume, big mid-palate mouthfeel, intense fruit concentration, smooth tannins and a mildly spicy finish. Red wines made with ICV D254® may be blended with Lalvin ICV D80® or ICV D21® to create more concentrated, full-bodied wines. In unripe reds, ferment 25% to 50% of the lot with ICV D254® and the balance with Lalvin ICV GRE™ to help mask vegetative character. As a complement to Lalvin CY3079®, winemakers use ICV D254® for fermenting Chardonnay with nutty aromas and creamy mouthfeel. Very malolactic bacteria compatible.

Lalvin ICV GRE™

For fruit-forward Rhône-style wines

In 1992, Lalvin ICV GRE™ was selected from the Cornas area of the Rhône Valley. In reds, it contributes up-front fruit to easy-to-drink Rhône-style wines. ICV GRE™ is used with short skin contact regimes (3 to 5 days) to reduce vegetal and undesirable sulfur components in varieties like Merlot, Cabernet sauvignon, Grenache and Syrah. In fruit-focused whites like Chenin blanc, Riesling and Viognier, ICV GRE™ results in stable fresh-fruit characteristics and delivers a big fore-mouth impact. If the fruit maturity is less than optimum, ICV GRE™ is excellent for bringing overall balance to red, rosé and white wines. Rosé wines fermented with ICV GRE™ from more balanced maturity fruit emphasize red fruit and higher volume, and are complemented by blending rosés fermented with Lalvin ICV D21®.

Lalvin ICV OPALE®

Higher aromatic intensity in rosés and whites

This is the latest natural yeast selection from the Institut Coopératif du Vin (ICV). When compared with other yeasts, the Lalvin ICV OPALE® develops more volatile aromatic compounds, resulting in intense and complex fruit aromas in premium white and rosé wines. This yeast also shows good fermentation abilities in the high maturity grapes coming from the Mediterranean and Rhône regions. Wines fermented with ICV OPALE® give the initial impression of volume and softness, followed by a round, intense mid-palate and balanced finish. Not malolactic bacteria compatible. Low vinyl phenols production (POF-).

Lalvin QA23™

Successfully ferments highly clarified must

Lalvin QA23™ was selected in Portugal by the University of Trás-os-Montes and Alto Douro (UTAD) in cooperation with the Viticultural Commission of the Vinhos Verdes region. It is used for Chardonnay, Sauvignon blanc, Chenin blanc, Colombard and Semillon for the production of crisp and fresh-fruit intense wines. It enhances aromas of terpenic varietals through its beta-glucosidase activity and is an excellent thiol converter, making it a complementary yeast for developing varietal Sauvignon blanc passion fruit character. QA23™ has low nutrient and oxygen requirements and will ferment juice with low turbidity at low temperatures (10°C) to dryness. It is classified as a *Saccharomyces cerevisiae bayanus*. Very malolactic bacteria compatible.

Lalvin R2™

For the expression of Sauvignon blanc aromas

Lalvin R2™ was isolated in the Sauternes region of Bordeaux by Brian Croser of South Australia. It has excellent cold temperature properties and will ferment as low as 5°C. Without good nutrition and protection against osmotic shock, it can tend to produce VA. For this reason, proper nutrition and protection during rehydration and during fermentation is recommended. R2™ helps produce intense, direct fruit-style whites by liberating fruit and floral aroma precursors. It is recommended for aromatic white varieties, such as Sauvignon blanc, Riesling and Gewürztraminer. It is classified as a *Saccharomyces cerevisiae bayanus*.

Lalvin RA17®

To liberate Pinot noir varietal aromas

Lalvin RA17® was selected by the BIVB in the Burgundy region. It is recommended to enhance varietal characters and to obtain fresh, aromatic and supple red wines. To avoid the formation of sulfides, it requires high nutrient levels and will benefit greatly from nutrition during rehydration. When properly fed, RA17® will develop cherry and fruit aromas in varieties like Pinot noir and Gamay. Wines made from RA17® can be blended with wines fermented with Lalvin RC212®, Lalvin BRL97™ or Enoferm AMH™ to give a more balanced, complex and fuller structure.

Lalvin RC212 (Bourgorouge)®

For Pinot noir with color and structure

Lalvin RC212® was selected from fermentations in Burgundy by the BIVB to extract and protect the polyphenols of Pinot noir. Due to the limited adsorption of polyphenols on RC212® yeast cell walls, there is limited color loss and structure is protected during aging. It requires high nutrient additions to avoid the potential development of sulfides and demonstrates best results when rehydrated with the right nutrient and protectant. RC212® consistently produces Pinot noir with good structure, ripe cherry, bright fruit and spicy characteristics. Wines made with RC212® can be blended with wines made with Lalvin RA17® to achieve more complexity and finesse.

Lalvin Rhône 2056®

For structure, color and spiciness

Lalvin Rhône 2056® was selected by the ITV for its ability to maintain varietal fruit aromas and flavors of Côtes du Rhône varieties. It demonstrates good alcohol tolerance as well as low SO_2 and VA production over a wide temperature range. Rhône 2056® is a quick to moderate fermenter with relatively high nutrient requirements. Rhône 2056® benefits greatly from good nutrition practices, maintains good color stability and is excellent for fruit-forward-style reds.

Lalvin Rhône 2226™

Excellent alcohol tolerance

Lalvin Rhône 2226™ is a vineyard isolate from Côtes du Rhône. It is very alcohol tolerant and highly recommended for high sugar reds and late harvest wines. In red varietals, high color and good structure, as well as black cherry, berry and cherry cola aromas characterize L2226™.

Lalvin Rhône 4600®

Aromatic and elegant whites and rosés

Lalvin Rhône 4600® was selected from Viognier by the Inter-Rhône's technical department after a three-year study of yeast well suited for fermenting fruit-forward, elegant white and rosé wines. High sugar and low nitrogen musts, when fermented cool (13.5°C) with the Rhône 4600®, have enhanced apricot and tropical fruit due to strong fatty acid ethyl ester production. Higher roundness with diminished bitterness also makes the Rhône 4600® a good choice for Rhône white varietals and Chardonnay. Although the Rhône 4600® does not enhance the varietal character of Sauvignon blanc or Semillon, this yeast does bring fatness and balance along with light aromatic ester notes as a good blending component.

Lalvin R-HST®

For Riesling and other aromatic whites

Lalvin R-HST® was selected for its exceptional enological properties in Riesling from trials conducted from 1991 to 1996 in the Heiligenstein region of Austria. R-HST® has a short lag phase and generation time, even at cold temperatures. These features allow it to dominate and persist over spoilage yeast, such as *Kloeckera apiculata*. R-HST® retains fresh varietal character and emphasizes floral (rose) and mineral characteristics, while contributing body and mouthfeel for an overall complexity and elegance. R-HST® also produces crisp, premium white and Pinot noir wines that develop well over time.

Lalvin T73™

Security for high alcohol reds

Lalvin T73™ was isolated from the València area in Spain and was selected for its ability to enhance the natural aromas and flavors of red wines produced in hot climates. Due to its ability to produce high quantities of glycerol, wines made from T73™ have good mouthfeel. Hot climate reds that have problems "opening up" are enhanced by the well-balanced production of esters and higher alcohols. T73™ has an extremely low nitrogen demand and quickly dominates the must's indigenous microflora. It also exhibits good resistance to vineyard antifungal treatments. T73™ is classified as a *Saccharomyces cerevisiae bayanus*.

Lalvin V1116 (K1)™

The secure choice for light, fresh, crisp whites

Lalvin V1116 (K1)™ was isolated in 1972 by Pierre Barre of the INRA Montpellier. V1116 (K1)™ tends to express the freshness of white grape varieties. Natural fresh fruit aromas are retained for longer, compared to wines fermented with standard yeast (such as Prise de Mousse). When fermented at low temperatures (below 16°C) and with the right addition of nutrients V1116 (K1)™ is one of the more flowery ester producers (isoamyl acetate, hexyl acetate and phenyl ethyl acetate). These esters bring fresh floral aromas to neutral varieties or high-yield grapes. Among the high ester producers, V1116 (K1)™ is the most resistant to difficult fermentation conditions, such as low turbidity, low temperature and low fatty acid content. V1116 (K1)™ is recommended for the fermentation of icewines. It can also be used for rosé or basic red wines. Not malolactic bacteria compatible. Low vinyl phenols production (POF-).

Lalvin W15™

For clean, low-temperature ferments

Lalvin W15™ was isolated in 1991 from a high-quality Müller Thurgau must at the Viticulture Research Station in Wädenswil, Switzerland. W15™ was developed to ferment dry white and red wines at moderate speeds, where bright fruit and good structure are desired, due to the production of higher levels of glycerol and succinic acid. Very little heat is generated by W15™ during fermentation, reducing the potential for the formation of sulfide aromas, and good osmotic tolerance has been noted for late harvest fermentations and icewine. Very malolactic bacteria compatible.

Levuline BRG™

For Burgundy varietals

Isolated in the Burgundy terroir by Professor Feuillat's team from the UIVV in Dijon (reference UP3OY5). This yeast was selected for its positive fermentation qualities and its ability to develop the aromatic and organoleptic expression in white and red Burgundy varietals.

Uvaferm 43®

The fructophilic yeast to rescue stuck fermentations

Selected for its exceptional ability to restart stuck fermentations, Uvaferm 43® was chosen from among 33 different isolates that were tested against each other, and from the traditional yeasts typically used to restart stuck fermentations. The stuck fermentations used in the selection process were from wines with high alcohol levels (14.3% with 21 g/L RS) and high free SO_2 (35 mg/L). The 43® yeast was recently found to be the most fructophilic yeast when compared to other yeasts promoted as being fructophilic. It is classified as a *Saccharomyces cerevisiae bayanus*.

Uvaferm BDX™

The perfect fermenter

A French isolate used extensively in California and Australia since the late 1980s, Uvaferm BDX™ has perfect fermentation kinetics and does not generate a lot of heat during fermentation. It is highly recommended for the production of quality red wines, especially Merlot and Cabernet sauvignon, with minimum color loss and enhanced flavor and aroma.

Uvaferm GHM™

For harmonious whites

Uvaferm GHM™ was isolated in the Rheingau region of Germany and selected from over 800 natural yeast isolates by a team led by Dr. Manfred Grossmann, professor at the Geisenheim Research Center. Numerous fermentation trials with GHM™ in Riesling and other aromatic white varietals from cooler regions resulted in consistently harmonious and well-balanced wines. It has the ability to enhance floral aromas, while avoiding strong ester production, even at low fermentation temperatures. It brings harmony to the bouquet and delicate fruit aromas, as well as an acidity that remains extremely refined. GHM™ is also particularly well adapted for white wines destined for aging using extended lees contact.

Uvaferm SVG™

For classic Sauvignon blanc character

The ITV, in collaboration with Lallemand, selected Uvaferm SVG™ from the Loire region specifically for the enhancement of typical Sauvignon blanc varietal character, diminished acidity and good fermentation kinetics. In tastings of Sancerre and Pouilly Fumé wines fermented with different yeasts, those fermented with SVG™ scored higher than the wines fermented with other yeasts commonly used for Sauvignon blanc. These Sauvignon blanc wines were described as having more intensity and a better balance of mineral, citrus and spicy notes. SVG™ is also recommended for aromatic white varieties, such as Riesling or Pinot gris.

Uvaferm VRB®

Balanced mouthfeel in high alcohol reds

Uvaferm VRB® was chosen by the CIDA in the Rioja region of Spain to enhance varietal characteristics and ester perception. When fermented with VRB®, red wines, such as Tempranillo, Barbera and Sangiovese, tend to have good color intensity and stability with increased phenolic structure. Its flavor attributes are often described as ripe fruit, jam, hazelnut and dried plums on the finish. With properly integrated nutrition, VRB® has a high alcohol tolerance (up to 17%), short lag phase, steady fermentation rate and low VA production. Low vinyl phenols production (POF-).

Vitilevure 3001™

For Pinot noir

VITILEVURE 3001™ was isolated, studied and selected from the prestigious Côte de Nuits terroir in Burgundy during a three-year research project by Laboratory Burgundia OEnologie in Beaune, France. The goal of this selection program was to find dominant natural yeast that would elaborate intense, complex and balanced Pinot noir varietal character. VITILEVURE 3001 yeast is recommended for cold soak as it tolerates SO_2 and low temperatures.

Vitilevure 58W3™

For Alsatian-style aromatic whites

Vitilevure 58W3™ was isolated, studied and selected during a five-year research project by the INRA in Colmar (Alsace), France, in collaboration with Gresser Oenology. The goal of this selection program was to find a dominant natural yeast that would enhance spicy, floral and fruit descriptors in aromatic white varietals, such as Gewürztraminer and Pinot gris. Unique to the 58W3™ is its ability to contribute an overall well-balanced mouthfeel and minimize the development of bitter compounds associated with more basic "workhorse" yeasts. Due to its fermentation kinetics, especially in high potential alcohol juices, a balanced nutrient strategy and good fermentation practices should be followed.

Vitilevure Elixir™

For aromatic expression in white and rosé wines

A natural cross hybrid from the Institute for Wine Biotechnology at the University of Stellenbosch in South Africa, Vitilevure Elixir™ was selected for its strong fermentation characteristics, with the revelation and expression of terpenes, thiols and floral, fruity aromas from fatty acid esters, for lasting elegance and finesse. Recommended for Sauvignon Blanc, Chardonnay, Gewürztraminer, Riesling, Muscat, Chenin Blanc and Ugni Blanc, as well as rosés, especially from Cabernet, Grenache and Syrah.

Vitilevure M83™

Rosé de Provence with mouthfeel and balance

Vitilevure M83™ is the outcome of a yeast selection program by the Laboratoire Aubanelle in the Bandol appellation of the Provence region. It produces round and balanced rosés with enhanced fruit aromas and more stable color, due to its polyphenol-reactive polysaccharides. M83™ is a low SO_2 and low volatile acidity yeast with very good fermentation kinetics up to 15.5% alcohol. Tastings by Bandol region professionals at the Centre de Recherche et d'Expérimentation sur le Vin Rosé confirmed that the M83™ was well adapted to the difficult fermentation conditions encountered in Provence.

Vitilevure MT™

For long-aging Bordeaux varieties

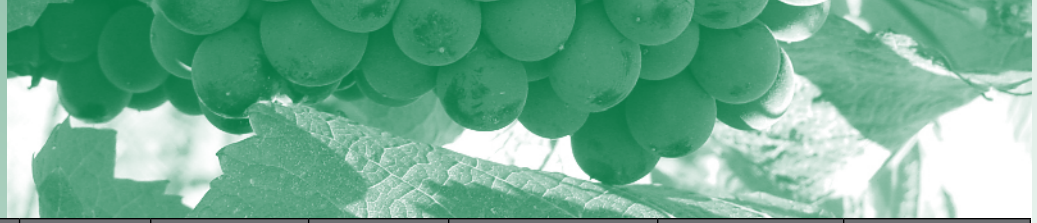
Vitilevure MT™ was selected in Saint Emilion by the ITV Bordeaux in collaboration with the INRA Montpellier, to help bring out the typical strawberry jam and caramel aromatics of Merlot. The color intensity and tannic structure of wines produced with MT are higher when compared with standard yeasts used for Bordeaux red varietals. This yeast is particularly recommended for grapes with high maturity and long aging potential. MT™'s fermentation kinetics are steady and its alcohol tolerance is high. However, it will benefit from a balanced nutrient strategy, especially in low nutrient musts with high potential alcohol.

Vitilevure QUARTZ™

For sparkling wines, secure fermentation and aromatic finesse

Vitilevure QUARTZ™ was isolated from the Fleury domain at Courteron in the Aube region, where biodynamics have been practiced since the 1980s. With an alcohol tolerance of up to 17% as well as low temperature and pH tolerance, QUARTZ™ is suited to difficult conditions. Aside from being a good choice for sparkling wines, it is a great selection for tank-fermented Sauvignon blanc or whites fermented in neutral barrels. It is also recommended for restarting stuck fermentations. QUARTZ™ is a *Saccharomyces cerevisiae bayanus*.

YEAST CHART



Yeast	Whites	Rosé	Reds	Late Harvest	Restart Stuck	Sensory Effect	Temp. Range °C	Ferm. Speed	Competitive Factor	Alcohol Tolerance	Relative Nitrogen Needs	H_2S Production 60 ppm N	H_2S Production 170 ppm N
Cross Evolution®	4	4	1	1	1	EVC	10-20	moderate	active	15	low		
Enoferm AMH™	2	1	4	1	1	EVC	20-30	slow	sensitive	15	medium	low	low
Enoferm BGY™	1	1	4	1	1	neutral	24-30	slow	sensitive	15	medium	low	low
Enoferm CSM™	1	1	4	1	1	EVC	15-32	moderate	active	14	high	high	medium
Enoferm M1™	4	2	1	2	1	esters	12-20	slow	sensitive	16	high	low	low
Enoferm M2™	4	4	4	1	1	esters	15-30	moderate	active	15	high	low	low
Enoferm RP15™	1	1	4	1	2	EVC	20-30	moderate	active	17	medium	low	low
Enoferm Simi White™	4	1	1	1	1	esters	15-30	slow	sensitive	14	medium	low	low
Enoferm Syrah™	1	2	4	1	1	EVC	15-32	moderate	active	16	medium	high	low
Enoferm T306®	4	2	2	1	1	EVC	15-30	moderate	active	14	high	low	low
Lalvin 71B®	3	4	4	2	1	esters	15-30	moderate	sensitive	14	low	low	low
Lalvin BA11™	4	3	1	2	1	esters	12-25	moderate	sensitive	15	high	low	low
Lalvin BM45™	2	1	4	1	1	EVC	18-28	moderate	active	15	high	low	low
Lalvin BM 4X4®	4	1	4	1	1	EVC	18-28	moderate	active	15	high		
Lalvin BRL97™	1	1	4	1	1	EVC	17-29	moderate	active	16	medium	low	low
Lalvin Clos®	1	2	4	1	1	EVC	13-35	fast	active	17	medium	low	low
Lalvin CY3079®	4	2	1	1	1	EVC	15-25	fast	sensitive	15	high	low	low
Lalvin DV10™	4	2	4	4	3	neutral	10-35	fast	active	17	low	low	low
Lalvin EC1118™	3	2	2	3	3	neutral	10-30	fast	active	18	low	low	low
Lalvin ICV D21®	3	2	4	1	1	EVC	16-30	moderate	active	16	medium	low	low
Lalvin ICV D47™	4	4	2	1	1	EVC	15-28	moderate	active	14	low	low	low
Lalvin ICV D80®	1	1	4	1	1	EVC	15-28	moderate	active	16	medium	low	low
Lalvin ICV D254®	4	1	4	1	1	EVC	12-28	moderate	neutral	16	medium	low	low
Lalvin ICV GRE™	4	4	4	1	1	EVC	15-28	moderate	active	15	high	low	low
Lalvin ICV Opale®	4	4	1	1	1	EVC	12-28	medium	active	14	low		

Yeast	White	Rosé	Red	Late Harvest	Restart Stuck	Sensory Effect	Temp. Range °C	Ferm. Speed	Competitive Factor	Alcohol Tolerance	Relative Nitrogen Needs	H_2S Production 60 ppm N	H_2S Production 170 ppm N
Lalvin QA23™	4	1	1	3	3	EVC	15-32	fast	active	16	low	low	low
Lalvin R2	4	3	1	4	3	esters	10-30	moderate	active	16	high	low	low
Lalvin RA 17®	1	2	4	1	1	EVC	16-29	moderate	sensitive	15	high	low	low
Lalvin RC 212®	1	1	4	1	1	EVC	20-30	moderate	neutral	16	high	low	low
Lalvin Rhône 2056®	4	3	4	1	1	esters	15-28	moderate	active	16	medium	high	low
Lalvin Rhône 2226™	2	2	4	4	3	EVC	15-28	fast	active	18	high	low	low
Lalvin Rhône 4600®	4	4	2	2	1	esters	13-22	moderate	active	15	low		
Lalvin R-HST®	4	1	1	1	1	neutral	10-30	moderate	active	15	medium	low	low
Lalvin T73™	1	1	4	1	1	esters	18-35	moderate	active	16	low	low	low
Lalvin V1116 (K1)™	4	2	4	3	3	esters	10-35	fast	active	18	low	low	low
Lalvin W15™	4	4	3	3	1	EVC	10-27	moderate	active	16	high	low	low
Levuline BRG™	4	2	4	3	1	EVC	18-32	moderate	neutral	15	medium		
Uvaferm 43®	2	1	3	3	4	neutral	13-35	fast	active	18+	low	low	low
Uvaferm BDX™	1	1	4	1	1	EVC	18-30	moderate	sensitive	16	medium	medium	low
Uvaferm GHM™	4	2	1	1	1	EVC	15-20	moderate	sensitive	14	medium		
Uvaferm SVG™	4	1	1	1	1	EVC	16-25	moderate	active	15	medium	low	low
Uvaferm VRB®	1	2	4	1	1	EVC	15-28	moderate	neutral	17	medium	high	low
Vitilevure 3001™	1	1	4	1	1	EVC	10-32	moderate	active	15	medium	low	low
Vitilevure 58W3™	4	1	1	1	1	EVC	12-25	moderate	neutral	14	medium	low	low
Vitilevure Elixir™	4	4	1	1	1	EVC	14-25	moderate	neutral	15	medium		
Vitilevure M83™	2	4	4	1	1	EVC	17-28	moderate	neutral	15	medium		
Vitilevure MT™	1	2	4	1	1	EVC	15-32	moderate	active	15	medium	medium	low
Vitilevure Quartz™	4	1	1	1	3	EVC	10-32	fast	sensitive	17	low		

This chart is meant to help you conquer the challenge of choosing the right yeast for every fermentation. The data in the chart is only intended as a quick reference guide. Please refer to the Yeast description and the Grape and Yeast Pairing Guide for additional technical information. For specific questions please contact your Lallemand representative or distributor. **Some notes:**

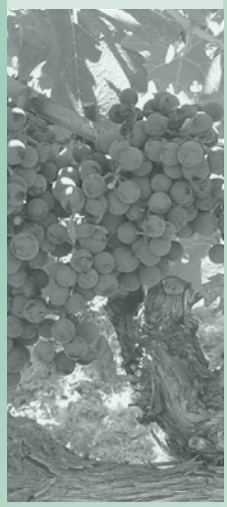
- Highest rating: 4, Lowest rating: 1
- Please note that the "temperature range" column does not indicate the "optimum temperature range."
- Keep in mind that a yeast's ability to ferment within the given temperature range will depend on the alcohol potential and other antagonistic conditions.
- The "relative nitrogen requirement" refers to how much nitrogen one yeast requires relative to the other yeasts on the chart under nitrogen-limiting conditions.
- The "H_2S production" columns refer to the yeast's relative H_2S production in a Chardonnay juice at 60 ppm (limiting conditions) and at 170 ppm assimilable nitrogen.
- EVC = Enhances Varietal Character

GRAPE AND YEAST PAIRINGS

You can't make good wine from bad grapes! The inherent quality of the fruit can account for most of a wine's quality, but the remaining quality contribution is directly related to winemaking. The yeast, and its ability to marry all aspects of the grape during fermentation, plays a significant role.

We have created this grape and yeast pairing guide to help you select the best yeast for your stylistic goals and given conditions. The yeasts are grouped under the descriptors or characteristics they will typically contribute under normal winemaking conditions in different varieties. For example, if you would like to accentuate the stone fruit character in Chardonnay, we recommend selecting Lalvin ICV D47™ or Lalvin ICV D254®. In our experience, these yeasts express more stone fruit than yeasts such as Lalvin CY3079 Bourgoblanc® or Enoferm T306®.

As always, this is just a guide and only one part of the story. For more information on the yeasts, refer to the Yeasts section and Yeast Chart. Of course, if you still have questions, email us and we will get right back to you!



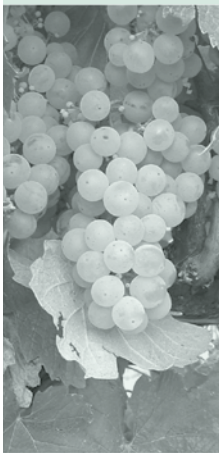
Cabernet franc

Berry	Plum	Spice	Color Stability	Rosé Style
Enoferm CSM **Lalvin** ICV D21 ICV GRE RC212 T73 **Uvaferm** VRB **Vitilevure** MT	**Lalvin** BM45 BM 4x4 BRL97 ICV D80 ICV D254 **Uvaferm** VRB BDX	**Enoferm** CSM M2 RP15 **Lalvin** ICV D80	**Enoferm** CSM RP15 **Lalvin** BM45 BM 4x4 BRL97 ICV D254 RC212 **Uvaferm** BDX VRB **Vitilevure** MT	**Lalvin** 71B ICV D21 ICV GRE Rhône 4600 **Vitilevure** M83 MT

Cabernet sauvignon

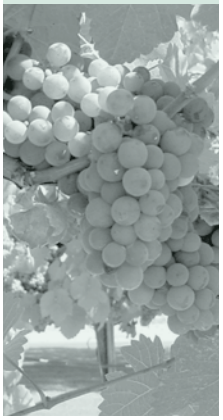
Berry	Jam	Color Stability	Round Mouthfeel	Ageable Tannins
Enoferm CSM M2 RP15 **Lalvin** Clos ICV D21 ICV D254 ICV GRE Rhône 2226 **Uvaferm** BDX VRB	**Lalvin** BM45 BM 4x4 BRL97 ICV D254 T73 **Uvaferm** BDX VRB	**Enoferm** CSM RP15 **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D254 Rhône 2226 **Uvaferm** BDX VRB	**Enoferm** RP15 **Lalvin** BM45 BM 4x4 Clos ICV D254 **Uvaferm** BDX VRB	**Enoferm** RP15 **Lalvin** Clos DV10 ICV D21 ICV D80 Rhône 2226 T73

GRAPE AND YEAST PAIRINGS



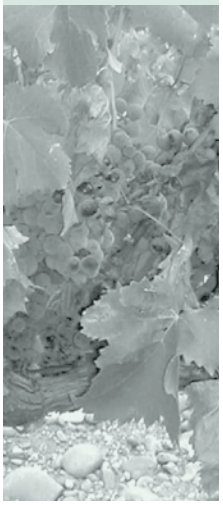
Chardonnay

White Fruit	Stone Fruit	Citrus	Nuts	Volume
Enoferm Simi White T306 **Lalvin** CY3079 ICV D21 ICV Opale QA23 **Level² TD** **Levuline** BRG	**Lalvin** ICV D47 ICV D254 ICV Opale	**Enoferm** M2 **Lalvin** DV10 ICV D47 ICV Opale **Levuline** BRG **Vitilevure** Quartz Elixir	**Lalvin** CY3079 ICV D47 ICV D254	**Cross Evolution** **Enoferm** T306 **Lalvin** BM 4x4 CY3079 ICV D47 ICV D254 ICV Opale **Level² TD** **Levuline** BRG



Gewürztraminer

Spice	Flint Stone/Mineral	Rose	Citrus
Lalvin DV10 QA23 R2 W15 **Uvaferm** SVG **Vitilevure** 58W3 Quartz	**Lalvin** BA11 ICV D47 ICV GRE ICV Opale R2 **Uvaferm** SVG	**Cross Evolution** **Lalvin** 71B BA11 ICV D47 W15 **Uvaferm** GHM **Vitilevure** 58W3	**Lalvin** DV10 ICV GRE ICV Opale QA23 W15 **Uvaferm** SVG **Vitilevure** Quartz Elixir



Grenache

Berry	Plum	Spice	Color Stability	Rosé Style
Enoferm CSM Syrah **Lalvin** Clos ICV GRE RC212 T73 **Uvaferm** VRB **Vitilevure** MT	**Enoferm** BGY **Lalvin** BM45 BM 4x4 BRL97 ICV D254 ICV D80 **Uvaferm** BDX VRB	**Enoferm** CSM RP15 Syrah **Lalvin** ICV D80	**Enoferm** BGY CSM RP15 **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D254 **Uvaferm** BDX VRB **Vitilevure** MT	**Lalvin** 71B ICV GRE ICV Opale Rhône 4600 **Vitilevure** M83 MT Elixir

GRAPE AND YEAST PAIRINGS

Merlot

Berry	Plum	Spice	Color Stability	Ageable Tannins
Enoferm CSM M2 RP15 **Lalvin** Clos ICV D21 ICV GRE Rhône 2226 T73 **Uvaferm** VRB **Vitilevure** MT	**Lalvin** BM45 BM 4x4 BRL97 ICV D80 ICV D254 **Uvaferm** BDX VRB	**Enoferm** CSM RP15 **Lalvin** ICV D80 Rhône 2226	**Enoferm** CSM RP15 **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D254 Rhône 2226 **Uvaferm** BDX VRB **Vitilevure** MT	**Enoferm** RP15 **Lalvin** Clos ICV D21 ICV D80 **Vitilevure** MT

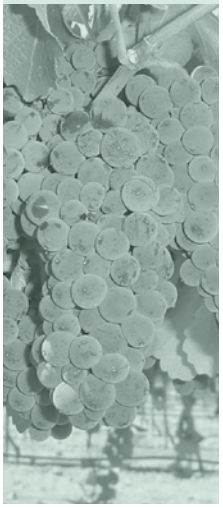
Nebbiolo

Berry	Plum Jam	Licorice	Cherry	Tannin Intensity	Color Stability
Enoferm Syrah RP15 **Lalvin** BRL97 ICV GRE **Uvaferm** VRB **Vitilevure** MT	**Lalvin** BM45 BM 4x4 ICV D21 **Uvaferm** VRB	**Enoferm** RP15 Syrah **Lalvin** BRL97 ICV D80	**Enoferm** AMH **Lalvin** BRL97 RA17 Rhône 2056 Rhône 2226 **Uvaferm** 43	**Lalvin** BRL97 ICV D21 ICV D80 Rhône 2226 **Uvaferm** BDX	**Enoferm** RP15 **Lalvin** BM45 BRL97 ICV D21 ICV D80 Rhône 2056 Rhône 2226 **Uvaferm** BDX VRB **Vitilevure** MT

Petite sirah

Fruit	Spice	Black Pepper	High Alcohol	Structural Enhancement
Enoferm RP15 Syrah **Lalvin** BM45 BM 4x4 BRL97 ICV D21 ICV GRE ICV D254 **Uvaferm** VRB	**Enoferm** AMH RP15 **Lalvin** BM45 BM 4x4 ICV D80 ICV D254 ICV GRE Rhône 2226 **Vitilevure** MT	**Enoferm** RP15 **Lalvin** ICV D80 Rhône 2226	**Enoferm** RP15 **Lalvin** Rhône 2226 **Uvaferm** 43 VRB	**Enoferm** RP15 **Lalvin** BM45 BM 4x4 BRL97 ICV D80 ICV D254 **Uvaferm** VRB

GRAPE AND YEAST PAIRINGS



Pinot gris

Floral	Peach/Apricot	Melon/Pear	Tropical Fruit	Rich Mouthfeel
Cross Evolution **Lalvin** BA11 DV10 QA23 V1116 (K1) **Level² TD** **Uvaferm** GHM SVG **Vitilevure** 58W3 Quartz	**Lalvin** BA11 ICV Opale QA23 Rhône 4600	**Enoferm** T306 **Lalvin** DV10 ICV GRE **Vitilevure** Quartz	**Cross Evolution** **Enoferm** M1 **Lalvin** 71B BA11 ICV D47 ICV Opale R2 Rhône 4600 **Level² TD** **Vitilevure** Elixir	**Cross Evolution** **Lalvin** BA11 BM 4x4 ICV D47 ICV GRE ICV Opale Rhône 4600 **Level² TD** **Vitilevure** 58W3

Pinot noir

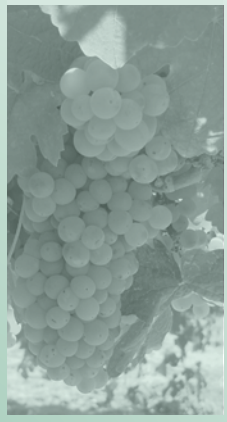
Red Fruit	Jam	Spice	Color Stability
Enoferm AMH BGY RP15 **Lalvin** ICV D21 RA17 RC212 W15 **Levuline** BRG **Vitilevure** 3001	**Lalvin** BM45 BM 4x4 BRL97	**Enoferm** AMH RP15 **Levuline** BRG	**Enoferm** AMH BGY RP15 **Lalvin** BM45 BM 4x4 RC212 BRL97 **Levuline** BRG

Riesling

Floral	Citrus	Tropical Fruit	Apple	Rose, Peach
Cross Evolution **Enoferm** M2 **Lalvin** BA11 DV10 W15 **Level² TD** **Uvaferm** GHM **Vitilevure** 58W3 Quartz	**Enoferm** M2 **Lalvin** QA23 W15 **Uvaferm** SVG	**Cross Evolution** **Enoferm** Simi White **Lalvin** 71B ICV GRE ICV Opale BA11 R2 **Level² TD** **Vitilevure** Elixir	**Lalvin** DV10 ICV D47 **Vitilevure** Quartz	**Enoferm** T306 **Lalvin** ICV D47 R-HST **Uvaferm** GHM

GRAPE AND YEAST PAIRINGS

Roussanne



Mineral	Spice	Citrus Zest	Floral	Volume
Lalvin ICV D254 W15 **Uvaferm** SVG	**Lalvin** ICV D47 ICV D254 W15 **Uvaferm** SVG **Vitilevure** 58W3	**Cross Evolution** **Enoferm** M2 **Lalvin** ICV D21 ICV Opale QA23 R-HST W15 **Uvaferm** SVG **Vitilevure** Elixir	**Cross Evolution** **Enoferm** M2 **Lalvin** BA11 ICV D21 V1116 (K1) W15 **Level² TD** **Vitilevure** 58W3	**Cross Evolution** **Lalvin** BA11 BM 4x4 ICV D47 ICV D254 ICV GRE ICV Opale **Level² TD**

Sangiovese

Berry	Plum	Floral	Color Stability	Tannin Intensity	Mid-Palate Enhancement
Enoferm AMH CSM Syrah **Lalvin** Clos ICV D21 ICV GRE Rhône 2056 Rhône 2226 **Uvaferm** 43 BDX VRB **Vitilevure** MT	**Enoferm** Syrah **Lalvin** BM45 BM 4x4 ICV D254 T73 **Uvaferm** VRB	**Enoferm** Syrah **Lalvin** ICV D80 **Vitilevure** MT	**Lalvin** BM45 BM 4x4 BRL97 Clos ICV D21 **Uvaferm** 43 BDX VRB **Vitilevure** MT	**Lalvin** Clos ICV D21 ICV D80 ICV D254 Rhône 2226 **Uvaferm** 43 **Vitilevure** MT	**Enoferm** CSM **Lalvin** BM45 BM 4x4 Clos ICV D21 ICV D254 **Uvaferm** VRB **Vitilevure** MT

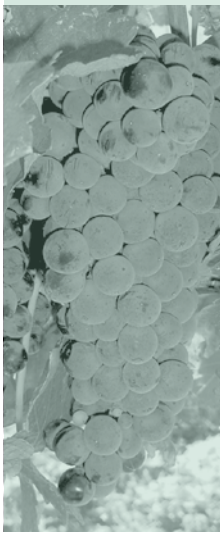
Sauvignon blanc

Citrus	Pear/Melon	Tropical Fruit/ Passionfruit	Grassy/ Asparagus	Rich Mouthfeel
Cross Evolution **Enoferm** M2 **Lalvin** BA11 ICV D47 ICV Opale QA23 **Uvaferm** SVG **Vitilevure** Elixir	**Lalvin** BA11 ICV GRE	**Cross Evolution** **Lalvin** R2 Rhône 2056 **Level² TD** **Vitilevure** Elixir	**Enoferm** M1 **Lalvin** DV10 V1116 (K1) **Vitilevure** Quartz	**Cross Evolution** **Lalvin** BA11 BM 4x4 ICV D47 ICV D254 ICV Opale **Level² TD**

GRAPE AND YEAST PAIRINGS

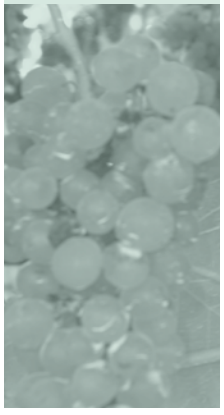
Syrah

Fruit	Spice	Violet	Structural Enhancement	Color Stability
Enoferm M2 RP15 Syrah **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D21 ICV D254 ICV GRE **Uvaferm** VRB	**Enoferm** RP15 **Lalvin** ICV D80 ICV D254 ICV GRE Rhône 2056	**Enoferm** Syrah **Lalvin** ICV GRE	**Enoferm** M2 RP15 **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D80 ICV D254 **Uvaferm** VRB	**Enoferm** M2 RP15 **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D21 ICV D254 ICV D80 **Uvaferm** VRB



Tempranillo

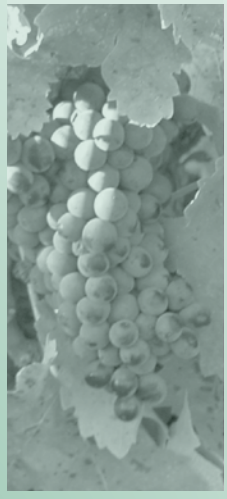
Berry	Plum	Floral	Tannin Intensity	Mid-Palate Enhancement
Enoferm CSM RP15 Syrah **Lalvin** Clos ICV D21 ICV GRE Rhône 2056 Rhône 2226 **Uvaferm** BDX VRB **Vitilevure** MT	**Enoferm** Syrah **Lalvin** BM45 BM 4X4 ICV D254 T73 **Uvaferm** VRB	**Enoferm** Syrah **Lalvin** ICV D80 **Vitilevure** MT	**Lalvin** Clos ICV D21 ICV D80 ICV D254 Rhône 2226 **Uvaferm** 43 BDX	**Enoferm** CSM RP15 **Lalvin** BM45 BM 4x4 Clos ICV D21 ICV D254 **Uvaferm** VRB **Vitilevure** MT



Viognier

Floral	Stone Fruit	Spice	Tropical Fruit	Rich Mouthfeel
Cross Evolution **Lalvin** BA11 DV10 QA23 R2 **Level² TD** **Vitilevure** 58W3 Quartz	**Lalvin** BA11 ICV D47 ICV D254 Rhône 4600	**Lalvin** ICV D47 ICV D254 W15 **Vitilevure** 58W3	**Cross Evolution** **Enoferm** T306 **Lalvin** 71B BA11 ICV GRE ICV Opale QA23 R2 **Level² TD** **Vitilevure** Elixir	**Cross Evolution** **Lalvin** BA11 BM 4x4 ICV D47 ICV GRE ICV Opale Rhône 4600 **Level² TD**

Zinfandel



Berry	Jam	Mineral	Black Pepper	Spice	Plum	High Alcohol
Enoferm AMH RP15 Syrah **Lalvin** BM45 BM 4x4 BRL97 Clos ICV D21 ICV D254 **Uvaferm** BDX VRB	**Lalvin** BM45 BM 4x4 Rhône 2226 T73 **Uvaferm** VRB	**Enoferm** AMH RP15 **Lalvin** Clos ICV D80	**Lalvin** ICV D80 Rhône 2226	**Enoferm** AMH RP15 **Lalvin** BM45 BM 4x4 BRL97 ICV D80 Rhône 2226	**Enoferm** Syrah **Lalvin** BM45 BM 4x4 ICV D254 T73 **Uvaferm** VRB	**Enoferm** RP15 **Lalvin** Clos Rhône 2226 **Uvaferm** 43 VRB

LEVEL^2™

After years of R&D, Lallemand is proud to produce two non – *Saccharomyces* yeast strains – *Metschnikowia pulcherrima* and *Torulaspora delbrueckii* – for use in sequential inoculation with a paired *Saccharomyces cerevisiae* strain. The sensory contribution of the non-conventional yeast in conjunction with the security of the *S. cerevisiae* enable winemakers to impact the sensory qualities and complexity of their wine while ensuring a reliable and complete fermentation.

Level² TD®

For aromatic intensity, complexity and mouthfeel in wines

Level² TD® is an innovative kit with two compatible yeasts *(Torulaspora delbrueckii* and a *Saccharomyces cerevisiae*) utilized in sequential inoculation. Extremely low volatile acidity production when utilized in late-harvest and ice wines.

NEW... BIODIVA™ *Torulaspora delbrueckii**

Enhance aromatic complexity and mouthfeel

Originally released in kit form as Level² TD™ for white wines, Lallemand has relaunched this yeast as a single product – BIODIVA™. Now winemakers can select *Torulaspora delbrueckii* and pair it with the appropriate *Saccharomyces cerevisiae* strain for both red and white wines. Enhance varietal and fermentation ester characters while contributing to mouthfeel and an overall increase in aromatic complexity. Suggested varieties include Chardonnay, Sémillon, Syrah and Pinot Noir.

*See a Lallemand representative to discuss a suitably paired *Saccharomyces cerevisiae* yeast.

NEW... FLAVIA™ *Metschnikowia pulcherrima**

Overexpress aromatic terpenes and volatile thiols.

FLAVIA™ is a pure culture of *Metschnikowia pulcherrima* selected from nature by the Universidad de Santiago de Chile (USACH) for its specific capacity to release enzymes with – arabinofuranosidase activity. When used in sequential inoculation with a compatible selected *Saccharomyces cerevisiae* yeast strain, FLAVIA™ will impact the production of such varietal aromas as terpenes and volatile thiols. Under certain conditions, *M. pulcherrima* does not show fermentative activity. However, the enzymatic activity of *M. pulcherrima* gives the desired outcomes. Best results are achieved when FLAVIA™ is sequentially inoculated with a *S. cerevisiae* strain that is a high terpene/thiol releaser/converter. Suggested varieties include Riesling, Sauvignon Blanc and Colombard.

*See a Lallemand representative to discuss a suitably paired *Saccharomyces cerevisiae*.

NO BRETT INSIDE®

RESPECT THE TRUE CHARACTER OF YOUR WINE

A New Tool to Fight against *Brettanomyces* and Preserve the Aromatic Qualities of Wines

Brettanomyces bruxellensis are a threat to wine quality. These yeasts are capable of developing in difficult media (high alcohol, nutrient deficient and high SO_2), at all stages of vinification, and are responsible for the production of undesirable aromatic compounds: volatile phenols (4-ethyl phenol, 4-ethyl guaiacol, and 4-ethyl catechol). These compounds give rise to the perception of disagreeable "animal-like" notes (leather, stable and barnyard) or pharmaceutical notes (Band-Aid® and medicinal).

At low population levels (1 to 1000 CFU/mL), *Brettanomyces* constitute a threat, as they can produce these volatile phenols at any moment. Even when the concentrations of these phenols are weak or below perception thresholds, they can mask the wine's varietal expression and intensity. In many regions, the volume of wine affected by *Brettanomyces* is significant.

Currently, different preventive means are implemented to fight against *Brettanomyces*:

- Good management of SO_2 related to wine pH
- Optimized alcoholic and malolactic fermentations
- Lees management
- Barrel hygiene and storage

But these means are not always effective. No Brett Inside® represents an innovative and efficient tool for *Brettanomyces* control.

ORIGIN

No Brett Inside® is a natural polysaccharide extracted from a **fungal source of chitin** (*Aspergillus niger*).

ACTION

No Brett Inside® interacts to disrupt the *Brettanomyces* cell membrane causing elimination from the wine.

RESULTS

- Scientific studies have shown the effectiveness of No Brett Inside® against *Brettanomyces*.
- Winery trials have validated the effectiveness of treatment with No Brett Inside® on *Brettanomyces* in large volumes.
- There is almost no significant difference between control and No Brett Inside® treated wines, and when there is one, the preference is the treated wine.

BIODEGRADABLE

Once in contact with soil, chitosan is digested by micro-organisms that transform it into soluble metabolites. It is non-toxic for ecosystems.

NON-ALLERGENIC

Numerous chitosan applications are referenced in the fields of agriculture, food, cosmetics and medicine. The fungal origin of No Brett Inside® available for enological application ensures that it is completely non-allergenic.

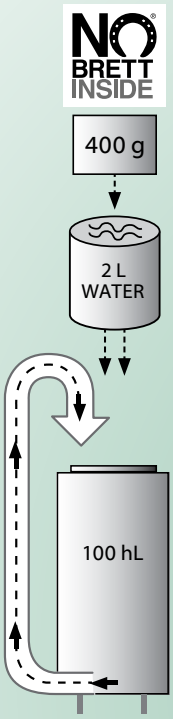
LEGISLATION

- Accepted as a new practice by enological codex in July 2009 by the OIV (Organisation Internationale de la Vigne et du Vin),
- Allowed by the European Union in December 2010, FDA GRAS Notice No. 000397.
- TTB letterhead approval required.

NO BRETT INSIDE®

RESPECT THE TRUE CHARACTER
OF YOUR WINE.

No Brett Inside® is easy to use



Recommended dosage: 4 g/hL

- No Brett Inside® is insoluble and must be suspended in water or wine before adding to the wine at a dose of 4 g/hL
- Introduce No Brett Inside® into wine at the top of the tank and mix thoroughly into the whole volume of the tank.
- After 10 days of contact time, the treated wine should be racked and separated from the lees.

The optimum application time is after malolactic fermentation

For earlier applications, contact your Lallemand representative.

Packaging

- No Brett Inside® comes in the form of a fine, light-colored beige powder.
- 100 g packs.
- Store in a cool and dry place.

Don't Bet on the Wrong Horse!

No Brett Inside® – chitosan of fungal origin for the elimination of *Brettanomyces* in wines.

Malolactic Bacteria Selected from Nature

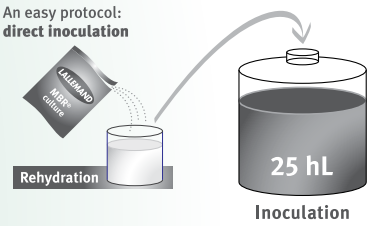
Lallemand offers two popular formats of freeze-dried bacteria cultures.

MBR®

The MBR® form of malolactic bacteria represents a Lallemand acclimatization process that subjects the bacteria cells to various biophysical stresses, making them better able to withstand the rigors of direct addition to wine. The conditioned MBR® bacteria that survive are robust and possess the ability to conduct reliable malolactic fermentation (MLF), even under difficult wine conditions.

Easy rehydration and inoculation protocol for MBR® bacteria cultures

MBR® process
direct inoculation



1-Step®

The 1-Step® starter kit contains one of our popular MBR® bacteria and an activator mix that require a short acclimatization protocol to "wake-up" the bacteria and activate their metabolism. Unlike the MBR® cultures, the 1-Step® cultures are not preconditioned at our Lallemand bacteria facility and therefore require a simple rehydration/activation step 24 hours before they can be inoculated into the wine.
Four popular MBR® bacteria – Enoferm ALPHA™, Enoferm Beta™, Lalvin VP41® and PN4™ – are now available as 1-Step® starter kit cultures. The 1-Step® cultures perform as well as or better than MBR® cultures, especially under more challenging MLF conditions, and they are recommended for restarting stuck MLF. Refer to pages 46 and 47 for more information.

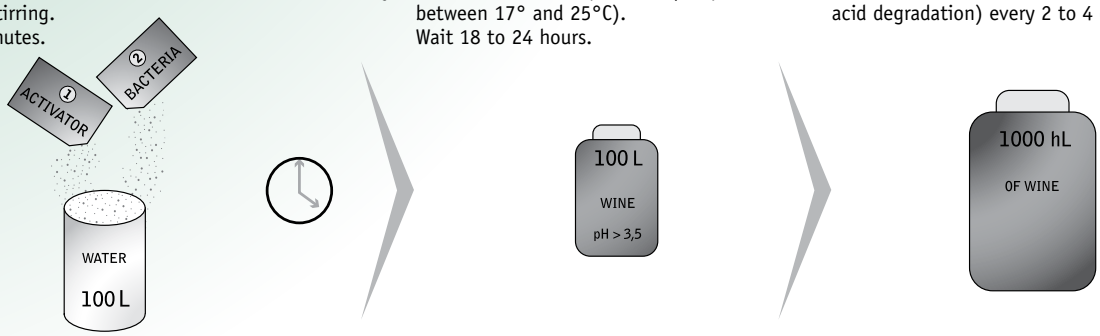
Easy rehydration and inoculation protocol for 1-Step bacteria culture

1-STEP®
MALOLACTIC FERMENTATION UNDER CONTROL

Mix and dissolve content of activator sachet in 100 L of drinking water (temperature between 18° and 25°C).
Add content of the bacteria sachet and dissolve carefully by gentle stirring.
Wait 20 minutes.

Mix the 1-Step® preparation (activator and bacteria dissolved in 100 L of drinking water) with 100 L of wine, pH > 3,5 (temperature between 17° and 25°C).
Wait 18 to 24 hours.

Transfer the preculture to 1000 hL of wine.
Maintain temperature between 18° and 22°C.
Check malolactic fermentation activity (malic acid degradation) every 2 to 4 days.



MBR® and 1-Step *Oenococcus oeni* Cultures

Enoferm ALPHA™

Structure and fruit, adapted to high alcohol wines

Enoferm ALPHA™ was selected by the Institut Francais de la Vigne et du Vin (IFV) from spontaneous malolactic fermentations showing good fermentation activity and sensory contribution. ALPHA™ is a dominant strain and has the capacity to achieve reliable MLF, even showing good resistance to botrycides. Contrary to spontaneous MLF, the contribution of ALPHA™ to white wine is usually described as enhancing the mouthfeel, while respecting the wine's varietal character. The lower perception of green and vegetative flavors is the result of the very positive impact of ALPHA™ on wine complexity.

Enoferm BETA™

For co-inoculation

Enoferm BETA™ was isolated in Italy and is best used to enhance tannin structure and red berry varietal character in reds. The name "Beta" comes from its capacity to increase levels of beta-damascenone and beta-ionone, which contribute floral notes, especially in Merlot. The strain is pH tolerant to 3.2, SO_2 tolerant to 60 ppm, temperature tolerant to 14°C (57°F) and alcohol tolerant to 14.5%. BETA™ benefits from the addition of a malolactic nutrient, such as Acti-ML™. Refer to page 27 for co-inoculation in whites.

Lalvin 31®

For cool climate, adapted to low pH and low temperature wines

Lalvin 31® (MBR®) was selected by the Institut Francais de la Vigne et du Vin (IFV), and performs well under such stressful conditions as low pH (>3.1) or low temperature (>14°C/57°F). Final color intensity depends on the duration of malolactic fermentation (MLF). By being able to carry out MLF at low temperature, Lalvin 31® gives the winemaker control to obtain wine with higher color intensity and stability; Lalvin 31® is noted for its good sensory balance in Pinot noir and white wines, and for low production of biogenic amines; Lalvin 31® benefits from the addition of a malolactic nutrient such as Opti'Malo PLUS™. Available only in MBR form.

Lalvin Elios 1®

For spice contribution and integration of highly ripened fruit

Lalvin Elios 1® was isolated by the Institut Coopératif du Vin (ICV) in Montpellier, France, from spontaneous malolactic fermentations showing very good fermentation performance, as well as positive sensory profiles. The ICV evaluated and compared Lalvin Elios 1® to several other *Oenococcus oeni* isolates over several years in their research winery and pilot plant. Lalvin Elios 1® consistently demonstrated good fermentation kinetics under such difficult MLF conditions as high alcohol (15.5%). This malolactic bacteria culture enhances the perception of overall tannin intensity, while avoiding green and vegetative character development. Available only in MBR form.

Lalvin VP41®

Supports red berry fruit and very low diacetyl production

Lalvin VP41® was isolated in Italy during an extensive European Union collaboration to research natural *Oenococcus oeni* strains. Numerous wineries and enological institutes participated in this four-year effort to isolate, study and select malolactic bacteria with unique winemaking properties. The positive mouthfeel contribution of Lalvin VP41® stood out in tastings when compared to other ML bacteria strains. In temperatures below 16°C (61°F), Lalvin VP41® is a slow starter, but will complete fermentation. The very good implantation, high alcohol and SO_2 tolerance, plus the steady fermentation kinetics of Lalvin VP41®, make it a very reliable malolactic fermentation culture to use when a significant impact on wine structure is desired.

PN4™

The Rocket, supports tannin structure

The PN4™ bacteria was isolated from a spontaneous malolactic fermentation in a Pinot noir by the Institute of San Michele in Trentino, Italy. This bacteria demonstrates its capacity to achieve malolactic fermentation for red and white wines in difficult conditions of pH, alcohol and SO_2. Microvinification testing of the PN4™ on a laboratory scale has been confirmed at more than 30 Trentino wineries. The PN4™ bacteria is well suited for spicy and structured Pinot noir wines, and may also be used to carry out malolactic fermentation in Chardonnay.

Malolactic Bacteria Nutrients

Acti-ML™

The nutrient for malolactic bacteria rehydration

Acti-ML™ was developed by the Lallemand bacteria R&D team led by Dr. Sibylle Krieger. For MLF in difficult wines, add Acti-ML™ to the bacteria culture's rehydration water. Acti-ML™ is a specific blend of inactive yeasts rich in amino acids, mineral cofactors and vitamins. These inactive yeasts are mixed with cellulose to provide more surface area to help keep bacteria in suspension.

Dosage recommendation: Dissolve 20 g of Acti-ML™ in 200 mL of 25°C (77°F) clean water then add 1 g of bacteria. Wait 15 minutes and add the suspension to 100 L of wine.

Opti'Malo PLUS™

The nutrient for malolactic fermentation

Opti'Malo PLUS™ was formulated to help support MLF in difficult wines. Add Opti'Malo PLUS™ directly to the wine before inoculating with the malolactic bacteria culture. Do not use Opti'Malo PLUS™ during bacteria rehydration. Opti'Malo PLUS™ is a unique blend of specific inactive yeasts rich in amino acids, mineral cofactors, vitamins and polysaccharides. These inactive yeasts provide more surface area to help keep bacteria in suspension, and to help absorb potential malolactic bacteria inhibitors.

Dosage recommendation: Add 20 g/hL (1.6 lb/1000 gal) Opti'Malo PLUS™ to a small amount of water or wine and then add directly to the wine anytime from 48 hours prior to or up until the same time as the malolactic bacteria culture addition.

NEW...

ML RED BOOST™

ML RED BOOST MLF nutrient for high maturity red wines

ML RED BOOST™ is a malolactic fermentation nutrient specifically formulated from inactivated yeast fractions for the application of conducting MLF in challenging red wines with high maturity Malbec, Merlot, Syrah or Zinfandel wines. ML RED BOOST™was developed by Lallemand after investigating lactic acid bacteria's specific nutritional requirements as well as the role of specific yeasts fractions that improved the resistance of wine bacteria against the inhibitory effects of high polyphenolic contents in red wines. The bioavailability of certain peptides strongly favor the growth of Lallemand selected wine bacteria and the quality of specific polysaccharides included in ML RED BOOST™ are particularly effective in reducing the MLF duration especially under challenging red wine environments.

Dosage recommendation: Add 20g/hL (1.6 lb/1000gal) calculated on final wine volume to a small amount of water or wine and then add directly to the wine, 24 hours before the addition of bacteria.

NEW...

Opti'ML Blanc™

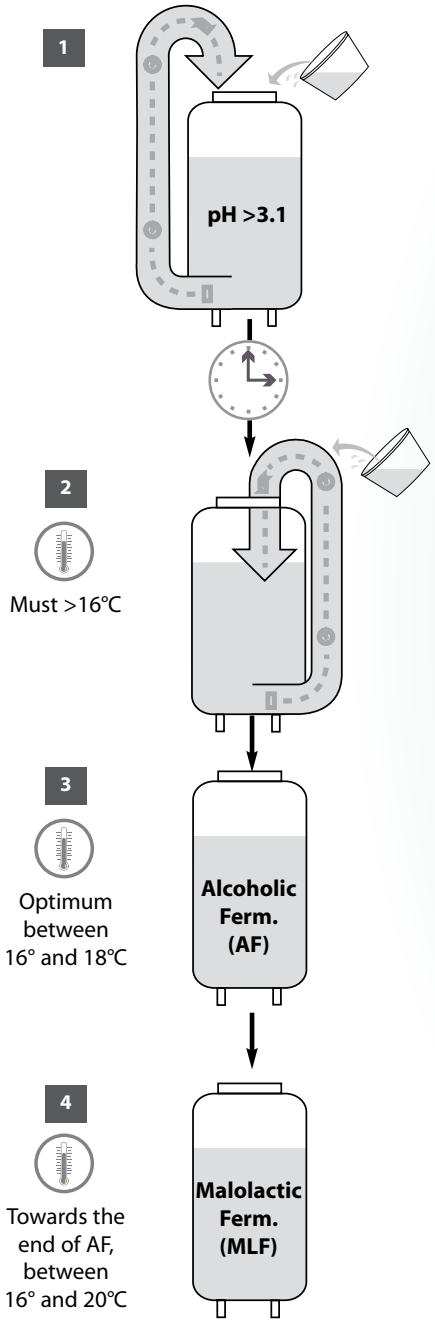
Opti'ML Blanc™ MLF Nutrient for white wines

Opti'ML Blanc™ is a malolactic fermentation nutrient specifically formulated from inactivated yeast fractions for the application of conducting MLF in challenging white wines. Opti'ML Blanc™ was developed by Lallemand after intensive investigations into lactic acid bacteria's specific nutritional requirements. The bioavailability of certain peptides strongly favor the growth of Lallemand selected wine bacteria and are particularly effective in reducing the MLF duration especially under more difficult white winemaking conditions.

Dosage recommendation: Add 20g/hL (1.6 lb/1000gal) calculated on final wine volume to a small amount of water or wine and then add directly to the wine.

PROPER CO-INOCULATION OF YEAST AND BACTERIA

Co-inoculation for White Wines



- Selected, rehydrated and protected yeast.*
- Choose a yeast with low nitrogen requirements adapted to the style of wine desired.
- Bacteria addition timing depends on SO_2 added:
  - <50 ppm of SO_2 added: wait 24 hours
  - 50 to 80 ppm of SO_2 added: wait 48 hours
  - >80 ppm of SO_2 added: wait 72 hours

  Note: If measuring free SO_2 24 hours after addition, at pH >3.3, the free SO_2 should be <25 ppm and <10 ppm when pH is below 3.3 pH.

- Selected rehydrated MBR® malolactic bacteria (1 g/hL of must).
- Choose a strain adapted to the conditions (pH, SO_2 and alcohol) and to the style of wine desired.
- Avoiding excessive air, stir bacteria into must until evenly mixed, based on the SO_2/bacteria addition timing above.

- Complex yeast nutrition one third of the way through AF (see page 40).
- Regular monitoring of temperature, malic acid and volatile acidity.
- Top off tank after AF.

- When MLF finishes during AF, monitor volatile acidity. If there is a 0.1 g/L increase per day, add 20 ppm SO_2 or use lysozyme.
- When MLF finishes after AF, rack and stabilize the wine after MLF.

*For yeast rehydration and protection, please refer to Proper Yeast Rehydration on page 31.

Co-inoculation for Red Wines

Same procedure as above except different temperatures in Steps 3 and 4. Step 3 normal red must starting temperature at the beginning of AF is 16° to 25°C, and once the alcohol level reaches 10% keep it below 25°C. Step 4 optimum temperature to finish MLF post-AF is 18° to 22°C.

SPECIFIC INACTIVATED YEASTS

Building Smooth and Balanced Wines

Lallemand's researchers have propelled us into exciting territory. One example is the development of a range of specific inactivated yeast products harvested from selected natural yeasts at the end of their growth phase, when their polysaccharides are more reactive than those released during autolysis. There are also other inactivated yeast components, such as peptides, that have winemaking applications. These specific inactivated yeasts provide a minor supply of nutrients, but do not replace the regular nutrition program integrating juice parameters and the nutritional needs of yeast.

Booster Blanc®

Increase smooth mid-palate intensity and fresh fruit in whites

Booster Blanc® is made from the inactivated yeast cells of a yeast that was isolated and selected by the ICV. It is produced with an inactivation process exclusive to Lallemand that makes the soluble fractions of the yeast cell walls rapidly available in the must. When added to the juice, Booster Blanc® participates in the colloidal balance of the wine, boosting the smooth mid-palate intensity and protecting the fresh fruit aromas of white and rosé wines. Interaction between the aroma compounds and the inactivated yeast macromolecules from Booster Blanc® smoothes the wine and limits aggressive ethereal, chemical and burning perceptions, particularly in wines made from botrytized grapes.

For high-end white or rosé wines from ripe grapes, Booster Blanc® helps develop intense and balanced aromas mid-palate, making it a good sensory complement for wines fermented with Lalvin ICV D47™ and Lalvin ICV D21™. Booster Blanc® may also be added towards the end of fermentation to add smooth mid-palate intensity and decrease perception of woody aromas, such as sap/sawdust, in wines aging in new barrels.

Dosage recommendations: Add Booster Blanc® to the juice at 20-40 g/hL (1.6-3.2 lb/1000 gal) for a smoother mid-palate and aromatic freshness. Add Booster Blanc® towards the end of fermentation at 20-30 g/hL (1.6-2.4 lb/1000 gal) for a smoother mid-palate intensity contribution and overall balance.

Booster Rouge®

For higher and smoother tannin intensity in red wines

Booster Rouge® originates from a specific natural wine yeast isolated and selected by the ICV. The yeast macromolecules in Booster Rouge® interact with red wine polyphenols resulting in a positive influence on the colloidal balance of the wine. Especially when used in red must sourced from hot climates, Booster Rouge® wines are perceived as having higher fore-mouth volume and smoother mid-palate tannic intensity, as well as fresher aromatic sensations.

Booster Rouge® compliments short maceration premium reds fermented with Lalvin ICV GRE™ for smooth mid-palate intensity and fresh varietal aromas, while avoiding sensations of aggressive and drying tannins. In ultra-premium reds from balanced ripe mature grapes, Booster Rouge® shows good synergy with Lalvin ICV D80® and Lalvin ICV D21™ for enhancing licorice aromas and smooth mid-palate intensity. Booster Rouge® may also be added towards the end of fermentation to contribute fore-mouth volume, smoother mid-palate tannin intensity and help with alcohol integration.

Dosage recommendation: Add Booster Rouge® to the must at 227 g/ton (0.5 lb/ton) or 30 g/hL (2.4 lb/1000 gal) towards the end of fermentation.

SPECIFIC INACTIVATED YEASTS

OMRI listed

NOBLESSE™

For smooth and balanced wines

The inactivated yeast cells of a popular ICV selected yeast are now available for sulfur compound prevention during fermentation and aging. NOBLESSE™ smoothes and stabilizes the wine's colloidal balance, resulting in:

- Increased perception of ripe fruit
- More intense structure, initial volume and smooth finish
- Decreased perception of "sawdust/sap" in wines aged in new barrels
- Decreased perception of harsh, chemical and burning sensations
- Stimulation of malolactic fermentation.

Dosage recommendation: Add 20-30 g/hL of NOBLESSE™ to the must, or toward the end of fermentation.

OMRI listed

Opti-Red®

For rounded and smooth tannin red wines

Opti-Red® is a unique natural yeast preparation that undergoes a specific refining process resulting in a high level of polyphenol-reactive yeast cell wall polysaccharides. Opti-Red® is used at the beginning of red wine fermentations to obtain fuller bodied, more color stable, smooth palate wines.

Using Opti-Red® in the must provides early polysaccharide availability for the complexing with polyphenols as soon as they are released and diffused. This early complexing results in smoother red wines with more stable color, rounder mouthfeel and better harsh or green tannin integration. Opti-Red® can be used alone or in conjunction with enological macerating enzymes such as Lallzyme EX™. Using Opti-Red® towards the end of fermentation allows the winemaker to shape harsh polyphenols into smoother more approachable tannins.

Dosage recommendation: Add Opti-Red® to the must at 227 g/ton (0.5 lb/ton) or 30 g/hL (2.4 lb/1000 gal) towards the end of fermentation.

NEW...

OptiMUM-White™

For aromatic intensity and longevity in white and rosé wines

OptiMUM-White™ is a new specific inactive yeast rich in glutathione (antioxidant properties) and polysaccharides. OptiMUM-White™ benefits from a new optimized production process that enhances the glutathione bioavailability. It has to be added at the earliest stage of alcoholic fermentation (after settling) in order to prevent the must from oxidation. This new biotechnological tool favors aromas intensity and longevity.

Dosage recommendation: 20-40 g/hL added to the juice post settling.

OMRI listed

OMRI listed

Opti-White®

For rounded and smooth white wines

Opti-White® is a specific inactivated yeast with high antioxidant properties. Its application in white wines is patent pending. Using Opti-White® on the juice at the beginning of fermentation results in smoothness and greater aromatic complexity in white wines. As its unique properties protect against oxidation of phenols and aromas, Opti-White® contributes to better color preservation and the aromatic freshness of white wines. Yeast cell wall components from Opti-White® will be solubilized during fermentation and aging. These polysaccharides will have a very positive impact, bringing more roundness and smoothness to the wine. Their action will enhance the benefits of autolysis following alcoholic fermentation.

Dosage recommendations: Add Opti-White® to the juice at 30-50 g/hL (2.4-4 lb/1000 gal) for smoothness, antioxidative color protection and aromatic freshness. Add Opti-White® towards the end of fermentation at 20-30 g/hL (1.6-2.4 lb/1000 gal) for smoothness and better integration of wood and alcohol.

Note: OMRI listed means this product complies with the *OMRI Standards Manual* and the *OMRI Policy Manual*, which are based on the requirements of the USDA National Organic Program Rule (7 CFR Part 205).

SPECIFIC INACTIVATED YEASTS

OMRI listed

NEW...

REDULESS™

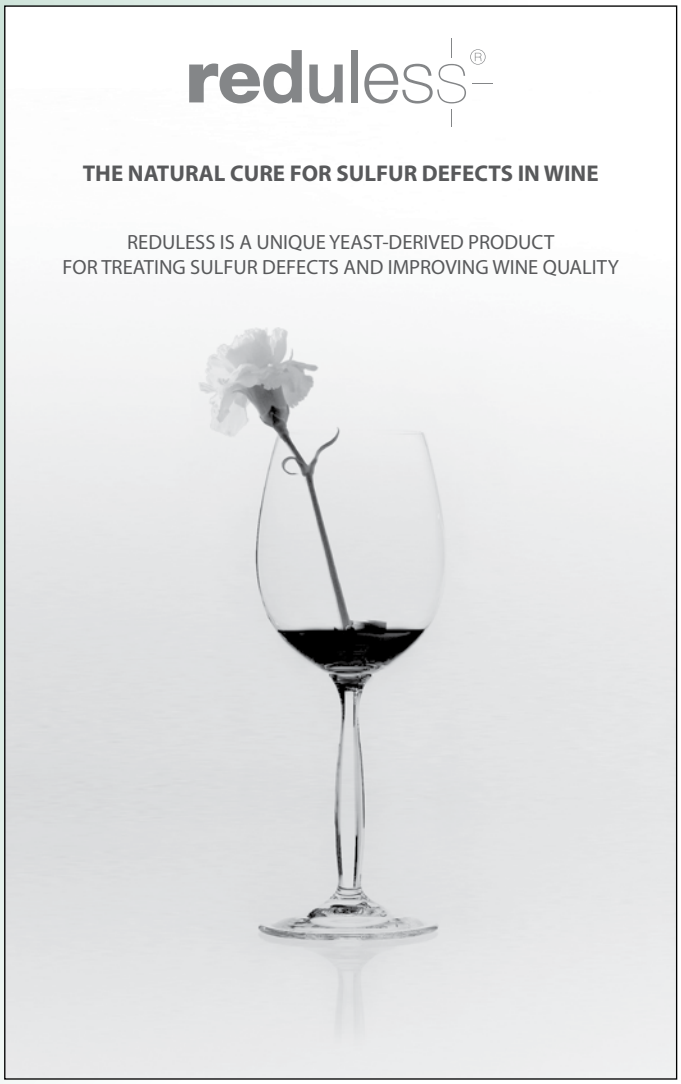
Sulfur defect management

REDULESS™ is a unique-yeast derived product formulated to reduce sulfur off-aromas and improve the overall wine quality. Sulfur off-aromas are common defects that are sometimes very difficult to remove or mask in wine, and can be the result of biological and non-biological factors that diminish the fruit and contribute to aggressive flavor sensations.

REDULESS™ has been developed for red and white wine treatment to:

- Reduce H_2S, DMS, DES and other sulfur-related defects in wine
- Increase overall quality of the wines (more balance, fewer phenol-related off-flavors).

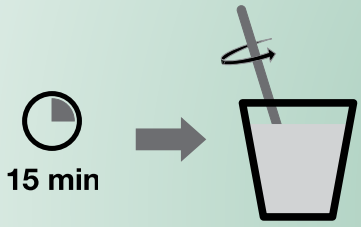
Dosage recommendation: Add 1 to 30 g/hL, depending on the severity of the sulfur like compounds in the wine.



Four Easy Steps for Rehydrating Yeast and Inoculating Must

1. Suspend 2.4 lb/1000 gal (30 g/hL) of Go-Ferm® or GO-FERM PROTECT EVOLUTION® in 20 times its weight of clean 110°F (43°C) water. *IMPORTANT: If not using Go-Ferm® or GO-FERM PROTECT EVOLUTION®, water temperature should be 95°-104°F (35°-40°C) to avoid damaging the yeast.*

2. Once the temperature of the Go-Ferm® or GO-FERM PROTECT EVOLUTION® solution has dropped to 104°F (40°C), add 2 lb/1000 gal (25 g/hL) of active dried yeast. Stir gently to break up any clumps. Let suspension stand for 15 to 30 minutes, then stir gently again.



Note: Foam is not an indicator of yeast viability.

3. Slowly (5 minutes) combine an equal amount of must to be fermented with the yeast suspension. This will help the yeast adjust to cool temperature must and avoid cold shock caused by a rapid temperature drop exceeding 18°F (10°C). This atemperation may need repeating in a very low temperature must.

4. Add the yeast slurry to the bottom of the fermentation vessel just as you begin filling the vessel with must.

GO FERM PROTECT evolution

GO FERM LALLEMAND

ENZYMES

Lallemand offers winemakers a complete range of high-quality enzymes to meet winemaking needs and international quality requirements. Lallemand's expertise in winemaking applications focuses on a tailor-made approach that involves:

- Investigating winemakers' needs throughout our worldwide network
- In-depth analysis in our enzymology laboratory of all available raw material enzymes
- Elaborate testing of experimental products at technical institutes and wineries throughout the world
- Developing new products for specific winemaking applications.

Lallzyme™ microbial-origin enzymes are utilized in winemaking for:

- Clarifying musts and wines
- Macerating grapes
- Increasing the filterability of musts and wines
- Releasing flavor components
- Macerating yeast.

In addition to these applications, lysozyme – sourced from egg whites – is approved for lactic acid bacteria management in winemaking.

Lallzyme BETA™

Aroma-releasing enzyme

Lallzyme BETA™ is formulated for use in white wine varieties high in "bound" terpenols, such as Gewürztraminer and Muscat. Lallzyme BETA™ is a blend of pectinases with beta-glucosidase, rhamnosidase, apiosidase and arabinofuranosidase. The sequential actions of these activities cleave aroma precursors and enhance the varietal character in aromatic wines. Lallzyme BETA™ has been formulated to act in a gentle way so it will not lead to an over-expression of aromas.

Lallzyme C™

Clarifying enzyme for whites

Lallzyme C™ is an enzyme formulated for clarification of white juice or wine. It has a low cinnamyl esterase activity to help protect against the formation of undesirable vinyl phenols. Lallzyme C™ contains the three main pectinase activities (polygalacturonase, pectin esterase and pectin lyase) specifically proportioned to provide rapid clarification and settling.

Lallzyme C-MAX™

Clarifying enzyme for extreme conditions

Lallzyme C-MAX™ is a cinnamyl esterase-free pectinase blend designed for fast and complete depectinization of juices in extreme conditions, such as high pectin content, low temperature or low pH.

Lallzyme CUVÉE BLANC™

White grape skin-contact macerating enzyme

Lallzyme CUVÉE BLANC™ was developed by Lallemand for use on white grapes during skin-contact maceration in order to obtain high quality white wines, rich in taste with intense mouthfeel, good structure and enhanced aromatic complexity.

Lallzyme CUVÉE BLANC™ is a very specific blend of pectinases concentrated in complementary glycosidase activities. It is low in macerating activities (cellulases, hemicellulases), and therefore provides gentle juice extraction and fast clarification after pressing. Lallzyme CUVÉE BLANC™ has been used with success in different wine regions around the world, particularly for Sauvignon blanc, Chardonnay and Semillon.

NEW...

Cuvée Rouge™

Red grape cold soak macerating enzyme

Cuvée Rouge™ is a new enzymatic preparation presenting an optimal balance of pectinases and other side activities for prefermentative maceration in red-winemaking. It enhances the extraction of aromatic precursors and polysaccharides from the grape-berry skins. It has to be added at the very beginning of maceration (ex: cold-soak) for an optimal extraction of varietal aromatic compounds. This is a new tool for the elaboration of red fruit oriented premium wines.

Lallzyme EX™

Macerating enzyme for early-release red wines

Lallzyme EX™ is specially formulated to improve color stability and enhance mouthfeel in red wines. In addition to well-balanced pectinases, Lallzyme EX™ contains key activities involved in the controlled release of polyphenols, such as galactanase (a member of the hemicellulase family) and endo-cellulase. Both of these activities aid the pectinase action on the grape cell wall and allow a progressive liberation of polyphenols and tannin-bound polysaccharides. Lallzyme EX™ has been formulated to provide a gentle maceration, making it useful on all grape varieties, even when full phenolic maturity has not been reached.

Lallzyme EX-V™

Macerating enzyme for red wines destined for aging

Due to its specific action on both grape cell walls and cell membranes, Lallzyme EX-V™ increases the extraction of intracellular polyphenolic content from red grapes, resulting in wines destined for long aging. Lallzyme EX-V™ allows for a complete and rapid release of anthocyanins and a more efficient release of tannins leading to stable anthocyanin-tannin bonding. The end result of this bonding is a more structured wine with deep, stable color. Aromatic profile analysis indicates Lallzyme EX-V™ has a great impact on the release of aromatic compounds, while respecting the varietal characteristics of the grape.

Lallzyme LYSO-EASY™

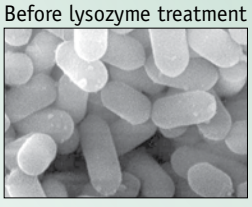
Ready-to-use solution of lysozyme

Lallzyme LYSO-EASY™ is a purified natural enzyme preparation extracted from egg whites and is specific for inhibiting Gram-positive bacteria. Lallzyme LYSO-EASY™ is a very efficient lysozyme solution (22% solution, no preservatives, stable at room temperature for 18 months or longer when refrigerated) that can be added directly to the must, juice or wine. It works by lysing the protective outer membrane of Gram-positive bacteria (see Fig. 1). It does not inhibit yeast or Gram-negative bacteria, such as Acetobacter.

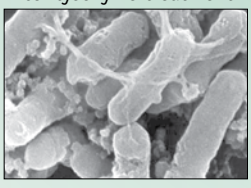
To reduce the risk of spoilage lactic acid bacteria, use Lallzyme LYSO-EASY™ during cold soak, spontaneous fermentations, sluggish or stuck alcoholic fermentations, extended maceration and micro-oxygenation.

Figure 1. Effect of lysozyme on *Lactobacillus* sp.

Before lysozyme treatment



After lysozyme treatment



IMAGES COURTESY OF INOVATECH

Lallzyme MMX™

Enzyme for clarification of *Botrytis* infected reds and whites and for white wine lees maceration

Lallzyme MMX™ is a beta-glucanase and pectinase blend sourced from *Trichoderma* sp. and *Aspergillus niger*. This enzymatic preparation was developed to improve yeast autolysis of wines on lees. The result is an increase in volume and mouthfeel contributing to a fuller more rounded wine. Because of the synergy of its glucanase and pectinase activities, Lallzyme MMX™ can also be used to improve filterability of wines infected with *Botrytis*. **Note:** The use of Lallzyme MMX™ requires filing for "letterhead approval" with the TTB as it contains enzymes sourced from *Trichoderma* sp.

REDStyle™

Red grape maceration for improved structure and smoothness

RED*Style*™ has been developed for use during maceration of red grapes to improve structure, color and tannin stabilization and smoothness. RED*Style*™ is a pectinase enzyme that is blended with a non-genetically modified strain of *Saccharomyces cerevisiae* that was selected, inactivated and produced to optimize its content in soluble polysaccharides.

RED*Style*™ is best used with:

- Optimum maturity red grapes for greater red wine aging potential through improved color stability and development of tannic intensity
- Low maturity and/or short maceration red grapes to increase color stability while building smoothness and covering "green" character perception
- Low structure red grape varieties to improve color intensity and stability
- *Botrytis* or infected moldy red grapes for a shorter maceration and more color stability.

VINStyle™

Accelerate yeast lees aging

VIN*Style*™ has been developed for use at the end of alcoholic fermentation for faster yeast autolysis. VIN*Style*™ is a beta-glucanase enzyme sourced from *Trichoderma* blended with a specific non-genetically modified strain of *Saccharomyces cerevisiae* that was selected, inactivated and produced to optimize its content in polysaccharides and antioxidant peptides. This combination results in the synergistic autolysis of yeast cell walls, resulting in a faster and a more complete release of polysaccharides, amino acids and peptides in the wine.

WHITEStyle™

White grape maceration for improved structure and smoothness

A unique pectinase (with beta-glucosidase side activities) blended with a specific non-genetically modified enology strain of *Saccharomyces cerevisiae* that was selected, inactivated and produced to optimize its content in polysaccharides and antioxidant peptides (glutathione). WHITE*Style*™ has been developed by Lallemand's R&D group for use in white must treatment prior to alcoholic fermentation. WHITE*Style*™ facilitates clarification and filterability, while allowing more control of aroma release and stabilization. Additionally, white wines treated with WHITE*Style*™ benefit from increased aromatic complexity, more balance and a longer shelf life.

	Origin	Specificity	Reds or Whites	Application	Dosage*
BETA™	*Aspergillus niger*	Glycosidase	Whites	Aroma enhancement	5 g/hL or 190 g/1000 gal
C™	*Aspergillus niger*	Mid-concentration pectinase Low CE	Whites	Juice clarification	2-3 g/hL or 75-115 g/1000 gal
C-MAX™	*Aspergillus niger*	High-concentration pectinase High level of pectinlyase and endo-polygalacturonase FCE	Whites	Juice clarification in difficult conditions (low temperatures, low pH, etc.)	0.5-2 g/hL or 20-75 g/1000 gal
CUVÉE BLANC™	*Aspergillus niger*	Mid-concentration pectinase rich in secondary activities and beta-glucosidase. Low CE	Whites	Neutral or aromatic white grape skin contact maceration	20 g/ton
CUVÉE ROUGE™	*Aspergillus niger*	Mid-concentration pectinase rich in secondary activities and beta-glucosidase. Low CE	Reds	Cold soak	20-30 g/ton
EX™	*Aspergillus niger*	Mid-concentration pectinase Low CE	Reds, whites	Grape maceration, for light/fruity red wines	20-30 g/ton
EX-V™	*Aspergillus niger*	High-concentration pectinase High level of side activities (cellulase, hemicellulase) FCE	Reds	Red grape maceration for full-bodied and complex red wines	10-30 g/ton
LYSO-EASY™	Egg whites	Liquid lysozyme (22% solution) preservative free	Reds, whites	Lactic acid bacteria management	50-250 mL/hL or 1.9-9.5 L/1000 gal
MMX™	*Aspergillus niger/ Trichoderma* sp.	Mid-concentration pectinase and beta-glucanase FCE	*Botrytis*: reds, whites Aging: whites	Juice/wine clarification in case of *Botrytis* infection, as well as short maturation on wine lees	1-5 g/hL or 40-190 g/1000 gal
RED*Style*™	*Aspergillus niger* and specific inactivated yeast	Pectinase and specific inactivated yeast high in polyphenol-reactive polysaccharides	Reds	Red grape maceration for improved structure and smoothness	230 g/ton or 30 g/hL
VIN*Style*™	*Trichoderma reesei* and specific inactivated yeast	Beta-glucanase and specific inactivated yeast high in polysaccharides and antioxidant peptides	Whites, reds	Yeast maceration during aging for improved smoothness	5-20 g/hL or 190 g-760 g/1000 gal
WHITE*Style*™	*Aspergillus niger* and specific inactivated yeast	Mid-concentration pectinase and beta-glucosidase Low CE and specific inactivated yeast high in polysaccharides and antioxidant peptides	Whites	White grape maceration for improved structure and smoothness	230 g/ton or 30 g/hL

* Dosage rate depends on several factors, including the specific application, grape condition, harvest and/or winemaking parameters. For more information, contact Lallemand or your distributor.

NUTRIENTS FOR ALCOHOLIC FERMENTATION

Since Lallemand began producing yeast in the early 20th century, we have understood the importance of providing growing yeast the nutrients they need to survive and reach their maximum potential. Experiences in our own yeast production fermentations laid the groundwork for our nutrient formulations. We have also collaborated with others in the area of yeast growth nutrition and fermentation to attempt to understand the complex and often frustrating interactions in grape must.

Lallemand offers three classifications of yeast fermentation nutrients:

1. Stimulants and protectants added to yeast rehydration water
2. Complex yeast nutrients for use during fermentation
3. Other yeast nutrients for use during fermentation.

Stimulants and Protectants Added to Yeast Rehydration Water

OMRI listed

Go-Ferm®

Lallemand's collaboration with the INRA in Montpellier and other institutes throughout the world have confirmed the critical role of yeast micronutrients, but more importantly, it identified the most effective way to ensure that these micronutrients benefit the selected yeast. The result of this research was the development of Go-Ferm®, a natural yeast nutrient to avoid sluggish and stuck fermentations. Go-Ferm® is specific inactive yeast produced through a unique yeast biomass process fine-tuned to obtain high levels of certain essential vitamins, minerals and amino acids required for healthy yeast fermentations.

The Go-Ferm® approach is to provide bioavailable micronutrients in the non-stressful environment of the yeast rehydration water, instead of the traditional method of adding micronutrients to the must. During rehydration, the yeast acts like a sponge, soaking up Go-Ferm®'s bioavailable nutrients. This direct contact between Go-Ferm® and the yeast in the absence of the must matrix avoids the chelation of key minerals by inorganic anions, organic acids, polyphenols and polysaccharides present in the must. It also prevents essential vitamins from being rapidly taken up by the competitive wild microflora or inactivated by SO_2. By making key minerals and vitamins available to the selected yeast at the critical beginning of its stressful task, the yeast's viability increases and fermentations finish stronger. The use of Go-Ferm® results in the significantly better overall health of yeast cells throughout the fermentation, affecting fermentation kinetics and resulting in a cleaner aromatic profile.

IMPORTANT!
NEVER USE NUTRIENTS CONTAINING AMMONIA SALTS, SUCH AS DAP, DURING YEAST REHYDRATION — THEY ARE TOXIC TO THE YEAST AT HIGH LEVELS!

Dosage recommendations: Use 30 g/hL (2.4 lb/1000 gal) of Go-Ferm® when rehydrating yeast to supply critical micronutrients. **Note:** This recommendation is based on a yeast inoculum of 25 g/hL (2 lb/1000 gal). If using more or less yeast, respect a ratio of 1 part yeast:1.25 parts Go-Ferm®.

Note: OMRI listed means this product complies with the *OMRI Standards Manual* and the *OMRI Policy Manual*, which are based on the requirements of the USDA National Organic Program Rule (7 CFR Part 205).

GO-FERM PROTECT EVOLUTION®

OMRI listed

GO-FERM PROTECT EVOLUTION® optimizes the micronutrient bioavailability of Go-Ferm with the added benefit of survival factor protection through the NATSTEP® process. These survival factors include specific sterols and polyunsaturated fatty acids that strengthen the yeast membrane during rehydration, making it more resistant to fermentation stress. GO-FERM PROTECT EVOLUTION® is used in the yeast rehydration water to create a suspension of micronutrients and survival factors that are bioavailable for selected yeasts. GO-FERM PROTECT EVOLUTION® is recommended in place of Go-Ferm® for very difficult fermentation conditions, such as:

1. High maturity conditions (>25° Brix) to protect yeast against osmotic shock, helping avoid high VA production during fermentation.
2. High potential alcohol conditions to protect yeast against alcohol toxicity, helping avoid sluggish fermentation finishes.
3. Over clarified juices to help supply key yeast survival factors.
4. Restarting stuck fermentations to protect and condition the “rescue yeast” against high alcohol conditions.
5. When oxygen additions are not possible during fermentation.

Dosage recommendations: Use 30 g/hL (2.4 lb/1000 gal) of GO-FERM PROTECT EVOLUTION® to stimulate and protect the rehydrating yeast.

Note: This recommendation is based on a yeast inoculum of 25 g/hL (2 lb/1000 gal). If using more or less yeast, respect a ratio of 1 part yeast:1.25 parts GO-FERM PROTECT EVOLUTION®.

Fermaid A™

Complex Yeast Nutrients for Use during Fermentation

Initially developed specifically for the Australia and New Zealand wine industries as a yeast fermentation nutrient. Nitrogen is of primary importance to the wine yeast during fermentation. The available yeast assimilable nitrogen (YAN) in the must/juice directly impacts the fermentation rate and formation of flavour-active volatile compounds. Fermaid A contains inactivated yeast (organic YAN; alpha-amino nitrogen) and diammonium phosphate (inorganic YAN). The inorganic/amino nitrogen mix is aimed at encouraging a more balanced metabolic fermentation outcome. The elevated intracellular amino nitrogen reserve (resulting from Fermaid A addition) assists the yeast to manage alcohol fermentation more effectively to complete fermentation, without prolonging the toxic exposure to alcohol that often results in a tailing of fermentation rate and an increased incidence of sluggish and/or stopped fermentations. Refer to page 40 for dosage recommendations. Note: Yeasts rehydrated in GO-FERM PROTECT EVOLUTION® especially benefit from the addition of Fermaid A at 1/3 into the fermentation.

IMPORTANT!
NEVER USE NUTRIENTS CONTAINING AMMONIA SALTS, SUCH AS DAP, DURING YEAST REHYDRATION — THEY ARE TOXIC TO THE YEAST AT HIGH LEVELS!

NUTRIENTS FOR ALCOHOLIC FERMENTATION

OMRI listed

Fermaid O™

Fermaid O™ is the latest nutrient developed by our winemaking nutrient research team headed by Dr. Anne Ortiz-Julien. Fermaid O is a blend of inactivated yeast fractions rich in organic nitrogen. Fermaid O™ does not contain added ammonia salts (DAP) or micronutrients. The importance of organic nitrogen from yeasts is well known as a highly efficient nutrient source for wine yeasts, especially when compared to inorganic nitrogen from DAP. In addition, Fermaid O™ consistently produces lower heat of fermentation and lower levels of negative sulfur compounds, compared with DAP. With its organic nitrogen, Fermaid O™ can help winemakers achieve steady fermentations, while limiting temperature peaks. When inorganic nitrogen (DAP) additions are NOT desired, the use of Go-Ferm® or GO-FERM PROTECT EVOLUTION® and Fermaid O™ is recommended. With this combination, Go-Ferm® or GO-FERM PROTECT EVOLUTION® provides needed micronutrients during yeast rehydration, and Fermaid O (when added at 1/3 sugar depletion) supplies critical nutrients to help the yeast avoid stressed conditions. **Note:** In low nutrient situations, yeast available nitrogen may be insufficient to avoid fermentation problems. Refer to page 40 for dosage recommendations.

Fermaid K™

The original and reliable Fermaid K™ is a blended complex yeast nutrient that supplies inorganic nitrogen (DAP), organic nitrogen (alpha amino nitrogen), key nutrients (magnesium sulfate, thiamine, folic acid, niacin and calcium pantothenate) and inactivated yeast.

It is best to add Fermaid K™ over two additions. The first addition is made at the end of the lag phase (6 to 12 hours after yeast inoculation) and the second addition is made around 1/3 sugar depletion (the end of exponential growth and the beginning of the stationary phase).

With proper rehydration and handling, the yeast cell population should be at least 4 million cells/mL at inoculation. By the time the second Fermaid K™ addition is made, this population should have grown to about 100 million cells/mL. It is critical to remember that yeast are still reproducing during the stationary phase, and to do this effectively, especially in high sugar musts, they need oxygen as well as the components of Fermaid K™, including nitrogen (for protein synthesis), sterols and fatty acids (for maintaining alcohol resistance and permease activity). In addition, the inactivated yeast cell walls in Fermaid K™ adsorb medium-chain fatty acids that are toxic to yeast, and provide nucleation sites to help keep the yeast in suspension. Refer to page 40 for dosage recommendations.

IMPORTANT!
NEVER USE NUTRIENTS CONTAINING AMMONIA SALTS, SUCH AS DAP, DURING YEAST REHYDRATION — THEY ARE TOXIC TO THE YEAST AT HIGH LEVELS!

YAN content of nutrients used in alcoholic fermentation

Nutrient	1 g/hL	12.5 g/hL (1 lb/1000 gal)	20 g/hL (1.7 lb/1000 gal)	25 g/hL (2 lb/1000 gal)	30 g/hL (2.4 lb/1000 gal)	YAN Source
DAP	2 mg/L	25 mg/L	40 mg/L	50 mg/L	63 mg/L	Inorganic nitrogen
Fermaid A™	1.2 mg/L	15 mg/L	24 mg/L	30 mg/L	36 mg/L	Inorganic nitrogen and organic nitrogen
Fermaid K™	1 mg/L	12.5 mg/L	20 mg/L	25 mg/L	30 mg/L	Inorganic nitrogen and organic nitrogen
Go-Ferm®					10 mg/L	Organic nitrogen
GO-FERM PROTECT EVOLUTION®					10 mg/L	Organic nitrogen
Fermaid O™	0.4 mg N/L		8 mg/L		16 mg/L*	Organic nitrogen

* 40 g/hL

NUTRIENTS FOR ALCOHOLIC FERMENTATION

OMRI listed

NUTRIENT VIT END™

NUTRIENT VIT END™ is a new specific inactivated yeast, developed by the Lallemand Research and Development group for use in avoiding and/or treating sluggish and stuck fermentations. Low yeast viability is a common problem in alcoholic fermentations, and may be caused by the presence of residual fungicides and/or short- and medium-chain saturated fatty acids, such as hexanoic, octanoic, decanoic and dodecanoic fatty acids and their esters. The production of these saturated fatty acids by yeast is favored by stressful fermentation conditions, which can arise with low juice turbidity, very high initial sugars, the condition of the selected yeast, or extreme fermentation temperatures during the later phase of fermentation. Saturated fatty acids modify the yeast sugar transport capacity by interfering with the membrane sugar transport proteins. NUTRIENT VIT END™ is a specific inactivated yeast that has very high bio-adsorptive properties for saturated short- and medium-chain fatty acids and fungicides. With these properties, NUTRIENT VIT END™ helps secure the end of alcoholic fermentation. **Note:** Although NUTRIENT VIT END™ provides a minor supply of yeast nutrients, such as organic nitrogen, it does not replace the regular nutrition program integrating juice parameters and the nutritional needs of yeasts. Preventive dosage: At the very beginning of fermentation, add 30 g/hL of NUTRIENT VIT END™ to juice or must. Curative dosage: With a sluggish or stuck fermentation, add 40 g/hL of NUTRIENT VIT END™ to the wine and let settle then rack off before inoculating with rescue yeast.

Other Nutrients for Alcoholic Fermentation

FNI 100™ Dry Yeast Extract

FNI 100™ dry yeast extract is composed of the water-soluble portion of autolyzed yeast cells and contains a high level of organic nitrogen in the form of easily absorbable amino acids and peptides for fermentation nutrients. FNI 100™ is especially useful for malolactic bacteria, as they are able to take up nitrogen only from organic sources. The amino acids are useful to yeast in juices or musts that are depleted of nutrients or missing specific amino acids.
Dosage recommendations: Standard addition rate for FNI 100™ dry yeast extract is 12.5 g/hL (1 lb/1000 gal).

FNI 150™ Pourable Liquid Yeast Extract

FNI 150™ is the easy-to-use liquid version of FNI 100™, a primary-grown yeast extract. FNI 150™ is organic nitrogen in the form of readily absorbable amino acids and peptides for fermentation nutrients.
Dosage recommendations: See above rate for FNI 100™ dry yeast extract; 1.9 lb of pourable FNI 150 is equivalent to 1 lb of the FNI 100 dry yeast extract. Measuring the addition by volume, 660 mL or 22 oz by volume is equivalent to 1 lb dry extract.

SIY33™

SIY33™ is pure, autolyzed, spray-dried yeast providing alpha amino nitrogen, B vitamins and the benefits of yeast cell walls to help sluggish or stuck fermentations. SIY33™ does not contain added ammonia salts (DAP) or micronutrients.

SIY Cell Hulls™

SIY™ (specific inactivated yeast) cell hulls are a dried preparation of the insoluble fraction of whole yeast cells (i.e., cell wall membranes). Yeast hulls added to the must supply survival factors, such as sterols and unsaturated fatty acids, increase the surface area of over-clarified juice and adsorb toxic compounds.
Dosage recommendations: Add 25 g/hL (2 lb/1000 gal) yeast hulls to highly clarified juice, or when preparing the wine before restarting a stuck fermentation.

Yeast Protection and Nutrition Guidelines

Juice/Must* YAN	Yeast Rehydration	Start of AF	1/3 through AF
>200 mg/L	GO-FERM PROTECT EVOLUTION® 30 g/hL (2.4 lb/1000 U.S. gallons)	FERMAID O™ 10-20 g/hL (0.8-1.7 lb/1000 U.S. gallons)	FERMAID O™ 10-20 g/hL (0.8-1.7 lb/1000 U.S. gallons)
125-200 mg/L	GO-FERM PROTECT EVOLUTION® 30 g/hL (2.4 lb/1000 U.S. gallons)	FERMAID O™ 10-20 g/hL (0.8-1.7 lb/1000 U.S. gallons)	FERMAID A™ 10-30 g/hL (0.8-2.4 lb/1000 U.S. gallons)
<125 mg/L	GO-FERM PROTECT EVOLUTION® 30 g/hL (2.4 lb/1000 U.S. gallons)	FERMAID A™ 10-30 g/hL (0.8-2.4 lb/1000 U.S. gallons)	FERMAID A™ 10-30 g/hL** (0.8-2.4 lb/1000 U.S. gallons)

* Although the initial levels of YAN in the juice or must help guide a nutrient strategy, avoid chasing YAN numbers through excessive nitrogen additions. Instead, consider the quality of the nitrogen (inorganic vs. organic), the balance and availability of micronutrients, the relative nitrogen demand of the selected yeast, the temperature and aeration management, as well as other good fermentation practices – all of which greatly impact the overall yeast health and resulting fermentation.

** If the YAN level of the juice or must is below 70 mg/L, add 25 g/hL of diammonium phosphate (DAP) with 30 g/hL of Fermaid® A around 1/3 through alcoholic fermentation (AF).

The above guidelines are based on an optimized protection and nutrition strategy. However, if you can only make one Fermaid® addition, add the total amount around 1/3 through AF.

How much Fermaid® should be added during fermentation?

- Use lower recommended dosages when fermentation conditions are considered good.
- Use higher recommended dosages when several key difficult conditions exist, such as:
  <50 Nephelometric Turbidity Units (low NTU = highly clarified juice)
  >14% potential alcohol
  fermentation temperatures below 16°C or above 28°C.

Sluggish fermentation?

Add Nutrient VIT END™ when there is a slowdown around 2/3 through AF of less than 0.5 Baume or 1° Brix/day, except for slow fermenting yeasts or fermenting <12°C.

Fermaid K™ may be substituted for Fermaid A™. Both are used instead of Fermaid O™ to help boost YAN levels.

Adjustments for high Brix musts (above 25°Brix) can also be successfully accomplished in two ways

1. When sugars are above 25°Brix, we recommend increasing the yeast inoculation rate from 25 g/hL (2 lb /1000 gal) to 35 g/hL (2.8 lb/1000 gal). Starting at a higher inoculation rate will help avoid a dilution effect and maintain the yeast's survival factors above critical levels. This higher cell density is helpful in order to successfully convert all of the sugar into alcohol during the course of the fermentation.
2. Select a yeast with lower relative nitrogen demands and higher alcohol tolerance (i.e., Lalvin QA23™, Lalvin T73™, Lalvin DV10™ or Enoferm RP15™). For more information, please refer to the Yeast Chart (see pages 12 and 13) and the Yeast section (starting on page 3).

Other good fermentation practice considerations when dealing with high Brix musts:

In reds:

- Aerate or add oxygen when the cap forms (usually when 15 g/L sugar is consumed) and again around 1/3 sugar depletion.
- Be careful to manage the temperature during yeast rehydration, the initial phase of fermentation, and at the peak of fermentation.
- Regularly move the yeast during their death phase, towards the end of fermentation.

In whites:

- Aim for an optimum initial juice turbidity level between 80–150 NTU.
- Aerate or add oxygen as soon as the fermentation is active and again around 1/3 sugar depletion.
- Be careful to manage the temperature during yeast rehydration, yeast inoculation, and at the end of fermentation.
- Regularly move the yeast during their death phase, towards the end of fermentation.

LIKE HUMANS, YEASTS ARE WHAT THEY EAT!

Yeasts are living organisms and, like humans, they need a balanced diet to perform well. From the beginning to the end of their lives, yeasts need proper care and nutrition to develop appropriately, be healthy and productive.

YSEO® PROCESS
Yeast Security Optimization

Healthy yeasts begin their lives at Lallemand!
Yeast SEcurity & Optimization
Lallemand's proprietary process to produce naturally selected yeasts from the growth phase to the drying phase results in yeasts that are better adapted to current winemaking practices.

GO FERM PROTECT evolution

In the winery, maintain yeast health with:
PROTECTION nutrition
GO-FERM PROTECT EVOLUTION® (OMRI listed) provides micronutrients and protectants that create generations of yeasts more resistant to alcohol toxicity and more viable at the end of fermentation.

FERMAID A™
FERMAID K™
FERMAID O™

NUTRITION
Lallemand's Fermaid A™, Fermaid K™ and Fermaid O™ (OMRI listed) complex yeast nutrients promote better yeast reproduction, better sugar transport and better aroma expression.

RESTARTING STUCK ALCOHOLIC FERMENTATIONS

Dr. Paul Monk used to say, "The best solution for a stuck fermentation is prevention," but it seems like no matter what preventive steps you take, problem ferments still occur. The general approach to deal with a stuck ferment is to clean up the stuck wine and then gradually adapting the yeast to the antagonistic wine environment. Reacting quickly is very important once the stuck fermentation is discovered.

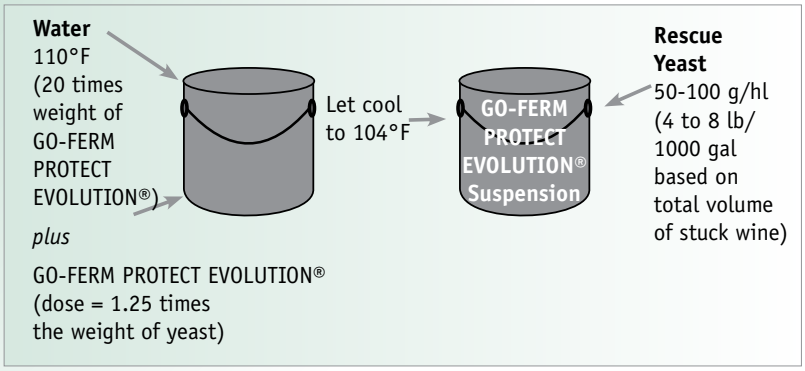
1. Prepare the stuck wine

Take the necessary precautions to avoid growth of spoilage bacteria by adding SO_2 and/or Lallzyme LYSO-Easy™. The addition of NUTRIENT VIT END™ at 40 g/hL (3.2 lb/1000 gal) helps remove potential inhibitory substances in the wine. Suspend the NUTRIENT VIT END™ in warm water, gently stir the suspension into the stuck wine, and allow the NUTRIENT VIT END™ to settle for 48 hours, then rack or filter.

2. Prepare the rescue yeast

Select a "rescue" yeast that is both alcohol tolerant and a vigorous fermenter, such as Uvaferm 43®, Lalvin Rhône 2226™, Lalvin DV10™ or Lalvin V1116 (K1)™.

Calculate the amount of yeast required for the total volume of stuck wine at 50 g/hL (4 lb/1000 gal). Use twice this amount, 100 g/hL, if you lack good temperature control in the cellar. Calculate the amount of GO-FERM PROTECT EVOLUTION® protectant required (1.25 times the weight of yeast). Suspend the GO-FERM PROTECT EVOLUTION® in 20 times its weight of 43°C (110°F) clean water (approximately 2 liters water for each 100 g GO-FERM PROTECT EVOLUTION®). Mix gently and allow the GO-FERM PROTECT EVOLUTION® solution to cool to 40°C (104°F). When the temperature has cooled, sprinkle the rescue yeast on the GO-FERM PROTECT EVOLUTION®/water suspension. Stir very gently to mix and avoid clumping. Let suspension stand for 15 to 30 minutes before adding to initial wine/water/sugar mixture.



3. Activate the prepared rescue yeast with nutrients and sugar

The nutrient content of the stuck fermentation will most likely be quite low and unable to support adequate yeast growth. In addition, the rescue yeast culture will require adaptation to the alcohol content of the wine.

Prepare the following initial starter mixture and adjust to 25°–30°C (77°–86°F):

A. 2.5% of volume of stuck wine (25 gal/1000 gal)
B. 2.5% of volume as water (25 gal/1000 gal)
C. 50 g Fermaid K™/hL wine and water mix (4 lb/1000 gal).
D. Adjust sugar level of this mixture to 5°Brix with juice, concentrate or sugar.

4. Start the fermentation and add the stuck wine in batches

A. Slowly add the GO-FERM PROTECT EVOLUTION®/rehydrated rescue yeast suspension to this wine/water/sugar mix and maintain the temperature at 20° - 24°C (68° - 75°F).
B. Monitor the sugar level of the starter. When the sugar level has dropped by half (approximately 2.5°Brix), begin to add the stuck wine to the starter and maintain between 20° - 24°C (68° - 75°F). **Note:** A very critical point – do not allow the sugar to be completely depleted. Add the stuck wine in batches of 20% of the total volume of stuck wine (total of five additions to the starter).
C. Add 25 g/hL (2 lb/1000 gal) of Nutrient Vit End to each batch prior to adding to the starter. The correct time to add a new batch is when the sugar from the previous addition has decreased by half. Only at the last batch of added stuck wine should the sugar be allowed to completely deplete.

Note: When starting stuck fermentations in barrels, the initial starter mixture from STEP 3 can be apportioned to 20% of the barrels, expanding the number of barrels at each stage.

SELECTING THE APPROPRIATE BACTERIA CULTURE

Guidelines for Selecting the Appropriate Lallemand MBR® Culture

There are two basic considerations when selecting an MBR culture, security or the culture's compatibility to the wine environment and the culture's sensory attributes.

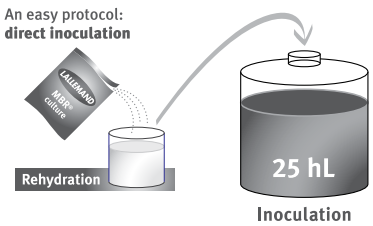
Note: The four main Environmental Limits have a cumulative effect on the MBR cultures and are the limits the MBR cultures can normally tolerate.

Table 1. Environmental limits and sensory impact

MBR® BACTERIA	ENVIRONMENTAL LIMITS							
	Alcohol (% v/v)	**pH**	**Total SO_2 (mg/L)**	**Temperature (°C)**	**Impact on mouthfeel**	**Impact on fruitiness**	**Typical MLF kinetics Temp. dependent**	**Nutrient demand**
Enoferm ALPHA	< 15.5	> 3.2	< 50	> 14	****	***	Quick start, slow finish	Low
Enoferm BETA	< 15.0	> 3.2	< 60	> 14	**	***	Slow start, fast finish	High
Lalvin 31	< 14.0	> 3.1	< 45	> 13	*	***	Slow start, fast finish	High
Lalvin Elios 1	< 15.5	> 3.4	< 50	> 18	***	**	Reliable in reds	Medium
Lalvin ICV Elios Blanc	< 14.5	> 3.3	< 45	> 16	***	***	Moderate start and finish	High
Lalvin VP41	< 16.0	> 3.1	< 60	> 16	***	****	Moderate start and finish	Low
PN4	< 16.0	> 3.0	< 60	> 14	**	**	Moderate start and fast finish	Medium

Easy rehydration and inoculation protocol for MBR® bacteria cultures

MBR® process
direct inoculation



MLF Scorecard

To take some of the guesswork out of winemaking, Lallemand has developed this scoring system to assess the malolactic fermentation potential of a wine. Each relevant condition is assigned a score, and the total score indicates whether MLF is likely to be easy or difficult.

Table 2. Scorecard for determining the ease of malolactic fermentation

CONDITION	1 point each	2 points each	8 points each	10 points each		Score
Alcohol (% vol)	<13	13 - 15	15 - 17	>17	➡	
pH	>3.4	3.1 - 3.4	2.9 - 3.1	<2.9	➡	
Free SO_2 (mg/L)	<8	8 - 12	12 - 15	>15	➡	
Total SO_2 (mg/L)	<30	30 - 40	40 - 60	>60	➡	
Temperature (°C)	18 - 22	14 - 18 or 22 - 24	10 - 14 or 24 - 29	<10 or >29	➡	
Yeast's nutritional needs	Low	Medium	High	Very high	➡	
Ease of alcoholic fermentation	No problems	Transient yeast stress	Sluggish / stuck AF	Prolonged yeast contact	➡	
Initial level of malic acid (g/L)	2 - 4	4 - 5 or 1 - 2	5 - 7 or 0.5 - 1	>7 or <0.5	➡	
Maximum AF rate (maximum loss of brix/day)	<2	2 - 4	4 - 6	>6	➡	
Note: Other, currently less well-known factors that are not considered in this scorecard may include the level of dissolved oxygen, polyphenolic content, lees compacting, pesticide residues, etc.						
Total score for the ease of malolactic fermentation:					➡	

RESULTS

Favorable: < 13 points – Pay attention to development of indigenous flora (*Brettanomyces*, contaminating bacteria, etc.) Inoculate rapidly with selected bacteria.

Not so favorable: 13-22 points – Choose the bacteria adapted to your wine. A specific bacteria nutrient may be necessary.

Difficult: 23-40 points – Give preference to a 1-STEP® bacteria adapted to your wine. Adjust conditions to optimize MLF: temperature, bacterial nutrition, etc.

Extreme: >40 points – Run quick test or consult your Lallemand representative. Decrease the obstacles before inoculating: blending, deacidification, temperature, bacterial nutrition, etc.

RESTARTING STUCK MALOLACTIC FERMENTATIONS

Recommendations from Lallemand North America

Winemakers are aware that *Oenococcus oeni* bacteria, responsible for malolactic fermentation (MLF), are successful only if they can adapt to the harsh environment of a fermenting must or finished wine. The usual factors influencing the success of MLF include pH, temperature, alcohol and SO_2 (both free and total). Problems can arise when pHs are low (under 3.4), alcohols are high (greater than 14.5%), the temperature of the wine is extreme (less than 18°C / 65°F or above 24°C /75°F), or the total SO_2 is high (greater than 30 ppm). In addition, these four conditions have a combined cumulative effect, making life truly difficult for the malolactic bacteria (MLB) if several stressful conditions coincide sometimes resulting in a stuck MLF.

To restart and complete a stuck MLF, sometimes it is simply enough to add and gently mix in a nutrient such Opti'Malo PLUS™. If that fails to restart the MLF, a more extensive protocol using a 1-Step® starter kit is necessary to complete the MLF. Lallemand's MLF R&D team, headed by Dr. Sibylle Krieger-Weber, has developed an MLB acclimatization strategy for using the 1-Step® starter kit to finish wines with stuck malolactic fermentations. Lallemand offers three different 1-Step® starter kits, each containing a sachet of malolactic bacteria and a second sachet containing an activator. This bacteria activation and adaptation can be critical in reducing the effect of an unfavorable wine matrix on the bacteria, favoring successful completion of the MLF.

Adaptation protocol for handling stuck malolactic fermentations

Stage 1

Pretreat wine and adjust temperature

Prepare the stuck-MLF wine by removing any lees, potential inhibitory toxins and inhibiting spoilage organisms. A small amount of SO_2 and/or lysozyme (or filtration) may be necessary to control undesirable *Lactobacillus* or *Pediococcus* bacteria.

Lysozyme is very effective at inhibiting spoilage lactic acid bacteria, especially when the wine is above pH 3.5. If using lysozyme, be sure that no residual activity remains in the treated wine before inoculation with the malolactic bacteria by deactivating the lysozyme with a bentonite addition.

In a wine with a stuck MLF suspected of containing substances toxic to malolactic bacteria, Lallemand recommends a pretreatment with Nutrient Vit End at 12.5 g/hL (1 lb/1000 U.S. gallons). Prepare the Nutrient Vit End suspension in water or wine then add it to the stuck wine while mixing.

Finally, adjust the temperature of the stuck-MLF wine to 18° to 22°C (65° to 72°F).

RESTARTING STUCK MALOLACTIC FERMENTATIONS

Stage 2

Prepare the 1-Step starter kit

Please refer to table below for liquid volumes, according to the size of kit used. **Note:** The use of the 1-Step® starter kit for restarting a stuck MLF requires twice the normal dosage to compensate for the more difficult MLF environment of a stuck MLF.

Rehydration Phase

- Mix and dissolve contents of the activator sachet in drinking water (temperature between 18° and 25°C).
- Add contents of the bacteria sachet and dissolve carefully by gentle stirring.
- Wait 20 minutes.

Acclimatization Phase

- Mix the 1-Step® preparation (activator and bacteria dissolved in drinking water) with wine, pH >3.5 (temperature between 17° and 25°C).
- Important: if the stuck wine has <1.0 g/L malic acid, then wait only 6-8 hours before inoculation. If the stuck-MLF wine has >1.0 g/L malic acid, then wait 12-18 hours before inoculation.

Inoculation

- Inoculate the wine with the acclimated culture.
- Maintain temperature between 18° and 22°C.
- Check MLF activity (malic acid degradation) every 2 to 4 days.

LIQUID VOLUME TABLE

	Rehydration Phase	Acclimatization Phase	Inoculation
ALPHA™ for 25 hL (660 gals) KIT	Dissolve ALPHA™ KIT in 2.5 L of water	Mix ALPHA™ (2.5 L) with 2.5 L of wine	Inoculate 12.5 hL (330 gals) of wine with ALPHA™ culture (5 L)
ALPHA™ for 100 hL (2,640 gals) KIT	Dissolve ALPHA™ KIT in 10 L of water	Mix ALPHA™ (10 L) with 10 L of wine	Inoculate 50 hL (1,320 gals) of wine with ALPHA culture (20 L)
ALPHA™ for 500 hL (13,200 gals) KIT	Dissolve ALPHA™ KIT in 50 L of water	Mix ALPHA™ (50 L) with 50 L of wine	Inoculate 250 hL (6,600 gals) of wine with ALPHA™ culture (100 L)
ALPHA™ for 1000 hL (26,400 gals) KIT	Dissolve ALPHA™ Kit in 100 L of water	Mix ALPHA™ (100 L) with 100 L of wine	Inoculate 500 hL (13,200 gals) of wine with ALPHA™ culture (200 L)
BETA™ for 250 hL (6,600 gals) KIT	Dissolve BETA™ KIT in 25 L of water	Mix BETA™ (25 L) with 25 L of wine	Inoculate 125 hL (3,300 gals) of wine with BETA™ culture (50 L)
VP41® for 1000 hL (26,400 gals) KIT	Dissolve VP41® KIT in 100 L of water	Mix VP41® (100 L) with 100 L of wine	Inoculate 500 hL (13,200 gals) of wine with VP41® culture (200 L)
PN4™ for 100 hL (2,640 gals) KIT	Dissolve PN4™ KIT in 10 L of water	Mix PN4™ (10 L) with 10 L of wine	Inoculate 50 hL (1,320 gals) of wine with PN4™ culture (20 L)
PN4™ for 500 hL (13,200 gals) KIT	Dissolve PN4™ KIT in 50 L of water	Mix PN4™ (50 L) with 50 L of wine	Inoculate 250 hL (6,600 gals) of wine with PN4™ culture (100 L)

CALCULATIONS AND CONVERSIONS

TEMPERATURE CONVERSIONS										
C° = Degree Celsius										
F° = Degree Fahrenheit										
F° = > C° = (F° - 32)*(5/9)										
C° = > F° = (C° * 9/5) + 32										
C°	-18	-15	-10	10	16	21	27	32	38	49
F°	0	5	14	50	60	70	80	90	100	120

MASS CONVERSIONS		
1 kg	=	1000 g
1 kg	=	2.205 lb
1 g	=	1000 mg
1 lb	=	453.6 g
1 lb	=	0.4536 kg
1 metric tonne	=	1000 kg
1 metric tonne	=	2205 lb
1 US ton	=	2000 lb
1 US ton	=	907 kg

VOLUME CONVERSIONS		
1 mL	=	0.035 US fl oz
1 US fl oz	=	30 mL
1 L	=	1000 mL
1 L	=	0.2642 US gal
1 US gal	=	3785 mL
1 US gal	=	3.785 L
1 hL	=	100 L
1 hL	=	26.4 US gal

WEIGHT/VOLUME EQUIVALENTS:
1 lb/1000 gal = 454 g/1000 gal = 0.45 g/gal = 0.12 g/L = 120 ppm = 12 g/hL
2 lb/1000 gal = 0.90 g/gal = 0.24 g/L = 240 ppm = 24 g/hL
1 g/hL = 1 g/26.42 gal = 0.038 g/gal = 0.084 lb/1000 gal

OTHER CONVERSIONS
1 kg/hL = 1000 g/hL = 10,000 mg/L = 10 g/L = 10 mg/mL
1 lb/1000 US gal = 454 g/1000 US gal = 0.454 kg/1000 US gal = 120 mg/L = 0.120 g/L
1 ppm = 1 mg/L
1 ppb = 1 mg/1000 L
1°Brix = 1% sugar (wt/vol)
1 Vol. % = 1 mL/100 mL
1 Gew. % = 1 g/100 g

Wine physiology

When calculating the physiological energy value of wine and food, the following values are generally useful:

1 g ethanol	7 cal	or	30 kJ
1 g digestible carbohydrates	4 cal	or	17 kJ
1 g digestible protein	4 cal	or	17 kJ
1 g digestible fat	9 cal	or	38 kJ
1 g organic acid (tartaric acid or malic acid)	3 cal	or	13 kJ
12 g glucose	1 bread unit		

The following table is meant as an aid to help the user to calculate density data in any of the three worldwide units: Balling/Brix, Baumé and Oechsle.

COMPARISON OF DIFFERENT DENSITY DATA

Gew. Verh. 20°/20°	Degree Balling /Brix	Degree Baumé	Degree Oechsle		Gew. Verh. 20°/20°	Degree Balling /Brix	Degree Baumé	Degree Oechsle
1.00000	0.0	0	0		1.08733	21.0	11.7	87
1.00078	0.2	0.1	1		1.08823	21.2	11.8	88
1.00155	0.4	0.2	2		1.08913	21.4	11.9	89
1.00233	0.6	0.3	2		1.09003	21.6	12.0	90
1.00311	0.8	0.45	3		1.09093	21.8	12.1	91
1.00389	1.0	0.55	4		1.09183	22.0	12.2	92
1.00779	2.0	1.1	8		1.09273	22.2	12.3	93
1.01172	3.0	1.7	12		1.09364	22.4	12.45	94
1.01567	4.0	2.2	16		1.09454	22.6	12.55	95
1.01965	5.0	2.8	20		1.09545	22.8	12.7	95
1.02366	6.0	3.3	24		1.09636	23.0	12.8	96
1.02770	7.0	3.9	28		1.09727	23.2	12.9	97
1.03176	8.0	4.4	32		1.09818	23.4	13.0	98
1.03586	9.0	5.0	36		1.09909	23.6	13.1	99
1.03998	10.0	5.6	40		1.10000	23.8	13.2	100
1.04413	11.0	6.1	44		1.10092	24.0	13.3	101
1.04831	12.0	6.7	48		1.10193	24.2	13.45	102
1.05252	13.0	7.2	53		1.10275	24.4	13.55	103
1.05667	14.0	7.8	57		1.10367	24.6	13.7	104
1.06104	15.0	8.3	61		1.10459	24.8	13.8	104
1.06534	16.0	8.9	65		1.10551	25.0	13.9	106
1.06968	17.0	9.4	70		1.10643	25.2	14.0	106
1.07142	17.4	9.7	71		1.10736	25.4	14.1	107
1.07404	18.0	10.0	74		1.10828	25.6	14.2	108
1.07580	18.4	10.2	76		1.10921	25.8	14.3	109
1.07844	19.0	10.55	78		1.11014	26.0	14.45	110
1.07932	19.2	10.65	79		1.11106	26.2	14.55	111
1.08021	19.4	10.8	80		1.11200	26.4	14.65	112
1.08110	19.6	10.9	81		1.11293	26.6	14.8	113
1.08198	19.8	11.0	82		1.11386	26.8	14.9	114
1.08287	20.0	11.1	83		1.11480	27.0	15.0	115
1.08376	20.2	11.2	84		1.11573	27.2	15.1	116
1.08465	20.4	11.35	85		1.11667	27.4	15.2	117
1.08554	20.6	11.45	86		1.11761	27.6	15.3	118
1.08644	20.8	11.55	86		1.11855	27.8	15.45	119

Evaluation of the titratable total acid

In such countries as Switzerland and Germany, the titratable acids of wine are calculated as tartaric acid and are indicated as a decimal in grams per liter. In France and in other Roman countries, the titratable total acid is calculated as sulfuric acid. For fruit and berry juices the titratable total acid is often calculated and indicated as citric acid and malic acid. In order to perform the appropriate conversions, multiply the titratable acid by the factors given in the following table.

The total acid was titrated and calculated as	The total acid is to be expresed as					
	Wine acid	Apple acid	Citric acid	Lactic acid	Sulfuric acid	Acetic acid
Wine acid	—	0.893	0.853	1.2	0.653	0.8
Apple acid	1.119	—	0.955	1.343	0.731	8.896
Citric acid	1.172	1.047	—	1.406	0.766	0.938
Lactic acid	0.833	0.744	0.711	—	0.544	0.667
Sulfuric acid	1.531	1.367	1.306	1.837	—	1.225
Acetic acid	1.25	1.117	1.067	1.5	0.817	—

Enological Guidelines

1. Basic Conversions and Addition Rates
   a. Brix to alcohol conversion factor use 0.60-0.64% EtOH per °Brix
   b. 1 ton of grapes yields roughly 200 gallons must or 155-175 gallons of juice/wine
   c. Calculate fermentation additions based on total volume (including skins, etc)
   d. Tartaric additions: 8lb. tartaric/l000 gals. adds roughly +0.1 g/100 mL shift in Titratable Acid
   e. Dry ice additions use 7lb. dry ice/ton of grapes to lower 1°F
   f. Water additions:
      i. (initial Brix - target Brix)/initial Brix = % water to add
         Example: Initial Brix = 27
                  Target Brix = 24
         (27-24)/27 = 11% water to achieve target Brix level
      ii. C1V1 = C2V2
         C1= potential alcohol if all sugar fermented (use 0.60-0.64 conversion rate)
         V1 = initial volume of wine
         C2 = final alcohol desired
         V2= final volume of wine
         C1V1 = C2V2 Example:
                  Current alcohol = 15.53%
                  Current sugar = 7,260 mg/100mL
                  Potential alcohol = 19.88% @ 0.60 conversion rate, 60 gallons wine.
                  (19.88%)(60 gals) = (15.5%)(x gal)
                  x = 73.5 gals
                  73.5 gals of final wine - 60 gals of initial wine = 13.5
                  gals of water required to bring total alcohol to 15.5%

ORGANIC WINEMAKING

Listed products may be used in certified organic production according to the USDA National Organic Program (NOP) Rule.

Certified Organic Yeast

EC1118™ Organic

AT-BIO-902 "EU Agriculture"

SGS ORGANIC

Yeast Rehydration and Protection

GO FERM LALLEMAND

OMRI LISTED or Organic Use

GO FERM PROTECT LALLEMAND

OMRI LISTED or Organic Use

Yeast Nutrition

FERMAID O©

OMRI LISTED or Organic Use

Specific Inactivated Yeast

OptiWHITE®

OMRI LISTED or Organic Use

OptiRED®

OMRI LISTED or Organic Use

OptiMUM WHITE®

OMRI LISTED or Organic Use

Noblesse®

OMRI LISTED or Organic Use

Reduless and Nutrient Vit End are also OMRI listed.

OMRI (Organic Materials Review Institute)
SGS is a USDA NOP - Authorized Organic Certifying Agent.

CONTACT INFORMATION

Lallemand North America

Sigrid Gertsen-Schibbye
Phone: 707 303-6333
Email: sigrid@lallemand.com

Shirley Molinari
Phone: 707 484-0919
Email: smolinari@lallemand.com

Gordon Specht
Phone: 707 477-9809
Email: gspecht@lallemand.com

For more recommendations suited for North American winemaking applications, please visit us at www.lallemandwine.us

In North America, Lallemand distributes its products to the professional winemaker through the best suppliers in the wine industry. To purchase our products, please contact one of the following:

Scott Laboratories

United States
Petaluma and Healdsburg, CA
Scott Laboratories Inc.
Phone: 707 765-6666
Fax: 707 765-6674
Email: info@scottlab.com
www.scottlab.com

Canada
Pickering, ON
Scott Laboratories Ltd.
Phone: 905 839-9463
Fax: 905 839-0738
Email: info@scottlabsltd.com

2013

For the most recent information, log onto

www.lallemandwine.us