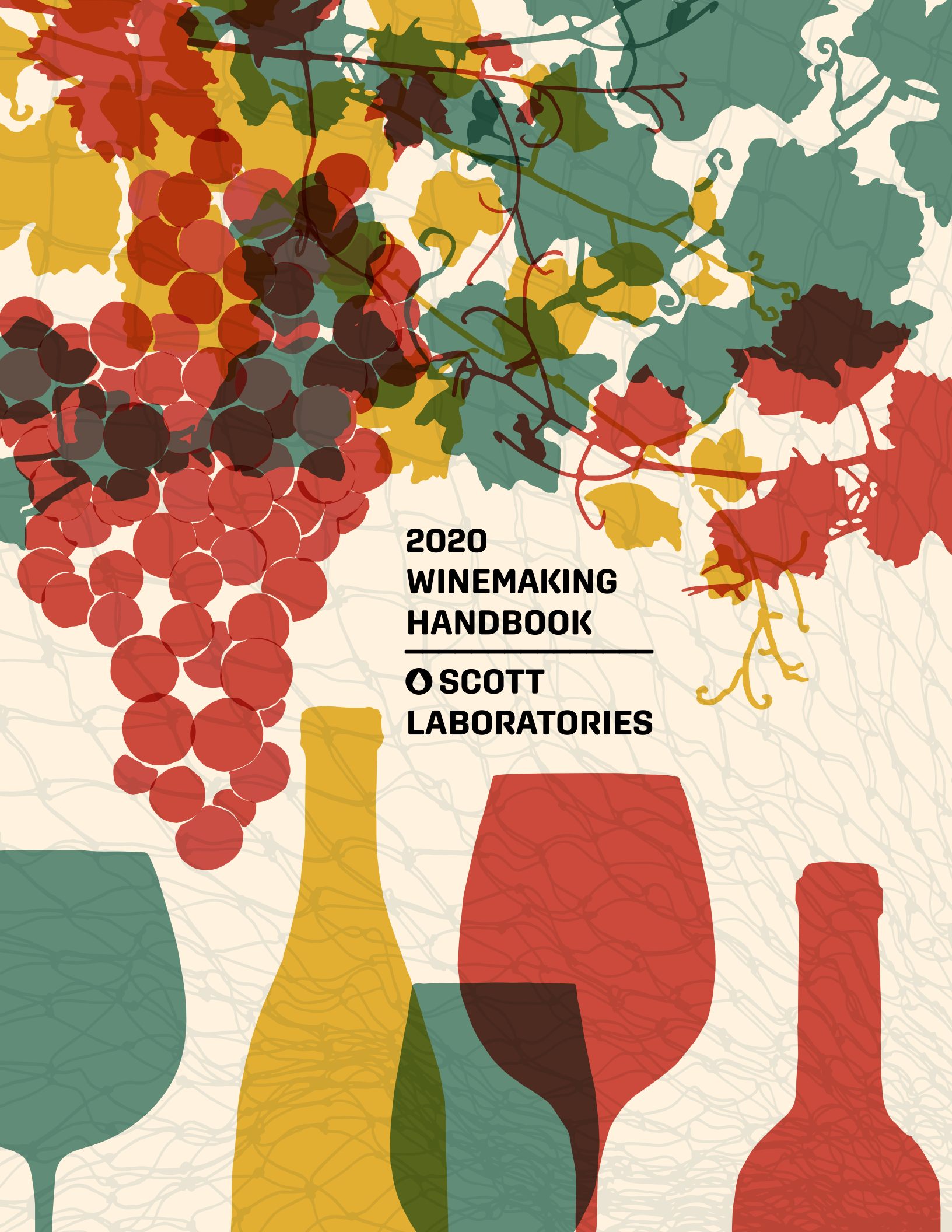

2020 WINEMAKING HANDBOOK

SCOTT LABORATORIES

WELCOME: YOU HAVE A FRIEND AT SCOTT LABS

Welcome to the 2020 edition of the Scott Labs' Winemaking Handbook! This publication, now in its 25th year, has a new name but the same purpose – to bring the wine industry the best fermentation and enological products while delivering the best product application support and winemaking know-how.

I recently came back to Scott Labs (for the 3rd time!) after having been away for several years. Since my return I have been amazed by the people who serve the needs of our fermentation and enology customers. Our team is large, geographically diverse, knowledgeable, friendly, and fiercely dedicated to getting things right. We are available to answer your questions, help you troubleshoot a problem, track down an order, or just lend a sympathetic ear.

I'm proud to be part of this team and wanted you to meet us if you haven't done so already.

You have a friend at Scott Labs. Your success is our success and we love being part of your community.

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Fermentation & Enology Dept. GM

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Inside Sales

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Laboratory Director

Julia Crosby Vazquez
Inside Technical Sales

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SUPPLIERS

LALLEMAND

www.lallemandwine.com

Lallemand has been producing yeast since the 1920s when it started supplying fresh bakers yeast in Quebec, Canada. In 1974, over 50 years later, Lallemand found a new partner with Scott Laboratories who was looking to produce dry wine yeast from their culture collection. Two strains were produced that first year — the first ever active dry wine yeast brought to North America!

The Lallemand/Scott Laboratories relationship, now in its 46th year, has brought North American winemakers nearly one hundred Lallemand products including yeast, yeast-based products, bacteria and enzymes. These products have changed the way North America makes wine and have changed winemakers' understanding of winemaking.

Lallemand is the leader in knowledge, education, applications and product development for winemakers worldwide. With 150 research scientists, 11 research labs, over 70 publications, eight patents, and collaboration with enological institutions on five continents, Lallemand is committed to the ongoing success of the global wine industry. Their solutions to winemaking problems are both cutting edge and practical.

IOC

www.ioc.eu.com

The origins of the Institut Oenologique de Champagne (IOC) headquartered in Epernay, France can to be traced back to the founding of the Entrepôt Général de la Champagne in 1890. Since 2010, Scott Laboratories has supplied their products to North America.

In the early days, the IOC was known for post-fermentation products. Today they offer not only fining agents and stabilizers, but yeast and other wine processing products for still and sparkling wines.

ANCHOR

www. anchoroenology.com

Anchor Yeast began in 1923 when Daniel Mills and Sons started the first yeast factory in Cape Town, South Africa. Yeast is now produced in an ISO 9001:2008 certified plant near Durban. They produce wine yeast, baker's yeast, distilling yeast and whiskey yeast and are sold throughout the world.

The wine yeast strains from Anchor Oenology can be divided into natural isolates and hybrid strains which combine the best characteristics from both parents. Anchor Oenology is the leading New World wine yeast producer.

THE OAK LAB

www.theoaklab.com

The Oak Lab is a portfolio of oak infusion products that was launched in 2019 and is the newest division of Scott Laboratories. The Oak Lab's mission is to deliver oak infusion products that are unique and exceedingly high-quality.

The Oak Lab's flagship Thermic line of products are produced using a revolutionry process. The Thermic products are consistent in their flavor and aroma profiles and reliably scale up from bench trials to production volumes with remarkable fidelity.

OENOBRANDS

www.oenobrands.com

Oenobrands comes to the Scott Laboratories portfolio with a distinguished pedigree. Supported by its world renowned parent companies, DSM Food Specialties and Anchor Oenology, Oenobrands provides winemakers with innovative and scientifically sound solutions. This results in revolutionary products from brands such as DSM, Rapidase and Claristar.

ERBSLÖH

www.erbsloeh.com

Scott Laboratories is proud to add Erbslöh to our list of suppliers. Erbslöh is one of the most trusted names in the industry. Based in Geisenheim, Germany, this family owned company brings the Scott Laboratories portfolio premium bentonites and granulated carbons.

BIOSEUTICA

www.bioseutica.com

Bioseutica produces our lysozyme. The Bioseutica Group's experience with egg-derived proteins extends back to the 1940s and they are now the world's largest producer of these products. In the early 1990s Bioseutica researchers discovered that lysozyme had winemaking uses. Bioseutica's lysozyme and Lysovin have since become standard tools in modern winemaking.

AIRD INNOVATIONS IN CHEMISTRY

www.airdchemistry.com

AiRD® Innovations in Chemistry specializes in environmentally conscious cleaning products for the wine industry. Founded over two decades ago in New South Wales, Australia, AiRD grew up near the vineyards with the goal of providing sustainable, non-hazardous alternatives to caustic for cleaning stainless steel and other surfaces.

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NEW PRODUCTS FROM SCOTT LABORATORIES

LALLEMAND

YEAST

LALVIN MSB™

Taste the power of New Zealand!

YSEO

MSB (Marlborough Sauvignon blanc) is a newly isolated yeast strain from the Marlborough Valley in New Zealand. This strain enhances fruity, tropical and citrus notes.

Find MSB on page 27.

LALLEMAND

INACTIVATED YEAST

GLUTASTAR™

GET SUPREME HIGH POWER

THE KING OF NATURAL ANTIOXIDANTS

Glutastar is a yeast derivative nutrient that protects and stabilizes wine aroma and color due to its unique content of antioxidant peptides and high concentration of GSH (reduced glutathione). Glutastar's high antioxidant and scavenging of free radicals leads to increased wine shelf life. Glutastar also increases the perception of freshness and mouthfeel thanks to the contribution from yeast-derived polysaccharides.

Find Glutastar on page 51.

YEAST

EXOTICS NOVELLO

ICONIC, FRESH AND **FRUITY** WINES

Exotics Novello is a new all-purpose yeast strain that enhances aromatic expression in white and red wines. This strain is an inter-species hybrid between *Saccharomyces cerevisiae* and *Saccharomyces cariocanus*.

Find Exotics Novello on page 23.

MALOLACTIC BACTERIA

SOLO SELECT

SECURITY AND STRUCTURE

Anchor Solo Select is a malolactic bacteria selected for its ability to perform MLF under a wide range of conditions. This robust culture can enhance complexity and structure as well as dark fruit and spicy characteristics.

Find Solo Select on page 59.

LALLEMAND

YEAST

SAUVY™

Dare to mark your territory

Unleash the full potential of your Sauvignon blanc

YSEO

Sauvy is a wine yeast perfect for Sauvignon blanc and other aromatically intense white wines. Sauvy was selected for its exceptional ability to reveal volatile thiols, most notably 4MMP, leading to overexpression of gooseberry, grassy, and passion fruit aromas.

Find Sauvy on page 30.

LALLEMAND

NON-*SACCHAROMYCES* YEAST

LAKTIA™

Give back freshness to your wines

LEVEL 2 SOLUTIONS

Laktia is a natural alternative for acidification. Laktia is a pure culture of *Lachancea thermotolerans* used to produce high levels of lactic acid during fermentation. Laktia gives winemakers new possibilities to naturally acidify wine during fermentation.

Find Laktia on page 35.

ERBSLÖH

BENTONITE

GranuBent PORE-TEC

GranuBent PORE-TEC is a new-to-us sodium-based bentonite for the removal of heat unstable proteins. Like all Erbslöh bentonites, GranuBent PORE-TEC is highly purified. Its production using PORE-TEC technology makes it virtually dust free and easy-to-use. GranuBent PORE-TEC joins our other specialty bentonites—BlancoBent UF, compatible with cross-flow filtration, and FermoBent PORTE-TEC, used during fermentation—from the Erbslöh family of products. *Find GranuBent on page 97.*

IOC

FERMENTATION OAK CHIPS

feelwood!

BALANCE & STRUCTURE

Minimize herbaceousness while amplifying fruit aromatics with feelwood! BALANCE & STRUCTURE fermentation oak chips. These oak chips are a mix of untoasted, light, and medium toasted French oak.

Find out more on page 75.

IOC

FERMENTATION OAK CHIPS

feelwood!

SWEET & FRESH

Enhance fruit, add mid-palate sweetness, while increasing length and finish with feelwood! SWEET & FRESH fermentation oak chips. These oak chips are untoasted 100% French oak.

Find out more on page 75.

VINEYARD PRODUCTS

Modern winegrowers face many challenges including increasing climatic uncertainty, demands from consumers looking for less chemical inputs in the vineyard, and high expectations of grape quality all while maintaining crop yields. Innovative vineyard strategies are needed to help growers meet these and future challenges.

Lallemand has developed several innovative products for use in the vineyard. The LalVigne® products, derived from inactivated yeast, offer winegrowers novel tools to promote sustainable viticulture while maintaining and protecting grape quality and yields. LalVigne is the outcome of Lallemand's deep knowledge of microbial technology and rigorous research with respected viticultural institutions.

LALVIGNE® IS A VINEYARD TOOL TO IMPROVE WINE QUALITY

- ♦ Advances phenolic maturity
- ♦ Increases uniformity in ripening
- ♦ Reduces herbaceous and green flavors (pyrazines)
- ♦ Protects volatile aromas and enhances mouthfeel

SELECTING LALVIGNE FOR SUCCESS

Each vineyard will differ in its potential to provide quality grapes and yield depending on many factors. In order to successfully choose and apply the best LalVigne product it's important to understand the vineyard location, the stage of growth of the vines, the vintage conditions, and the grape variety.

VINEYARD LOCATION

In cooler climates phenolic maturity can be difficult to reach. Due to the onset of rain and early frosts the harvest date may be determined by external factors and not by grape maturity. In warm climates optimal sugar levels are often reached before phenolic maturity. Application of LalVigne minimizes the sugar/maturity gap and allows winemakers the opportunity to make picking decisions based on flavor.

VINE GROWTH PHASE

LalVigne is applied at the beginning of veraison. Maximum benefit of a LalVigne treatment is when the first spray is applied at 5% veraison and the second application is 10 - 12 days later. If the window of veraison is missed, there is still some benefit in applying LalVigne (see chart on Page 8).

VINTAGE CONDITIONS

Drought, rainfall, temperature and light variations are dominant conditions affecting the vintage. These variations impact vine growth rates, vigor, yield and fruit composition. Berry size, tannins, flavor, color, aroma and Brix are all uniquely affected by each years vintage conditions.

GRAPE VARIETY

LalVigne can reduce green and herbaceous flavor when applied to grape varieties high in pyrazines (Cabernet Sauvignon, Cabernet Franc, and Merlot). When using LalVigne on white grape varieties there is an increase in compounds that help stabilize volatile aromas. With highly aromatic varities such as Sauvignon blanc, Muscat, and Riesling LalVigne can increase varietal aromas.

LALVIGNE® AROMA + LALVIGNE LA

Yeast-based foliar spray for enhancing varietal expression

White grape varieties

#17501	3 kg LalVigne Aroma*	$110.00
#17500	3 kg LalVigne LA*	$110.00

Use of LalVigne® Aroma will improve both grape and wine quality. In grapes an increase in berry skin thickness gives added protection against rot. Increases in glutathione prevent degradation of aromatic compounds making them more stable for ageing. In aromatic grape varieties there is an increase of the 3MH aromatic precursors which can convert to 3MHA, increasing the thiol aromatic compounds in varieties such as Sauvignon blanc. Mouthfeel components are enhanced and green and vegetal flavors are diminished. Minimal impact on berry weight, Brix, pH or total acidity.

Recommended Dosage

1 treatment = 2 applications = $88.00/acre

1 application =	2.7 lb/acre/1.2 kgs/acre

LALVIGNE® MATURE + LALVIGNE LM

Yeast-based foliar spray for phenolic maturity and uniform ripening

Red grape varieties

#17511	1 kg LalVigne Mature*	$94.00
#17510	1 kg LalVigne LM*	$94.00

Use of LalVigne® Mature advances phenolic maturity and evens the ripening process. Increases in berry skin thickness give added protection against rot. Thicker skins also allow for better extractability of anthocyanins (color) as well as improved structure. LalVigne Mature reduces herbaceous and green characters with a positive impact on mouthfeel. Minimal impact on berry weight, Brix, pH or total acidity.

Recommended Dosage

1 treatment = 2 applications = $76/acre

1 application =	0.9 lb/acre/405 g per acre

Application Recommendation

LalVigne® is applied with a standard vineyard sprayer on the leaves at the beginning of veraison. Maximum benefit of a LalVigne treatment is when the first application is applied at 5% veraison with a second application 10 - 12 days later. If 5% veraison is missed there is still some benefit in applying LalVigne. See chart below for guidance on applying LalVigne at different stages of veraison.

%Veraison at First Application:	Timing of Second Application
5% (ideal)	12-14 days after first application
5–30%	10-12 days after first application (+/- 2 days)
30–50%	7 days after the first application
50–70%	7 days after the first application if 100% veraison is not reached
70%	Not reccommended

HOW DOES LALVIGNE WORK?

Recognition
Treatment recognition by plant receptors

↓

Activation
Plant response activated

↓

Secondary Metabolism
Plant synthesis of secondary metabolites

↓

Grape Improvement
Improved extractability of compounds most desired by winemakers

↓

Wine Improvement
More balanced wines

LalVigne is an inactivated yeast product that is sprayed as a foliar spray on the grapevines twice during early veraison. The plant receptors in the leaves **recognize** the yeast as a possible pathogen, which **activates** the plant's **secondary metabolism**. The production of secondary metabolites includes anthocyanins, tannins and other phenolic compounds, resulting in uniform ripening and better **quality of grapes and the resulting wine**.

**LalVigne Aroma® and LalVigne Mature® are registered in the following states: AL, AK, AZ, CT, DE, FL, GA, HI, IL, IN, IA, KS, KY, LA, MD, MA, MI, MO, MT, NE, NV, NH, NJ, NY, NC, OR, RI, TN, UT, VT, VA, WA, WY*

LalVigne LA and LalVigne LM are registered in the following states: CA, CO, ME, MN, MS, NM, OH, PA, SC, TX, WI
The following states have no registered use: ID, ND, OK, SD, WV

YEAST

Since our founding in 1933 as the Berkeley Yeast Laboratory, yeast has been at the heart of our portfolio. Our first commercial yeasts were provided on slants and came from the yeast collection housed at the University of California, Berkeley during prohibition. Growing yeast from slants poses microbial challenges for winemakers so we started providing yeast in an active dried form. For many years we produced and dried our strains at a large brewery, but in 1974 we partnered with Lallemand who began to produce our wine strains in addition to their baking strains. This partnership launched Lallemand into wine yeast production. Lallemand continues to isolate and bring new wine yeast strains to winemakers worldwide and they remain the most respected wine yeast producer in the world.

Today's wine yeast strains are well characterized and improvements have been made in their strength, purity and reliability. A near century of wine yeast cultivation makes Scott Laboratories and our yeast partners uniquely positioned to assist winemakers with yeast to meet the demands of today's winemaking.

SELECTING YEAST FOR SUCCESS

Harvested grape lots can differ from vintage to vintage and from block to block even within the same vineyard. There is no such thing as "standard" fruit chemistry and you can improve your yeast selection success by knowing the fermentable sugar, yeast assimilable nitrogen (YAN), and physical condition for every lot of fruit. Knowing the pH, titratable acidity (TA), malic acid and potassium concentration for each lot is also helpful for your entire winemaking plan.

We suggest selecting yeast based first on its technical compatibility with grape and winery conditions and secondly on its sensory contribution and compatibility with the desired wine style. For assistance see yeast strain selection charts on pages 11-16.

As a reminder:

FERMENTABLE SUGAR

Yeast strains vary in their ability to tolerate ethanol levels. The initial sugar content will help determine the final ethanol content. Initial sugar content may be determined by gravity (usually reported as °Brix) or by direct measurments of sugar.

YAN

Yeast strains vary in their need for yeast assimilable nitrogen (YAN). Our strains are classified as low, medium or high nitrogen-demanding strains. The amount of nitrogen a yeast will need is dependent upon its individual needs, the initial sugar level and the temperature of the fermentation.

TEMPERATURE

Yeast strains vary in their temperature tolerance. Do not stress the yeast by fermenting at the upper or lower end of the recommended range. Temperature management is a key factor of yeast health, fermentation rate and security. Temperature should be measured directly under the cap in red must/wine and good cap management is required to ensure homogenous temperatures. When working with high sugar fermentations, lower temperatures are recommended.

FRUIT CONDITION

Yeast strain choice can be optimized for unsound or spoiled fruit. Yeast strains that have a short lag phase, are low volatile acidity (VA) producers, and are positive/neutral for competitive factor, will be quick to outcompete microbial spoilers, won't contribute to VA, and won't be sensitive to microbial attack. If the fruit was treated with high SO_2 to combat spoilage, consider using a no to low H_2S-producing strain.

WHY SHOULD YOU ADD 25 g/hL* OF YEAST?

Lower potential for osmotic shock	Shorter lag phase	Fast onset of fermentation	Shorter fermentation length	Lower final VA	Lower final residual sugar	Healthier cell population

** If sugar is greater than 25 °Brix you should increase your inoculation rate to at least 30g/hL (2.5 lb/1000 gal). Increasing dosage of yeast may help prevent a sluggish or stuck fermentation.*

HOW TO MAKE GOOD YEAST BETTER

QTL PROCESS: BREEDING YEAST THAT DO NOT PRODUCE SULFIDES OR SULFUR DIOXIDE

Selective breeding is used to improve the traits of enological strains of *Saccharomyces cerevisiae*. At the genetic level, traits may be controlled by a single/small group of genes or by a large group of genes.

Yeast traits that are controlled by a single or small group of genes have been the traditional target of selective breeding. When two yeast strains, each with different traits controlled by one or a few genes, are bred together, daughter yeast are easily screened to find the correct combination of traits.

Some yeast traits are genetically complex and traditional selective breeding and screening methods are an ineffective tool to target these traits. For example, if we breed two strains of wine yeast, one that produces low levels of H_2S and another that produces low levels of SO_2, it is very difficult to identify the daugher yeast that is both a low H_2S and low SO_2 producer. This is because these traits are controlled and influenced by a large group of genes.

Quantitative Trait Loci (QTL) is a new technique that allows us to pinpoint the location of all genes involved in complex yeast traits. Now when we selectively breed yeast we can quickly screen daughter strains for the desired trait. Combining QTL mapping with selective breeding has allowed Lallemand to produce a line of **no to very low H_2S, SO_2, and acetaldehyde producing strains**. This is a non-GMO technique and all QTL process strains are naturally bred. Look for the QTL logo in the yeast descriptions.

QTL PROCESS

Low H_2S and SO_2 producer

YSEO PROCESS: YEAST PREPARATION IMPROVES PERFORMANCE AND SENSORY QUALITY

Did you know that the way in which a yeast is produced can have a major impact on wine quality?

In the early 2000s, Lallemand began developing a new yeast preparation technique. The Yeast SEcurity and SEnsory Optimization process (YSEO) optimizes nutrient additions during cell growth and the results are impressive.

The chart shows that yeast produced using the YSEO process produce less volatile acidity (VA) in a variety of wine types. In each fermentation the same yeast strain was used in identical conditions. The only difference was that one was fermented with yeast produced with the YSEO process and the other with the traditional yeast production process.

Other trials have shown that the YSEO process can enhance strain performance in other ways including reduced lag phase, faster fermentation times, decreased H_2S production, better adaption to stressful conditions and reduced malolactic fermentation antagonism.

YSEO can make a good yeast even better.

YSEO IS A UNIQUE AND INNOVATIVE PROCESS FOR YEAST DEVELOPED BY LALLEMAND.

The benefits of the YSEO process are:

Reduced lag phase	Better adaption to stressful conditions	Optimized fermentation	Reduced potential for VA

Production of Volatile Acidity in Yeast Produced with and without the YSEO Process

	Yeast without YSEO (g/L acetic acid)	Yeast with YSEO (g/L acetic acid)
Italy (Montepulciano)	0.29	0.18
INRA (Sauvignon)	0.51	0.42
INRA (Sauvignon)	0.31	0.13
WSU (Riesling)	0.44	0.31
WSU (Syrah)	0.23	0.21
WSU (Cabernet Sauvignon)	0.58	0.38

Adapted from the article, *Evaluation of the YSEO Process to Prepare Dried Winemaking Yeast* by Sibylle Krieger[1], Anne Ortiz-Julien[1], Francoise Raginel[1], Ann Dumont[1], Forbes Wardrop[1], Charles G. Edwards[2]

[1] Lallemand, 1620, rue Prefontaine, Montreal, QC Canada

[2] Department of Food Science and Human Nutrition, Washington State University, Pullman, WA, U.S.A.

YSEO™ PROCESS

Yeast Security & Sensory Optimization

YEAST STRAINS FOR WHITE & ROSÉ WINE

○ Yeast Strain Type
♦ Highly Recommended
◊ Recommended
M Mouthfeel
EVC Enhanced Varietal Character
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	43/43 RESTART	58W3	71B	Alchemy I	Alchemy II	Assmanshausen (AMH)	BA11	BM 4x4	BRG	CEG (Epernay II)	Cross Evolution	CVW5	CY3079	DV10	EC1118	Elixir	Exotics Mosaic	Exotics Novello	Fermivin Champion	ICV D21
Page#	17	17	17	18	18	19	19	20	20	20	21	21	22	22	22	22	23	23	24	24
S. cerevisiae cerevisiae		○	○				○		○	○			○							○
S. cerevisiae bayanus	○											○		○	○				○	
Yeast hybrid/other						○					○					○	○	○		
Yeast blend				○	○			○												
Alcohol Tolerance[1]	17%	14%	14%	15.5%	15.5%	15%	16%	16%	15%	13.5%	15%	15%	15%	17%	18%	15%	15.5%	15.5%	18%	16%
Relative Nitrogen[2]	Low	Med	Low	Med	Med	Med	High	High	High	Med	Low	Low	High	Low	Low	Med	Med	Med	Med	Med
Temp. Range (°F)[3]	55–95	54–77	59–85	56–61	56–61	68–86	59–77	64–82	64–88	59–77	58–68	57–82	59–77	50–95	50–86	57–77	64–83	62-82	59–86	61–86
Fermentation Speed	Fast	Mod	Mod	Fast	Fast	Slow	Mod	Mod	Fast	Slow	Mod	Fast	Mod	Fast	Fast	Slow	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Ntrl	Snstv	Yes	Yes	Snstv	Snstv	Yes	Ntrl	Snstv	Yes	Yes	Snstv	Yes	Yes	Snstv	Yes	Yes	Ntrl	Yes
Sensory Effect	Ntrl	EVC Esters M	Esters	EVC Esters	EVC Esters	EVC	Esters M	EVC M	EVC	Esters	EVC M	Esters	EVC M	Ntrl	Ntrl	EVC Esters	EVC M	EVC M	Ntrl	EVC M
MLF Compatibility	Good	Avg	Very Good	Good	Good	Very Good	Below Avg	Below Avg	Avg	Not Known	Avg	Avg	Good	Good	Avg	Avg	Very Good	Good	Good	Avg
Albariño					♦						♦	♦					♦	♦		
Chardonnay				♦				♦	♦		♦	♦	♦	♦		♦	♦			♦
Chenin blanc				♦	♦							♦					♦			
Gewürztraminer		♦				◊	♦				♦			♦						
Muscat							◊			♦	♦	♦		◊				♦		
Pinot blanc							♦				♦		♦	♦						
Pinot gris		♦	♦	♦								♦		♦		◊				
Riesling		♦	♦	♦		♦	♦				♦									
Sauvignon blanc				♦	♦		♦	◊			♦					♦				
Viognier		♦		◊			♦									♦	♦			
Rosé			♦				♦			♦	♦	♦				♦				◊
Rhône Whites		♦		♦	♦		♦	◊			♦					♦	♦			
Aromatic Whites		♦		♦			♦				♦	♦				♦		♦		
Late Harvest	♦													◊	◊					
Sparkling Base							◊					♦		♦	♦					
Restart Stuck	♦													♦	◊				♦	

1. The alcohol tolerance column indicates performance possibilities in good circumstances and conditions. Alcohol tolerance may vary as circumstances and conditions vary.

2. Relative nitrogen needs refer to how much nitrogen one strain requires relative to the other strains on this chart. *See article on page 45.*

YEAST STRAINS FOR WHITE & ROSÉ WINE

○ Yeast Strain Type
♦ Highly Recommended
◊ Recommended
M Mouthfeel
EVC Enhanced Varietal Character
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	ICV D47	ICV D254	ICV GRE	ICV OKAY	ICV Opale 2.0	IOC Be Fruits	IOC Be Thiols	K1 (V1116)	M83	MSB	NT 116	QA23	R2	Rhône 4600	R-HST	Sauvy	Sensy	VIN 13	VIN 2000	W15
Page#	24	25	25	25	26	26	26	27	27	27	28	28	29	29	30	30	30	31	32	32
S. cerevisiae cerevisiae	○	○	○					○	○					○	○	○				○
S. cerevisiae bayanus										○		○	○							
Yeast hybrid/other				○	○	○	○				○						○	○	○	
Yeast blend																				
Alcohol Tolerance[1]	15%	16%	15%	16%	14%	14%	15%	18%	15%	14.5%	16%	16%	16%	15%	15%	14%	15%	17%	15.5%	16%
Relative Nitrogen[2]	Low	Med	Med	Low	Low	Low	Med	Med	Med	Med	Med	Low	High	Low	Med	Med	Low	Low	Low	High
Temp. Range (°F)[3]	60–82	54–82	59–82	54–86	59–86	54–75	59–77	50–95	63–82	57-68	54-61	59–90	50–86	56–72	50–86	57–68	54–64	54–61	55–61	50–81
Fermentation Speed	Mod	Mod	Mod	Mod	Mod	Mod	Fast	Fast	Mod	Mod	Fast	Fast	Mod	Mod	Mod	Mod	Mod	Fast	Mod	Mod
Competitive Factor	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sensory Effect	EVC M	EVC M	EVC M	Esters	EVC Esters	EVC Esters	EVC	Esters	EVC	EVC M	EVC E	EVC	Esters	Esters	EVC M	EVC	EVC M	EVC Esters	EVC Esters	EVC M
MLF Compatibility	Good	Very Good	Very Good	Very Good	Good	Good	Good	Poor	Avg	Not Known	Good	Very Good	Good	Good	Avg	Not Known	Very Good	Good	Good	Very Good
Albariño	◊					♦						♦						♦	♦	
Chardonnay	♦	♦			♦							♦		♦				♦	♦	
Chenin blanc			♦				♦		♦		♦							♦	♦	
Gewürztraminer	◊						◊					♦	♦		♦					♦
Muscat												♦						♦		
Pinot blanc												♦					♦			
Pinot gris													◊	◊						♦
Riesling			♦				◊					◊	♦		♦					♦
Sauvignon blanc					♦		♦			♦	♦	♦	♦	◊	♦	♦	♦	♦	♦	
Viognier	◊			♦								◊	◊	♦	♦				♦	
Rosé	♦	◊	♦	♦	♦	♦	♦		♦					♦	◊		♦	♦	◊	♦
Rhône Whites	♦	♦	♦		♦									♦	♦			♦	◊	♦
Aromatic Whites												♦	♦		♦	♦		♦		♦
Late Harvest							◊						♦		◊			◊		
Sparkling Base				◊			◊					◊						◊		
Restart Stuck							♦											♦		

3. The temperature column indicates general performance possibilities. It is not a substitute for sound winemaking. Yeast may be stressed or die if temperatures are sustained at extremes of their tolerance. Keep in mind that a yeast's ability to ferment within the given range also depends on alcohol and other antagonistic conditions.

Important Notes
This chart is only useful as a quick reference guide. For more information on selected yeast strains, please refer to the yeast section of this handbook.

Red Wine Yeast Strains *continue on next page* →

YEAST STRAINS FOR RED WINE

○ Yeast Strain Type
♦ Highly Recommended
◊ Recommended
M Mouthfeel
EVC Enhanced Varietal Character
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	43	43 RESTART	3001	71B	Alchemy III	Alchemy IV	Assmanshausen (AMH)	BDX	BM 4X4	BRG	BRL97	CLOS	CSM	CVRP	Exotics Mosaic	Exotics Novello	Fermivin Champion	Fermivin MT48
Page#	17	17	18	17	18	19	19	19	20	20	20	21	21	21	23	23	24	24
S. cerevisiae cerevisiae			○	○				○		○	○	○	○	○				○
S. cerevisiae bayanus	○	○															○	
Yeast hybrid/other							○								○	○		
Yeast blend					○	○			○									
Alcohol Tolerance[1]	17%	17%	15%	14%	15.5%	15.5%	15%	16%	16%	15%	16%	17%	14%	16%	15.5%	15.5%	18%	15%
Relative Nitrogen[2]	Low	Low	Med	Low	Med	Med	Med	Med	High	High	Med	Med	Med	Med	Med	Med	Med	Low
Temp. Range (°F)[3]	55–95	55–95	54–90	59–85	61–82	61–82	68–86	64–86	64–82	64–88	62–85	57–90	59–90	64–86	64–83	62-82	59–86	68–86
Fermentation Speed	Fast	Fast	Mod	Mod	Fast	Fast	Slow	Mod	Mod	Fast	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Yes	Yes	Snstv	Yes	Yes	Snstv	Snstv	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Ntrl
Sensory Effect	Ntrl	Ntrl	EVC	Esters	EVC	EVC	EVC	EVC M	EVC M	EVC M	EVC	EVC M	EVC	EVC M	EVC M	EVC M	Ntrl	M
MLF Compatibility	Good	Good	Avg	Very Good	Good	Good	Very Good	Avg	Below Avg	Avg	Avg	Very Good	Avg	Very Good	Very Good	Good	Good	Good
Barbera								◊	◊		♦	♦						
Cabernet Franc						♦					◊		♦	♦				
Cabernet Sauvignon					♦			♦	♦		◊		♦	♦				
Grenache				♦	♦				♦		◊	♦			♦			♦
Malbec					♦						♦	♦						
Merlot								♦	◊		♦		♦	♦	♦			♦
Petite Sirah							♦		♦			♦		♦				
Pinot noir			♦		◊	♦	♦			♦	♦							
Petit Verdot					♦			♦			♦	♦	♦		♦			♦
Sangiovese	♦					♦			♦									♦
Syrah	♦					♦		♦	◊		◊	♦			♦			
Tempranillo					♦							♦		♦	♦			♦
Zinfandel	♦				♦		♦	♦	♦		♦	♦						
Fruit Forward Reds				♦		♦									♦	♦		♦
Structured Reds					♦			♦	♦			♦						
Restart Stuck	♦	♦															♦	

1. The alcohol tolerance column indicates performance possibilities in good circumstances and conditions. Alcohol tolerance may vary as circumstances and conditions vary.

2. Relative nitrogen needs refer to how much nitrogen one strain requires relative to the other strains on this chart. *See article on page 45.*

Yeast

YEAST STRAINS FOR RED WINE

○ Yeast Strain Type
♦ Highly Recommended
◊ Recommended
M Mouthfeel
EVC Enhanced Varietal Character
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	ICV D21	ICV D80	ICV D254	ICV GRE	ICV OKAY	Ionys$_{WF}$	MT	NT 116	NT 202	Persy	RC212	Rhône 2226	RP15	Syrah	T73	Tango Malbec	VRB	W15
Page#	24	25	25	25	25	26	27	28	28	28	29	29	30	31	31	31	32	32
S. cerevisiae cerevisiae	○	○	○	○		○	○				○	○	○	○		○	○	○
S. cerevisiae bayanus															○			
Yeast hybrid/other					○			○	○	○								
Yeast blend																		
Alcohol Tolerance[1]	16%	16%	16%	15%	16%	16%	15%	16%	16%	16%	16%	18%	17%	16%	16%	16%	17%	16%
Relative Nitrogen[2]	Med	High	Med	Med	Low	High	Med	Med	Med	Low	Med	Med	Med	Med	Low	Med	Med	High
Temp. Range (°F)[3]	61–86	59–82	54–82	59–82	54–86	77–82	59–90	76-83	60–82	59–82	60–86	59–82	68–86	59–90	65–90	59–82	59–82	50–81
Fermentation Speed	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Fast	Fast	Mod	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Yes	Yes	Yes	Yes	Ntrl	Ntrl	Yes
Sensory Effect	EVC M	EVC M	EVC M	EVC M	Esters	M	EVC M	EVC	EVC Esters	EVC M	EVC	EVC M	EVC	EVC	Esters M	EVC	EVC M	EVC M
MLF Compatibility	Avg	Avg	Very Good	Very Good	Very Good	Good	Avg	Good	Very Good	Very Good	Good	Below Avg	Avg	Avg	Below Avg	Good	Good	Very Good
Barbera	◊	◊	◊	◊								♦					♦	
Cabernet Franc	◊	◊	◊	♦			◊		◊		◊	♦	♦		◊			
Cabernet Sauvignon	♦	♦	♦	♦		♦	♦	♦	♦		♦	◊	♦					
Grenache	◊		◊	♦							♦	◊		◊			◊	
Malbec			♦			♦			♦				♦			♦		
Merlot	♦	♦	◊	♦		♦	♦		♦			♦	♦	♦	♦	◊		
Petite Sirah		♦			♦	♦				♦		♦	♦	♦		◊	♦	
Pinot noir				◊					♦	♦	♦							♦
Petit Verdot	◊		♦			♦	♦	♦					♦	♦				
Sangiovese	◊		♦	◊		♦						♦		◊	♦		♦	
Syrah	♦	♦	♦	♦	♦	♦				♦			♦	♦		♦		♦
Tempranillo	◊	◊	◊	◊		♦	◊			♦					♦	♦	♦	
Zinfandel	♦	♦	♦						◊			♦	♦		♦		♦	
Fruit Forward Reds				♦											♦		♦	
Structured Reds	♦	♦					♦		♦			♦	♦	♦				
Restart Stuck									◊			◊						

3. The temperature column indicates general performance possibilities. It is not a substitute for sound winemaking. Yeast may be stressed or die if temperatures are sustained at extremes of their tolerance. Keep in mind that a yeast's ability to ferment within the given range also depends on alcohol and other antagonistic conditions.

Important Notes
This chart is only useful as a quick reference guide. For more information on selected yeast strains, please refer to the yeast section of this handbook.

YEAST STRAINS FOR AMERICAN & HYBRID WHITE CULTIVARS

○ Yeast Strain Type
♦ Highly Recommended
◊ Recommended
M Mouthfeel
EVC Enhanced Varietal Character
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	58W3	71B	Alchemy I	CVW5	CY3079	Elixir	Exotics Mosaic	ICV Opale 2.0	QA23	Sauvy	VIN 13	VIN 2000
Page#	17	17	18	21	22	22	23	26	28	30	31	32
S. cerevisiae cerevisiae	○	○			○					○		
S. cerevisiae bayanus				○					○			
Yeast hybrid/other						○	○	○			○	○
Yeast blend			○									
Alcohol Tolerance[1]	14%	14%	15.5%	15%	15%	15%	15.5%	14%	16%	14%	17%	15.5%
Relative Nitrogen[2]	Med	Low	Med	Low	High	Med	Med	Low	Low	Med	Low	Low
Temp. Range (°F)[3]	54-77	59–85	56-61	57-82	59-77	57-77	64-83	59-86	59-90	57-68	54-61	55-61
Fermentation Speed	Mod	Mod	Fast	Fast	Mod	Slow	Mod	Mod	Fast	Mod	Fast	Mod
Competitive Factor	Ntrl	Snstv	Yes	Yes	Snstv	Snstv	Yes	Yes	Yes	Yes	Yes	Yes
Sensory Effect	EVC Esters M	Esters	EVC Esters	Esters	EVC M	EVC Esters	EVC M	EVC Esters	EVC	EVC	EVC Esters	EVC Esters
MLF Compatibility	Average	Very Good	Good	Average	Good	Average	Very Good	Good	Very Good	Not Known	Good	Good
Reduces malic acid content		♦					♦	♦				
Aromella	♦		◊			◊			♦		◊	
Blanc du Bois				♦		◊			♦	♦	♦	♦
Chardonel			♦	♦	♦			♦	♦		♦	♦
Frontenac blanc			♦			♦			♦		♦	◊
Frontenac gris	◊	♦		♦			♦	♦	♦	♦		
Itasca		♦		♦					♦		♦	◊
La Crescent	♦	♦	♦			♦	♦		♦	♦	♦	
Muscadine	◊			♦					♦		♦	
Rosé		♦		♦		◊	♦	♦			♦	♦
Seyval blanc			♦			♦			♦	♦		◊
Traminette	♦		♦			◊	♦		◊	♦	♦	
Vidal blanc			♦	♦		◊		◊				♦
Vignoles	♦		♦			♦		◊	♦		♦	

1. The alcohol tolerance column indicates performance possibilities in good circumstances and conditions. Alcohol tolerance may vary as circumstances and conditions vary.

2. Relative nitrogen needs refer to how much nitrogen one strain requires relative to the other strains on this chart. *See article on page 45.*

HYBRID AND NON-VINIFERA WINES

Most native American grape cultivars tend to have strong fruit flavors and aromas as compared to European cultivars. This is especially true of *rotundifolia* (Muscadine) and *labrusca* varieties. The combination of strong fruit and high acid is often balanced by creating wines with residual sugar.

French-American hybrid varieties are crosses between *Vitis vinifera* and one or more American varieties. As a result of the breeding it is possible to create cultivars that have aromas and flavors that are more or less reminiscent of their European ancestors. In addition to viticultural practices, wine style can be influenced by the yeast strain. Yeast can enhance flavors and aromas, mouthfeel and varietal expression. If the yeast

YEAST STRAINS FOR AMERICAN & HYBRID RED CULTIVARS

○ Yeast Strain Type
♦ Highly Recommended
◊ Recommended
M Mouthfeel
EVC Enhanced Varietal Character
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	3001	71B	Alchemy III	Alchemy IV	BM 4X4	BRL 97	CLOS	CSM	ICV D254	Exotics Mosaic	Persy	NT 202	RC212
Page#	18	17	18	19	20	20	21	21	25	23	28	28	29
S. cerevisiae cerevisiae	○	○				○	○	○	○				○
S. cerevisiae bayanus													
Yeast hybrid/other										○	○	○	
Yeast blend			○	○	○								
Alcohol Tolerance[1]	15%	14%	15.5%	15.5%	16%	16%	17%	14%	15.5%	16%	16%	16%	16%
Relative Nitrogen[2]	Med	Low	Med	Med	High	Med	Med	Med	Med	Med	Med	Low	Med
Temp. Range (°F)[3]	54-90	59–85	61-82	61-82	64-82	62-85	57-90	59-90	64-83	54–82	60-82	59-82	60-86
Fermentation Speed	Mod	Mod	Fast	Fast	Mod	Mod	Fast	Mod	Mod	Mod	Fast	Mod	Mod
Competitive Factor	Yes	Snstv	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Yes	Yes	Ntrl
Sensory Effect	EVC	Esters	EVC	EVC	EVC M	EVC	EVC M	EVC	EVC M	EVC M	EVC Esters	EVC M	EVC
MLF Compatibility	Average	Very Good	Good	Good	Below Average	Average	Very Good	Average	Very Good	Very Good	Very Good	Very Good	Good
Diminishes vegetal characters		♦		♦	♦			♦			♦		
Promotes color stability					♦	♦							
Reduces malic acid content		♦								♦			
Black Spanish					♦		♦						
Chambourcin	♦			♦	♦	◊	♦	♦	♦		♦	♦	♦
Crimson Pearl			◊	♦					♦				♦
Frontenac		♦		♦	♦			♦		♦	♦	♦	♦
Maréchal Foch	♦		♦			♦				♦	♦	◊	♦
Marquette	♦		♦		♦		♦	♦	♦	♦	♦		◊
Noiret			♦	◊		♦	♦			◊	♦	♦	
Norton	◊		♦	◊		♦	♦		♦	♦		♦	
Petite Pearl		♦	◊	♦			◊		♦			◊	♦
St. Croix			♦				◊	◊				♦	

3. The temperature column indicates general performance possibilities. It is not a substitute for sound winemaking. Yeast may be stressed or die if temperatures are sustained at extremes of their tolerance. Keep in mind that a yeast's ability to ferment within the given range also depends on alcohol and other antagonistic conditions.

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HYBRID AND NON-VINIFERA WINES (CONTINUED)

can convert flavorless thiol precursors into aromatic elements or produce enzymes that cleave glycosidic bonds and release aromatic terpenes into the wine, then varietal characteristics are enhanced. Yeast can also produce high levels of polysaccharides which can increase mouthfeel, balance harshness and acidity (within reason) and add to the colloidal stability of the wine.

In the last few years, new strains of yeast have shown promise with hybrids and native American varieties. These strains are listed in the chart above.

YEAST STRAIN DESCRIPTIONS

43

Fructophilic yeast for high sugar or traditional restart

Zinfandel, Sangiovese, Syrah, Late Harvest

#15134	500 g	$46.00
#15140	10 kg	$560.00

Uvaferm 43™ is a *Saccharomyces cerevisiae bayanus* strain that gives high-quality sensory results in high Brix red fermentations and helps maintain color, red fruit and cherry characteristics.

Isolated by Lallemand in collaboration with the research center of Inter-Rhône in France.

Alcohol Tolerance: 17%	Nitrogen Needs: LOW	Temp. Range: 55-95°F

43 RESTART

Preacclimated fructophilic yeast for restarting stuck fermentations

Restart Stuck Fermentations, Late Harvest

#15223	500 g	$55.00
#15240	10 kg	$672.00

Uvaferm 43 RESTART™ is the result of an innovative preacclimation process developed by Lallemand using Uvaferm 43, a strain isolated by Lallemand in collaboration with Inter-Rhône in France.

43 RESTART's resistance to stressful conditions of stuck fermentations has been naturally enhanced. Acclimation includes addition of micronutrients, sterols and polyunsaturated fatty acids to strengthen 43 RESTART cell membranes. Yeast cells are more robust, acclimate quicker and have a lower mortality rate after inoculation.

43 RESTART is sensory neutral and malolactic bacteria compatible.

For best results use the 43 RESTART protocol for stuck wines. See page 38 for protocol which includes Reskue™ and Fermaid O™ and best practices.

Alcohol Tolerance: 17%	Nitrogen Needs: LOW	Temp. Range: 55-95°F

58W3

Spicy and fruity aromatic white wines

Pinot gris, Gewürztraminer, Riesling, Viognier, Rhône Whites, Aromatic Whites

#15630	500 g	$49.00
#15631	10 kg	$592.00

Vitilevure 58W3™ contributes an overall well-balanced mouthfeel with spicy, floral and fruity aromas.

Allows for the release of bound terpenes in aromatic varieties due to the strain's beta-glucosidase activity. This enhances classic varietal characters.

Due to 58W3's fermentation kinetics, especially in high sugar juices, a balanced nutrient strategy and good fermentation practices should be followed.

This strain was isolated during a five-year study by the INRA (National Agricultural Research Institute) in Alsace, France.

Alcohol Tolerance: 14%	Nitrogen Needs: MEDIUM	Temp. Range: 54-77°F

71B

Softens high malic acid grapes

Pinot gris, Riesling, Grenache, Rosé, Fruit Forward Reds

#15059	500 g	$32.00
#15078	10 kg	$415.00

Lalvin 71B™ is known for fermenting fruity rosé wines and semi-sweet whites. It sythesizes relatively stable esters and higher alcohols resulting in long-lived aromas. Respects rosé wine color.

Softens high acid musts by partially metabolizing malic acid.

Sensitive to competitive factors and may have difficulty competing with wild microflora. Careful rehydration with Go-Ferm Protect Evolution™ and early inoculation will help 71B dominate in competitive conditions.

This strain was isolated and selected by the INRA (National Agricultural Research Institute) in Narbonne, France.

Alcohol Tolerance: 14%	Nitrogen Needs: LOW	Temp. Range: 59-85°F

3001

Suitable for wines that have undergone cold soak

Pinot noir

#15682	500 g	$49.00

Vitilevure 3001™ is recommended for use with cold soak protocols to produce intense Pinot noir wines with aging potential.

Wines made with 3001 are noted for fruit and varietal characters that are both elegant and complex.

This strain 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 a dominant yeast strain from a traditional cold soak that would enhance the varietal character, intensity, and balance of Pinot noir.

Tolerant of standard SO_2 additions and low temperatures for a steady and reliable alcoholic fermentation following cold soak.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 54-90°F

ALCHEMY I

Blend of yeast strains for fruity and floral esters

Sauvignon blanc, Chardonnay, Chenin blanc, Riesling, Pinot gris, Rhône Whites, Aromatic Whites

15174	1 kg	$105.00

Alchemy I is a blend of *Saccharomyces cerevisiae* wine yeast strains developed in collaboration with the Australian Wine Research Institute (AWRI) in South Australia.

The ratio of the yeast in the blend has been formulated to provide an optimal aromatic profile. Alchemy I enhances fruity and floral esters and volatile thiols (boxwood, passion fruit, grapefruit and guava aromas).

Alchemy I is a strong aroma producer with fast fermentation kinetics and low foam production.

Barrel fermentation is not recommended and temperature control is advised.

Alcohol Tolerance: 15.5%	Nitrogen Needs: MEDIUM	Temp. Range: 56-61°F

ALCHEMY II

Blend of yeast strains for expressing volatile thiols

Albariño, Sauvignon blanc, Chenin blanc, Rhône Whites

15177	1 kg	$105.00

Alchemy II is a blend of *Saccharomyces cerevisiae* wine yeast strains developed in collaboration with the AWRI in South Australia for optimal aromatic profile.

Alchemy II enhances volatile thiols such as boxwood, passion fruit, grapefruit, kiwifruit and guava aromas. It is highly recommended for cool tank fermentations of Sauvignon blanc (New Zealand, South African or Chilean style).

Under difficult conditions (pH<3.2, turbidity under 80 NTU, low YAN, temperatures below 15°C(59°F), Alchemy II can be stressed and will produce VA.

Alchemy II is a low SO_2 producer with fast fermentation kinetics. Temperature management is crucial.

Alcohol Tolerance: 15.5%	Nitrogen Needs: MEDIUM	Temp. Range: 56-61°F

ALCHEMY III

Blend of yeast strains for complex structured reds

Cabernet Sauvignon, Malbec, Zinfandel, Tempranillo, Grenache, Petit Verdot, Structured Reds

#15230	1 kg	$105.00

Alchemy III is a blend of *Saccharomyces cerevisiae* wine yeast strains developed in collaboration with the AWRI in South Australia.

Alchemy III is a very high producer of 2-phenylethanol (rose), 2-phenylethyl acetate (floral and fruity), ß-ionone (raspberry) and acetate esters (fruity and candy).

It produces complex wines with good structure and body and is suitable for all red varietals.

Alchemy III is a strong fermenter, producing minimal SO_2 and high levels of glycerol (8–11 g/L).

Alcohol Tolerance: 15.5%	Nitrogen Needs: MEDIUM	Temp. Range: 61-82°F

ALCHEMY IV

Blend of yeast strains for intensely fruity reds

Pinot noir, Syrah, Cabernet Franc, Sangiovese, Fruit Forward Reds

#15231	1 kg	$105.00

Alchemy IV is a blend of *Saccharomyces cerevisiae* wine yeast strains developed in collaboration with the AWRI in South Australia.

Formulated for the production of intense red fruit characters such as cherry, red currant, raspberry and pomegranate. The high production of ethyl esters, especially ethyl hexanoate (fruity) contributes to the longevity of the fruit aromas.

Alchemicy IV can diminish herbaceous, vegetal, and unripe flavors and elevate terpenes while producing smooth, round wines with heightened aroma intensity.

Alchemy IV is a strong fermenter, produces minimal SO_2, and high levels of glycerol (8–11 g/L).

Alcohol Tolerance: 15.5%	Nitrogen Needs: MEDIUM	Temp. Range: 61–82°F

ASSMANSHAUSEN (AMH)

Allows for the expression of indigenous microflora

Pinot noir, Zinfandel, Riesling, Petite Sirah, Gewürztraminer

#15632	500 g	$49.00
#15633	10 kg	$592.00

Enoferm AMH™ has a long lag phase with a slow to medium fermentation rate. A well-managed nutrient program during rehydration and fermentation is essential.

Enhances spicy (clove, nutmeg) and fruit flavors and aromas while adding overall complexity.

Fermentation potential is enhanced with AMH if the culture is allowed to develop in about 10% of the total must volume for eight hours prior to final inoculation.

AMH is a *Saccharomyces kudriavzevii* strain originating from the Geisenheim Research Institute in Germany.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 68-86°F

BA11

Strong fermenter for white wine mouthfeel

Riesling, Viognier, Sauvignon blanc, Pinot blanc, Gewürztraminer, Rosé, Muscat, Rhône Whites, Aromatic Whites

#15117	500 g	$46.00

Lalvin BA11™ promotes clean aromatic characteristics and intensifies mouthfeel and persistent flavors in white or sparkling base wines.

BA11 can enhance fresh aromas of tropical fruit, cream, vanilla and spice in relatively neutral white grape varieties.

This *S. cerevisiae cerevisiae* strain was selected in 1997 near the Estação Vitivinicola de Barraida in Portugal.

Alcohol Tolerance: 16%	Nitrogen Needs: HIGH	Temp. Range: 59-77°F

BDX

Steady fermenter for Bordeaux varietals

Merlot, Cabernet Sauvignon, Zinfandel, Petit Verdot, Structured Reds

#15634	500 g	$49.00
#15635	10 kg	$592.00

Uvaferm BDX™ is a reliable fermenter for high quality red wines and allows for the expression of varietal character.

This strain does not generate a lot of heat during fermentation. Optimizes color and structure with soft tannin extraction and increased mouthfeel.

Selected from the Institut Pasteur strain collection in Paris, France.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 64-86°F

BM 4X4

Mouthfeel and color stability for extended fermentations

Sangiovese, Cabernet Sauvignon, Grenache, Zinfandel, Chardonnay, Structured Reds

#15176	500 g	$55.00
#15200	10 kg	$655.00

Lalvin BM 4X4™ is a blend of Lalvin BM45™ (see scottlab.com for more information) and another yeast known for fermentation reliability. The BM4X4 blend was formulated to provide the aromatic complexity of BM45 while providing greater reliability under difficult fermentation conditions.

In Italian red varietals sensory descriptors include jam, floral and cherry liqueurs, sweet spice, licorice, cedar and earthy elements.

Produces high levels of polyphenol-reactive polysaccharides, resulting in wines with increased mouthfeel and improved color stability in reds. In whites, BM 4X4 releases high levels of esters responsible for fruit aromas.

Poor malolactic fermentation compatibility.

Alcohol Tolerance: 16%	Nitrogen Needs: HIGH	Temp. Range: 64–82°F

BRG

Classic strain for Burgundy varietals

Chardonnay, Pinot noir

#15669	500 g	$46.00
#15670	10 kg	$489.00

Levuline BRG™ is the reference strain for Burgundian winemakers.

Increases minerality in whites such as Chardonnay and spice characters in reds like Pinot noir.

BRG is a fast fermenter. Ability to produce significant amounts of polysaccharides during fermentation leading to enhanced mouthfeel and body.

This strain was isolated in Burgundy at the IUVV (Institut Universitaire de la Vigne et du Vin) laboratory in Dijon, France.

Alcohol Tolerance: 15%	Nitrogen Needs: HIGH	Temp. Range: 64-88°F

BRL97

Enhanced color stability and structure in color sensitive varietals

Pinot noir, Zinfandel, Barbera, Merlot, Malbec, Petit Verdot

#15102	500 g	$46.00
#15205	10 kg	$560.00

Lalvin BRL97™ respects varietal characteristics and helps retain color in grapes sensitive to color loss.

Fast starter and a moderate speed fermenter. Demonstrates good malolactic fermentation compatibility and high alcohol tolerance.

This strain was isolated at the University of Torino in Italy from a Nebbiolo fermentation.

To enhance complexity, BRL97 fermented wine may be blended with wines fermented with RC212™ or W15™.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 62-85°F

CEG (EPERNAY II)

Sweet and semi-sweet wine production

White, Rosé

#15081	500 g	$25.00

Uvaferm® CEG was isolated by the Geisenheim Research Institute in Germany.

Notable for its ability to deliver slow, steady and clean fermentations. Optimal fermentation temperatures range from 15–25°C(59–77°F).

CEG fermentations often slow or stop under stressed conditions leaving residual sugar. This makes CEG advantageous for use in semi-dry white or rosé wines.

Alcohol Tolerance: 13.5%	Nitrogen Needs: MEDIUM	Temp. Range: 59-77°F

CLOS

Ultra-premium reds

Syrah, Grenache, Tempranillo, Zinfandel, Petite Sirah, Barbera, Petit Verdot, Structured Reds, Malbec

#15201	500 g	$46.00
#15204	10 kg	$560.00

Lalvin CLOS™ was selected for its ability to enhance aromatic complexity, structure and mouthfeel.

Notable for its high alcohol tolerance (up to 17% v/v) and good implantation in difficult conditions. Good compatibility with malolactic bacteria.

This strain was isolated by the University of Rovira i Virgili in Spain from the Priorat region.

Alcohol Tolerance: 17%	Nitrogen Needs: MEDIUM	Temp. Range: 57-90°F

CROSS EVOLUTION

Natural yeast hybrid to enhance aromatics and mouthfeel

Chardonnay, Gewürztraminer, Pinot blanc, Riesling, Sauvignon blanc, Rosé, Rhône Whites, Muscat, Albariño, Aromatic Whites

#15640	500 g	$49.00
#15641	10 kg	$592.00

Cross Evolution™ is a strong fermenter and ideal for aromatic white and rosé wines that have a high alcohol potential. This strain complements an increased mouthfeel style resulting in aromatic wines that are balanced.

Increases fresh fruit and floral aromas in whites and rosés.

This hybrid yeast is from a unique breeding program at the Institute for Wine Biotechnology at the University of Stellenbosch in South Africa.

Alcohol Tolerance: 15%	Nitrogen Needs: LOW	Temp. Range: 58-68°F

CSM

Minimizes herbaceous characters in under-ripe fruit

Cabernet Sauvignon, Cabernet Franc, Merlot, Petit Verdot

#15638	500 g	$49.00
#15639	10 kg	$592.00

Wines fermented with Enoferm CSM™ have shown intense aromas of berries, spice and licorice.

CSM has been known to reduce vegetal aromas and add complexity with a balanced, round mouthfeel.

CSM is malolactic friendly and was selected by the Institut Français de la Vigne et du Vin (IFV, formerly ITV) in Bordeaux in cooperation with Conseil Interprofessionnel du Vin de Bordeaux (CIVB-Bordeaux).

Alcohol Tolerance: 14%	Nitrogen Needs: MEDIUM	Temp. Range: 59–90°F

CVRP

High polysaccharide producer for roundness in reds

Cabernet Franc, Cabernet Sauvignon, Merlot, Petite Sirah, Tempranillo

#15207	500 g	$46.00
#15208	10 kg	$560.00

Ideal for big reds, CVRP™ is one of the highest polysaccharide producers in the Lallemand yeast collection.

CVRP enhances mouthfeel, roundness, soft tannins and elevated varietal character. Good compatibility with malolactic bacteria.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 64-90°F

CVW5

Production of stable esters in whites

Chardonnay, Chenin blanc, Pinot gris, Rosé, Sparkling Base, Albariño, Muscat, Aromatic Whites, Fruit Wine

#15237	500g	$46.00
#15210	10 kg	$560.00

CVW5™ is a high producer of fruity aromas (esters) and low producer of volatile acidity and SO_2.

CVW5 has the lowest nitrogen demand of the Lallemand yeast strains. Strong fermenter even under difficult conditions, including low turbidity.

This *S. cerevisiae bayanus* strain was selected from the Lallemand yeast collection and is a daughter strain of Lalvin EC1118™ (see pg 22).

Alcohol Tolerance: 15%	Nitrogen Needs: LOW	Temp. Range: 57–82°F

CY3079 (BOURGOBLANC)

Classic strain for barrel-fermented whites

Chardonnay, Pinot blanc

#15061	500 g	$46.00
#15082	10 kg	$560.00

Lalvin CY3079 (Bourgoblanc)™ is highly recommended for barrel-fermented and *sur lie* aged Chardonnay.

Autolyzes quickly at the end of fermentation resulting in wines with roundness. Enhances aromas of fresh butter, almond, honey, flowers and pineapple.

CY3079 is a steady, average fermenter even at cooler temperatures (15°C/59°F). This strain demonstrates good alcohol tolerance and low production of volatile acidity and H_2S when nutrient requirements are met.

This strain was isolated for its ability to complement typical white Burgundy whites by the Bureau Interprofessional des Vins de Bourgogne (BIVB) in France.

Alcohol Tolerance: 15%	Nitrogen Needs: HIGH	Temp. Range: 59–77°F

DV10

Strong fermenter for crisp, clean wines

Chardonnay, Sparkling Base, Gewürztraminer, Pinot gris, Late Harvest, Pinot blanc, Restart Stuck Fermentations

#15062	500 g	$46.00
#15106	10 kg	$560.00

Lalvin DV10™ is well known for clean fermentations that respect varietal character while avoiding bitter sensory contributions associated with other, more one-dimensional, 'workhorse' strains such as Prise de Mousse.

Strong fermentation kinetics. Recognized for low foaming, low VA production and very low H_2S and SO_2 production. *Saccharomyces cerevisiae bayanus* strain from Epernay, France.

Alcohol Tolerance: 17%	Nitrogen Needs: LOW	Temp. Range: 50-95°F

EC1118 (PRISE DE MOUSSE)

Original sparkling wine strain

Sparkling Base Wines

#15053	500 g	$29.00
#15076	10 kg	$413.00

Lalvin EC1118™ is the original, steady, low-foamer yeast strain.

This *Saccharomyces cerevisiae bayanus* strain was selected by the IOC in Epernay, France and is the reference strain for sparkling base wine. It is an excellent choice for secondary fermentations of sparkling wine.

Ferments well at low temperatures and flocculates with compact lees. Under low nutrient conditions EC1118 can produce high amounts of SO_2 (up to 50 ppm) and, as a result, may inhibit malolactic fermentation.

Alcohol Tolerance: 18%	Nitrogen Needs: LOW	Temp. Range: 50-86°F

ELIXIR

Varietal optimization in whites and rosés

Sauvignon blanc, Chardonnay, Viognier, Rosé, Rhône Whites, Aromatic Whites

#15214	500 g	$49.00

Vitilevure Elixir™ expresses terpenes, thiols, and floral and fruity aromas (from fatty-acid esters), adding complexity to aromatic varieties.

Good implantation in clarified juice. Strain requires good nutrition and proper temperature control. It is a low SO_2, H_2S and volatile acidity producer.

Elixir is a hybrid yeast cross resulting from the yeast hybridization program at the Institute for Wine Biotechnology at the University of Stellenbosch in South Africa.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 57-77°F

EXOTICS MOSAIC

All-purpose hybrid yeast for fruity wines with mouthfeel

Chardonnay, Viognier, Chenin blanc, Syrah, Merlot, Tempranillo, Grenache

#15213	250 g	$40.00
#15220	5 kg	$696.00

Produces white wines with guava, passion fruit, tropical and stone fruit aromas and flavors as well as good mouthfeel. In red wines Exotics Mosaic has shown aromas of cherry, floral, cocoa and strawberries. Reds are described as full-bodied, well-balanced, complex and intense.

Steady fermenter but sensitive to cold temperatures. Can produce elevated levels of glycerol (9–13 g/L) which potentially leads to lower alcohol. Low volatile acidity and SO_2 production.

Strain can partially degrade malic acid and is known to facilitate and enhance malolactic fermentation.

Exotics Mosaic is a hybrid of *Saccharomyces cerevisiae* and *S. paradoxus* developed at the Institute for Wine Biotechnology at the University of Stellenbosch in South Africa.

Storage: 5-15°C(41-59°F)

Alcohol Tolerance: 15.5%	Nitrogen Needs: MEDIUM	Temp. Range: 64–83°F

STAFF PICK

"The yeast strain that I most often recommend is Exotics Mosaic. I fell in love with it while using it on hybrid grapes 10 years ago. It has the magical ability to both add body and reduce acidity which helps soften the mouthfeel in high-acid varietals. This strain is cold-sensitive which is a benefit when someone is looking to arrest fermentation to balance the wine with some residual sugar. I love that it can be used successfully in both reds and whites. I find that Exotics Mosaic enhances varietal character without being over-the-top and mimics the aromatic complexity that is desired from spontaneous ferments without the inherent risk of spontaneous ferments. I'm really excited to start working with more yeast strains coming out of the Exotics line from Anchor."
—Katie Cook, Sales Representative based in Upstate New York

NEW

EXOTICS NOVELLO

All purpose hybrid yeast for aromatic expression and mouthfeel

Sauvignon blanc, Viognier, Aromatic Whites, Merlot, Syrah, Fruity Reds

#15271	250g	$40.00

Developed by Anchor Oenology in collaboration with the Australian Wine Research Institute (AWRI), Exotics Novello is a *Saccharomyces* hybrid having the sensory characteristics of *S. cariocanus* and the fermentation security of *S. cerevisiae*.

Exotics Novello has some pectinase activity. Known for being a thiol revealer and an ester producer in both white and red wines.

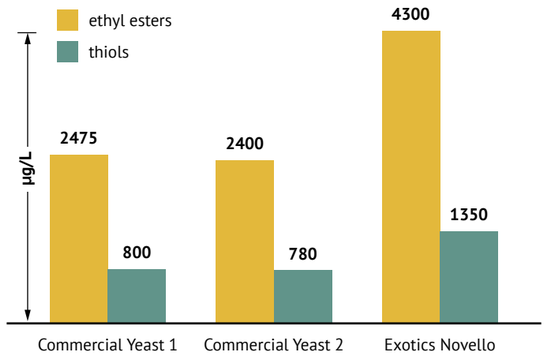
Reveals fresh fruit and floral esters while decreasing astringency and bitterness in whites. Increases red and black fruits and spice while diminishing green and vegetal characters in reds. Wines produced with Exotics Novello are known for improved mouthfeel and softness.

It produces low levels of VA and H_2S.

Storage: 5-15°C(41-59°F)

Alcohol Tolerance: 15.5%	Nitrogen Needs: MEDIUM	Temp. Range: 62-82°F

Exotics Novello Impact on Esters & Thiols in Sauvignon blanc



EXOTICS NOVELLO: A NEW HYBRID YEAST FOR NEW WORLD RED AND WHITE WINEMAKING

Hybrid yeast can occur in nature when organisms are present in the same ecological niche. By definition, a hybrid is an organism that contains genomic DNA from two or more hereditarily distinct parents.

Exotics Novello is an interspecies hybrid of *Saccharomyces cerevisiae* and *Saccharomyces cariocanus* developed by Anchor Oenology in collaboration with the Australian Wine Research Institute. *S. cariocanus* is closely related to *S. cerevisiae* and produces an interesting array of aromas and flavors. However, *S. cariocanus* is not a strong fermenter. Exotics Novello combines the novel sensory profile of *S. cariocanus* with the strong fermentation kinetics of *S. cerevisiae*.

This new strain produces wines that are fruit forward and focused and has the ability to reveal thiols and synthesize esters (see chart above). Exotics Novello can also produce red wines that have elevated red and black fruits and spicy nuances. This specific hybrid can produce polysaccharides that impart a softness to the wine, as well as displaying pectinase activity that can assist with clarification.

FERMIVIN CHAMPION

Fructophilic yeast for restarting stuck ferments

Restart Stuck Fermentations

#17143	500 g	$30.00
#17145	10 kg	$420.00

Fermivin® Champion has an excellent capacity to metabolize fructose, making it a good choice for restarting stuck fermentations when the glucose-to-fructose ratio isn't favorable.

Fermivin Champion can be added as a preventative measure towards the end of high (initial) Brix fermentations with no pre-acclimatization if the ethanol is <10% (v/v).

Fermivin Champion helps preserve the varietal character of the must/juice when restarting a stuck fermentation. Does not produce secondary aromas.

This *Saccharomyces cerevisiae bayanus* strain was selected in Alsace by INRA of Narbonne, France.

Alcohol Tolerance: 18%	Nitrogen Needs: MEDIUM	Temp. Range: 59-86°F

FERMIVIN MT48

Fruity and spicy reds

Merlot, Sangiovese, Grenache, Tempranillo, Petit Verdot, Fruit Forward Reds

#17106	500 g	$46.00

Fermivin® MT48 enhances aromatic notes of cherry, raspberry, blackberry, plum and spices in Bordeaux varieties. Produces excellent results in Sangiovese, Grenache and Tempranillo.

Fermivin MT48 has a short to medium lag phase, rapid and steady kinetics and low volatile acidity production. Produces high glycerol.

Fermivin MT48 was selected in Bordeaux by the IFV (formerly ITV) France in collaboration with CIVB-Bordeaux.

Alcohol Tolerance: 15%	Nitrogen Needs: LOW	Temp. Range: 68-86°F

ICV D21

Freshness and mouthfeel for mature and concentrated reds and whites

Merlot, Syrah, Zinfandel, Cabernet Sauvignon, Chardonnay, Structured Reds

#15143	500 g	$46.00
#15163	10 kg	$560.00

Lalvin ICV D21™ was selected for fermenting red wines with stable color, intense fore-mouth volume, mid-palate tannin structure and fresh aftertaste. Contributes both higher acidity perception and positive polyphenol-reactive polysaccharides leading to a more stable aromatic profile in the mouth.

Strain can be used with ripe white grapes that are barrel fermented to develop fresh fruit aromas, volume and perceived acidity.

Noted for its good fermentation performance and low sulfide production. In highly clarified juices, maintain fermentation temperatures above 16°C(61°F) and supplement with proper nutrition.

ICV D21 was isolated from one of the best Languedoc terroirs during a special regional program run by the Institut Coopératif du Vin's (ICV) Natural Micro-Flora Observatory and Conservatory in France.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 61-82°F

ICV D47

Complex whites with citrus and floral expression

Chardonnay, Rosé, Rhône Whites

#15642	500 g	$46.00
#15643	10 kg	$560.00

Lalvin ICV D47™ is a high polysaccharide producer and produces wines known for accentuated fruit and volume.

ICV D47 is known for the production of full-bodied, barrel-fermented Chardonnay and other white varietals. Excellent for blending with wines made with Lalvin ICV D21™.

Short lag phase followed by a regular fermentation. Will tolerate a fermentation temperature range of 15–28°C(59–82°F), however a temperature range of 15–20°C(59–68°F) is preferential. This isolate is from Suze-la-Rousse in the Côtes du Rhône in France.

Alcohol Tolerance: 15%	Relative Nitrogen: LOW	Temp. Range: 60–82°F

ICV D80

Enhances tannin structure in reds

Cabernet Sauvignon, Merlot, Syrah, Zinfandel, Petite Sirah, Structured Reds

#15125	500 g	$46.00
#15133	10 kg	$560.00

Lalvin ICV D80™ is a rapid starter with a moderate fermentation rate. Produces wines with high fore-mouth volume, big mid-palate mouthfeel and intense fine-grain tannins in reds.

Complements big tannin volume, ripe fruit, and licorice style reds. Selected for its ability to bring out varietal aromas by reinforcing the rich concentrated flavors found in varieties such as Zinfandel and Syrah. Excellent for blending with wines fermented with LALVIN ICV D254™.

This strain was isolated by the Institut Coopératif du Vin (ICV) in 1992 from the Côte Rôtie area of the Rhône Valley in France.

Alcohol Tolerance: 16%	Nitrogen Needs: HIGH	Temp. Range: 59–82°F

ICV D254

Mouthfeel and balance in reds and whites

Cabernet Sauvignon, Syrah, Zinfandel, Sangiovese, Chardonnay, Petit Verdot, Malbec, Rhône Whites

#15094	500 g	$46.00
#15021	10 kg	$560.00

In red wines, Lalvin ICV D254™ develops ripe fruit, jam and cedar aromas together with mild spiciness.

On the palate it contributes high fore-mouth volume, big mid-palate mouthfeel and intense fruit concentration.

When used for white wines (particularly Chardonnay), sensory descriptors include butterscotch, hazelnut and almond aromas.

This strain was isolated by the Institut Coopératif du Vin (ICV) from a Rhône Valley Syrah fermentation.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 54–82°F

ICV GRE

Fruit forward reds with minimal skin contact

Cabernet Franc, Grenache, Cabernet Sauvignon, Merlot, Syrah, Chenin blanc, Riesling, Rosé, Rhône Whites, Fruit Forward Reds

#15101	500 g	$46.00
#15142	10 kg	$560.00

In reds, Lalvin ICV GRE™ complements up-front fruit for easy-to-drink Rhône-style wines. With short skin contact (three to five days), ICV GRE reduces vegetal and undesirable sulfur components in varieties like Merlot, Cabernet Sauvignon, Grenache and Syrah.

In fruit-focused whites, such as Chenin blanc, Riesling and Rhône whites, ICV GRE fermentations result in stable, fresh fruit characteristics such as melon and apricot while improving fore-mouth impact.

ICV GRE is a rapid starter, with good alcohol tolerance and low volatile acidity production.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 59–82°F

ICV OKAY

Low H_2S and SO_2 producer

Strong fermenter for sulfur management and fruity esters

Petit Sirah, Rosé, Syrah, Viognier

#15221	500 g	$30.00
#15222	10 kg	$441.00

Lalvin ICV OKAY™ is recommended for fresh and aromatic red, white or rosé wines with fruit intensity.

Very short lag phase with steady fermentation kinetics. Low foam production.

ICV OKAY has very good synergy with malolactic bacteria.

This *S. cerevisiae* hybrid was selected in collaboration with the INRA, SupAgro Montpellier, the ICV and Lallemand for very low to no SO_2, H_2S, and acetaldehyde production.

Alcohol Tolerance: 16%	Nitrogen Needs: LOW	Temp. Range: 54–86°F

Low H_2S and SO_2 producer

ICV OPALE 2.0

Sulfur compound management in aromatic wines

Chardonnay, Sauvignon blanc, Rosé, Rhône Whites

#15065	500 g	$46.00

Lalvin ICV Opale 2.0™ enhances varietal character and aromatics in high-maturity/high Brix grapes that might otherwise produce neutral wines. Complements intense and complex fruit aromas in premium white and rosé wines.

ICV Opale 2.0 has excellent fermentation qualities with a short lag phase. Very low to no SO_2, H_2S, and acetaldehyde production

Alcohol Tolerance: 14%	Nitrogen Needs: LOW	Temp. Range: 59–86°F

Low H_2S and SO_2 producer

IOC BE FRUITS

Sulfur management and fruity esters for whites and rosés

Albariño, Rosé

#15241	500 g	$46.00

IOC Be Fruits™ produces fruity esters (strawberry, pineapple, citrus notes) in white and rosé wines without masking varietal aromas. Fruit expression is emphasized due to the yeast's very low to no sulfite and acetaldehyde production.

Optimal conditions for fruity ester production are achieved when must/juice is clarified (80 NTU ± 20) and fermentation temperatures are between 12–15°C(54–59°F).

Be Fruits™ has a short lag phase and low volatile acidity production. This hybrid yeast strain was selected by INRA for very low to no SO_2 or H_2S production.

Alcohol Tolerance: 14%	Nitrogen Needs: LOW	Temp. Range: 54-75°F

Low H_2S and SO_2 producer

IOC BE THIOLS

Sulfur management and thiol revelation

Sauvignon blanc, Riesling, Gewürztraminer, Rosé

#15247	500 g	$46.00

IOC Be Thiols™ reveals fruity thiols (citrus and exotic fruits) in white and rosé wines. It enhances 3MH potential (grapefruit, passion fruit) without excessive green flavors. The purity of the fruity expression is heightened by this strain's inability to produce negative sulfur compounds that can mask aromas.

Optimal conditions for expressing fruity thiols occur when must/juice is clarified (80 NTU ± 20), pH >3.2, and fermentation temperatures are between 15–20°C(59–68°F).

Be Thiols is a fast fermenter with a short lag phase. This hybrid yeast strain was selected by INRA for very low to no SO_2 or H_2S production.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 59–77°F

IONYS$_{WF}$

Acidity retention for low acid ferments

Malbec, Petite Sirah, Sangiovese, Syrah, Tempranillo, Cabernet Sauvignon, Merlot, Petit Verdot

#15233	500 g	$55.00

IONYS$_{WF}$™ is a selected wine yeast that naturally increases the acidity of wines feremented from low acid musts.

IONYS$_{WF}$ is recommended for fermenting reds from warmer climates with high pH and high potential alcohol. The acidification 'power' of IONYS$_{WF}$ may result in a titratable acidity increase of 0.4–1.4 g/L (tartaric acid) and a pH decrease of between 0.04–0.2. With proper nutrition and temperature control, wines made with IONYS$_{WF}$ are characterized as having fresh fruit and mineral characters and fine-grain tannins.

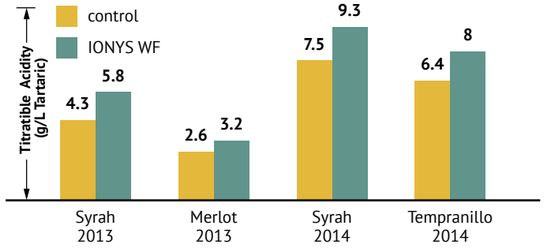
Low producer of volatile acidity, SO_2 and H_2S, with an alcohol tolerance of up to 16% (v/v). Maintaining a temperature range of 25–28°C(77–82°F) optimizes glycerol production (up to 15 g/L) and may decrease alcohol production by 0.4–0.8% (v/v).

Moderate fermentation speed with a long, but steady stationary phase. IONYS$_{WF}$ has very high nitrogen requirements and a balanced nutrient protocol is essential.

Storage: 4°C(39°F).

Note: IONYS$_{WF}$ is an innovative yeast selection and is protected by an International Patent pending; No WO2015/11411. Propagation of IONYS$_{WF}$ is an infringement of this Patent.

Acidifying Effects of Ionys$_{WF}$



Alcohol Tolerance: 16%	Nitrogen Needs: HIGH	Temp. Range: 77–82°F

K1 (V1116)

Strong fermenter for ester production and challenging conditions

Restart Stuck Fermentations, Sauvignon blanc, Chenin blanc, Sparkling Base

#15063	500 g	$28.00
#15077	10 kg	$270.00

Lalvin K1 (V1116)™ is one of the highest ester producing strains in our portfolio. When fermented at low temperatures (16°C/61°F) with proper nutrition, it is a strong floral ester producer, especially in neutral or high-yielding varieties.

K1 (V1116) performs well in difficult conditions such as extreme temperatures, high alcohol (18% v/v) and low turbidity and is useful in restarting stuck fermentations, especially when relative fructose levels remain high.

Alcohol Tolerance: 18%	Nitrogen Needs: LOW	Temp. Range: 50–95°F

M83

Provence style rosés

Rosé

#15674	500 g	$49.00

Vitilevure M83™ increases color stability in rosé as a result of its polysaccharide production. Produces round and balanced rosés with enhanced fresh fruit aromas.

M83 is particularly well adapted for rosé winemaking in warmer regions. It has good implantation, strong fermentation kinetics, and low volatile acidity and SO_2 production.

This strain was selected by the Laboratoire Aubanelle in the Bandol appellation of Provence.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 63-82°F

NEW

MSB

Enhances Sauvignon blanc varietal characters

Sauvignon blanc, Colombard

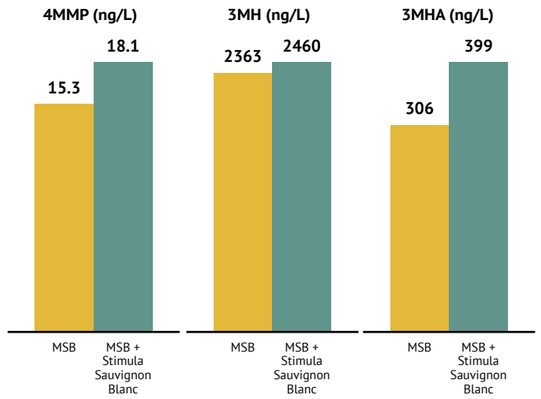
#15267	500 g	$46.00

Lalvin MSB™ is a yeast strain isolated from the Marlborough Valley in New Zealand by the Lallemand R&D team.

This strain enhances fruity, tropical and citrus notes, while maintaining a balanced mouthfeel. Maintains the natural acidity of grapes due to negligible malic acid uptake.

To optimize thiols, use in conjunction with our yeast nutrient, Stimula Sauvignon Blanc™ (see pg 47 for more information).

Effect of Stimula Sauvignon Blanc™ on Thiol Production in a Wine Fermented with Lalvin MSB™



Alcohol Tolerance: 14.5%	Nitrogen Needs: MEDIUM	Temp. Range: 57-68°F

MT

High maturity, long-aging Bordeaux varieties

Merlot, Cabernet Sauvignon, Petit Verdot, Structured Reds

#15650	500 g	$49.00
#15651	10 kg	$592.00

Vitilevure MT™ is recommended for grapes with high maturity and long aging potential.

Known for producing aromas of strawberry and caramel, especially in Merlot. MT fermented wines have good color intensity and tannin structure.

Has steady fermentation kinetics. This strain benefits from a balanced nutrient strategy. When good fermentation practices are followed MT produces minimal volatile acidity and H_2S.

MT was selected in Saint Emilion, France, by the IFV (formerly ITV) Bordeaux in collaboration with the INRA Montpellier.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 59–90°F

NT 116

All-purpose strain for new world style whites and reds

Syrah, Cabernet Sauvignon, Merlot, Petite Sirah, Pinot gris, Aromatic Whites

#15185	1 kg	$94.00
#15226	10 kg	$672.00

NT 116 is equally suited for both white and red winemaking.

Its ability to reveal volatile thiols and produce esters makes it suitable for aromatic white wine production. Wines are crisp and fresh with citrus and zesty aromas. Also suitable for full-bodied, high maturity red wines destined for oak aging.

Temperature control is advised when using this low foaming but vigorous strain.

This hybrid strain of *S. cerevisiae* is a product of the yeast hybridization program of Infruitec-Nietvoorbij, the wine and vine institute of the Agricultural Research Council in Stellenbosch, South Africa.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 54-83°F

NT 202

Structured and complex reds

Cabernet Sauvignon, Pinot noir, Merlot, Malbec, Structured Reds

#15191	1 kg	$94.00
#15227	10 kg	$672.00

NT 202 is an aromatic red wine yeast that promotes blackcurrant, blackberry and plum-like flavors.

This strain has a stimulatory effect on malolactic fermentation and good fructose utilization. Fermentation temperature should be monitored to control the speed. Not suitable for cold soaking.

This low foaming, hybrid strain of *S. cerevisiae* is a product of the yeast hybridization program of Infruitec-Nietvoorbij, the wine and vine institute of the Agricultural Research Council in Stellenbosch, South Africa.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 64-82°F

Low H_2S and SO_2 producer

PERSY

Sulfur management and mouthfeel in red wines

Rhône reds, Pinot noir, Tempranillo or other varietals susceptible to hydrogen sulfide production

#15261	500 g	$46.00
#15262	10 kg	$560.00

Red wines fermented with Lalvin Persy™ have a balanced mouthfeel with fruit forward persistent aromas and flavors optimizing varietal expression.

Using good fermentation practices, Persy produces very low to no H_2S, SO_2, or volatile acidity and is compatible with malolactic bacteria.

This hybrid yeast strain was developed for use in red wines produced from varietals naturally susceptible to H_2S. It was developed in collaboration with INRA, SupAgro Montpellier and Lallemand.

Alcohol Tolerance: 16%	Nitrogen Needs: LOW	Temp. Range: 59–82°F

QA23

Strong fermenter for varietal expression in highly clarified musts

Chardonnay, Sauvignon blanc, Gewürztraminer, Pinot blanc, Albariño, Muscat, Aromatic Whites

#15652	500 g	$49.00
#15653	10 kg	$592.00

Lalvin QA23™ is an excellent thiol converter making it a complementary yeast for developing varietal Sauvignon blanc passion fruit character.

Large amounts of the enzyme beta-glucosidase are produced during growth which allows for the release of bound terpenes in aromatic varieties.

QA23 has low nutrient and oxygen requirements and will ferment juice with low turbidity at low temperatures to dryness.

This strain was selected in Portugal by the University of Trás-os-Montes and Alto Douro (UTAD) in cooperation with the Viticultural Commission of the Vinho Verde region.

Alcohol Tolerance: 16%	Nitrogen Needs: LOW	Temp. Range: 59–90°F

R2

Expression of varietal aromas at cold temperatures

Riesling, Sauvignon blanc, Gewürztraminer, Late Harvest, Aromatic Whites

#15071	500 g	$46.00

Lalvin R2™ can enhance varietal characters due to the enzymatic release of aroma precursors producing intense, direct fruit-style whites with heightened fruity and floral aromas.

Has excellent cold temperature properties and has been known to ferment in conditions as low as 5°C(41°F). Tends to produce VA without proper nutrition.

This *Saccharomyces cerevisiae bayanus* strain was isolated in the Sauternes region of Bordeaux, France, by Brian Croser of South Australia.

Alcohol Tolerance: 16%	Nitrogen Needs: HIGH	Temp. Range: 50-86°F

RC212 (BOURGOROUGE)

Enhanced structure and color for Pinot noir

Pinot noir, Grenache, Rosé

#15057	500 g	$46.00
#15097	10 kg	$560.00

Lalvin RC212 (Bourgorouge)™ is known for its ability to generate ripe berry, bright fruit and spicy characteristics and to consistently produce Pinot noir with good tannin structure.

RC212 requires thoughtful nutrient additions to avoid potential sulfide production.

Wines fermented with RC212 can be blended with wines fermented with Enoferm AMH™, Lalvin W15™ or Lalvin BRL97™ to achieve more complexity.

This *S. cerevisiae cerevisiae* strain was selected from fermentations in Burgundy, France, by the BIVB.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 60-86°F

RHÔNE 2226

(formerly L2226)

Complexity and balance in high alcohol reds

Merlot, Zinfandel, Sangiovese, Barbera, Cabernet Franc, Petite Sirah, Structured Reds

#15644	500 g	$46.00
#15645	10 kg	$560.00

Lalvin Rhône 2226™ contributes to wine quality by enhancing varietal aroma expression, tannin structure and high color intensity in high-alcohol reds. Produces aromas of black cherry, berry and cherry cola in red wines.

This strain was isolated from a vineyard in the Côtes du Rhône in France.

Alcohol Tolerance: 18%	Nitrogen Needs: HIGH	Temp. Range: 59-82°F

RHÔNE 4600

Aromatic and elegant whites and rosés

Rosé, Viognier, Chardonnay, Rhône Whites

#15171	500 g	$46.00

Lalvin Rhône 4600™ produces wines with complex aromatic notes. Noted for elevating fresh fruit aromas (apple, pear, strawberry) this strain is ideal for rosé and Rhône-style whites. Can produce fatty-acid ethyl esters (apricot and tropical fruit flavors) when fermented in high-sugar, low nutrient musts at cool temperatures 13.5°C(56°F).

Higher roundness with diminished bitterness makes this strain a good choice for Rhône white varietals and Chardonnay.

Rhône 4600 has a short lag phase. May produce low levels of SO_2 and H_2S under conditions of stress. Malolactic friendly.

Isolated from a Viognier fermentation in the Côtes du Rhône region in France in collaboration with Inter-Rhône technical department.

Alcohol Tolerance: 15%	Nitrogen Needs: LOW	Temp. Range: 56-72°F

R-HST

Strong fermenter for Riesling and other aromatic whites

Riesling, Gewürztraminer, Sauvignon blanc, Viognier, Rhône Whites, Aromatic Whites

#15130	500 g	$46.00

Lalvin R-HST™ retains fresh varietal character while contributing structure and mouthfeel. It can produce crisp, premium white wines with citrus and floral notes.

Tolerates fermentation temperatures as low as 10°C(50°F), however, allow the temperature to increase toward the end for a clean finish.

Short lag phase and generation time, even at cold temperatures. R-HST dominates and persist over spoilage yeast such as *Kloeckera apiculata*.

This strain was selected from Riesling trials conducted in the Heiligenstein region of Austria.

Alcohol Tolerance: 15%	Nitrogen Needs: MEDIUM	Temp. Range: 50-86°F

RP15

Complex, balanced and concentrated reds

Syrah, Zinfandel, Merlot, Cabernet Sauvignon, Cabernet Franc, Petite Sirah, Malbec, Petit Verdot, Structured Reds

#15665	500 g	$49.00
#15666	10 kg	$592.00

Enoferm RP15™ is recommended for medium to full bodied reds to produce a rich, lush, balanced mouthfeel. Wines are characterized by red fruit and mineral notes.

Contributes a rich mid-palate structure and enhances varietal fruit characters and helps to stabilize color.

Rehydrating the yeast in Go-Ferm Protect Evolution™ (see pg 45) tends to improve the aromatic profile of this yeast.

This strain was isolated from spontaneous Rockpile Syrah fermentations in California.

Alcohol Tolerance: 17%	Nitrogen Needs: MEDIUM	Temp. Range: 68-86°F

NEW

SAUVY

For mega expression of grassy thiols

Sauvignon blanc, Chenin blanc

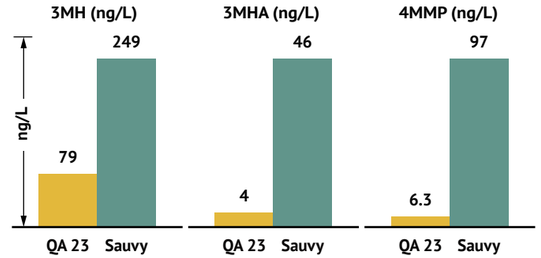
#15258	500 g	$50.00
#15272	10 kg	$604.00

Sauvy™ was selected for its exceptional ability to uptake and reveal volatile thiols, especially 4MMP (passion fruit/black currant/gooseberry). Even in grapes where there are low levels of the thiol precursors the resulting wine expresses the 4MMP/green thiol character.

Sauvy also elevates Sauvignon blanc's traditional tropical fruit and citrus aromas and flavors especially when used in conjunction with the yeast nutrient, Stimula Sauvignon blanc™.

Sauvy produces very low to no H_2S, SO_2 and volatile acidity.

Impact of Sauvy™ on Volatile Thiols in 2019 Napa Valley Sauvignon blanc



Alcohol Tolerance: 14%	Nitrogen Needs: MEDIUM	Temp. Range: 57-68°F

Low H_2S and SO_2 producer

SENSY

Sulfur management and aromatic finesse for whites and rosés

Rosé, Sauvignon blanc, Pinot blanc

#15225	500 g	$46.00

Lalvin Sensy™ respects varietal aromas and promotes aromatic esters while balancing mouthfeel and freshness in aromatic white wines.

Sensy has a short lag phase, is malolactic bacteria friendly and produces very low to no SO_2 or H_2S even under low temperature and NTU white winemaking conditions. Avoid adding >50 ppm SO_2 at the crusher.

This hybrid strain of *S. cerevisiae* was selected in collaboration with the INRA, SupAgro Montpellier, the ICV and Lallemand as part of an innovative porfolio of yeast to control the production of negative sulfur compounds.

Alcohol Tolerance: 15%	Nitrogen Needs: LOW	Temp. Range: 54-64°F

SYRAH

Spicy, fruity and floral reds

Syrah, Merlot, Mourvedre, Petite Sirah, Petit Verdot, Structured Reds

#15657	500 g	$49.00
#15658	10 kg	$592.00

Enoferm Syrah™ offers good mouthfeel and stable color extraction. Tends to produce high levels of β-damascenone, which promotes violet and red fruit aromas.

Typical aromas include violets, raspberries, strawberries and black pepper which enhance and respect the varietal character.

This strain has a tendency to produce H_2S under low YAN conditions hence rehydration with Go-Ferm Protect Evolution™ and thoughtful nutrition management is essential.

This strain that was isolated from the Côtes du Rhône region of France.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 59–90°F

T73

Strong fermenter for varietal complexity in high-alcohol reds

Merlot, Zinfandel, Sangiovese, Tempranillo, Fruit Forward Reds

#15091	500 g	$46.00

Lalvin T73™ is recognized for its ability to enhance natural aromas and flavors in red wines produced in hot climates. Its well balanced production of esters and higher alcohols help hot climates wines “open up”.

Mouthfeel is enhanced through the production of glycerol.

T73 shows good resistance to anti-fungal vineyard treatments, has extremely low nitrogen demand, and dominates against indegenous microflora.

This yeast strain was isolated by La Universidad de Valencia of Spain in collaboration with Lallemand.

Alcohol Tolerance: 16%	Nitrogen Needs: LOW	Temp. Range: 65-90°F

TANGO MALBEC

Balanced reds with perception of sweetness

Malbec, Syrah, Tempranillo, Merlot, Petite Sirah

#15252	500 g	$46.00

Lalvin Tango Malbec™ respects varietal character and promotes intense color. Tango Malbec produces full bodied red wines with aromatic complexity including flavors of violet, black cherry, blackberry, raspberry, dark plum and anise.

Its interactions with polyphenolic compounds creates wines with good structure, balance and the natural sweetness associated with Malbec.

It is a low H_2S and SO_2 producer and malolactic friendly.

Tango Malbec was isolated by the National Institute of Agricultural Technology in La Consulta, Uco Valley, Mendoza, Argentina.

Alcohol Tolerance: 16%	Nitrogen Needs: MEDIUM	Temp. Range: 59–82°F

VIN 13

Strong fermenter for thiol expression

Sauvignon blanc, Chenin blanc, Chardonnay, Rosé, Gewürztraminer, Muscat, Albariño, Rhône Whites, Aromatic Whites, Restart Stuck Fermentations

#15183	1 kg	$94.00
#15228	10 kg	$672.00

VIN 13 is a very good thiol releaser (guava, passion fruit and grapefruit) and outstanding ester producer. In tank-fermented Chardonnay VIN 13 promotes pineapple and banana flavors, while on Riesling, Gewürztraminer and Viognier it accentuates floral notes.

Aromatic as well as cold tolerant it is favored for its ease of use, making it a good choice for restarting stuck white fermentations, especially when fructose levels remain high.

Temperature control is advised. Do not over inoculate.

This hybrid yeast strain is a product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch in South Africa.

Alcohol Tolerance: 17%	Nitrogen Needs: LOW	Temp. Range: 54-61°F

VIN 2000

Full bodied, Aromatic Whites

Chenin blanc, Chardonnay, Sauvignon blanc, Viognier, Albariño

#15195	1 kg	$94.00

VIN 2000 is recommended for the production of rich and ripe style Chenin blanc (fresh pineapple and citrus aromas), oaked Chardonnay (citrus aromas) and Sauvignon blanc (passion fruit, guava and tropical aromas).

Moderate speed fermenter with very low SO_2 production and low foaming. VIN 2000 is suitable for barrel fermentation.

This hybrid yeast strain is a product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch in South Africa.

Alcohol Tolerance: 15.5%	Nitrogen Needs: LOW	Temp. Range: 55-61°F

VRB

Balance and mouthfeel in high alcohol reds

Tempranillo, Barbera, Sangiovese, Zinfandel, Petite Sirah, Fruit Forward Reds

#15173	500 g	$46.00

Uvaferm VRB™ helps express varietal characteristics and ester production in wines such as Tempranillo, Barbera, and Sangiovese. These wines are described as having flavors of ripe fruit, jam, hazelnut and dried plums.

VRB can soften tannins and add flavor complexity with good mid-palate volume. Wines tend to have good color intensity and stability with good polyphenolic structure.

VRB softens high acid musts by partially metabolizing malic acid.

VRB was selected by Centro de Investigaciones Agrarias (CIDA) in Logroño, Spain.

Alcohol Tolerance: 17%	Nitrogen Needs: MEDIUM	Temp. Range: 59–82°F

W15

Ferments cleanly at low temperatures

Gewürztraminer, Riesling, Pinot gris, Pinot noir, Syrah, Rosé, Aromatic Whites, Rhône Whites

#15118	500 g	$46.00
#15119	10 kg	$560.00

In white wines, Lalvin W15™ helps retain bright fruit characters while optimizing mouthfeel and balance. Performs well in Pinot noir and cooler climate Syrah.

Produces glycerol and succinic acid, especially when fermented between 15–20°C(59–68°F), adding complexity to the mid-palate.

Low heat generation during fermentation helps winemakers minimize the potential for temperature spikes and possible H_2S problems.

Isolated in 1991 at the Swiss Federal Research Station in Wädenswil, Switzerland.

Alcohol Tolerance: 16%	Nitrogen Needs: HIGH	Temp. Range: 50-81°F

NON-*SACCHAROMYCES* YEAST

"Non-*Saccharomyces*" is the colloquial term for yeast strains associated with vineyards or wineries that are not from the *Saccharomyces* genus. Due to their unpredictable nature and their ability to produce ethyl acetate and other undesirable characters, non-*Saccharomyces* have a bad reputation. However, specific organism within this group have been shown to contribute positively during the pre-fermentative and early fermentation stages. We have gained a better appreciation for these yeasts and use them as bioprotectants, to enhance the aromatic potential of grapes, and to naturally increase wine acidity.

Non-*Saccharomyces* are not strong fermenters and they require different handling than regular wine yeast. It is important to follow the specific handling recommendations and inoculate with a *Saccharomyces* species to complete the alcoholic fermentation.

SELECTING NON-*SACCHAROMYCES* YEAST FOR SUCCESS

Non-*Saccharomyces*	Organism	Main activity	Winemaking application	When to add *Saccharomyces*	Suggested Compatible *Saccharomyces* strains
BIODIVA	*Torulaspora delbrueckii*	Produces polysaccharides and aroma compounds (esters). Consumes some sugar to alleviate osmotic (high sugar) stress on *Saccharomyces*.	To enhance mouthfeel, fruity esters and complexity of white, rosé and red wines. Suitable for late harvest, icewine and high starting sugar.	After 2-3°Brix drop	43, BDX, ICV D254, Persy, QA23 and VRB
FLAVIA	*Metschnikowia pulcherrima*	Enzyme production cleaves aroma precursors to reveal terpenes and thiols.	Optimize the tropical, citrus and floral notes of certain white and rosés.	24 hours after Flavia	Cross Evolution, Elixir, ICV D47, ICV GRE, QA23, Rhône 4600
GAIA	*Metschnikowia fructicola*	Out-competes native microflora that may produce volatile acidty. Useful when SO_2 isn't effective or desired.	Can be added to white or rosé grapes or juices for protection during transportation. Can be added to red grapes to protect during transportation or cold soak.	Upon juice receipt or end of cold soak	Any strain
LAKTIA	*Lachancea thermotolerans*	Converts glucose to lactic acid. Acts as a natural acidifier.	Acidification of low acid musts adding freshness and complexity.	24-72 hours after Laktia	Any strain

BIODIVA LALLEMAND

Torulaspora delbrueckii

For enhancing complexity and fruit in whites, reds, late harvest, icewine

15697 | 500g | $111.00

Biodiva™ is a pure culture of *Torulaspora delbrueckii* that can enhance the aroma profile and complexity of wines (see figure at right). This non-*Saccharomyces* yeast is an ester producer and can also produce components that lead to a fuller mouthfeel. Biodiva is osmotolerant making it a good choice for high sugar fermentations, late harvest and icewine production as it will consume some sugar alleviating some of the stress on *Saccharomyces*. This can result in lower final volatile acidity levels.

Recommended Dosage

250ppm	25g/hL	2 lb/1000 gal

Usage

Prior to inoculation, ensure that: free SO_2 <15ppm, turbidity >80 NTU, and inoculation temperature >16°C(61°F)*. Rehydrate Biodiva in ten times its weight of chlorine free, 30°C(86°F) water and stir gently. After 15 minutes stir gently again. Slowly combine some of the must with the rehydrated yeast to drop the temperature 10°C(18°F) and hold for 15 minutes. This step may need repeating until you are within 10°C(18°F) of the must temperature, however the process should not exceed 45 minutes.

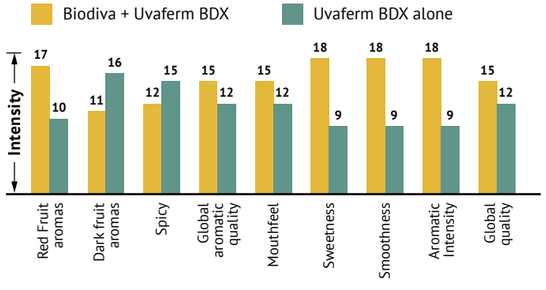
After 1.5-3°Brix drop a compatible *S. cerevisiae* strain should be inoculated following the recommended *Saccharomyces* rehydration protocol (see pg 36).

*If the must is <16°C(61°F) you may observe a long lag phase.

Storage

Store for 24 months at 11°C (52°F). Once opened use immediately.

Impact of Biodiva on Sensory Perception of a Merlot by 27 Tasters



Impact: Rounder, fruitier, more complex wines due to over-production of polyols and esters	Add *Saccharomyces*: After 2-3°Brix drop

FLAVIA LALLEMAND

Metschnikowia pulcherrima

For revelation of terpenes and thiols in aromatic whites and rosés

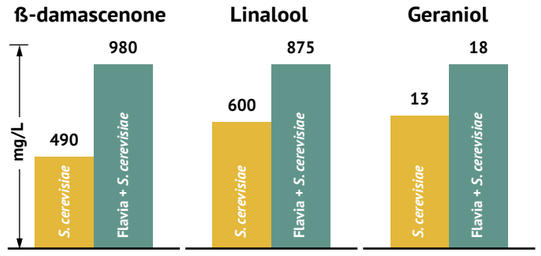
15244 | 500g | $109.00

Flavia™ is a pure culture of *Metschnikowia pulcherrima* used for its ability to liberate bound thiols and terpenes in grapes. Bound thiols and terpenes are odorless and flavorless but are odor-active when released contributing to tropical, citrus and floral aromas.

Bound terpenes are attached to two sugar molecules and require two different actions to release them. Flavia has the ability to remove one sugar due to its α-arabinofuranosidase activity and *S. cerevisiae* can remove the other sugar due to its β-glucosidase activity. Flavia also has the ability to release bound thiols. Wines made using Flavia have enhanced floral aromas (see figure below).

This strain was selected in conjunction with the Universitad de Santiago de Chili (USACH).

Impact of Flavia on Floral Aromatics



Recommended Dosage

250ppm	25g/hL	2 lb/1000 gal

Usage

Prior to inoculation ensure the free SO_2 <10ppm. Rehydrate Flavia in ten times its weight of chlorine free, 30°C(86°F) water and stir gently. After 15 minutes stir gently again. Slowly combine some of the must with the rehydrated yeast to drop the temperature 10°C(18°F) and hold for 15 minutes. This step may need repeating until you are within 10°C(18°F) of the juice temperature, however, the process should not exceed 45 minutes. If the initial YAN is <100ppm we recommend using Go-Ferm Protect Evolution during the Flavia rehydration.

After 24 hours a compatible *S. cerevisiae* strain should be inoculated, even if there has been no change in °Brix.

Storage

Store for 24 months at 11°C(52°F). Once opened use immediately.

Impact: Heightened terpenes and thiols due to enzymatic activity	Add *Saccharomyces*: After 24 hours

GAIA LALLEMAND

Metschnikowia fructicola

For managing spoilage risks when transporting grapes or juice, or cold soaking reds

15686 | 500g | $109.00

Gaia™ is non-fermentative but implants and multiplies quickly, controlling the production of ethyl acetate and acetic acid from *Kloeckera apiculata* (see figure below), acetic acid bacteria, and other native microflora. Gaia can protect your grapes during a pre-fermentation cold soak for up to five days if the temperature is <10°C (50°F). Although Gaia was selected for its use as a bioprotectant, it can also help to preserve fruit characteristics and aroma.

Recommended Dosage

250ppm	25g/hL	2 lb/1000 gal

Usage

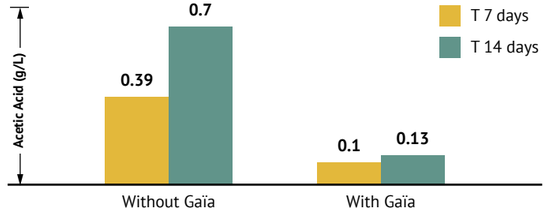
Prior to inoculation ensure the total SO_2 is <50ppm. Rehydrate Gaia in ten times its weight of chlorine free, 30°C(86°F) water and stir gently. After 15 minutes stir gently again. Slowly combine some of the must with the rehydrated yeast to drop the temperature 10°C (18°F) and hold for 15 minutes. This step may need repeating until you are within 10°C(18°F) of the must temperature, however, the process should not exceed 45 minutes.

Upon juice receipt or once cold soak has been completed, a compatible *S. cerevisiae* strain should be added following the recommended *Saccharomyces* rehydration protocol (see pg 36).

Storage

Store for 24 months at 11°C(52°F). Once opened use immediately.

Effect of Gaïa™ on Acetic Acid Production in Must Inoculated with *Kloeckera apiculata*



Impact: Crowds out volatile acid-producing native microflora	Add *Saccharomyces*: When desired (after juice settling, end of cold soak)

STAFF PICK

*Why would you even consider cold soak in 2020 without Gaia? Preservation of fruit and aromatic expression with less risk of volatile acidity during maceration, it is the perfect use of a non-*Saccharomyces *to prevent spoilage. A snub to* Kloekera apiculata*!*
—Shirley Molinari, Technical Support - Lallemand Oenology, based in Sonoma County, CA

NEW

LAKTIA

Lachancea thermotolerans

Naturally acidifies grapes lacking acidity

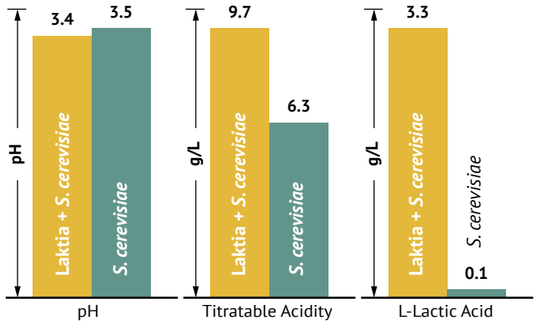
15253 | 500g | $109.00

Laktia™ is a pure culture of *Lachancea thermotolerans* isolated from the Rioja region of Spain. It is added at the beginning of fermentation where it produces lactic acid from sugar, bringing a freshness and aromatic complexity to wines. Laktia gives winemakers an interesting blending opportunity for wines lacking in acidity (Figure 1). Laktia is recommended for red musts but has been used successfully used in whites.

Although Laktia produces some alcohol, it does not have the ability to complete the alcoholic fermentation. It must be followed up after 24-72 hours with *S. cerevisiae*.

It is important to note that lactic acid >3g/L can inhibit malolactic bacteria.

Impact of Laktia on Acidity in a 2017 Tempranillo



Recommended Dosage

250ppm	25g/hL	2 lb/1000 gal

Usage

Prior to inoculation ensure the free SO_2 is <15ppm, temperature >17°C(63°F) and YAN >150ppm. Rehydrate Laktia in ten times its weight of chlorine free, 30°C(86°F) water and stir gently. After 15 minutes stir gently again. Slowly combine some of the must with the rehydrated yeast to drop the temperature 10°C(18°F) and hold for 15 minutes. This step may need repeating until you are within 10°C(18°F) of the must temperature, however the process should not exceed 45 minutes.

After 24 hours a compatible *S. cerevisiae* strain should be inoculated following the recommended *Saccharomyces* rehydration protocol (see pg 36) and using Go-Ferm Protect Evolution™. Due to consumption of nitrogen by Laktia, YAN should be measured and supplemented as necessary when *Saccharomyces* is inoculated.

Storage

Store for 24 months at 4°C(39°F). Once opened use immediately.

Impact: Adds freshness due to lactic acid production	Add *Saccharomyces*: After 24-72 hours

HOW TO

SACCHAROMYCES YEAST REHYDRATION

Proper yeast rehydration is one of the most important steps to ensure a strong and healthy fermentation. Normal inoculation rate for wine active dried yeast is 2 lb/1000 gal (25 g/hL). When added properly, this inoculation rate results in an initial yeast cell concentration of 3–4 million viable cells per mL of must/juice. Under favorable conditions, the initial yeast cell population will increase up to 100–150 million viable cells per mL of must/juice before growth stops and alcoholic fermentation begins. This biomass increase is critical for healthy fermentations. Higher inoculation rates are recommended on grapes that are higher maturity (higher sugar). When using a yeast rehydration nutreint such as Go-Ferm™ or Go-Ferm Protect Evolution™, maintain a ratio of 1 part yeast to 1.25 parts rehydration nutrient. Careful rehydration, atemperation, inoculation and homogenization are all important to help prevent sluggish or stuck fermentations.

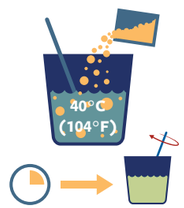
Note: This protocol is not appropriate for non-*Saccharomyces* yeast. Please see individual product descriptions for rehydration guidelines (pgs 33-35).

1. Suspend 2.5 lb/1000 gal (30 g/hL) of Go-Ferm or Go-Ferm Protect Evolution in 20 times its weight of clean, chlorine free, 43°C(110°F) water. (For example: 2.5 lb rehydration nutrient x 20 = 50 ÷ 8.33 lb/gal water = 6 gal water.) The water temperature is important for mixing of the rehydration nutrient. Due to the unique nature of Go-Ferm and Go-Ferm Protect Evolution, they will not go into solution completely. This is due to the fatty acid and sterol content. *Please see page 45-46 for information on yeast rehydration nutrients.* **Important: If not using a yeast rehydration nutrient, water temperature should begin at 40°C(104°F) and the volume of water should be 10 times the weight of the yeast amount. This lower temperature is important so you do not to harm the yeast.**
2. Once the temperature of the yeast rehydration nutrient solution has dropped to 40°C(104°F), add 2 lb/1000 gal (25 g/hL)* of active dried yeast. Stir gently to break up any clumps. Let suspension stand for 20 minutes, then stir gently again. Live yeast populations decline when allowed to stand for more than 30 minutes. **Note: Foaming is not an indicator of yeast viability.**
3. Slowly (over a period of 5 minutes) combine an equal amount of the must/juice to be fermented with the yeast suspension. This will help the yeast adjust to the high sugar conditions and the cooler temperature of the must/juice. This step is essential as it will help to avoid cold shock caused by a rapid temperature drop exceeding 10°C(18°F). This atemperation step may need repeating for very low temperature must/juice. Each atemperation step should last about 15–20 minutes. For every 10°C(18°F) temperature difference between the must/juice and the yeast slurry, an atemperation step must be performed. For example, for a must/juice temperature of 20°C(68°F) and yeast slurry temperature of 40°C(104°F), two atemperation steps are required.
4. For direct inoculation of yeast post rehydration, ensure you mix the yeast slurry into the full volume of the must/juice.
5. For large tanks with long filling times add the yeast slurry to the bottom of the fermentation vessel just as you begin filling with must/juice. This is especially important when inoculating with strains that are sensitive to the competitive factor (refer to pages 11–14 for individaul yeast strain information). This allows the yeast a head start over indigenous organisms.

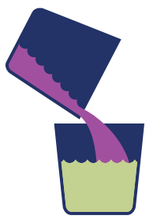
Note: Copies of "Easy Steps for Optimal Yeast Rehydration" may be downloaded in Spanish, French and English from our website (scottlab.com).
*The yeast dosage can vary depending on the initial Brix, manufacturer's recommendations and the sanitary state of the grapes or winery.
Visit scottlab.com for a video animation of this protocol.

Step 1
Add Go-Ferm or Go-Ferm Protect Evolution to warm water.

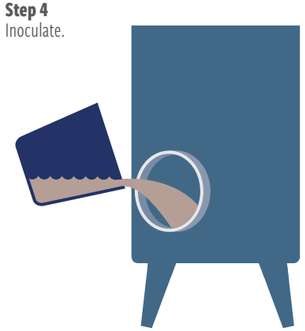
Step 2
Cool, add yeast, stir, let stand for 20 minutes, stir.



Step 3
Atemperate.
Repeat if necessary.



Step 4
Inoculate.



TROUBLESHOOTING GUIDE FOR SLUGGISH ALCOHOLIC FERMENTATIONS

Many factors influence the success of a fermentation including yeast strain selection, yeast cell number, yeast handling and inoculation practices, availability of nutrition and oxygen, and temperature management. If a fermentation becomes sluggish or you suspect it might be stuck, it is wise to get a complete picture of the wine before jumping into a full restart. Sometimes a simple adjustment or a mixing can be enough to get a fermentation back on track (refer below).

If a restart is necessary, having all the details will help you determine the best approach.

Recognizing that a fermentation is sluggish or stuck is the first step in rectifying a challenging situation. A fermentation can be viewed as stuck if the sugar has not dropped for >48 hours. A warning sign that a sluggish fermentation may become stuck is when the fermentation approaches ~1 °Brix and fermentation slows to <0.25 °Brix per day (and the temperature is reasonable).

There are a two protocols in our handbook (and more online), that can walk you through the necessary steps to restart a sluggish or stuck fermentation.

Choosing the correct protocol is essential for a successful outcome. If a fermentation sticks and the sugar level is >3 °Brix with an alcohol <11.5% (v/v) it is relatively easy to restart as long as there are no other compounding factors. However, fermentations are more difficult to restart when the alcohol is higher and the sugar is lower.

Our **preferred method to restart sluggish and stuck fermentations** is the "Recommended Method to Restart a Stuck Fermentation using Uvaferm 43 RESTART™" listed on the next page. This protocol was developed in conjunction with Inter-Rhône and is specifically for use with the 43 RESTART yeast strain. Other yeast strains (even ones within our portfolio, including Uvaferm 43™) should not be attempted with this one-step acclimatization protocol. If a different strain like Uvaferm 43, Fermivin® Champion, Lalvin K1 (V1116)™ or VIN 13 is preferred for the restart, then the multi-step build-up protocol "Traditional Method to Restart a Stuck Fermentation" on page 39-40 can be used.

THE JUICE/WINE MIGHT BE TOO CLEAR

If your juice is clear (<50 NTU), there may not be enough solids to keep the yeast in suspension during the early phases of fermentation. Increasing the turbidity is advised. This can be achieved through an addition of Reskue™ (pg 49), in addition to stirring. A side benefit of Go-Ferm™ and Go-Ferm Protect Evolution™ (pg 45-46) is that they also help to increase the turbidity of the juice.

THE YEAST MAY NOT HAVE BEEN PROPERLY ACCLIMATIZED

Rehydrated yeast must have time to acclimatize to the changes in sugar concentration and temperature of juice/must during inoculation. Improper acclimatization can delay the start of fermentation after inoculation. Our "*Saccharomyces* Yeast Rehydration" protocol (pg 36) contains proper timing and steps for acclimatization.

THERE MAY NOT BE ENOUGH YEAST

If you didn't inoculate at the appropriate rate it is possible that you don't have a sufficient population of yeast. In this case a re-inoculation might be necessary.

THE YEAST POPULATION IS NOT HEALTHY

You may have an adequate population, but the cells may not be healthy.

THE YEAST MIGHT NEED ADDITIONAL NUTRIENTS

For a fermentation to be happy and healthy it is essential that the yeast have enough nutrients. Even when starting with high nutrient levels (>300ppm YAN) additional nutrients are almost always needed at 1/3 of the way through the fermentation. If you're at the tail end of the fermentation with just a small amount of sugar left, an addition of Reskue™ (pg 49) and a mixing can be beneficial.

THE TEMPERATURE OF THE WINE IS PROBLEMATIC

Each yeast strain has an optimal temperature range for fermentation. Anything outside of this range can cause stress for the yeast. If your temperature is too low, try warming the wine slowly. If the temperature is too high, or if it spiked at any point, it's possible that the yeast are no longer viable and a re-inoculation will be necessary. To increase success rates at the end of fermentation, try adjusting the temperature of the wine to 20-22°C(68-72°F).

THE ALCOHOL MAY BE TOO HIGH FOR YOUR SELECTED YEAST STRAIN

Certain yeast strains can tolerate more alcohol than others. If you have exceeded the tolerance level of your selected strain, you may need to re-inoculate with a strain that has a higher tolerance. Based on your starting sugar, you should always select a strain that will be able to handle the potential alcohol level.

THE WINE MIGHT NEED A DETOXIFICATION

When wine yeast become stressed, they can produce certain compounds that impede fermentation. Reskue™ (pg 49) can be extremely beneficial in this situation. If possible, Reskue should be added and racked after 48 hours. If you are unable to rack, adding Reskue and leaving it in the wine can still help.

THERE MIGHT BE OTHER MICROBIAL POPULATIONS YOU NEED TO ADDRESS

Check your malic acid and volatile acidity (VA). If malic acid has dropped, and you have not used malic acid-degrading yeast or bacteria, you may have a lactic acid bacteria (LAB) infection. A strong LAB population can produce VA and inhibit yeast that are already weak at the end of alcoholic fermentation. VA >0.6g/L can be challenging for yeast, especially in high alcohol situations, and anything greater than 0.8g/L can be inhibitory. LAB can be mitigated with Lysovin™ (pg 89) if malolactic fermentation (MLF) isn't complete but is desired, or Bactiless™ (pg 90) if MLF is complete or a MLF is not desired. In any condition, uncontrolled LAB should be controlled before attempting to restart a stuck ferementation.

HOW TO

RECOMMENDED METHOD TO RESTART A STUCK FERMENTATION USING UVAFERM 43 RESTART™

FOR 1000 GALS OF STUCK WINE

PREPARE THE STUCK WINE

1. Address any potential spoilage organism concerns with SO_2, Bactiless™ or Lysovin additions.
2. Suspend 1.5kg (3.3lb) Reskue™ in 10 times its weight of warm water 30–37°C(86–98°F). Wait 20 minutes then add to stuck wine. Mix thoroughly to incorporate.
3. Allow the Reskue to settle for 48 hours then rack off the settled lees.
4. Adjust the temperature of the Reskue-treated wine to 20–25°C(68–77°F).

PREPARE THE "PIED-DE-CUVE" (STARTER)

5. Prepare the following:
   - 40 gallons water
   - 50 gallons racked Reskue-treated wine
   - 0.3kg (2/3 lb) Fermaid O™
6. Adjust to 5°Brix.
7. Mix well.

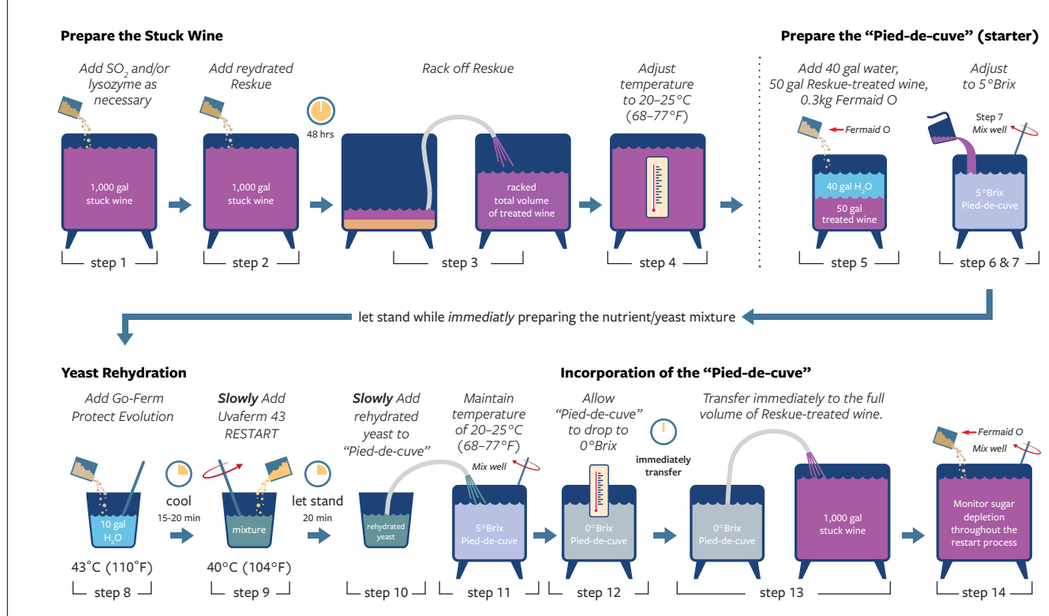
YEAST REHYDRATION

8. Add 2kgs (4.4 lbs) of Go-Ferm Protect Evolution in 10 gallons of water at 43°C (110°F).
9. Cool solution to 40°C (104°F) and add 1.5kgs (3.3 lbs) of Uvaferm 43 RESTART.
10. Wait 20 minutes and slowly acclimate the yeast before adding to the "Pied-de-cuve."
11. Maintain temperature of 20–25°C (68–77°F).

INCORPORATION OF THE "PIED-DE-CUVE"

12. Allow "Pied-de-cuve" to drop to 0°Brix.
13. Transfer immediately to the full volume of Reskue treated wine.
14. Add 1.5kg (3.3lbs) of Fermaid O to tank. Mix to homogenize. Monitor sugar depletion throughout the restart process.

The steps in this protocol can be adapted for volumes of wine other than 1000 gallons.



STAFF PICK

Our recently introduced Reskue/43Restart protocol has been a game changer for stuck and sluggish ferments. I've seen it solve many problems for winemakers—while saving time and people power!—Mollie Forest, Sales Representative, based in Washington State

HOW TO

TRADITIONAL METHOD TO RESTART A STUCK FERMENTATION IN WINES >3°BRIX AND <11.5% ALCOHOL

When restarting a sluggish or stuck fermentation, it is essential to address yeast biomass buildup together with the low nutrient levels. A yeast rehydration nutrient such as Go-Ferm Protect Evolution™ is essential, as it is rich in micronutrients and survival factors.

When stuck wines have high residual sugar levels, the addition of a complex nutrient to the stuck wine is also recommended. Unwanted bacteria like *Lactobacillus spp.* and *Oenococcus oeni* are often present in stuck fermentations. Adding Lysovin (pg 89) to the stuck wine prior to restarting the fermentation may help control unwanted bacteria and provide an improved environment for the restart to occur.

Adding Reskue™ (pg 49) to the stuck wine prior to restarting the fermentation may also help reduce accumulated toxins and improve chances for a successful restart.

FOR WINES STUCK AT >3°BRIX AND <11.5% (V/V) ALCOHOL

STEPS 1–8

Build-up for Stuck Wine

1. Add 40 g/hL (3.3 lb/1000 gal) of Reskue 48 hours prior to restarting.
2. After 48 hours, rack off the Reskue.
3. Add a complex yeast nutrient (Fermaid K™ or Fermaid O™) directly to the tank of stuck wine at a rate of 0.5–1.0 lb/1000 gal (6–12 g/hL). Many winemakers also add Lysovin at this time to reduce potential bacteria problems (see page 89).
4. In another clean container mix equal volumes of stuck wine and water. Generally this would total 1% of the total wine volume. (Example: For 1000 gal of stuck wine, use 10 gal water + 10 gal wine.) This container will be the "Mother Restart Tank".
5. Calculate the amount of Go-Ferm Protect Evolution at the recommended rate. Dissolve this yeast rehydration nutrient in 20 times its weight of clean, chlorine free, 43°C(110°F)water. (Example: 5 lb Go-Ferm Protect Evolution x 20 = 100 lb, divided by 8.33 lb/gal water = 12 gal water needed.) Mix the solution.
6. Select a yeast strain that is both alcohol tolerant and a vigorous fermenter such as Uvaferm 43™, Lalvin K1 (V1116)™, Fermivin® Champion or VIN 13. Calculate the amount of yeast required for the total volume of stuck wine at 3–5 lb/1000 gal (36–60 g/hL). When the rehydration nutrient/water solution temperature has cooled to 40°C(104°F), slowly (over 5 minutes) add yeast. Stir gently to mix and avoid clumping. Let this yeast suspension stand for 20 minutes.
7. Check the temperature of the yeast suspension. There should not be more than 10°C(18°F) difference between the yeast suspension and the diluted wine in the Mother Restart Tank. If there is too great a temperature difference, acclimatization may be required. Cold temperatures may shock the yeast cells.
8. When the yeast suspension is properly rehydrated and proper consideration has been given to temperature differences, add the yeast to the Mother Restart Tank and wait 20–30 minutes.

STEPS 9–12

Inoculation of Stuck Wine

9. Add 10% of stuck wine to the Mother Restart Tank and wait 20–30 minutes. (Example: For 1000 gal stuck wine, add 100 gal wine.)
10. Add 20% of stuck wine to the Mother Restart Tank and wait 20–30 minutes. (Example: For 1000 gal stuck wine, add 200 gal wine.)

11a. Repeat step 10.

11b. Repeat step 10.

11c. Repeat step 10.

12. Add any remaining wine to the Mother Restart Tank.

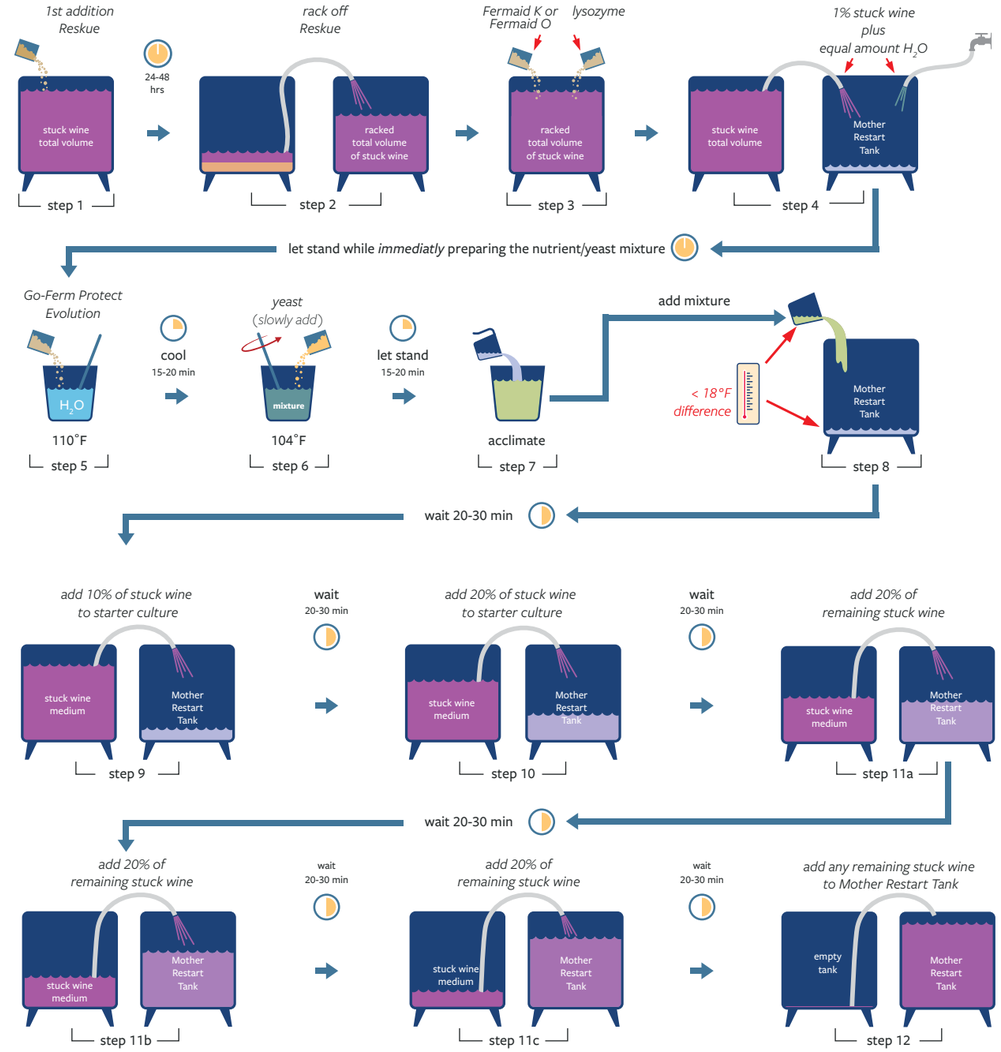
FOR WINES STUCK AT 1–2°BRIX AND <11.5% (V/V) ALCOHOL

Follow this restart protocol, except in Step 3 reduce the complex yeast nutrient addition to 0.5 lb/1000 gal (6 g/hL).

FOR WINES STUCK AT <1°BRIX AND <11.5% (V/V) ALCOHOL

Follow this restart protocol, except in Step 3 eliminate the addition of a complex yeast nutrient.

TRADITIONAL METHOD TO RESTART A STUCK FERMENTATION IN WINES >3°BRIX AND <11.5% ALCOHOL



NUTRIENTS

Yeast are living organisms. When treated well, they survive most winemaking conditions. If yeast physical and nutritional needs are understood and met, they can be expected to perform at their peak while converting juice into wine. If yeast needs are not met, however, they become stressed and their performance is hindered. To optimize yeast performance and to encourage a successful fermentation the yeast's nutritional needs must be met. Yeast require a balance of vitamins, minerals, survival factors and nitrogen.

SUPPLEMENTING NUTRIENTS FOR SUCCESS

Yeast require nitrogen in a form they can assimilate. Yeast assimilable nitrogen (YAN) consists of most amino acids, ammonia, and some types of peptides. Grapes vary in their YAN content. When determing the YAN content of must/juice, both assimilable amino acids (Proline is not assimilable) and ammonia need to be measured to determine total YAN.

Yeast also need vitamins, minerals and survival factors. Vitamins and minerals are co-factors for growth and aroma metabolism. Interestingly, the higher the YAN content the more vitamins and minerals a yeast requires. Yeast cannot survive without them.

Yeast survival factors (sterols and unsaturated fatty acids) are needed for healthy plasma membranes. When yeast have sufficient survival factors, sugar uptake can continue throughout fermentation and the toxic effects of ethanol can be minimized. By providing sterols and unsaturated fatty acids during yeast rehydration, the cells will be off to a great start!

HOW MUCH YAN IS REQUIRED?

The amount of YAN yeast require depends on the following: individual yeast strain requirements, initial sugar content, fermentation temperature, oxygenation, turbidity, pre-fermentation practices and fruit quality.

YAN will vary between vintages, vineyards and varietals so it's necessary to analyize each lot of fruit. Analysis should be conducted as close to yeast inoculation as possible.

See more informaton on nitrogen supplementation and the importance of organic nitrogen on pgs 44.

YEAST STRAIN CHOICE

Different yeast strains have different requirements and are classified as low, medium or high.

- Low nitrogen-requiring yeast need 7.5 ppm YAN per 1°Brix.
- Medium nitrogen-requiring yeast need 9 ppm YAN per 1°Brix.
- High nitrogen-requiring yeast need 12.5 ppm YAN per 1°Brix.

INITIAL SUGAR CONTENT

The higher the initial sugar content, the more YAN required.

TEMPERATURE

An increase in temperature stimulates fermentation rate and yeast growth, thereby requiring increased levels of nitrogen.

OXYGEN

When adding more oxygen to the must/juice, nitrogen is captured faster, and more is needed.

TURBIDITY

When juice is over-clarified (<50 NTU), many nutritional factors for yeast are removed, making it necessary to supplement with complete and balanced nutrients.

PRE-FERMENTATION PRACTICES

Vitamins and minerals are generally consumed (even in healthy fruit) by native microflora. This means that prior to inoculation these essential factors may be deficient.

FRUIT QUALITY

The presence of rot will impact grape juice/must chemistry. Studies have shown that grapes impacted by *Botrytis cinerea* and other molds are deficient in YAN.

CHOOSING YEAST NUTRIENTS & YEAST DERIVATIVE NUTRIENTS

♦ Highly Recommended
◊ Recommended

Note: With the exceptions of Fermaid K™ and Fermaid K (Kosher)™, all ingredients of the products shown in the nutrient section of this handbook are listed by the TTB as acceptable in good commercial winemaking practice listed in 27 CFR 24.246. The ingredients in Fermaid K and Fermaid K (Kosher) are listed as acceptable in good commercial winemaking practice in either 27 CFR 24.250 or 27 CFR 24.246. For more information please visit www.TTB.gov.

	DAP	Fermaid K + Fermaid K (Kosher)	Fermaid O	Go-Ferm	Go-Ferm Protect Evolution	Nutrient Vit End	Reskue	Stimula Chardonnay	Stimula Sauvignon blanc	Glutastar	Noblesse	Opti-MUM Red	Opti-RED	Opti-WHITE
Page#	48	48	49	46	45	50	49	46	47	51	52	52	53	53
Measurable YAN/YAN equivalents* (in ppm) at 25 g/hL dose	50/50	25/25	10/40-60	-	-	-	-	10/40-60	10/40-60	-	-	-	-	-
Measurable YAN/YAN equivalents* (in ppm) at 30 g/hL dose	60/60	30/30	12/48-72	-	-	-	-	12/48-72	12/48-72	-	-	-	-	-
Measurable YAN/YAN equivalents* (in ppm) at 40 g/hL dose	80/80	40/40	16/64-96	-	-	-	-	16/64-96	16/64-96	-	-	-	-	-
Yeast rehydration nutrient				◊	♦									
Yeast stimulant for increasing positive thiols (aromatics)					◊				♦					
Yeast stimulant for increasing positive esters (aromatics)			◊					♦						
Does not contain DAP (inorganic nitrogen)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Contains organic nitrogen from autolyzed yeast		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Contains supplemented vitamins and minerals		✓												
Contains naturally occurring vitamins and minerals			✓	✓	✓			✓	✓					
Contains supplemented thiamin		✓												
Inactivated yeast for challenging conditions						◊	♦							
Protects aromatic freshness and color (antioxidant)										♦	◊			◊
Develops mid-palate intensity in whites and rosés										◊	♦			♦
Develops mid-palate intensity in reds											◊	♦	◊	
Facilitates oak integration											♦	♦	◊	◊
Color and tannin stabilization												♦	◊	
Decreases alcohol perception											◊	♦	◊	
Increase overall balance			◊					◊	◊	◊	♦	♦	◊	◊
Reduces bitterness or green character													◊	◊
Reduced production of sulfur off-odors during fermentation		◊	♦	◊	♦			♦	♦		◊			
Reduces sulfur defects											◊		◊	
OMRI Listed			✓	✓	✓	✓					✓	✓	✓	✓
Approved under 27 CFR 24.246	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Approved under 27 CFR 24.250		✓												

*See page 43 for more information on YAN equivalent vs measurable YAN

FERMAID O IS MORE EFFICIENT THAN AMMONIA (DAP)

THE IMPORTANCE OF AN ORGANIC SOURCE OF NITROGEN

Yeast are living organisms and require a balance of energy sources (sugar), nitrogen-containing compounds, vitamins, minerals, and survival factors to perform at their best. Nitrogen is one of the most important nutrients for yeast and the nitrogen-containing compounds that yeast can use are known as yeast assimilable nitrogen (YAN). YAN comes in two main forms: ammonia, an inorganic source of nitrogen (does not contain carbon), and amino acids which are complex organic based compounds (containing carbon).

Historically, nitrogen in the form of diammonium phosphate (DAP) has been the focus for yeast nutrition. In fact, most academic recommendations for YAN supplementation are based on DAP addition (see box on Measurable YAN vs YAN Equivalent this page). However, nitrogen supplied as DAP accumulates very quickly which can lead to uncontrolled cell growth and hot fermentations and does not necessarily give yeast the staying power to complete a fermentation. Alternatively, when nitrogen is supplied in the form of amino acids (from autolyzed yeast) the fermentation profiles are very different. Ferments do not get as hot, the yeast population is controlled, and the cells are healthier. Interestingly, both aroma and mouthfeel are also improved when DAP is avoided.

Organic and inorganic nitrogen each have a distinct role and impact on fermentation. While yeast may show an affinity for inorganic nitrogen, a yeast diet balanced with organic nitrogen can produce healthier fermentations, better aromatics (e.g. terpenes and esters) and lower levels of undesirable compounds (e.g. ethyl acetate and hydrogen sulfide).

To illustrate the relative effects of different nitrogen sources on fermentation kinetics, trials were done by Lallemand and the ICV in collaboration with the INRA Pech Rouge Research Station in the Languedoc region of France. The purpose of the trials was to compare the efficacy of adding DAP (inorganic nitrogen) versus Fermaid O™. The trial musts and fermentation protocols were identical. The only difference was that one lot received an addition of the equivalent of 16 ppm of YAN in the form of DAP while another received a similar YAN addition from Fermaid O. This addition was split into two for both treatments, with the first addition added at the onset of fermentation and the second addition added at 1/3 sugar depletion. The control received no addition of nitrogen.

The addition of YAN from Fermaid O resulted in a complete fermentation (Figure 2) in approximately 10 days (Figure 1). Further, the fermentation involving only DAP had a significantly slower conclusion and higher final residual sugars than the wine made with Fermaid O (Figure 2). These trials show the importance of the source of yeast available nitrogen.

Figure 1: *Fermentation kinetics representing the fermentation activity of yeast according to the three protocols (expressed in g/L.h^{-1} of CO_2 released).*

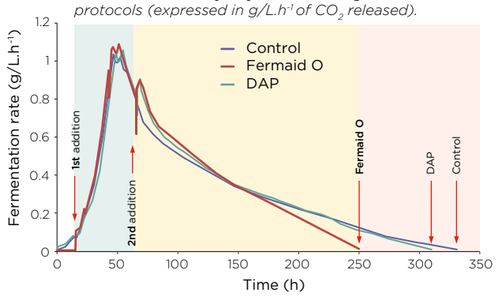
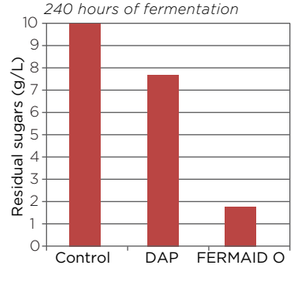


Figure 2: *Residual sugars at 240 hours of fermentation*



MEASURABLE YAN VS YAN EQUIVALENT

Most academic recommendations for YAN supplementation have been based on measurable YAN, often supplemented in the form of inorganic nitrogen (usually DAP). Lallemand has demonstrated that organic forms of YAN are 4-6 times more efficient than inorganic YAN. This means that a 25 g/hL dose of Fermaid O has 10 ppm measurable YAN but a YAN equivalent of 40-60 ppm. Throughout our recommendations we have taken this efficiency into account.

HOW TO

NUTRIENT SUPPLEMENTATION PLANNER

In order to conduct a healthy and complete fermentation, yeast require minerals, vitamins, fatty acids, sterols and nitrogen. Minerals, vitamins, fatty acids and sterols are provided by GoFerm Protect Evolution™, whereas nitrogen is supplied by Fermaid O™ or Fermaid K™. If we consider the individual needs of the yeast, how much fermentable sugar is present and how much nitrogen is required by the yeast under these conditions we can tailor a program designed for success. Use the following step-by-step guide to develop a complete yeast nutrition program for each fermentation:

1. Choose the yeast strain. Strains can be found on pages 11-16 and are classed as low, medium or high nitrogen-requiring.
2. Determine the yeast strain's Measurable YAN requirement using Table 1.
3. Calculate the amount of Measurable YAN that needs to be supplemented:
   [Yeast Measurable YAN Requirement (using Table 1)] – [Measurable YAN of Juice or Must] = Amount of YAN Required to Supplement (ppm)
4. Determine fermentation goal and follow program as outlined below:

Table 1: Yeast Assimilable Nitrogen (YAN) needs of yeast at different starting sugars*

Sugar	Yeast Strain Measurable YAN* Requirements (ppm N)		
°Brix	Low	Medium	High
20	150	180	250
22	165	200	275
24	180	220	300
26	195	240	325
28	210	260	350
30	225	280	375

** based on supplementation with inorganic nitrogen source, see pg 42 for info on YAN Equivalents*

GOAL — FERMENTATION SECURITY

YAN Required to Supplement	At Yeast Rehydration Phase	At 2–3 °Brix Sugar Drop	At 1/3 Sugar Drop
0-50 ppm	30 g/hL (2.5 lb/1000 gal) Go-Ferm Protect Evolution	No addition	30 g/hL (2.5 lb/1000 gal) Fermaid O
51-100 ppm		20 g/hL (1.7 lb/1000 gal) Fermaid O	20 g/hL (1.7 lb/1000 gal) Fermaid O + 12.5 g/hL (1.0 lb/1000 gal) Fermaid K
101-150* ppm		40 g/hL (3.3 lb/1000 gal) Fermaid O	40 g/hL (2.5 lb/1000 gal) Fermaid K

GOAL — FERMENTATION SECURITY AND REVELATION OF THIOLS

YAN Required to Supplement	At Yeast Rehydration Phase	At 2–3 °Brix Sugar Drop	At 1/3 Sugar Drop
0-50 ppm	30 g/hL (2.5 lb/1000 gal) Go-Ferm Protect Evolution	40 g/hL (3.3 lb/1000 gal) Stimula Sauvignon blanc	10 g/hL (0.8 lb/1000 gal) Fermaid O
51-100 ppm			20 g/hL (1.7 lb/1000 gal) Fermaid O
101-150* ppm			40 g/hL (3.3 lb/1000 gal) Fermaid O

GOAL — FERMENTATION SECURITY AND PRODUCTION OF ESTERS

YAN Required to Supplement	At Yeast Rehydration Phase	At 2–3 °Brix Sugar Drop	At 1/3 Sugar Drop
0-50 ppm	30 g/hL (2.5 lb/1000 gal) Go-Ferm Protect Evolution	No addition	40 g/hL (3.3 lb/1000 gal) Stimula Chardonnay
51-100 ppm		20 g/hL (1.7 lb/1000 gal) Fermaid O	
101-150* ppm		40 g/hL (3.3 lb/1000 gal) Fermaid O	

**If your calculation requires >150ppm nitrogen it is suggested to choose a yeast strain with a lower nitrogen requirement.*

REHYDRATION NUTRIENTS FOR CELL PROTECTION

Rehydration is the first stage of a yeast nutrient strategy. Yeast rehydration nutrients provide natural micronutrients (vitamins and minerals) and survival factors (sterols and unsaturated fatty acids) to the yeast at a time when they can be used most efficiently. Yeast cells soak these nutrients up like a sponge making them biologically available for many essential reactions. Further, nutrients are available for their intended purpose since they are not consumed by competitive microorganisms, bound up by organic acids, anions, polysaccharides and polyphenols, or inactivated by SO_2.

Never use nutrients containing DAP during yeast rehydration—they are toxic to the yeast.

GO-FERM PROTECT EVOLUTION

OMRI LISTED · LALLEMAND

Yeast rehydration nutrient; OMRI listed

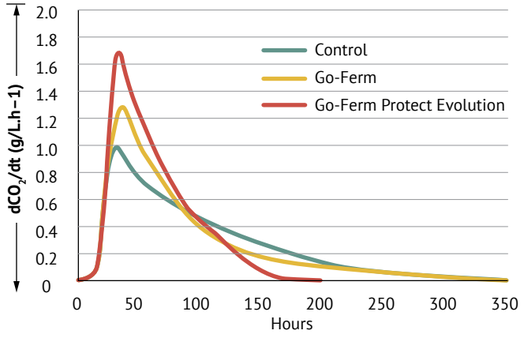
#15103	2.5 kg	$85.00
#15251	10 kg	$288.00

Go-Ferm Protect Evolution™ is the latest generation of yeast rehydration nutrients. This formulation has optimized the bioavailability of vitamins, minerals and sterols, all of which are derived from inactivated wine yeast. The benefits are clearly seen at the end of alcoholic fermentation (Fig. 1).

Yeast rehydrated in Go-Ferm Protect Evolution have enhanced viability (Fig. 2), vitality and tolerance to wine stresses such as ethanol, acid, sugar and temperature. These yeast also express more aromatic varietal aromas (Fig. 3) due to Go-Ferm Protect Evolution's high ergosterol content which enables yeast membrane transport systems better aromatic precursor assimilation.

When used in fermentations where oxygen additions are difficult, Go-Ferm Protect Evolution's enhanced sterol content can replace the second oxygen addition recommended at 1/3 sugar depletion.

Fig. 1: Impact of Go-Ferm Protect Evolution on Fermentation Kinetics in a High Nitrogen, Low Sugar Ferment.



STAFF PICK

GoFerm Protect Evolution makes yeast happy, that makes me happy—Nichola Hall, PhD, Staff Scientist and Yeast Physiologist based in Sonoma Co.

Fig. 2: Impact of Go-Ferm Protect Evolution on Yeast Viability 115 Hours Post-Inoculation

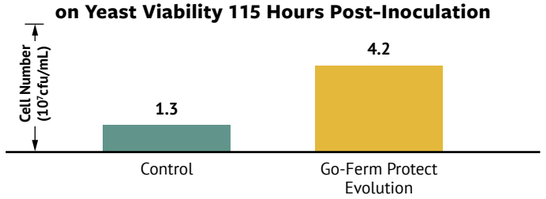
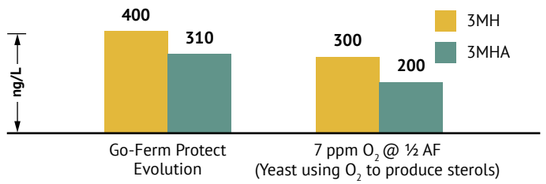


Fig. 3: Impact of Go-Ferm Protect Evolution vs Oxygen on Varietal Thiol Production



Recommended Dosage

30 g/hL	2.5 lb/1000 gal

Note: This recommendation is based on a yeast inoculum of 2 lb/1000 gallons (25 g/hL). If using more or less yeast, use a ratio of 1 part yeast to 1.25 parts Go-Ferm Protect Evolution.

Usage

Mix Go-Ferm Protect Evolution in 20 times its weight of clean 43°C(110°F) water. Let the mixture cool to 40°C(104°F) then add the selected active dried yeast. Let stand for 20 minutes. Slowly (over 5 minutes) add equal amounts of juice/must to be fermented to the yeast slurry. Do not allow more than 10°C(18°F) difference. Acclimatize yeast as necessary (see page 36 for more details).

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Note: Due to the unique nature of Go-Ferm and Go-Ferm Protect Evolution, they will not go into solution completely. This is due to the fatty acid and sterol content and is to be expected.

Stage of Winemaking: During yeast rehydration	Provides: Natural vitamins, minerals, and survival factors in autolyzed yeast base
Impact: Supports healthy fermentation, minimizes yeast stress, optimizes aromas	YAN contribution: Insignificant

GO-FERM

LALLEMAND · OMRI LISTED

Yeast rehydration nutrient; OMRI listed

#15149	1 kg	$38.00
#15135	2.5 kg	$71.00
#15161	10 kg	$231.00

Go-Ferm™ is the original yeast rehydration nutrient and contains a balance of micronutrients. It was developed to enhance fermentation kinetics and to help avoid fermentation problems like hydrogen sulfide.

Recommended Dosage

30 g/hL	2.5 lb/1000 gal

Note: This recommendation is based on a yeast inoculum of 2 lb/1000 gallons (25 g/hL). If using more or less yeast, use a ratio of 1 part yeast to 1.25 parts of Go-Ferm.

Usage

Mix Go-Ferm in 20 times its weight of clean 43°C(110°F) water. Let the mixture cool to 40°C(104°F) then add the selected active dried yeast. Let stand for 20 minutes. Slowly (over 5 minutes) add equal amounts of juice/must to be fermented to the yeast slurry. Do not allow more than 10°C(18°F) difference. Acclimatize yeast as necessary (see page 36 for more details).

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: During yeast rehydration	Provides: Natural vitamins & minerals in autolyzed yeast base
Impact: Supports healthy fermentations	YAN contribution: Insignificant

YEAST STIMULANTS FOR OPTIMIZING AROMAS

The Stimula range of yeast nutrients are some of the most innovative products within the Lallemand portfolio. Yeast nutrients are generally used to nourish cells and assist them with the challenges of fermentation. The Stimula range is different. These natural yeast autolysates are formulated to supply optimal levels of specific amino acids, vitamins, minerals and sterols that stimulate the yeast cell functions involved in aroma compound revelation and production. When used at specific times during fermentation, ester production, and thiol uptake, revelation and release, are increased. The Stimula natural yeast autolysates can be used in any varietal where you wish to optimize thiol expression or ester production.

STIMULA CHARDONNAY

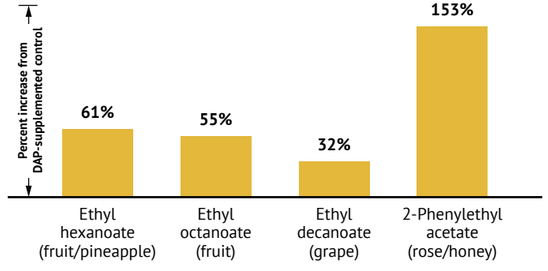
LALLEMAND

Stimulates ester production in fruity whites and rosés

#15245	1 kg	$44.00
#15260	10 kg	$383.00

Stimula Chardonnay™ is a 100% autolyzed yeast added at the end of yeast growth phase, usually at about 1/3 sugar depletion. At the end of growth phase, yeast use Stimula Chardonnay's naturally occurring amino acids, riboflavin, biotin, vitamin B6 complexes, sterols, manganese and zinc to produce esters rather than for growth. Esters are desirable and contribute fruity and floral aromas. Stimula Chardonnay optimizes the aromatic potential of white and rosé wines.

Impact of Stimula Chardonnay on Ester Production in Languedoc Chardonnay



Recommended Dosage

40 g/hL | 3.3 lb/1000 gal

Usage

Mix Stimula Chardonnay in 10 times its weight of clean, chlorine-free water or juice and add to the fermentation at ⅓ sugar depletion. It is essential that the timing of addition is respected. Stimula Chardonnay is not fully soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store in a dry environment at 18°C (65°F). Once opened, use immediately.

Stage of winemaking: During fermentation at 1/3 sugar depletion	Provides: Organic nitrogen with natural vitamins and minerals
Impact: Stimulates fruity and floral ester production	Measurable YAN at 40 g/hL dose: 16 ppm YAN equivalents at 40 g/hL dose: 64-96 ppm

STIMULA SAUVIGNON BLANC

Stimulates positive thiol production in aromatic whites and rosés

#15246	1 kg	$44.00
#15255	10 kg	$383.00

Stimula Sauvignon Blanc™ is a 100% autolyzed yeast added at the beginning of fermentation, after approximately 2–3°Brix drop. It enhances volatile thiol production in Sauvignon blanc, Chardonnay, Riesling, and Sémillon, as well as rosés made from Syrah, Grenache and Cabernet Sauvignon. Volatile thiols are responsible for the varietal aromas associated with tropical (passion fruit, guava), citrus (grapefruit), gooseberry, and blackcurrant flavors.

Stimula Sauvignon Blanc is particularly rich in calcium pantothenate, thiamin, vitamin B6 complexes, folic acid, manganese and zinc. These vitamins and minerals stimulate yeast uptake of odorless thiol precursors and their subsequent conversion into aromatic volatile thiols (4MMP and 3MH).

Recommended Dosage

40 g/hL	3.3 lb/1000 gal

Usage

Mix Stimula Sauvignon blanc in 10 times its weight of clean, chlorine-free water or juice and add to the fermentation at 2–3°Brix drop. It is essential that the timing of addition is respected. Stimula Sauvignon blanc is not fully soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store in a dry environment at 18°C (65°F). Once opened, use immediately.

Stage of winemaking: During fermentation at 2-3°Brix sugar drop	Provides: Organic nitrogen with natural vitamins and minerals
Impact: Optimizes uptake of thiol precursors	Measurable YAN at 40 g/hL dose: 16 ppm YAN equivalents at 40 g/hL dose: 64-96 ppm

ESTERS OR THIOLS: WHICH STIMULA NUTRIENT SHOULD YOU USE?

Despite their names, Stimula nutrients can be used on varietals other than Chardonnay or Sauvignon blanc. Which Stimula to use depends on whether esters or thiols are desired.

STIMULA CHARDONNAY FOR ESTERS

Esters contribute sweet-fruity aromas and flavors in white, rosé and red wines. It is the synergy of esters that contributes to overall complexity of wine aromas. Recent research has shown that ester production happens in two phases with the majority of esters produced during last two thirds of fermentation.

Fermentation esters can be split into two major groups: acetate esters, responsible for rose/floral aromas, and ethyl esters, responsible for red berry/fruit aromas. Although yeast vary in their ability to produce esters (see charts pgs 11-16), ester production is also influenced by nutrient composition and fermentation conditions. Lipids, vitamins and specific amino acids all support ester production which is why Stimula Chardonnay is recommended for all fruity and floral wine styles.

STIMULA SAUVIGNON BLANC FOR THIOLS

Volatile thiols are compounds that contribute tropical notes reminiscent of passion fruit, guava and grapefruit in white wines. Although Sauvignon blanc is the poster child for thiols we know that volatile thiol precursors are in the skin of many other white varieties like Chardonnay, Colombard, Gewürztraminer, Grenache blanc, Pinot gris, Pinot blanc and Sémillon. Interestingly, the blackcurrant flavor found in red wines like Cabernet Sauvignon, Merlot and Syrah are also due to the presence of thiols. These compounds are released from their bound form due to yeast enzymatic activity, and yeast establish this enzymatic activity very early in fermentation. Using Stimula Sauvignon blanc early in any thiolic varietal can help to optimize the potential of volatile thiol production.

NUTRIENTS FOR FERMENTATION SECURITY

Yeast nutrition refers to the utilization of essential nutrients for cellular reactions which ultimately ensures the growth and survival of the cell. Fermentation nutrients are a vital part of a controlled fermentation strategy. Yeast cells use nitrogen for growth, enzyme synthesis, protein synthesis and sugar transport. Yeast cells also require a balanced supply of minerals (magnesium, zinc, etc.), vitamins, sterols including ergosterol and natural sterols from the grapes (phytosterols), polyunsaturated fatty acids, and oxygen.

Tailor your fermentation regime for optimal yeast reproduction, sugar transport and aromatic expression.

DIAMMONIUM PHOSPHATE (DAP)

Inorganic nitrogen source

#15805	5 kg	$40.00

Diammonium phosphate (DAP) should only be used to supplement severely deficient juices/musts. DAP provides inorganic nitrogen and should only be used if necessary and always in combination with complex nutrients.

Usage

Suspend DAP in water or juice/must and mix well before adding, especially during fermentation to avoid CO_2 release and overflowing of vessel.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: 1/3 sugar depletion if YAN needs cannot be achieved using Fermaid O or Fermaid K	Provides: Ammonia and phosphate
Impact: Supports cell growth, drives fermentation rate	Measurable YAN at 25 g/hL dose: 50 ppm YAN equivalents at 25 g/hL dose: 50 ppm

FERMAID K/FERMAID K (KOSHER)*

Complex yeast nutrient

#15073	2.5 kg	$63.00
#15070	10 kg	$162.00

Fermaid K (Kosher) - certified Kosher for Passover

#15070K	10 kg	$273.00

Fermaid K™ is a complex yeast nutrient that contains a blend of assimilable amino acids from inactivated and autolyzed yeast, sterols and unsaturated fatty acids, magnesium sulfate, thiamin, folic acid, niacin, calcium pantothenate, diammonium phosphate (DAP), and inactivated yeast. This blended nutrient assists with many of the fermentation challenges yeast face. The balance of amino acids and ammonia salts can be used to boost YAN. The sterols and unsaturated fatty acids provide important survival factors which are needed for alcohol resistance and sugar uptake. Inactivated yeast act as nucleation sites that help keep yeast in suspension and absorb toxic short and medium chain fatty acids.

For optimal results, Fermaid K should be used in conjunction with Go-Ferm Protect Evolution™ rehydration nutrient (pg 45).

Recommended Dosage

25-50 g/hL	2-4 lb/1000 gal

Usage

Suspend Fermaid K in water or juice/must and mix well before adding, especially during fermentation to avoid CO_2 release and overflowing of vessel.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

**Note: The ingredients in Fermaid K and Fermaid K (Kosher) are listed by the TTB as acceptable in good commercial winemaking practice in 27 CFR 24.250 together with 27 CFR 24.246. The ingredients in all other products shown on pages 48-53 are listed by the TTB as acceptable in good commercial winemaking practice in 27 CFR 24.246. For more information please visit www.TTB.gov. This product contains thiamin. The TTB Maximum Legal Dose for thiamin hydrochloride = 0.60 mg/L (0.005 lb/1000 gal) of wine or juice. 21 CFR 184.1875.*

Stage of winemaking: 1/3 sugar depletion	Provides: Complex nutrient blend
Impact: Fermentation health and security	Measurable YAN at 25 g/hL dose: 25 ppm YAN equivalents at 25 g/hL dose: 25 ppm

FERMAID O

Organic yeast nutrient; OMRI listed

#15067	2.5 kg	$92.00
#15107	10 kg	$346.00

Fermaid O™ is a blend of highly specific inactivated yeast fractions that are rich in assimilable amino acids (organic nitrogen). It's amino acid profile is highly consistent. Though Fermaid O does not supply a lot of Measurable YAN (see pg 43 for more info), it is a highly effective nutrient. It reliably lowers peak fermentation temperatures, produces lower levels of negative sulfur compounds, and improves fermentation kinetics. Organic nitrogen use has been correlated with positive aromatic expression (thiols and esters) and mouthfeel. For more info, see article on pg 43.

Fermaid O does not contain any DAP or supplemented micronutrients. For optimal results, Fermaid O should be used in conjunction with Go-Ferm Protect Evolution™ rehydration nutrient (pg 45).

Recommended Dosage

10-40 g/hL	0.83-3.3 lb/1000 gal

Usage

Suspend Fermaid O in water or juice/must and mix well before adding, especially during fermentation to avoid CO_2 release and overflowing of vessel.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Note: Due to high nutrient requirements, some yeast strains may benefit from additional nutrient supplementation (see yeast reference chart on pgs 11-16 and Nitrogen Supplementation article on pg 44).

Stage of winemaking: Onset of fermentation and/or 1/3 sugar depletion	Provides: Highly consistent source of amino acids
Impact: Fermentation security and enhanced aroma production	Measurable YAN at 40 g/hL dose: 16 ppm YAN equivalents at 40 g/hL dose: 64-96 ppm

RESKUE

Specific inactivated yeast for treating sluggish and stuck fermentations

#15224	1 kg	$42.00
#15242	10 kg	$312.00

Reskue™ is a specific wine yeast that has been inactivated and treated with a specialized process to create cells with very high bioadsorptive properties specific for short- and medium-chain fatty acids. These fatty acids are toxic to yeast and can be created by yeast during stressful fermentation conditions. Their presence interferes with yeast membrane sugar transport proteins thereby interfering with sugar uptake rates. Using Reskue removes these toxins and reinvigorates sluggish or stuck alcoholic and/or malolactic fermentations.

Reskue has unique lumps and bumps! This increased surface area allows for greater adsorption of toxins.

SEM photo provided by Lallemand. Research collaboration with Professor Aude Vernhet at SupAgro Montpellier.

Dosage

40 g/hL	3.3 lb/1000 gal

Usage

Suspend Reskue in 10 times its weight of clean 30–37°C(86–98°F) water and mix. Wait 20 minutes then add to challenging fermentation. For stuck fermentations, allow Reskue to settle for 48 hours then rack off and follow restart protocol (pg 38-40).

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Any point during fermentation	Provides: Highly specific autolyzed yeast with bioadsorptive properties
Impact: Reinvigorates and detoxifies sluggish/stuck fermentations	YAN contribution: Insignificant

NUTRIENT VIT END

Inactivated yeast for compromised fruit and challenging conditions; OMRI listed

#15679	2.5 kg	$75.00

This specific inactivated yeast can be used at any stage of the fermentation process. Due to its bioadsorptive properties Nutrient Vit End™ can be used early to bind residual fungicides or later to bind specific fermentation derived inhibitors like short- and medium-chain fatty acids. When used preventatively, Nutrient Vit End can bind these toxins and help minimize the risk of sluggish or stuck fermentations.

Recommended Dosage

30-40 g/hL	2.5-3.3 lb/1000 gal

Usage

Suspend Nutrient Vit End in water or juice/must and mix well before adding.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Any point during fermentation	Provides: Highly specific autolyzed yeast with bioadsorptive properties
Impact: Binds fungicides and other fermentation inhibitors	YAN contribution: Insignificant

YEAST DERIVATIVE NUTRIENTS

Yeast derivative nutrients are produced from specific strains of wine yeast that have been inactivated and then fully or partially autolyzed to provide enologically attractive compounds like polysaccharides and peptides. These compounds are harvested in their most reactive form. Each of our yeast derivative nutrients can be differentiated by: strain, level of refinement, functional contribution, and the presence of specific fractions such as glutathione. These winemaking tools contribute certain fermentative advantages and significant wine quality improvement.

All yeast derivative nutrients will contribute some nitrogen to a fermentation, but different autolyzed yeast products are used for different reasons. The nitrogen (YAN) contribution is only mentioned if the goal of the product is fermentation security. Used alone, these nutrients they should not be viewed as a substitute for the complete range of fermentation nutrition products listed in the preceding pages.

SELECTING YEAST DERIVATIVE NUTRIENTS FOR SUCCESS

Yeast derivatives have been used for centuries, historically in the form of autolyzed lees. Lees aging enhances the complexity and stability of wines but the process is slow and can take years to complete. It also comes with risks of sulfur off-odor production, microbial spoilage, and unpredictable outcomes due to the variability of the yeast used for fermentation. Yeast derivative nutrients are autolyzed (inactivated) yeast that can contribute to balance, aroma preservation and color stability in red, white and rosé wines without the risk of lees aging. They can be used at various stages of the fermentation process, from grape to fermentation completion.

AROMA STABILITY

Glutathione and other peptides protect aromas due to their anti-oxidant and quinone-scavenging properties. Polysaccharides can bind with some aroma compounds leading to a stabilizing effect as well as a lengthing of aroma sensations.

COLOR STABILITY

High molecular weight polysaccharides can interact positively with polyphenolic compounds. This complex can help stabilize polymeric pigments (color).

PEPTIDES

Peptides act as anti-oxidants and quinone-scavengers, and give the perception of sweetness.

MOUTHFEEL

Aging on lees releases mannoproteins and polysaccharides that result in reduced astringency and an increase in mouthfeel components. When polysaccharides complex with tannins there are less reactive sites where the tannin can react with salivary proteins, thus lowering the perception of astringency.

GLUTATHIONE

Glutathione is a natural tripeptide found in grapes and yeast in two forms: reduced (GSH) and oxidized (GSSH). In winemaking, GSH is the active form that can scavenge ortho-quinones and can act as a buffer in redox reactions. This powerful antioxidant helps to protect juice and wine from the deleterious effects of oxygen.

POLYSACCHARIDES

The main sources of polysaccharides in wine are from grape skin walls or yeast. Yeast-based polysaccharides can improve aroma, color stability and mouthfeel. They can add palate weight, sweetness and decrease astringency depending on the molecular weight of the compound, its composition and structure.

NEW

GLUTASTAR LALLEMAND

Protects and stabilizes aroma and color compounds against oxidative damage

Aromatic Whites and Rosés

#15265	1 kg	$71.00
#15266	10 kg	$454.00

Glutastar™ is a yeast derivative nutrient that is used early in white and rosé winemaking to scavenge quinones. Quinones quickly lead to oxidative damage when left untreated. By scavenging quinones, aroma compounds and color are preserved. Glutastar is a highly soluble, unique, autolyzed yeast that brings protective qualities of both specialized peptides and reactive glutathione to wines. The effect of Glutastar is long-lasting and its positive impact on varietal and fermentation-derived aromas (Fig. 1) and wine color (Fig. 2) contribute to a prolonged wine shelf-life.

Glutastar can be used in no- and low-SO_2 winemaking.

Fig. 1: Impact of Glutastar on Volatile Thiol Content in a Sauvignon blanc at End of Fermentation

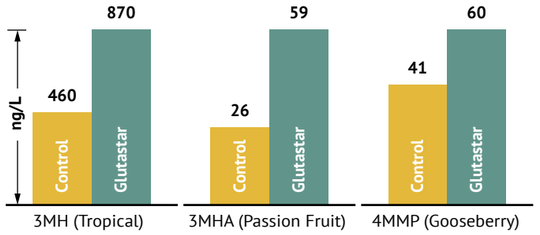
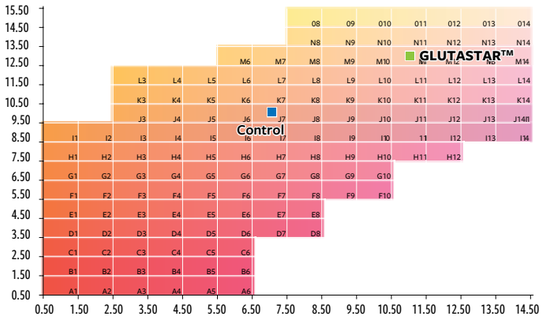


Fig. 2: Color Analysis in a 2018 Provence Rosé of Syrah/Grenache. Trial Compares Control Wine with Glutastar added after Pressing



Recommended Dosage

30 g/hL	2.5 lb/1000 gal

STAFF PICK

*Glutastar is my favorite new product for 2020. Merely explaining what this product does doesn't do it justice. Yes, it's an antioxidant and it protects aromas and colors, but it's even more interesting than that. It reminds me of seeing a dress on a hanger and not realizing how cool it is until you try it on and then thinking "Damn! This is *so* good." This product needs to be experienced to be appreciated.*
—Jessica Just, Fermentation & Enology Dept. General Manager

Usage

Mix Glutastar in 10 times its weight of water or juice. Add directly to juice post-pressing for optimal protection. This product is mostly soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Add directly to juice post-pressing	Provides: Peptides, polysaccharides and glutathione
Impact: Scavenges quinones to protect aromas and color	YAN contribution: insignificant

GLUTASTAR: MORE THAN GLUTATHIONE

Glutathione protects color and aromas from oxidation during the earliest stages of post-harvest winemaking. Glutathione is a tripeptide naturally found in grapes and yeast in its reduced or oxidized form. In winemaking, only glutathione in its reduced form, GSH, protects musts and wines against oxidation due to its ability to scavenge ortho-quinones.

GSH plays a critical role in preventing the oxidation of wine phenols via the reaction of its sulfhydryl group with caftaric acid, one of the most browning-susceptible phenols in wine, to generate stable and colorless products. Other wine compounds contain sulfhydryl groups (some thiols, the amino acid cysteine, and the glutamyl-cysteine dipeptide) but only GSH can react with caftaric acid.

GSH can also outcompete several wine aromatic thiols such as 3MH, 3MHA and 4MMP, for oxidative ortho-quinones thus protecting these wine aromas.

Pure glutathione is not allowed to be added to must or wines but the early addition of Glutastar™, a new GSH-rich yeast derivative, provides a natural alternative to optimize wine quality. Glutastar was developed for the protection of white and rosé wines against oxidation phenomena responsible for color browning and loss of aromas. In fact, **studies have shown Glutastar to be more effective than glutathione alone**.

NOBLESSE LALLEMAND OMRI

Contributes to balance, sweetness and softness on the finish; OMRI listed

Reds, Complex Whites and Rosés

#15105	2.5 kg	$102.00

Noblesse™ is a partially autolyzed yeast derivative nutrient that gives the perception of sweetness and promotes harmony between mouthfeel characteristics in red, white and rosé wines. Upon addition, Noblesse starts to release polysaccharides that can help mask sensations of acidity, astringency or bitterness while helping to integrate alcohol and oak.

Wines made using Noblesse appear to have more fruit and sweetness due to the contribution of low molecular weight polysaccharides. There is also a decrease in tannin intensity and a reduction in both drying and aggressive characters due to the softening effect of the high molecular weight polysaccharides. Noblesse can be used at any time during fermentation and although immediate results are possible, full integration may take three to five months.

Recommended Dosage

30 g/hL	2.5 lb/1000 gal

Usage

Mix Noblesse in 10 times its weight of water or must/juice. Add during a pump-over or tank mixing. This product is partially soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Anytime during fermentation processes	Provides: High and low molecular weight polysaccharides
Impact: Adds sweetness, harmonizes and integrates mouthfeel	YAN contribution: Insignificant

OPTI-MUM RED LALLEMAND OMRI

For increased color stability and roundness in red wines; OMRI listed

Reds

#15229	1 kg	$57.00
#15250	10 kg	$339.00

The yeast strain behind Opti-MUM Red™ was specifically selected and autolyzed for its highly reactive polysaccharides and oligosaccharides. Upon addition, Opti-MUM Red's high molecular weight polysaccharides are released and quickly participate in reactions that stabilize color and polyphenolic compounds (tannins). The earlier that Opti-MUM Red is used the more effective it is in reacting with early diffused color molecules. Using Opti-MUM Red results in wines that are more intense in color and have a rounder and softer mouthfeel with a decreased perception of astringency.

Recommended Dosage

20–40 g/hL	1.7–3.3 lb/1000 gal

Usage

Mix Opti-MUM Red in 10 times its weight of water or juice and add directly to the grapes or must. If adding later in fermentation, add during a pump-over or during tank mixings. This product is mostly soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store in a cool, dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Add directly to grapes or at first mixing	Provides: High molecular weight polysaccharides and oligosaccharides
Impact: Color stabilty, volume and softness	YAN contribution: Insignificant

OPTI-RED

For rounder and smoother tannins in reds; OMRI listed

Reds

#15148	1 kg	$48.00
#15138	2.5 kg	$102.00
#15211	10 kg	$295.00

Opti-RED™ is an inactivated and partially autolyzed yeast derivative nutrient. Opti-RED may be used either at the beginning or towards the end of red wine fermentations. Using Opti-RED in the must quickly releases polysaccharides. These polysaccharides are then available to complex with polyphenols. This early complexing results in red wines with better color stability. Using Opti-RED in the latter part of alcoholic fermentation allows the winemaker to shape harsh polyphenolics into smoother, more approachable tannins.

Recommended Dosage

30 g/hL	2.5 lb/1000 gal

Usage

Mix Opti-RED in 10 times its weight of must or water and add during a punch-down or a pump-over to ensure Opti-Red is mixed in well. This product is partially soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Anytime before the completion of fermentation	Provides: High molecular weight polysaccharides
Impact: Early use promotes color stabilty, late use smoothes harsh tannins	YAN contribution: Insignificant

OPTI-WHITE

Promotes roundness and smoothness and protects aromatics; OMRI listed

Complex Whites and Rosés

#15165	1 kg	$48.00
#15136	2.5 kg	$102.00
#15216	10 kg	$295.00

Opti-WHITE™ is prepared using a specific production process that results in a yeast derivative nutrient containing both antioxidant peptides and polysaccharides. The peptides protect aromatics, whereas the polysaccharides help stabilize aroma compounds and enhances roundness.

When added to the juice at the onset of fermentation Opti-WHITE helps to prevent oxidative browning* while bringing smoothness and complexity. When Opti-WHITE is added during the later stages of fermentation, it helps integrate the flavors.

Recommended Dosage

25–50 g/hL	2–4 lb/1000 gal

*Use 50 g/hL for maximum antioxidative properties or use Glutastar™ (pg 51) for maximum anti-browning potential.

Usage

Mix Opti-WHITE in 10 times its weight of juice or water. Add to the juice after settling or directly to the barrel or tank prior to the onset of fermentation. If adding during the later stages of alcoholic fermentation, add during a tank mixing for proper homogenization. This product is partially soluble. Stir to maintain suspension before and during addition.

Storage

Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of winemaking: Anytime before the completion of fermentation	Provides: Polysaccharides and antioxidant peptides
Impact: Balances mouthfeel and protects aromas	YAN contribution: Insignificant

FREQUENTLY ASKED QUESTIONS: YEAST NUTRIENTS

What is the difference between Go-Ferm and Go-Ferm Protect Evolution?

Go-Ferm Protect Evolution is the latest generation of rehydration nutrients, developed in conjunction with INRA, France, for today's winemaking needs. In addition to the vitamins and minerals that Go-Ferm provides Go-Ferm Protect Evolution contains higher levels of unsaturated fatty acids and sterols for improved sugar uptake capacity and fermentation security.

Why doesn't my Go-Ferm and Go-Ferm Protect Evolution go into solution?

This is a good thing! Due to their high content of sterols and fatty acids, they will not go completely into solution.

Can I use Fermaid K in my yeast rehydration water instead of Go-Ferm?

No, using nutrients that contain ammonia salts during the rehydration phase can be toxic to the yeast. Rehydration nutrients should be fully autolyzed so that the nutrients are freely available to the yeast.

Every harvest I add 2 lb/1000 gal of a complete yeast nutrient 1/3 of the way through fermentation. Is that what is recommended?

A 2 lb/1000 gal addition at 1/3 of the way through fermentation may suffice, however, this depends on the specific conditions of each fermentation. To help build a nutrient supplemntation program, see the planner on pg 44.

I missed the addition of nutrients at 1/3 sugar depletion. Should I add Fermaid product past this point?

The purpose of a nitrogen addition at this point of fermentation is for re-synthesis of the sugar transport system in the yeast cell so that fermentation can continue. Ammonia uptake is inhibited above 10% alcohol. New research has shown that amino acids may be used even at a late stage. A small addition of Fermaid O or Nutrient Vit End may help. This really is a case-by-case scenario.

Some suppliers say their nutrients contain a lot more nitrogen than Fermaid O. Why?

Other suppliers may be calculating total nitrogen versus the amount of nitrogen that can be utilized by the yeast (YAN). Not all nitrogen is assimilable by yeast and not all nitrogen is utilized equally. Nitrogen supplied as amino acids from autolyzed yeast are very efficiently used. Research shows that YAN from amino acids can be four times more efficient than YAN from ammonia (DAP) (see article "Fermaid O is More Efficient than Ammonia" on pg 43). That means that an addition of 40 g/hL of Fermaid O can be calculated as having a yeast assimilable nitrogen equivalent value of 64 ppm. A 40 g/hL addition of ammonia as a comparison gives 80 ppm yeast assimilable nitrogen, but this is used up very quickly leading to a deficiency.

I checked my YAN and added DAP accordingly. Why do I still have off-aromas and/or stuck fermentations?

Both inorganic (ammonia) and organic (amino acids and peptides) nitrogen occur naturally in grape must. Each type of nitrogen has a distinct role and impact on fermentation. While yeast may show an affinity for inorganic nitrogen, adding only ammonia (in the form of DAP) is not what is best for the yeast. A diet balanced with organic nitrogen, vitamins and minerals can produce healthier fermentations, better aromatics and lower levels of undesirable compounds.

I am noticing sulfur off-odors during fermentation — what should I do?

First, assess your nutrient program. If it is early enough in the fermentation, consider increasing your nutrient additions. Organic nutrients such as Fermaid O can go a long way in improving aromatics. If you are past the point where additional complex nutrients are recommended, run a bench trial with Noblesse and Reduless. If this is a continual problem, consider using our low- to no-H_2S strains.

As fermentation progresses, I have noticed an increased perception of 'hotness' on the finish of my wine. Are there any products that can help with this?

Try an addition of Opti-MUM Red, Opti-WHITE or Noblesse.

My whites and rosés tend to lose their aromatic freshness quickly. What can I do to preserve the aromatics?

Inactivated yeast derivative products like Glutastar can help retain aromatic intensity and longevity.

Why don't some nutrients increase YAN?

All yeast derived nutrients will have some nitrogen to contribute to a fermentation, but different autolyzed yeast products are used for different reasons. The YAN contribution is only mentioned if the goal of the product is nitrogen supplementation and fermentation security.

MALOLACTIC FERMENTATION

Malolactic fermentation (MLF) converts malic acid to lactic acid and has a direct impact on wine quality. Uncontrolled, spontaneous malolactic fermentations or wild lactic acid bacteria can result in diminished varietal and fruit flavors, reduced esters, masked aromas and off-characters. The importance of choosing a selected malolactic (ML) strain has increased due to evolving winemaking preferences (e.g. higher pH levels, lower SO_2, higher alcohol, etc.), as well as concerns such as biogenic amines. The use of selected malolactic strains can contribute positively to wines while minimizing risks.

SELECTING BACTERIA FOR SUCCESS

It is very important to know the properties of the wine prior to inoculating with malolactic bacteria. Analyze the wine for pH, SO_2, volatile acidity (VA), residual sugar, malic acid and alcohol level. Extremes in one or more of these properties can have a compounding inhibitory effect on the growth of malolactic bacteria. For example, if a wine has low pH and high SO_2, that will be more antagonistic to the bacteria than low pH alone. Creating an optimal environment for malolactic bacteria includes:

TEMPERATURE

Optimal: 20–25°C(68–77°F)

Challenging: <60°F or >85°F

ALCOHOL LEVEL

Optimal: <13% (v/v)

Challenging: >16% (v/v)

pH

Optimal: >3.5

Challenging: <3.5

SO_2

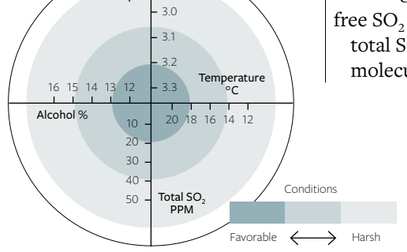
Optimal:

free SO_2 <10 ppm,
total SO_2 <45 ppm
molecular SO_2 <0.3 ppm

Challenging:

free SO_2 >10 ppm,
total SO_2 >60 ppm
molecular SO_2 >0.3 ppm

EFFECT OF pH, SO_2, ALCOHOL, AND TEMPERATURE ON ML GROWTH CONDITIONS



VOLATILE ACIDITY (VA)

If the pH is high, other bacteria strains may already be growing, causing elevated VA. The wine should be monitored for unwanted bacteria.

NUTRITIONAL STATUS

Malolactic bacteria require sugar (fructose, glucose), organic acids (malic, citric, pyruvic), organic nitrogen (amino acids, peptides), vitamins (B group, pantothenic acid) and trace minerals (Mn, Mg, K, Na). Good nutrition is important for malolactic bacteria and nutrients such as Opti'Malo Blanc and ML Red Boost will help with the growth and survival of specific malolactic bacteria. Malolactic nutrients are not as critical in a co-inoculation.

STRAIN COMPATIBILITY

Choose a yeast strain which is compatible with the selected malolactic bacteria. See MLF Compatibility in the yeast charts on pages 11–14.

MALIC AND LACTIC ACID

Measure malic acid levels. Wine conditions are difficult for bacteria if the malic level is <0.5 g/L or >7.0 g/L. The higher the malic acid levels the higher the resulting lactic acid levels which can be stressful for bacteria. Lactic acid levels of 1.5 g/L slow down bacteria and 3 g/L starts to inhibit MLF.

CHOOSING ML BACTERIA AND NUTRIENTS

♦ Highly Recommended
◊ Recommended
Note: The limits shown are individually stressful. In combination, stresses are increased. Other aspects such as nutrition can also be critical.

		Direct Inoculation (MBR) Cultures										Effervescent Direct Inoculation Cultures	Nutrients			
		Beta Co-Inoc	Alpha	Beta	Elios 1	MBR 31	O-MEGA	PN4	Silka	Solo Select	VP41	Malotabs	Acti-ML	Opti'Malo Plus	Opti'Malo Blanc	ML Red Boost
Page#		57	57	58	58	58	58	59	59	59	59	60	60	61	61	60
Alcohol tolerance(% v/v)		<15.0	<15.5%	<15.0	<14.0	<14.0	<16.0	<16.0	<16.0	<16.0	<16.0	<16.0				
pH limit		>3.2	>3.2	>3.2	>3.4	>3.1	>3.1	>3.1	>3.3	>3.2	>3.1	>3.2				
Total SO_2 limit (mg/L)		<60	<50	<60	<50	<45	<60	<60	<60	<50	<60	<60				
Temperature °C(°F)		>14° (57°)	>14° (57°)	>14° (57°)	>18° (64°)	>13° (55°)	>14° (57°)	>16° (61°)	>15° (59°)	>15° (59°)	>16° (61°)	>16° (61°)				
Relative nutrient demand		High	Low	High	Med	Med	Low	Med	Med	Med	Low	Low				
Typical fermentation kinetics	Start	Slow	Fast	Slow	Mod	Slow	Fast	Mod	Mod	Mod	Fast	Fast				
	Finish	Fast	Slow	Fast	Fast	Fast	Fast	Fast	Mod	Mod	Fast	Mod				
Reds		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦
Whites and Rosé		♦	♦	♦		♦	♦	◊			♦	♦	♦	♦	♦	
Fruit, Cider and Mead			◊			♦		♦					♦	♦		
Compatible with yeast co-inoculation		♦	◊	◊	◊	◊	◊		◊	◊	◊	◊				
Higher diacetyl production			◊	♦*		◊		♦	◊							
Enhances mouthfeel and fullness			♦	◊	◊			◊	♦		♦	♦				
Enhances structure			◊		♦				♦	♦	◊	◊				
Enhances fruitiness and/or spiciness		♦			◊	♦	♦	◊		♦	♦					
Restart stuck or sluggish MLF							◊			◊	♦					♦
Bacteria rehydration nutrient													♦			
Nutrient for difficult red MLFs																♦
Nutrient for difficult white MLFs															♦	
General ML Nutrient														♦		
OMRI listed															♦	♦

**when inoculated in sequential order with yeast*

DIRECT ADDITION BACTERIA

Wine environments are hostile. To compensate, Lallemand developed the MBR™ process which prepares the bacterial cell membranes for difficult conditions. The MBR process allows for the direct inoculation of the bacteria into the wine without any rehydration.

None of our commercial ML strains contain the decarboxylase enzymes known to produce biogenic amines. They are also cinnamyl esterase negative meaning they can't produce the precursors for ethyl phenol production by *Brettanomyces*.

CO-INOCULATION

Malolactic bacteria can be added early in primary fermentation, known as co-inoculation, or toward the end of primary fermentation, known as sequential inoculation (see SEQUENTIAL INOCULATION below). Adding bacteria in co-inoculation, or within 24-48 hours of adding yeast, can have many benefits. Due to the temperature development of primary fermentation, lack of alcohol, and better nutrient availability, malolactic bacteria growth conditions are more favorable and MLF can finish shortly after primary fermentation. Another benefit is the effect on flavor. Because of the reductive environment of the alcoholic fermentation, very little diacetyl (butter) aroma or flavor is produced. The resulting wines are fresh and fruity.

BETA CO-INOC

Oenococcus oeni for use in co-inoculation

White, Red

#15617	25 hL (660 gal) dose	$108.00
#15618	250 hL (6600 gal) dose	$556.00

Enoferm Beta Co-Inoc™ was specifically selected by Lallemand for reliable performance in co-inoculation of wines with pH >3.2. Not recommended for use in a sequential MLF.

Wines that are co-inoculated have a more fruit-forward profile due to diacetyl consumption by yeast and bacteria.

Beta Co-Inoc is added to the juice/must 24–48 hours after yeast inoculation and before alcohol reaches 5% (v/v). Recommended temperature at inoculation is between 18–25°C(64–77°F) and recommended ongoing temperatures are between 15–28°C(59–82°F). Total SO_2 at crusher should not exceed 50 ppm.

Note: In co-inoculation, the health and success of the primary fermentation are keys to success. Factors such as pH, turbidity, temperature and nutrition must be considered. If the primary fermentation is sluggish or stuck, it may be necessary to add Bactiless™ (pg 90), or Lysovin (pg 89). This is especially important if the pH is over 3.5. Beta Co-Inoc is not recommended for wines with alcohol potential >15% (v/v).

Usage

Add directly to juice 24-48 hours after yeast inoculation and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at –18°C(0°F).

Alcohol Tolerance: <15%	pH: >3.2	Total SO_2 at crush: <50 ppm	Temp: <77°F once alcohol >5% (v/v)

SEQUENTIAL INOCULATION

Many winemakers prefer to add malolactic bacteria toward the end of primary fermentation. This is known as sequential inoculation. In wines with pH >3.5, residual sugar can be consumed by malolactic bacteria to form volatile acidity (VA). When malolactic fermentation is conducted after primary fermentation the risk of VA is minimized. Wines made by sequential inoculation can also have higher levels of diacetyl when using certain bacteria strains (see article on "Using Timing of Inoculation to Influence Diacetyl Levels and Drive Wine Style" on page 63 for more information).

ALPHA

Oenococcus oeni adapted to high alcohol; enhances mouthfeel

White, Red

#15601	2.5 hL (66 gal) dose	$24.00
#15602	25 hL (660 gal) dose	$122.00
#15603	250 hL (6,600 gal) dose	$639.00

Enoferm Alpha™ was selected by the IFV (formerly ITV) from a spontaneous fermentation. It shows good fermentation activity and provides a positive sensory contribution.

It is often described as enhancing mouthfeel and complexity while reducing perceptions of green and vegetative characters.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at –18°C(0°F).

Alcohol Tolerance: <15.5%	pH: >3.2	Total SO_2: <50ppm	Temp: >57°F

BETA

Oenococcus oeni adapted to high SO_2 with positive aroma impact

White, Red

#15604	2.5 hL (66 gal) dose	$24.00
#15605	25 hL (660 gal) dose	$122.00
#15606	250 hL (6,600 gal) dose	$639.00

Enoferm Beta™ was isolated in the Abruzzi wine region of Italy. Its name comes from its capacity to increase levels of beta-damascenone and beta-ionone which are compounds that contribute floral notes, particularly in Merlot. Beta contributes fruity and berry notes in Cabernet Sauvignon and can enhance diacetyl in white wines when used in a sequential fermentation.

Beta benefits from the addition of a malolactic nutrient.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at -18°C(0°F).

Alcohol Tolerance: <15%	pH: >3.2	Total SO_2: <60ppm	Temp: >57°F

ELIOS 1

Oenococcus oeni adapted to high pH, contributes to tannin mouthfeel intensity

Red

#15108	25 hL (660 gal) dose	$108.00
#15109	250 hL (6,600 gal) dose	$556.00

Lalvin Elios 1™ was isolated by the Institut Coopératif du Vin (ICV) from a spontaneous malolactic fermentation for use in warm region red wines with high pH.

Contributes mouthfeel to the finished wine by enhancing perception of overall tannin intensity while avoiding green and vegetative characters.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at –18°C(0°F).

Alcohol Tolerance: <14%	pH: >3.4	Total SO_2: <50ppm	Temp: >64°F

MBR 31

Oenococcus oeni adapted to low temperature and pH, enhances polyphenolic content and fruit character

White, Red, Fruit, Cider

#15022	2.5 hL (66 gal) dose	$24.00
#15032	25 hL (660 gal) dose	$108.00
#15127	250 hL (6,600 gal) dose	$556.00

Lalvin 31™ was selected by the IFV for use in red and white wines. Known for its positive sensory characteristics. In reds, it may increase berry fruit flavors and mouthfeel. In whites, it is known for light buttery flavor, respect for fruit, increased body and length of finish.

It is sometimes slow to start, but finishes quickly. It performs well even under stressful conditions such as low pH (3.1) and low temperature, though not below 13°C(55°F).

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at –18°C(0°F).

Alcohol Tolerance: <14%	pH: >3.1	Total SO_2: <45ppm	Temp: >55°F

O-MEGA

Oenococcus oeni adapted to high alcohol and cooler temperatures

White, Red

#15615	25hL (660 gal) dose	$122.00
#15616	250hL (6,600 gal) dose	$639.00

O-MEGA™ was selected in the south of France by the Institut Français de la Vigne et du Vin (IFV) in Burgundy for its ability to complete MLF in a wide range of applications.

Due to its late degradation of citric acid, only very low levels of diacetyl are produced. This makes it suitable for fruit-forward wines. Using this bacteria in reds helps stabilize color because of the slow degradation of acetaldehyde. Also does well in cold climate Pinot noirs. Low volatile acidity producer.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at –18°C(0°F).

Alcohol Tolerance: <16%	pH: >3.1	Total SO_2: <60ppm	Temp: >57°F

PN4

Oenococcus oeni adapted to difficult pH, alcohol and SO_2

Red, White

#15607	25 hL (660 gal) dose	$122.00
#15608	250 hL (6,600 gal) dose	$639.00

PN4™ was isolated from a spontaneous malolactic fermentation in a Pinot noir by the Institute of San Michele in the Trentino region of Italy and is known for its fast fermentation kinetics.

For Chardonnay, PN4 is one of the highest diacetyl producers resulting in wines that tend to be creamy and buttery with a full, round mouthfeel. When used in sequential inoculation, more diacetyl is produced. Using PN4 on reds leads to more structured and spicy wines. PN4 can also increase the perception of fruitiness in reds which can diminish unripe characters.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at −18°C(0°F).

Alcohol Tolerance: <16%	pH: >3.1	Total SO_2: <60ppm	Temp: >61°F

STAFF PICK

*VP41 is my go-to malolactic bacteria for almost all wine styles. It is a low diacetyl producer, can ferment in high alcohol and low pH condition, and the resulting wines maintain good fruit character and mouthfeel. *Plus* it is workhorse when dealing with a stuck malolactic fermentation.*

—Rebekka DeKramer, Dir of Ops, Enology & Cellar, Sonoma Co.

SILKA

Oenococcus oeni adapted to high alcohol that enhances mouthfeel and oak integration

Red

#15624	25 hL (660 gal) dose	$134.00

Lalvin Silka™ was isolated in Rioja, Spain and selected by the ICVV during an extensive research program.

Silka is recognized for its positive impact on mouthfeel and softening of astringency and bitterness. It is well-suited for wines aged in contact with oak.

Kinetics are regular and nutrient demand is moderate, so Silka would benefit from an addition of ML Red Boost nutrient (pg 60).

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at −18°C(0°F).

Alcohol Tolerance: <16%	pH: >3.3	Total SO_2: <60ppm	Temp: >59°F

NEW

SOLO SELECT

Oenococcus oeni for fast fermentation, enhances structure and spice

Red

#15270	25 hL (660 gal) dose	$134.00

Anchor Solo Select was isolated in the Yarra Valley, Australia and selected by the Australian Wine Research Institute for its good implantation rates and efficient fermentation kinetics, even in challenging conditions.

Solo Select is known to enhance dark fruit and spicy notes while enhancing structure and complexity. The production of diacetyl and volatile acidity is low due to the late degradation of citric acid.

This strain has a moderate nutrient demand and will benefit from ML Red Boost nutrient (pg 60). Fast and steady kinetics.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at −18°C(0°F).

Alcohol Tolerance: <16%	pH: >3.2	Total SO_2: <50ppm	Temp: >57°F

VP41

Oenococcus oeni adapted to high SO_2 and alcohol, enhances complexity and mouthfeel

Red, White

#15048	2.5 hL (66 gal) dose	$24.00
#15042	25 hL (660 gal) dose	$108.00
#15044	250 hL (6,600 gal) dose	$556.00

Lalvin VP41™ was isolated in Italy during an extensive European Union collaboration.

Chosen for its strong implantation, steady fermentation, high alcohol tolerance (up to 16% v/v), enhanced mouthfeel and ability to improve wine structure. Both red and white wines fermented with VP41 have increased richness and complexity.

An excellent strain for restarting stuck malolactic fermentation (see Restart ML protocol page 62). At temperatures below 16°C(61°F) it is a slow starter but can complete fermentation.

Usage

Add directly to wine and mix thoroughly.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at −18°C(0°F).

Alcohol Tolerance: <16%	pH: >3.1	Total SO_2: <60ppm	Temp: >61°F

EFFERVESCENT DIRECT ADDITION BACTERIA

MALOTABS

Oenococcus oeni in tablet form for barrel additions

White, Red

#15049	2.5 hL (66 gal) dose (5/box)	$150.00

Malotabs™ are an easy-to-use form of malolactic bacteria designed by Lallemand for direct addition into barrels. Malotabs dissolve immediately and are dispersed throughout the barrel. They were designed for sequential inoculations to complement fresh and fruit driven red and white wines.

Malotabs are produced from a known strain developed for good implantation, moderate to fast kinetics, and low volatile acid and diacetyl production. Red and white wines fermented with Malotabs™ show increased fruit, mouthfeel, balance and structure.

Usage

Add directly to wine.

Once opened, tablets should be used immediately. Keep unused tablets sealed and stored in their original packaging until ready for use.

STAFF PICK

I think Malotabs are really cool. Not only is this bacteria strain really tolerant to tough conditions but the ease of use is amazing! I picture myself climbing a stack of barrels back when I was an intern and the thought of being able to drop in a tablet of ML that would self-mix is just awesome.

—Annamarie "Onnie" Howard, Outside Technical Sales, Sonoma Co.

Storage

Dated expiration. For short term (<18 months) store at 4°C(40°F). For long term (>18 months) store at −18°C(0°F).

Alcohol Tolerance: <16%	pH: >3.2	Total SO_2: <60ppm	Temp: >61°F

MALOLACTIC BACTERIA NUTRITION

Malolactic bacteria have complex nutrient needs. If one of the essential nutrients are missing, then malolactic fermentations may struggle or stick completely. Even under ideal conditions, malolactic bacteria grow slowly. Taking care of their nutritional needs will alleviate the challenges associated with malolactic fermentation (MLF). We classify our ML strains' relative nutrient requirement as low, medium or high nutrient. See "Choosing ML Bacteria and Nutrients" chart (pg 56) for more information

ACTI-ML

Bacteria Rehydration Nutrient

Reds, Whites and Rosés

#15681	1 kg	$55.00

Acti-ML™ is a bacteria nutrient used during rehydration. It was developed by the Lallemand Bacteria R&D team led by Dr. Sibylle Krieger-Weber. 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. Acti-ML can strengthen the development of bacteria growth under difficult conditions

Recommended Dosage

20 g/hL	50 g/60 gal	1.7 lb/1000 gal

Usage

Mix Acti-ML into 5 times its weight of 20°C(68°F) chlorine-free water. Add bacteria, then wait 15 minutes before adding the suspension to the wine.

Storage

Dated expiration. Store at 18°C(65°F). Once opened, keep tightly sealed and dry.

ML RED BOOST

Malolactic nutrient for red fermentations, OMRI listed

Reds, Restarts

#15218	1 kg	$55.00

ML Red Boost™ protects malolactic bacteria against polyphenolics in red wines that have an inhibitory effect on malolactic fermentation. This malolactic bacteria nutrient is formulated from specific inactivated yeast fractions and the availability of certain peptides and polysaccharides improves bacterial health and can reduce the duration of ML fermentation.

ML Red Boost™ is highly recommended for restarting sluggish and stuck malolactic fermentations (see protocol on pg 62).

Recommended Dosage

20 g/hL	50 g/60 gal	1.7 lb/1000 gal

Usage

Suspend in small amount of water or wine and then add directly to the wine 24 hours before adding the malolactic bacteria. ML Red Boost should not be added to the ML rehydration water (if rehydrating ML).

Storage

Dated expiration. Store at 18°C(65°F). Once opened, keep tightly sealed and dry.

OPTI'MALO BLANC

LALLEMAND OMRI

Malolactic nutrient for white and rosé fermentations; OMRI listed

White and Rosés

#15217	1 kg	$55.00

Opti'Malo Blanc™ is a unique malolactic nutrient specifically formulated for white and rosé wines from a blend of selected inactivated yeasts.

Opti'Malo Blanc helps compensate for amino nitrogen and peptide deficiencies. The bioavailability of certain peptides stimulates the growth of selected bacteria and shortens the duration of MLF, especially under difficult white winemaking conditions.

Recommended Dosage

20 g/hL	50 g/60 gal	1.7 lb/1000 gal

Usage

Suspend in small amount of water or wine and then add directly to the wine just before adding the malolactic bacteria. Opti'Malo Blanc should not be added to ML rehydration water (if rehydrating ML).

Storage

Dated expiration. Store at 18°C(65°F). Once opened, keep tightly sealed and dry.

OPTI'MALO PLUS

LALLEMAND

Complete malolactic nutrient

Reds, White and Rosés

#15141	1 kg	$55.00

Opti'Malo Plus™ is a general-purpose MLF nutrient. It is a blend of inactive yeasts rich in amino acids, mineral cofactors, vitamins, cell wall polysaccharides and cellulose. The cellulose provides surface area to keep the bacteria in suspension and to help adsorb toxic compounds that may be present at the end of primary fermentation.

ML Red Boost™ (pg 60) is the preferred ML nutrient over Opti-Malo Plus for red wines and Opti-Malo Blanc (this page) is preferred for white and rosé wines.

Recommended Dosage

20 g/hL	50 g/60 gal	1.7 lb/1000 gal

Usage

Suspend in a small amount of water or wine and add directly to the wine just before adding the malolactic bacteria. Opti'Malo Plus should not be added to ML rehydration water (if rehydrating ML).

Storage

Dated expiration. Store at 18°C(65°F). Once opened, keep tightly sealed and dry.

TROUBLESHOOTING GUIDE FOR MALOLACTIC FERMENTATIONS

There are many factors that can influence the success of a malolactic fermentation (MLF). Before jumping into a full restart, it's a good idea to assess each of these factors. Sometimes only a small adjustment is needed to help a MLF complete successfully. If MLF continues to struggle after considering the factors listed below, a full MLF restart may be necessary. Our MLF restart protocol is available on the next page.

WINE TEMPERATURE MIGHT BE TOO LOW

Try warming the tank or barrels; 18-20°C(64-68°F) is optimal. A MLF will progress much slower at cooler temperatures.

WINE MIGHT BE LACKING NUTRIENTS

Try adding an ML-specific nutrient like ML Red Boost™ or Opti'Malo Blanc™ (pages 60 and 61, respectively).

WINE MIGHT NEED A DETOX

If you've already done a nutrient addition, the bacteria should have what it needs. Sometimes toxins can be present that impede the success of an MLF. Reskue™, a specific inactivated yeast for treating stuck fermentations, can be extremely beneficial for detoxification. Reskue should be added and racked after 48 hours (dosage and usage information on page 49).

WINE CHEMISTRY MIGHT BE CHALLENGING OR INHIBITORY TO THE BACTERIA

It is essential that you check your pH, alcohol, and free and total SO_2 to see if one of these factors might be inhibiting the fermentation. Winemakers are often surprised by the amount of SO_2 in a wine when they've added little to no SO_2. SO_2 can come from several sources including: yeast during alcoholic fermentation, vineyards, old barrels, or erroneous cellar additions. Total SO_2 is just as important to check. SO_2 is often bound to acetaldehyde and when bacteria consume acetaldehyde, free SO_2 is liberated which can inhibit MLF. If wine chemistry is challenging, make sure you've inoculated with a strain that can handle the challenges.

THERE MAY NOT BE ENOUGH HEALTHY *OENOCOCCUS OENI* TO GET THE JOB DONE

If you did not inoculate with *Oenococcus oeni*, there may not be enough healthy bacteria to complete MLF. Consider inoculating with a known strain that is appropriately suited to handle the chemistry of your wine. If you've already inoculated, and the wine has low turbidity, it's possible that the bacteria are struggling to stay in suspension. Try stirring your tanks or barrels more frequently.

YOU MIGHT JUST NEED TO GIVE IT MORE TIME

MLF can be a test of patience taking weeks, or even months, to complete. To determine if MLF is complete, malic acid must be measured — it's nearly impossible to determine completion by sensory analysis — and is considered complete when malic acid is ≤0.1g/L (some say ≤0.2 g/L). If initial malic acid content was high (>7.0 g/L) then lactic acid produced by MLF may be high. Lactic acid levels >3g/L can inhibit ML bacteria.

HOW TO

RECOMMENDED METHOD TO RESTART A STUCK MALOLACTIC FERMENTATION

PREPARE THE STUCK WINE

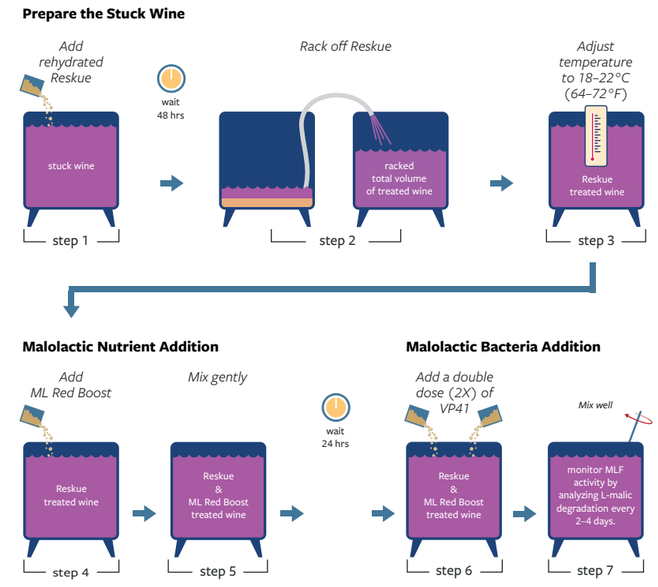
1. Add 30 g/hL (2.5 lb/1000 gal) of Reskue™ prior to restarting. Suspend Reskue in 10 times its weight of warm water 30–37°C(86–98°F)(see pg 49 for more about Reskue). Wait 20 minutes then add to stuck wine.
2. Allow tank to settle for 48 hours then rack off the settled lees.
3. Adjust temperature of Reskue-treated wine to 18–22°C(64–72°F).

MALOLACTIC ACTIVATOR ADDITION

4. Add 20 g/hL (1.7 lb/1000 gal) of ML Red Boost™ to Reskue-treated wine. When restarting a stuck MLF, ML Red Boost is used for white, red, and rosé wines.
5. Mix gently and wait 24 hours before bacteria addition.

MALOLACTIC BACTERIA ADDITION

6. Add a double dose of Lalvin MBR VP41™ direct inoculation culture (Example: for 1000 gallons, add 3 x 25hL (660 gal) packets).
7. Check for MLF activity by analyzing L-malic acid degradation every 2–4 days.



USING TIMING OF INOCULATION TO INFLUENCE DIACETYL LEVELS AND DRIVE WINE STYLE

Malolactic fermentation is more than a simple conversion of malic acid to lactic acid. The ability of the malolactic bacteria, *Oenococcus oeni*, to affect wines in a positive way, both texturally and sensorially, is now being used to influence wine aromas and drive wine style. Common terms used to describe the positive effect of MLF on wine flavor are fruity, spicy, toasty, nutty and buttery. The butter aroma is due to diacetyl, an intermediate metabolite in the metabolism of citric acid (see Figure 1). High diacetyl concentrations in wine can be perceived as overtly 'buttery' and may be regarded as undesirable by consumers. Lower diacetyl concentrations, depending on wine type and style, can contribute a desirable 'buttery' or butterscotch flavor character.

The timing of inoculation has a strong impact on diacetyl levels. In citric acid metabolism, pyruvic acid is decarboxylated to diacetyl via an α-acetolactate intermediate (see figure 1). Diacetyl is chemically unstable and can be reduced further by active *O. oeni* and yeast to less flavor-active products (acetoin and 2,3-butanediol). When ML bacteria is added 24-48 hours after yeast inoculation and alcoholic and malolactic fermentations occur together (co-inoculation), diacetyl is converted to the less buttery compounds resulting in fruitier wines.

Using a co-inoculation strategy in white wine or red wines is a powerful tool to enhance fresh, fruit-driven styles and to avoid the production of diacetyl, even with bacteria known for high diacetyl production (see Figures 2 and 3).

If high diacetyl concentrations are desired, a sequential inoculation of *O. oeni* after alcoholic fermentation will promote the retention of diacetyl. The potential of diacetyl production is strain dependent (see Figure 2). For protocols to increase or decrease diacetyl go to www.scottlab.com.

Figure 1:

CITRIC ACID METABOLISM

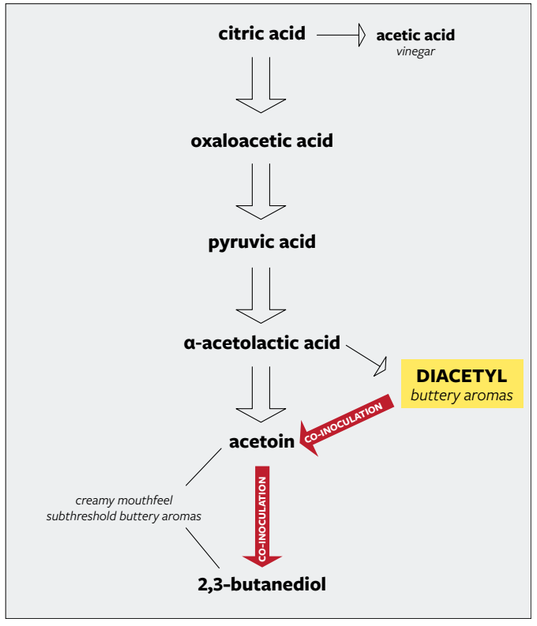
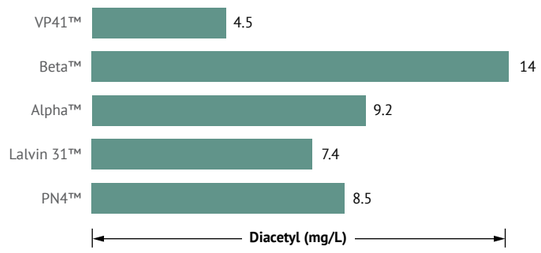


Figure 2:

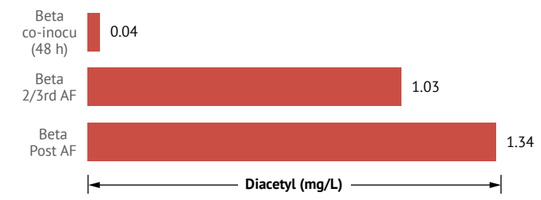
Effect of ML Strain on Diacetyl Concentration in a Sequential Inoculation



Diacetyl concentration of Cabernet Sauvignon (Clare Valley, Australia) with sequential MLF (Bartowsky, AWRI results).

Figure 3:

Effect of ML Inoculation Timing on Diacetyl Concentration in Chardonnay



Impact of the timing of inoculation on diacetyl content in Chardonnay wines

Relative Diacetyl Potential by ML Strain

Less Diacetyl	O–Mega	VP41	Lalvin 31	Alpha	Silka	Elios 1	Beta	PN4	More Diacetyl
	Very low producer	Only attacks citric acid after completion of malic acid	Medium to low producer	Medium producer	Medium producer	Medium producer	High producer when used in sequential inoculation	Early attack of citric acid	

OUR MBR™ MALOLACTIC BACTERIA CAN HANDLE TEMPERATURE CHALLENGES:

A STUDY OF THE EFFECT OF SHIPPING AND STORAGE TEMPERATURE ON MALOLACTIC VIABILITY RATE

We recommend that our malolactic bacteria be kept cool. In fact, our recommendation is that bacteria be kept at -18ºC/0ºF for long-term storage. In the real world we know that bacteria can get warm during shipment and that not all wineries have perfect storage. The winemaker's question then becomes: "How can I be confident that my malolactic culture is in good shape?" This is a good question and deserves a good answer.

Lallemand's unique malolactic bacteria processing methods, called MBR™, have created important advantages. One advantage is that MBR cultures have very low water activity and are therefore more tolerant of moderate temperature variations when compared to other strain formats (frozen, liquid, etc.).

Lallemand ran studies to determine the effect of transport temperatures on MBR bacteria survival rate. Figure 1 shows the temperatures applied to bacteria during two simulated transport scenarios. The viability (survival rate), malolactic activity and water activity (directly linked to shelf life) were all tested. Results in both cases showed that MBR bacteria cell viability, malolactic activity, and shelf life were preserved.

Lallemand also tested the impact of moderate summer storage temperatures on MBR bacteria viability (see Fig. 2). The results showed good tolerance to short-term temperature exposure. Even after two weeks at 30°C(86°F) viability remained over 60% and over the guaranteed viable cell count of 10^11 CFU/g.

CONCLUSION

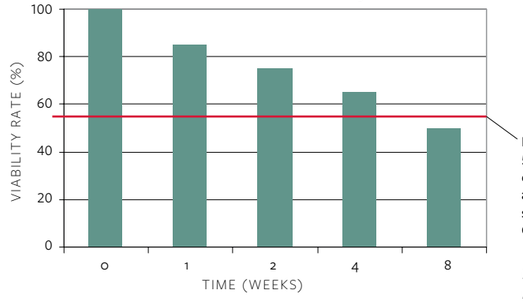
If despite our best efforts, the ice is melted and the container is not cold to the touch when your bacteria arrives, do not be alarmed. Lallemand's proprietary manufacturing process means their bacteria are different. Provided that temperature variations are moderate (e.g. 30ºC/86ºF for less than 48 hours) viability should be excellent. In fact, sealed packets can be delivered and stored for 3 weeks at ambient temperature (<25°C/77°F) without critical loss of viability. So just put the bacteria in the cooler (-18ºC/0ºF is preferred, 4ºC/40ºF is acceptable) and keep it there until you need it.

Finally, we wish to emphasize that in spite of the superior temperature tolerance of Lallemand bacteria, cold is always preferred. To limit temperature variation, Lallemand ships MBR bacteria to Scott Laboratories by refrigerated transport. We ship to our customers overnight with icepacks. We ask that you store it cold. Such efforts will always have a positive impact on cell viability and malolactic activity.

Fig. 1: Temperature Profile Applied to MBR™ Bacteria in Two Simulated Transport/Storage Scenarios

In both transport/storage scenarios, MBR bacteria cell viability, malolactic activity, and shelf-life were maintained. MBR bacteria are resistant to moderate temperature fluctuations!

Fig. 2: Impact of 30ºC/86ºF Storage Temperature on MBR Bacteria Viability Rate



Note: This graph is shown for illustrative reasons. We do NOT recommend that our customers store Lallemand MBR bacteria cultures at such temperatures after receipt.

FREQUENTLY ASKED QUESTIONS: MALOLACTIC BACTERIA & ML NUTRIENTS

Can I use half a sachet of bacteria now and save the other half to use later?

No. Once the sachet of bacteria is opened it must be used immediately. Exposure to oxygen and excess moisture can be detrimental to the survival of the bacteria.

My bacteria arrived and the ice pack has melted. How can I be confident that my malolactic culture is in good shape?

We ship bacteria overnight with ice packs. If, despite our best efforts, the ice pack has melted and the container is not cold to the touch when your bacteria arrive, **do not be alarmed**. Lallemand's proprietary manufacturing process means its bacteria is stable. Sealed packets can be delivered and stored for a few weeks at ambient temperature (<25°C/77°F) without significant loss of viability. Place the bacteria in the freezer (−18°C/0°F is preferred but up to 4°C/40°F is acceptable) and store until you need it.

I would like to have less diacetyl in my white wines. Which strain should I choose?

High inoculation levels of neutral strains like O-MEGA™ and Lalvin MBR VP41™, will help control excessive diacetyl production. Co-inoculate by adding bacteria one day after yeast addition (if the pH is under 3.5). The diacetyl will be consumed by the yeast and bacteria. Leaving wine on the lees will also reduce diacetyl levels, as does conducting the MLF at warmer temperatures (24°C/75°F compared to 17°C/63°F). See article on page 63 for more information.

Can I use citric acid to acidulate my wine for increased diacetyl formation?

We do not recommend that you use citric acid for acidification before MLF is finished. Citric acid can promote acetic acid in addition to diacetyl formation during malolactic fermentation. If increased diacetyl is the goal, choose a bacteria strain that is a known diacetyl producer such as Enoferm Beta™ or MBR PN4®. See article on page 63 for more information.

Why is my malolactic fermentation not finishing?

Check wine parameters (free and total SO_2, alcohol, pH, VA, malic acid and temperature) to determine if there is an obvious reason that the fermentation is not completing. Pesticide and fungicide residue, juice concentrates and preservatives in juice or wine can also inhibit malolactic bacteria, as can lack of essential nutrients. See "Troubleshooting Guide for Malolactic Fermentations" on page 61 for more information.

When is my ML complete?

There is some controversy among wine scientists and professionals regarding this topic. At Scott Laboratories we think that MLF is complete when malic acid is ≤0.1 g/L. Others say that MLF is complete when malic acid is ≤0.2 g/L. See "Troubleshooting Guide for Malolactic Fermentations" on page 61 for more information.

Does the yeast strain used for primary fermentation affect the malolactic fermentation?

Yes. Some yeast strains are harder for malolactic fermentation than others. Yeast strains differ in nutrient demand, production of SO_2 and rate of autolysis which has a resulting effect on the bacteria. Please refer to the yeast charts on pages 11-14 for their MLF compatibility ratings.

Does my bacteria need nutrients?

Unfortunately, there are no analytical tools to determine nutrient deficiencies for bacteria. Bacteria need amino acids (not ammonium salts), peptides, vitamins and minerals to complete a successful MLF. Each strain of bacteria, like yeast, has specific requirements. See "Choosing ML Bacteria and Nutrient Chart" on page 56 and "Troubleshooting Guide for Malolactic Fermentations" on page 61 for more information.

How do I choose the correct strain of bacteria for my wine?

Each bacteria strain performs best within specific environmental parameters. Consider free and total SO_2 levels, pH, alcohol, and temperature constraints as well as malic acid concentration when choosing a ML strain (see page 56 for more information).

Why does the total SO2 need to be measured when choosing the correct strain of bacteria?

SO_2 can be bound to acetaldehyde. Bacteria can break that bond, increasing free SO_2, making the wine environment more challenging for MLF.

I have tried everything to get my wine through MLF but nothing is working. What should I do?

Sometimes MLF might not be possible in certain wines. However, before giving up, consult the "Troubleshooting Guide for Malolactic Fermentations" on page 61 to make sure that all the factors have been considered.

I'm thinking of trying co-inoculation. Which bacteria strain should I use?

Enoferm Beta Co-Inoc™ (page 57) was developed by Lallemand for use in co-inoculation. Due to its slow growth, there is less risk of malolactic fermentation finishing before primary. Therefore, there is also less risk of volatile acid production resulting in timely completion of both fermentations.

If I am doing a co-inoculation, which bacteria nutrient do I need? When should I add it, and how much should I add?

As long as you have a good yeast nutrient strategy and add complex nutrients for primary fermentation, additional ML nutrients aren't always necessary. If wine conditions are very difficult — low pH (<3.2), high alcohol (>15.5 % v/v), high SO_2 (>45 mg/L total or 5 mg/L free SO_2) — and MLF has not started by the end of alcoholic fermentation, ML nutrient additions are recommended. Add 20 g/hL of ML Red Boost™ (pg 60) for structured red wines or 20 g/hL Opti'ML Blanc™ (pg 61) for white wines.

ARTICLE

WINE STYLE GUIDE: CHARDONNAY

Chardonnay is the most popular white wine produced. Visit any wine region in the world, and there is at least one vineyard growing this grape. The wine can be simple or complex, aged for many years or consumed immediately. Chardonnay originally came to popularity in the Burgundy region of France, where it became known for its elegance and complexity. Other regions planted the variety as growers soon realized that the grape was relatively easy to grow, and winemakers could use a range of different winemaking techniques. Chardonnay is truly a grape that can be made into wines of many different styles.

Chardonnay produced in relatively hot growing regions, such as the interior valleys of California, South Africa and Australia, can produce wines with tropical fruit flavors and even some suggestion of oakiness. In cooler wine regions, such as Chablis, Carneros and Tasmania, wines can be apple-crisp juice with razor sharp acidity. The best of which can benefit from five or more years in bottle to soften that acidity and develop rounder flavors for balance.

There are a number of protocols winemakers can use to create the Chardonnay style that fits their winery's portfolio and their consumer's preference the best.

For any particular style, factors to take into consideration are: turbidity (NTU), yeast strain, fermentation temperatures, additions of inactivated yeasts, nutrient regimes and malolactic fermentation choices. Below are some recommendations for achieving a desired Chardonnay profile.

	MINERAL PROFILE	FRUITY PROFILE	TROPICAL/CITRUS PROFILE	BARREL-FERMENTED PROFILE
SOLIDS (TURBIDITY) GOAL	*50-80 NTU*	*60-80 NTU*	*80-100 NTU*	*100-120 NTU*
REHYDRATION NUTRIENT	Go-Ferm Protect Evolution™ at 30 g/hL (2.5 lb/1000 gal) (pg 45)			
YEAST STRAIN at 25 g/hL (2 lb/1000 gal)	Lalvin W15™ (pg 32) or Lalvin DV10™ (pg 22)	CVW5 (pg 21), Cross Evolution™ (pg 21) or VIN 2000 (pg 32) (if mouthfeel volume is desired)	Lalvin QA23™ (pg 28) or Exotics Novello (pg 23)	Lalvin CY3079™ (pg 22) or Lalvin ICV D47™ (pg 22)
FERMENTATION TEMPERATURE GOAL	15-18°C(59-65°F)	18-20°C(65-68°F)	18-20°C(65-68°F)	18-22°C(65-72°F)
JUICE ADDITIONS	Glutastar™ at 30 g/hL (3 lb/1000 gal) (pg 51)			
NUTRIENT ADDITION at 2-3 °Brix drop	*if YAN <150 ppm then:* 10 g/hL DAP* 10 g/hL Fermaid O™ (pg 49)	*if YAN <150 ppm then:* Fermaid O 10-40 g/hL	Stimula Sauvignon Blanc™ 40 g/hL (3.3 lb/1000 gal) (pg 47)	*if YAN <150 ppm then:* Fermaid O 10-40 g/hL (1.67 - 3.3 lb/1000 gal)
NUTRIENT ADDITION at 1/3 °Brix drop	Fermaid O 10-40 g/hL (1.67 - 3.3 lb/1000 gal)	Stimula Chardonnay™ 40 g/hL (3.3 lb/1000 gal) (pg 46)	Fermaid O 10-40 g/hL (1.67 - 3.3 lb/1000 gal)	Fermaid O 10-40 g/hL (1.67 - 3.3 lb/1000 gal)
ML STRAIN CHOICE (if desired)	O-MEGA™ (pg 58) Sequential inoculation and partial degradation	Beta Co-Inoc™ (pg 57) Simultaneous ALF and MLF	No MLF	Enoferm Beta™ (pg 58) Sequential inoculation

* *Avoid DAP any time fruit flavors are desired.*

OAK AND TANNINS

Scott Laboratories offers a varity of tannins and oak infusion products to provide winemakers flexible tools to achieve wine-style goals. Sources of tannin include oak (American, European, toasted, untoasted), grapes (skin and seeds), chestnut, gall nuts and exotic woods. Each of these tannins have distinct functions and all provide some degree of protection from oxidation. We also offer oak chips and oak infusion products with multiple toast profiles to boost oak aroma and flavors, structure, and color. Our proprietary Thermic range of oak infusion products from the Oak Lab™ positively impacts weight, length, and complexity of wine. Whether oak infusion or tannin products, Scott Laboratories has a broad portfolio to assist in improving wine quality.

SELECTING OAK & TANNINS FOR SUCCESS

The goal of using oak and tannins is to bring out the best that grapes have to offer from the moment they enter the winery. Oak and tannins can be used in all aspects of winemaking and their selection is determined by the state of the grapes, juice or wine, the grape variety, and the intended wine style. Tannins and oak can affect structure, aroma, provide protection against oxidation and promote color stability. They can also be used to mask greenness and enhance fruit characters. Use of oak and tannins in aging and finishing are especially useful in wines that may lack structure, complexity and balance.

STABILITY

Fermentation tannins, which are generally a mix of condensed and ellagic tannins, combine with the anthocyanins to create optimal color stability. In protein-rich grape varieties, some of the gall nut derived tannins can help remove proteins. Tannins help protect juice from browning, especially in grapes affected by *Botrytis* and other rot. They act as an antioxidant and inhibit laccase.

STRUCTURE AND BALANCE

Untoasted oak chips added during fermentation can reinforce the structure of the juice, bringing length and perceived sweetness to the finished wine. Toasted oak chips can minimize the impact of astringency due to underripe fruit. Likewise, fermentation tannins added early can help mask greenness and build structure in a wine that is lacking in tannin. Oak infusion products and finishing tannins can be used during cellaring and aging, or as last-minute wine additions to bring balance, complexity and structure.

AROMA

The use of tannins and oak can positively impact aromas in almost all stages of winemaking. Tannins can reveal and enhance aromas and mask some undesired green/herbaceous characters. The addition of oak infusions can affect the ripe fruit profiles, and integrate wood and oak characters to balance the aromatic profile of the wine.

CHOOSING OAK AND TANNINS

● Highly Recommended
◊ Recommended

	Tannins															Oak		
	Estate	FT Blanc	FT Blanc Citrus	FT Blanc Soft	FT ColorMax	FT Rouge	FT Rouge Berry	FT Rouge Soft	Onyx	Radiance	Riche	Riche Extra	Royal	Uva'Tan	Uva'Tan Soft	Feelwood! Balance & Structure	Feelwood! Sweet & Fresh	Thermic – all profiles (1-5)
Page#	69	69	69	70	70	71	71	71	72	72	73	73	73	74	74	75	75	76
Reds	●	◊		◊	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Whites and Rosé	◊	●	●	●						●	◊	◊	●	◊	◊	●	●	●
Fruit, Cider and Mead		●	●	●		◊		●		●								●
Protection from oxidation for white wine		●	●	●														
Mouthfeel enhancement for white wine			●	●						●						◊	◊	●
Grape tannin														●	●			
Enhances structure	●	◊	●	◊		●	●	●			●	●	●	●	●	●		●
Enhances mid-palate volume	●				●	●	●	●						◊	●		●	●
Enhances aromatic potential			●				●			●			●				●	●
Stabilizes color					●	◊	◊	◊						●	◊			
Enhances fruit			●				●		●	●							●	◊
Mitigates green, unripe chararacters						●	●	●	◊			●	●			●	◊	●
Vanillin oak character									●	●	●	●						●
Protects grapes with rot		●	●	●		●	●	●										
Enhances aging potential	●	◊		◊	◊	◊	●	◊						◊	◊			●
Perception of sweetness											●	●						◊
Lowers perception of alcohol											●	●						
Rapid integration									●	●			●					●
Used during fermentation		●	●	●	●	●	●	●								●	●	◊
Used during aging	●										◊	◊		●	●			●
Used for finishing			●	●			●		●	●	●	●	●					●

Oak & Tannins

A winemaker's goal is to showcase the grapes. This begins the moment the fruit enters the winery and continues until the wine is bottled. Tannins can be used to enhance aromas, mouthfeel, stabilize color and add structure.

ESTATE

Mid-palate volume enhancement during aging

White, Rosé, Red

#15958	1 kg	$140.00

Scott'Tan™ Estate can help compensate for lack of tannins in finished wine without the "dryness" associated with barrels. It enhances mid-palate, complexity and balance while providing a measure of antioxidant protection. Fruit characters can be enhanced. Estate is especially recommended when using older, tannin-depleted barrels.

Dosage

Prior to Barrel Aging Red Wine		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal
Prior to Bottling (3–6 weeks) or During Racking		
50–100 ppm	5–10 g/hL	0.42–0.83 lb/1000 gal

Note: Estate is best used prior to barrel aging. This encourages tannin integration in the wine over time. It may also dramatically improve a red wine when added prior to bottling. Successful additions can be made closer to bottling, but this may result in less throughput during filtration.

Usage

During transfer or racking add Estate into the wine. Mix well to ensure homogeneity. Following organoleptic evaluations, 2–3 further additions can be made subsequent to rackings. Additions should be made at least 6 weeks before bottling to allow for polymerization and settling.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Aging	Minimum Contact Time: 6 weeks	Impact: Mouthfeel

FT BLANC

Protection from oxidation

White, Rosé, Red, Fruit, Cider

#15954	1 kg	$51.00
#15969	5 kg	$225.00

Scott'Tan™ FT Blanc tannin is a white gall nut tannin specifically formulated for use on grapes with mold or rot (e.g. *Botrytis*). It helps protect juice from browning by acting as an antioxidant and inhibiting laccase activity. On sound grapes, FT Blanc is an effective antioxidant when used with SO_2. In protein-rich grape varieties such as Sauvignon blanc, FT Blanc can help remove proteins. In some wines it will also contribute notes of minerality.

Dosage

White/Rosé Juice		
50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal
Red Wine		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal
Fruit, Cider, Mead		
50–200 ppm	5–20 g/hL	0.42–1.6 lb/1000 gal
White/Rosé Wine*		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal

**A small addition of 2.5–5.0 g/hL(0.21–0.42 lb/1000 gal) may help mask the perception of bitterness in a finished wine.*

Usage

Add FT Blanc by sprinkling directly on grapes at the crusher, adding to juice, or adding to wine during a tank mixing. Good homogenization is important. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation, Finishing	Minimum Contact Time: 3 weeks	Impact: Antioxidant

FT BLANC CITRUS

Enhances fruity and floral aromas

White, Rosé, Cider

#15974	1 kg	$118.00
#15975	5 kg	$505.00

Scott'Tan™ FT Blanc Citrus is a mixture of condensed tannins extracted from citrus wood and gallic tannins. The use of FT Blanc Citrus during alcoholic fermentation in combination with yeast strains that have beta-glycosidase activity (Alchemy II, Lalvin 71B™, VIN 2000, Lalvin Rhône 4600™, VIN 13, Lalvin QA23™ and Vitilevure 58W3™), allows for the development of enhanced aromatic potential. Resulting wines present more intense aromas of lemon, grapefruit, apple and white flowers, which complement varietal and fermentation aromas. FT Blanc Citrus also protects the must and wine from oxidation.

Dosage

White, Cider		
20–150 ppm	2–15 g/hL	0.17–1.2 lb/1000 gal
Rosé Must		
50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal

Usage

Add FT Blanc Citrus within 24–48 hours after yeast inoculation to maximize the benefit of its aromatic precursors. Dissolve in ten times its weight of water before adding.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation, Finishing	Minimum Contact Time: 3 weeks	Impact: Aromatic Enhancement

FT BLANC SOFT

Oxidation protection and mouthfeel enhancement

White, Rosé, Red, Fruit, Cider, Mead

#15955	1 kg	$74.00
#15980	5 kg	$331.00

Scott'Tan™ FT Blanc Soft combines the benefits of FT Blanc (see pg 69) with improved softness and mouthfeel. White and rosé wines made with FT Blanc Soft have enhanced texture with a perception of sweetness on the palate. Even relatively small dosages can contribute to minerality in wines. Similar improvements can be seen in fruit and mead wines.

Dosage

White/Rosé Juice		
50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal
Red Wine		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal
Fruit, Cider, Mead		
50–200 ppm	5–20 g/hL	0.42–1.6 lb/1000 gal
White/Rosé Wine*		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal

**A small addition of 2.5–5.0 g/hL(0.21–0.42 lb/1000 gal) may help mask the perception of bitterness in a finished wine.*

Usage

Add FT Blanc Soft by sprinkling directly on grapes at the crusher, adding to juice, or adding to wine during a tank mixing. Good homogenization is important. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation, Finishing	Minimum Contact Time: 3 weeks	Impact: Antioxidant and Mouthfeel

FT COLORMAX

Promote color stability

Red, Fruit

#15968	1 kg	$66.00

Scott'Tan™ FT ColorMax is a natural catechin product developed for its superior ability to stabilize color. Its special formulation goes into solution more easily than conventional fermentation tannin products. It is intended for use in conjunction with FT Rouge or FT Rouge Soft (pg 71). Wines made with FT ColorMax tend to have a softer palate than those made with FT Rouge alone.

Dosage

Red Must		
100–300 ppm	10–30 g/hL	0.8–2.5 lb/1000 gal

Usage

Add FT ColorMax at ⅓ sugar depletion during alcoholic fermentation. If a cold soak has been done, add FT ColorMax during the first pump-over.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation	Contact Time: During fermentation	Impact: Color Stability

FT ROUGE

Promotes color, structure and fruit

Red, Fruit

#15950	1 kg	$41.00
#15951	5 kg	$163.00

Scott'Tan™ FT Rouge is a proprietary tannin which is a blend of highly reactive tannins derived from exotic woods and chestnut. The addition of FT Rouge at the beginning of red wine fermentation helps preserve the grapes' natural tannins so they can combine with anthocyanins to create optimal color stability. Mouthfeel is also enhanced. FT Rouge provides antioxidative protection and may inhibit oxidative enzymes (such as laccase) associated with browning.

Dosage

Red *Vinifera* Must		
200–500 ppm	20–50 g/hL	1.6–4.0 lb/1000 gal
Red Non-*Vinifera* Must		
300–600 ppm	30–60 g/hL	2.5–5.0 lb/1000 gal
Fruit		
200–500 ppm	20–50 g/hL	1.6–4.0 lb/1000 gal

Usage

Gradually pour directly on grapes at the crusher or add to the must during a pump-over to obtain good homogenization. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (~60 ppm) during pump-overs. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking:	Contact Time:	Impact:
Fermentation	During fermentation	Color Stability; Structure

STAFF PICK

I think the FT Rouge Berry smells lovely!
—Teniya Schipper, Inside Sales, based in Paso Robles, CA

FT ROUGE BERRY

Enhances red berry fruit, diminishes vegetative notes

Rosé, Red, Hybrids

#15972	1 kg	$118.00
#15973	5 kg	$505.00

Scott'Tan™ FT Rouge Berry is a mixture of condensed tannins extracted from the wood of red berry plants. The use of FT Rouge Berry during alcoholic fermentation in combination with yeast strains that have beta-glycosidase activity (Lalvin 71B™, Lalvin ICV GRE™) allows for the development of enhanced red berry characters. Resulting wines present intense aromas of cherry, strawberry, and blueberry, which complement varietal and fermentation aromas. FT Rouge Berry can also diminish green/vegetative notes in underripe fruit.

FT Rouge Berry promotes the stabilization of color and prevents oxidation of the primary aromas.

Dosage

Rosé Must		
20–150 ppm	2–15 g/hL	0.17–1.2 lbs/1000 gal
Red Must		
50–200 ppm	5–20 g/hL	0.42–1.6 lbs/1000 gal

Usage

Add FT Rouge Berry at the first pump-over or punch-down, or 24–48 hours after yeast inoculation. Dissolve in ten times its weight of water before adding.

Storage

Dated expiration. Unopened, store in a cool dry, ventilated area. Once opened, carefully reseal and use within the same harvest.

Stage of Winemaking:	Minimum Contact Time:	Impact:
Fermentation	During fermentation	Aromatic enhancement

FT ROUGE SOFT

Promotes color, mouthfeel and fruit

Red, Fruit

#15952	1 kg	$46.00
#15953	5 kg	$175.00

Scott'Tan™ FT Rouge Soft is a proprietary tannin specifically formulated for its gentle impact. It is particularly suitable for Pinot noir and early-to-release wines. FT Rouge Soft is reactive with natural grape proteins and thus helps promote optimal color and color stability while enhancing structure. Mouthfeel and roundness are improved while the potential for bitter characters is reduced.

FT Rouge Soft provides antioxidative protection.

Dosage

Red *Vinifera* Must		
200–500 ppm	20–50 g/hL	1.6–4.0 lb/1000 gal
Red Non-*Vinifera* Must		
300–600 ppm	30–60 g/hL	2.5–5.0 lb/1000 gal
Fruit		
200–500 ppm	20–50 g/hL	1.6–4.0 lb/1000 gal

Usage

Gradually pour directly on grapes at the crusher or add to the must during a pump-over to obtain good homogenization. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (~60 ppm) during pump-overs. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking:	Contact Time:	Impact:
Fermentation	During fermentation	Color Stability, Mouthfeel

ONYX

French oak for "last minute" complexity and flavor integration

Red, Rosé

#15977	250 g	$145.00

Scott'Tan™ Onyx is derived from French oak. It was designed for use in red and rosé wines to bring out berry and sweet red fruit notes. Onyx is known for maintaining varietal characteristics while adding complexity and minimizing greenness. It helps soften and integrate flavors.

Onyx integrates rapidly and is great for "last-minute" additions. Can be added up to 48 hours before membrane (final) filtration. Always conduct filterability trials prior to addition to avoid filtration challenges.

Dosage

10–100 ppm	1–10 g/hL	0.08–0.83 lb/1000 gal

Usage

Dissolve Onyx in about ten times its weight of warm water 35–40°C(95–104°F) until fully dissolved. Add to wine gradually during a transfer or pump-over. Good mixing is important.

Storage

Dated expiration. Unopened the shelf-life is 4 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking:	Minimum Contact Time:	Impact:
Pre-bottling	48 hours	Complexity, Integration

RADIANCE

Tannin blend for "last minute" fresh fruit highlights

White, Red, Rosé, Cider

#15978	250 g	$145.00

Scott'Tan™ Radiance is a blend of tannins for use in white, red and rosé wines as well as ciders. It will help unmask and refine aromas and flavors of fresh fruit, vanilla, coconut and caramel. Radiance promotes balance and mouthfeel while maintaining acidity.

Radiance integrates rapidly and is great for "last-minute" additions. Can be added up to 48 hours before membrane (final) filtration. Always conduct filterability trials prior to addition to avoid filtration challenges.

Dosage

10–100 ppm	1–10 g/hL	0.08–0.83 lb/1000 gal

Usage

Dissolve Radiance in about ten times its weight of warm water 35–40°C(95–104°F) until fully dissolved. Add to wine gradually during a transfer or pump-over. Good mixing is important.

Storage

Dated expiration. Unopened the shelf-life is 4 years at 18°C(65°F).Once opened, keep tightly sealed and dry.

Stage of Winemaking:	Minimum Contact Time:	Impact:
Pre-bottling	48 hours	Mouthfeel, Aromas

RICHE

Sweetness and finesse

White, Rosé, Red

#15962 | 500 g | $146.00

Scott'Tan™ Riche is a cellaring and finishing tannin notable for enhancing complexity. Derived from 100% toasted French oak, Riche imparts hints of coconut and vanilla together with a perception of sweetness. It can contribute the final touch to your wine.

Dosage

White/Rosé Wine		
30–100 ppm	3–10 g/hL	0.25–0.83 lb/1000 gal
Red Wine		
30–200 ppm	30–20 g/hL	0.25–1.6 lb/1000 gal

Usage

Dissolve in about 10 times its weight of warm water (35–40°C/95–104°F) then add it to the wine and mix well. Good homogenization is important. Final additions should be made at least 3 weeks prior to bottling. After additions, proceed with normal racking.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Finishing	Minimum Contact Time: 3 weeks	Impact: Aroma, Mouthfeel

RICHE EXTRA

Smoothness and richness

Red, White

#15963 | 500 g | $208.00

Scott'Tan™ Riche Extra was specifically developed from 100% toasted American oak. This proprietary tannin contributes nuances similar to Scott'Tan™ Riche but with heightened perception of vanilla. Riche Extra can help smooth a wine's finish.

Dosage

White/Rosé Wine		
30–100 ppm	3–10 g/hL	0.25–0.83 lb/1000 gal
Red Wine		
30–200 ppm	30–20 g/hL	0.25–1.6 lb/1000 gal

Usage

Dissolve in about 10 times its weight of warm water (35–40°C/95–104°F) then add it to the wine and mix well. Good homogenization is important. Final additions should be made at least 3 weeks prior to bottling. After additions, proceed with normal racking.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Finishing	Minimum Contact Time: 3 weeks	Impact: Aroma, Mouthfeel

ROYAL

American oak for "last minute" structure and balance

White, Red

#15979 | 250 g | $145.00

Scott'Tan™ Royal is derived from American oak. It may be used in red and white wines to add structure, balance and length on the palate. Royal is a good complement for wines aged with American oak. It is known to bring out hints of cocoa, chocolate, coffee and butterscotch. Royal has also been known to help mask off-aromas and flavors of *Brettanomyces*.

Royal integrates rapidly and is great for "last-minute" additions. Can be added up to 48 hours before membrane (final) filtration. Always conduct filterability trials prior to addition to avoid filtration challenges.

Dosage

10–100 ppm	1–10 g/hL	0.08–0.83 lb/1000 gal

Usage

Dissolve Royal in about 10 times its weight of warm water 35–40°C(95–104°F) until fully dissolved. Add to wine gradually during a transfer or pump-over. Good mixing is important.

Storage

Dated expiration. Unopened the shelf-life is 4 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Pre-bottling	Minimum Contact Time: 48 hours	Impact: Structure, Balance

UVA'TAN

Grape seed and skin tannin for structure and color stability

Red, White, Rosé

#15964 | 500 g | $189.00

Scott'Tan™ Uva'Tan is composed entirely of grape tannins (seeds and skins). It is high in polyphenols and low in astringency. Uva'Tan can be used both during fermentation and later during cellaring and finishing. For fermentation, Uva'Tan is particularly useful when natural grape tannin levels are deficient. Post-fermentation it can be used to stabilize color, enhance structure and provide antioxidant protection. Used prior to barreling it can improve integration of tannins in wines.

It is recommended that Uva'Tan additions be made well in advance of bottling (six weeks at least) for better integration. Additions closer to bottling will still have a beneficial effect but filtration throughput will likely be reduced.

Dosage

Red Must		
50–400 ppm	5–40 g/hL	0.42–3.3 lb/1000 gal
White Wine		
50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal
Rosé Wine		
50–200 ppm	5–20 g/hL	0.42–1.6 lb/1000 gal
Red Wine		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal

Usage

Pour Uva'Tan evenly on the must/juice at the crusher or into wine during a transfer or racking. If further additions are required, two to three adds can be made after racking. Final additions can be made up to three weeks before bottling, though six weeks are recommended for a more complete polymerization, settling, and optimal filtration.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation, Aging	Minimum Contact Time: 6 weeks	Impact: Color Stability, Structure

UVA'TAN SOFT

Grape skin tannin for color stability and roundness

Red, White, Rosé

#15965 | 500 g | $211.00

Scott'Tan™ Uva'Tan Soft is made entirely from white grape skin tannins extracted from fresh grapes immediately after pressing to avoid oxidation of polyphenols. These highly reactive tannins have very low astringency. Like Uva'Tan, Uva'Tan Soft can be used in fermentations as well as in cellaring and finishing. During fermentation Uva'Tan Soft is useful when the grapes' natural tannins are insufficient and softness is a concern. Post-fermentation it can be used to stabilize color, soften structure and provide antioxidant protection. Used prior to barreling it can improve integration of tannins.

Additions of Uva'Tan Soft should be made well in advance of bottling (six weeks at least). Additions closer to bottling may still have a beneficial effect but filtration throughput will likely be reduced. At low dosages, Uva'Tan Soft will optimize the aging potential of white and rosé wines.

Dosage

Red Must		
50–400 ppm	5–40 g/hL	0.42–3.3 lb/1000 gal
White Wine		
50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal
Rosé Wine		
50–200 ppm	5–20 g/hL	0.42–1.6 lb/1000 gal
Red Wine		
50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal

Usage

Pour Uva'Tan Soft evenly on the must/juice at the crusher or into wine during a transfer or racking. If further additions are required, two to three adds can be made after racking. Final additions can be made up to three weeks before bottling, though six weeks are recommended for a more complete polymerization, settling, and optimal filtration.

Storage

Dated expiration. Unopened, the shelf-life is 5 years at 18°C(65°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation, Aging	Minimum Contact Time: 6 weeks	Impact: Color Stability, Mouthfeel

OAK CHIPS

NEW

FEELWOOD! BALANCE & STRUCTURE

Boosts ripe fruit, masks vegetative characteristics

Red, White, Rosé

#15942 | 10kg (2 x 5kg units) | $120.00

Feelwood! BALANCE & STRUCTURE oak chips minimizes harsh and astringent characters in fruit. Herbaceous notes are minimized while fruit aromatics are amplified. Foremouth volume and mid-palate sweetness are enhanced. These 100% French oak chips are aged for 24 months and are a blend of toast levels (untoasted, light, medium).

Dosage

Whites, Rosé		
0.5-1 g/L	50-100 g/hL	4.15-8.3 lbs/1000 gal
Reds		
1-3 g/L	100-300 g/hL	8.3-25 lbs/1000 gal

Usage

For whites and rosés, chips must be used with infusion bags.

For reds, add into the tank while filling or by using infusion bags.

Storage

Dated expiration. Unopened, the shelf-life is 4 years at 25°C(77°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation	Minimum Contact Time: 2 weeks	Impact: Minimize Herbaceousness, Enhance Structure

NEW

FEELWOOD! SWEET & FRESH

Enhances fruit profile, sweetness and length

Red, White, Rosé

#15940 | 10kg (2 x 5kg units) | $90.00

These 100% untoasted French oak chips are used during fermentation to enhance fruit, add mid-palate sweetness and increase the length of the finish. Feelwood! SWEET & FRESH chips are aged for 24 months.

Dosage

White, Rosé		
0.5-1 g/L	50-100 g/hL	4.15- 8.3 lb/1000 gal
Reds		
1-3 g/L	100-300 g/hL	8.3 - 25 lb/1000 gal

Usage

For whites and rosés, chips must be used with infusion bags.

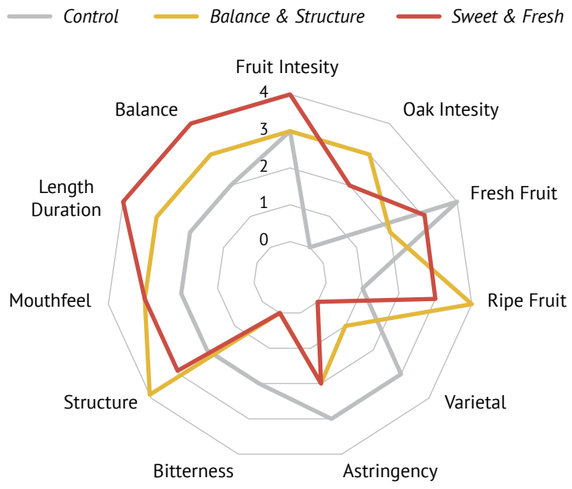
For reds, chips can be removed from infusion bags and added directly into the tank while filling if preferred.

Storage

Dated expiration. Unopened, the shelf-life is 4 years at 25°C(77°F). Once opened, keep tightly sealed and dry.

Stage of Winemaking: Fermentation	Minimum Contact Time: 2 weeks	Impact: Enhance Fruit, Sweetness, Length

Impact of feelwood! Oak Chips on Merlot



Impact of 3 g/L feelwood! Balance & Structure and Sweet & Fresh on the flavor and aroma profile of a 2018 Merlot from Bordeaux, France- 2 week contact time.

OAK INFUSION PRODUCTS/BARREL ALTERNATIVES

Oak has been used to ferment and store wine for centuries. Oak impacts wine color, texture and structure. Its volatile flavor componets are an important contributor and driver of many wine styles. Oak barrels are the traditional way to impart oak character, but barrels are costly. Modern winemaking includes the use of oak infusion products and other barrel alternatives to impart oak character to wine while saving money, space and labor.

Scott Laboratories launched The Oak Lab™ last year to provide high quality oak infusion products and barrel alternatives. Using our products alone, or in conjunction with our full range of Scott'Tan™ tannins, enables winemakers the freedom to craft wines to achieve their oak goals. Please visit theoaklab.com for more information.

THERMIC

oaklab

Range of oak infusion products that provide consistent oak flavors, structure, and mouthfeel

Red, White

The Oak Lab™ Thermic range of oak infusion products and barrel alternatives are produced using a breakthrough modification process that we call Thermic. The Thermic process provides a level of accuracy and consistency superior to other products that are toasted, baked, or electrically radiated. Using only wood and heat, our Thermic process occurs under vacuum in an oxygen-free and combustion-free environment, enabling the creation of a wide spectrum of flavor profiles.

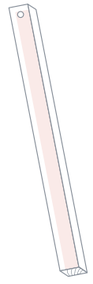
The Thermic products come in four formats and five distinct profiles (see descriptions below) that provide a range of aroma, structure, and mouthfeel possibilities.

Thermic products are consistent and predictable, scale effortlessly from bench trials to production and will provide the same profile year after year.

These products taste great! Trials are highly recommended.

Thermic Profile Description

	Thermic Profile 1	Thermic Profile 2	Thermic Profile 3	Thermic Profile 4	Thermic Profile 5
Aroma	coconut, sweet oak	nutty, toasty, toffee	vanilla, dark fruits, complexity	warm, rich, spice, vanilla	espresso, smoked meat, complexity
Mouthfeel	fresh and light, addition of length	rounding, boost of mid-palate	texture, weight, volume, length	full, viscous, rich	balanced, rich, round

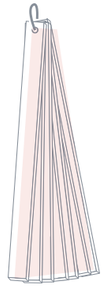


SINGLE ROD

Single rods are added to tanks during the aging process. Rods can be used in loose form or stacked in a matrix formation at the base of the tank. Available in Thermic Profiles 1–5.

$5.00

Size . . . . . 36" x 1 1/16" x 13/16"
Surface area. . . 1 sq. ft.
Dosage rate . . . 60–160 per 1000 gal
Contact time. . 1–18 months
Wood variety. . *Quercus alba*



FAN PACK

Fan packs are added to tanks during fermentation and aging process. Fan packs are bound by food grade nylon zip ties to allow for easy installation and removal. Available in Thermic Profiles 1–5.

$90.00

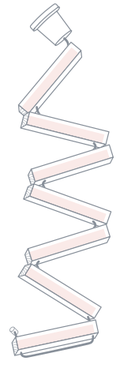
Size . . . . . 20 rods–36"x 1 1/16" x 13/16"
Surface area. . . 20 sq. ft.
Dosage rate . . . 3–8 per 1000 gal
Contact time. . 1–18 months
Wood variety. . *Quercus alba*

CUBE BAG

Cube bags are added to tanks during fermentation, aging, and just before bottling to quickly add oak (flashing). Cubes are added to tanks in sewn, food grade polyethylene infusion bags. Available in Thermic Profiles 1–5.

$200.00

Package Size . . 20 lb bag
Cube Size. . . . . 1" x 1 1/16" x 13/16" ea.
Surface area. . . 34 sq. ft.
Dosage rate . . . 2–8 bags per 1000 gal
Contact time. . 1–9 months
Wood variety. . *Quercus alba*



BUNG SLEEVE INSERT

Bung sleeves are added during the fermentation and aging process and are added to barrels directly through the bung hole. Each sleeve is made of 20 sections of oak in food grade polyethylene netting and fastened to the barrel bung with a #304 stainless steel eyelet. Available in Thermic Profiles 1–5.

$80.00

Size . . . . . 20 sections–9" x 1 1/16" x 13/16"
Surface area. . . 5.5 sq. ft.
Dosage rate . . . 1 per 60 gal
Contact time. . 3–12 months
Wood variety. . *Quercus alba*

TANNINS USED IN WINEMAKING: ORIGIN, EFFECTS AND IMPACTS

The phenolic content of grapes is influenced by grape variety, climatic conditions and viticultural practices. Phenolic compounds impact wine color, taste and mouthfeel. It is the polymerization of phenols in grapes that creates tannins. In addition to their antioxidant properties, tannins provide mid-palate texture and stabilize color by condensing with anthocyanins to create polymeric pigments.

Tannins can play a role in improving wines made with rot-compromised grapes. Tannin additions at the grape stage can combat many of the negative effects cause by *Botrytis cinerea* and other rot-causing organisms. *Botrytis* grows intracellularly and infects fruit primarily under the grape skin, secreting a damaging and stable enzyme called laccase. Depending on the mold and bacteria present, serious enological issues such as oxidative browning, degradation of color and aromatic compounds, as well as clarification and possibly filtration challenges can occur. Early tannin additions can minimize these damaging effects.

Even in healthy grapes, nature often conspires to provide conditions that are less than ideal for phenolic development in the vineyard and/or phenolic extraction during winemaking. Enological tannins can be used to make up for phenolic defeciencies.

Tannins come from a variety of sources including grapes, oak, oak gall nuts and exotic woods (such as Tara and Quebracho).

At the crusher/ press gallic tannins (**FT Blanc** and **FT Blanc Soft**), are added for their antioxidant properties. They can also be used to supplement grapes that are lacking in tannin or have a weak mid-palate. During fermentation of reds, enological tannins derived from either grapes or trees are added at the crusher or directly into the tank to bind proteins, begin color stabilization, and add structure. It is recommended that tannins such as **FT Rouge**, **FT Rouge Soft**, and **FT ColorMax** are added when there is a sizeable pool of acetaldehyde in the fermenting must. Acetaldehyde acts as a bridge during tannin polymerization and anthocyanin condensation.

During aging the addition of tannins are beneficial. Aging tannins are derived from oak (**Riche** or **Riche Extra**), grapes (**Uva′Tan** or **Uva′Tan Soft**), and exotic woods or blends thereof (**Estate**, **FT Rouge Berry** or **FT Blanc Citrus**). At this point even small tannin additions can assist with structural enhancement and protect against oxidation.

Sometimes, just prior to bottling, a final touch of tannins can be used to elevate fruit, freshness and balance. The highly refined **Onyx**, **Radiance** and **Royal** can do just that.

TARA TREE

Botanical origin: *Tara spinosa*

Tannin source: heartwood

Chemical description of tannin: galloylated (gallic) tannin

EFFECTS ON MUST AND WINE

- Antioxidant
- Stabilizes color in rosé wines
- Delay onset of color loss and yellowing

GALL NUT

Botanical origin: *Quercus infectoria*, *Rhus semialata*

Tannin source: galls

Chemical description of tannin: gallic tannin

EFFECTS ON MUST AND WINE

- Highly antioxidant
- Binds proteins, protects from browning

QUEBRACHO

Botanical origin: *Schinopsis lorentzii*

Tannin source: heartwood

Chemical description of tannin: condensed tannin

EFFECTS ON MUST AND WINE

- Direct color stabilization
- Light increase of body and tannic structure

OAK

Botanical origin: *Quercus robur*, *Q. petraea*, *Q.alba*, *Quercus* spp.

Tannin source: heartwood

Chemical description of tannin: ellagic tannin

EFFECTS ON MUST AND WINE

- Antioxidant activity
- Develops tannin balance
- Structure and roundness in white wines

GRAPE SKIN

Botanical origin: *Vitis vinifera*

Tannin source: fermented or not fermented white grape skins

Chemical description of tannin: condensed tannin

EFFECTS ON MUST AND WINE

- Direct color stabilization
- Increase of body and tannic structure
- Some antioxidant properties

GRAPE SEEDS

Botanical origin: *Vitis vinifera*

Tannin source: grape seeds

Chemical description of tannin: condensed tannin

EFFECTS ON MUST AND WINE

- Antioxidant properties
- Increase of body and tannic structure

FREQUENTLY ASKED QUESTIONS: OAK & TANNINS

When is the best time to add fermentation tannins and/or oak chips? How do I add them?

Fermentation tannins and oak chips are best added early in the winemaking process. In red wine, an addition during the fermentation stage integrates tannin into the wine and offers the greatest opportunity for color stability and increased mid-palate structure. Tannins can be added at the crusher or to the tank during the first pump-over, depending on the grape quality (rotten vs. sound). Additional tannin can be added with each pump-over. If adding tannins to a white wine, add directly to the grapes at the crusher or to the tank during a tank mixing.

Oak chips can be added at the time of filling the tank or after settling. Using mesh bags (chips or cubes) is often the easiest method. Make sure the bags remain below the cap to avoid fermentation problems.

I am using tannin and enzymes. Will SO_2 interfere with my additions?

Using all three products together is fine, but timing is important! High SO_2 content can inhibit enzyme activity. Do not add SO_2 and enzymes at the same time. It is okay to add enzymes after the SO_2 is adequately dispersed OR to add SO_2 after the enzymes are adequately dispersed. Follow with a tannin addition six to eight hours later. When enzymes are not being used, add SO_2 first, allow to disperse, then follow with the tannin addition. (See more information on pg 86.)

Can I use tannins or oak on white juice and wine?

Yes, a tannin addition in white juice may be beneficial to remove off-aromas, to improve clarification, to inhibit laccase activity from *Botrytis* or rot, or to serve as an antioxidant. We recommend using either Scott′Tan Uva'Tan, Scott′Tan Uva'Tan Soft, Scott′Tan FT Blanc, Scott′Tan FT Blanc Citrus or Scott′Tan FT Blanc Soft. Tannins can also be added later to wine to improve mid-palate structure or softness.

Oak can also be used with similar results. Oak may also bring toasted oak or sweet oak characteristics depending upon the toast level of the product.

Why should I use tannins or oak on my "premium" red grapes?

Tannins can be used to protect the color and phenolic structure of your wines. For the easiest and most efficient integration of tannins, add Scott′Tan FT Rouge, Scott′Tan FT Rouge Soft, or Scott′Tan FT Rouge Berry at the crusher. If needed, an addition of Scott′Tan Uva'Tan, Scott′Tan Uva'Tan Soft or Scott′Tan Estate prior to aging can help reinforce phenolic balance. During long maturation in barrels, Estate will help prevent excessive oxidation that can result in loss of structure and freshness. For improved SO_2 management add small amounts of Estate (5–7.5 g/hL) during each racking.

Oak has long been used in red wine production and brings increased structure, mouthfeel and aromatics to red wines. See our line of products on pages 75-76 for more details.

Will tannin additions increase color in low-color grape varieties?

Tannins do not add color to the must of low color grapes. Recent research indicates that early addition of tannins, such as FT Rouge, binds up available proteins. This preserves grape′s own natural tannins making them available to bind with grape anthocyanins, thereby providing increased color stability.

What if I did not add enough tannin during the primary fermentation?

If increased tannin structure and flavor is desired post-fermentation, make additions with Scott′Tan Estate. Addition is best before barrel aging when tannins can be incorporated into the wine and when oxidation and polymerization are slow. Scott′Tan Riche, and Scott′Tan Riche Extra are the best tannins to use prior to bottling (3–6 weeks) when a bit of oak influence is desired. Any of these tannins can be used throughout winemaking, depending on the desired effect. Bench trials are required to determine the best tannin for a particular wine or style.

Oak infusion products can be added before or after fermentation to boost tannin structure and elevate aromatics. In addition, oak infusion products can add oak aromas and mask vegetative characters.

Will adding tannins or oak inhibit barrel aging?

Tannins protect wine from oxidation during barrel aging. The wood tannins extracted from a new barrel protect the wine from over-oxidation during the slow process needed for tannin polymerization and wine development. When using old barrels, indigenous tannin may have been completely leached out. A small tannin addition of 5–10 g/hL of Scott′Tan Estate will act as an antioxidant and help protect the wine. Attaining a good phenolic profile will slow the maturation process and still protect the wine.

Oak infusion bung sleeve inserts can be used to impart new oak aromas and flavors while using neutral barrels.

Can tannins or oak help remove undesirable astringency or bitterness?

Yes. Over-astringency is caused by an imbalance of tannin molecules or by insufficiently bound tannin complexes. By adding either a more refined, highly polymerized tannin or oak infusion product to the wine, balance can be restored and the perception of astringency or bitterness reduced. This frequently improves the perception of fruit.

What if I only want to use pure grape tannin in my wine?

Scott′Tan Uva'Tan (tannins from grape skins and seeds) and Scott′Tan Uva'Tan Soft (tannins from white grape skins only) are comprised of 100% grape tannin. All other tannins are sourced from a combination of grapes, exotic woods, oak or chestnut.

Why can ONLY Onyx, Radiance and Royal be added 48 hours before bottling?

Scott′Tan Onyx, Scott′Tan Radiance and Scott′Tan Royal undergo a specific extraction process. The tannins are extracted from heartwood at low temperature which makes them easily soluble in the wine matrix. This process reduces the concentration of high molecular weight compounds which greatly reduces the risk of any precipitation.

Will Onyx, Radiance and Royal cause filtration problems?

These tannins have undergone extensive research under various conditions. No filtration problems were found 48 hours after the tannin addition. It is not recommended to filter less than 48 hours after addition.

ENZYMES

Enzymes have been used in the fruit industry since the 1930s. Scott Laboratories began offering specialized enzymes for grapes over 25 years ago. In the early days, enzymes for grapes were poorly understood pectinases meant for increasing juice yields. After decades of experience and research we now provide enzymes that are a blend of pectinases (polygalacturonase, pectin methylesterase and pectin lyase) or a blend of pectinases with interesting properites like cellulase and glycosidase side-activities.

Winemaking enzymes are used to accelerate natural reactions that would otherwise occur slowly in grapes, juice, must, and wine. Grape skins and grape pulp are rich in pectins, a structural polysaccharide, linked together into a matrix with other molecules such as cellulose and hemicellulose. Pectin is the backbone that gives grape cells firmness and structure; it is a viscous compound that can impede filtration, clarification, extraction, and aroma expression. Pectin can be highly branched with many side chains, affecting the efficiency of every enzyme blend.

Enzymes can be used to increase yield before fermentation, improve aromas and mouthfeel as well as improving clarification and filtration. At almost every stage in the winemaking process proper enzyme use can improve quality and save costs.

SELECTING ENZYMES FOR SUCCESS

It is important to match the winemaking goal, enzyme blend and correct dosage to achieve maximum success. The amount of enzyme necessary to achieve success will depend on: the method of harvest, varietal, pectin content, skin thickness, contact time, grape chemistry (pH and temperature) and the presence of inactivating agents like SO_2, bentonite and tannins. Consider the following when choosing an enzyme and determining its dosage:

VARIETAL OPTIMIZATION

Skin contact enzymes can help release bound aroma precursors into the must or juice.

CLARIFICATION & PRESSING

Enzymes break down grape pulp threby releasing trapped juice, decreasing solids, increasing yield and resulting in higher quality juice. Press cycles are optimized and lees are more compact.

COLOR & PHENOLICS

Enzymes accelerate the release of anthocyanins and tannins resulting in wines with brighter, more stable color and enhanced structure.

MOUTHFEEL

Enzymes promote tannin extraction which impacts mouthfeel. Some enzymes, like beta-glucanase will aid with yeast autolysis, releasing mannoproteins which increases mouthfeel and sweetness perception.

AROMA REVEALING

Aroma compounds, if not released from their precursor form, can be undetectable. Some enzymes have the ability to release these compounds after fermentation.

SUGAR LEVEL

Enological beta-glucosidase/glycosidase enzymes are inhibited by sugar. It is recommended that these enzymes are used post-fermentation once the sugar level is <0.5°Brix.

FILTRATION

Grapes impacted by *Botrytis* can be filtration nightmares. Enzymes help break down glucans and other polysaccharides that are colloidal in nature and can make the wine very difficult to filter.

CHOOSING ENZYMES

● Highly Recommended
○ Recommended
**Note: The ingredients in MMX are listed by the TTB as acceptable in good commercial winemaking practice in 27 CFR 24.250.*

For more information, please visit www.TTB.gov. All other enzymes are listed in CFR 24.246.

	Lallzymes				Rapidase			Scottzymes						
	Cuvée Blanc	EX	EX-V	MMX	Clear Extreme	Expression Aroma	Revelation Aroma	BG	Cinn-Free	Color Pro	HC	KS	KS Plus	Pec5L
Page#	81	81	81	81	82	82	83	83	83	83	84	84	85	85
Reds		●	●	●			○	○		●		○	○	
Whites and Rosé	●			●		●	●	●	●	●	○	●	●	●
Fruit, Cider and Mead				●				●		●	●	●	●	●
Hybrids and non-*vinifera*					●						●	○	●	●
Aroma enhancement for aromatic white wines	●			○		●	●	●	●					
Macerating enzyme for fruit forward reds		●								●				
Macerating enzyme for premium reds			●							●				
Hard-to-press grapes (e.g. Concords, Muscat, Thompsons), fruit											●			●
Gentle extraction	●	●				●			●	●				
Improved pressability	●								●	○				●
Never use BEFORE pressing					●							●	●	
Enhanced settling					●				●	●		●	●	●
Improved clarification	●			○	●	○			●	●		●	●	●
Increased yield	○					○			●	○	●			●
Reduced solids					●				●	●	●	●	●	●
Improved filterability	●	●		●	●				●	●	●	●	●	●
Improved flowrate in crossflow												○	○	
Use on botrytised wines				●								○	○	
Contains beta-glucanase				●										
Listed in 27 CFR 24.250				●										

LALLZYME CUVÉE BLANC

Skin contact enzyme to release aroma precursors

#16203	100 g	$39.00

Lallzyme Cuvée Blanc™ is a granular enzyme that was developed by Lallemand for use on white grapes during skin contact prior to pressing. It is a very specific blend of pectinases with glycosidase side activities and low in macerating activities. Lallzyme Cuvée Blanc is used to enhance aromatic complexity, provide gentle juice extraction and fast clarification after pressing.

Dosage

Crushed Grapes	Juice	Wine
20 g/ton	Not recommended	Not recommended

Usage

Dissolve Lallzyme Cuvée Blanc in 10 times its weight of water, gently stir and allow to sit for a few minutes. Add directly to the grapes or add in the press.

Storage

Dated expiration. Store dry enzyme at 25°C(77°F). Once rehydrated, use within a few hours.

Stage of Winemaking: White Grapes	Activity: Pectinase and glycosidase	Impact: Enhanced aromatics

LALLZYME EX

Macerating enzyme for light to medium-bodied reds

#16204	100 g	$26.00
#16205	250 g	$51.00

Lallzyme EX™ is a granular enzyme with pectinase and hemicellulase activities to improve color stability and mouthfeel in red wines. Specific side activities contribute to the macerating action on the grape cell wall which allows progressive liberation of polyphenols and tannin bound-polysaccharides. EX increases juice extraction, improves wine filterability and provides gentle maceration, even in low-maturity grapes.

Dosage

Crushed Grapes	Juice	Wine
15–30 g/ton	Not recommended	Not recommended

Usage

Dissolve Lallzyme EX in 10 times its weight of water, gently stir and allow to sit for a few minutes. Add directly to grapes at the beginning of fermentation or start of cold soak.

Storage

Dated expiration. Store dry enzyme at 25°C(77°F). Once rehydrated, use within a few hours.

Stage of Winemaking: Red Grapes	Activity: Pectinase, Hemicellulase	Impact: Gentle extraction of juice and color

LALLZYME EX-V

Macerating enzyme for medium to full-bodied reds

#16206	100 g	$39.00
#16208	500 g	$110.00

Lallzyme EX-V™ is a granular enzyme with pectinase, cellulase and hemicellulase activities for use in red wines intended for aging. It has a specific action on grape cell walls and cell membranes that allows for rapid and efficient release of anthocyanins and tannins leading to stable polymeric pigments. This results in structured wine with deep, stable color. Aromatic analysis shows that Lallzyme EX-V increases the release of aromatic compounds while respecting varietal characteristics.

Dosage

Crushed Grapes	Juice	Wine
10–20 g/ton	Not recommended	Not recommended

Usage

Dissolve Lallzyme EX-V in 10 times its weight of water, gently stir and allow to sit for a few minutes. Add to the grapes at the beginning of fermentation or the onset of cold soak.

Storage

Dated expiration. Store dry enzyme at 25°C(77°F). Once rehydrated, use within a few hours.

Stage of Winemaking: Red Grapes	Activity: Pectinase, Cellulase, Hemicellulase	Impact: Enhanced structure and color

LALLZYME MMX

Enzyme to increase yeast autolysis rates and/or to improve filterability of *Botrytis* infected wines

#16207	100 g	$50.00

Lallzyme MMX™ is a granular enzyme with beta-glucanase and pectinase activities sourced from *Trichoderma harzianum* and *Aspergillus niger*. This enzyme improves yeast autolysis of wine aged on lees, leading to rounder, fuller-bodied wines. Glucanase and pectinase activities act synergistically to improve clarity and filterability of wines infected with *Botrytis*. In order to maximize benefit of MMX, a contact time of 6-8 weeks is recommended.

Beta-glucanase enzymes from *Trichoderma harzianum* are listed in 27 CFR 24.250.

Dosage

Bench trials recommended for wine

Crushed Grapes	Juice	Wine
Not recommended	Not recommended	1–3 g/hL 40–114 g/1000 gal

Usage

Dissolve Lallzyme MMX in 10 times its weight of water, gently stir, allow to sit for a few minutes then add to wine.

Storage

Dated expiration. Store dry enzyme at 25°C(77°F). Once rehydrated use within a few hours.

Stage of Winemaking: Wine	Activity: Pectinase and beta-glucanase	Impact: Mouthfeel, clarification and filterability

RAPIDASE CLEAR EXTREME

Hard to settle Hybrid and American grapes

#16257	100g	$24.00

Hybrid and American grape varieties may be difficult to clarify. Rapidase® Clear Extreme is a granular enzyme that can be used after pressing to preserve aromatic freshness, reduce viscosity, improve juice clarity, help compact lees and speed clarification even in difficult conditions (low temperature, low pH, hard to settle varieties). Rapidase Clear Extreme will remain active at 6–50°C(43–122°F).

Dosage

Crushed Grapes	Juice	Wine
Not recommended	1-4 g/hL 38-152 g/1000 gal	Not recommended

Usage

Dissolve Rapidase Clear Extreme in 10 times its weight of water, stir gently, allow to sit for a few minutes, then add to the juice right after pressing.

Storage

Dated expiration. Store refrigerated at 4–8°C(40–45°F). Once rehydrated, use within a few hours.

Stage of Winemaking: White grapes	Activity: Pectinase	Impact: Clarification under extreme conditions

RAPIDASE EXPRESSION AROMA

For extraction of aroma precursors

#16260	100g	$25.00

Rapidase® Expression Aroma is a granular enzyme specifically formulated for early extraction of aroma precursors (such as thiols) from white grapes optimizing aromatic compounds and complexity of the final wine. It is particularly useful for thick skin or early harvested grapes.

Dosage

Crushed Fruit	Juice	Wine
20–25 g/ton	Not recommended	Not recommended

Usage

Dissolve Rapidase Expression Aroma in 10 times its weight of water, stir gently, allow to sit for a few minutes. Pour over fruit or add in the press.

Storage

Dated expiration. Store refrigerated at 4–8°C (40–45°F). Once rehydrated, use within a few hours.

Stage of Winemaking: White grapes	Activity: Pectinase	Impact: Varietal optimization

ARTICLE ENZYMES FOR AMERICAN AND HYBRID GRAPE VARIETIES

All grapes contain pectin, a polysaccharide responsible for holding the flesh of the grape in its semi-solid state. Most native American grape varieties and their hybrids tend to have higher levels of pectin compared to *Vitis vinifera*. This pectin can inhibit juice extraction and clarification, wine sedimentation, and create nightmare filtrations, clogging filter media and significantly increasing costs.

Pectins can be broken down using pectinase enzymes. There are many types of pectinase. Some are stronger and some gentler. Side activities also affect the action of the pectinase. Those side activities may include protease, cellulase, and hemi-cellulase activities which aid the breakdown of grape cell walls and help extract color, tannin and flavor. The gentlest pectinases (e.g. Rapidase Expression Aroma) are designed to extract the juice of white grapes without breaking down solids and extracting potentially bitter phenolics.

All pectinases will aid the settling of solids in both juice and wine. However, some American and hybrid grapes may need further help with additional enzymes at the juice stage (e.g. Rapidase Clear Extreme, Scottzmye Pec5L and Scottzyme HC) to help settling.

Generally, red grapes will require stronger enzymes with more side activities for early extraction of color and tannins (e.g. Scottzyme ColorPro, Scottzyme HC and Lallemand EX-V). In years with high fungal pressure, these enzymes will help shorten maceration times to allow for early pressing and separation of the wine from infected solids.

Once the wine is made, some of the highest pectin varieties (such as Concord, Edelweiss, and other varieties with *Vitis labrusca* in their background) may be difficult to filter. The most effective treatment is with the strongest enzymes (e.g. Scottzyme KS and KS Plus), which should never be used on the actual fruit. To aid the final clarification and filtration, Scottzyme KS can be used on white juice or finished wine, while Scottzyme KS Plus should only be used on finished wine.

Several enzymes have very specialized activites. One of these is glycosidase activity (e.g. Scottzyme BG, Rapidase Revelation Aroma). Many aroma compounds, especially terpenes, are bound to sugars. These glycosides have no aroma and require either enzymes or time and acid hydrolysis to release them as free aromatic compounds. These enzymes are most effective on finished wine since sugar inhibits their action. The other specialized activity is that of beta-glucanase (Lallemand MMX). Wines heavily infected by *Botrytis* often have high levels of glucans that are not affected by regular pectinases and cause nightmare filtrations. Lallzyme MMX breaks down the glucans and improves the filterability of botrytised wines.

RAPIDASE REVELATION AROMA

For fast, early release of varietal aroma precursors

#16266	100g	$51.00

Rapidase® Revelation Aroma is a granular enzyme that contains alpha- and beta-glycosidase activities to breakdown sugar-bound aroma precursors. Respects varietal characters and increases thiols and terpenes for intense and complex aromas. Since glycosidase activity is inhibited by high sugar levels, Revelation Aroma addition after fermentation gives good results. Once the desired aroma has been obtained, enzyme can be halted via a bentonite addition.

Dosage

Bench trials recommended for wine

Whites

Crushed Fruit	Juice	Wine
15–22 g/ton	1–1.5 g/hL 35–55 g/1000 gal	1–2 g/hL 35–70 g/1000 gal

Reds

Crushed Fruit	Juice	Wine
20–25 g/ton	2–2.5 g/hL 70–90 g/1000 gal	2–2.5 g/hL 70–90 g/1000 gal

Usage

Dissolve Rapidase Revelation Aroma in 10 times its weight of water, stir gently, allow to sit for a few minutes. Pour over crushed fruit, add to the juice before the start of alcoholic fermentation, or add to wine post-fermentation.

Storage

Dated expiration. Store refrigerated at 4–8°C (40–45°F). Once rehydrated, use within a few hours

Stage of Winemaking: Red or white grapes, juice or wine	Activity: Pectinase and glycosidase	Impact: Aroma release

SCOTTZYME BG

Aroma releasing enzyme for white, red and fruit wines

#16176	1 kg	$202.00

Scottzyme® BG is a powdered pectinase with beta-glucosidase side-activity for the release of bound terpenes. It is generally used in white wines, but may also be used in red, rosé and fruit wines for the release of aroma and flavor compounds. BG should only be used at the end of fermentation, never on grapes or in juice as the glucosidase activity is inhibited by sugars. The wine should have less than 0.5% residual sugar for proper enzyme activity.

Dosage

Bench trials recommended for wine

Crushed Grapes	Juice	Wine
Not recommended	Not recommended	3–5 g/hL 114–190 g/1000 gal

Usage

Dissolve Scottzyme BG in 10 times its weight of cool water, stir gently, allow to sit for a few minutes and add to wine.

Storage

Store at room temperature for 1–2 years. Once opened, keep tightly sealed and dry. Once rehydrated, use within a few hours.

Stage of Winemaking: Wine	Activity: Pectinase and beta-glucosidase	Impact: Aroma release

SCOTTZYME CINN-FREE

Used in white must for release of varietal aromas

#16175	1 kg (890 mL)	$93.00
#16165	25 kg (22.25 L)	$1314.00

Scottzyme® Cinn-Free is a purified liquid pectinase with very low cinnamyl esterase activity which helps reduce the formation of vinyl phenols. It is used in white must for the release of varietal aromas and aromatic precursors. In addition to releasing desirable pectin-trapped aromas, Scottzyme Cinn-Free aids in pressability, yield, settling, clarification and filtration. It is recommended for aromatic varieties like Sauvignon blanc, Viognier, Pinot gris, Gewürztraminer, Riesling and Vignoles. It can also be used in varieties like Chardonnay to bring out the full aromatic potential of the grape.

Dosage

Crushed Grapes	Juice	Wine
15–30 mL/ton	1.3–1.6 mL/hL 50–60 mL/1000 gal	Not recommended

Usage

Dilute Scottzyme Cinn-Free to approximately a 10% solution in cool water. Pour over the grapes before pressing or add to juice before the start of alcoholic fermentation.

Storage

Store at 4°C(40°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Stage of Winemaking: White grapes or juice	Activity: Pectinase	Impact: Aroma and clarification

SCOTTZYME COLOR PRO

Macerating enzyme for aged and early-to-market reds, whites

#16172	1 kg (890 mL)	$80.00
#16162	25 kg (22.25 L)	$1016.00

Scottzyme® Color Pro is a specialty liquid pectinase with protease side-activities. These side-activities are important for helping break down cell walls of red grapes to gently extract anthocyanins, polymeric phenols and tannins. This gentle extraction creates wines that are rounder in the mouth and bigger in structure, with improved color stability. Wines made with Color Pro tend to have increased tannins, improved clarity and reduced herbaceous or "veggie" characters. Lower doses of Scottzyme Color Pro are recommended for red varieties that are underripe, low in anthocyanins or high in seed tannins. For "big" reds from ripe fruit with mature seeds, higher doses of Scottzyme Color Pro are recommended.

Scottzyme Color Pro is also used in white winemaking for settling and clarifying juice. The improved clarification helps lead to more compact lees, less fining, cleaner fermentation and easier filtration.

Dosage

Bench trials recommended for wine

Reds

Crushed Grapes	Juice	Wine
60–100 mL/ton	Best used before fermentation	Best used before fermentation

Whites

Crushed Grapes	Juice	Wine
15–30 mL/ton	2–4 mL/hL 75–150 mL/1000 gal	2.6–5.3 mL/hL 100–200 mL/1000 gal

Usage

Dilute Scottzyme Color Pro to approximately a 10% solution in cool water. Pour the solution over the crushed grapes, or add directly to tank and mix thoroughly.

Storage

Store at 4°C(40°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Stage of Winemaking: Grapes, juice and wine	Activity: Pectinase and protease	Impact: Color and structure in red, clarification in whites

SCOTTZYME HC

To increase yield and enhance processing in fruits and American grapes

#16171	1 kg (890 mL)	$80.00
#16161	25 kg (22.25 L)	$1016.00

Scottzyme® HC is a liquid pectinase and cellulase blend developed to increase yield, reduce solids and improve filtration. It is a strong enzyme useful for hard-to-press or slimy grapes (such as Concords), pome fruit (apple or pear), and stone (pitted) fruits. Scottzyme HC is best used in conjunction with Scottzyme Pec5L.

Dosage

Bench trials recommended for wine

Crushed Fruit	Juice	Wine
60–100 mL/ton	5.3–7.9 mL/hL 200–300 mL/1000 gal	6.6–9.2 mL/hL 250–350 mL/1000 gal

Usage

Dilute Scottzyme HC to approximately a 10% solution in cool water. Pour the solution over the crushed fruit or add during a tank mixing before alcoholic fermentation. If adding to wine, gently mix a 10% solution into the tank for even dispersion.

Storage

Store at 4°C(40°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Stage of Winemaking: Grapes and Fruit	Activity: Pectinase and cellulase	Impact: Clarification and filtration

SCOTTZYME KS

Blend of enzymes for enhanced settling and filtration

#16174	1 kg (890 mL)	$80.00
#16164	25 kg (22.25 L)	$1016.00

Scottzyme® KS is a liquid blend of enzymes developed to create a special formulation for difficult-to-settle or hard-to-filter juice or wine. The earlier in the process Scottzyme KS is used, the more effective it will be. However, it should never be used before pressing in either red or white grapes. It is never too late to use Scottzyme KS. Customers have reported very favorable results when used to solve "nightmare" filtrations before bottling.

Dosage

Bench trials recommended for wine

Reds

Crushed Grapes	Must	Wine
Not recommended	Not recommended	5.3–7.9 mL/hL 200–300 mL/1000 gal

Whites

Crushed Grapes	Juice	Wine
Not recommended	2.6–4.0 mL/hL 100–150 mL/1000 gal	5.3–7.9 mL/hL 200–300 mL/1000 gal

Usage

Dilute Scottzyme KS to approximately a 10% solution in cool water. Add to the juice after pressing or to the wine after alcoholic fermentation during a tank mixing.

Warning: Never use Scottzyme KS before pressing. Scottzyme KS has very aggressive enzymatic activities that will break down skins and create too many fine solids. After pressing, these activities will help with settling and the breakdown of sticky solids (even from *Botrytis*). The goal is to make the juice or wine more manageable.

Storage

Store at 4°C(40°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Stage of Winemaking: Juice or wine	Activity: Pectinase, cellulase and protease	Impact: Clarification and filtration

SCOTTZYME KS PLUS

Enzyme blend for enhanced clarification and filtration of difficult lots

#16178	1 kg (890 mL)	$239.00
#16168	25 kg (22.25 L)	$3046.00

Scottzyme® KS Plus is a powerful liquid enzyme created for use in wine that is very difficult to clarify. It has higher enzyme activities for the most difficult tasks. Scottzyme KS Plus should be used on finished wine only, either to assist with settling or to help with filtration issues before bottling.

Dosage

Bench trials recommended for wine

Fruit	Juice	Wine
Not recommended	Not recommended	4 mL/hL 150 mL/1000 gal

Usage

Dilute Scottzyme KS Plus to approximately a 10% solution in cool water. Add to the wine after alcoholic fermentation during a tank mixing.

Warning: Never use Scottzyme KS Plus before pressing or on the juice. It is our most aggressive enzyme and may result in over clarification of juice.

Storage

Store at 4°C(40°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Stage of Winemaking: Wine	Activity: Pectinase, cellulase and protease	Impact: Clarification and filterability in very difficult lots

Impact of Scottzyme KS Plus on Turbidity after Four Day Settling at Room Temperature

Control: 120 NTU **Enzyme A: 46.1 NTU** **KS Plus: 20.8 NTU**

SCOTTZYME PEC5L

Pressability, settling and clarification for white and fruit wines

#16170	1 kg (890 mL)	$80.00
#16160	25 kg (22.25 L)	$895.00

Scottzyme® Pec5L is a highly concentrated liquid pectinase blend developed and formulated specifically for winemaking.

It is used on crushed grapes for easier pressing and higher yields and in juice for improved settling, clarification and filtration. It is also useful for berries, pome and stone fruits. When adding to fruit, it is sometimes beneficial to use in conjunction with Scottzyme HC.

Dosage

Crushed Grapes	Juice	Wine
10–20 mL/ton	1.0–1.3 mL/hL 40–50 mL/1000 gal	1.3–1.6 mL/hL 50–60 mL/1000 gal

Usage

Dilute Scottzyme Pec5L to approximately a 10% solution in cool water. Pour over the grapes or fruit before pressing or add to the juice before the start of alcoholic fermentation.

Storage

Store at 4°C(40°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Stage of Winemaking: White grapes and fruit, juice and wine	Activity: Pectinase	Impact: Clarification

EXPERT TIP FROM OUR FILTRATION SPECIALIST

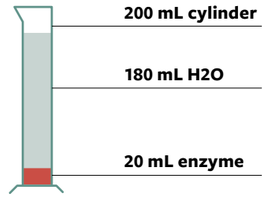
A powerful enzyme such as Scottzyme KS Plus has a great fringe benefit in that it can unclog crossflow and cartridge filters. This is especially useful after filtering colloidally dramatic wines, or specific varietals with naturally higher pectin levels that tend to struggle on filtration day (assuming prefiltration was done properly and within the recommended 24 hour time limit, and a 20 psi differential has not been exceeded). Use KS Plus in the filter after filtration but before the alkaline cleaning cycle. The enzyme should always be used before a hot water or steam sanitization so the solids are not baked in. The use of the KS Plus will then enable a more successful cleaning.

FREQUENTLY ASKED QUESTIONS: ENZYMES

What is the best way to add liquid enzymes?
First calculate the dosage then dilute Scottzymes to approximately a 10% solution (v/v) in cool water (see below). Pour the solution over the crushed grapes/fruit or during a pump-over before fermentation. If adding to juice or wine, gently mix a 10% solution into the tank for even dispersion. Thorough mixing is important.

HOW TO

HOW TO MAKE A 10% SOLUTION



If using a dose of 20 mL/ton, mix 20 mL of liquid enzyme with approximately 180 mL of water.

Scottzyme liquid enzymes are sold by weight but doseage recommendations are given in volume. What's the conversion?
One kg of Scottzyme liquid enzyme equals 890 mL and 25 kg liquid enzyme equals 22.25 liters.

How do I add powdered or granular enzymes?
Granular enzymes need to be dissolved in 10 times their weight of water (for every gram of enzyme dissolve in 10 mL water), gently stirred and allowed to sit for a few minutes. They are then ready to be added to juice or wine. Powdered enzymes tend to scatter across water or wine. It is best to add just enough cool water (~21°C/70°F) to the enzyme to create a paste. Then add more cool water to dissolve the enzyme completely. It is now ready to be added to the tank. Make sure you have gentle motion in the tank to disperse the enzyme or use a dosing pump.

How long will powdered/granular enzymes remain active after rehydration?
Rehydrated powdered/granular enzymes should not be kept in liquid form for more than a few hours at room temperature. The liquid solution of these enzymes may be kept a few days at 4°C(39°F) in water acidified with tartaric acid to pH 3.5 with 50 mg/L of SO_2.

Are enzymes deactivated by SO_2?
Yes, enzymes are inhibited by SO_2. Deactivation occurs around 200 ppm. Do not add SO_2 and enzymes together. It is okay to add enzymes after the SO_2 is adequately dispersed or to add the SO_2 after the enzymes are adequately dispersed.

I have already added bentonite. Can I still use enzymes?
You may still use enzymes but not until the wine has been racked off the bentonite. Bentonite inactivates enzymes. It is best to use bentonite after the enzyme treatment is complete.

When should I add Scottzyme Color Pro, Lallzyme EX or Lallzyme EX-V?
Add at the crusher or the fermenter as soon as possible. Anthocyanins are water-soluble and are released as the grapes are crushed. Most of a red wine's color potential is achieved very early.

Why should I use Scottzyme Color Pro on whites?
Scottzyme Color Pro improves settling, fining and filterability of white wines.

When should I choose Lallzyme EX or Lallzyme EX-V?
Lallzyme EX is recommended for fruit forward red or rosé wines and EX-V is formulated for premium, aged reds.

What should I do if the optimal time to add enzymes has passed?
Low temperatures, alcohol and SO_2 all inhibit enzyme activity, but the enzymes will still work. This is why recommended enzyme dosage levels for wine are higher than for juice in most cases. Reaction time will also increase when conditions are not optimal.

I have problems settling and clarifying my late harvest white wines. When should I treat with Scottzyme KS?
It is best to add Scottzyme KS after pressing and before fermentation. If added later, you will need a higher dose and a longer reaction time in the wine. If you know you have problems with a specific white wine, add Scottzyme KS to the juice tank. Preventative use is more effective and quicker.

Warning: Do not use Scottzyme KS before pressing. Never use Scottzyme KS on red grapes or must.

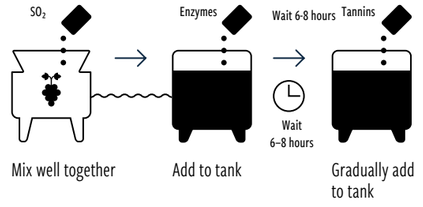
I have enzymes left from last year. Are they still OK to use?
Leftover liquid Scottzymes should be tightly sealed and stored in a refrigerated environment. Granular enzymes should be kept in a dry, cool environment. If the dry enzymes get moisture in them, they should be thrown out. If kept properly, liquid enzymes should be good for at least one year with only a small activity loss. Granular enzymes will be good for several years.

I had *Botrytis* on my grapes this harvest and I want to use a beta-glucanase enzyme. Do you carry a beta-glucanase enzyme?
Yes, Lallzyme MMX is a blend of beta-glucanase and pectinase. It is currently listed in 27 CFR 24.250.

How long should I leave the enzyme on white grapes before pressing?
In general, waiting 2–12 hours before pressing should be enough time for the enzyme to work.

I am using tannin and enzymes. Will SO_2 interfere with my additions?
Using all three products together is fine, but timing is important! High SO_2 content can inhibit enzyme activity. Do not add SO_2 and enzymes at the same time. It is okay to add enzymes after the SO_2 is adequately dispersed OR to add SO_2 after the enzymes are adequately dispersed. Follow with a tannin addition six to eight hours later. When enzymes are not being used, add SO_2 first, allow to disperse, then follow with the tannin addition.

Timing of Additions: SO_2, Enzymes and Tannins



Add SO_2 and mix well prior to adding enzymes. Tannins can be added 6–8 hours later. Yeast derivative nutrients (e.g. Opti-Red) can be added at any point during fermentation.

MICROBIAL CONTROL

An important part of making wine is controlling microbes during pre-fermentation, fermentation, aging and packaging. Practices such as adding yeast and ML starter cultures, controlled sulfur dioxide additions, acidification, winery hygiene, and filtration are all ways in which microbial control is applied throughout the winemaking process. Though many wine spoilage problems can be prevented with good winemaking practices, there are still circumstances that require extra microbial control. This section describes some of the tools that Scott Laboratories offers to inhibit or eliminate unwanted microorganisms.

MICROBIAL CONTROL ACTION

REMOVAL

Microorganisms are physically removed from the wine. Removal strategies include filtration, centrifugation and some types of fining followed by racking.

INHIBITION

Microbe replication is slowed or stopped, but organisms are not necessarily killed. Microbes may start to grow and multiply once the inhibitory pressure is removed. Inhibition strategies include acidification to lower pH and use of sulfur dioxide and Lysovin at non-lethal concentrations.

DESTRUCTION

Microorganisms are killed and will not survive to replicate. Destruction strategies include No Brett Inside™ or Bactiless™ additions, use of Lysovin (especially at pH >4.0) and the addition of alcohol (as in the case of fortified wines).

SELECTING MICROBIAL CONTROL AGENTS FOR SUCCESS

INCREASING VOLATILE ACIDITY

VA can be increased by stressed wine yeast, spoilage yeast and bacteria (acetic and lactic acid bacteria). In general, pre-fermentation VA increases are due to acetic acid bacteria and non-*Saccharomyces* yeast.

HIGH pH WINEMAKING

The higher the pH, the more diverse the microbial population. Careful attention to wine microbiology and chemistry is advised.

MICROBIAL STABILIZATION

Strategies include pH, temperature management, thoughtful rackings, filtration and the use of Bactiless, Lysovin, No Brett Inside or SO_2. Generally accepted SO_2 levels to control microbes in winemaking are 0.5ppm molecular for bacteria and 0.8ppm molecular for yeast.

ACETIC ACID BACTERIA (AAB)

AAB are generally problematic in the pre- and post-fermentation phases. They are responsible for the oxidation of ethanol to acetic acid (VA), production of polysaccharides that can give clarification and filtration issues as well as changes in aromas and flavors. Control growth via Bactiless and SO_2 and by limiting oxygen.

LACTIC ACID BACTERIA (LAB)

LAB are responsible for converting malic acid into lactic acid. *Oenococcus oeni* is favorably associated with malolactic fermentation (MLF) but can also produce volatile acidity (VA) under certain conditions. *Pediococcus* and *Lactobacillus* are usually considered spoilage organisms. Some LAB can convert sugar to VA. Control growth with Bactiless, Lysovin or SO_2.

YEAST

Highly diverse group of organisms that can be both beneficial or detrimental depending on the stage of winemaking. Control growth post-fermentation with No Brett Inside if *Brettanomyces* is present and SO_2.

CHOOSING MICROBIAL CONTROL AGENTS

Highly Recommended
Recommended

	Lysozyme	Sulfur Dioxide			Chitosan	Chitin-Glucan
	Lysovin	Inodose Granules	Inodose Tablets	Potassium Metabisulfite	No Brett Inside	Bactiless
Page#	89	91	91	91	90	90
Reds	♦	♦	♦	♦	♦	♦
Whites and Rosé	♦	♦	♦	♦	♦	♦
Fruit, Cider and Mead	♦	♦	♦	♦	♦	♦
Protection from indigenous yeast		♦	♦	♦		
Control gram positive bacteria (Lactic Acid Bacteria)	♦	♦	♦	♦		♦
Control gram negative bacteria (*Acetobacter*)		♦	♦	♦		♦
Inhibit oxidation of grapes and juice		♦	♦	♦		
Control spoilage yeast (*Brettanomyces*)		♦	♦	♦	♦	
Protection during stuck and sluggish fermentations	♦	◊	◊	◊		
Delay MLF	♦					
Helps prevent refermentation in bottle		♦	♦	♦		
Chitosan					♦	
Chitin-Glucan						♦
Listed in 27 CFR 24.250					♦	♦

LYSOVIN

Lactic acid bacteria inhibitor for reds, whites, and rosés

#16402	500 g	$99.00
#16400	1 kg	$173.00
#16401	5 kg	$856.00

Lysovin is a powdered lysozyme that is used to control or inhibit lactic acid bacteria including *Oenococcus* spp., *Pediococcus* spp. and *Lactobacillus* spp. at any stage of winemaking. The enzymatic activity of lysozyme can degrade the cell walls of gram-positive bacteria (LAB) but not gram-negative bacteria (*Acetobacter* spp.) or yeast. Lysozyme's effectiveness depends on the type of bacteria and the number of cells present. Recommended Lysovin contact time is seven days, after which time wine should be removed from lysozyme be racking. In red wines, Lysovin will interact with tannins rendering it inactive. In white wines Lysovin should be removed with bentonite.

Recommended Dosage

Lysozyme Applications		Lysovin Dose			Timing of Addition
Inhibit Growth of LAB in Must and Juice Inhibit spoilage characters due to uncontrolled microbial growth. This is especially important in high pH conditions or with grapes containing rot.		200 ppm	20 g/hL	0.75 g/gal	Add prior to fermentation
Protection During Stuck/Sluggish Fermentations Reduce the risk of VA production by lactic acid bacteria and limit use of SO_2 to encourage yeast growth		250–400 ppm	25–40 g/hL	0.94–1.50 g/gal	Add at first signs of a stuck fermentation
Delay MLF/Post-MLF Stabilization Protect wine without the negative effects of SO_2 during maceration or aging; allow for implantation of selected bacteria; delay MLF to increase efficiency of Phase I micro-oxygenation	Delay	100–200 ppm	10–20 g/hL	0.38–0.75 g/gal	Add at juice stage or immediately after alcoholic fermentation
	Stabilize	250–500 ppm	25–50 g/hL	0.94–1.90 g/gal	Add immediately after MLF completion
Inhibit MLF when Blending Partial and Complete ML Wines		300–500 ppm	30–50 g/hL	1.10–1.90 g/gal	Add during blending

Usage

Rehydrate Lysovin in 5–10 times its weight of warm water. Stir gently for one minute and avoid foaming. Allow to soak for 45 minutes. Repeat until the solution is a clear, colorless liquid. To ensure accurate results, wait one week before culturing for microbes. If lysozyme-treated samples are assessed too quickly after treatment, results may show a false-positive for bacterial growth. **It is important to note that lysozyme requires a minimum seven day contact time to allow the enzyme to work.**

Storage

Store in dry form for 5–10 years at 18°C(65°F). Once rehydrated, Lysovin should be used immediately.

Warning: In the case of low color potential grapes such as Pinot noir, caution is needed when adding Lyzovin prior to completion of alcoholic fermentation (See FAQ for more details). If spoilage yeasts such as *Brettanomyces* are suspected, SO_2 addition should not be delayed. Lysovin is only effective against gram-positive bacteria and has no effect on yeast or gram-negative bacteria.

LYSOVIN OR BACTILESS?

Which lactic acid bacteria inhibitor you choose will depend on several factors. Has malolactic fermentation finished? Is malolactic desired? What is the microbial load? Is the wine destined for export?

Lysovin is a natural product isolated from egg whites that is active against lactic acid bacteria but not acetic acid bacteria. Lysovin can be used at any stage of winemaking, even if malolactic fermentation is still desired. Lysozyme should also be your inhibitor of choice if you are exporting the wine.

Bactiless is fungal derived and targets lactic acid bacteria and acetic acid bacteria. Bactiless should not be used unless malolactic fermentation is complete or not desired. Bactiless is listed as an ingredient for domestic wine production and, at this time, should not be used in wines destined for export.

BACTILESS

Acetic acid and lactic acid bacteria control

#15232	500 g	$84.00

Bactiless™ is a 100% natural, non-allergenic source of chitin-glucan and chitosan from a non-GMO strain of *Aspergillus niger*. Bactiless helps protect wine from acetic acid and lactic acid spoilage bacteria. Bactiless can be used to drastically reduce bacteria populations and to help prevent bacterial growth in wines, especially after malolactic fermentation. It offers an interesting alternative to lysozyme treatment and/or significant amounts of SO_2. The effectiveness of Bactiless can be enhanced with SO_2, but it does not replace the use of SO_2 since it does not have antioxidant or antifungal properties. Bactiless can help inhibit malolactic fermentation when it is not desired. In wines where malolactic fermentation is desired, Bactiless should not be used until after MLF is complete.

Bactiless is shown to be effective against a broad spectrum of wine bacteria, but does not affect yeast populations.

Recommended Dosage

200–500 ppm	20–50 g/hL	1.67–4.16 lb/1000 gal	45–113 g/60 gallon barrel

Usage

Suspend Bactiless in 5–10 times its weight of cool water or wine (Bactiless is insoluble, so it will not go into solution). Bactiless should be mixed to obtain a homogenous addition. Leave Bactiless in contact with the wine for 10 days and then conduct a clean racking. If malolactic fermentation is desired, Bactiless should not be added until after MLF is complete.

To assess Bactiless effectiveness wait 20–30 days post-racking before microbial analysis by traditional plating, microscopic observations or RT-PCR.

Storage

Dated expiration. Store in a dry environment below 25°C(77°F).

Note: This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information please visit www.TTB.gov.

IMPACT OF BACTILESS ON SIX DIFFERENT ORGANISMS 30 DAYS AFTER TREATMENT

	Control	Bactiless at 20 g/hL
Acetic acid bacteria (cells/mL)	2,033,333	54,800
Lactobacillus brevis (cells/mL)	35,733	1,030
Lactobacillus plantarum (cells/mL)	99,333	4,867
Lactobacillus kunkeei (cells/mL)	313	73
Oenococcus oeni (cells/mL)	1,733,333	46,667
Pediococcus species (cells/mL)	100,033	2,700

Trials conducted by ETS Laboratories, St. Helena, California. Trial results are the average of three replicates.

NO BRETT INSIDE

Brettanomyces spp. control agent

#16410	100 g	$105.00

No Brett Inside™ is a commercial preparation of chitosan that specifically targets *Brettanomyces* cells. The active ingredient, chitosan, works in two ways: 1) *Brettanomyces* cells adsorb onto chitosan and settle out of the wine and 2) a biological action occurs which results in cell death. This double action of No Brett Inside helps control contaminating populations to preserve wine quality.* However, No Brett Inside cannot decrease any sensory contribution already produced by *Brettanomyces*.

**No Brett Inside should be added post-ML.*

Recommended Dosage

40–80 ppm	4–8 g/hL	0.33–0.67 lb/1000 gal	9–18 g/60 gallon barrel

Usage

Suspend No Brett Inside in 5 times its weight of cool water (No Brett Inside is insoluble, so it will not go into solution). No Brett Inside can be added during a pump-over or tank/barrel mixings to ensure a homogenous addition. Leave the No Brett Inside in contact with the wine for 10 days and then conduct a clean racking.

To assess Bactiless effectiveness wait 20–30 days post-racking before microbial analysis by traditional plating, microscopic observations or RT-PCR.

Storage

Dated expiration. Store in a dry, odor-free environment below 25°C(77°F).

Note: This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information please visit www.TTB.gov.

VISUALIZATION OF NO BRETT INSIDE EFFECT ON *BRETTANOMYCES*

Before

Scanning Electron Micrograph x 20,000 magnification
Brettanomyces *cells prior to being treated with No Brett Inside.*

After

Scanning Electron Micrograph x 20,000 magnification
Brettanomyces *cells treated with 4 g/hL of No Brett Inside. Image shows* Brettanomyces *cells attached to the surface of the Chitosan.*

Images courtesy of Biljana Petrova and Dr. Charles G. Edwards, Washington State University, Pullman, WA.

SULFUR DIOXIDE AND TARTARIC ACID

Wine quality can be preserved with sulfur dioxide (SO_2) and is used for its antioxidant and antimicrobial properties. The effectiveness of SO_2 as an antimicrobial agent is dependent upon pH as well as the presence of other SO_2-binding compounds. As pH increases, the portion of sulfur dioxide that is active against microorganisms decreases. Therefore, increases in pH require the addition of more SO_2 to maintain adequate antimicrobial activity. Inodose Granules and Tablets are an easy and effective way to add SO_2 to grapes, juice or wine.

INODOSE GRANULES

Effervescent sulfur dioxide granules

#15780	100 g	$11.00
#15781	400 g	$22.00

Note: Volume discounts are available. Please contact us for details.

Inodose Granules are small, effervescent granules made of potassium metabisulfite and potassium bicarbonate. As they dissolve the granule release a precise dose of SO_2. Inodose granules are packaged in pre-measured 100 g and 400 g packs. Inodose granules are perfect for SO_2 additions to incoming must, juice, and wines prior to clarification and fining. The potassium bicarbonate in these granules has little or no effect of pH.

INODOSE TABLETS

Effervescent sulfur dioxide tablets

#15775	2 g (48/box)	$36.00
#15776	5 g (42/box)	$40.00

Note: Volume discounts are available. Please contact us for details.

Inodose Tablets are a blend of potassium metabisulfite and potassium bicarbonate. They are packaged in 2 g and 5 g dosage levels. As they dissolve into must or wine, the tablets release a precise dose of SO_2. The effervescent action of the bicarbonate provides mixing in barrels or small tanks while reducing time and labor needed for stirring. The easy-to-use tablet helps prevent overdose problems associated with traditional forms of SO_2. Sealed strip packages keep unused tablets fresh for optimal efficacy. The potassium bicarbonate fraction in these tablets has little or no effect on pH.

Dosage

Inodose Granules and Tablets Conversion Chart— PPM of Total Sulfur Dioxide

SO_2 Dose	1 Liter	1 Gallon	60 Gallons	100 Gallons	1000 Gallons
2 g	2,000	529	9	5	0.5
5 g	5,000	1,321	22	13	1.3
100 g	100,000	26,420	440	264	26.4
400 g	400,000	105,680	1,761	1,057	106

Note: The SO_2 products contribute a precise dose of pure SO_2 when added to the wine, measured as total SO_2. These products are blends of potassium metabisulfite and potassium bicarbonate and weigh more than 2 g, 5 g, etc.

Usage

Various applications include:

- Add to gondolas or picking bins to inhibit oxidation of grapes and juice, especially from *Botrytis* or mold.
- Add during transport of must or juice.
- To inhibit indigenous yeast and bacteria.
- Add in tanks before or after fermentation.
- Add directly into barrels after malolactic fermentation.
- To make SO_2 additions to wine during aging.

Storage for Granules and Tablets

Store in a dry, well-ventilated environment at temperatures below 25°C(77°F). Once the pack has been opened it should be used immediately.

POTASSIUM METABISULFITE

#POTMETA1K	1 kg	$6.00

Potassium metabisulfite can be used throughout the winemaking process from grape receipt to finished wine.

TARTARIC ACID

#TARTARIC5	5 kg	$97.00

Used to correct tartaric acid deficiencies, to decrease the pH and increase the titratable acidity of grapes, juice and wine thereby enhancing microbial stability, wine color and flavor.

FREQUENTLY ASKED QUESTIONS: MICROBIAL CONTROL

LYSOZYME

How long does it take for lysozyme to work?

The rate of activity depends on many factors including temperature, pH, bacterial load, bacterial resistance and the specific matrix of any given wine. Even though lysozyme starts working immediately, it doesn't necessarily kill all the bacteria immediately. If lysozyme-treated wine samples are plated too quickly after treatment, results may show a false-positive. To ensure accurate results, wait one week before culturing for microbes.

Is lysozyme effective against all lactic acid bacteria?

No. Some lactic acid bacteria strains show resistance to lysozyme. Bench trials MUST be performed to accurately determine the effectiveness and correct addition rate of lysozyme for your wine.

How soon after a lysozyme addition can I bottle?

Wait at least one week, even if you have diligently completed your lab trials. Lysozyme is a protein and may produce lees (especially in reds) and affect the protein stability in whites. It is not recommended to bottle white wines that contain residual lysozyme.

Will lysozyme treatment affect the color of red wine?

Lysozyme added to red must can bind with tannins and other polyphenols that otherwise would have stabilized anthocyanins. This tannin loss can result in reduced color. In general, using 100–200 ppm should not cause a visually observed decrease in color. Lysozyme added post-MLF for microbial stability during barrel aging may have positive color effects when compared to stabilization with SO_2. Any decrease in color should occur in the first few days of treatment. For low color potential grapes (e.g. Pinot noir) lysozyme should be added with extreme care before alcoholic fermentation is complete, however, the consequences of adding lysozyme versus not doing so must be heavily weighed. Bench trials are critical.

SULFUR DIOXIDE

Can I use a partial bag of Inodose granules?

No. Use the entire packet for a single dose of SO_2. The formulation (therefore dosage) can be affected if the granules absorb any moisture.

Can I break the Inodose tablets in half to deliver a smaller dose?

No. Do not break the tablets for smaller dose additions. The combination of potassium metabisulfite and potassium bicarbonate may not be evenly distributed in the tablet. The tablets are available in two sizes to help give dosing choices.

I added a 5 g tablet of SO_2 to my 60 gallon barrel. Does this mean I have 22 ppm of free SO_2?

You will have 22 ppm total SO_2 added. The amount of free SO_2 depends on pH, residual sugar, solids, etc.

BACTILESS

Do I have to rack my wine after 10 days?

Yes.

Can I just add Bactiless to the top of my vessel?

No. A thorough mixing is essential.

Does Bactiless have an impact on yeast?

Bactiless has no impact on *S. cerevisiae*. It can have a minimal impact on *Brettanomyces*, but it is not as effective as No Brett Inside. It is possible that some yeast can be caught up in the chitin-glucan matrix but this is not the best use of the product and it may not be reproducible.

Can I induce malolactic after a Bactiless addition?

This is still to be determined, however, it is highly advisable to wait until malolactic fermentation is complete before using Bactiless. If you have a lactic acid bacteria issue prior to inducing MLF you may wish to consider the use of lysozyme.

Does Bactiless impact wine sensory character?

Bactiless is neutral with regards to its sensory impact, however, it does not have the ability to remove any negative sensory compounds that may have been produced by bacterial contaminants prior to treatment.

Can Bactiless or No Brett Inside be used if I am exporting?

These products are currently approved by the TTB for use in domestic winemaking (27 CFR 24.250) and cannot be used in wines destined for export (even if it is permitted for use in the country that you are exporting to).

NO BRETT INSIDE

Do I have to rack off the No Brett Inside lees after 10 days?

Yes.

Can I just add No Brett Inside to the top of my vessel?

No. A thorough mixing is essential.

Can I induce malolactic fermentation after a No Brett Inside addition?

This is still to be determined, however, it is highly advisable to wait until malolactic fermentation is complete before using No Brett Inside.

Does No Brett Inside impact the sensory of the wine?

No Brett Inside is insoluble so it should not impact wine sensory. This also means that it will not remove any of the sensory compounds that may already be present due to a *Brettanomyces* infection (4-ethylphenol and 4-ethylguiacol).

What is the difference between Bactiless and No Brett Inside?

No Brett Inside is chitosan and Bactiless is chitin-glucan. The source is the same (*Aspergillus niger*), but the formulations are different. They are active in controlling different microbial groups.

FINING AND STABILITY

Fining and stabilizing are complementary actions that remediate and protect juice and wine from off-odors, off-colors, and unsightly hazes and precipitates.

Fining removes unwanted elements from juice and wine by physical removal. Though fining agents work by different mechanisms, they all react with or adsorb unwanted substances that are then removed by racking, filtration, centrifugation, or other means. Stabilizers react with substances to prevent wine hazes and precipitates from occuring.

A properly fined, stabilized, and filtered wine ultimately leads to a bottle-stable wine.

SELECTING FINING & STABILITY AGENTS FOR SUCCESS

To properly select appropriate fining and stabilizing agents many considerations must be taken into account. First identify the fining or stability goal and then choose a treatment appropriate for the stage of winemaking. Early, proactive treatments are always recommended. Treating problems now can avoid compounded problems later.

BROWNING & OXIDIZATION

Grape juice and wine can oxidize leading to unwanted visual, sensory, and chemical changes. Conditions leading to browning and oxidation are not always understood, but treating problems early is always encouraged. Early fining with activated carbon and PVPP/Casein based products can help remove oxidized phenolics and brown pigments in both the juice and wine phase.

CLARIFICATION

High solids can be problematic. Solids removal can be achieved using enzymes, gelatins, PVPP, bentonite, and casein. These options can be used pre- and post-fermentation. Post-fermentation isinglass can be used to reduce turbidity due to polysaccharides and colloids thereby eliminating multiple filtration steps.

HAZE

Haze can be caused by many things: microbes, heat unstable proteins, tartrates, residual fining aids, etc. Protein instability can be remedied by using bentonite and residual fining aids can be removed by Hot Mix Sparkolloid and silica gels like Gelocolle. Microbial hazes can be reduced via fining and filtration. Microbial stability can also be achieved through appropriate used of microbial control agent (see pgs 87-91).

TARTRATE INSTABILITY

Preventing tartrate precipitation in a finished wine can be achieved in a number of ways. Traditionally, tanks are seeded with potassium bitartrate and chilled close to freezing temperatures to induce tartrate precipitation before bottling. Recent advances include adding tartrate inhibitors like mannoproteins and gum arabic. These products work by inhibiting tartrate crystal formation, thereby keeping tartrates in solution.

SENSORY ASPECTS

Wines with perceived astringency and bitterness may be improved with the use of gelatins or other protein-based products that complex with polyphenols. When the goal is to improve aromatic profiles, products like isinglass (pg 103), tannins (see pgs 68-74) as well as gelatins (pg 100) are useful.

ALWAYS CONSIDER THE FOLLOWING FACTORS WHEN CHOOSING OR APPLYING A FINING OR STABILIZING AGENT:

Fining/stability agent preparation
Most dry agents should be prepared in water. Always read product directions and follow accordingly.

Dosage
Bench trials must be conducted on each wine to determine proper dose rate.

Contact time
Most agents react rapidly when contact is made, but may need time to settle out.

Shape and size of vessel
Vessel type may impact settling time.

Temperature
Temperature imapcts settling time. Both high and low temperatures can inhibit sedimentation.

Winemaking stage

Previous treatments
Previous treatments can interfere with downstream treatments.

Addition method
Pumping using a Venturi is an efficient way to disperse agents. Closed circulation afer addition is also beneficial.

CHOOSING FINING & STABILITY AGENTS

● Highly Recommended
○ Recommended

	Bentonite				Acitivated Carbon		PVPP & Casein					Gelatins		Isinglass	Inert Clarifying Agents		Inactivated Yeast For Fining		Gum Arabic	Mannoprotein	Gum Arabic/ MannoproteinBlends
	Blancobent UF	FermoBent PORE-TEC	GranuBent PORE-TEC	NaCalit PORE-TEC	Granucol FA	Granucol GE	Bentolact S	Caséinate de Potassium	Freshprotect	Polycacel	Polycel	Colle Perle	Inocolle	Cristalline Plus	Gelocolle	Hot Mix Sparkolloid	Pure-Lees Longevity +	Reduless	Flashgum R Liquide	Claristar	UltiMA Soft
Page#	96	96	97	97	95	95	98	98	98	99	99	100	100	103	102	102	101	101	104	103	104
Reds					○	○						●	○		○	○		●	●	●	●
Whites and Rosé	●	●	●	●	○	○	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●
Fruit, Cider and Mead	○	○	○	○	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●		
Treat moldy juice (*Botrytis*)			○	○	●	●	●	●	●	●	●		●								
Prevention/Treatment of oxidization in juice			○	○	○		●	●	●	●	●										
Treatment of oxidization and color defects in wines					●		●	●	●	●	●										
Prevent oxidation and preserve color in wine							○	○	○	○	○						●				
Promote protein stability	●	●	●	○											○						
Wine clarification			○	○								○	○	●	○	●					
Help compact lees							○						○		○	●					
Remove haze left by other fining agents															●	●					
Colloidal stability																			●	○	○
Tartrate (KHT) stability																			○	●	○
Diminish bitterness						○	●	●	●	●	●	○		○							
Diminish harsh tannins and astringency							○		○			●	○						○	○	○
Diminish greenness and other off flavors						●			●			●	○								
Enhance/unmask aromatics									○	○		○	●				●	●			
Aromatic stability																	●			●	○
Add perception of sweetness and softness																			●	○	●
Reduces sulfur defects						●	○											●			

ACTIVATED CARBON

GRANUCOL FA

Decolorizing carbon

White, Red, Rosé

#15331	1 kg	$21.00

Granucol FA is a decolorizing carbon for the elimination of off-colors due to browning in juice and wine. These activated carbon pellets are prepared for ease of use in the cellar.

Dosage

Bench trials recommended for wine

Juice

100–1000 ppm	10–100 g/hL	0.83–8.3 lb/1000 gal

Wine

100–300 ppm	10–30 g/hL	0.83–2.5 lb/1000 gal

Usage

Add Granucol FA directly to juice or wine. The pellets immediately dissolve after addition. Stir vigorously for several minutes to ensure even distribution. The activated carbon deposit should be racked as soon as possible.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Juice, Wine	Contact Time: 24 hours	Impact: Removes color

GRANUCOL GE

Deodorizing carbon

White, Red, Rosé

#15332	1 kg	$21.00

Granucol GE is a deodorizing carbon for the absorption of off-tastes and off-aromas. These activated carbon pellets are prepared for ease of use in the cellar.

Dosage

Bench trials recommended for wine

100–1000 ppm	10–100 g/hL	0.83–8.3 lb/1000 gal

Usage

Add Granucol GE directly to juice or wine. The pellets immediately dissolve after addition. Stir vigorously for several minutes to ensure even distribution. The activated carbon deposit should be racked as soon as possible.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Juice, Wine	Contact Time: 24 hour	Impact: Removes off-odors and flavors

BENTONITE

Bentonite is aluminum silicate clay which is mined in several areas around the world. The wine industry uses two types of bentonite, sodium (Na) and calcium (Ca), to remove heat unstable protein from white and rosé wines. Sodium-based bentonites are better at protein removal. Its lattice structure readily separates in water, exposing negative charges that adsorb and trap positively charged proteins. Calcium bentonite is gentler. Its structure does not separate as easily in water, it flocculates faster, and forms a more compact sediment.

The stronger the positive charge of the protein, the more reactive it is with bentonite. At lower pH, protein has a stronger charge. At higher pH, the protein charge is weaker so the more potent sodium-based bentonite is recommended.

In addition to protein removal, bentonite can also be used as a counter-fining and clarifying agent in conjunction with positively charged fining agents (e.g. gelatin, isinglass, etc.). Bentonite is also used in sparkling winemaking as an adjuvant to help riddling.

The quality of bentonite determines its effectiviness. The most refined bentonites are lighter in color with no or very low levels of sand and grit. We're happy to offer Erbslöh bentonites, considered to be some of the highest quality bentonite in the world.

Note for successful bentonite preparation: Hard water or acidic water makes swelling less effective as it inhibits cation exchange. Pay close attention to swelling times. If bentonite is not swelled as recommended its efficacy will be reduced. The longer the swelling time, the greater the adsorption area. Ensure that bentonite has not picked up any off-odors prior to use.

BLANCOBENT UF

Bentonite for use during crossflow filtration

White, Red, Rosé

#15320	25 kg	$118.00

Blancobent UF is a highly purified and particularly effective powdered sodium-calcium bentonite formulated for use in conjunction with crossflow filtration. Due to the preparation of the bentonite and the absence of particles >100 µm, Blancobent UF does not cause excessive abrasion to crossflow membranes. Owing to its defined particle size distribution, it is compatible with direct dosing into hollow fiber membrane crossflow systems. In this way, filtration and stabilization happen in one step!

Blancobent UF has fine particles and is free of crossflow-damaging grit and sand.

Competitor Bentonite

Dosage

Bench trials recommended for wine

Wine

200–2000 ppm	20–200 g/hL	1.6–16.8 lb/1000 gal

Usage

Add Blancobent UF slowly to approximately 10 times its weight of warm water under constant stirring. Allow a rest period of 30-60 minutes, then stir again thoroughly. Let the mixture swell for 6–12 hours. Dispose of supernatant and add remaining bentonite slurry to the wine while thoroughly mixing.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Pre-crossflow filtration (wine)	Contact Time: 1 hour	Impact: Removes proteins

FERMOBENT PORE-TEC

Bentonite for use during fermentation

White, Rosé

#15321	5 kg	$31.00

FermoBent® PORE-TEC is a pure granular sodium-calcium based bentonite with low iron for the specific treatment of juice. Due to its low iron content, fermentation on this particular bentonite is not only possible but encouraged. Fermenting on bentonite improves the release of CO_2 during fermentation and the constant contact between juice and bentonite may eliminate the need for protein stabilization before bottling. This also helps to preserve varital aromatics as protein fining takes place before volatile aromatics are produced.

Dosage

Bench trials recommended

Juice

1000–2000ppm	100–200 g/hL	8.4–16.8 lb/1000 gal

Usage

Add FermoBent PORE-TEC slowly to approximately 5-10 times its weight of water and allow to swell. Allow a rest period of 4–6 hours. Dispose of supernatant and add remaining bentonite slurry to the must while thoroughly mixing. After fermentation, rack off of bentonite and gross lees.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Fermentation	Contact Time: During fermentation	Impact: Removes proteins

NEW

GRANUBENT PORE-TEC

Bentonite for general protein stability

White, Red, Rosé

#15325	20 kg	$97.00

GranuBent PORE-TEC is a highly purified sodium-based bentonite for the removal of heat unstable proteins in juice and wine. Its refined, granular formation is produced using PORE-TECnology, making it almost dust-free and easy to use.

GranuBent PORE-TEC is cleaner and more uniform than other bentonite.

Competitor Bentonite

Dosage

Bench trials recommended for wine

Juice

350–750 ppm	35-75 g/hL	2.9-6.3 lb/1000 gal

Wine

200–1500 ppm	20-150 g/hL	1.7-12.6 lb/1000 gal

Usage

Add GranuBent PORE-TEC slowly to approximately 10 times its weight of warm water under constant stirring. Let the mixture swell for 4–8 hours. Dispose of supernatant and add remaining bentonite slurry to the wine while thoroughly mixing.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Juice or wine	Contact Time: 1-7 days	Impact: Removes proteins

NACALIT PORE-TEC

Sodium-calcium bentonite for clarification

White, Red, Rosé

#15322	5 kg	$28.00

NaCalit® PORE-TEC is a granulated sodium and calcium bentonite that is specifically formulated for instances where superior flocculation, adsorption and clarification are required.

Dosage

Bench trials recommended for wine

50–1500	50–150 g/hL	4.2–12.6 lb/1000 gal

Usage

Add NaCalit PORE-TEC slowly to approximately 5-10 times its weight of water under constant stirring. Allow to swell for a minimum of 4–12 hours. Dispose of supernatant and add remaining bentonite slurry to the wine while thoroughly mixing.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Cold settling for juice, protein stabilization for wine	Contact Time: 1-7 days	Impact: Clarification and protein removal

STAFF PICK

I love Freshprotect because I've seen it remove bitterness and add back mouthfeel. I love it for Sauvignon blanc and Pinot gris/grigio that gets a long or hard press cut. It can make that portion of juice blendable back to the main blend. It can take old green bean Sauvignon blanc wine and turn it grassy! Also Freshprotect settles nicely.

—Maggie McBride, Inside Technical Sales, based in Sonoma Co

CASEIN AND/OR PVPP BASED FINING AGENTS

BENTOLACT S

For the preventative treatment of oxidation and removal of off-odors

White, Rosé, Fruit

#15788	5 kg	$130.00

Bentolact S is a proprietary IOC blend of soluble casein and bentonite. It is most effective when used early in the winemaking process to clean-up moldy fruit, remove bitter characters, assist with clarification and help remove volatile sulfur off-odors.

Dosage

Bench trials recommended for wine

Juice

200–1000 ppm	20–100 g/hL	1.7–8.4 lb/1000 gal

Wine

1000–2000 ppm	100–200 g/hL	8.4–16.8 lb/1000 gal

Usage

Dissolve Bentolact S in approximately 10 times its weight in cold water and mix vigorously to remove lumps. Mix well and allow the mixture to stand for 3 hours. Add during a pump-over or a good mixing. Bentolact S additions may take up to 7 days to settle.

Once hydrated, Bentolact S should not be stored for more than 24 hours.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Cold settling for juice, pre-bentonite add for wine	Contact Time: 1-2 weeks	Impact: Cleans up off odors and flavors. Preventative treatment for oxidation

FRESHPROTECT

For treatment of oxygen sensitive juice and wine

White, Rosé, Fruit

#15791	5 kg	$149.00

Freshprotect is a proprietary IOC blend of polyvinylpolypyrrolidone (PVPP), bentonite, cellulose and gum arabic. It is used to remove oxidized characters, bitterness and herbaceousness in both juice and wines. It is especially useful in the treatment of hard-press wine where it reduces aggressiveness and reveals fruit. Freshprotect must be removed from wine via filtration per TTB regulations due to the PVPP.

Dosage

Bench trials recommended for wine

200–1000 ppm	20–100 g/hL	1.7–8.3 lb/1000 gal

Usage

Dissolve Freshprotect in approximately 10 times its weight of cool water. Mix well and allow to sit for 1 hour. Add the mixture into the tank slowly; making sure the solution is thoroughly mixed.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Juice: Cold settling, young wines	Contact Time: 1-2 weeks	Impact: Softens wine and removes oxidized characters

CASÉINATE DE POTASSIUM

To help prevent oxidation and remove oxidized components

White, Rosé, Fruit, Cider

#15808	5 kg	$207.00

Caséinate de Potassium is used in both juice and wine for the treatment of oxidized phenolics and bitter compounds. It helps freshen wine and reveal muted aromas. Although the potassium helps with solubility, once added a thorough mixing is essential.

Dosage

Bench trials recommended for wine

Juice

500–1000 ppm	50–100 g/hL	4.2–8.4 lb/1000 gal

Wine

200–1000 ppm	20–100 g/hL	1.7–8.4 lb/1000 gal

Usage

Dissolve Caséinate de Potassium in approximately 10 times its weight of cold water. Mix well and allow the solution to stand for 4 hours. Stir to remove lumps. For juice, add before settling or at the start of alcoholic fermentation. For wine, mix vigorously after adding as Caséinate de Potassium can float.

Once hydrated, Caséinate de Potassium should be used within 48 hours.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Pre-fermentation for juice, pre-bentonite add for wine	Contact Time: 1-2 weeks	Impact: Treats oxidation

POLYCACEL IOC

For treatment of oxidized must and wine or for the preventative treatment of browning and pinking

White, Rosé, Fruit

#15785	1 kg	$89.00
#15786	5 kg	$266.00

Polycacel is an IOC blend of polyvinylpolypyrrolidone (PVPP), micropulverized cellulose and casein for use on phenols associated with browning and pinking. It can reduce bitterness and reveal hidden aromas. Polycacel must be removed from wine via filtration per TTB regulations due to the PVPP.

Dosage

Bench trials recommended for wine

Juice		
300–700 ppm	30–70 g/hL	2.5–5.8 lb/1000 gal
Wine		
150–300 ppm	15–30 g/hL	1.25–2.5 lb/1000 gal

Usage

Dissolve Polycacel in approximately 20 times its weight in cool water. Mix well and allow to sit for 2 hours. Add the mixture into the tank slowly; making sure the addition is thoroughly blended into the juice or wine being treated. This is important as the casein portion can float.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Cold settling for juice, pre-bentonite addition for wine	Contact Time: 10-21 days	Impact: Treatment of oxidation, unmasking of aromas

POLYCEL IOC

For treatment of pinking or browning, removal of bitter compounds

White, Rosé

#15784	1 kg	$78.00

Polycel is a blend of polyvinylpolypyrrolidone (PVPP) and cellulose formulated to help prevent and/or treat compounds which cause pinking and browning. It can also be used to treat bitterness and herbaceousness. As Polycel can bind color molecules and catechins it is best to use in young wines. Polycel must be removed from wine via filtration per TTB regulations.

Dosage

Bench trials recommended for wine

Juice		
400–800 ppm	40–80 g/hL	3.3–6.7 lb/1000 gal
Wine (Preventative)		
150–300 ppm	15–30 g/hL	1.25–2.5 lb/1000 gal
Wine (Curative)		
300–500 ppm	30–50 g/hL	2.5–4.2 lb/1000 gal

Usage

Dissolve Polycel in approximately 20 times its weight of cool water. Mix well and allow to sit for 1 hour. Add mixture to the tank slowly, making sure the addition is thoroughly blended into the juice or wine being treated. Depending upon the wine, Polycel may take up to a week to settle out. PVPP is intended as a processing aid.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Cold settling for juice, young wines post early racking	Contact Time: 1-2 weeks	Impact: Oxidation control, removal of bitter compounds

COLLE PERLE IOC

Gelatin for treatment of astringent wines

Red, White, Fruit

#15798	1 L	$23.00
#15799	5 L	$75.00
#15800	20 L	$278.00

Colle Perle is a hydrolyzed gelatin solution which can be used for clarification as well as for the treatment of astringency in wines. Colle Perle flocculates and settles well. It is particularly useful for hard pressed wines.

Dosage

Bench trials recommended for wine

800–1500 ppm	80–150 mL/hL	3.0–5.7 L/1000 gal

Usage

Juice

Add at the beginning of cold settling and mix throughly to ensure even distribution. When used in juice Colle Perle should be used in conjunction with bentonite or Gelocolle to improve settling. Racking should be done after 1 week.

Wine

Add and mix vigorously into the wine to ensure thorough distribution. Racking should be done after 1 week. Filtration is possible 48–72 hours after fining with Colle Perle. This is when filtration is most productive. For wines intended for aging, a second racking 1 week after the first racking will produce the best results.

It is not recommended to leave gelatins in wine for more than 30 days.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Cold settling for juice, pre-bentonite addition for wine	Contact Time: 1 week	Impact: Clarification, removal of astringent compounds

INOCOLLE IOC

Gelatin for the treatment of moldy must and to enhance the bouquet of finished wines

White, Rosé, Red, Fruit, Cider

#15795	1 L	$26.00
#15796	5 L	$88.00

Inocolle is a partially hydrolyzed gelatin solution that softens wine while improving aromas and flavors. It can help clarify wine by removing both colloidal and unstable materials.

Dosage

Bench trials recommended for wine

White Wines, Rosé, Ciders, or Light Colored Fruit Wines		
300–600 ppm	30–60 mL/hL	1.1–2.2 L/1000 gal
Red Wines		
500–1000 ppm	50–100 mL/hL	1.9–3.8 L/1000 gal
When used with Gelocolle		
250–500 ppm	25–50 mL/hL	0.95–1.9 L/1000 gal

Usage

Juice

Dilute Inocolle 1:1 in water. Introduce into juice gradually while mixing vigorously to assure even treatment. Racking should be done after 1 week. Do not adjust juice acidity with either tartaric or citric acid prior to treatment with Inocolle.

Wine

Dilute Inocolle 1:1 in water. Introduce into wine in conjunction with Gelocolle (pg 102). For enhanced settling and gentler fining, introduce Inocolle into wine 1 hour before adding Gelocolle. Mix vigorously to assure even treatment. Racking should be done after 1 week. Filtration is possible 48-72 hours after treating with Inocolle. This is when filtration is most productive. For wines intended for aging, a second racking 1 week after the first racking will produce the best results.

It is not recommended to leave gelatin in wine for more than 30 days.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Cold settling for juice, pre-bentonite addition for wine	Contact Time: 1 week	Impact: Clarification and aroma revelation

INACTIVATED YEAST & BENTONITE BLENDS

PURE-LEES LONGEVITY +

Gentle fining and oxygen scavenging, compatible with no/low SO_2 winemaking

White, Rosé, Cider

#15249	1 kg	$39.00

Pure-Lees Longevity +™ is a proprietary blend of inactivated yeast and bentonite used to scavenge dissolved oxygen during aging, cold (tartrate) stabilization and transportation. Pure-Lees Longevity + is the result of work done in collaboration with INRA with different inactivated yeast fractions to evaluate their impact on oxidation. The result is a product with high dissolved oxygen uptake capacity. Oxidation can be responsible for loss of fruit character, browning of wine and decreased shelf-life. Using Pure-Lees Longevity + helps protect color and aromas. Although research determined it was more efficient than SO_2 at preserving color and thiols during 5-month aging trials, it is not a substitute for SO_2 as it has no antimicrobial activity.

Dosage

Bench trials recommended for wine

200–400 ppm	20–40 g/hL	1.7-3.4 lb/1000 gal

Usage

Suspend Pure-Lees Longevity + in 10 times its weight of water, gently mix, then add to wine. Mix thoroughly. Contact time depends on aging time (1–9 months).

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Post-fermentation	Contact Time: 1-9 months	Impact: Scavenges oxygen

STAFF PICK

Reduless is a very handy tool to keep in your back pocket (not literally, of course, or you might smell yeasty). Reduless attacks sulfides which are tricky little compounds that can come and go in the lifetime of a wine. Removing them is not always essential, as some winemakers love them, but when they mask aromas or even add harshness to the finish (especially in reds) sulfides need to be removed. Using Reduless can unveil fruit and soften the palate. Even small doses of 1-2g/hL can make big difference.

—Ashlie Helm, Sales Representative, based in Central Valley, CA

PURE-LEES LONGEVITY +: INACTIVATED YEAST TO SCAVENGE OXYGEN

Scavenging dissolved oxygen during aging and storage helps protect white and rosé wine quality from the end of fermentation through the bottling step. During aging or movement of finished wines, white and rosé wines can develop aroma defects due to oxidation reactions. These reactions are mainly due to oxidation of alcohols by a coupled oxidation mechanism involving oxygen and wine di- and tri-hydroxyphenols. These oxidized compounds are responsible for lowering wine quality due to browning and loss of aromas.

Yeast cells, even in a non-viable physiological state, can uptake oxygen. This potential for oxygen consumption by non-viable yeast cells is now used for the protection of wines against oxidation during storage and/or aging. After years of collaborative research and development with the INRA Montpellier in France, Pure-Lees Longevity + ™ was developed as an innovative solution for protection of wines against oxidation during storage and aging, allowing lower sulfite additions.

REDULESS

Reduces sulfur off-aromas; OMRI listed

Red, White, Rosé, Cider

#15116	1 kg	$78.00
#15115	2.5 kg	$149.00

Reduless™ is a unique fining product used to reduce sulfur off-odors such as H_2S and dimethyl sulfide. Its formulation includes bentonite together with other natural elements which are rich in copper. Reduless can naturally enhance roundness while treating sulfur problems. It has also been shown to reduce phenol-related defects.

Dosage

Bench trials recommended for wine

100–150 ppm	10–15 g/hL	0.8–1.2 lb/1000 gal

Usage

Mix Reduless in 10 times its weight of water. Add immediately to the tank. If prepared in advance, re-suspend the product prior to its addition to the tank. Gently mix and rack off or filter after 72 hours. The maximum potential copper transfer, when used according to the recommendation, is 0.02 ppm.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Post-fermentation	Contact Time: 1-3 days	Impact: Reduction of sulfur off-odors

INERT CLARIFYING AGENTS

GELOCOLLE

Silica gel for improved settling

Red, White, Rosé, Fruit, Cider

#15783	5 L	$69.00

Gelocolle is an aqueous solution of suspended silica commonly used in conjunction with gelatins, isinglass and other organic (protein-based) fining agents. It initiates flocculation of fining agents and helps lees compaction. It also reduces the risk of leaving residual protein-based fining agent behind (overfining). Gelocolle can be used for hard-to-filter wines where it helps chelate proteins and other compounds.

Dosage

Bench trials recommended for wine

200–1000 ppm	20–100 mL/hL	0.75–3.8 L/1000 gal

Note: Use 1.0 mL of Gelocolle to 1.0 mL of gelatin.

Usage

Gelocolle should be added directly into wine 1 hour after addition of protein-based fining agents (gelatin, isinglass, etc.). Mix thoroughly.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Do not refrigerate or freeze! Gelocolle solidifies at temperatures of less than 0°C(32°F). This process is irreversible.

Stage of Winemaking: Wine fining	Contact Time: 1-2 weeks	Impact: Lees compaction

HOT MIX SPARKOLLOID

For superior clarification of wine

White, Red, Rosé, Fruit, Cider, Mead

#15035	25 lb	$182.60

Hot Mix Sparkolloid® is specially formulated to clarify wine without impacting aroma, body or flavor. It can be used after bentonite or carbon fining to help compact lees. Hot Mix Sparkolloid can be helpful in removing haze left by other fining agents and enhances filterability.

Dosage

Bench trials recommended for wine

Wine		
125–500 ppm	12–50 g/hL	1.0–4.0 lb/1000 gal

Usage

Heat water to boiling [1–2 gallons of water per pound Hot Mix Sparkolloid (8–15 L/kg)]. Slowly stir in the Hot Mix Sparkolloid. Maintain temperature above 82°C(180°F) while agitating the mixture constantly until all of the translucent globules of clarifier have been dissolved and the mixture is smooth and creamy (approximately 20–30 minutes). While still hot, slowly add the mixture to the wine. This is easily accomplished by adding to a tank being mixed by a tank agitator or by introducing the hot mixture into the line during a tank circulation. Let the wine settle 1 week or more, depending somewhat on the volume of wine involved. Then filter, preferably from the top of the tank.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Wine clarification	Contact Time: 1-2 weeks	Impact: Lees compaction, filterability enhancement

ISINGLASS

CRISTALLINE PLUS

Isinglass to assist with clarification and brightening

White, Rosés, Light reds, Fruit

#15770	100 g	$17.00
#15771	1 kg	$144.00

Cristalline Plus is a blend of isinglass and citric acid stabilized with potassium metabisulfite. It has a strong positive charge and can improve clarity and filterability even in very difficult wines (such as wines made with botrytised grapes). It is favored by Pinot noir winemakers due to its gentle fining effect and brightening of aromas. Cristalline Plus is not sensitive to cold temperatures but may be slow to complete settling.

Recommended Dosage

Bench trials recommended for wine

15–30 ppm	1.5–3 g/hL	0.12–0.25 lb/1000 gal

Usage

Dissolve Cristalline Plus in 150–200 times its weight of tepid water (15–20°C(59–68°F)). Allow to swell for 3 hours. Add additional water if solution is too viscous. Add homogenized solution to wine, taking care to mix well. Rack once lees are well settled.

Storage

Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Stage of Winemaking: Pre-bentonite addition (wine)	Contact Time: 2-4 weeks	Impact: Clarification, brightening and aroma revealing

MANNOPROTEINS AND GUM ARABICS FOR STABILITY

CLARISTAR

Natural liquid mannoprotein preparation for potassium tartrate stabilization

White, Rosé, Red

#17000	2.5 L	$204.00
#17001	20 L	$1436.00

Claristar® is a specialty liquid mannoprotein product from Oenobrands to aid in the natural tartrate stabilization of wines. It is the result of a patented extraction and separation technique that isolates the fraction of mannoproteins from *S. cerevisiae* with the highest Tartrate Stability Index (TSI). When added to wine, Claristar inhibits the nucleation and growth of potassium tartrate crystals. In addition to improved stability, the sensory balance of red, white and rosé wines are enhanced. Users note improved aromatics as well as smoothness on the palate.

Claristar is packaged as a liquid and its highly purified mannoproteins are 100% soluble in wine. It can be added directly and homogenizes easily. Thanks to Claristar's enhanced potassium tartrate stabilization properties, wine can be treated immediately prior to bottling.

Dosage

Verification of efficacy prior to use

White and Rosé Wines

80–100 mL/hL	(3–3.8 L/1000 gal)

Red Wines

70–90 mL/hL	(2.7–3.46 L/1000 gal)

To ensure efficacy of a Claristar addition for stability of any particular wine, bench trials MUST be run with laboratory analysis and verification. The amount of Claristar required will be unique to each wine. Its effectiveness is dependent upon a wine's individual characteristics (e.g. protective colloid levels, pH, alcohol, etc.) in addition to a user's chosen stability criteria. The wine submitted for bench trials MUST be the final blend. Claristar should be the final addition to any wine prior to filtration and bottling. Please contact Scott Laboratories, Inc. for more information regarding the bench trial requirement.

Note: Claristar is not appropriate for calcium tartrate stabilization problems.

Usage

Claristar can be considered for use in white, rosé and red wines that meet the below criteria:

- Are the final blend
- Have never been pH adjusted with calcium carbonate
- Are confirmed protein stable
- Are under 16% alcohol by volume

Claristar should never be added to a wine prior to cake/DE/Earth/Velo filtration, or cellulose pads, however, it can be added prior to crossflow and sterile cartridge filtration.

Storage

Dated expiration. Store in a cool, dry environment at under 10°C(50°F). Once opened, use within 15 days. Can be frozen once.

Note: This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250.

For more information please visit www.TTB.gov.

Stage of Winemaking: Pre-bottling	Contact Time: Indefinitely	Impact: Inhibits potassium tartrate precipitation

FLASHGUM R LIQUIDE

Gum arabic for colloidal protection

Red, White, Rosé, Cider, Mead

#15772	1 L	$24.00
#15773	5 L	$78.00
#15769	20 L	$264.00

Flashgum R Liquide is a gum arabic derived from *Acacia seyal*. This preparation offers colloidal protection and gives perception of sweet and soft characters on the palate. Gum arabic products can help reduce the risk of colloidal deposits in unfiltered bottled wine. Natural polysaccharides reduce astringency and increase feelings of volume and fullness in the mouth. Flashgum R Liquide can provide color protection in rosé and fruit wines.

Dosage

Bench trials recommended for wine

400–1200 ppm	40–120 mL/hL	1.5–4.5 L/1000 gal

Usage

Flashgum R Liquide should be the last commercial product added to the wine. It is best to do inline additions 24–72 hours prior to the final pre-membrane and membrane filtrations. Filterability trials prior to membrane filtration are recommended. If using on wine that is not going to be filtered, add Flashgum R Liquide just prior to bottling.

Storage

Dated expiration. Store in a dry, odor-free environment at or below 25°C(77°F).

Stage of Winemaking: 24-72 hours Pre-bottling	Contact Time: Indefinitely	Impact: Colloidal protection, sweetness

ULTIMA SOFT

Mannoprotein/gum arabic with positive impact on stability and perceived softness and volume

White, Red

#17012	1 kg	$136.00

UltiMA Soft is a unique blend of mannoproteins and gum arabic. On white wines, UltiMA Soft can soften, enhance body, add length, and lower astringency. On red wines, it helps maintain fruity aromas while helping to round out the mid-palate. If the wine is not to be filtered, this fully soluble product can be added immediately prior to bottling. Bench trials are recommended. Gum arabic and mannoproteins both have some stabilizing effects on wine, though the addition of this product is not a replacement for good winemaking practice or thorough analysis.

Dosage

Bench trials recommended for wine

150–300 ppm	15–30 g/hL	1.2–2.4 lb/1000 gal

Usage

Add UltiMA Soft by mixing with 10 times its weight of water. UltiMA Soft should be the last commercial product added to the wine. Ideally it should be added to the wine using a dosing pump. If the wine is to be filtered, it is recommended that the addition be done 24–72 hours before the membrane filtration and that filterability trials be conducted prior to filtration.

Storage

Dated expiration. Store in a dry, well-ventilated environment with temperatures less than 25°C(77°F).

Note: These products contain ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information please visit www.TTB.gov.

Stage of Winemaking: 24-72 hours pre-bottling	Contact Time: Indefinitely	Impact: Balancing and softening

FREQUENTLY ASKED QUESTIONS: FINING & STABILITY

Do I need to run bench trials before I use a fining agent?

Yes. Bench trials are essential to determine proper dosing, efficiency, and outcome in the wine. Each fining product works by a different mechanism and will react to each wine differently. Bench trials and cellar additions should be prepared and used the same way (same temperature, same mixing style, etc.). If bench trials are not performed, the winemaker may risk under or over fining and could harm the wine.

What are the main factors that influence how well fining works?

Fining can be a delicate operation. Product preparation and addition, product concentration, temperature, product age, pH, metal content and previous fining treatments are all factors that can influence the effectiveness of fining. It is important to follow the manufacturer's instructions and maintain accuracy when using fining products.

Which fining agents react with lysozyme?

Carbon, silica sol, oak chips and tannin will bind and precipitate lysozyme with a resulting decrease in activity. Bentonite will bind with and inactivate lysozyme.

Which fining agents do not react with lysozyme?

Gelatin, potassium caseinate and pectinase do not affect lysozyme activity. In fact, pectinase treatment will help maintain lysozyme activity by breaking down phenolic compounds that can bind lysozyme.

What is the best way to add fining agents?

There are several ways to add fining agents. Add the fining agent to the tank while mixing with a Guth agitator, dosing into a recirculation pump setup with a stand-alone dosing machine or with a Mazzei injector (see scottlab.com for more information).

CLEANING

BENEFITS OF AIRD® PRODUCTS

- Specially formulated products for the wine industry
- Significant water savings — no citric rinse is required
- Non-dusting product
- Innovative BUILT FORMULA for more effective cleaning
- Effective at low doses over wide temperature ranges
- Does not require hazardous shipping
- No chlorine, other halogens, phosphates, silicates or fillers
- Safer and lower environmental impact than bulk chemical cleaners

WATER SAVINGS WITH AIRD PRODUCTS

AiRD PROCESS VS CLASSIC METHOD

DUE TO ITS UNIQUE FORMULATION, AIRD PRODUCTS CAN RESULT IN UP TO 50% WATER SAVINGS.*

AiRD Process	Water Used*	Classic Method	Water Used*
Rinse	100 gallons	Rinse	100 gallons
AiRD Product	200 gallons	Caustic	200 gallons
Short Rinse	100 gallons	Long Rinse	200 gallons
TOTAL	**400 gallons**	Citric	200 gallons
		Rinse	100 gallons
		TOTAL	**800 gallons**

*The chart shows a common cleaning procedure for a 2,000 gallon tank cleaning. *Not including potential reuse of AiRD solutions. Actual water savings may be greater.*

CHOOSING CLEANING PRODUCTS FOR SUCCESS

♦ Highly Recommended
◊ Recommended

	Cleaning Agents			
	Cleanskin-K	**Destainex-LF**	**Oak Restorer**	**Oak Restorer-HW**
Page#	106	106	106	106
Dosage	1.0-4.0% w/v	0.5–1.5% w/v	1.0-2.0% w/v	0.5–2.0% w/v
Water temperature for use	68–140°F 20–60°C	104–140°F 40–60°C	68–86°F 20–30°C	104–140°F 40–60°C
pH (1% solution)	~11.3	~10.8	~10.65	~9.6
Removes tartrates	♦	◊	♦	♦
Removes color	◊	♦	♦	♦
Microbial neutralizing		◊	♦	♦
General purpose cleaning	◊	♦		
Barrel cleaning			♦	♦

CLEANING AGENTS

CLEANSKIN-K AiRD

Multi-purpose cleaner and tartrate remover

Tanks and Equipment

#18500	5 kg	$43.00

Cleanskin-K is a 100% active, water soluble, multi-purpose potassium-based cleaning product for use in the winery. This carbonate formulation uses the power of oxygen to effectively clean stainless steel and associated materials. Cleanskin-K can be used in tanks, presses, destemmers, juice channels and more to remove tartrate crystals. Secondarily, it is effective at removing wine color, protein and organic soils. In addition to the potassium carbonate, Cleanskin-K contains proprietary percarbonates, chelation and sequestering aids, polysurfactants and a rinse aid, to leave your surfaces bright, clean, neutral and spot free.

Dosage

1.0–4.0% w/v	10–40 g/L	1.3–5.4 oz/gal

Storage

Store in a dry, odor-free environment between 10–20°C(50–68°F) away from sunlight.

DESTAINEX-LF (LOW FOAMING) AiRD

Multi-purpose oxidizing cleaner for organic soils and molds

Bottling systems, winery surfaces, lines, equipment and difficult to rinse systems

#18504	5 kg	$41.00

Destainex-LF is a proprietary sodium percarbonate based cleaning agents with microbial neutralizing abilities. This highly effective formulation can be used at low levels to remove wine color, protein stains, mold, mildew, and biofilms from wine contact surfaces such as: stainless steel, galvanized metals, concrete, polyethylene (low and high density), polypropylene, plastics, flexible hoses, glass and powder-coated surfaces.

Destainex-LF can be used in both automated (CIP) and manual systems. The sodium percarbonate in Destainex-LF is complemented with proprietary surfactants and chelation agents, water conditioning materials and rinse aids for a bright, clean and spot free neutral surface.

Dosage

0.5–1.5% w/v	5–15 g/L	0.7–2.0 oz/gal

Storage

Store in a dry, odor-free environment between 10–20°C(50–68°F) away from sunlight.

OAK RESTORER AiRD

Oak cleaner and refresher

Barrels, staves and oak chips

Oak Restorer		
#18508	5 kg	$38.00
Oak Restorer-HW		
#18510	5 kg	$38.00

Oak Restorer products are proprietary cleaners formulated for use on oak surfaces. These products were developed on behalf of winery clients in Australia. These buffered carbonate blends also contain bicarbonates and surfactants to effectively remove tartrate build-up, color, tannin and protein residues, thereby extending the working life of barrels, puncheons, redwood tanks and staves. Oak Restorers are single process cleaning agents requiring only a water rinse. No subsequent neutralization is required. Oak Restorers leave your wooden surfaces refreshed, odorless and pH neutral.

Dosage

0.5–2.0% w/v	5–20 g/L	0.7–2.7 oz/gal

Storage

Store in a dry, odor-free environment between 10–20°C(50–68°F) away from sunlight.

INSTRUCTIONS FOR CLEANING PRODUCTS

Consult the chart on page 105 for water temperature requirements of each product. Cleaning is most effective when soft or treated water is used.

Prepare appropriate volume of potable water (typically 10% of vessel volume you are cleaning), accurately measuring the correct weight of the cleaner. Slowly add the powder into the water, mixing until a consistent solution is obtained. Initially the prepared solution will appear milky, but will clarify. Once the solution has clarified it is ready for use. Products can be used manually or with automated CIP systems. Contact time is based on water temperature and quality, amount of product used and turbulence of contact.

FRUIT WINES & MEAD

Making wine from sources other than grapes can be quite different and can pose many challenges. Numerous tools used in grape fermentation can also be utilized in fruit or mead fermentation.

These tools can help the winemaker create a better product and ultimately enhance product longevity. The following information has been compiled to highlight our recommendations.

CHOOSING PRODUCTS FOR FRUIT WINES AND MEAD

● Highly Recommended

○ Recommended

Yeast	Fruit	Mead	Page#
Lalvin 71B ™	●		17
CVW5™	●	●	21
Lalvin DV10 ™	●	●	22
Lalvin EC1118™	●	●	22
Lalvin ICV D47™	●		24
Lalvin K1 (V1116)™	●	●	27
Lalvin ICV OKAY™	●		25
Lalvin QA23™	●	●	28
Lalvin R2™	●		29
Lalvin Sensy™	●		30
VIN 13	●	●	31

Nutrients			
Go-Ferm Protect Evolution™	●	●	45
Fermaid K™	●	●	48
Fermaid O™	●	●	49

Malolactic Bacteria			
Enoferm Alpha™	●		57
Lalvin MBR 31™	●		58
PN4™	●		59
Lalvin VP41™	●		59

Enzymes			
Scottzyme® BG	●		83
Scottzyme®HC	●		84
Scottzyme® KS	●		84
Scottzyme® KS Plus	●		85
Scottzyme® Pec5L	●		85

Tannins	Fruit	Mead	Page#
Scott'Tan™ FT Blanc	●		69
Scott'Tan™FT Blanc Citrus	●	●	69
Scott'Tan™FT Blanc Soft	●	●	70
Scott'Tan™FT ColorMax	●		70
Scott'Tan™FT Rouge	●		71
Scott'Tan™FT Rouge Berry	●		71
Scott'Tan™FT Rouge Soft	●		71
Scott'Tan™ Radiance	●		72

Fining Agents/Stability			
Bentolact S	●		98
Caséinate de potassium	●		98
Colle Perle	●		100
Cristalline Plus	●	●	103
Freshprotect	●	○	98
Fermobent	●		96
Flashgum R Liquide	●	●	104
Gelocolle	●	●	102
Hot Mix Sparkolloid NF	●	●	102
Inocolle	●		100
NaCaLit	●		97
Polycacel	●		99
Reduless™	●	●	101

Yeast Derivative Nutrients			
Glutastar™	●	●	51
ICV Noblesse™	●	●	52
Opti-MUM Red™	●		52
Opti-RED™	●		53
Opti-WHITE™	●	●	53

SELECTING PRODUCTS FOR SUCCESS IN FRUIT WINES & MEAD

YEAST

Using a selected yeast strain can maximize the positive attributes that come with that strain (e.g., mouthfeel, complexity, aromas, fermentation kinetics), while avoiding unpleasant aromas and poor fermentation kinetics that may come with a "wild" strain. The key to yeast choice is matching it to the wine style, and more importantly, the fermentation conditions. Proper rehydration and acclimatization of the selected yeast strain is essential.

NUTRIENTS

Fruit wines and mead are notorious for having low nutrient content. Proper nutrition for both yeast and malolactic bacteria is essential to ensure good fermentation kinetics, with positive flavor and aroma profiles. Nutrients can also help to avoid stuck or prolonged fermentations and H_2S and VA problems.

YEAST DERIVATIVE NUTRIENTS

Glutastar and Opti-WHITE are used either pre-fermentation or early in the fermentation to increase mouthfeel, help avoid browning and protect freshness and aromas during aging. Opti-RED and Opti-MUM Red are high in polyphenol reactive polysaccharides. Add at the onset of fermentation to enhance mouthfeel and to help stabilize color. Noblesse can be used to improve the perception of fruit and roundness and softness in the finish. It may be added at the onset or near the end of fermentation.

MALOLACTIC BACTERIA

Malolactic fermentation can soften wines made from fruit high in malic acid. Many fruits have unbalanced acid profiles and the resulting wine may have a very low pH. Be sure to choose a bacteria strain that works under the conditions of the fruit. If the winemaker's goal is to reduce acid without adding flavor/aroma characteristics, then a neutral strain should be used. Other strains can produce subtle changes in flavor and/or texture.

TANNINS

Tannins help give wine its structure and contribute to its longevity. Honey and some types of fruit contain very little natural tannin.Enological tannins can be used to add structure and enhance flavor and aroma.They reduce the risk of oxidation and help stabilize wine color. FT Blanc Soft adds to the midpalate texture without darkening lighter colored fruit wines and meads. For darker meads and fruit wine, there is a whole array of complex tannins derived from oak, exotic wood, grape skins and seeds, and more. For color stabilization, there is FT ColorMax, which is most effective when used in conjunction with FT Rouge or FR Rouge Soft. Onyx, Radiance, and Royal are ideal tannins for a finishing touch, even just before bottling.

ENZYMES

All fresh fruit contains pectin. For many fruits, excess pectin can be responsible for inadequate juice extraction, lack of clarity, slow sedimentation and poor filterability. Pectinases break down pectin. When pectinases are used at pressing, they result in the release of more juice. At the juice stage, enzymes speed settling of solids prior to racking and fermentation. In finished wine, pectinases aid filterability and final clarification. For most fruit wines, a combination of Pec5L and HC will work for most situations. For certain difficult situations, such as fruit compromised by rot, stronger enzymes like KS or MMX may be necessary. Both of these should only be used on juice or wine according to directions. Some enzymes, such as BG and Revelation Aroma, release aromas that are bound to sugars, thereby increasing the aromatic intensity of the wine.

FINING AGENTS

Most fining of fruit wine and mead is done for clarification. The fining agents pull minute particles together. The heavier particles then settle faster and and form a more compact sediment. Hot Mix Sparkolloid is very effective at clarifying the finished wine, as is the combination of Cristalline Plus (isinglass) counter-fined with the negatively-charged Gelocolle. Fining agents can also be used to remove oxidized phenolic compounds from young wines. Caséinate de Potassium (casein) and Polycel (PVPP) are effective at removing the bitterness and browning caused by oxidation of young wines. Reduless is used to treat wines suffering from reduced sulfur compounds (e.g., H_2S). For fruit wines subject to protein instability, bentonite fining is the only way to remove the unstable proteins.

MICROBIAL CONTROL

Sulfur dioxide (SO_2), Lysovin, Bactiless and No Brett Inside can all be used to protect wine quality against microbial spoilage. Although its primary use is microbial control, SO_2 also helps reduce the risk of oxidation. Inodose SO_2 Granules and Tablets are pre-measured, and no mixing is necessary once added to the wine. No Brett Inside specifically targets and kills *Brettanomyces*. Lysovin (lysozyme) attacks gram-positive bacteria, such as *Lactobacillus*, *Pediococcus* and *Oenococcus*. Bactiless kills a wider range of bacteria, from lactic acid bacteria to acetic acid bacteria. Both Bactiless and Lysovin can be used to delay or inhibit malolactic fermentation.

Fruit Wines & Mead

GENERAL TOOLS

CALCULATIONS AND CONVERSIONS

VOLUME CONVERSIONS

mL = milliliter, fl oz = fluid ounce, gal = gallon, L = liter, hL = hectoliter

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

MASS CONVERSIONS

mg = milligram, g = gram, kg = kilogram, lb = pound

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 ton = 1000 kg
1 metric ton = 2205 lb
1 US ton = 2000 lb
1 US ton = 907 kg

INTERNET CONVERSION PROGRAMS

www.onlineconversion.com	www.wineadds.com	www.winebusiness.com/tools

TEMPERATURE CONVERSIONS

F° = Degree Fahrenheit C° → F° = (C° x 9/5) + 32	F°	0	32	40	50	60	70	80	90	100	110	120
C° = Degree Celsius F° → C° = (F° - 32) x (5/9)	C°	-18	0	4	10	16	21	27	32	38	44	49

OTHER CONVERSIONS

1 lb/1000 gal = 454 g/1000 gal = 0.454 kg/1000 gal = 120 mg/L = 27.2 g/barrel* = 0.120 g/L

1 kg/hL = 1000 g/hL = 10,000 mg/L = 2.271 kg/barrel* = 10 g/L

1 ppm = 1 mg/L

*barrel = 60 gal = 227.1 L

1°Brix = 1% sugar (wt/vol)

BENCH TRIAL CALCULATOR

We recommend performing bench trials with many of our products including lysozyme, tannins, enzymes and fining agents. This calculator will help determine the amount of any given stock solution to achieve a range of concentrations in various-sized sample bottles.

FOR POWDERED PRODUCTS (LYSOVIN, TANNINS, FINING AGENTS, ETC.)

$$\text{mLs of stock solution to add per sample bottle} = \frac{\text{(sample size in mLs) x (desired concentration in ppm) x (0.0001)}}{\text{\% concentration (w/v) of stock solution}}$$

FOR LIQUID PRODUCTS (SCOTTZYMES, GELATINS, ETC.)

$$\text{mLs of stock solution to add per sample bottle} = \frac{\text{(sample size in mLs) x (desired concentration in mLs/1000 gal) x (0.000024)}}{\text{\% concentration (v/v) of stock solution}}$$

For example: If you have a 10% stock solution of Color Pro and wish to create a 150 mL/1000 gal dose in a 375 mL sample bottle you would calculate:

$$\text{mLs of stock solution} = \frac{(375) \times (150) \times (0.000024)}{10} = 0.135 \text{ mL}$$

Therefore, you would need to add 0.135 mL of a 10% Color Pro stock solution to a 375 mL bottle to represent a concentration of 150 mL/1000 gal.

BENCH TRIAL PROTOCOLS AND PROCEDURES

A bench trial is a small-scale test that simulates the effect a tannin, fining agent or other additive will have on a large volume of wine. Bench trials are used to: evaluate the efficacy of treatments, determine proper dose rate, and gain familiarity with addition methods. By working in small volumes, large volume mistakes can be avoided.

Wine matrices differ for many reasons (vintage variations, winemaking practices, etc) and bench trials must be repeated for every lot of wine. An additive that worked last year or in a different lot, may not work again in the same way or at the same dose.

Bench trials also demonstrate how an additive will behave during preparation (rehydration) or mixing. Many fining products have unique and sometimes difficult solubility issues which can pose a challenge in the cellar. Bench trials alert the winemaker to potential issues and can help formulate a more efficient plan when additions are made in the cellar.

HOW TO DO A BENCH TRIAL

TOOLS:

100 mL graduated cylinder or volumetric flask.	Scale that can weigh to a tenth of a gram.	1 mL pipette divided into 100th's.	5 mL pipette divided into 1/10 mL.

PROCEDURE

1. Make sure to keep a CONTROL. A control is an untreated portion of wine.
2. Decide which dosages to prepare (100 ppm, 200 ppm and 300 ppm for example). Consult product technical information for manufacturer's recommended dosages.
3. Prepare stock solutions. Make a 2.5%, 5% or 10% stock solution by adding 2.5, 5.0, or 10.0 grams of product to total volume of 100 mL, respectively. After weighing out the product, mix it with 80 mL of water until either dissolved or all lumps are gone. Put it into the graduated cylinder or volumetric flask and fill to the 100 mL mark. Additives that are liquids can also be prepared in this way by adding 2.5, 5.0, or 10 mL product to total volume of 100 mL.
4. Using either the Bench Trial Calculator (previous page) or the Cheat Sheet here, add the appropriate volume of stock solution to either 375 mL or 750 mL bottles, then fill to the proper level (evacuating the head space with gas, if possible).
5. After capping or corking, agitate gently to get a good mix. If the product is not completely soluble (e.g., Noblesse, fining agents), occasional agitation to stir up the product in the wine might be necessary to duplicate what would take place in the barrel or tank.
6. Taste and/or test after the appropriate waiting period. For fining agents, this might just be as long as it takes the agent to settle. For tannins, it should be at least several days, but it is even better if the trial can sit for at least two weeks.

Cheat Sheet:

Desired Dosage	Stock Solution	mLs of solution to add to 375 mL bottle	mLs solution to add to 750 mL bottle
100 ppm	2.5%	1.5	3.0
	5.0%	0.75	1.5
	10.0%	0.375	0.75
200 ppm	2.5%	3.0	6.0
	5.0%	1.5	3.0
	10.0%	0.75	1.5
300 ppm	2.5%	4.5	9.0
	5.0%	2.25	4.5
	10.0%	1.125	2.25
400 ppm	2.5%	6.0	12.0
	5.0%	3.0	6.0
	10.0%	1.5	3.0
500 ppm	2.5%	7.5	15.0
	5.0%	3.75	7.5
	10.0%	1.875	3.75

FINISHING KIT FOR BENCH TRIALS

#SLQDTAN	Finishing Kit for Bench Trials	$94.00
#37101	20–200µL Micropipette	$135.00
#37102	100–1000µL Micropipette	$135.00
#37111	5–200µL Micropipette tips (96 tips)	$11.00
#37112	100–1250µL Micropipette tips (96 tips)	$13.00

Finishing agents are valuable tools for perfecting a wine. Our Finishing Kit for Bench Trials includes pre-dissolved tannins and stability agents for ease of running bench trials.

Bench trials are a very important step to determine the right fit of any of these products. Finding the correct product to work with the matrix of your wine, as well as the correct dosage, might take several trials.

Finishing aids have been found to help with:

- Masking pyrazines/greenness
- Maximizing fruit
- Boosting/increasing mid-palate
- Increasing aromatic intensity
- Increasing body
- Help minimize impact of *Brettanomyces*
- Brighten acid
- Impart oak character
- Increase perception of sweetness

This kit contains:

- Scott'Tan™ FT Blanc (pg 69)
- Scott'Tan™ FT Blanc Soft (pg 70)
- Scott'Tan™ FT Blanc Citrus (pg 69)
- Scott'Tan™ FT Rouge Berry (pg 71)
- Scott'Tan™ Complex (see scottlab.com)
- Scott'Tan™ Estate (pg 69)
- Scott'Tan™ Riche (pg 73)
- Scott'Tan™ Riche Extra (pg 73)
- Scott'Tan™ Onyx (pg 72)
- Scott'Tan™ Radiance (pg 72)
- Scott'Tan™ Royal (pg 73)
- Reduless™ (pg 101)
- UltiMA Soft (pg 104)
- Flashgum R Liquide (pg 104)
- Oak Lab™ Thermic Oak Samples, Profiles 1-5 (pg 76)

Note: Tannin solutions have been prepared for ease of use in bench trials. All of our tannins are normally sold as powder or granulate.

PRODUCT STORAGE AND STABILITY GUIDELINES

Product	Optimal Storage Temperature (unopened)	Recommended Storage (once opened)
Active Dried Yeast	20°C(68°F)	Use immediately
Activated Carbon	25°C(77°F)	Tightly sealed, dry, odor-free environment
Bactiless	Below 25°C(77°F)	Tightly sealed, dry, odor-free environment
Bentolact S	25°C(77°F)	Tightly sealed, dry, odor-free environment
Bentonites	25°C(77°F)	Tightly sealed, dry, odor-free environment
Caséinate de Potassium	25°C(77°F)	Tightly sealed, dry, odor-free environment
Claristar	10°C(50°F)	Use immediately
Cleaning Products (AiRD)	10–20°C(50–68°F)	Tightly sealed, dry, odor-free environment, protected from light
Cristalline Plus	25°C(77°F)	Tightly sealed, dry, odor-free environment
Enzymes- Lallzyme	25°C(77°F)	Dry: Tightly sealed, general storage Rehydrated: Use within a few hours
Enzymes- Rapidase	4–8°C(39–45°F)	Dry: Tightly sealed, general storage Rehydrated: Use within a few hours
Enzymes- Scottzymes	1–2 years: Store liquid forms: @ 4°C(39°F) Store dry forms: @ 18–24°C(60–77°F)	Rehydrated: Use within a few hours
Exotics Mosaic/Novello	5–15°C(41–59°F)	Use immediately
Flashgum R Liquide	25°C(77°F)	Tightly sealed
Freshprotect	25°C(77°F)	Tightly sealed; dry
Gelatins (Colle Perle & Inocolle)	25°C(77°F)	Tightly sealed
Gelocolle	10–20°C(50–68°F). Do not freeze.	Use immediately
Inodose Granules & Tablets	25°C(77°F)	Use immediately
$Ionys_{WF}$	4°C(39°F)	Use immediately
Lysovin	Dry: 5–10 years @ 18°C(65°F)	Use immediately
Malolactic Bacteria	Short term: @ 4°C(39°F) Long term: @ –18°C(0°F)	Use immediately
No Brett Inside	Below 25°C(77°F)	Tightly sealed; dry
Non-*Saccharomyces* yeast (Biodiva, Flavia, Gaia)	11°C(52°F)	Use immediately
Non-*Saccharomyces* yeast (Laktia)	4°C(39°F)	Use immediately
Nutrients- Yeast, Bacteria and Yeast Derivative Nutrients	18°C(65°F)	Tightly sealed; dry
Oak	25°C(77°F)	Tightly sealed; dry
Polycacel	25°C(77°F)	Tightly sealed; dry
Polycel	25°C(77°F)	Tightly sealed; dry
Potassium Metabisulfite	25°C(77°F)	Use immediately
Pure-Lees Longevity Plus	Below 25°C(77°F)	Tightly sealed; dry
Hot Mix Sparkolloid	4 years @ 18°C(65°F)	Tightly sealed; dry
Tannins	18°C(65°F)	Tightly sealed; dry
Tartaric Acid	25°C(77°F)	Tightly sealed; dry
UltiMA soft	25°C(77°F)	Tightly sealed; dry

Note: Most products have an expiration date on the package. Please check the product and store appropriately.

HOW TO ORDER

WWW.SCOTTLAB.COM

Our easy-to-use website makes planning and submitting your orders easier than ever. Try one, or all, of these convenient features:

QUICK-ORDER SHOPPING CART

Our website's shopping cart allows you to quickly enter orders without navigating to every item page. Simply open the site directly to scottlab.com/shop/basket and start entering search terms or item numbers.

PDF ORDER PLANNER

Use order Planner at scottlab.com/order-planner to easily plan and organize your winemaking products list in one place.

ORDER UPLOAD

Do you love spreadsheets as much as our web team? Assemble your order in a spreadsheet and you can load a CSV file directly as a shopping cart. Head to scottlab.com/upload-cart to learn more and download the CSV template.

REORDER

Head to the My Account section (scottlab.com/profile) of the site and you can search back through your past Invoices and Shipments. If you have an order that you want to re-create, click the handy "Reorder" button to load the items from that invoice or shipment into your shopping cart.

ORDER TEMPLATES

If you have groups of items that you order regularly or want to save for quick re-ordering, nothing beats our Order Templates feature. Just assemble a shopping cart by browsing the site or using any of the handy tools listed above, and from the Shopping Cart page choose "Save as Order Template." Next time you want to start an order from this list of items you can load it from either your "My Account" section of the site, or directly from the Shopping Cart page. Great for recurring purchases.

CIDER + SPARKLING BOOKS

Scott Laboratories is proud to be a trusted resource for all of your fermentation endeavors! For a copy of our Sparkling or Cider Handbook, please contact us.

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